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ATTACHMENT J-0200000-01
ACRONYMS AND DEFINITIONS

Definition	Description
Abatement Plan	A written plan identifying program deficiencies, a timetable for correction, the individual(s) responsible for correction, the steps to be taken in the interim, and an explanation of the circumstances causing any delay in abatement.
Administrative Control	Procedures and practices that limit exposure to harmful physical or chemical agents by control or manipulation of work schedule or the manner in which work is performed. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. If you are unable to alter the job or workplace to reduce the physical stressors, administrative controls should be used to reduce the strain and stress on the work force. Administrative controls are most effective when used in combination with engineering controls.
Anchorage	A secured point of attachment that can safely withstand the forces exerted by activation of fall protection and rescue equipment. The anchorage is the rigid part of the structure that can be in the form of a beam, girder, column or floor.
Commercial Item	Any item or that real property that is of a type customarily used by the general public or non-governmental entities, for purposes other than governmental purposes and: (i) Has been sold or leased or licensed to the general public; or (ii) Has been offered for sale, lease, or license to the general public.
Commercial Off-the-Shelf (COTS)	Any item or supply that is: (i) A commercial item; (ii) That is sold in substantial quantities in the commercial marketplace; (iii) Offered to the Government under a contract or subcontract at any tier, without modification in the same form in which it is sold in the commercial marketplace.
Competent Person	A person who has the professional experience and training necessary to identify existing and predictable hazards at a work or service environment, and who has the authority to take prompt and corrective action to eliminate or remove dangers from the environment.
Competent Person for Fall Protection	A person designated by the Contractor to be responsible for the immediate supervision, implementation and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.
Confined Work Space	A space that is large enough and so configured that a person may bodily enter a space (such as in tanks, vessels, silos, storage bins, hoppers, vaults, pits, and like spaces where there is limited means of entry) and is hindered or restricted from escaping during an emergency.

Definition	Description
Contracting Officer (KO)	That individual with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.
Contractor	That entity or its representative responsible for the delivery of the services or materials specified in this contract, as designated by contract award. The term Contractor as used herein refers to both the prime Contractor and any subcontractors. The prime Contractor shall insure that subcontractors comply with the provision of this contract.
Contractor Representative	That individual appointed by the Contractor, either orally or in writing, who has been assigned responsibility for executing the requirements of this contract.
Cost-Benefit Analysis	A formal quantitative procedure comparing costs and benefits of a proposed project or act under a set of pre-established rules. To determine a rank ordering of projects to maximize rate of return when available funds are unlimited, the quotient of benefits divided by costs is the appropriate form; to maximize absolute return given limited resources, benefits-costs is the appropriate form.
Cumulative Trauma Disorders	Health disorders arising from repeated biomechanical stress. Other terms that have been used for such disorders include “work-related musculoskeletal disorders”, "repetitive motion injury," "occupational overuse syndrome," and "repetitive strain injury." CTDs are a class of musculoskeletal disorders involving damage to the tendons, tendon sheaths, and related bones, muscles, and nerves of the hands, wrists, elbows, shoulders, spine (neck and back), and lower extremities,. Examples of disorders in this class include carpal tunnel syndrome, tennis elbow, tendonitis, tenosynovitis, DeQuervain's Disease, and low back strain.
Damage	Damage is the severity of injury or the physical, functional, or monetary loss that could result if control of a hazard is lost.
Death From Mishap	A death which occurs within one year of the mishap.
Direct Material Costs	The actual vendor invoice charges for materials used for performance of work under contract. Direct material costs include transportation charges when such charges are included on the invoice by the vendor, as well as any discounts allowed for prompt payment and discounts or rebates for core value or salvage value that accrue to the Contractor. When questions arise concerning the cost of materials, material costs will be based on the lowest of quotes provided by the Contractor from at least three different commercial vendors for the direct material cost. The Government retains the right to obtain additional quotes in questionable situations. The lowest price will be used.
Disabling injury	An injury causing permanent disability, or any degree of temporary total disability beyond the day of the accident.

Definition	Description
Electrical Hazard	A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn or blast.
Engineering Control	Engineering controls are physical changes to work stations, equipment, materials, processes, production facilities or any other relevant aspect of the work environment that reduces or prevents exposure to work place risk factors. The use of PPE is not considered an engineering control.
Engineering Control (Fall Protection)	A design change or using different techniques or equipment such as the use of work platforms movable or stationary.
Equipment	Tangible asset that is functionally complete for its intended purpose, durable, and non-expendable.
Industrial Ergonomics	The field of study that involves the application of knowledge about physiological, psychological and biomechanical capacities and limitations of the human body This knowledge is applied in the planning, design, and evaluation of work environments, jobs, tools and equipment to enhance worker performance, safety and health and reducing the potential for fatigue, error, or unsafe acts. Fitting work systems and work environment to the human; fitting the task to the worker. Industrial Ergonomics is the scientific discipline concerned with the understanding of interactions, capabilities and limitations of humans and their work environment. The profession applies theory, principles, methods to design or modify parts of the work environment (tools, equipment, workstations, and process) to optimize human and system performance. Industrial Ergonomics focus on work environment that is not predominately occupied by keying/data entry type tasks.
Exposure	The experience of coming into contact with an environmental condition or in the immediate area of a hazard that has a harmful effect. Occupational exposure is all exposure of workers expected to occur under the normal operating conditions of a facility or activity incurred in the course of their work.
Facility	A building or structure designed and created to serve a particular function.
Facility	An establishment, workplace, building, structure, construction site or other work environment.
Fall Arrest System	An engineered system used to arrest an employee in a fall; consists of an anchorage, connectors, body harness, and may include a lanyard, deceleration device, lifeline, or suitable combination of these.
Fall Protection	Any equipment, device or system that prevents an accidental fall from elevation or that mitigates the effect of such a fall.
Fatal Mishap	A mishap which results in one or more deaths within one year.
FEAD	Facility Engineering and Acquisition Division
Guardrail System	A rail system erected along the open sided floors, openings, ends of platforms. The rail system consists of a top rail and mid rail and their supports.
Hazard	Anything which causes danger, peril, or risk to persons or property.

Definition	Description
Hazard Abatement	Prevention, mitigation, abatement or control of a hazard. Any measure or set of measures designed to permanently eliminate hazards, including worker personal protection and safe work practices.
Hazard Assessment	An objective overall assessment for measuring the relative priority of hazard abatement projects in terms of a 3-digit dimensionless number. This assessment will be used to prioritize centrally funded projects.
Hazard Control Hierarchy	Effective design or redesign of a task or workstation is the preferred method of preventing and controlling harmful stresses. The methods of intervention (in order of priority) to be used are: process elimination, substitution, engineering controls, warnings, administrative controls and work practices (e.g. adjust work-rest cycles, slowing work pace, task rotation.) and PPE.
Hazard Control Hierarchy (Fall Hazards)	The hierarchy of controls for fall hazards is specific to the Navy requirements. The order of control measures for fall hazards as part of this contract shall be as follows: Elimination, Prevention, Engineering Controls and Protective Systems and Equipment. The contractor needs to follow the Navy Hierarchy of controls. With regard to administrative controls, this should not be part of the required solutions, the Navy command can develop such administrative controls including warnings and work practices. This type of work is inherently Governmental.
Hazard Exposure	Expresses a relative exposure to a hazard. A hazard may be present, but there may be little danger because of the precautions taken.
Hazard Severity	An assessment of the worst potential consequence, defined by degree of occupational injury, illness or property damage which is likely to occur as a result of the deficiency.
Horizontal Lifeline System	A fall arrest system consisting of an assembly of components that uses rope, wire or synthetic cable spanned horizontally between two end anchorages. The assembly includes the necessary connectors, turnbuckles, in-line energy absorbers, tensioner and may include intermediate anchorages. The system enables a trained worker to move and safely traverse/work in the horizontal plane.
Human Factors	The application of behavioral principles to the development of technological systems to make such systems work more efficiently and productively and to make it easier for people to operate and maintain these systems.
Illness	Any abnormal condition or disorder, other than one resulting from an injury, caused by exposure to conditions associated with the occupational environment.
Industrial Hygiene	An occupational health science involving the identification, evaluation, and control of environmental factors/stresses arising in/from the workplace that causes sickness or impairs health.
Injury	Traumatic bodily harm, such as a cut, fracture, burn, or poisoning, caused by a single or 1-day exposure to an external force, toxic substance, or physical agent.
Interim Controls	A set of measures designed to temporarily reduce human exposure or likely exposure to a hazard.

Definition	Description
Lifeline	A component consisting of a flexible line that connects to an anchorage at one end to hang vertically (vertical lifeline), or that connects to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.
Maintenance and Repair	The preservation or restoration of a piece of equipment, system, or facility to such condition that it may be effectively used for its designated purposes. Maintenance/repair may be adjustment, overhaul, reprocessing, or replacement of constituent parts or materials that are missing or have deteriorated by action of the elements or usage, or replacement of the entire unit or system if beyond economical repair.
Mishap	That occurrence in a sequence of events which usually produces unintended injury, death or property damage.
Mishap Probability	The probability that a hazard will result in a mishap or loss, based on an assessment of such factors as location, exposure (cycles or hours of operation), affected populations, experience, or previously established statistical information.
Monthly On-Site Labor Report	A compilation of all Contractor and subcontractor employee-hours involved in delivering contract services on a Government property.
Mishap Prevention Hazard Abatement (MPHA)	The lifecycle of a Mishap Prevention Hazard Abatement (MPHA) Project can be thought of as a three-step process. A project starts out in an initial step where a hazardous condition is recognized by an activity that is of sufficient risk to require intervention to prevent illness and/or injury. The Department of Defense (DoD), using a risk-categorizing scheme derived from MIS-STD-882, sets the probability and severity of a Risk Assessment Code (RAC) at 1, 2, or 3 as requiring intervention. For those conditions that cannot be corrected within 30 days and are beyond the funding capability of the activity, the Navy's MP/HA program is utilized to abate those conditions. The MPHA program exists due to federal statute, 29 CFR 1960.30(d), which requires that "When a hazard cannot be abated within the authority and resources of the official in charge of the establishment, that official shall request assistance from appropriate higher authority".
Musculoskeletal Disorders	Injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones.
Nonfatal Injury Mishap	A mishap in which at least one person is injured, and no injury is fatal.

Definition	Description
Operation and Maintenance and Support Information (OMSI)	OMSI is a set of consultant-prepared data manuals that contain detailed, as-built technical information that describes the efficient, economical and safe operation, maintenance and repair of a equipment or system throughout its life cycle. Generally prepared following completion of new construction facility or major facility upgrade. OMSI's typically include staffing and budgeting information, supply support including critical spare parts, operating procedures, troubleshooting and diagnostic guides, extended warranty data, maintenance task frequencies and documentation, technical data, repair procedures and manufacturer's product data.
Performance Assessment	A method used by the Government to provide some measure of control over the quality of purchased goods and services received.
Performance Assessment Representative (PAR)	That individual designated by the KO to be responsible for the monitoring of Contractor performance.
Permanent Disability	Includes any degree of permanent impairment of the body such as amputation, permanent impairment of vision and other permanently crippling nonfatal injury ranging from the permanent stiffening of a joint or a finger amputation, to permanent, complete crippling.
Personal Fall-Arrest System	A system used to arrest an employee's fall. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or combinations of these.
Positioning System	A body harness system rigged to allow a worker to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
Pre-Expended Bin Materials and Supplies	The minor materials and supplies that are incidental to the job, for which the total direct cost of any one material line item shown on the material estimate is $10.00 or less. Examples of pre-expended bin materials and supplies include, but are not limited to, solder, lead, flux, electrical connectors, electrical tape, fuses, nails, screws, bolts, nuts, washers, spacers, masking tape, sand paper, solvent, cleaners, lubricants, grease, oil, rags, mops, glue, epoxy, spackling compound, joint tape, plumbers tape and compound, clips, welding rods, and touch up paint.
Probability	The likelihood that an event will occur, often expressed as the ratio of the number of favorable outcomes in the set of outcomes divided by the total number of possible outcomes. The state of being likely to happen, or the extent to which something is likely to happen.
Program Manager, MPHA	The individual responsible for overseeing the Government's MPHA Program.
Property Administrator	An authorized representative of the Contracting Officer who is responsible for administering contract property requirements, terms and conditions of the contract.
Property Management Program	A Government program established for the purpose of reviewing and approving the Contractor's Property Management Plan and System through performance of a system analysis whenever government property is in the possession of the Contractor.

Definition	Description
Qualified Person for Fall Protection	A person with a recognized degree or professional certificate and with extensive knowledge, training, and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating and specifying fall protection and rescue systems.
Quality Control (QC)	A method used by the Contractor to control the quality of goods and services produced.
R. S. Means	A data collection and organization system developed by R. S. Means Company which can be used to prepare accurate, dependable construction estimates and budgets in a variety of ways. The Contractor shall use the latest edition. Material prices are based on a national average and computed labor costs are based on a 30-city national average. An estimate prepared using this data is called a "Means estimate"; data may simply be referred to as "Means".
Response Time	The time allowed the Contractor after initial notification of a work requirement to be physically on the premises at the work site with appropriate personnel, tools, equipment, and materials, ready to perform the work required.
Restraint System	A combination of anchorage, anchorage connector, lanyard (or other mean of connection), and body support that limits travel in such as manner that the user is not exposed to a fall hazard.
Risk	The potential for realization of unwanted, adverse consequences to human life, health, property, or the environment; estimation of risk is usually based on the expected value of the conditional probability of the event occurring times the consequence of the event given that it has occurred.
Risk Analysis	A detailed examination performed to understand the nature of unwanted, negative consequences to human life, health, or property; an analytical process to provide information regarding undesirable events; the process of quantification of the probabilities and expected consequences for identified risks.
Risk Assessment Code	Represents the degree of risk associated with a hazard considering the elements of hazard severity and mishap probability. The RAC is expressed as a single Arabic number that is used to help determine hazard abatement priorities.
ROICC	Resident Officer in Charge of Construction
Safety	Freedom from danger: protection from, or not being exposed to, the risk of harm or injury.

Definition	Description
Unit Priced Labor (UPL) Hour	The unit price bid by the Contractor to perform one hour of work-in-place. With the exception of direct material and construction equipment costs, the unit price includes all indirect and direct costs associated with performing work. The price includes the Contractor's hourly composite trade wage, adjusted to allow for workforce productivity; costs for pre-expended bin materials, union agreements, crew sizes, hand tools, payroll burdens and fringes, overtime, job (field) overhead (including clerical support, supervision, inspection, fees, taxes, licenses, permits, and insurance), general and administrative (home office) overhead, and profit. Additionally, time for job preparation, safety standby personnel, and similar indirect labor elements are included.
Work-Related Musculoskeletal Disorders	Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-related Musculoskeletal Disorders (WMSDs) are: Musculoskeletal disorders to which the work environment and the performance of work contribute significantly, or Musculoskeletal disorders that are aggravated or prolonged by work conditions.

Acronyms	
ACO	Administrative Contracting Officer
ANSI	American National Standards Institute
ASSE	American Society of Safety Engineers
BBP	Blood borne Pathogens
BW	Biweekly
CDC	Centers for Disease Control
CDR	Contract Discrepancy Report
CFR	Code of Federal Regulations
CIA	Controlled Industrial Area
CMMS	Computerized Maintenance Management System
COR	Condition of Readiness
CTD	Cumulative Trauma Disorder
DBH	Diameter at Breast Height
DoD	Department of Defense
DoN	Department of Navy
DRMO	Defense Reutilization Management Office
EPA	Environmental Protection Agency
ESAMS	Enterprise Safety Application Management System
EPCRA	Emergency Planning and Community Right-to-Know Act
FAR	Federal Acquisition Regulation
FFP	Firm Fixed Price
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSC	Facility Support Contract
GFE	Government-furnished Equipment
GFF	Government-furnished Facilities
GFM	Government-furnished Materials
GOCO	Government-Owned Contractor Operated
GPWS	Guide Performance Work Statements
HAZCOM	Hazard Communication
HCA	Head Contracting Agency
ICP	Integrated Contingency Plan
IDIQ	Indefinite Delivery Indefinite Quantity
IDLH	Immediately Dangerous to Life and Health
IH	Industrial Hygienist
IPM	Integrated Pest Management
IPMIS	Integrated Pest Management Information System
IPMP	Integrated Pest Management Plan
JHA	Job Hazard Analysis
KO	Contracting Officer
LAN	Local Area Network
LSC	Life Safety Codes
M	Monthly
MPHA	Mishap Prevention & Hazard Abatement Program
MSD	Musculoskeletal Disorders

Acronyms	
MSDS	Material Safety Data Sheets
NAVFAC	Naval Facilities Engineering Command
NAVOSH	Naval Occupational Safety and Health
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NMCI	Navy Marine Corps Intranet
NOSC	Navy-On-Scene Coordinator
OHP	Occupational Health Physician
OSHA	Occupational Safety and Health Administration
OPNAVINST	Office of the Chief of Naval Operations Instruction
PAP	Performance Assessment Plan
PAR	Performance Assessment Representative
PAW	Performance Assessment Worksheet
PEL	Permissible Exposure Limit
PEO	Program Executive Officer
PM	Project Manager
PPE	Personal Protective Equipment
PRCSP	Permit Required Confined Space Program
PWS	Performance Work Statement
Q	Quarterly
QC	Quality Control
RAC	Risk Assessment Code
SC	Security Clearances
SM	Semimonthly
SOH	Safety and Occupational Health
SPAR	Senior Performance Assessment Representative
TE	Technical Exhibit
TLV	Threshold Limit Values
VIQ	Variation in Quantity
WBS	Work Breakdown Structure
WMSD	Work-related Musculoskeletal Disorder

ATTACHMENT J-0200000-02

WAGE DETERMINATIONS

Service Contract Act (SCA) Wage Determinations are provided herein. Notification of any revisions, before contract award, will be made by amendment to the Solicitation.

Service Contract Act Wage Determination

Wage Det. Number	State / County	Revision Number	Revision Date
2005-2057	San Diego, CA	12	June 13, 2011

WD 05-2057 (Rev.-12) was first posted on www.wdol.gov on 06/17/2011
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REGISTER OF WAGE DETERMINATIONS UNDER THE SERVICE CONTRACT ACT By direction of the Secretary of Labor	U.S. DEPARTMENT OF LABOR EMPLOYMENT STANDARDS ADMINISTRATION WAGE AND HOUR DIVISION WASHINGTON D.C. 20210
Diane C. Koplewski Division of Director Wage Determinations	Wage Determination No.: 2005-2057 Revision No.: 12 Date Of Revision: 06/13/2011

State: California

Area: California Counties of Imperial, San Diego

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION CODE - TITLE	FOOTNOTE	RATE
01000 - Administrative Support And Clerical Occupations		
01011 - Accounting Clerk I		15.61
01012 - Accounting Clerk II		17.52
01013 - Accounting Clerk III		19.61
01020 - Administrative Assistant		25.04
01040 - Court Reporter		19.16
01051 - Data Entry Operator I		15.00
01052 - Data Entry Operator II		16.37
01060 - Dispatcher, Motor Vehicle		19.16
01070 - Document Preparation Clerk		14.63
01090 - Duplicating Machine Operator		14.63
01111 - General Clerk I		13.54
01112 - General Clerk II		15.34
01113 - General Clerk III		17.22
01120 - Housing Referral Assistant		20.30
01141 - Messenger Courier		12.23
01191 - Order Clerk I		14.73
01192 - Order Clerk II		16.08
01261 - Personnel Assistant (Employment) I		18.29
01262 - Personnel Assistant (Employment) II		20.67
01263 - Personnel Assistant (Employment) III		23.10
01270 - Production Control Clerk		22.89
01280 - Receptionist		13.16
01290 - Rental Clerk		16.09
01300 - Scheduler, Maintenance		17.28
01311 - Secretary I		17.28
01312 - Secretary II		18.08
01313 - Secretary III		20.30
01320 - Service Order Dispatcher		17.60
01410 - Supply Technician		24.51
01420 - Survey Worker		19.16
01531 - Travel Clerk I		13.51
01532 - Travel Clerk II		14.76
01533 - Travel Clerk III		16.21
01611 - Word Processor I		16.07
01612 - Word Processor II		18.04
01613 - Word Processor III		20.18
05000 - Automotive Service Occupations		
05005 - Automobile Body Repairer, Fiberglass		22.21
05010 - Automotive Electrician		22.37
05040 - Automotive Glass Installer		21.55

05070 - Automotive Worker	21.55
05110 - Mobile Equipment Servicer	19.83
05130 - Motor Equipment Metal Mechanic	23.16
05160 - Motor Equipment Metal Worker	21.55
05190 - Motor Vehicle Mechanic	22.75
05220 - Motor Vehicle Mechanic Helper	18.60
05250 - Motor Vehicle Upholstery Worker	20.75
05280 - Motor Vehicle Wrecker	21.55
05310 - Painter, Automotive	22.79
05340 - Radiator Repair Specialist	21.55
05370 - Tire Repairer	15.52
05400 - Transmission Repair Specialist	23.16
07000 - Food Preparation And Service Occupations	
07010 - Baker	12.40
07041 - Cook I	12.84
07042 - Cook II	13.58
07070 - Dishwasher	9.46
07130 - Food Service Worker	10.31
07210 - Meat Cutter	15.71
07260 - Waiter/Waitress	9.71
09000 - Furniture Maintenance And Repair Occupations	
09010 - Electrostatic Spray Painter	19.94
09040 - Furniture Handler	14.32
09080 - Furniture Refinisher	19.94
09090 - Furniture Refinisher Helper	16.57
09110 - Furniture Repairer, Minor	18.49
09130 - Upholsterer	19.94
11000 - General Services And Support Occupations	
11030 - Cleaner, Vehicles	12.96
11060 - Elevator Operator	12.96
11090 - Gardener	17.18
11122 - Housekeeping Aide	12.96
11150 - Janitor	12.96
11210 - Laborer, Grounds Maintenance	13.92
11240 - Maid or Houseman	9.85
11260 - Pruner	13.45
11270 - Tractor Operator	14.90
11330 - Trail Maintenance Worker	13.92
11360 - Window Cleaner	14.20
12000 - Health Occupations	
12010 - Ambulance Driver	18.34
12011 - Breath Alcohol Technician	20.17
12012 - Certified Occupational Therapist Assistant	25.81
12015 - Certified Physical Therapist Assistant	27.54
12020 - Dental Assistant	17.68
12025 - Dental Hygienist	40.91
12030 - EKG Technician	26.42
12035 - Electroneurodiagnostic Technologist	26.42
12040 - Emergency Medical Technician	18.34
12071 - Licensed Practical Nurse I	19.25
12072 - Licensed Practical Nurse II	21.53
12073 - Licensed Practical Nurse III	24.01
12100 - Medical Assistant	14.37
12130 - Medical Laboratory Technician	20.67
12160 - Medical Record Clerk	15.16
12190 - Medical Record Technician	16.54
12195 - Medical Transcriptionist	19.21
12210 - Nuclear Medicine Technologist	36.75
12221 - Nursing Assistant I	10.38
12222 - Nursing Assistant II	11.67

12223 - Nursing Assistant III		12.74
12224 - Nursing Assistant IV		14.30
12235 - Optical Dispenser		21.24
12236 - Optical Technician		16.53
12250 - Pharmacy Technician		17.36
12280 - Phlebotomist		14.34
12305 - Radiologic Technologist		30.68
12311 - Registered Nurse I		29.75
12312 - Registered Nurse II		35.92
12313 - Registered Nurse II, Specialist		35.92
12314 - Registered Nurse III		42.67
12315 - Registered Nurse III, Anesthetist		42.67
12316 - Registered Nurse IV		51.14
12317 - Scheduler (Drug and Alcohol Testing)		24.55
13000 - Information And Arts Occupations		
13011 - Exhibits Specialist I		20.91
13012 - Exhibits Specialist II		25.91
13013 - Exhibits Specialist III		31.68
13041 - Illustrator I		21.12
13042 - Illustrator II		26.16
13043 - Illustrator III		32.00
13047 - Librarian		28.91
13050 - Library Aide/Clerk		13.29
13054 - Library Information Technology Systems Administrator		26.11
13058 - Library Technician		17.77
13061 - Media Specialist I		18.84
13062 - Media Specialist II		21.07
13063 - Media Specialist III		23.50
13071 - Photographer I		16.33
13072 - Photographer II		18.44
13073 - Photographer III		22.63
13074 - Photographer IV		27.68
13075 - Photographer V		33.49
13110 - Video Teleconference Technician		17.71
14000 - Information Technology Occupations		
14041 - Computer Operator I		17.02
14042 - Computer Operator II		19.04
14043 - Computer Operator III		21.22
14044 - Computer Operator IV		23.58
14045 - Computer Operator V		26.11
14071 - Computer Programmer I	(see 1)	27.62
14072 - Computer Programmer II	(see 1)	
14073 - Computer Programmer III	(see 1)	
14074 - Computer Programmer IV	(see 1)	
14101 - Computer Systems Analyst I	(see 1)	
14102 - Computer Systems Analyst II	(see 1)	
14103 - Computer Systems Analyst III	(see 1)	
14150 - Peripheral Equipment Operator		17.02
14160 - Personal Computer Support Technician		23.58
15000 - Instructional Occupations		
15010 - Aircrew Training Devices Instructor (Non-Rated)		30.51
15020 - Aircrew Training Devices Instructor (Rated)		36.91
15030 - Air Crew Training Devices Instructor (Pilot)		44.25
15050 - Computer Based Training Specialist / Instructor		30.51
15060 - Educational Technologist		30.67
15070 - Flight Instructor (Pilot)		44.25
15080 - Graphic Artist		23.93
15090 - Technical Instructor		26.13
15095 - Technical Instructor/Course Developer		31.96

15110 - Test Proctor	21.83
15120 - Tutor	21.83
16000 - Laundry, Dry-Cleaning, Pressing And Related Occupations	
16010 - Assembler	9.79
16030 - Counter Attendant	9.79
16040 - Dry Cleaner	12.02
16070 - Finisher, Flatwork, Machine	9.79
16090 - Presser, Hand	9.79
16110 - Presser, Machine, Drycleaning	9.79
16130 - Presser, Machine, Shirts	9.79
16160 - Presser, Machine, Wearing Apparel, Laundry	9.79
16190 - Sewing Machine Operator	12.81
16220 - Tailor	13.55
16250 - Washer, Machine	10.49
19000 - Machine Tool Operation And Repair Occupations	
19010 - Machine-Tool Operator (Tool Room)	19.94
19040 - Tool And Die Maker	23.80
21000 - Materials Handling And Packing Occupations	
21020 - Forklift Operator	18.88
21030 - Material Coordinator	22.89
21040 - Material Expediter	22.89
21050 - Material Handling Laborer	13.07
21071 - Order Filler	15.33
21080 - Production Line Worker (Food Processing)	18.88
21110 - Shipping Packer	14.04
21130 - Shipping/Receiving Clerk	14.04
21140 - Store Worker I	12.48
21150 - Stock Clerk	16.40
21210 - Tools And Parts Attendant	18.88
21410 - Warehouse Specialist	18.88
23000 - Mechanics And Maintenance And Repair Occupations	
23010 - Aerospace Structural Welder	26.52
23021 - Aircraft Mechanic I	25.55
23022 - Aircraft Mechanic II	26.52
23023 - Aircraft Mechanic III	27.54
23040 - Aircraft Mechanic Helper	18.88
23050 - Aircraft, Painter	22.46
23060 - Aircraft Servicer	21.08
23080 - Aircraft Worker	21.88
23110 - Appliance Mechanic	20.66
23120 - Bicycle Repairer	15.52
23125 - Cable Splicer	26.10
23130 - Carpenter, Maintenance	22.28
23140 - Carpet Layer	18.15
23160 - Electrician, Maintenance	23.07
23181 - Electronics Technician Maintenance I	22.59
23182 - Electronics Technician Maintenance II	23.97
23183 - Electronics Technician Maintenance III	27.60
23260 - Fabric Worker	20.80
23290 - Fire Alarm System Mechanic	23.50
23310 - Fire Extinguisher Repairer	19.48
23311 - Fuel Distribution System Mechanic	27.67
23312 - Fuel Distribution System Operator	21.35
23370 - General Maintenance Worker	19.20
23380 - Ground Support Equipment Mechanic	25.55
23381 - Ground Support Equipment Servicer	21.08
23382 - Ground Support Equipment Worker	21.88
23391 - Gunsmith I	19.48
23392 - Gunsmith II	22.16
23393 - Gunsmith III	24.85

23410 - Heating, Ventilation And Air-Conditioning Mechanic	23.57
23411 - Heating, Ventilation And Air Contditioning Mechanic (Research Facility)	24.46
23430 - Heavy Equipment Mechanic	28.70
23440 - Heavy Equipment Operator	28.86
23460 - Instrument Mechanic	24.17
23465 - Laboratory/Shelter Mechanic	23.51
23470 - Laborer	12.27
23510 - Locksmith	20.96
23530 - Machinery Maintenance Mechanic	24.66
23550 - Machinist, Maintenance	20.86
23580 - Maintenance Trades Helper	16.57
23591 - Metrology Technician I	24.17
23592 - Metrology Technician II	25.25
23593 - Metrology Technician III	30.26
23640 - Millwright	29.26
23710 - Office Appliance Repairer	21.74
23760 - Painter, Maintenance	21.93
23790 - Pipefitter, Maintenance	24.76
23810 - Plumber, Maintenance	23.93
23820 - Pneudraulic Systems Mechanic	24.85
23850 - Rigger	23.07
23870 - Scale Mechanic	21.03
23890 - Sheet-Metal Worker, Maintenance	23.06
23910 - Small Engine Mechanic	21.12
23931 - Telecommunications Mechanic I	26.33
23932 - Telecommunications Mechanic II	27.33
23950 - Telephone Lineman	26.11
23960 - Welder, Combination, Maintenance	23.82
23965 - Well Driller	24.96
23970 - Woodcraft Worker	24.85
23980 - Woodworker	18.60
24000 - Personal Needs Occupations	
24570 - Child Care Attendant	11.87
24580 - Child Care Center Clerk	19.94
24610 - Chore Aide	10.20
24620 - Family Readiness And Support Services Coordinator	17.12
24630 - Homemaker	20.77
25000 - Plant And System Operations Occupations	
25010 - Boiler Tender	27.02
25040 - Sewage Plant Operator	26.45
25070 - Stationary Engineer	27.02
25190 - Ventilation Equipment Tender	19.72
25210 - Water Treatment Plant Operator	26.45
27000 - Protective Service Occupations	
27004 - Alarm Monitor	24.53
27007 - Baggage Inspector	13.86
27008 - Corrections Officer	29.73
27010 - Court Security Officer	31.17
27030 - Detection Dog Handler	23.51
27040 - Detention Officer	29.73
27070 - Firefighter	27.18
27101 - Guard I	13.86
27102 - Guard II	23.51
27131 - Police Officer I	35.16
27132 - Police Officer II	39.06
28000 - Recreation Occupations	
28041 - Carnival Equipment Operator	15.20

28042 - Carnival Equipment Repairer		16.19
28043 - Carnival Equpment Worker		10.89
28210 - Gate Attendant/Gate Tender		15.62
28310 - Lifeguard		13.53
28350 - Park Attendant (Aide)		17.38
28510 - Recreation Aide/Health Facility Attendant		12.67
28515 - Recreation Specialist		21.52
28630 - Sports Official		13.84
28690 - Swimming Pool Operator		17.11
29000 - Stevedoring/Longshoremen Occupational Services		
29010 - Blocker And Bracer		28.99
29020 - Hatch Tender		28.99
29030 - Line Handler		28.99
29041 - Stevedore I		27.21
29042 - Stevedore II		30.76
30000 - Technical Occupations		
30010 - Air Traffic Control Specialist, Center (HFO)	(see 2)	38.91
30011 - Air Traffic Control Specialist, Station (HFO)	(see 2)	26.84
30012 - Air Traffic Control Specialist, Terminal (HFO)	(see 2)	29.55
30021 - Archeological Technician I		20.59
30022 - Archeological Technician II		22.84
30023 - Archeological Technician III		28.30
30030 - Cartographic Technician		28.30
30040 - Civil Engineering Technician		25.89
30061 - Drafter/CAD Operator I		20.42
30062 - Drafter/CAD Operator II		22.84
30063 - Drafter/CAD Operator III		25.47
30064 - Drafter/CAD Operator IV		31.34
30081 - Engineering Technician I		18.88
30082 - Engineering Technician II		21.19
30083 - Engineering Technician III		23.70
30084 - Engineering Technician IV		29.36
30085 - Engineering Technician V		35.91
30086 - Engineering Technician VI		43.45
30090 - Environmental Technician		22.65
30210 - Laboratory Technician		21.62
30240 - Mathematical Technician		27.79
30361 - Paralegal/Legal Assistant I		21.72
30362 - Paralegal/Legal Assistant II		26.91
30363 - Paralegal/Legal Assistant III		32.91
30364 - Paralegal/Legal Assistant IV		39.82
30390 - Photo-Optics Technician		28.30
30461 - Technical Writer I		23.46
30462 - Technical Writer II		28.69
30463 - Technical Writer III		34.71
30491 - Unexploded Ordnance (UXO) Technician I		24.73
30492 - Unexploded Ordnance (UXO) Technician II		29.92
30493 - Unexploded Ordnance (UXO) Technician III		35.87
30494 - Unexploded (UXO) Safety Escort		24.73
30495 - Unexploded (UXO) Sweep Personnel		24.73
30620 - Weather Observer, Combined Upper Air Or Surface Programs	(see 2)	25.47
30621 - Weather Observer, Senior	(see 2)	28.30
31000 - Transportation/Mobile Equipment Operation Occupations		
31020 - Bus Aide		14.37
31030 - Bus Driver		17.56
31043 - Driver Courier		13.59
31260 - Parking and Lot Attendant		10.07
31290 - Shuttle Bus Driver		14.66
31310 - Taxi Driver		12.33

31361 - Truckdriver, Light	14.66
31362 - Truckdriver, Medium	18.11
31363 - Truckdriver, Heavy	20.85
31364 - Truckdriver, Tractor-Trailer	20.85
99000 - Miscellaneous Occupations	
99030 - Cashier	12.02
99050 - Desk Clerk	10.60
99095 - Embalmer	21.58
99251 - Laboratory Animal Caretaker I	13.87
99252 - Laboratory Animal Caretaker II	14.55
99310 - Mortician	23.74
99410 - Pest Controller	14.26
99510 - Photofinishing Worker	16.54
99710 - Recycling Laborer	19.84
99711 - Recycling Specialist	24.10
99730 - Refuse Collector	18.98
99810 - Sales Clerk	13.18
99820 - School Crossing Guard	11.77
99830 - Survey Party Chief	28.85
99831 - Surveying Aide	18.84
99832 - Surveying Technician	26.23
99840 - Vending Machine Attendant	14.19
99841 - Vending Machine Repairer	16.89
99842 - Vending Machine Repairer Helper	14.09

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: $3.59 per hour or $143.60 per week or $622.27 per month

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year, New Year's Day, Martin Luther King Jr's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4174)

THE OCCUPATIONS WHICH HAVE NUMBERED FOOTNOTES IN PARENTHESES RECEIVE THE FOLLOWING:

1) COMPUTER EMPLOYEES: Under the SCA at section 8(b), this wage determination does not apply to any employee who individually qualifies as a bona fide executive, administrative, or professional employee as defined in 29 C.F.R. Part 541. Because most Computer System Analysts and Computer Programmers who are compensated at a rate not less than $27.63 (or on a salary or fee basis at a rate not less than $455 per week) an hour would likely qualify as exempt computer professionals, (29 C.F.R. 541. 400) wage rates may not be listed on this wage determination for all occupations within those job families. In addition, because this wage determination may not list a wage rate for some or all occupations within those job families if the survey data indicates that the prevailing wage rate for the occupation equals or exceeds

$27.63 per hour conformances may be necessary for certain nonexempt employees. For example, if an individual employee is nonexempt but nevertheless performs duties within the scope of one of the Computer Systems Analyst or Computer Programmer occupations for which this wage determination does not specify an SCA wage rate, then the wage rate for that employee must be conformed in accordance with the conformance procedures described in the conformance note included on this wage determination.

Additionally, because job titles vary widely and change quickly in the computer industry, job titles are not determinative of the application of the computer professional exemption. Therefore, the exemption applies only to computer employees who satisfy the compensation requirements and whose primary duty consists of:
(1) The application of systems analysis techniques and procedures, including consulting with users, to determine hardware, software or system functional specifications;
(2) The design, development, documentation, analysis, creation, testing or modification of computer systems or programs, including prototypes, based on and related to user or system design specifications;
(3) The design, documentation, testing, creation or modification of computer programs related to machine operating systems; or
(4) A combination of the aforementioned duties, the performance of which requires the same level of skills. (29 C.F.R. 541.400).

2) AIR TRAFFIC CONTROLLERS AND WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY: If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work).

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordance, explosives, and incendiary material differential pay.

** UNIFORM ALLOWANCE **

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an

employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of $3.35 per week (or $.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations", Fifth Edition, April 2006, unless otherwise indicated. Copies of the Directory are available on the Internet. A links to the Directory may be found on the WHD home page at http://www.dol.gov/esa/whd/ or through the Wage Determinations On-Line (WDOL) Web site at http://wdol.gov/.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s).

2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.

3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).

4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.

5) The contracting officer transmits the Wage and Hour decision to the contractor.

6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

ATTACHMENT J-0200000-03
GENERAL REFERENCES, INSTRUCTIONS, & DIRECTIVES

REFERENCE	GENERAL REFERENCES	WEBSITE
EM 385-1-1	U.S. Army Corps of Engineers Safety and Health Requirements	http://www.usace.army.mil/CESO/Pages/EM385-1-1.aspx
P.L. 91-596	Occupational Safety and Health Act	http://www.dol.gov/compliance/laws/comp-osha.htm
UFGS 01 35 26	Unified Facilities Guide Specifications	http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_02.pdf
ANSI/ASSE Z359 Fall Protection Code/Standards	Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components	http://www.asse.org/professionalsafety/pastissues/052/09/47_FeldsteinZ359_Sept2007.pdf
COMNAVREGSW Instruction 5090.2	Regional Solid Waste and Recycling Program	https://www.cnic.navy.mil/Coronado/About/Departments/Recycling/index.htm
DTIC ADA 427785	Uniform Federal Policy for Quality Assurance Project Plans	http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf
SECNAV Manual (SECNAV M)-5510.30	DoN Personnel Security Program	http://www.everyspec.com/USN/SECNAV/SECNAV_M-5510--30-PERSONNEL-SECURITY-PROGRAM_4719/
Memorandum of Understanding (MOU) CI 00.CR/6023 dated May 25, 2010	Between Naval Facilities Engineering Command Southwest (NAVFAC SW) and the Commanding Officer, Naval Safety and Environmental Training Center (NAVSAFENVTRACEN)	Attached
CNIC Notice 5530, dated July 20, 2010	RAPID Gate Program	http://www.rapidgate.com/government/overview
MPHA Program 2007 Report		Attached
MPHA Program 2008 Report		Attached
MPHA Program 2009 Report		Attached
ANSI A10.34	Protection of the Public on or Adjacent to Construction Sites	http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2FASSE+A10.34-2001+(R2005)

REFERENCE	ELECTRICAL SAFETY	WEBSITE
(OSHA) 29 CFR Part 1910	Occupational Safety and Health Administration - Electrical Standard; Final Rule	http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=19269&p_table=federal_register
UFGS 01 31 26	United Facilities Guide Specifications	http://www.wbdg.org/ccb/browse_org.php?o=70
(NFPA) 70	National Fire Protection Association–National Electric Code (NEC)	http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70
NFPA 70E	Life Safety Code	http://www.nfpa.org/catalog/product.asp?pid=70E09&order_src=A381&CMP=KNC-A381&HBX_PK=nfpa+70e&HBX_OU=50&gclid=CK2clqSC5KMCFRJNagod731b5w
NFPA 780	National Standard for the Installation of Lightning Protection Systems	http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=780
SECNAVINST 5100.10J	Department Of The Navy Policy For Safety, Mishap Prevention, Occupational Health And Fire Protection Programs	http://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-100%20Safety%20and%20Occupational%20Health%20Services/5100.10J.pdf
OPNAVINST 5100.23G	Navy Safety And Occupational Health (SOH) Program Manual	http://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-100%20Safety%20and%20Occupational%20Health%20Services/5100.23G.pdf
MIL-HDBK-419A	Grounding, Bonding, And Shielding For Electronic Equipments And Facilities	http://www.wbdg.org/ccb/FEDMIL/hdbk419a_vol2.pdf
MIL-STD-188-124B	Grounding, Bonding And Shielding For Common Long Haul/Tactical Communication Systems Including Ground Based Communications - Electronics Facilities And Equipments	www.everyspec.com/MIL-STD/MIL-STD.../download.php?...MIL_STD_704E...

REFERENCE	ELECTRICAL SAFETY	WEBSITE
MIL-STD-704E	Interface Standard - Aircraft Electric Power Characteristics	www.everyspec.com/MIL-STD/MIL-STD.../MIL_STD_704E_1052/
SPAWARINST 5100.9D	Navy Shore Electronics Safety Precautions	http://aero-defense.ihs.com/document/abstract/IFXWDAAAAAAAAAAA
JTR	Joint Travel Regulations	http://www.defensetravel.dod.mil/site/travelreg.cfm
DOD FCM	Foreign Clearance Manual	https://www.fcg.pentagon.mil/fcg.cfm
UFC 3-560-01	Electrical Safety	http://pdffinder.net/UFC-3-560-01-Electrical-Safety,-O.html

REFERENCE	ERGONOMIC	WEBSITE
DOD Instruction 6055.1	DoD Safety and Occupational Health (SOH) Program	http://www.dtic.mil/whs/directives/corres/pdf/605501p.pdf
MIL-HDBK-759C	Handbook For Human Engineering Design Guidelines	http://www.hf.faa.gov/docs/508/docs/milhdbk759C.pdf
MIL-STD-1474D	DoD Design Criteria Standard, Noise Limits	www.acq.osd.mil/atptf/policy/documents/MILSTD1474D.pdf
OPNAVINST 5100.23G	Navy Safety And Occupational Health (SOH) Program Manual	http://doni.daps.dla.mil/Directives/05000%20General%20Management%20Security%20and%20Safety%20Services/05-100%20Safety%20and%20Occupational%20Health%20Services/5100.23G.pdf
MIL-STD 1472F	Human Design Standards	www.everyspec.com/MIL-STD/MIL-STD.../MIL_STD_1472F_1208/
American National Standards Institute (ANSI)/Human Factors & Ergonomics Society (HFES) 100-2007	Human Factors Engineering of Computer	http://www.hfes.org/publications/ProductDetail.aspx?ProductId=69
ANSI - B11 Technical Report	Ergonomic Guidelines for the Design, Installation & Use of Machine Tools	http://www.ergoweb.com/resources/reference/guidelines/ansib11.cfm
International Organization for Standards (ISO) 9241	Ergonomic Requirements For Office Work	www.ergonomic-solutions.net/pdf/ISO9241Summary.pdf
ISO 10075	Ergonomic Principles Related To Mental Work-Load	http://www.iso.org/iso/catalogue_detail.htm?csnumber=27571
National Institute for Occupational Safety and Health (NIOSH)	Ergonomic Publications	www.cdc.gov/niosh
World Health Organization (WHO) – Health Series	Preventing Musculoskeletal Disorders In The Workplace	w.who.int/occupational_healthblications/en/oehmsd3.
28 CFR Part 36	ADA Standards For Accessible Design	www.ada.gov/stdspdf.htm

REFERENCE	FALL PROTECTION	WEBSITE
(OSHA) 29 CFR Part 1910	Occupational Safety and Health Administration – 29 CFR Part 1910 Occupational Safety and Health Standards	http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910
OSHA 29 CFR Part 1926	Safety and Health Regulations for Construction	http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=0
U.S. Army Corps of Engineers EM 385-1-1	Safety And Health Requirements	http://www.usace.army.mil/CESO/Pages/EM385-1-1.aspx
	Department Of The Navy Fall-Protection Guide For Ashore Facilities	http://www.docstoc.com/docs/3437425/DEPARTMENT-OF-THE-NAVY-FALL-PROTECTION-GUIDE-FOR-ASHORE-FACILITIES
Naval Facilities Engineering Command (NAVFACENGCOM) Instruction 5100.11J	NAVFACENGCOM Safety and Health Program	https://portal.navfac.navy.mil/portal/page/portal/docs/doc_store_pub/5100_11j.pdf

Attachment J-0200000-03
MISHAP PREVENTION & HAZARD ABATEMENT (MPHA) PROGRAM
2007 REPORT

In world of hazard abatement you often do not see an immediate impact of a completed project. This was not the case for a project at Naval Air Station Joint Reserve Base (NAS JRB), New Orleans, LA. Implementation of the National Fire Prevention Association 780, Standard for the Installation of Lightning Protection Systems, and National Electric Code compliant grounding system for the Air Operations Building @ NAS JRB was completed in February 2005. Hurricane Katrina hit the area in late August of that same year. The rain and high wind caused no damage to the new (buried) grounding system, but the air terminals lightning rods, on top of the Air Traffic Control (ATC) Tower, were either carried away or damaged beyond repair. Many of the base infrastructure buildings and personnel housing were also severely damaged but the facility did not suffer the extreme flooding that was evident in New Orleans proper, a short 20 miles to the North.

NAS JRB, as the only operational airfield within 100 miles of New Orleans, became the operational, logistical and administrative center for the largest natural disaster in United States history. More than 18 million pounds of relief supplies and approximately 10,000 personnel were transferred to the base in the first crucial days following the storm's passing. Over 3 million gallons of fuel were dispensed to assist in rescue and patrol efforts, and tens of thousands of lives were saved through rescue missions undertaken by Coast Guard, Navy, Army, Air Force, Marine, and National Guard forces staged out of the air station. In fact, the two-runway airfield became the sixth busiest airport in the country for a short period of time.

When operations had returned to almost normal and recovery efforts well underway, NAVFAC South West (SW) was contacted by the NAS JRB Air Operations personnel to report the severe damage to the air terminals. Following a site visit to assess the damage and prepare an economic assessment; a local New Orleans company, certified to repair and replace lightning protection systems, was contracted to put up four new 20 ft fiberglass air terminals and make any other repairs necessary to ensure the system was returned to a code compliant condition. Repairs were completed in February 2007 and the ATC Tower is now once again fully protected and operational.

All four masts were replaced with a PVC type that will better weather any future storms and comply with lightning protection code requirements.

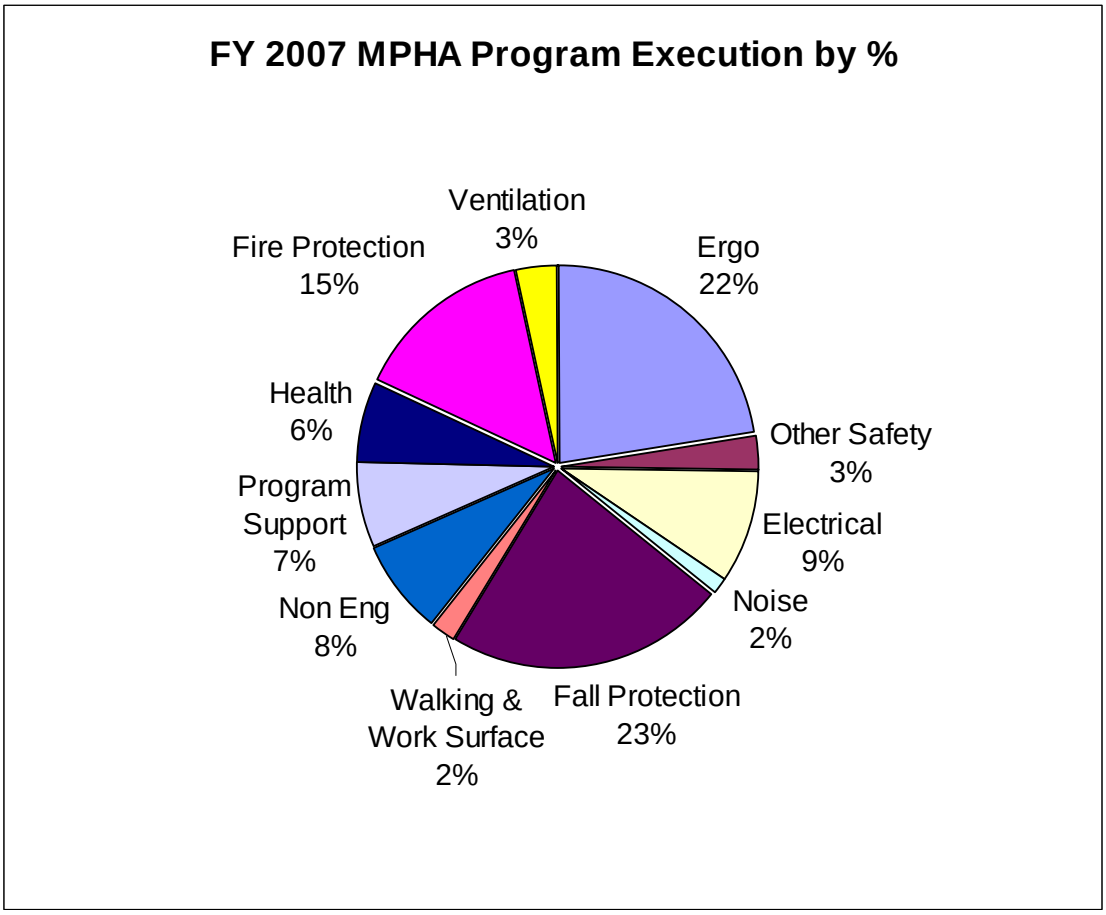
The MPHA Program experienced personnel changes; Dave Wiggins joined the program as the program manager and is located at NAVFAC HQ. Mike Sargeant moved on, as the project manager position at NAVFAC Northwest was eliminated at the end of fiscal year 2007. Glenna Humphrey will be providing support for the Northwest area.

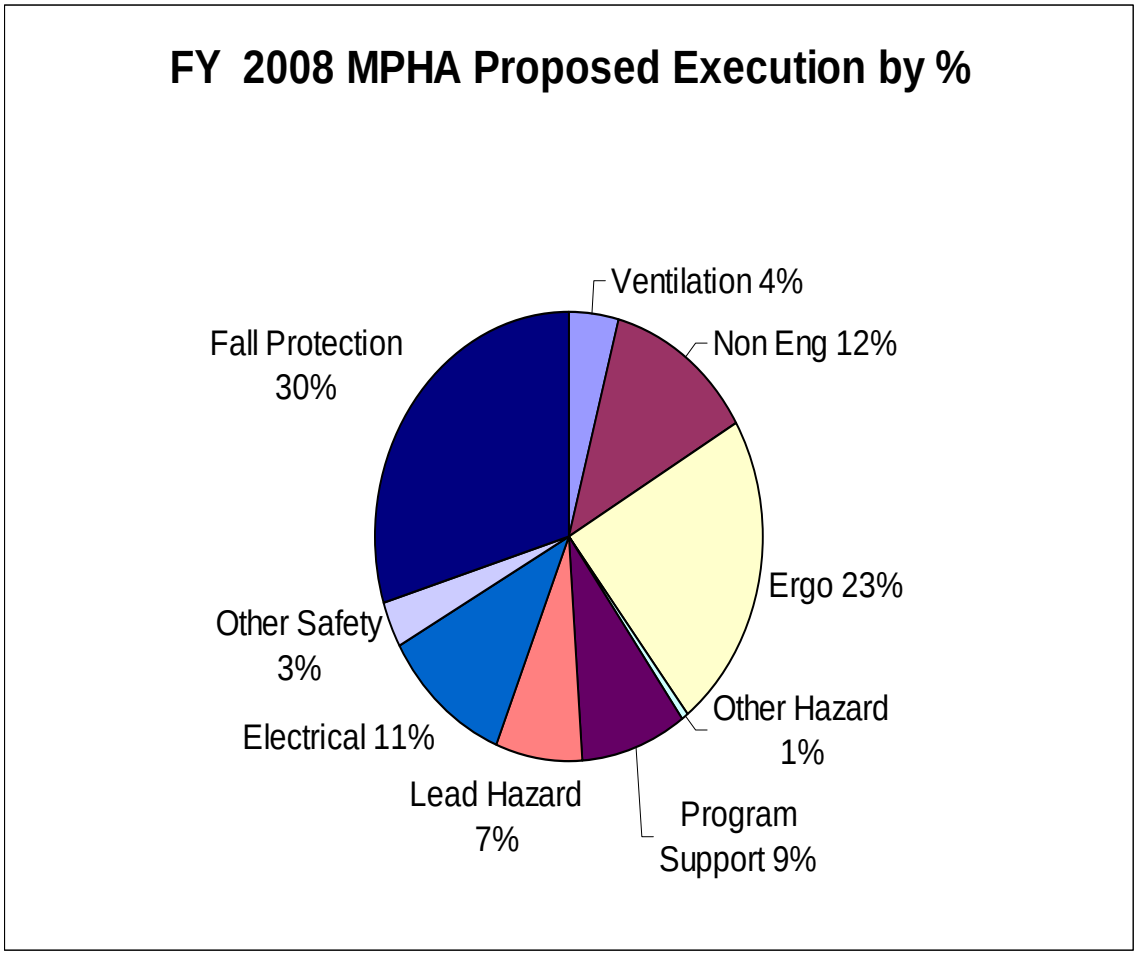
A focus on mishap prevention has always been a key element of the program and efforts have improved in Fall Protection/Prevention and Ergonomics. Awareness training classes are being held for Navy facilities architects, engineers, planners and designers to help identify, eliminate, prevent or control fall hazards and work-related musculoskeletal disorder risk factors during facility design and remodeling. Over thirty fall protection training sessions were held during 2007 at numerous NAVFAC sites from Far East to Europe. Four ergonomic sessions were held in southern California with more planned for 2008. (Fall Protection and ERGO training sessions are available and can be arranged by contacting the respective subject matter expert.)

Efforts are ongoing to make improvements to the Mishap Prevention & Hazard Abatement Program.

- The MPHA project initiation phase was undertaken as a Lean Six Sigma (LSS) project at Naval Facilities Engineering Command (NAVFAC) Headquarters.
- The MPHA Website was launched in 2007 and contains documents that provide guidance in preparing a hazard abatement project, the HA process flow diagram for projects, Project Guide with generic descriptions, points of contact for more information and more.
- The hazard abatement database now allows the administrator to make email announcements, provides more details in e-mail announcements of new projects, and is undergoing UIC verifications to note just a few of the improvements.

The following diagrams note the $ distribution of projects executed in 2007 and planned for 2008:


FY 2007 MPHA Program Execution by %
Ventilation 3%
Ergo 22%
Other Safety 3%
Electrical 9%
Noise 2%
Fall Protection 23%
Walking & Work Surface 2%
Non Eng 8%
Program Support 7%
Health 6%
Fire Protection 15%



The MPHA program supported non-engineering mishap prevention areas. Following are some of the accomplishments from these efforts:

The Mishap Prevention and Hazard Abatement (MPHA) Program provided funding to support the Operations Safety Support Committee (OSSC) of the Navy Executive Safety Board (NESB). MPHA funding provided technical support to the OSSC and respective OSSC working groups to promote development and implementation of policies and initiatives to improve the Navy's safety program, reduce mishaps and enhance overall mission readiness.

OSSC Working Groups and Task Action Teams were established to address a variety of mishap prevention areas including Occupational Safety and Health (OSH), Safety Data Management (SDM) and Traffic Safety and Recreational Off-Duty Safety (TS/RODS) achieved the following improvements in mishap prevention:

* Developed and implemented a Navy-wide private motor vehicle mishap investigation process.
* Recommended revisions to Navy Traffic Safety Program policy and Occupational Safety and Health Manual.

* Developed Navy-wide communication plan to increase awareness of noise and hearing loss.
* Reviewed risk management information system study to recommend single safety management system for Navy.

Task Action Teams in the areas of fall protection and ergonomics were also established under the auspices of the OSH Working Group. The Action teams are chaired by NAVFAC to serve as the technical and policy advisor to the OSH Working Group to reduce mishaps in the Navy by providing tools, criteria and safe work practices and to ensure Navy Ashore and Afloat Commands establish and manage viable fall protection and Ergonomic programs. The effort to chair both action teams is funded by MPHA program.

Supporting the efforts of Naval Safety Center (CNO N09F) resulted in the following accomplishments:

Seven success stories were published to the 1,001 Navy Safety Success Stories web pages. Several stories outlined the accomplishments made by Navy installations selected as OSHA Voluntary Protection Program (VPP) Star and Merit sites. To qualify, these sites excelled in their mishap prevention and hazard abatement efforts. Additional stories dealt with fall protection and ergonomics hazard abatement interventions such as the improvements in Naval Hospital Rota's operating room funded through the Mishap Prevention and Hazard Abatement Program (MP/HAP). The Safety Success Stories are located at http://www.safetycenter.navy.mil/success/default.htm.

In NAVHOSP Rota operating room, equipment on suspended, swiveling racks reduces clutter, allowing surgical team to work in neutral postures.

Administered the following Navy safety policy updates to ensure the inclusion of mishap investigations and hazard abatement efforts:

The three volumes of OPNAVINST 5100.19 (Series), Navy Safety and Occupational Health Program for Forces Afloat, were revised to reflect changes in references and surface ship/submarine safety requirements (e.g., addition of operational risk management (ORM); updates to chapter B3 Hazardous Materials).

OPNAVINST 5100.27 (Series), Navy Laser Hazards Control Program was modified to clarify the role of the Laser Safety Review Board and responsibilities for activity and command laser hazard control programs. This instruction is in the final stages of review by Navy Directives.

OPNAVINST 5100.12 (Series), Navy Traffic Safety Program was revised in FY 2007 to focus on changes that support the SECDEF/SECNAV 75% Mishap Reduction initiative and to comply with current federal regulations and DoD guidance. This policy is expected to be delivered in FY 2008.

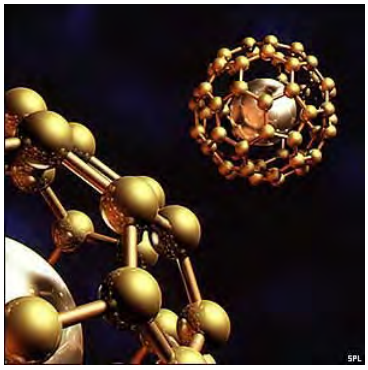
Documented citations issued by the Occupational Safety and Health Administration (OSHA) to Navy facilities. OSHA expects employers (e.g., U.S. Navy) to learn from violations that have been "cited previously for a substantially similar condition." Details of these citations are posted

at http://www.safetycenter.navy.mil/osh/shore/citations/default.htm. The Navy uses the posted OSHA citations to perform trend analyses and to identify program and implementation areas where improvements are needed to prevent future citations.

Coordinated efforts with the Joint Service General Purpose Mask (JSGPM) Working Group to obtain an OSHA alternate standard for the JSGPM and the integration of the OSHA alternate standard into the DoD Installation Protection Steering Group. The next generation military mask will be used for all military unique and non-military unique operations. Military units deployed to perform national defense contingency actions at DoD installations in the aftermath of CBRN terrorist attacks will wear the new Joint Service General Purpose (JSGPM) military gas mask.

The JSGPM provides enhanced protection against CBRN agents and toxic industrial chemicals. With the alternate standard, DoD will be in compliance with federal requirements for masks used for non-military unique operations to be NIOSH approved for Chemical, Biological, Radiological and Nuclear (CBRN) agents. When DoD is granted an alternate OSHA standard, then DoD installation first responders wearing the JSGPM will be interoperable with military units (also equipped with the JSGPM) deployed to perform national defense contingency actions at DoD installations. This respirator interoperability will allow for replacement canisters and mask repair parts to be interchanged between the DoD installation first responders and the military units deployed to assist the installation.

Continued development of the Acquisition Safety Web pages http://www.safetycenter.navy.mil/acquisition/default.htm. The *Acquisition Safety* web pages are a work in progress for addressing the most significant safety challenges facing the Defense Acquisition and Navy Safety and Occupational Health communities during planning of ship, weapons, and aircraft systems. The goal of this website is to promote incorporation of safety and occupational health factors into all stages of the Defense Acquisition Process by discussing the challenges, communicating information on Best Practices, and sharing successful Navy acquisition safety and health initiatives. This year, the Acquisition Safety Executive Overview was updated to include Laser Radiation and Radiofrequency Radiation hazards.



Artist's depiction of fullerene with functional payload used in nanotechnology applications.

Additional sections on Nanotechnology and Electrical Shock were drafted in FY 2007 the former section explores the concern in the DON that hazards will be identified with some nanomaterials after they are manufactured and in use. The latter explores the challenges of hazardous energy sources and the importance of planning to minimize or eliminate these hazards during the system design phase of new acquisitions. These two sections will be completed in FY 2008.

Following are some examples of Hazard Abatement projects accomplished during 2007:

Ergonomics Project for Fort Kam, Pearl Harbor HI

Built in 1970, the wastewater treatment plant at Fort Kamehameha ("Ft. Kam", Pearl Harbor, Hawaii) processes 6-million gal/day of wastewater produced by the military and civilian population of more than 50,000. The treatment process begins as screens remove material from the raw wastewater and discharge them into a compactor. The raw wastewater is then pumped to primary clarifiers for separation of more solid matter. During clarification, skimmers collect scum from the surface and bottom of the clarifier. Next, aeration tanks provide oxygenation to support waste-devouring bacteria. Secondary clarifiers then remove most remaining suspended solids. Finally, the wastewater flows through effluent filters, to remove remaining particulate, and into an ultraviolet disinfection system, that kills any residual bacteria. The clean wastewater is then discharged into the ocean.

Collected sludge sits in digester tanks for more than 30 days, where "good" bacteria break down (digest) the material thereby reducing its volume and odor. The sludge is then dewatered and discarded. Treatment plant employees are responsible for a wide range of labor intensive activities to maintain the tanks, pumps, conveyors, blowers, filters, wells, pool and drying beds.

The plant engineer was particularly concerned with the ergonomics hazards associated with employees lifting the stop gates during pool isolation and cleaning settling pond filters. The plant engineer coordinated efforts with the Navy Ergonomics Subject Matter Experts for the submission and execution of a Mishap Prevention and Hazard Abatement project to eliminate the hazards.

As seen in photos each stop gate measures 96" x 30" and weighs approximately 120 pounds, the gates are positioned 6” below the deck. The six gates per pool are lifted and lowered at least twice a year, if not more frequently.

Two overhead handling units, similar to a gantry crane were fabricated to lift the stop gates above the deck. One gantry is positioned at each end of the waste pools. The overhead units virtually eliminate handling of the heavy gates and the associated hazards.

Downward facing stainless steel weir gates (3) were installed at the surface level of three of the waste pools. Opening the gates will allow skimming the scum / debris off the surface before the pool is drained. Draining off most of the scum / debris will reduced the quantity and time associated with hand shoveling the scum / debris off the bottom once dried. The improvement did not eliminate the repetitive shoveling or handling of heavy loads but did reduce the duration and severity of the exposure.

Return on investment potential is not yet fully realized due to the recent completion of the project. It can be projected that the two gantries eliminated the risk of injury. According to Bureau of Labor Statistics data from 2003, the average cost of a cumulative trauma injury is $15,757. If one injury is projected as being adverted, the ROI is realized in 141 days. In

addition it can also be projected that the weir gates reduced handling and processing time by 50%.

Two people are required to lift gate into place and lower it on to the frame guides.

Gantry type lifts for isolation gates

Fall Protection for Stacked Furnaces Naval Support Activity (NSA) Mechanicsburg, PA

Safety industry design engineers from the Naval Facilities Engineering Command Southwest (NAVFAC SW) Hazard Abatement Implementation Team (HAIT) conducted a site survey to gather data on ten stacked furnaces at Naval Support Activity (NSA) Mechanicsburg, PA.

HAIT personnel visited the site in November 2005 and accompanied by site personnel examined the ten buildings in question. This detailed survey of the buildings and furnaces revealed many fall hazards of which the most common were inadequate or missing guardrails, unprotected ladder openings, and limited or no access to the side of the furnaces that must serviced. Using the information from this visit, potential OSHA compliant options were developed for each hazard and a detailed cost/benefit trade-off analysis was conducted resulting in a Site Analysis containing recommendations for the “best value” resolutions to the verified hazards.

HAIT design engineers returned to the site in June 2006 to take detailed measurements and generate computer models of the existing structures. From this data, design and fabrication drawings were prepared and submitted to the site for comment and review. When all comments were resolved, separate SOWs were prepared for fabrication and implementation and with the approved drawings, released to a number of qualifying companies to obtain quotes for the respective efforts. Subcontracts were awarded for both efforts, all materials fabricated and implementation completed by mid August 2007.

Furnace Rooms without platforms or access ladders:

Furnace Rooms with new platforms and access ladders:

Electrical Shock Hazard and Degraded Maintenance Capability at Naval Base Ventura Country (NBVC) PT Mugu, CA, Hangar 533

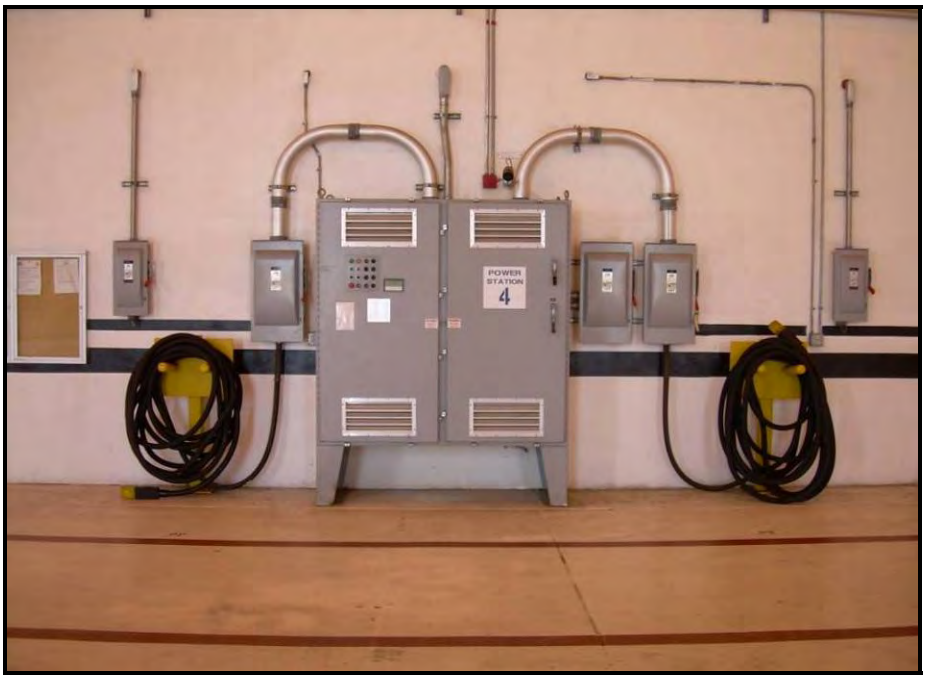
In March of 2007, as a follow-up to a previous survey done in August of 2004 of the power systems associated with Hangar 553, NAVFAC SW Hazard Abatement Implementation Team electrical and power quality specialists conducted a detailed survey of the 400 Hz Inverter Systems inside the hangar and the 300 KVA Flight Line Electrical Distribution System (FLEDS). This visit served to validate and document personnel safety hazards and discrepancies previously brought to light, enabled the Team to clearly define a Statement of Work (SOW), and determine the funding required for corrective action.

The inspection revalidated the hazards previously outlined dealing with poor grounding measures that resulted in high noise voltage on aircraft fuselages and put both personnel and sensitive electronic equipment at risk. It was determined that in order to correct the issues the power supply equipment needed to be properly grounded to comply with NEC and NAVFAC criteria and proper electrical grounding points needed to be provided to comply with MIL-HDBK-274(AS) requirements.

In addition to correcting the existing hazards, it was determined that better protection could be provided for both operating personnel and systems, by installing a ground fault monitoring system previously utilized to provide protection in hangars at NAS JRB Fort Worth, TX.

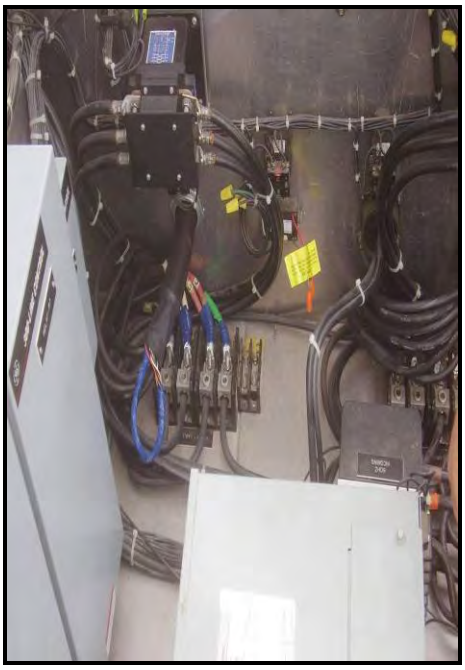
In order to ensure full compliance with applicable federal, state and local requirements, and because implementation of the electrical hazards was to be a relatively short term event, NAVFAC SW issued a subcontract (through a competitive bid process) to a qualified electrical contractor in the vicinity of Pt Mugu to provide the qualified personnel and materials to satisfy the requirements of the SOW. This alleviated the many issues associated with wide variations in state/local licensing, bonding and insurance requirements, and more importantly eliminated the majority of travel/per diem expenses.

On July 9th 2007, under the oversight of the NAVFAC HAIT, the contractor initiated the corrective actions necessary to resolve these hazards. Approximately three weeks into the project a modification was made to the SOW to add additional grounding points to the rear FLEDS line in order to remove a personnel safety issue that was observed first hand during the repair process. The entire repair process, including the additional work associated with the modification, was completed in approximately five weeks, successfully removed all the hazards identified and increased the safety environment of both personnel and equipment.



The 400 HZ Inverters were not bonded to building steel and therefore were not configured as derived systems in violation of NEC and NAVFAC criteria. The existing configuration was allowing voltage to circulate on the airplane's skin thereby exposing personnel to possible shock hazards and degrading sensitive aircraft components. Aircraft cables were not protected against faults.

Existing ground wires were extended to allow them to be connected to the terminal blocks which were then bonded to the neutral. Ground Leakage Monitoring units were installed to monitor aircraft cables and provide additional safety protection to both maintenance personnel and aircraft equipment.



The FLEDS were not configured as derived systems in violation of NEC and NAVFAC criteria. This raised the same issues as with the hangar inverters. Maintenance personnel were attaching the safety grounding cables to the aircraft Tie Downs in the front row of the FLEDS because there were no proper grounding points available. In many instances the impedance of these Tie Downs exceeded the maximum limit to provide a safe grounding source.

In the back row, the grounding cups were positioned in front of the normal aircraft positions causing the maintenance personnel to abandon these grounds whenever the aircraft engines were engaged to prevent the possibility of Foreign Object Debris (FOD) from entangling in the propellers. Therefore, when the aircraft were powered up with the power cables still attached and the ground cable removed, thus posing an electrical safety risk to hazard to personnel.

Electrical vaults, local to each FLEDS, were found to be flooded putting electrical cables underwater. They were subsequently pumped out and the ground rods located in the vaults. Ground cables were then exothermically welded to existing rods to provide the best permanent connection.

As with the hangar systems, ground leakage monitors were installed with Sum Current Transformers (CT) to provide fault protection. The FLEDS were load tested after repairs and the fault monitors adjusted to insure the proper operation and provide critical protection to personnel and equipment.

Please note that March 31, 2008 is the deadline for submitting hazard projects into the HA Database for consideration and prioritization to obtain initial funding during fiscal year (FY) 2009. Current plans are for the Project Selection Board (Murder Board) meeting to be held during the month of May to select from the submitted projects those that will be executed in the FY 2009. The Project Selection Board consists of the Regional HAPMs and the major claimant Points of Contact or their designated representatives.

If you have any questions or would like any additional information about the Mishap Prevention & Hazard Abatement Program please contact:

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The Navy Professional Development Conference (PDC) will be held March 10-14, 2008. Cathy, Basil and I are available for presentations at the Claimant breakouts sessions (Please contact us individually to make arrangements). You will also be able to obtain addition program information at the Ergonomic and Fall Protection displays in the PDC Exhibition Room on Monday and Tuesday.

Attachment J-0200000-03
MISHAP PREVENTION & HAZARD ABATEMENT (MPHA) PROGRAM 2008 REPORT

The MPHA program is dedicated to improving the safety and working conditions of our Navy members world-wide. This report will highlight a few of the 2008 accomplishments of the program in working to achieve those goals. Maybe one of the following projects could be repeated at your command or you have questions about a possible hazard abatement project, please contact one of the program members noted at the end of this document:

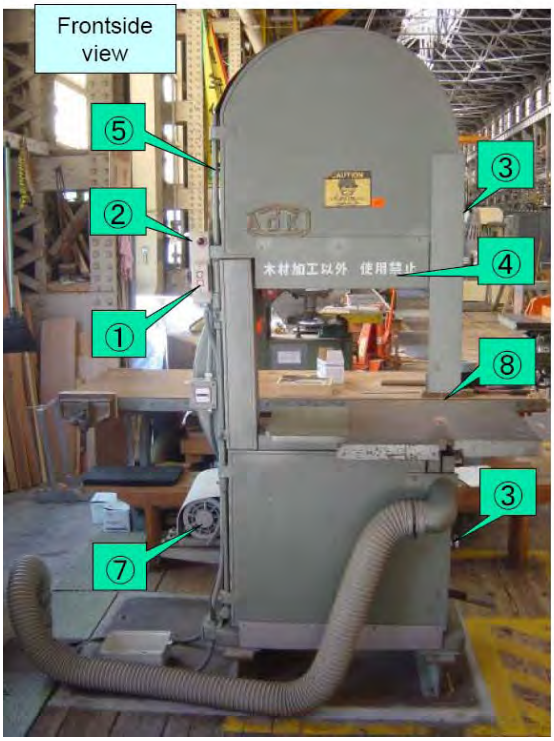
Machine Guarding Project for U.S. Navy Ship Repair Facility (SRF) and Japan Regional Maintenance Facility (JRMC) Yokosuka, JA

Built in 1865 the shipyard at Yokosuka, Japan was known as the Yokosuka Iron Works. This shipyard was one of the largest shipbuilding and repair sites of the Imperial Japanese Navy during World War II. The facility was surrendered to the U.S. in 1945.

In 1947 the shipyard was opened by U.S. Forces as the Ship Repair Department Fleet Activities, Yokosuka with an Officer-in-Charge, a staff of 75 U.S. Navy personnel and 576 former Japanese Imperial Navy workers. Over the years the facility has expanded to meet the needs of the U.S. presence in the Pacific. Today the facility employs U.S. military and civil service workers as well as over 2,000 Japanese Nationals. The facility consists of 6 dry-docks, 19 wet berth locations, 10 industrial buildings and a combined workspace of 730,000 square feet. Yokosuka and Sasebo detachment are home to 18 ships of the Forward Deployed Naval Forces serving the U.S. Seventh Fleet. Yokosuka is now the home port of the USS George Washington, the only nuclear-powered ship ever to be forward deployed to Japan.

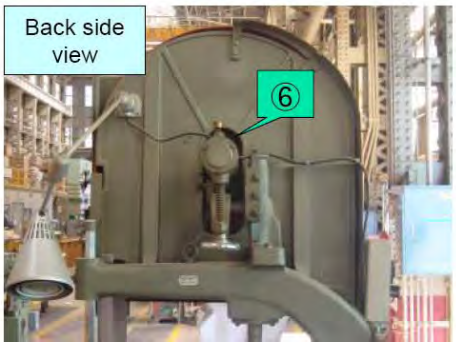
Due to the long history of the facility combined with the unchanged mission, many of the early machines have remained. Therefore it was not surprising that machine guarding deficiencies were identified in a safety inspection of the shops. The deficiencies consisted of missing or absent guards on various machines as well as other machine safety issues such as missing emergency shut off switches. Machine guarding was also among OSHA's top ten for most frequently cited standards resulting in some of the highest penalties in 2008. The project was submitted to the Hazard Abatement Program and was subsequently selected for funding. The project is being phased over a period of years due to the number of machines to be guarded.

The return on investment potential is not yet fully realized since the machine guarding is being installed over several years. According to the Bureau of Labor Statistics, 2002 data metal and woodworking machinery were among those most often identified with lost workdays. Although it is difficult to determine the return on investment due to the wide range of costs for each machine, many of the hazards have been mitigated with the guards in place. In addition to the physical installation of the guards, machine guard training was provided to the machine operators, their supervisors, safety specialists and safety managers. Positive responses to the training and the shops establishment of a machine guard maintenance plan should ensure that the machine operators will continue to work safely using the machine guards.
As an example, the following band saw "before" photos show the hazards identified by the machine guard assessment team while the "after" photos show the machine properly guarded.

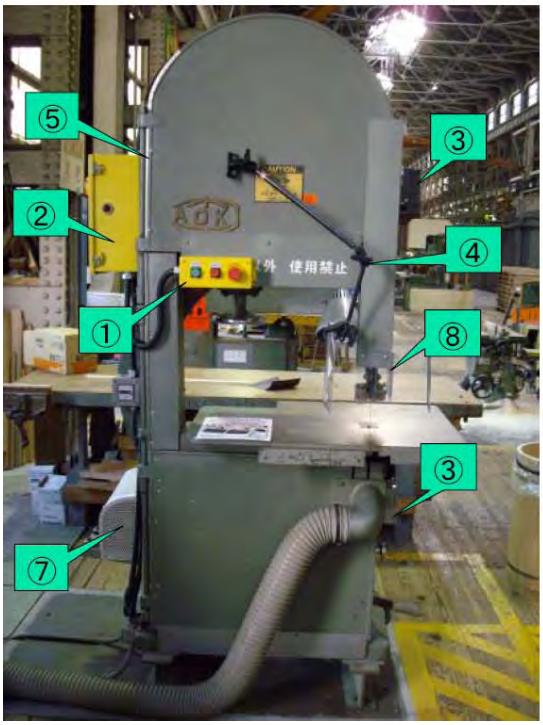


——— Work Contents———

1. Combination Disconnect Motor Starter
2. Motor Starter
3. Safety Door switch for top and bottom maintenance door
4. Shield ASSY 90 degree 31" Arm
5. Sheet metal guard (hinge area)
6. Sheet metal guard (upper door)
7. Mesh metal guard (motor compartment)
8. Transparent guard (saw area)



Before: Band saw showing areas where guarding is needed.



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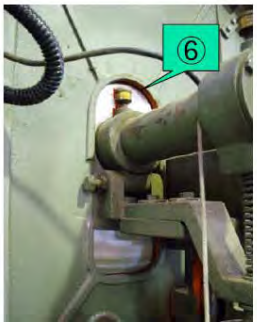


After: Band saw after machine guards installed.

Fall Abatement Resolutions at Naval Computer and Telecommunication Station (NCTS), Cutler, ME

The primary mission of NCTS Cutler is to provide a VLF broadcast link between high level command authority ashore and U.S. and NATO ships, planes, and submarines operating at sea in areas of broadcast coverage. A previous study by Cutler safety personnel reported significant fall hazards - situations in which maintenance personnel would be in danger of sustaining injuries by falling while working on or operating equipment - in both the North and South Helix Houses. The Naval Facilities Engineering Command Southwest (NAVFAC SW) Mishap Prevention and Hazard Abatement (MPHA) Team was tasked to evaluate the fall hazards, develop, design and implement "best value" resolutions to the validated hazards.

The May 2003 U.S. Navy Fall-Protection Guide For Ashore Facilities (and the primary reference for OPNAVINST 5100.23G, Chapter 13, Fall Protection Program), states ". . . the standard fall protection height for federal employees (military and civil service) on US Navy Ashore Facilities is 4 feet as per 29 CFR 1910, Subpart D." The guide goes on to say ". . . fall protection must be provided each employee on any elevated surface ABOVE 4 FEET including working from ladders – where there is a possibility of a fall to a lower level, onto dangerous equipment, or environment or onto impalement hazards."

NCTS Cutler broadcasts VLF radio signals through two very large circular antenna arrays, each with a diameter of about one mile and supported by approximately twenty 980 ft towers. Radio signals generated in the transmitter are tuned and frequency matched to the antennas by the elements in the Helix Houses, located at the center of each array. Because of the strong electromagnetic (EM) field generated within the Helix Houses, they must be shut down before personnel are allowed to enter. During the initial survey, the Team was told that the North and South Helix House (the one evaluated) configurations are practically identical.

Each house is 80-foot high and shaped like a "Y". At the base of the "Y" is a room containing the electrical equipment that creates the radio signal which is then conducted to two of the six panels of the antenna array. From the two rooms at the ends of the arms, also 80-ft high, the signal is conducted to the remaining four panels of the antenna array. All walls, ceilings and floors of the Helix Houses are lined with grounded shielding material.

Helix house

The intense EM field generated within a Helix House during operation also places material restrictions on any fall abatement resolutions introduced within range of the EM field. Because the supporting fixtures within the Helix House must not interfere with the broadcast signal, the primary construction material for both structures and fasteners is laminated wood. Proposed designs also had to consider that any material of a permanently implemented resolution that could either conduct or re-radiate an EM signal could degrade the facility's operability capability.

Within each Helix House are a variety of structures, each with their own unique fall hazards. The laminated wood structures are held together with threaded wooden bolts and nuts, and are in many cases over 40 years old. A good number of fasteners are at heights up to 40 ft and require inspection by hand on an annual basis to determine their integrity. The only possible anchorage points available to the maintenance crew were the wooden members of the structure they were climbing and inspecting and it was doubtful whether they would be strong enough to resist the forces produced by a fall.

At several locations in each Helix House, maintenance is required at ceiling level, which is 80 feet high. In these locations, scaffolding was built from the ground up, which took several hours, and guy-wired to local plumbing. Anchoring in this manner is an OSHA violation in that there must be engineered anchor points to connect and stabilize the scaffolding structure. Once the work was completed, the scaffolding was dismantled and removed from the Helix House. The wooden structures, as well as the insulators along the ceiling of the Helix Houses require frequent dusting to keep the entire structure electrically insulated. At regular intervals, the tallest wood support structure and laminated wood nuts and bolts holding it together must be inspected for deterioration. On occasion, adjustments must be made by hand to the tuning components of the helix house, again at height.

The MPHA Team generated design and fabrication design drawings for the final recommended resolutions to the Safety and facility managers and maintenance technicians and Space and Naval Warfare System (SPAWAR) Subject Mater Experts (SMEs) for review and comment. Solutions proposed included OSHA compliant guardrails, swing gates, customized anchored ladders, raised platforms with guardrails, and mobile mechanized lifts. Agreement was reached on the designs and all materials were fabricated for both the North and South Houses and shipped to the site. Funding was provided through the Navy Hazard Abatement Program. As a result of subsequent meetings with SPAWAR SMEs, a few items were redesigned and fabricated from non-conducting materials (fiberglass) to ensure there would be no any interference with the generated electromagnetic field.

The MPHA Team worked closely with facility personnel and the implementation contractor and facility to schedule all work during a brief operational stand-down. Work commenced on 09 September and completed on 01 October 2008, a week earlier than originally planned. At the conclusion of the implementation, SPAWAR SMEs conducted full power (110%) tests and have indicated in their final report that the installed fall abatement resolutions did not interfere with the operation of the Helix House. Facility maintenance personnel were also complementary in their assessment of the resolutions and stated that in addition to their safety, the maintenance procedures would be greatly simplified and the time spent on maintenance significantly reduced.

Horn gap access platform

Deicing switch access ladder and platform

Ladder and rail on elevated gallery

Large trap door (closed) with safety rail

Ergonomic Resolutions at Naval Base Kitsap (NBK), Bangor WA

The safety specialist at NBK Bangor submitted a Hazard Abatement (HA) project after reviewing and validating the risk factors found with the paper sorting process within the recycle facility.

Recyclable paper was transported to the facility and dumped onto the floor. Two to three times a week, depending on the volume of material, two workers sorted the paper. The task exposed workers to direct compression on their lower extremities from sitting or kneeling on the floor; awkward postures associated with reaching, bending and twisting in combination with a high repetition rate.
The project was validated by the Navy Subject Matter Experts (SMEs) at Naval Facilities Engineering Command (NAVFAC). NAVFAC manages the MPHA program and provides no-cost technical ergonomics support to all Navy activities. The Ergonomists assisted NBK Bangor with the project execution.

The recycle center staff worked in conjunction with the safety professional at NBK Bangor to design a custom system that would eliminate the risk factors associated with the sorting task.

Paper is now dumped directly onto the table and moved towards the workers. The workers are able to easily and efficiently sort the paper at elbow height which eliminates reaching and twisting. The custom sorting system not only eliminated the risk factors but increased productivity by eliminating the transportation of sorted paper and reducing wasteful motions. Paper is sorted faster with fewer errors. The system has been well received and is being well used by the recycle center staff.

Recycle center paper sorting process

Recycle center paper sorting process exposures workers to a high rate of bending and twisting.

Recycle centers’ new sorting system eliminates awkward postures, twisting and bending.

Recycle centers’ new sorting system eliminates awkward postures, compression, twisting and bending.

Resolution of Electrical Safety Hazards at Fleet Readiness Center (FRC) Naval Air Station, Oceana, VA

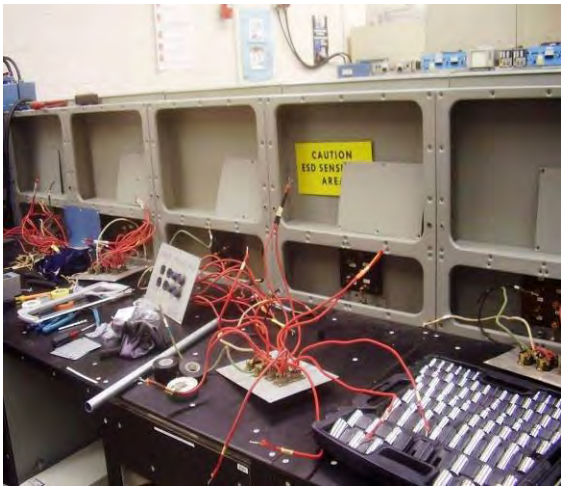
In August of 2007, as a follow-up to a 2004 survey of the FRC Building 513 power systems, Naval Facilities Engineering Command Southwest (NAVFAC SW) Mishap Prevention and Hazard Abatement (MPHA) Team electrical and power quality specialists conducted an inspection of the numerous work centers located within the FRC. Prior to the initial 2004 survey, the base had just started a major upgrade of the FRC building and work centers. The 2007 inspection was conducted to determine what recommendations from the earlier survey had been correctly implemented during the upgrade; document the remaining safety hazards and discrepancies, enable the Team to prepare a detailed Statement of Work (SOW), and determine the funding required for corrective actions needed to bring the electrical systems into compliance with current electrical safety codes.

The inspection revalidated most of the hazards previously identified dealing with improper wiring and grounding measures as well as errors in labeling/circuit identification, all of which put both personnel and sensitive electronic equipment at risk. These OSHA/NFPA/NEC deficiencies presented clear personnel safety hazards and were also violations of SPAWARINST 5100.9D (Navy Shore Electronics Safety Precautions) and NAVAIR 01-1A-512 (Design Guide For Avionics Shop Power Distribution). Among the discrepancies and hazards noted were:

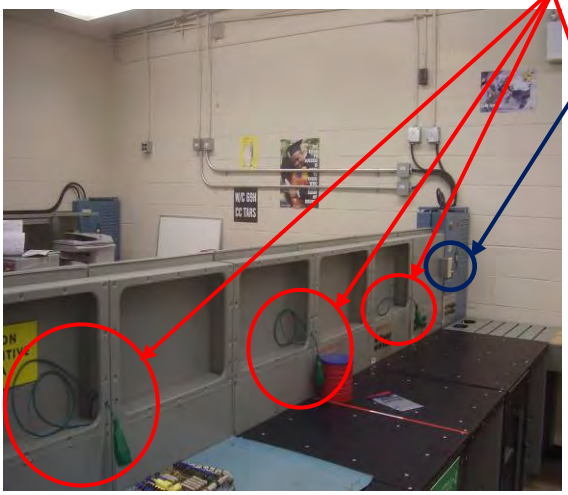
- Internal bench wiring not properly color-coded
- Ground loops which allowed current flow through equipment housings
- Approximately 111 workbench sections, 74 Power Output Panels and 22 PS-1A + 28V Power Supplies improperly wired
- 60 Hz Ground Fault Circuit Interrupter (GFCI) protection missing from all electronic workbenches
- Circuit breakers misidentified
- Improperly sized circuit breaker protection
- Lack of local disconnect means
- Safety straps missing from workbenches
- Loose ground fittings

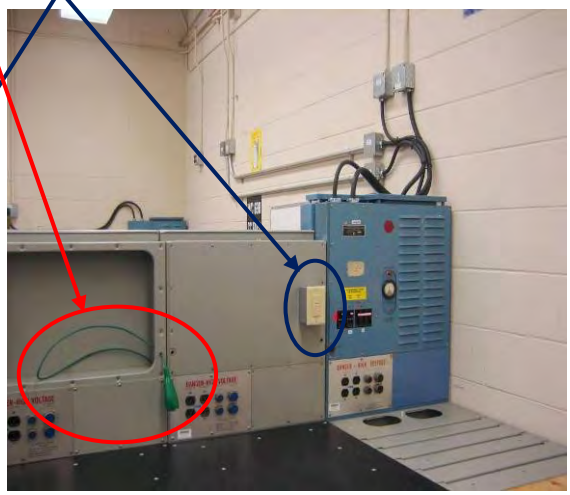
In April 2008, as a result of an open competitive bid process, NAVFAC SW awarded a firm fixed priced contract to a local Oceana firm to provide qualified personnel and code compliant materials to correct the electrical safety hazards identified. A pre-implementation meeting was held in mid-May with representatives from NAVFAC SW, the selected contractor, all involved avionics shops, safety and security codes to coordinate security, safety and access requirements prior to the start of the work.

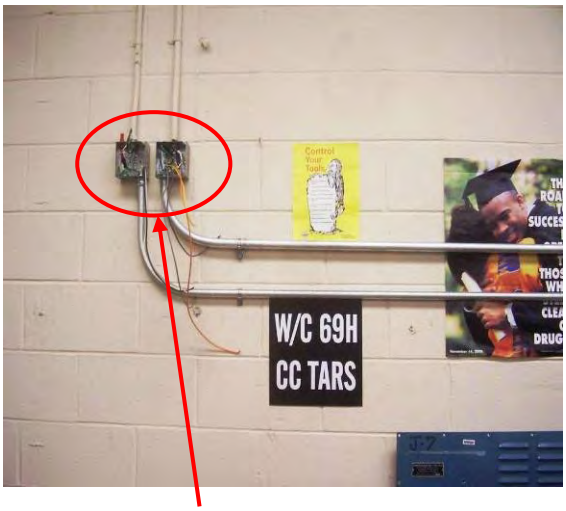
Two weeks later implementation efforts were initiated, with continuous oversight by a member of the NAVFAC SW MPHA Team. All hazard resolutions were fully and successfully implemented in 11 weeks with no major disruptions to FRC operations or maintenance activities. The most intensive efforts were centered on rewiring over 100 workbenches to conform to NFPA/NEC, SPAWAR and NAVAIR requirements.

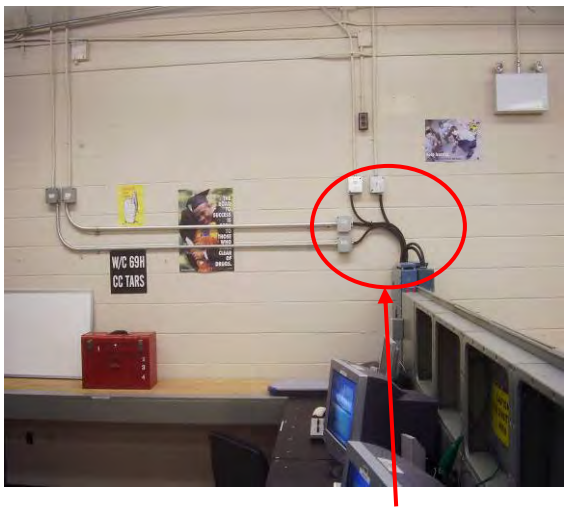


Workbench wiring was gutted and benches were rewired to meet NAVAIR / SPAWAR / NEC requirements including ground safety straps, GFCI protection and correct color coding.

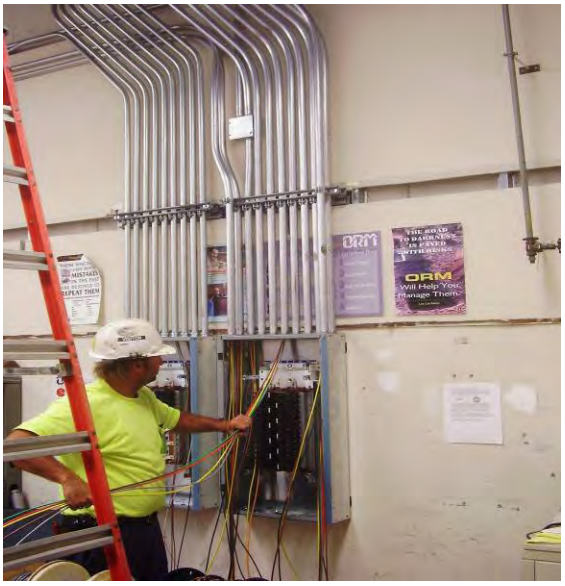








Unused 400Hz and 60Hz circuits were utilized to introduce additional supply circuits going to the benches in order to comply with the maximum outlet per circuit requirements outlined in the NEC.



In FRC Room 512, work center 640, dedicated 400Hz and 60Hz panels were installed to correct several issues including providing a local disconnect means, correcting wire size and colors, isolating the neutrals between the 400Hz and 60Hz circuits, providing necessary grounding and providing a safe circuit distribution system to replace the old custom aluminum raceways that contain inherent safety issues that could cause shock injuries to personnel.

The successful correction of the electrical safety hazards translates to a significant increase in the safety environment of both personnel and equipment. NAVFAC SW will continue to monitor work center maintenance factors and ready-for-issue statistics to determine the rate of return-on-investment previously estimated to be $1.2M per year for a typical work center.

The MPHA Ergonomics Program has recently been augmented by the addition of Dr. Lee T. Ostrom, Ph.D., CSP, CPE to the Team. Dr. Ostrom joined General Dynamics Information Technology (under contract to the NAVFAC to evaluate and resolve fall, electrical and ergonomic hazards), from the University of Idaho where he was an associate professor and taught classes in Ergonomics, Risk Assessment, Safety, Industrial Technology, and Project Management. He is also the author and/or co-author of numerous articles related to these areas and has presented papers and lectures at national and international symposiums. He has been a member of The Human Factors Society, The American Institute of Aeronautics and Astronautics, The American Society of Safety Engineers, The American Industrial Hygiene Association, The Society of Automotive Engineers, and The System Safety Society.
The Navy Ergonomics SME, Cathy Rothwell, has recently nominated Dr. Ostrom to serve on the committee that will revise MIL-STD-1472F, Human Engineering Design Criteria for Military Systems, Equipment and Facilities.

Ergonomics program members developed and posted the two-tiered interactive web-based ergonomics training modules, General Ergonomics Awareness and Ergonomics for SOH Personnel. General Ergonomics Awareness satisfies the requirement that all personal shall have general ergonomics awareness training and is available on the Enterprise Safety Administrative Management System (ESAMS) and both will soon be available on Navy Knowledge Online. Both the General Ergonomics Awareness and Ergonomics for SOH Personnel is currently posted and available on the Defense Ammunition Center website https://ammoschool.sumtotalsystems.com These courses are free for all DoD employees. All non-DoD employees (those without a ".mil" email address) are required to pay a $500 course fee.

The group also developed the Ergonomics Guidelines for Office Chair Selection. This guidance document identifies the salient features of a well designed chair to assist purchasers in making informed choices in selecting chairs to reduce risk to injury. This document is currently posted on the NSC website.

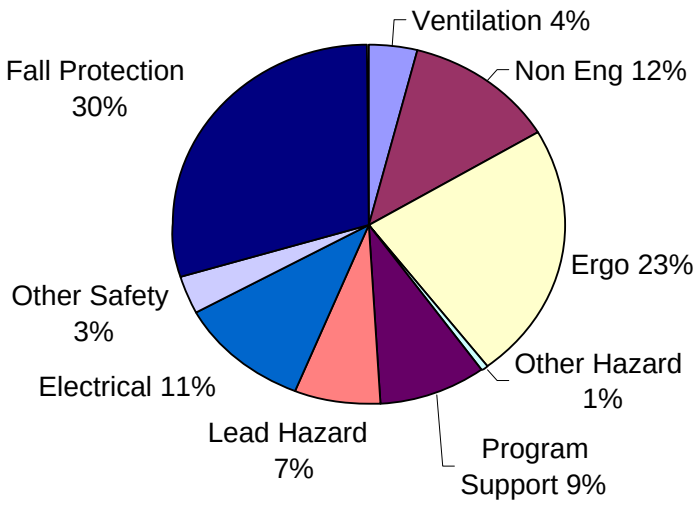
For more info go to the Ergonomics tab of www.navfac.navy.mil/safety

Increasing awareness of hazards and ways to avoid them are all important goals addressed by members of the MPHA program. At the 2009 Safety Professional Development Conference, the MPHA program will provide instructors for classes in Fall Protection, Ergonomics and this year a class on Electrical Safety covering basic electrical principles, hazards, regulatory requirements and more.

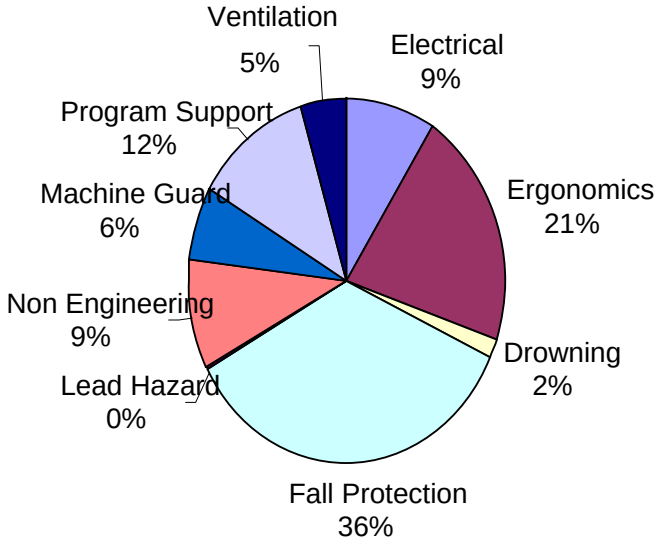
Efforts are ongoing to make changes that will improve the customer experience when submitting a project to the Hazard Abatement Program.

- The MPHA Lean Six Sigma (LSS) project has progressed with several changes aimed at increasing the ease of project submittals and providing pertinent information for current or prospective customers.
- The MPHA Website continues to be enhanced with new documents that provide guidance in project preparation, information for a better understanding of the program and help our customers gain benefits from the HA program.
- The hazard abatement database now allows the administrator to make email announcements, provides more details in those announcements of new projects, and has undergone Activity/UIC verifications to note just a few of the accomplishments.

FY 08 MPHA Execution by %



FY09 MPHA Proposed Execution by %



Please note that March 31, 2009 is the deadline for submitting hazard projects into the HA Database for consideration and prioritization to obtain initial funding during fiscal year (FY) 2010. Current plans are for the Project Selection Board meeting to be held during the month of May to select from the submitted projects those that will be executed in the FY 2010. The Project Selection Board consists of the Regional HAPMs and MPHA program manager.

If you have any questions or would like any additional information about the Mishap Prevention & Hazard Abatement Program please contact:

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The Navy Professional Development Conference (PDC) will be held in San Diego March 16-20, 2009. Cathy, Basil and I are available for presentations at the Claimant breakouts sessions (Please contact us individually to make arrangements).

You will also be able to obtain program information at the MPHA Program, Ergonomic, and Fall Protection displays in the PDC Exhibition Room on Monday and Tuesday the week of the Conference.

Attachment J-0200000-03
MISHAP PREVENTION & HAZARD ABATEMENT (MPHA) PROGRAM 2009 REPORT

The MPHA program is dedicated to improving the safety and working conditions of our Navy military and civilian personnel world-wide. This report highlights a few of the 2009 challenges and accomplishments of the program in working to achieve those goals. The following are descriptions of selected projects executed by MPHA program funding during 2009.

Ergonomic Resolutions to Emergency Medical Responses at Naval Air Station (NAS) Lemoore, CA, NAS Fallon, NV, and NAS Jacksonville, FL.

Federal firefighters are faced with an ever-changing, uncontrolled work environment when manning ambulances. Patients are commonly moved from homes and barracks with narrow passageways and multiple flights of stairs. Once at the hospital, the ambulance crew transfers the patient from the ambulance to the emergency room, and then to a short-term care ward stretcher for treatment.

During the loading process the technician at the foot of the gurney bears the weight of both the gurney and the patient while pushing the gurney into the ambulance. The process may be complicated if the feet of a tall patient interfere with the gurneys' base controls and hand-holds.

During the unloading process, the gurney is removed from the ambulance with one technician outside the ambulance at the foot of the gurney and the other technician inside the ambulance. The technician at the foot pulls the gurney out until the base drops and supports the gurney weight. Again, the patient's feet can obstruct the handhold which requires the technician to flex forward while bearing all the weight of the gurney and patient.
Technicians noted stress fractures on the gurneys from this operation and back fatigue at the end of a shift even if the 'best posture' was maintained, Photos 1 and 2.

Photo 1

Photo 2

The major ergonomics risk factor for the ambulance technicians is excessive lifting forces due to manual handling of the gurney. To reduce the risk of injury, powered gunnies were provided to federal firefighters at NAS Lemoore, NAS Fallon and NAS Jacksonville. The powered systems raise and lower the patient using electro-hydraulics. The gurneys also incorporate fold down features which enable them to be easily maneuvered in constrained spaces such as elevators, tight hallway corners and small rooms. The new gurneys are capable of handling 700 lbs which enables the technicians to respond to virtually any emergency without having the patient wait for special bariatric equipment /units.

After using the powered gurney for a week, one technician stated; ‘at the end of the week my lower back was not feeling the normal fatigue we all know so well. When lifting a regular gurney, even with proper body mechanics you still bend and lean forward to lift and grasp the manual release levers, with the power gurney this was not necessary.’

Photo 3

As shown in Photo 3 above, the powered ambulance gurney raises and lowers patients with an electric hydraulic power reducing the forceful exertion in awkward postures typically found in the emergency response community. The adjustable load height with jog function allows the operator to preset the height of the load wheels to meet the ambulance deck. The jog function assists operators when loading on an incline by jogging past the preset load height. The high-speed hydraulic lift raises and lowers the patient with the touch of a button and fully retracts in 2.4 seconds, reducing load and unload times.

The Bureau of Labor and Statistics, estimates that a lower back injury costs $27,000 (2007 data). The MPHA Program purchased two gurneys and two stair chairs for each of the three locations, Lemoore, Fallon and Jacksonville. If one back injury is prevented at each site with this new equipment, there is an immediate return on investment.

Global Hazard - Brows

Brows are movable bridges used by personnel to board or leave a ship, submarine, or other vessel while in port. They’re generally used between a vessel and a pier, but may be used between two vessels as well. Brow configurations vary in width and length and the location on the ship - fantail, amid ships, or bow - determines which is used. Once installed, they may extend from the vessel horizontally, or at an upward or downward angle.

In addition to the brow itself, a variety of other materials are often used. The vessel end of a brow is often placed atop wooden pallets, blocks, or other materials in order to elevate it above a deck, bulwark, or gunwale. This prevents the brow from abrading the ship’s paint and deck nonskid. The same materials may also be used as steps or stairs in cases when a brow is elevated well above a deck or pier.

Wooden pallets, although used for many years, have inherent features which make them unsuitable for use with brow installations. They have a discontinuous surface which has caused personnel to trip, fall, or otherwise injure themselves. They often sustain latent damage that isn’t discovered until they’re stepped on. Undamaged wooden pallets have also been known to fail underfoot due to insufficient strength. In 2005 four injuries, including a broken ankle, were reported due to wooden pallets that were used in brow installations.

Prior research by Naval Station (NAVSTA) Mayport, FL safety personnel identified a variety of fall hazards due to the use of wooden pallets in brow installations at their site - situations in which personnel leaving or boarding the ship could be in danger of falling.

The Mishap Prevention and Hazard Abatement (MPHA) Program funded a “proof-of-concept” project to investigate the extent of the hazard and develop prototype brow stand(s) that would eliminate the need for the transition materials, i.e., wood/metal pallets, steps, etc., currently used.

NAVFAC MPHA Safety/Design engineers made several visits to NAVSTA San Diego, CA to gather information on the different configurations of brows and “adaptors.” In most cases, the pier end of the brow had some moveable mechanism (wheels or rollers) that allowed some limited movement to accommodate changes in the local tide. The ship ends were secured to guardrails or nearby ship structures with chains or rope and had one or more wood or metal pallets stacked between the brow and ship deck. The photos below show typical ship to pier (Photo 1) and pier to ship (Photo 2) configurations.

Photo 1

Photo 2

The MPHA engineers worked through several design iterations before the first prototype was fabricated and subjected to field tests at NAVSTA San Diego. Comments from ship’s company resulted in subsequent design changes which reduced the weight and increased stability. The final prototype subjected to field tests has resulted in very positive feedback from ship’s company. Final “as-built” drawings, including options for fabrication of three sizes to accommodate various brow widths, are available for follow-on development and deployment. Photos 3 and 4 below show the final design as delivered and in field testing.

Photo 3 – as delivered

Photo 4 – Undergoing final field tests

<u>Dry Dock #1, Pearl Harbor Naval Shipyard (PHNSY) & Intermediate Maintenance Facility (IMF)</u>

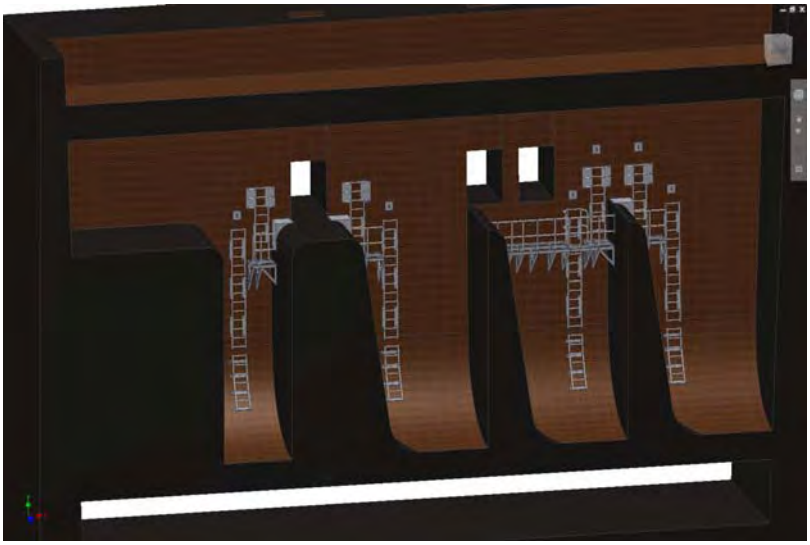
The PHNSY & IMF was built in the early 1900's as the Pearl Harbor Navy Yard. It is the largest ship repair facility between the West coast and Far East consisting of 114 buildings and 4 dry docks on 112 acres. The shipyard's primary mission is to provide regional maintenance to keep surface ships and submarines "Fit to Fight".

Dry-dock Pumpwell and Engineering Section personnel conduct regular inspection and maintenance to ensure that the dry docks are in operational condition. At Dry Dock #1, this includes Sluice Gates SG-13, 14, & 15 and Main Pumps 1, 2, 3, & 4. The sluice gates are 22-1/2 feet below street level and the main pump discharge chambers are another 24-1/2 feet below the sluice gates. When performing maintenance and inspection of the sluice gates and main pumps and their respective discharge chambers personnel must access each space via extension ladders and/or rope ladders which are set up from street level. Entry into these spaces presents a serious fall hazard which is exacerbated by its limited access and wet conditions.

Rails and walk platforms were designed to provide safe access to the Dry Dock #1 spaces.

View: Looking down access ladder.

Schematic diagram displays proposed ladder and walk platforms.



EA-6B Prowler Tail Maintenance

The tail of the EA-6B contains control mechanics as well as a pod for various electronics. As such, there is longer than average maintenance performed on the tail section. This had been accomplished with the use of a scissor lift, a B-1 maintenance stand, or a B-4 maintenance stand. Because neither the lift nor the stands provided access all portions of the tail without bypassing their guardrails, conducting certain maintenance procedures on some portions of the tail exposed personnel to fall hazards – situations where there was a potential to fall more than four feet. Following an information gathering site visit, NAVFAC Mishap Prevention and Hazard Abatement (MPHA) design engineers conducted a analysis which compared the costs and trade-off benefits of several potential OSHA compliant solutions. The result was a recommendation to NAVFAC to procure a maintenance stand from a proven vendor that would allow access to three sides of the tail section and provide the fall protection required.

The stand was delivered, assembled and personnel training held in January 2009. At this point, the stand is still being evaluated, but NAVFAC is aware that other Navy bases with EA-6Bs have expressed their desire for a large stand which can be used for longer term phase maintenance and the current design could also be modified to provide fall protection to other high tail aircraft. If sufficient interest is relayed to NAVFAC, this could be a candidate for designation as a “global” HA project. Figures 1 and 2 below show the stand as assembled and in use at NAF Washington.

Figure 1 – Tail Stand assembled

Figure 2 – Tail Stand in place

Material Handling and Storage Solutions at Naval Submarine Support Facility (NSSF) New London, Groton, CT

Naval Submarine Base New London is the United States Navy's primary submarine base, the "Home of the Submarine Force", and "the Submarine Capital of the World. All submariners in today's Navy will be stationed at Naval Submarine Base New London (SUBASE NLON) for training and perhaps a tour onboard a fast attack submarine or with a pre-commissioning crew while their new submarine is under construction. SUBASE NLON is home to more than 40 tenant commands including the submarines and crews of Submarine Group TWO, the faculty and students of the Submarine School, and the Naval Submarine Support Facility (NSSF).

The base supports twenty one attack submarines and the Navy's nuclear research deep submersible vessel NR-1. Naval Submarine Support Facility (NSSF) provides repair and maintenance assistance to vessels home ported at SUBASE NLON.

Photo 1:: Before the index unit, round stock retrieval was time consuming and required multiple pieces to be moved using a sling and hoist in order to locate the correct pieces. Workers risked injury from the repeated material handling in less than optimal postures.

Various raw metals are used during the maintenance and repair processes. Manual material handling and storage issues with angle iron, round stock and sheet metal were identified by the safety office in 2004. NSSF requested an ergonomics assist visit after submitting a Mishap Prevention and Hazard Abatement (MPHA) Project for the round stock. Subsequent projects were submitted and approved for the angle iron and sheet metal. A vertical index system virtually eliminates the manual handling storage and retrieval tasks. The storage system houses all the raw materials, and delivers it to the personnel around elbow height. Elbow height handling of material typically results in less back bending.

Photo 2: Stock stored in the horizontal plane

The index system delivers the sheet metal quickly. Improves sheet metal quality and reduces handling time and unnecessary finish work because storage will be exclusively indoors and in one unified location. Saves time and effort when completing a project due to less preparation work through product specific storage and quicker product access time. Round stock system has security controls to limit access to level one stock and incorporates a grabbing claw and overhead hoist Systems have inventory control functions to track stock in real time.

Photo 3 (Left): Angle iron and sheet metal was previously stored outside increasing production time due to unnecessary preparation. Index system for angle iron installation projected Feb 2010.

Photo 4 (Right):: The index system delivers the sheet metal quickly and eliminates risk associated with carrying sheet metal long distances or lifting in awkward postures. The system reduces waste by improving sheet metal quality and reduces handling time and unnecessary finish work because storage will be exclusively indoors and in one unified location.

Ergonomic Resolutions to the Dental Community at Naval Hospital Rota, Spain

In July 1951, President Dwight D. Eisenhower named a commission to visit Spain to explore the possibility of strengthening ties between the two countries. On September 26, 1953, after almost two years of surveys, negotiations and planning, the Mutual Defense, Economic Aid and Defense Agreements were signed by the governments of Spain and the United States. Naval Station Rota now covers more than 6,000 acres in an area recognized for its strategic and maritime importance over the centuries. In 1956, the first base dispensary in Rota was opened. In August of 1989, the new hospital building expanded the space from 57,000 square feet to 139,000 square feet. Of the many services offered to the 5,000 active duty and civilian employees by Naval Hospital (NH) Rota, the Dental Directorate is tasked with preventing and treating oral disease or injury that may interfere with military duties and early diagnosis of oral disease to decrease cost, time, and improve combat readiness.

Ergonomics studies of the dental work force have documented significant occurrences of chronic ergonomics stressors, work-related musculoskeletal disorders and discomfort. In numerous clinical studies, musculoskeletal disorders were cited by almost one-third of the dentists as the primary cause of early retirement (ahead of cardiovascular disease, neurotic symptoms and tumor causes). Over 50% of dental hygienists surveyed report suffering from chronic shoulder, back and neck pain with almost identical percentages for these same body regions among both male and female dentists.

The industrial hygiene department at NH Rota recognized the opportunity to take a proactive approach to reducing the identified ergonomics stressors that affect their personnel. A Certified Industrial Hygienist for the Industrial Hygiene Department initiated a follow-up ergonomics field survey and then consulted the Navy Ergonomics Subject Matter Experts (SMEs) at the request of the treating physical therapist. As part of this field evaluation, the dental technicians were asked to complete a discomfort survey. The results disclosed significant discomfort in the upper-mid-lower back and pelvis and indicated a high exposure to the ergonomics risk factors of prolonged static and awkward seated postures shown in Photos 1, 2, and 3.

Photos 1 & 2: Prolonged dental procedures force dentists and technicians into maintaining prolonged awkward postures while bending over patients. Other ergonomics stressors include highly repetitious movements of the hands while exerting high forces from using dental tools with small diameter grips.

The NAVFAC Ergonomics SME worked remotely with the NH Rota Dental clinic leadership and the industrial hygiene department to research, test, and purchase specialty dental seating with new innovative designs. The new seats (Photo 3) offer staff members optimal lumbar support and adjustability and torso / arm support during patient care (Photo 4).

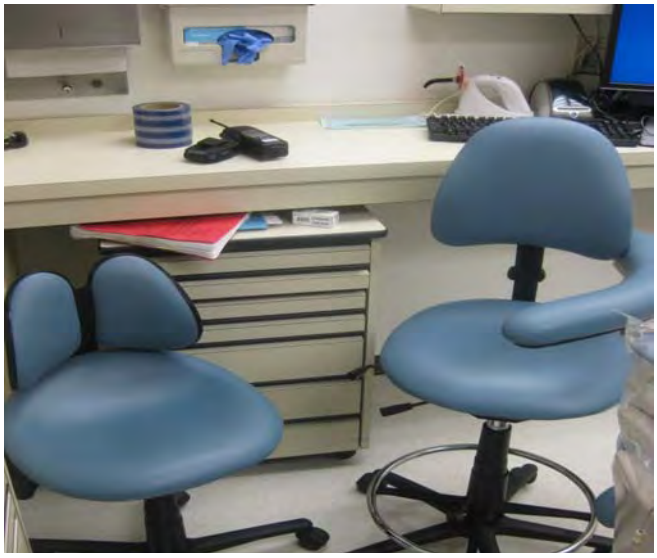


Photo 3 - Dentist (left) and assistant chair (right) were selected for trial testing under actual patient care

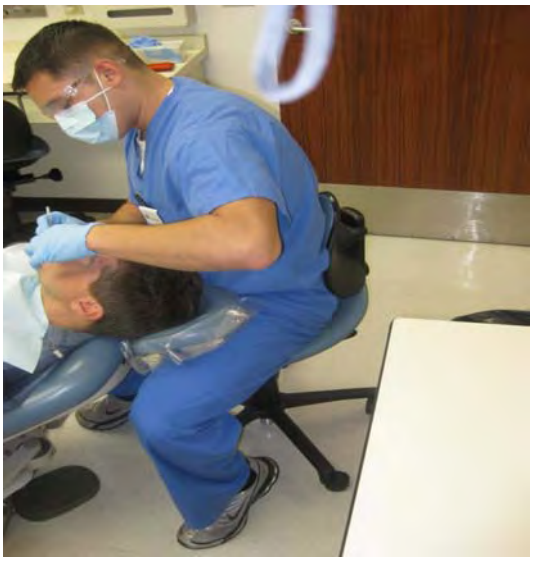


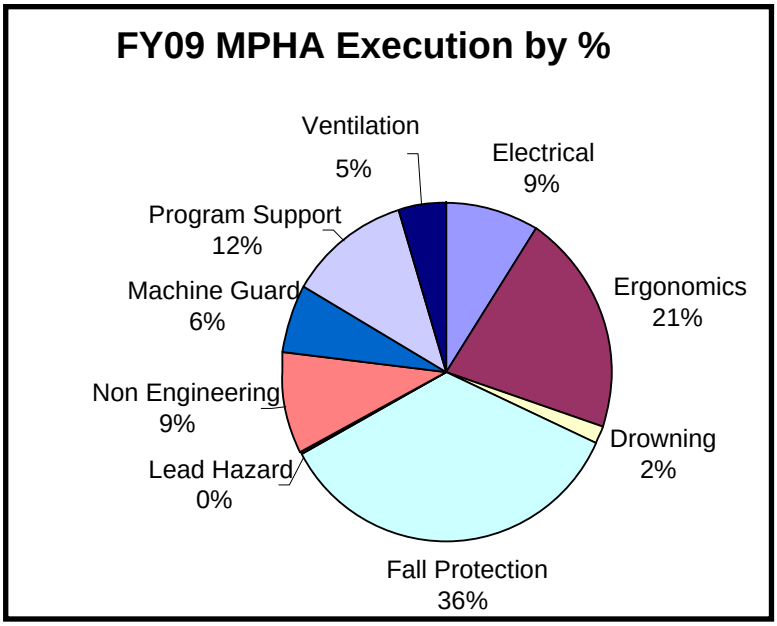
Photo 4 – Dentists improved posture during actual patient care

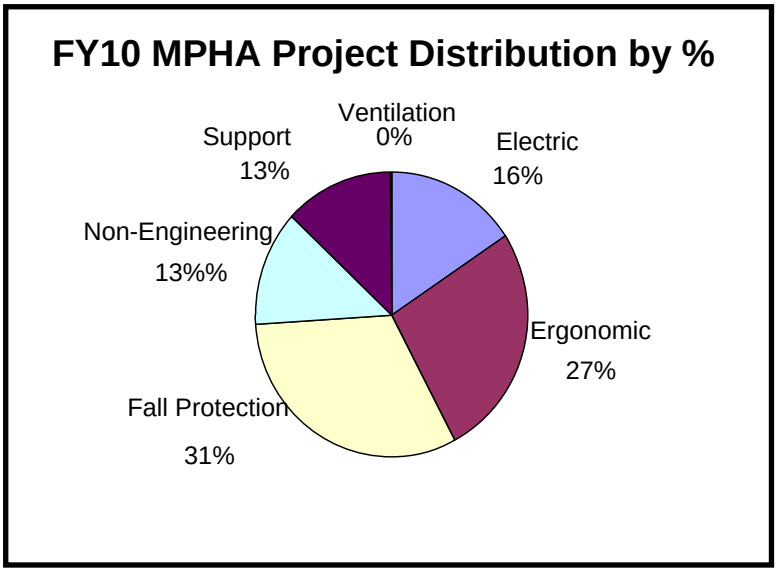
From initial exposure at a dental equipment trade show and other recommendations from previous dental interventions, dentist and assistant chairs (left & right, respectively) were selected for trial testing at the Rota clinic under actual patient care conditions. The Mishap Prevention and Hazard Abatement (MPHA) Program provided $15,000 to replace Rota Clinic's patient-side chairs.

Initial reaction from the Rota dental providers has been highly positive. The knowledge gained from this real-world field test will now be provided by the Navy SMEs to dental clinics Navy-wide that are also intent on making similar improvements toward providing ergonomically sound working conditions and maximizing productivity and comfort.

In terms of gross financial Return-on-Investment (ROI), a cost/benefit analysis used $15,000 for an estimated cost for 17 dental chairs. In light of the fact that lost time for one back, shoulder, or neck WMSD injury, according to Bureau of Labor and Statistics data, can cost the Navy up to $27,000 in lost work days and rehabilitation costs, such an investment represents an immediate ROI of nearly 200% if one such injury is avoided.

MPHA Program Funding Information:





DEPARTMENT OF THE NAVY
COMMANDER, NAVY INSTALLATIONS COMMAND
716 SICARD STREET, SE, SUITE 1000
WASHINGTON NAVY YARD, DC 20374-5140

Canc frp: Jun 11
CNICNOTE 5530
N3AT

JUL 12 2010

CNIC NOTICE 5530

From: Commander, Navy Installations Command

Subj: *RAPID*GATE IMPLEMENTATION FOR NON-COMMON ACCESS CARD (CAC) CONTRACTORS/VENDORS PROGRAM WITHIN CONUS REGIONS, NAVY REGION HAWAII AND JOINT REGION MARIANAS

Ref: (a) OPNAVINST 5530.14E
(b) *RAPID*Gate Standard Operating Procedure (SOP)
(c) SECNAV 5210.1 Navy Records Management Manual

1. Purpose

a. To implement the *RAPID*Gate Program for Navy Regions in the Continental United States (CONUS), Hawaii and Guam.

b. The *RAPID*Gate Program is the standard identity management and perimeter installation access control solution for the access management of vendors, contractors, suppliers and service providers who are not authorized a Common Access Card (CAC).

2. Background and Concept of Operations

a. Reference (a) provides over-arching Navy policy, guidance, information, procedures and responsibilities for the Navy Physical Security and Law Enforcement Program. The *RAPID*Gate Program is an operational application of Navy security and law enforcement policy. It operates on the principle of driver, rather than cargo, verification with each access request.

b. The *RAPID*Gate Program has been tested and implemented in Navy Region Southwest and three installations within Naval District Washington. To date there are 38 Department of Defense installations operating with the *RAPID*Gate Program in CONUS and Hawaii.

c. The *RAPIDGatee* identity management and perimeter installation access control solution is specifically designed to manage recurring vendors, contractors, suppliers and other service providers who are not authorized a CAC. It uses the following concept of operations:

(1) A *RAPID*Gate credential is issued and base access granted once the enrollee passes vetting and National background checks conducted by *RAPID*Gate systems maintained by the vendor at the installation.

(2) Participants that successfully enroll into *RAPID*Gate and subsequently approved for access by the installation are not required to obtain a new pass from the Base Pass and Identification Office for each visit and are not subjected to mandatory commercial vehicle inspection unless during higher Force Protection Condition Operations or required by a periodic Random Access Control Measure. Access authorization can be controlled and monitored by base security personnel and restricted to specific days and time periods.

(3) Government costs to implement *RAPID*Gate system are minimal and consist of providing electrical power, analog phone lines and space for registration station kiosks at the Pass and Identification Offices.

(4) The majority of the *RAPID*Gate costs are borne by the commercial vendors/contractors who require access to the installation and participate in the program, through fees to the *RAPID*Gate vender.

(5) Costs to Vendor participants are recaptured through increased productivity of their employees due to the reduction of waiting times at the Pass and Identification Offices and Entry Control Points (ECP).

3. *RAPID*Gate Objectives

a. Standardize the process across Commander, Navy Installations Command (CNIC)Region/Installation to enroll, vet, credential and electronically control access privileges of non-CAC vendors/contractors requesting to access an installation.

b. Improve efficiency and effectiveness at Pass and Identification Offices through a reduction in the issuance of routine business passes and other locally produced credentials.

4. Responsibilities

a. Each Region will establish a *RAPID*Gate Point of Contact to the CNIC N61 Regional Support to CNIC N3 at (202) 433-2845 or via email to Sharon.gibson@navy.mil.

b. Each Installation will establish a *RAPID*Gate Standard operating Procedure (SOP) and Post Orders, using the CNIC *RAPID*Gate SOP as a template.

c. Installations will maintain a daily Visitor Pass program for those non-CAC vendors/contractors who choose not to enroll in the *RAPID*Gate Program, although it is expected that this service may be reduced in scope due to significantly lower requirements.

d. To remain eligible to support Navy Installations the *RAPID*Gate Program will:

(1) comply with best security practices and Defense Information Assurance Certification and Accreditation Process (DIACAP) information assurance controls and prohibits the storage of Personally Identifiable Information on mobile devices.

(2) ensure perimeter installation access control management in near real time: by individual (with biometric authentication of identity) and company; privileges by time of day, day of week and by installation (one or more as authorized).

(3) Remain responsible for program enrollment and Background screening.

5. Records Management. Records created as a result of this notice, regardless of media and format, shall be managed in accordance with Navy's records management manual, reference (c).

6. Forms and Reports

a. The *RAPID*Gate Program produces a Monthly Activity Report for each installation which provides an overview of active companies, participants, ingresses by ECP and other useful

information for purposes of managing the program.

M. C. Vitale

M. C. VITALE
Vice Admiral, U.S. Navy

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NAVSAFENVTRACEN
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NAVFACENGCOMSOUTHWEST
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25 MAY 2010

MEMORANDUM OF UNDERSTANDING
BETWEEN
COMMANDING OFFICER,
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST AND
COMMANDING OFFICER,
NAVAL SAFETY AND ENVIRONMENTAL TRAINING CENTER

Subj: MEMORANDUM OF UNDERSTANDING

1. Purpose: This Memorandum of Understanding is negotiated by and between, Naval Safety and Environmental Training Center (NAVSAFENVTRACEN) and Naval Facilities Engineering Command Southwest (NAVFAC Southwest). The purpose of this agreement is to establish the conditions and responsibility for providing a Navy Ergonomics Program (A-493-0085) course for NAVSAFENVTRACEN.

2. Scope: This agreement is limited to the delivery of the Navy Ergonomics Program course only including, but not limited to, developing and maintaining the curriculum, quota control, providing classrooms, instructors, travel/per diem and course materials.

3. Agreement/Understanding:

a. Commanding Officer, NAVFAC Southwest shall provide:

(1) Subject matter experts to assist in the maintenance of the course objectives and topic outline.

(2) Qualified instructor(s) for a maximum of five (5) regularly scheduled convenings. The central quota control enterprise Naval Training Reservation System (eNTRS) must be at least 75% full thirty days before the course convening for the course to be taught (50% for OCONUS courses). Salary of instructors will be paid by NAVFAC Southwest with centrally managed Hazard Abatement and Mishap Prevention (HAMP) Program funds.

(3) HAMP funding for travel and per diem for one (1) of the two instructors. Instructors shall stay in government quarters (Navy Gateway Inns (first priority) or Navy Lodge) unless they are unavailable and will follow the Joint Travel Regulations (JTR) cost guidelines for lodging and meals.

(4) Maintenance of student handouts/workbook, curriculum and lesson plans as agreed to through technical audits or with NAVSAFENVTRACEN course supervisor. Student workbook and instructor lesson guide will have the most current revision date on the front page of the document. Curriculum will cover both Navy and Marine Corps instructions and orders that apply to ergonomics.

(5) Print and ship student handouts/workbooks to designated class locations.

(6) Instructor(s) who will prepare the classroom for instruction, including but not limited to, ensuring course materials are brought into the classroom from storage facilities, and laying out course material for each student. Additionally, instructor(s) will ensure the classroom is left in an orderly fashion at the end of each day and at the conclusion of the course.

(7) Within thirty days of the class completion, provide NAVSAFENVTRACEN with the final class roster, student critique sheets, and student test answer sheets.

(8) On the first day of class, FAX a copy of the NAVSAFENVTRACEN Attendance Sheet to NAVSAFENVTRACEN. At the completion of the class FAX the NAVSAFENVTRACEN Attendance Sheet with exam grade, pass/fail and drop/attrite annotated as applicable.

(9) Demonstration materials and equipment (i.e., hand tools, hand strength tester, PPE, etc).

(10) Estimates of annual travel, per diem, printing and shipping expenses (demonstration materials) to NAVSAFENVTRACEN Fiscal Division prior to the start of each fiscal year.

(11) Detailed annual summary of actual expenses incurred for travel, per diem, printing and shipping expenses after the last convening of the year.

b. NAVSAFENVTRACEN will provide:

(1) A course schedule of convenings in the course catalog on the NAVSAFENVTRACEN website. The course schedule of convening's will be mutually agreed between NAVSAFENVTRACEN and NAVFAC Southwest prior to posting and changes to the posted schedule will only be made in emergent situations.

(2) Student Control and liaison with Central Quota Control.

(3) Classrooms

(4) Copies of:

(a) File to produce Course Completion Letter or Certificates

(b) Student Critique Sheets

(c) Student Desk Name Plates

(d) Course Student Roster with FAX cover sheet

(5) Funding for inclusion within the NAVFAC Southwest contract, to pay for travel and per diem for one instructor per convening. Instructors shall stay in government quarters (CSQ (first priority) or Navy Lodge) unless they are unavailable, and will follow the Joint Travel Regulations (JTR) cost guidelines for lodging and meals.

(6) Funding for inclusion in NAVFAC Southwest contract, to pay for printing of student handouts and student guides/workbooks, as well as shipping expenses for these materials to class locations.

(7) Duplicate and ship course compact disc (CD) to designated class locations.

(8) Audits and instructor reviews of the course to ensure adequate coverage of course topics and quality of instructors at least triennially.

(9) Ensure classroom sites have an LCD projector.

5. Modifications/Reviews: No changes shall be made to this agreement without the mutual review and consent of both parties. This Memorandum of Understanding is to be reviewed on a triennial basis or as needed.

6. Termination: NAVSAFENVTRACEN or NAVFAC Southwest may terminate this Memorandum of Understanding at anytime if funding or contract support is not available.

7. Effective Date: 1 June 2010

M. K. MAJAR
CDR, MSC, USN

S. K. HAMILTON
CAPT, CEC, USN

NOT MEASUREMENT SENSITIVE

MIL-STD-882D
10 February 2000

SUPERSEDING
MIL-STD-882C
19 January 1993

DEPARTMENT OF DEFENSE

STANDARD PRACTICE FOR SYSTEM SAFETY

AMSC N/A **AREA SAFT**

FOREWORD

1. This standard is approved for use by all Departments and Agencies within the Department of Defense (DoD).

2. The DoD is committed to protecting: private and public personnel from accidental death, injury, or occupational illness; weapon systems, equipment, material, and facilities from accidental destruction or damage; and public property while executing its mission of national defense. Within mission requirements, the DoD will also ensure that the quality of the environment is protected to the maximum extent practical. The DoD has implemented environmental, safety, and health efforts to meet these objectives. Integral to these efforts is the use of a system safety approach to manage the risk of mishaps associated with DoD operations. A key objective of the DoD system safety approach is to include mishap risk management consistent with mission requirements, in technology development by design for DoD systems, subsystems, equipment, facilities, and their interfaces and operation. The DoD goal is zero mishaps.

3. This standard practice addresses an approach (a standard practice normally identified as system safety) useful in the management of environmental, safety, and health mishap risks encountered in the development, test, production, use, and disposal of DoD systems, subsystems, equipment, and facilities. The approach described herein conforms to the acquisition procedures in DoD Regulation 5000.2-R and provides a consistent means of evaluating identified mishap risks. Mishap risk must be identified, evaluated, and mitigated to a level acceptable (as defined by the system user or customer) to the appropriate authority, and compliant with federal laws and regulations, Executive Orders, treaties, and agreements. Program trade studies associated with mitigating mishap risk must consider total life cycle cost in any decision. Residual mishap risk associated with an individual system must be reported to and accepted by the appropriate authority as defined in DoD Regulation 5000.2-R. When MIL-STD-882 is required in a solicitation or contract and no specific references are included, then only those requirements presented in section 4 are applicable.

4. This revision applies the tenets of acquisition reform to system safety in Government procurement. A joint Government/Industrial process team oversaw this revision. The Government Electronic and Information Technology Association (GEIA), G-48 committee on system safety represented industry on the process action team. System safety information (e.g., system safety tasks, commonly used approaches, etc.) associated with previous versions of this standard are in the *Defense Acquisition Deskbook* (see 6.8). This standard practice is no longer the source for any safety-related data item descriptions (DIDs).

5. Address beneficial comments (recommendations, additions, and deletions) and any pertinent information that may be of use in improving this document to: HQ Air Force Materiel Command (SES), 4375 Chidlaw Road, Wright-Patterson AFB, OH 45433-5006. Use the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter or electronic mail.

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1. SCOPE

1.1 Scope. This document outlines a standard practice for conducting system safety.

The system safety practice as defined herein conforms to the acquisition procedures in DoD Regulation 5000.2-R and provides a consistent means of evaluating identified risks. Mishap risk must be identified, evaluated, and mitigated to a level acceptable (as defined by the system user or customer) to the appropriate authority and compliant with federal (and state where applicable) laws and regulations, Executive Orders, treaties, and agreements. Program trade studies associated with mitigating mishap risk must consider total life cycle cost in any decision. When requiring MIL-STD-882 in a solicitation or contract and no specific paragraphs of this standard are identified, then apply only those requirements presented in section 4.

2. APPLICABLE DOCUMENTS

Sections 3, 4, and 5 of this standard contain no applicable documents. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples.

3. DEFINITIONS

3.1 Acronyms used in this standard. The acronyms used in this standard are defined as follows:

a.	AMSDL	Acquisition Management System & Data Requirement List
b.	ANSI	American National Standard Institute
c.	DID	Data Item Description
d.	DoD	Department of Defense
e.	ESH	Environmental, Safety, and Health
f.	GEIA	Government Electronic & Information Technology Association
g.	MAIS	Major Automated Information System
h.	MDAP	Major Defense Acquisition Program
i.	USAF	United States Air Force

3.2 Definitions. Within this document, the following definitions apply (see 6.4):

3.2.1 Acquisition program. A directed, funded effort designed to provide a new, improved, or continuing system in response to a validated operational need.

3.2.2 Developer. The individual or organization assigned responsibility for a development effort. Developers can be either internal to the government or contractors.

3.2.3 Hazard. Any real or potential condition that can cause injury, illness, or death to personnel; damage to or loss of a system, equipment or property; or damage to the environment.

3.2.4 Hazardous material. Any substance that, due to its chemical, physical, or biological nature, causes safety, public health, or environmental concerns that would require an elevated level of effort to manage.

3.2.5 Life cycle. All phases of the system's life including design, research, development, test and evaluation, production, deployment (inventory), operations and support, and disposal.

3.2.6 Mishap. An unplanned event or series of events resulting in death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.

3.2.7 Mishap risk. An expression of the impact and possibility of a mishap in terms of potential mishap severity and probability of occurrence.

3.2.8 Program Manager (PM). A government official who is responsible for managing an acquisition program. Also, a general term of reference to those organizations directed by individual managers, exercising authority over the planning, direction, and control of tasks and associated functions essential for support of designated systems. This term will normally be used in lieu of any other titles, e.g.; system support manager, weapon program manager, system manager, and project manager.

3.2.9 Residual mishap risk. The remaining mishap risk that exists after all mitigation techniques have been implemented or exhausted, in accordance with the system safety design order of precedence (see 4.4).

3.2.10 Safety. Freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.

3.2.11 Subsystem. A grouping of items satisfying a logical group of functions within a particular system.

3.2.12 System. An integrated composite of people, products, and processes that provide a capability to satisfy a stated need or objective.

3.2.13 System safety. The application of engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operational effectiveness and suitability, time, and cost, throughout all phases of the system life cycle.

3.2.14 System safety engineering. An engineering discipline that employs specialized professional knowledge and skills in applying scientific and engineering principles, criteria, and techniques to identify and eliminate hazards, in order to reduce the associated mishap risk.

4. GENERAL REQUIREMENTS

This section defines the system safety requirements to perform throughout the life cycle for any system, new development, upgrade, modification, resolution of deficiencies, or technology development. When properly applied, these requirements should ensure the identification and understanding of all known hazards and their associated risks; and mishap risk eliminated or reduced to acceptable levels. The objective of system safety is to achieve acceptable mishap risk through a systematic approach of hazard analysis, risk assessment, and risk management. This document delineates the minimum mandatory requirements for an acceptable system safety program for any DoD system. When MIL-STD-882 is required in a solicitation or contract, but no specific references are included, then only the requirements in this section are applicable. System safety requirements consist of the following:

4.1 Documentation of the system safety approach. Document the developer's and program manager's approved system safety engineering approach. This documentation shall:

a. Describe the program’s implementation using the requirements herein. Include identification of each hazard analysis and mishap risk assessment process used.

b. Include information on system safety integration into the overall program structure.

c. Define how hazards and residual mishap risk are communicated to and accepted by the appropriate risk acceptance authority (see 4.7) and how hazards and residual mishap risk will be tracked (see 4.8).

4.2 Identification of hazards. Identify hazards through a systematic hazard analysis process encompassing detailed analysis of system hardware and software, the environment (in which the system will exist), and the intended use or application. Consider and use historical hazard and mishap data, including lessons learned from other systems. Identification of hazards is a responsibility of all program members. During hazard identification, consider hazards that could occur over the system life cycle.

4.3 Assessment of mishap risk. Assess the severity and probability of the mishap risk associated with each identified hazard, i.e., determine the potential negative impact of the hazard on personnel, facilities, equipment, operations, the public, and the environment, as well as on the system itself. The tables in Appendix A are to be used unless otherwise specified.

4.4 Identification of mishap risk mitigation measures. Identify potential mishap risk mitigation alternatives and the expected effectiveness of each alternative or method. Mishap risk mitigation is an iterative process that culminates when the residual mishap risk has been reduced to a level acceptable to the appropriate authority. The system safety design order of precedence for mitigating identified hazards is:

a. Eliminate hazards through design selection. If unable to eliminate an identified hazard, reduce the associated mishap risk to an acceptable level through design selection.

b. Incorporate safety devices. If unable to eliminate the hazard through design selection, reduce the mishap risk to an acceptable level using protective safety features or devices.

c. Provide warning devices. If safety devices do not adequately lower the mishap risk of the hazard, include a detection and warning system to alert personnel to the particular hazard.

d. Develop procedures and training. Where it is impractical to eliminate hazards through design selection or to reduce the associated risk to an acceptable level with safety and warning devices, incorporate special procedures and training. Procedures may include the use of personal protective equipment. For hazards assigned Catastrophic or Critical mishap severity categories, avoid using warning, caution, or other written advisory as the only risk reduction method.

4.5 Reduction of mishap risk to an acceptable level. Reduce the mishap risk through a mitigation approach mutually agreed to by both the developer and the program manager. Communicate residual mishap risk and hazards to the associated test effort for verification.

4.6 Verification of mishap risk reduction. Verify the mishap risk reduction and mitigation through appropriate analysis, testing, or inspection. Document the determined residual mishap risk. Report all new hazards identified during testing to the program manager and the developer.

4.7 Review of hazards and acceptance of residual mishap risk by the appropriate authority. Notify the program manager of identified hazards and residual mishap risk. Unless otherwise specified, the suggested tables A-I through A-III of the appendix will be used to rank residual risk. The program manager shall ensure that remaining hazards and residual mishap risk are reviewed and accepted by the appropriate risk acceptance authority (ref. table A-IV). The appropriate risk acceptance authority will include the system user in the mishap risk review. The appropriate risk acceptance authority shall formally acknowledge and document acceptance of hazards and residual mishap risk.

4.8 Tracking of hazards, their closures, and residual mishap risk. Track hazards, their closure actions, and the residual mishap risk. Maintain a tracking system that includes hazards, their closure actions, and residual mishap risk throughout the system life cycle. The program manager shall keep the system user advised of the hazards and residual mishap risk.

5. DETAILED REQUIREMENTS

Program managers shall identify in the solicitation and system specification any specific system safety engineering requirements including risk assessment and acceptance, unique classifications and certifications (see 6.6 and 6.7), or any mishap reduction needs unique to their program. Additional information in developing program specific requirements is located in Appendix A.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This standard establishes a common basis for expectations of a properly executed system safety effort.

6.2 Data requirements. Hazard analysis data may be obtained from contracted sources by citing DI-MISC-80508, Technical Report - Study/Services. When it is necessary to obtain data, list the applicable Data Item Descriptions (DIDs) on the Contract Data Requirements List (DD Form 1423), except where the DoD Federal Acquisition Regulation Supplement exempts the requirement for a DD Form 1423. The developer and the program manager are encouraged to negotiate access to internal development data when hard copies are not necessary. They are also encouraged to request that any type of safety plan required to be provided by the contractor, be submitted with the proposal. It is further requested that any of the below listed data items be condensed into the statement of work and the resulting data delivered in one general type scientific report.

Current DIDs, that may be applicable to a system safety effort (check DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) for the most current version before using), include:

DID Number	DID Title
DI-MISC-80043	Ammunition Data Card
DI-SAFT-80101	System Safety Hazard Analysis Report
DI-SAFT-80102	Safety Assessment Report
DI-SAFT-80103	Engineering Change Proposal System Safety Report
DI-SAFT-80104	Waiver or Deviation System Safety Report
DI-SAFT-80105	System Safety Program Progress Report
DI-SAFT-80106	Occupational Health Hazard Assessment
DI-SAFT-80184	Radiation Hazard Control Procedures
DI-MISC-80508	Technical Report - Study Services
DI SAFT-80931	Explosive Ordnance Disposal Data
DI-SAFT-81065	Safety Studies Report
DI-SAFT-81066	Safety Studies Plan
DI-ADMN-81250	Conference Minutes
DI-SAFT-81299	Explosive Hazard Classification Data
DI-SAFT-81300	Mishap Risk Assessment Report
DI-ILSS-81495	Failure Mode, Effects, Criticality Analysis Report

6.3 Subject term (key word) listing.

Environmental
Hazard
Mishap
Mishap probability levels
Mishap risk
Mishap severity categories
Occupational Health
Residual mishap risk
System safety engineering

6.4 Definitions used in this standard. The definitions at 3.2 may be different from those used in other specialty areas. One must carefully check the specific definition of a term in question for its area of origination before applying the approach described in this document.

6.5 International standardization agreements. Certain provisions of this standard are the subject of international standardization agreements (AIR STD 20/23B, *Safety Design Requirements for Airborne Dispenser Weapons*, and STANAG No. 3786, *Safety Design Requirements for Airborne Dispenser Weapons*). When proposing amendment, revision, or cancellation of this standard that might modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels, including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.6 Explosive hazard classification and characteristic data. Any new or modified item of munitions or of an explosive nature that will be transported to or stored at a DoD installation or facility must first obtain an interim or final explosive hazard classification. The system safety effort should provide the data necessary for the program manager to obtain the necessary classification(s). These data should include identification of safety hazards involved in handling, shipping, and storage related to production, use, and disposal of the item.

6.7 Use of system safety data in certification and other specialized safety approvals. Hazard analyses are often required for many related certifications and specialized reviews. Examples of activities requiring data generated during a system safety effort include:

a. Federal Aviation Agency airworthiness certification of designs and modifications
b. DoD airworthiness determination
c. Nuclear and non-nuclear munitions certification
d. Flight readiness reviews
e. Flight test safety review board reviews
f. Nuclear Regulatory Commission licensing
g. Department of Energy certification

Special safety-related approval authorities include USAF Radioisotope Committee, Weapon System Explosive Safety Review Board (Navy), Non-Nuclear Weapons and Explosives Safety Board (NNWESB), Army Fuze Safety Review Board, Triservice Laser Safety Review

Board, and the DoD Explosive Safety Board. Acquisition agencies should ensure that appropriate service safety agency approvals are obtained prior to use of new or modified weapons systems in an operational or test environment.

6.8 DoD acquisition practices. Information on DoD acquisition practices is presented in the *Defense Acquisition Deskbook* available from the Deskbook Joint Program Office, Wright-Patterson Air Force Base, Ohio. Nothing in the referenced information is considered additive to the requirements provided in this standard.

6.9 Identification of changes. Due to the extent of the changes, marginal notations are not used in this revision to identify changes with respect to the previous issue.

GUIDANCE FOR IMPLEMENTATION OF A SYSTEM SAFETY EFFORT

A.1 SCOPE

A.1.1 Scope. This appendix provides rationale and guidance to fit the needs of most system safety efforts. It includes further explanation of the effort and activities available to meet the requirements described in section 4 of this standard. This appendix is not a mandatory part of this standard and is not to be included in solicitations by reference. However, program managers may extract portions of this appendix for inclusion in requirement documents and solicitations.

A.2 APPLICABLE DOCUMENTS

A.2.1 General. The documents listed in this section are referenced in sections A.3, A.4, and A.5. This section does not include documents cited in other sections of this appendix or recommended for additional information or as examples.

A.2.2 Government documents.

A.2.2.1 Specifications, standards, and handbooks. This section is not applicable to this appendix.

A.2.2.2 Other Government documents, drawings, and publications. The following other Government document forms a part of this document to the extent specified herein. Unless otherwise specified, the issue is that cited in the solicitation.

DoD 5000.2-R	Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs

(Copies of DoD 5000.2-R are available from the Washington Headquarters Services, Directives and Records Branch (Directives Section), Washington, DC or from the DoD Acquisition Deskbook).

A.2.3 Non-Government publications. This section is not applicable to this appendix.

A.2.4 Order of precedence. Since this appendix is not mandatory, in event of a conflict between the text of this appendix and the reference cited herein, the text of the reference takes precedence. Nothing in this appendix supersedes applicable laws and regulations unless a specific exemption has been obtained.

A.3 DEFINITIONS

A.3.1 Acronyms used in this appendix. No additional acronyms are used in this appendix.

A.3.2 Definitions. Additional definitions that apply to this appendix:

A.3.2.1 Development agreement. The formal documentation of the agreed-upon tasks that the developer will execute for the program manager. For a commercial developer, this agreement usually is in the form of a written contract.

A.3.2.2 Fail-safe. A design feature that ensures the system remains safe, or in the event of a failure, causes the system to revert to a state that will not cause a mishap.

A.3.2.3 Health hazard assessment. The application of biomedical knowledge and principles to identify and eliminate or control health hazards associated with systems in direct support of the life-cycle management of materiel items.

A.3.2.4 Mishap probability. The aggregate probability of occurrence of the individual events/hazards that might create a specific mishap.

A.3.2.5 Mishap probability levels. An arbitrary categorization that provides a qualitative measure of the most reasonable likelihood of occurrence of a mishap resulting from personnel error, environmental conditions, design inadequacies, procedural deficiencies, or system, subsystem, or component failure or malfunction.

A.3.2.6 Mishap risk assessment. The process of characterizing hazards within risk areas and critical technical processes, analyzing them for their potential mishap severity and probabilities of occurrence, and prioritizing them for risk mitigation actions.

A.3.2.7 Mishap risk categories. An arbitrary categorization of mishap risk assessment values often used to generate specific action such as mandatory reporting of certain hazards to management for action, or formal acceptance of the associated mishap risk.

A.3.2.8 Mishap severity. An assessment of the consequences of the most reasonable credible mishap that could be caused by a specific hazard.

A.3.2.9 Mishap severity category. An arbitrary categorization that provides a qualitative measure of the most reasonable credible mishap resulting from personnel error, environmental conditions, design inadequacies, procedural deficiencies, or system, subsystem, or component failure or malfunction.

A.3.2.10 Safety critical. A term applied to any condition, event, operation, process, or item whose proper recognition, control, performance, or tolerance is essential to safe system operation and support (e.g., safety critical function, safety critical path, or safety critical component).

A.3.2.11 System safety management. All plans and actions taken to identify, assess, mitigate, and continuously track, control, and document environmental, safety, and health mishap risks encountered in the development, test, acquisition, use, and disposal of DoD weapon systems, subsystems, equipment, and facilities.

A.4 GENERAL REQUIREMENTS

A.4.1 General. System safety applies engineering and management principles, criteria, and techniques to achieve acceptable mishap risk, within the constraints of operational effectiveness, time, and cost, throughout all phases of the system life cycle. It draws upon professional knowledge and specialized skills in the mathematical, physical, and scientific disciplines, together with the principles and methods of engineering design and analysis, to specify and evaluate the environmental, safety, and health mishap risk associated with a system. Experience indicates that the degree of safety achieved in a system is directly dependent upon the emphasis given. The program manager and the developer must apply this emphasis during all phases of the system's life cycle. A safe design is a prerequisite for safe operations, with the goal being to produce an inherently safe product that will have the minimum safety-imposed operational restrictions.

A.4.1.1 System safety in environmental and health hazard management. DoD 5000.2-R has directed the integration of environmental, safety, and health hazard management into the systems engineering process. While environmental and health hazard management are normally associated with the application of statutory direction and requirements, the management of mishap risk associated with actual environmental and health hazards is directly addressed by the system safety approach. Therefore, environmental and health hazards can be analyzed and managed with the same tools as any other hazard, whether they affect equipment, the environment, or personnel.

A.4.2 Purpose (see 1.1). All DoD program managers shall establish and execute programs that manage the probability and severity of all hazards for their systems (DoD 5000.2-R). Provision for system safety requirements and effort as defined by this standard should be included in all applicable contracts negotiated by DoD. These contracts include those negotiated within each DoD agency, by one DoD agency for another, and by DoD for other Government agencies. In addition, each DoD in-house program will address system safety.

A.4.2.1 Solicitations and contracts. Apply the requirements of section 4 to acquisitions. Incorporate MIL-STD-882 in the list of contractual compliance documents, and include the potential of a developer to execute section 4 requirements as source selection evaluation criteria. Developers are encouraged to submit with their proposal a preliminary plan that describes the system safety effort required for the requested program. When directed by the program manager, attach this preliminary plan to the contract or reference it within the statement of work; so it becomes the basis for a contractual system safety program.

A.4.3 System safety planning. Before formally documenting the system safety approach, the program manager, in concert with systems engineering and associated system safety

professionals, must determine what system safety effort is necessary to meet program and regulatory requirements. This effort will be built around the requirements set forth in section 4 and includes developing a planned approach for safety task accomplishment, providing qualified people to accomplish the tasks, establishing the authority for implementing the safety tasks through all levels of management, and allocating appropriate resources to ensure that the safety tasks are completed.

A.4.3.1 System safety planning subtasks. System safety planning subtasks should:

a. Establish specific safety performance requirements (see A.4.3.2) based on overall program requirements and system user inputs.

b. Establish a system safety organization or function and the required lines of communication with associated organizations (government and contractor). Establish interfaces between system safety and other functional elements of the program, as well as with other safety and engineering disciplines (such as nuclear, range, explosive, chemical, and biological). Designate the organizational unit responsible for executing each safety task. Establish the authority for resolution of identified hazards.

c. Establish system safety milestones and relate these to major program milestones, program element responsibility, and required inputs and outputs.

d. Establish an incident alerting/notification, investigation, and reporting process, to include notification of the program manager.

e. Establish an acceptable level of mishap risk, mishap probability and severity thresholds, and documentation requirements (including but not limited to hazards and residual mishap risk).

f. Establish an approach and methodology for reporting to the program manager the following minimum information:

(1) Safety critical characteristics and features.

(2) Operating, maintenance, and overhaul safety requirements.

(3) Measures used to eliminate or mitigate hazards.

(4) Acquisition management of hazardous materials.

g. Establish the method for the formal acceptance and documenting of residual mishap risks and the associated hazards.

h. Establish the method for communicating hazards, the associated risks, and residual mishap risk to the system user.

i. Specify requirements for other specialized safety approvals (e.g., nuclear, range, explosive, chemical, biological, electromagnetic radiation, and lasers) as necessary (reference 6.6 and 6.7).

A.4.3.2 Safety performance requirements. These are the general safety requirements needed to meet the core program objectives. The more closely these requirements relate to a given program, the more easily the designers can incorporate them into the system. In the appropriate system specifications, incorporate the safety performance requirements that are applicable, and the specific risk levels considered acceptable for the system. Acceptable risk levels can be defined in terms of: a hazard category developed through a mishap risk assessment matrix; an overall system mishap rate; demonstration of controls required to preclude unacceptable conditions; satisfaction of specified standards and regulatory requirements; or other suitable mishap risk assessment procedures. Listed below are examples of safety performance statements.

a. Quantitative requirements. Quantitative requirements are usually expressed as a failure or mishap rate, such as "The catastrophic system mishap rate shall not exceed x.xx X 10^{-y} per operational hour."

b. Mishap risk requirements. Mishap risk requirements could be expressed as "No hazards assigned a Catastrophic mishap severity are acceptable." Mishap risk requirements could also be expressed as a level defined by a mishap risk assessment (see A.4.4.3.2.3), such as "No Category 3 or higher mishap risks are acceptable."

c. Standardization requirements. Standardization requirements are expressed relative to a known standard that is relevant to the system being developed. Examples include: "The system will comply with the laws of the State of XXXXX and be operable on the highways of the State of XXXXX" or "The system will be designed to meet ANSI Std XXX as a minimum."

A.4.3.3 Safety design requirements. The program manager, in concert with the chief engineer and utilizing systems engineering and associated system safety professionals, should establish specific safety design requirements for the overall system. The objective of safety design requirements is to achieve acceptable mishap risk through a systematic application of design guidance from standards, specifications, regulations, design handbooks, safety design checklists, and other sources. Review these for safety design parameters and acceptance criteria applicable to the system. Safety design requirements derived from the selected parameters, as well as any associated acceptance criteria, are included in the system specification. Expand these requirements and criteria for inclusion in the associated follow-on or lower level specifications. See general safety system design requirements below.

a. Hazardous material use is minimized, eliminated, or associated mishap risks are reduced through design, including material selection or substitution. When using potentially hazardous materials, select those materials that pose the least risk throughout the life cycle of the system.

b. Hazardous substances, components, and operations are isolated from other activities, areas, personnel, and incompatible materials.

c. Equipment is located so that access during operations, servicing, repair, or adjustment minimizes personnel exposure to hazards (e.g., hazardous substances, high voltage, electromagnetic radiation, and cutting and puncturing surfaces).

d. Protect power sources, controls, and critical components of redundant subsystems by physical separation or shielding, or by other acceptable methods.

f. Consider safety devices that will minimize mishap risk (e.g., interlocks, redundancy, fail safe design, system protection, fire suppression, and protective measures such as clothing, equipment, devices, and procedures) for hazards that cannot be eliminated. Make provisions for periodic functional checks of safety devices when applicable.

g. System disposal (including explosive ordnance disposal) and demilitarization are considered in the design.

h. Implement warning signals to minimize the probability of incorrect personnel reaction to those signals, and standardize within like types of systems.

i. Provide warning and cautionary notes in assembly, operation, and maintenance instructions; and provide distinctive markings on hazardous components, equipment, and facilities to ensure personnel and equipment protection when no alternate design approach can eliminate a hazard. Use standard warning and cautionary notations where multiple applications occur. Standardize notations in accordance with commonly accepted commercial practice or, if none exists, normal military procedures. Do not use warning, caution, or other written advisory as the <u>only</u> risk reduction method for hazards assigned to Catastrophic or Critical mishap severity categories.

j. Safety critical tasks may require personnel proficiency; if so, the developer should propose a proficiency certification process to be used.

k. Severity of injury or damage to equipment or the environment as a result of a mishap is minimized.

l. Inadequate or overly restrictive requirements regarding safety are not included in the system specification.

m. Acceptable risk is achieved in implementing new technology, materials, or designs in an item's production, test, and operation. Changes to design, configuration, production, or mission requirements (including any resulting system modifications and upgrades, retrofits, insertions of new technologies or materials, or use of new production or test techniques) are accomplished in a manner that maintains an acceptable level of mishap risk. Changes to the environment in which the system operates are analyzed to identify and mitigate any resulting hazards or changes in mishap risks.

A.4.3.3.1 Some program managers include the following conditions in their solicitation, system specification, or contract as requirements for the system design. These condition statements are used optionally as supplemental requirements based on specific program needs.

A.4.3.3.1.1 Unacceptable conditions. The following safety critical conditions are considered unacceptable for development efforts. Positive action and verified implementation is required to reduce the mishap risk associated with these situations to a level acceptable to the program manager.

a. Single component failure, common mode failure, human error, or a design feature that could cause a mishap of Catastrophic or Critical mishap severity catagories.

b. Dual independent component failures, dual independent human errors, or a combination of a component failure and a human error involving safety critical command and control functions, which could cause a mishap of Catastrophic or Critical mishap severity catagories.

c. Generation of hazardous radiation or energy, when no provisions have been made to protect personnel or sensitive subsystems from damage or adverse effects.

d. Packaging or handling procedures and characteristics that could cause a mishap for which no controls have been provided to protect personnel or sensitive equipment.

e. Hazard categories that are specified as unacceptable in the development agreement.

A.4.3.3.1.2 Acceptable conditions. The following approaches are considered acceptable for correcting unacceptable conditions and will require no further analysis once mitigating actions are implemented and verified.

a. For non-safety critical command and control functions: a system design that requires two or more independent human errors, or that requires two or more independent failures, or a combination of independent failure and human error.

b. For safety critical command and control functions: a system design that requires at least three independent failures, or three independent human errors, or a combination of three independent failures and human errors.

c. System designs that positively prevent errors in assembly, installation, or connections that could result in a mishap.

d. System designs that positively prevent damage propagation from one component to another or prevent sufficient energy propagation to cause a mishap.

e. System design limitations on operation, interaction, or sequencing that preclude occurrence of a mishap.

f. System designs that provide an approved safety factor, or a fixed design allowance that limits, to an acceptable level, possibilities of structural failure or release of energy sufficient to cause a mishap.

g. System designs that control energy build-up that could potentially cause a mishap (e.g., fuses, relief valves, or electrical explosion proofing).

h. System designs where component failure can be temporarily tolerated because of residual strength or alternate operating paths, so that operations can continue with a reduced but acceptable safety margin.

i. System designs that positively alert the controlling personnel to a hazardous situation where the capability for operator reaction has been provided.

j. System designs that limit or control the use of hazardous materials.

A.4.3.4 Elements of an effective system safety effort. Elements of an effective system safety effort include:

a. Management is always aware of the mishap risks associated with the system, and formally documents this awareness. Hazards associated with the system are identified, assessed, tracked, monitored, and the associated risks are either eliminated or controlled to an acceptable level throughout the life cycle. Identify and archive those actions taken to eliminate or reduce mishap risk for tracking and lessons learned purposes.

b. Historical hazard and mishap data, including lessons learned from other systems, are considered and used.

c. Environmental protection, safety, and occupational health, consistent with mission requirements, are designed into the system in a timely, cost-effective manner. Inclusion of the appropriate safety features is accomplished during the applicable phases of the system life cycle.

d. Mishap risk resulting from harmful environmental conditions (e.g., temperature, pressure, noise, toxicity, acceleration, and vibration) and human error in system operation and support is minimized.

e. System users are kept abreast of the safety of the system and included in the safety decision process.

A.4.4 System safety engineering effort. As stated in section 4, a system safety engineering effort consists of eight main requirements. The following paragraphs provide further descriptions on what efforts are typically expected due to each of the system safety requirements listed in section 4.

A.4.4.1 Documentation of the system safety approach. The documentation of the system safety approach should describe the planned tasks and activities of system safety management

and system engineering required to identify, evaluate, and eliminate or control hazards, or to reduce the residual mishap risk to a level acceptable throughout the system life cycle. The documentation should describe, as a minimum, the four elements of an effective system safety effort: a planned approach for task accomplishment, qualified people to accomplish tasks, the authority to implement tasks through all levels of management, and the appropriate commitment of resources (both manning and funding) to ensure that safety tasks are completed. Specifically, the documentation should:

a. Describe the scope of the overall system program and the related system safety effort. Define system safety program milestones. Relate these to major program milestones, program element responsibility, and required inputs and outputs.

b. Describe the safety tasks and activities of system safety management and engineering. Describe the interrelationships between system safety and other functional elements of the program. List the other program requirements and tasks applicable to system safety and reference where they are specified or described. Include the organizational relationships between other functional elements having responsibility for tasks with system safety impacts and the system safety management and engineering organization including the review and approval authority of those tasks.

c. Describe specific analysis techniques and formats to be used in qualitative or quantitative assessments of hazards, their causes, and effects.

d. Describe the process through which management decisions will be made (for example, timely notification of unacceptable risks, necessary action, incidents or malfunctions, waivers to safety requirements, and program deviations). Include a description on how residual mishap risk is formally accepted and this acceptance is documented.

e. Describe the mishap risk assessment procedures, including the mishap severity categories, mishap probability levels, and the system safety design order of precedence that should be followed to satisfy the safety requirements of the program. State any qualitative or quantitative measures of safety to be used for mishap risk assessment including a description of the acceptable and unacceptable risk levels (if applicable). Include system safety definitions that modify, deviate from, or are in addition to those in this standard or generally accepted by the system safety community (see *Defense Acquisition Deskbook* and System Safety Society's *System Safety Analysis Handbook)* (see A.6.1).

f. Describe how resolution and action relative to system safety will be implemented at the program management level possessing resolution authority.

g. Describe the verification (e.g., test, analysis, demonstration, or inspection) requirements for ensuring that safety is adequately attained. Identify any certification requirements for software, safety devices, or other special safety features (e.g., render safe and emergency disposal procedures).

h. Describe the mishap or incident notification, investigation, and reporting process for the program, including notification of the program manager.

i. Describe the approach for collecting and processing pertinent historical hazard, mishap, and safety lessons learned data. Include a description on how a system hazard log is developed and kept current (see A.4.4.8.1).

j. Describe how the user is kept abreast of residual mishap risk and the associated hazards.

A.4.4.2 Identification of hazards. Identify hazards through a systematic hazard analysis process encompassing detailed analysis of system hardware and software, the environment (in which the system will exist), and the intended usage or application. Historical hazard and mishap data, including lessons learned from other systems, are considered and used.

A.4.4.2.1 Approaches for identifying hazards. Numerous approaches have been developed and used to identify system hazards. A key aspect of many of these approaches is empowering the design engineer with the authority to design safe systems and the responsibility to identify to program management the hazards associated with the design. Hazard identification approaches often include using system users in the effort. Commonly used approaches for identifying hazards can be found in the *Defense Acquisition Deskbook* and System Safety Society's *System Safety Analysis Handbook* (see A.6.1)

A.4.4.3 Assessment of mishap risk. Assess the severity and probability of the mishap risk associated with each identified hazard, i.e., determine the potential impact of the hazard on personnel, facilities, equipment, operations, the public, or environment, as well as on the system itself. Other factors, such as numbers of persons exposed, may also be used to assess risk.

A.4.4.3.1 Mishap risk assessment tools. To determine what actions to take to eliminate or control identified hazards, a system of determining the level of mishap risk involved must be developed. A good mishap risk assessment tool will enable decision makers to properly understand the level of mishap risk involved, relative to what it will cost in schedule and dollars to reduce that mishap risk to an acceptable level.

A.4.4.3.2 Tool development. The key to developing most mishap risk assessment tools is the characterization of mishap risks by mishap severity and mishap probability. Since the highest system safety design order of precedence is to eliminate hazards by design, a mishap risk assessment procedure considering only mishap severity will generally suffice during the early design phase to minimize the system's mishap risks (for example, just don't use hazardous or toxic material in the design). When all hazards cannot be eliminated during the early design phase, a mishap risk assessment procedure based upon the mishap probability as well as the mishap severity provides a resultant mishap risk assessment. The assessment is used to establish priorities for corrective action, resolution of identified hazards, and notification to management of the mishap risks. The information provided here is a suggested tool and set of definitions that can be used. Program managers can develop tools and definitions appropriate to their individual programs.

A.4.4.3.2.1 Mishap severity. Mishap severity categories are defined to provide a qualitative measure of the most reasonable credible mishap resulting from personnel error, environmental conditions, design inadequacies, procedural deficiencies, or system, subsystem, or component failure or malfunction. Suggested mishap severity categories are shown in Table A-I. The dollar values shown in this table should be established on a system by system basis depending on the size of the system being considered to reflect the level of concern.

TABLE A-I. **Suggested mishap severity categories**.

Description	Category	Environmental, Safety, and Health Result Criteria
Catastrophic	I	Could result in death, permanent total disability, loss exceeding $1M, or irreversible severe environmental damage that violates law or regulation.
Critical	II	Could result in permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, loss exceeding $200K but less than $1M, or reversible environmental damage causing a violation of law or regulation.
Marginal	III	Could result in injury or occupational illness resulting in one or more lost work days(s), loss exceeding $10K but less than $200K, or mitigatible environmental damage without violation of law or regulation where restoration activities can be accomplished.
Negligible	IV	Could result in injury or illness not resulting in a lost work day, loss exceeding $2K but less than $10K, or minimal environmental damage not violating law or regulation.

NOTE: These mishap severity categories provide guidance to a wide variety of programs. However, adaptation to a particular program is generally required to provide a mutual understanding between the program manager and the developer as to the meaning of the terms used in the category definitions. Other risk assessment techniques may be used provided that the user approves them.

A.4.4.3.2.2 Mishap probability. Mishap probability is the probability that a mishap will occur during the planned life expectancy of the system. It can be described in terms of potential occurrences per unit of time, events, population, items, or activity. Assigning a quantitative mishap probability to a potential design or procedural hazard is generally not possible early in the design process. At that stage, a qualitative mishap probability may be

derived from research, analysis, and evaluation of historical safety data from similar systems. Supporting rationale for assigning a mishap probability is documented in hazard analysis reports. Suggested qualitative mishap probability levels are shown in Table A-II.

TABLE A-II. **Suggested mishap probability levels**.

Description*	Level	Specific Individual Item	Fleet or Inventory**
Frequent	A	Likely to occur often in the life of an item, with a probability of occurrence greater than 10^{-1} in that life.	Continuously experienced.
Probable	B	Will occur several times in the life of an item, with a probability of occurrence less than 10^{-1} but greater than 10^{-2} in that life.	Will occur frequently.
Occasional	C	Likely to occur some time in the life of an item, with a probability of occurrence less than 10^{-2} but greater than 10^{-3} in that life.	Will occur several times.
Remote	D	Unlikely but possible to occur in the life of an item, with a probability of occurrence less than 10^{-3} but greater than 10^{-6} in that life.	Unlikely, but can reasonably be expected to occur.
Improbable	E	So unlikely, it can be assumed occurrence may not be experienced, with a probability of occurrence less than 10^{-6} in that life.	Unlikely to occur, but possible.

*Definitions of descriptive words may have to be modified based on quantity of items involved.
**The expected size of the fleet or inventory should be defined prior to accomplishing an assessment of the system.

A.4.4.3.2.3 Mishap risk assessment. Mishap risk classification by mishap severity and mishap probability can be performed by using a mishap risk assessment matrix. This assessment allows one to assign a mishap risk assessment value to a hazard based on its mishap severity and its mishap probability. This value is then often used to rank different hazards as to their associated mishap risks. An example of a mishap risk assessment matrix is shown at Table A-III.

TABLE A-III. **Example mishap risk assessment values**.

SEVERITY PROBABILITY	Catastrophic	Critical	Marginal	Negligible
Frequent	1	3	7	13
Probable	2	5	9	16
Occasional	4	6	11	18
Remote	8	10	14	19
Improbable	12	15	17	20

A.4.4.3.2.4 Mishap risk categories. Mishap risk assessment values are often used in grouping individual hazards into mishap risk categories. Mishap risk categories are then used to generate specific action such as mandatory reporting of certain hazards to management for action or formal acceptance of the associated mishap risk. Table A-IV includes an example listing of mishap risk categories and the associated assessment values. In the example, the system management has determined that mishap risk assessment values 1 through 5 constitute "High" risk while values 6 through 9 constitute "Serious" risk.

TABLE A-IV. **Example mishap risk categories and mishap risk acceptance levels.**

Mishap Risk Assessment Value	Mishap Risk Category	Mishap Risk Acceptance Level
1 – 5	High	Component Acquisition Executive
6 – 9	Serious	Program Executive Officer
10 – 17	Medium	Program Manager
18 – 20	Low	As directed

*Representative mishap risk acceptance levels are shown in the above table. Mishap risk acceptance is discussed in paragraph A.4.4.7. The using organization must be consulted by the corresponding levels of program management prior to mishap risk acceptance.

A.4.4.3.2.5 Mishap risk impact. The mishap risk impact is assessed, as necessary, using other factors to discriminate between hazards having the same mishap risk value. One might discriminate between hazards with the same mishap risk assessment value in terms of mission capabilities, or social, economic, and political factors. Program management will closely consult with the using organization on the decisions used to prioritize resulting actions.

A.4.4.3.3 Mishap risk assessment approaches. Commonly used approaches for assessing mishap risk can be found in the *Defense Acquisition Deskbook* and System Safety Society's *System Safety Analysis Handbook* (see A.6.1)

A.4.4.4 Identification of mishap risk mitigation measures. Identify potential mishap risk mitigation alternatives and the expected effectiveness of each alternative or method. Mishap risk mitigation is an iterative process that culminates when the residual mishap risk has been reduced to a level acceptable to the appropriate authority.

A.4.4.4.1 Prioritize hazards for corrective action. Hazards should be prioritized so that corrective action efforts can be focused on the most serious hazards first. A categorization of hazards may be conducted according to the mishap risk potential they present.

A.4.4.4.2 System safety design order of precedence (see 4.4). The ultimate goal of a system safety program is to design systems that contain no hazards. However, since the nature of most complex systems makes it impossible or impractical to design them completely hazard-free, a successful system safety program often provides a system design where there exist no hazards resulting in an unacceptable level of mishap risk. As hazard analyses are performed, hazards will be identified that will require resolution. The system safety design order of precedence defines the order to be followed for satisfying system safety requirements and reducing risks. The alternatives for eliminating the specific hazard or controlling its associated risk are evaluated so that an acceptable method for mishap risk reduction can be agreed to.

A.4.4.5 Reduction of mishap risk to an acceptable level. Reduce the system mishap risk through a mitigation approach mutually agreed to by the developer, program manager and the using organization.

A.4.4.5.1 Communication with associated test efforts. Residual mishap risk and associated hazards must be communicated to the system test efforts for verification.

A.4.4.6 Verification of mishap risk reduction. Verify the mishap risk reduction and mitigation through appropriate analysis, testing, or inspection. Document the determined residual mishap risk. The program manager must ensure that the selected mitigation approaches will result in the expected residual mishap risk. To provide this assurance, the system test effort should verify the performance of the mitigation actions. New hazards identified during testing must be reported to the program manager and the developer.

A.4.4.6.1 Testing for a safe design. Tests and demonstrations must be defined to validate selected safety features of the system. Test or demonstrate safety critical equipment and procedures to determine the mishap severity or to establish the margin of safety of the design. Consider induced or simulated failures to demonstrate the failure mode and acceptability of safety critical equipment. When it cannot be analytically determined whether the corrective action taken will adequately control a hazard, conduct safety tests to evaluate the effectiveness of the controls. Where costs for safety testing would be prohibitive, safety characteristics or procedures may be verified by engineering analyses, analogy, laboratory test, functional mockups, or subscale/model simulation. Integrate testing of safety systems into appropriate system test and demonstration plans to the maximum extent possible.

A.4.4.6.2 Conducting safe testing. The program manager must ensure that test teams are familiar with mishap risks of the system. Test plans, procedures, and test results for all tests including design verification, operational evaluation, production acceptance, and shelf-life validation should be reviewed to ensure that:

a. Safety is adequately demonstrated.

b. The testing will be conducted in a safe manner.

c. All additional hazards introduced by testing procedures, instrumentation, test hardware, and test environment are properly identified and controlled.

A.4.4.6.3 Communication of new hazards identified during testing. Testing organizations must ensure that hazards and safety discrepancies discovered during testing are communicated to the program manager and the developer.

A.4.4.7 Review and acceptance of residual mishap risk by the appropriate authority. Notify the program manager of identified hazards and residual mishap risk. For long duration programs, incremental or periodic reporting should be used.

A.4.4.7.1 Residual mishap risk. The mishap risk that remains after all planned mishap risk management measures have been implemented is considered residual mishap risk. Residual mishap risk is documented along with the reason(s) for incomplete mitigation.

A.4.4.7.2 Residual mishap risk management. The program manager must know what residual mishap risk exists in the system being acquired. For significant mishap risks, the program manager is required to elevate reporting of residual mishap risk to higher levels of appropriate authority (such as the Program Executive Officer or Component Acquisition Executive) for action or acceptance. The program manager is encouraged to apply additional resources or other remedies to help the developer satisfactorily resolve hazards providing significant mishap risk. Table A-IV includes an example of a mishap risk acceptance level matrix based on the mishap risk assessment value and mishap risk category.

A.4.4.7.3 Residual mishap risk acceptance. The program manager is responsible for formally documenting the acceptance of the residual mishap risk of the system by the appropriate authority. The program manager should update this residual mishap risk and the associated hazards to reflect changes/modifications in the system or its use. The program manager and using organization should jointly determine the updated residual mishap risk prior to acceptance of the risk and system hazards by the risk acceptance authority, and should document the agreement between the user and the risk acceptance authority.

A.4.4.8 Tracking hazards and residual mishap risk. Track hazards, their closures, and residual mishap risk. A tracking system for hazards, their closures, and residual mishap risk must be maintained throughout the system life cycle. The program manager must keep the system user apprised of system hazards and residual mishap risk.

A.4.4.8.1 Process for tracking of hazards and residual mishap risk. Each system must have a current log of identified hazards and residual mishap risk, including an assessment of the residual mishap risk (see A.4.4.7). As changes are integrated into the system, this log is updated to incorporate added or changed hazards and the associated residual mishap risk. The Government must formally acknowledge acceptance of system hazards and residual mishap risk. Users will be kept informed of hazards and residual mishap risk associated with their systems.

A.4.4.8.1.1 Developer responsibilities for communications, acceptance, and tracking of hazards and residual mishap risk. The developer (see 3.2.2) is responsible for communicating information to the program manager on system hazards and residual mishap risk, including any unusual consequences and costs associated with hazard mitigation. After attempting to eliminate or mitigate system hazards, the developer will formally document and notify the program manager of all hazards breaching thresholds set in the safety design criteria. At the same time, the developer will also communicate the system residual mishap risk.

A.4.4.8.1.2 Program manager responsibilities for communications, acceptance, and tracking of hazards and residual mishap risk. The program manager is responsible for maintaining a log of all identified hazards and residual mishap risk for the system. The program manager will communicate known hazards and associated risks of the system to all system developers and users. As changes are integrated into the system, the program manager shall update this log to incorporate added or changed hazards and the residual mishap risk identified by the developer. The program manager is also responsible for informing system developers about the program manager's expectations for handling of newly discovered hazards. The program manager will evaluate new hazards and the resulting residual mishap risk, and either recommend further action to mitigate the hazards, or formally document the acceptance of these hazards and residual mishap risk. The program manager will evaluate the hazards and associated residual mishap risk in close consultation and coordination with the ultimate end user, to assure that the context of the user requirements, potential mission capability, and the operational environment are adequately addressed. Copies of the documentation of the hazard and risk acceptance will be provided to both the developer and the system user. Hazards for which the program manager accepts responsibility for mitigation will also be included in the formal documentation. For example, if the program manager decides to execute a special training program to mitigate a potentially hazardous situation, this approach will be documented in the formal response to the developer. Residual mishap risk and hazards must be communicated to system test efforts for verification.

A.5 SPECIFIC REQUIREMENTS

A.5.1 Program manager responsibilities. The program manager must ensure that all types of hazards are identified, evaluated, and mitigated to a level compliant with acquisition management policy, federal (and state where applicable) laws and regulations, Executive Orders, treaties, and agreements. The program manager should:

A.5.1.1 Establish, plan, organize, implement, and maintain an effective system safety effort that is integrated into all life cycle phases.

A.5.1.2 Ensure that system safety planning is documented to provide all program participants with visibility into how the system safety effort is to be conducted.

A.5.1.3 Establish definitive safety requirements for the procurement, development, and sustainment of the system. The requirements should be set forth clearly in the appropriate system specifications and contractual documents.

A.5.1.4 Provide historical safety data to developers.

A.5.1.5 Monitor the developer's system safety activities and review and approve delivered data in a timely manner, if applicable, to ensure adequate performance and compliance with safety requirements.

A.5.1.6 Ensure that the appropriate system specifications are updated to reflect results of analyses, tests, and evaluations.

A.5.1.7 Evaluate new lessons learned for inclusion into appropriate databases and submit recommendations to the responsible organization.

A.5.1.8 Establish system safety teams to assist the program manager in developing and implementing a system safety effort.

A.5.1.9 Provide technical data on Government-furnished Equipment or Government-furnished Property to enable the developer to accomplish the defined tasks.

A.5.1.10 Document acceptance of residual mishap risk and associated hazards.

A.5.1.11 Keep the system users apprised of system hazards and residual mishap risk.

A.5.1.12 Ensure the program meets the intent of the latest MIL-STD 882.

A.5.1.13 Ensure adequate resources are available to support the program system safety effort.

A.5.1.14 Ensure system safety technical and managerial personnel are qualified and certified for the job.

A.6 NOTES

A.6.1 DoD acquisition practices and safety analysis techniques. Information on DoD acquisition practices and safety analysis techniques is available at the referenced Internet sites. Nothing in the referenced information is considered binding or additive to the requirements provided in this standard.

A.6.1.1 *Defense Acquisition Deskbook*. Wright-Patterson Air Force Base, Ohio: Deskbook Joint Program Office.

A.6.1.2 *System Safety Analysis Handbook*. Unionville, VA: System Safety Society.

CONCLUDING MATERIAL

Custodians:
Army - AV
Navy - AS
Air Force – 40

Reviewing activities:
Army - AR, AT, CR, MI
Navy - EC, OS, SA, SH
Air Force - 10, 11, 13, 19

Preparing activity:
Air Force - 40

Project SAFT - 0038

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE *(YYYYMMDD)*
	MIL-STD-882	20000210

3. DOCUMENT TITLE

System Safety

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include zip code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(if applicable)*	7. DATE SUBMITTED *(YYYYMMDD)*

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE *(Include Area Code)*
Headquarters, Air Force Materiel Command System Safety Division	(1) Commercial (937) 257-6007 (2) DSN 787-6007
b. ADDRESS *(Include Zip Code)* HQ AFMC/SES 4375 Chidlaw Road Wright Patterson AFB, Ohio 45433-5006	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** **Defense Standardization Program Office (DLSC-LM)** **8725 John J. Kingman Road, Suite 2533** **Fort Belvoir, Virginia 22060-6621** **Telephone 703 767-6888 DSN 427-6888**

ATTACHMENT J-0200000-04
NAVFAC PARTNERING POLICY

See Attachment Document

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
1322 PATTERSON AVENUE, SE SUITE 1000
WASHINGTON NAVY YARD DC 20374-5065

NAVFACINST 11013.40A
EOC/OCR

28 December 2004

NAVFAC INSTRUCTION 11013.40A

From: Commander, Naval Facilities Engineering Command

Subj: NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC) PARTNERING POLICY

Encl: (1) NAVFAC Partnering System

1. Purpose: To promulgate policy for the use of partnering on all NAVFAC construction and FSC contracts. This instruction also applies to other types of NAVFAC contracts as deemed appropriate by the Business Line Leader.

2. Cancellation: NAVFACINST 11013.40 is cancelled.

3. Policy: It is the policy of NAVFAC to employ partnering on all NAVFAC contracts per enclosure (1).

4. Discussion: Two major changes have been made to the original partnering policy: a) the requirement to partner all FSC contracts has been added, and b) the monetary thresholds for the three levels of construction partnering have been changed. The NAVFAC team has great influence over the success of individual contracts and the level of Client satisfaction. Our primary goal is to maximize efficiency and to achieve Client success. This is measured by how well our product meets the Client's operational requirements (scope), financial constraints (budget), schedule constraints (time), quality needs (quality), and by how effectively the project team employs the appropriate level of operational risk management (safety). Partnering maximizes the opportunity to accomplish this by capitalizing on the collective strengths of the NAVFAC team and our contractor partners.

5. Policy Guidelines: The enclosed NAVFAC Partnering System is built around the concept that partnering requires the maintenance of the partnering mindset, full commitment of all the parties involved, and execution of a sound process. The process component of partnering is straightforward and well documented in enclosure (1). Commitment of stakeholders requires constant reinforcement to be achieved. I expect all NAVFAC team members to consistently maintain the partnering mindset on all contracts, at all times. We can accomplish this through proactive contract administration, effective communications, honesty, integrity, and by having courage to do the right thing. Partnering is not easy, but the paybacks are well worth it.

6. Action: All NAVFAC field Activities will implement this policy on all contracts per enclosure (1).

M. K. LOOSE

Distribution:
See next page

Subj: NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC) PARTNERING POLICY

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NAVAL FACILITIES ENGINEERING COMMAND

NAVFAC
Naval Facilities Engineering Command

PARTNERING SYSTEM

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1. PARTNERING OVERVIEW AND GOALS

Partnering is a collaborative effort and a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources in delivering the Client's requirements. This requires changing traditional "individualized" relationships to a "shared culture" relationship without regard to organizational boundaries. The partnering relationship is based upon trust, dedication to common goals, an understanding of each other's individual expectations and values, and a full commitment to success. Benefits include improved communications, efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of product quality and services.

The NAVFAC Partnering System applies these concepts to the construction and Facilities Support Contracts (FSC) delivery processes. By employing partnering in our contracting, we seek to maximize the opportunity to achieve Client success. Client success is measured by how well the project meets the Client's operational requirements ("scope"), financial constraints ("budget"), schedule constraints ("time"), and quality needs ("quality"), as well as meeting everyone's desires to employ appropriate levels of Operational Risk Management ("safety").

All NAVFAC FSC contracts and construction projects will include a provision for partnering.

2. NAVFAC PARTNERING SYSTEM

PARTNERING = MINDSET + COMMITMENT + PROCESS

The NAVFAC Partnering System involves a mindset, a commitment, and a process. The mindset component of partnering is consistent, regardless of the contract or the project's characteristics. The commitment component ensures that the contract is completed to the Client's requirements. The process component deals with the steps or activities that support the Government-Contractor-Client partnership during performance under the contract. The partnering process will vary depending on the characteristics (e.g. scope, value, complexity, criticality, etc.) and needs unique to the specific procurement. Partnering does not begin or end with the formal partnering sessions. It is a philosophy on how our business is managed through the collaborative efforts of NAVFAC, the Contractor, the Client, the user, and our consultants.

a. Partnering Mindset

"Coming together is a beginning,
keeping together is progress,
working together is success."
-Henry Ford

The NAVFAC team has great influence over the outcome of the contract/project, the level of Client satisfaction, and the success of the Contractor. The team members, who work in the procurement delivery process, must maintain a mindset that is committed to the goals of partnering. This means that the NAVFAC team must take the lead in working with the other partners to remove unnecessary roadblocks that stifle success. To a great degree, this is

accomplished through effective communications, proactive contract administration, mutual trust, honesty, integrity, cooperation, open-mindedness, and the courage to do the right thing. The NAVFAC team has the responsibility to ensure that the contract terms are met, that the Contractor is fairly compensated and evaluated, and that the Client fully participates as a stakeholder in the partnership. All partners must always be treated fairly and with respect. We believe our Contractor partners should make a reasonable profit and be successful so that they can help us achieve Client success now and in the future. Legal and ethical principles are never compromised in the administration of a contract.

b. Partnering Commitment

By preparing and signing the PARTNERING CHARTER at the initial partnering session, the stakeholders commit to the stated, and agreed to, requirements; i.e., delivering a quality product per the contract, delivering on time, staying within the available budget, protecting the environment, minimizing inconvenience to the public, communicating openly and honestly on all issues, trusting each other, building a strong partnership, resolving problems quickly and at the appropriate level, and assuring a safe worksite. A partnering commitment entails a long-term dedication to the partnering principles and processes at all times and on every contract.

c. Partnering Processes

At NAVFAC, all contracts will be done using a partnering process. To accomplish this goal, three distinct partnering process levels, A through C, have been established. A project's characteristics determine the process level to be used. In addition, there are several partnering actions for the entire team that shall be used for all partnerships regardless of the process level. These are: a) meet periodically to review the Contractor's performance of contract requirements; b) assess the Government's performance of its responsibilities; c) provide progress information to the Client; and d) check for any concerns. To increase the likelihood of successful performance of a contract, the Government requires cohesive partnerships with its Contractors. These partnerships draw on each organization's strengths to ensure that contract services are done right the first time, within the contract price, as scheduled, and without any safety mishaps. OCONUS activities have the discretion to adjust the level of partnering to accommodate local situations, customs, available resources, and security requirements. However, as a minimum, Level C partnering will be conducted. Security requirements must always be taken into consideration.

Part I. CONSTRUCTION PROJECTS PARTNERING

(1) Project Partnering Levels

One of the following process levels shall be used based on the characteristics of the project. If the partners have an existing, highly effective relationship, built on recent partnerships, they may agree to use a more appropriate process level.

Level A: *(Generally, for projects with one or more of these characteristics - high risk, high visibility, compressed performance period, technically complex, over $5M)*
Level A partnering is facilitated by a consultant facilitator, who is paid for by the Contractor per the contract specifications. Different facilitators should be used as frequent use of one particular facilitator, with the same Client and Contractor, may limit the synergy of the partnership due to an over-familiarity with points of view and expectations. The process

consists of an initial session and follow-on sessions; see Initial and Follow-on Partnering Sessions paragraphs for details.

Level B: *(Generally, for projects with average risk and visibility, non-compressed schedule, and a value between $3M and $5M)*
This level of partnering requires an in-house facilitator, at no cost to the Contractor, who is not a member of the ROICC team that will administer the contract. The facilitator could be an employee of NAVFAC, another Government agency, or from a Contractor association. Should an in-house facilitator not be available, a consultant/professional facilitator could be used. A modification to the contract, to reimburse the Contractor for the expense for the consultant facilitator, must be issued. If either the Client or the Contractor is new to NAVFAC, Level A partnering should be considered even though the characteristics of the project may indicate Level B. All project stakeholders will meet for an initial session of sufficient duration for everyone to reach an understanding of the partnering principles, see Partnering Overview and Goals. The initial session can be held in conjunction with the preconstruction conference or as soon as possible after the preconstruction conference but before construction work begins; see Initial and Follow-on Partnering Session paragraphs for details.

Level C: *(Generally, for projects with a value less than $3M; i.e., delivery orders, task orders, work orders, BPAs, and small contracts)*
This level of partnering discusses partnering concepts and benefits. It should become a part of the preconstruction conference. The senior ROICC and senior Contractor persons present will lead the discussion. Brief follow-on sessions should be held, as needed, to discuss issues relevant to the execution of the project, to resolve problems that have surfaced since the last session, and to discuss Contractor performance; see Initial and Follow-on Partnering Sessions paragraphs for details.

(2) Project Partnering Solicitation Provisions

The ROICC must be an active participant on the project planning team and ensure that the requirement for partnering will be in the specifications. See UFGS 01310, Administrative Requirements, latest edition, paragraph 1.15, PARTNERING, and select one of the three paragraphs appropriate for the project.

(3) Project Partnering Administration

The AROICC/AREICC should contact the Contractor, Client, Installation, designer-of-record, and FEC team to discuss implementation of partnering. Compensation to the designer-of-record for participation may be appropriate and the expense therefore should be borne by the party responsible for the project design; i.e. by the Government if the project is Design-Bid-Build (DBB) or by the Contractor if the project is Design-Build (DB). Check with NAVFAC Project Manager (PM) since the fees for participating in partnering may be included as an option to the designer-of-record's contract. When Level A or B partnering is specified, commence discussions with the Contractor to select a facilitator and a location that are acceptable to all partners. The initial session must be scheduled as soon as possible after award of the contract. A partnership agreement, The Charter, should be in place as early as possible so issues arising, even before work begins, can be resolved using the issues resolution process. Replacement of Core Management Team members (stakeholders who attended the initial session and manage the contract work day-to-day) is discouraged since it will disrupt the synergy that has been developed. If replacement of a team member proves to be unavoidable,

a follow-on partnering session must be held to officially turn the responsibilities of the position over to the new member.

(4) Project Partnering Session Attendees

Stakeholders represent NAVFAC and the ROICC Office, the Contractor and major subcontractors, the Client, the Region, the Installation and the Designer-of-Record. If the contract was led by one of NAVFAC's Specialty Centers, representatives of the Center must attend. The Core Management Team must be present during the initial and all follow-on partnering sessions. Individuals considered for attendance include:

Partnering Sessions Attendees for Construction Project Partnering

Level	NAVFAC	Contractor	Client	Region/Installation	Designer of Record
A	OICC **ROICC** **SGE** **AROICC/AREICC** **ET** **PCO** **ACO** **CS** **PM** Construction PLM/C Client Liaison	**President/VP** **KRPM** **Superintendent** **QC Manager** **Safety Manager** SubKR Reps	CO XO **Facility Manager**	RCOM/DRCOM ICO/IXO RE **PWO** **Facility Manager** Tenant's Reps Safety Reps Specialty Reps	**Principal** **AIC/EIC** Consultant's Reps
B	OICC **ROICC** SGE **AROICC/AREICC** **ET** **ACO** **CS** PM Construction PLM/C Client Liaison	**President/VP** **KRPM** **Superintendent** **QC Manager** Safety Manager SubKR Reps	CO XO **Facility Manager**	ICO/IXO PWO **Facility Manager** Tenant's Reps Safety Reps Specialty Reps	Principal **AIC/EIC** Consultant's Reps
C	OICC **ROICC** SGE **AROICC/AREICC** **ET** ACO **CS** PM Construction PLM/C Client Liaison	President/VP **KRPM** **Superintendent** **QC Manager** Safety Manager	CO XO **Facility Manager**	ICO/IXO PWO Facility Manager Tenant's Reps Safety Reps Specialty Reps	Principal **AIC/EIC** Consultant's Reps

Legend:
Bold type "must attend", normal type "recommend attend"
ACO – Administrative Contracting Officer
AIC/EIC – Architect-in-Charge/Engineer-in-Charge

AROICC/AREICC – Assistant Resident Officer/Engineer in Charge of Construction
CO – Commanding Officer
Construction PLM/C – Construction Product Line Manager/Coordinator
CS – Contract Specialist
ET – Engineering Technician
ICO/IXO – Installation Commanding Officer/Installation Executive Officer
KRPM – Contractor Project Manager
OICC - Officer in Charge of Construction
PCO – Procuring Contracting Officer
PM – NAVFAC Project Manager
PWO – Public Works Officer
QC Manager – Quality Control Manager
RCOM/DRCOM – Commander, Navy Region/Dep Commander, Navy Region
RE – Engineer, Navy Region
ROICC - Resident Officer in Charge of Construction
SGE – Supervisory General Engineer
SubKR Reps – Subcontractor Representatives
VP – Vice President
XO – Executive Officer

Part II. FACILITIES SUPPORT CONTRACTS (FSC) PARTNERING

(1) Contract Partnering Levels

All NAVFAC FSC/BOS contracts will include one of the Contract Partnering Levels described below. OCONUS activities have the discretion to adjust the level of partnering to accommodate local situations and customs, available resources, and security requirements. However, as a minimum, Level C partnering will be conducted on every contract with an annual value of less than $3M.

Level A: *(Generally, use this level for contracts with one or more of these characteristics: annual contract value of $10 million or more; first-time BOS contract, high visibility, many Clients, large geographic area, services provided concurrently at multiple activities or for multiple functions, and complex management and coordination issues.)*
Level A partnering is facilitated by a consultant/professional facilitator. The Contractor will pay all costs associated with the partnering effort, including facilitator, meeting room, and other incidental items. All contract stakeholders will meet for an initial session and follow-on sessions. See Initial and Follow-on Partnering Session paragraphs for details.

Level B: *(Generally, use this level for contracts with one or more of these characteristics: annual contract value of $3 million but less than $10 million, average risk and visibility, services provided to multiple Clients, services one or more Activities performing one or more functions, average to above average management and coordination issues.)*
This level of partnering requires an in-house facilitator who is not associated with the current contract. The facilitator could be an employee of NAVFAC or another Government agency. The Government will cover the facilitator cost. The Contractor shall pay all other costs associated with the partnering effort, including the meeting room and incidental items. Should an in-house facilitator not be available, a consultant/professional facilitator could be used. All contract stakeholders will meet for an initial session of sufficient duration for everyone to reach an understanding of the partnering principles, see Partnering Overview and Goals paragraph.

The initial session can be held in conjunction with the pre-performance conference or as soon as possible after the pre-performance conference but before contract work begins. See Initial and Follow-on Partnering Session paragraphs for details.

Level C: *(Generally, use this level for contracts with an annual contract value of less than $3 million.)*
This level of partnering is an informal introduction to partnering concepts and benefits and will be held in conjunction with the pre-performance conference. Senior Government and Contractor stakeholders present will lead the discussion. Brief follow-on sessions should be held, as needed, to discuss issues, resolve problems and provide feedback on Contractor performance. See Initial and Follow-on Partnering Sessions paragraphs for details.

(2) Contract Partnering Solicitation Provisions

Based on the Contract Partnering Levels, the active participants on the contract planning team will ensure one of the following contract provisions are in the solicitation.

Lead-in paragraph applicable to each of the three partnering levels paragraphs that follow:
To increase the likelihood of successful performance of this contract, the Government requires cohesive partnerships with its Contractors and subcontractors. Key stakeholders, including the Clients who will receive services, principal individuals from NAVFAC, the performance assessment team, and representative(s) of the Installation(s) will be invited to participate in the partnering process. Key members of the prime and subcontractors teams, including senior management personnel, must participate. The partnership will draw on the strength of each organization in an effort to achieve quality contract services done right the first time, within the contract price, as scheduled, and without any safety mishaps.

Contract Partnering Level A
The initial session will be at least one-day in duration and the follow-on sessions, held at a minimum of once every three months or as agreed to by the partners, will be at least a half-day in duration. The initial partnering session should be held at a neutral location off the installation that is acceptable to the Contractor and to the Government. Follow-on sessions may be held at locations agreed to by both parties. The Contractor shall pay all costs associated with the partnering effort including facilitator, meeting room, and other incidental items. Before the partnering session, the Contractor shall coordinate with the facilitator the requirements for incidental items (audio-visual equipment, computer(s), two easels, flipchart paper, colored markers, note paper, pens/pencils, colored flash cards, etc.) and have these items available at the partnering session. The Contractor will copy documents for distribution to all attendees. The facilitator must be acceptable to both the Contractor and the Government. The participants shall pay their own costs for meals, lodging, and transportation associated with partnering.

Contract Partnering Level B
The initial session will be at least a half-day to a full day in duration and the follow-on sessions, held at a minimum once every six months or as agreed to by the partners, approximately a half-day in duration. The partnering sessions should be held at locations agreeable to the partners. A Government in-house facilitator will facilitate the partnering sessions at no cost to the Contractor. The Contractor shall pay all other costs associated with the partnering effort including meeting room, and other incidental items. Before the partnering session, the Contractor shall coordinate with the in-house facilitator the requirements for incidental items (audio-visual equipment, computer(s), two easels, flipchart paper, colored markers, note paper, pens/pencils, colored flash cards, etc.) and have these items available at the partnering session.

The Contractor will copy documents for distribution to all attendees. The in-house facilitator must be acceptable to both the Contractor and the Government. The participants shall pay their own costs for meals, lodging, and transportation associated with partnering.

Contract Partnering Level C
This level of partnering discusses partnering concepts and benefits and should become a part of the pre-performance conference. The senior Government and Contractor stakeholders present will jointly host the partnering sessions. The partners will determine the frequency of the follow-on sessions. The partnering sessions should be held at locations agreed to by the partners.

(3) Contract Partnering Administration

Upon award, the ACO should contact the Contractor, Client(s), Region, and Installation(s) stakeholders, and the performance assessment team to discuss implementation of partnering. When Level A or B partnering will be used, commence discussions with the Contractor to select a facilitator and a location that are acceptable to both partners. The initial session must be scheduled as soon as possible after award of the contract. A partnership agreement, The Charter, should be in place as early as possible so issues arising, even before work begins, can be resolved using the issues resolution process. Replacement of Core Management Team members (stakeholders who attended the initial session and manage the contract work day-to-day) is discouraged since it will disrupt the synergy that has been developed. If replacement of a team member proves to be unavoidable, a follow-on partnering session must be held to officially turn the responsibilities of the position over to the new member.

(4) Contract Partnering Session Attendees

The Core Management Team must be present during the initial and all follow-on partnering sessions.

Partnering Sessions Attendees for FSC Contract Partnering

Level	NAVFAC	Contractor	Client	Region/Installation
A, B	OICC **ROICC** **SPAR/PAR** **FSC PM/L** **PCO** **ACO** **CS** Construction PLM/C Client Liaison	**President/VP** **CM/KRPM** **Supervisor/Superintendent** **QC Manager** **Safety Manager** SubKR Reps	CO XO FSCM **TRCO** **PAR**	RCOM/DRCOM ICO/IXO RE PWO **APWO/DPWO** **Facilities Manager** Tenant's Reps
C	OICC ROICC **SPAR/PAR** FSC PM/L PCO **ACO** **CS** Construction PLM/C Client Liaison	President/VP CM/KRPM **Supervisor/Superintendent** **QC Manager** Safety Manager	CO XO FSCM TRCO **PAR**	ICO/IXO PWO Facilities Manager Tenant's Reps

Legend:
Bold type "must attend", normal type "recommend attend"
ACO – Administrative Contracting Officer
APWO/DPWO – Assistant Public Works Officer/Deputy Public Works Officer
CO – Commanding Officer
Construction PLM/C – Construction Product Line Manager/Coordinator
CM/KRPM – Contract Manager/Contractor Project Manager
CS – Contract Specialist
FSC PM/L – FSC Project Manager/Leader
FSCM – Facility Support Contract Manager
ICO/IXO – Installation Commanding Officer/Installation Executive Officer
OICC - Officer in Charge of Construction
PAR – Performance Assessment Representative
PCO – Procuring Contracting Officer
PWO – Public Works Officer
QC Manager – Quality Control Manager
RCOM/DRCOM – Commander, Navy Region/Dep Commander, Navy Region
RE – Engineer, Navy Region
ROICC - Resident Officer in Charge of Construction
SPAR – Supervisory Performance Assessment Representative
SubKR Reps – Subcontractor Representatives
TRCO – Technical Representative of the Commanding Officer
VP – Vice President
XO – Executive Officer

3. NOTES ON PARTNERING

a. Paying for Partnering

Partnering will ultimately benefit the project and the Client. Therefore, the requirement to partner will be included in the contract. The Contractor must bid this requirement and shall pay all costs associated with the partnering effort including facilitator (Level A only; unless the partners mutually agree to use a consultant, instead of an in-house, facilitator for Level B, which will necessitate a modification to the contract.), and meeting room and other incidental items (Levels A and B). The participants shall bear their own costs for meals, lodging and transportation associated with partnering.

b. Setting Up the Partnering Facility

The meeting room set-up, audio-visual equipment, other accessories, and schedule must be coordinated with the facilitator. The meeting room set-up is very important and must be given thorough consideration. The objective is to enable all participants to partake in the discussions in a comfortable setting that enhances communications and participation.

c. Initial Partnering Session

The initial session should be held prior to the contract start date. All stakeholders are encouraged to attend the initial partnering session; individuals identified, as "**must attend**" on the Partnering Session Attendees lists, shall be present. The initial session should focus on

team building to ensure all stakeholders understand the concept of "we" versus the adversarial concept of "us versus them". A Partnering Charter (see sample outline, Attachment B), which is the foundation of the partnership, will be written during the initial session. The stakeholders present will indicate agreements reached by signing the Charter. Agreements on the use of the partnership evaluation and rating forms (see Attachment C and D), an issue resolution process (ladder) (Attachment E), a plan of action for specific contract problems, and a specific plan for continuing the partnership process, are also reached. For DBB projects, the initial session should be held within 30 calendar days following the preconstruction conference but before physical work begins; for DB projects, the initial session should be held within 30 calendar days following award of the contract but before design work begins. The designer must participate. Initial sessions for contracts with IDQ line items that will be issued via task order should use the partnering level for the projected total annual award amount.

d. Follow-on Partnering Sessions

A successful partnership depends on maintenance throughout the life of the contract. Follow-on sessions are for maintaining and nurturing the partnership. They are vital and must be attended by the Core Management Team to reinforce team-building skills, address significant issues, assess the health of the partnership, solve issues that have surfaced since the last session, and to discuss Contractor performance. Other stakeholders who participated in the initial partnering session are encouraged to attend. If a facilitator was used for the initial session, the same facilitator should be used for the follow-on session(s). One follow-on session every three months, or as stated otherwise herein, is a good frequency to use. Flexibility is necessary. For DB projects, a follow-on session is required just before start of construction. Management personnel from the Contractor and major subcontractors must attend this session. During the follow-on sessions, the partners should use the attached evaluation form (Attachment C) to rate each other's performance. All ratings will be read and discussed before the end of the session. These periodic ratings will become the foundation for the Contractor's final performance rating. This process will prevent any "surprises" at the end of the project.

e. How to Ensure That Partnering Efforts are Successful

Some key points to help get the most out of Partnering:

1. Find Champions: Each organization in the partnership must have a champion. This person should fully embrace the partnering concept and is responsible for keeping his/her organization in the win-win mind set. Without champions, the partnership may flounder.

2. The Right People: Make sure that only the critical stakeholders attend, no more. Level A or B partnering should rarely exceed 20 people. However, do not turn anybody, who wants to attend, away.

3. Pleasant Environment: Find a location that is suitable for the task. Telephone calls, interruptions, noise, poor temperature control and other distractions are highly undesirable. Many partnerships elect to meet at locations that are remote from each other's places of business so that the partners can stay focused.

4. Strong Facilitator: For Level A and B partnering, a facilitator who has a good track record and is familiar with NAVFAC's business should be selected. Ask others, who have partnered, about their experiences with a potential facilitator. Regardless of the

facilitator's background, a pre-session brief is desirable to familiarize the facilitator with the particulars of our processes. Both the ROICC and the Contractor should present the pre-session brief to the facilitator. Select a variety of facilitators to avoid the appearance of preferential treatment.

5. Follow-on: Once you start the partnering process, you need to keep the ball rolling. Meet regularly and gather insight into the partner's successes and failures for future reference.

6. Observe Standards of Conduct: Although we are trying to develop a better relationship with our Contractors during partnering, we must always observe the bedrock standards of conduct. Do not accept or encourage gifts, gratuities, or fraternize with Contractors in a way that might be viewed by the public as a conflict of interest. Partnering is not a license to break rules. Be particularly sensitive to the selection of the meeting facility and location to avoid the appearance of misuse of funds.

7. Realistic Expectations: Do not expect partnering to be a panacea. Partnering a contract does not mean that the Contractor should be expected to perform anything for free, nor does it mean that every change that the Contractor might suggest will result in additional funding to the contract. Partnering is a tool that is available to help us perform better. Partnering does not replace the contract documents.

8. Buy-in: Make sure that all partnering agreements made by the various sub-groups are submitted to the entire partnering group for adoption and that they conform to the requirements of the contract. Confidential agreements work against trust among the stakeholders.

9. Communicate openly with all stakeholders and ensure that the current status of the partnership is known by all.

10. Review the partnering process at the end of the project and provide feedback to all stakeholders for future improvements (i.e. was the partnering successful or was it merely "lip service").

f. <u>The Benefits of Partnering</u>

There are many benefits that result from partnering, some tangible and some intangible. A few are mentioned here:

1. Reduced costs and exposure to claims
2. Timely delivery due to improved responsiveness and efficient utilization of resources
3. Expedited decision making with issue resolution process
4. Improved safety
5. Reduced rework and improved quality of product
6. Improved responsiveness
7. Joint evaluation process of the partnership
8. Periodic evaluation of all stakeholder's performance of each other
9. A final performance appraisal that is no "surprise"
10. Enhanced Client focus among all members of the project/contract team.

g. Where to Get Help with Partnering

Each NAVFAC field component has a designated point of contact (POC) for partnering. The Assistant Director, Construction and ROICC Support, will be the POC for construction unless someone else has been named. For FSC/BOS contracts, help is also available from the Public Works BL Leader. A library of partnering references and a list of facilitators are available on the web should there be nothing available in the office. Here are a few sites:

http://www.cecos.navy.mil (Moreell Library, Administrative Librarian)
http://www.construction-institute.org
http://www.adr.org

Talk with other people who have participated in partnering to obtain their personal insight.

h. Facilitators Lists on the Intranet

If you are looking for a professional or an in-house facilitator, check the lists posted on the NAVFAC Intranet. The lists are located at http://navfacilitator.navfac.navy.mil/che/enet/coi/construct/Listfacil.xls.

i. How to Change the Document

Recommendation for changes to this document should be addressed to NAVFAC EOC/OCR at (202) 685-9215/9218.

Attachment A: Sample Agenda for Partnering Sessions

1. Introductions, getting to know one another, developing relationships, and becoming aware of individual job duties and responsibilities.

2. Discussion of the intent of partnering to ensure all parties have the same expectations and develop mission statement using goals and objectives
   a. Common sense communications
   b. Negotiation and conflict resolution

3. Overview of contract/project requirements by personnel to include as applicable:
   a. Basis of design
   b. Requirements in the contract/RFP
   c. Critical items to ensure a successful contract/project
   d. Performance Assessment Program
   e. Contract Incentives
   f. Performance Evaluation Process

4. Identify significant events, problems, issues, and opportunities by soliciting input from each stakeholder
   a. Prioritize significant events, problems, issues, and opportunities
   b. Discuss and resolve, or
   c. Develop action plan
      (1) Significant event, problem, issue, opportunity
      (2) Responsibility for solution
      (3) Date solution needed

5. Develop problem resolution/escalation process
   a. Identify lateral authority levels
   b. Establish vertical authority levels
   c. Development of ground rules (Five rules:)
      (1) Resolve problems at the lowest level
      (2) Either party escalates unresolved problems upward in a timely manner before impact to performance of contract work or delay to the project
      (3) No jumping levels of authority
      (4) Ignoring the problem or "no decision" is not acceptable
      (5) Don't make a decision you're uncomfortable with, escalate upward

6. Identify the Core Contract/Project Management Team

7. Develop evaluation factors and process

8. Sign charter

9. Establish time and place for follow-on session(s)

Attachment B: Sample Partnering Charter

The mutual goals and objectives of the stakeholders form the partnering charter. The charter for each contract/project, therefore, will be unique to that contract/project. The charter may be a simple statement about communications and cooperation in all matters affecting the contract/project and resolution of conflicts at the lowest level. The following sample provides an idea of objectives that might be included in a charter.

The Charter for (Contract / Project)

We are a team dedicated to providing a quality product per the contract. We are committed to honest and open communications, trusting each other, building of a strong partnership, resolving problem issues quickly and at the lowest level, a safe work site, producing a quality product, timely completion, protection of the environment, and minimizing inconvenience to the public.

1. COMMUNICATIONS OBJECTIVES
   We intend to deal with each other in a fair, reasonable, trusting, and professional manner including:
   a. Communicate and resolve problems within the terms of the contract
   b. Decision making at lowest possible level
   c. Open, honest communications
   d. Treat each other with mutual respect, resolve personal conflicts immediately, and avoid personal attacks
   e. Timely notification of future meetings
   f. Support of all meetings
   g. Not allowing grudges to interfere with professionalism

2. CONFLICT RESOLUTION SYSTEM
   Step 1. When conflict is not resolved at the originating/lowest level within a set number of days, it will be taken to the next level of supervision.
   Step 2. When conflict is not resolved at this level within the set number of days, it will be taken to the next higher level of supervision.
   Step 3. This process continues to the highest level in the organizations (ROICC/ACO and President/VP) for resolution within a set number of days. If the conflict can't be resolved at this level, then it will be handled per contract provisions.

3. PERFORMANCE OBJECTIVES
   a. Complete the contract without litigation
   b. Utilize cost reduction incentive proposals
   c. Finish contract on time
   d. No delays in delivering the product
   e. No safety mishaps
   f. Promote positive public relations
   g. Make contract site(s) enjoyable to work at
   h. Administer the contract so that all parties are treated fairly

Attachment B (Page 2 of 2)

We, the undersigned, agree to make a good faith effort to undertake and implement the above as applicable to each of us.

The Partners

Attachment C: Sample Evaluation Form

Partnering Status Evaluator (Form to be filled out by the core management team at the beginning of each follow-on session. Completed evaluation forms are reviewed and discussed as the last agenda item of the session.)

Date _____

ITEMS	***EVALUATIONS***			
	Contractor	ROICC	Client	Others
1. Quality of work				
2. Timeliness Meeting schedule RFIs Invoices Submittals				
3. Resolution of jobsite issues				
4. Communications Progress meetings Correspondence Oral (face-to-face)				
5. Safety program				
6. Partnership relations				

Attachment D: Sample Partnership Rating Form
(To be used at every follow-on session)

Date _____

(Contract number, project title)

Ratings:

1 - Adversarial, forcing, avoidance, self interest
2 – Barely cooperating, still one-sided interests
3 - Accommodating, compromising, moderate positions
4 – Pulling together, exchanging information, open communications
5 - Synergistic, collaborative, win-win, team interest

PARTNERING FACTORS	RATING
1. Communications	
a. Open, honest, timely	_____
b. Active, empathetic, timely	_____
c. Number and tone of letters	_____
2. Problem solving	
a. Win-win synergistic	_____
b. Solved at lowest level	_____
c. Immediate escalation when not responsible	_____
3. Overall trust / candor	_____
4. Progress on goals	_____
OVERALL RATING	_____

Key issues:

_____
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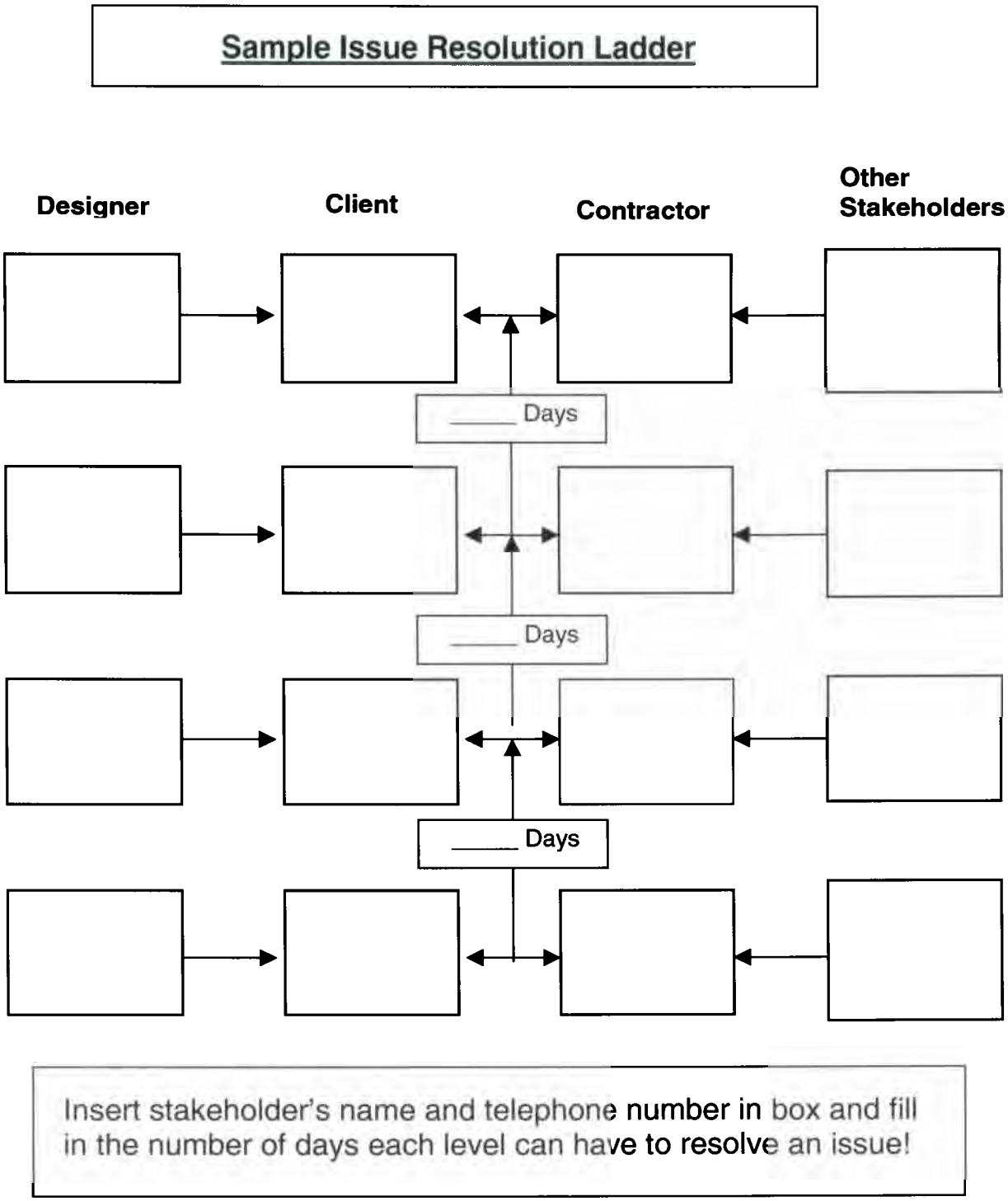
Attachment D

Attachment E: Sample Issue Resolution Ladder



ATTACHMENT J-0200000-05

GOVERNMENT FURNISHED PROPERTY (GFP)

NAVY ERGONOMIC TRAINING PROGRAM EQUIPMENT LIST

EQUIPMENT	QUANTITY
Balance Kit	1
Pair Vibration Dampening Gloves; 1 Spear Glove	2
Safety Glasses	15
White Balls	5
Rubber Hearts	3
Rubber Mallet	1
Hammers	2
Box Cutters	4
Can Openers	4
Ice Cream Scoop	3
Kitchen Flippers	3
Jar Openers	5
Metal Tape Measures	12
Can Openers	4
Needle Nose Pliers	3
Cutting Pliers	2
Rotary Cutters	4
Reg. Scissors, 1 Specialty Scissors	3
Fabric Tape Measures	4
Undetermined Number for Screen Cleaners, Risk Factor Cards, JRPDS	
Nikon Cool Pix Cameras with USB Cords, Picture Cards and Cases	4
Misc Items: Tape, Pen, Markers, Poster Board, and Batteries	
Pelican Trunks	4
Wireless Keyboard	1
Ovation Keyboard	1
Vertical Mouse	1
Mice	4
Roller Mouse	1
Sets of Bonicals	8
Fish Scales	4
Grip Meters	2
Drill	1
Light Meters	3
Chatillons	2
Digital Sound Meters	2

ATTACHMENT J-0200000-06
FIRM FIXED-PRICE EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0001, FFP - BASE PERIOD

ELIN	DESCRIPTION	QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
CLIN 0001	**NAVOSH PROGRAM SUPPORT** In accordance with Annex 0404000, Spec Item 3				
A001	**EDUCATIONAL TRAINING** **Industrial Ergonomics Training Course A-403-0085** In accordance with Annex 0404000, Spec Item 3.1				
A001-AA	Provide Training 32 hour Ergonomics Course	5	EA		**$0.00**
A001-AB	Provide Ergonomics Training Plan	1	EA		**$0.00**
A001-AC	Provide Course Presentation Modules	5	EA		**$0.00**
A001-AD	Provide Course Materials (30 students per class)	150	EA		**$0.00**
A001-AE	Provide CD's of complete Course Materials	150	EA		**$0.00**
A002	**PROJECT STATUS REPORTS** In accordance with Annex 0404000, Spec Item 3.2				
A002-AA	Provide bi-monthly project status reports	26	EA		**$0.00**
A003	**MEETINGS** In accordance with Annex 0404000, Spec Item 3.3				
A003-AA	Navy Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 3.3.1	2	EA		**$0.00**
A003-AB	Joint Professional Development Conference Support In accordance with Annex 0404000, Spec Item 3.3.2	1	EA		**$0.00**
A004	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1 - class given 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2 - class given 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event a training class is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved, which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	In accordance with JTR - - NTE - -		**$100,000.00**
TOTAL FOR THE LINE ITEM 0001, FFP FOR THE BASE PERIOD (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$100,000.00**

ATTACHMENT J-0200000-06
FIRM FIXED-PRICE EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0003, FFP - OPTION PERIOD ONE

ELIN	DESCRIPTION	QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
CLIN 0003	**NAVOSH PROGRAM SUPPORT** In accordance with Annex 0404000, Spec Item 3				
B001	**EDUCATIONAL TRAINING** **Industrial Ergonomics Training Course A-403-0085** In accordance with Annex 0404000, Spec Item 3.1				
B001-AA	Provide Training 32 hour Ergonomics Course	5	EA		**$0.00**
B001-AB	Provide Ergonomics Training Plan	1	EA		**$0.00**
B001-AC	Provide Course Presentation Modules	5	EA		**$0.00**
B001-AD	Provide Course Materials (30 students per class)	150	EA		**$0.00**
B001-AE	Provide CD's of complete Course Materials	150	EA		**$0.00**
B002-AA	**PROJECT STATUS REPORTS** In accordance with Annex 0404000, Spec Item 3.2				
B002-AA	Provide bi-monthly project status reports	26	EA		**$0.00**
B003	**MEETINGS** In accordance with Annex 0404000, Spec Item 3.3				
B003-AA	Navy Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 3.3.1	2	EA		**$0.00**
B003-AB	Joint Professional Development Conference Support In accordance with Annex 0404000, Spec Item 3.3.2	1	EA		**$0.00**
B004	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1 - class given 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2 - class given 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event a training class is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved, which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	In accordance with JTR - - NTE - -		**$100,000.00**
TOTAL FOR THE LINE ITEM 0003, FFP FOR OPTION PERIOD ONE (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$100,000.00**

ATTACHMENT J-0200000-06
FIRM FIXED-PRICE EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0005, FFP - OPTION PERIOD TWO

ELIN	DESCRIPTION	QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
CLIN 0005	**NAVOSH PROGRAM SUPPORT** In accordance with Annex 0404000, Spec Item 3				
C001	**EDUCATIONAL TRAINING** **Industrial Ergonomics Training Course A-403-0085** In accordance with Annex 0404000, Spec Item 3.1				
C001-AA	Provide Training 32 hour Ergonomics Course	5	EA		**$0.00**
C001-AB	Provide Ergonomics Training Plan	1	EA		**$0.00**
C001-AC	Provide Course Presentation Modules	5	EA		**$0.00**
C001-AD	Provide Course Materials (30 students per class)	150	EA		**$0.00**
C001-AE	Provide CD's of complete Course Materials	150	EA		**$0.00**
C002	**PROJECT STATUS REPORTS** In accordance with Annex 0404000, Spec Item 3.2				
C002-AA	Provide bi-monthly project status reports	26	EA		**$0.00**
C003	**MEETINGS** In accordance with Annex 0404000, Spec Item 3.3				
C003-AA	Navy Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 3.3.1	2	EA		**$0.00**
C003-AB	Joint Professional Development Conference Support In accordance with Annex 0404000, Spec Item 3.3.2	1	EA		**$0.00**
C004	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1 - class given 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2 - class given 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event a training class is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved, which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	In accordance with JTR - - NTE - -		**$100,000.00**
TOTAL FOR THE LINE ITEM 0001, FFP FOR OPTION PERIOD TWO (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$100,000.00**

ATTACHMENT J-0200000-07
EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0002, IDIQ - BASE PERIOD

NOTE: Offerors are advised that these IDIQ requirements are likely to impact the fixed price management and administration operations under Annex 0200000, which include, but are not limited to, work control & scheduling, quality management, reports, standard operating procedures, and work reception. Quantities are "estimates" only.

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
A005	**PHASE 1 - ASSESSMENT SERVICES** Conduct Assessments of customer workplaces and work processes to identify hazardous and unsafe or unhealthful working conditions in accordance with Annex 0404000, Spec Item 4.1	30	EA		**$0.00**
A006	**PHASE 2 - IMPLEMENTATION** The Contractor has complete implementation, in accordance with Annex 0404000, Spec Item 4.2				
A006-AA	**PROVIDE DESIGN SERVICES** Provide design service for selected mitigation strategies, In accordance with Annex 0404000, Spec Item 4.2.1	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
A006-AB	**PROVIDE CORRECTIVE ACTIONS** Purchase, delivery, set-up, testing, and training of COTS or non-commercial items to correct deficiencies in accordance with Annex 0404000, Spec Item 4.2.2	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
A006-AC	**PROVIDE PROJECT CLOSEOUT SERVICES** Provide photos, native summary of completed work and a Hazard Completion Certification, in accordance with Annex 0404000, Spec Item 4.2.3	30	EA		**$0.00**
A006-AD	**PROVIDE CONSULTATION SERVICES** Provide “reach back” consultation support to correct unsafe and unhealthy working conditions for which the consulting contractor under this contract had developed planned resolutions (fully burdened, maximum direct hourly labor rate ceiling rates for SCA employees) in accordance with Annex 0404000, Spec Item 4.2.4				
A006-AD01	Unit Priced Labor - Electrical Safety Specialist	100	Hourly Rate		
A006-AD02	Unit Priced Labor - Fall Protection Specialist	100	Hourly Rate		
A006-AD03	Unit Priced Labor - Endustrial Ergonomicist	100	Hourly Rate		
A007	**MEETING ATTENDANCE AND PARTICIPATION** In accordance with Annex 0404000, Spec Item 4.3				
A007-01	DOD Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 4.3.1	2	EA		**$0.00**
A008	**ADDITIONAL EDUCATIONAL TRAINING** In accordance with Annex 0404000, Spec Item 3.1	3	EA		**$0.00**

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
A009	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1: assessment site is 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2: assessment site is 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event assessment is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
TOTAL FOR THE LINE ITEM 0002, IDIQ FOR THE BASE PERIOD (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$1,500,000.00**

ATTACHMENT J-0200000-07
EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0004, IDIQ - OPTION PERIOD ONE

NOTE: Offerors are advised that these IDIQ requirements are likely to impact the fixed price management and administration operations under Annex 0200000, which include, but are not limited to, work control & scheduling, quality management, reports, standard operating procedures, and work reception. Quantities are "estimates" only.

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
B005	**PHASE 1 - ASSESSMENT SERVICES** Conduct Assessments of customer workplaces and work processes to identify hazardous and unsafe or unhealthful working conditions in accordance with Annex 0404000, Spec Item 4.1	30	EA		**$0.00**
B006	**PHASE 2 - IMPLEMENTATION** The Contractor has complete implementation, in accordance with Annex 0404000, Spec Item 4.2				
B006-AA	**PROVIDE DESIGN SERVICES** Provide design service for selected mitigation strategies, In accordance with Annex 0404000, Spec Item 4.2.1	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
B006-AB	**PROVIDE CORRECTIVE ACTIONS** Purchase, delivery, set-up, testing, and training of COTS or non-commercial items to correct deficiencies in accordance with Annex 0404000, Spec Item 4.2.2	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
B006-AC	**PROVIDE PROJECT CLOSEOUT SERVICES** Provide photos, native summary of completed work and a Hazard Completion Certification, in accordance with Annex 0404000, Spec Item 4.2.3	30	EA		**$0.00**
B006-AD	**PROVIDE CONSULTATION SERVICES** Provide “reach back” consultation support to correct unsafe and unhealthy working conditions for which the consulting contractor under this contract had developed planned resolutions (fully burdened, maximum direct hourly labor rate ceiling rates for SCA employees) in accordance with Annex 0404000, Spec Item 4.2.4				
B006-AD01	Unit Priced Labor - Electrical Safety Specialist	100	Hourly Rate		
B006-AD02	Unit Priced Labor - Fall Protection Specialist	100	Hourly Rate		
B006-AD03	Unit Priced Labor - Endustrial Ergonomicist	100	Hourly Rate		
B007	**MEETING ATTENDANCE AND PARTICIPATION** In accordance with Annex 0404000, Spec Item 4.3				
B007-01	DOD Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 4.3.1	2	EA		**$0.00**
B008	**ADDITIONAL EDUCATIONAL TRAINING** In accordance with Annex 0404000, Spec Item 3.1	3	EA		**$0.00**

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
B009	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1: assessment site is 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2: assessment site is 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event assessment is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
TOTAL FOR THE LINE ITEM 0004, IDIQ FOR THE OPTION PERIOD ONE (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$1,500,000.00**

ATTACHMENT J-0200000-07
EXHIBIT LINE ITEM NUMBERS (ELIN)

LINE ITEM 0006, IDIQ - OPTION PERIOD TWO

NOTE: Offerors are advised that these IDIQ requirements are likely to impact the fixed price management and administration operations under Annex 0200000, which include, but are not limited to, work control & scheduling, quality management, reports, standard operating procedures, and work reception. Quantities are "estimates" only.

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
C005	**PHASE 1 - ASSESSMENT SERVICES** Conduct Assessments of customer workplaces and work processes to identify hazardous and unsafe or unhealthful working conditions in accordance with Annex 0404000, Spec Item 4.1	30	EA		**$0.00**
C006	**PHASE 2 - IMPLEMENTATION** The Contractor has complete implementation, in accordance with Annex 0404000, Spec Item 4.2				
C006-AA	**PROVIDE DESIGN SERVICES** Provide design service for selected mitigation strategies, In accordance with Annex 0404000, Spec Item 4.2.1	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
C006-AB	**PROVIDE CORRECTIVE ACTIONS** Purchase, delivery, set-up, testing, and training of COTS or non-commercial items to correct deficiencies in accordance with Annex 0404000, Spec Item 4.2.2	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
C006-AC	**PROVIDE PROJECT CLOSEOUT SERVICES** Provide photos, native summary of completed work and a Hazard Completion Certification, in accordance with Annex 0404000, Spec Item 4.2.3	30	EA		**$0.00**
C006-AD	**PROVIDE CONSULTATION SERVICES** Provide “reach back” consultation support to correct unsafe and unhealthy working conditions for which the consulting contractor under this contract had developed planned resolutions (fully burdened, maximum direct hourly labor rate ceiling rates for SCA employees) in accordance with Annex 0404000, Spec Item 4.2.4				
C006-AD01	Unit Priced Labor - Electrical Safety Specialist	100	Hourly Rate		
C006-AD02	Unit Priced Labor - Fall Protection Specialist	100	Hourly Rate		
C006-AD03	Unit Priced Labor - Endustrial Ergonomicist	100	Hourly Rate		
C007	**MEETING ATTENDANCE AND PARTICIPATION** In accordance with Annex 0404000, Spec Item 4.3				
C007-01	DOD Ergonomic Working Group Support In accordance with Annex 0404000, Spec Item 4.3.1	2	EA		**$0.00**
C008	**ADDITIONAL EDUCATIONAL TRAINING** In accordance with Annex 0404000, Spec Item 3.1	3	EA		**$0.00**

ELIN	DESCRIPTION	EST. QTY	UNIT OF ISSUE	UNIT PRICE	TOTAL AMOUNT
C009	**TRAVEL EXPENSES REIMBURSEMENT** Payment for Government directed travel in excess of a 75 mile radius of NAVFAC Southwest Headquarters, 1220 Pacific Highway, San Diego, CA, when so specified herein or otherwise identified in Annex 0200000. Reimbursable expenses shall be consistent with Part 31 of the Federal Acquisition Regulations and the Joint Federal Travel Regulation rates and allowances. Example #1: assessment site is 123 miles from NAVFAC Southwest: 123 miles one-way - 75 mile radius = 48 miles reimbursable X 2 for round trip. Example #2: assessment site is 72 miles from NAVFAC Southwest: 72 miles one-way - 75 mile radius = no reimbursement). In the event assessment is required at a location outside the 75 miles radius, it is understood that airfare, lodging, per diem, car rental, etc. may be involved which will be reimbursed as well under this ELIN. Travel within the NAVFAC Southwest footprint is limited to the JTR prescribed mileage rate.	LOT	Negotiated with each Task Order	- - NTE - -	**$500,000.00**
TOTAL FOR THE LINE ITEM 0006, IDIQ FOR OPTION PERIOD TWO (NOTE: THIS AMOUNT TO BE ENTERED INTO SECTION B, SUPPLIES OR SERVICES & PRICES/COSTS WORKSHEET)					**$1,500,000.00**

ATTACHMENT J-0200000-08
TRAINING, CERTIFICATION & EDUCATIONAL REQUIREMENTS

ELECTRICAL SAFETY SPECIALIST

Certifications: OSHA 30 Hour Course (General Industry),
First Aid/CPR/AED Certification,
Licensed Master Electrician
Professional Engineer (PE)

Education: Bachelor's Degree in electrical engineering or equivalent experience

Experience: Six (6) years relevant electrical engineering experience or an equivalent combination of education and experience; three (3) years experience in conducting site surveys/inspections to validate and identify electrical safety hazards in violation of OSHA 1910 CFR Subpart S and NFPA/NEC;

If multiple Electrical Specialists are utilized they need not all meet qualifications but must collectively meet qualifications.

All Electrical Safety Specialist must have OSHA 30 hr and First Aid/CPR/AED.

INDUSTRIAL ERGONOMIST

Certifications: Board Certified Professional Ergonomist (CPE)

Education: Master's Degree in human factors/ergonomics, or an equivalent educational background in the life sciences, engineering sciences and behavioral sciences to comprise a professional level of ergonomic education.

Experience: Three (3) years of full-time professional practice in relevant ergonomics evaluations and resolutions in industrial settings.
Three (3) years of full-time professional practice in developing and presenting classroom training of industrial ergonomics practices.

FALL PROTECTION SPECIALIST

Certifications: OSHA 30 Hour Course (General Industry),
Competent Person Fall Protection
Qualified Person in Fall Protection;
Professional Engineer (PE)

Education: Bachelor's Degree in engineering discipline (with preference in mechanical or civil engineering)

Experience: Three (3) years of relevant engineering experience or an equivalent combination of education and experience in design and evaluation of Fall protection systems. Three (3) years experience in supervising and performing Quality Assurance/Quality Control during fabrication and implementation of fall abatement resolutions.

If multiple Fall Protection Specialists are utilized they need not all meet qualifications but must collectively meet qualifications.

All Fall Protection Specialists must have OSHA 30 hr and First Aid/CPR.

EDUCATION / EXPERIENCE SUBSTITUTION TABLE		
Degree	**Degree and Experience Substitution**	**Related Experience Substitution**
Associate's	2 Years	2 Years
Bachelor's	Associate's + 2 Years	4 Years
Master's	Bachelor's + 2 Years	6 Years
Doctorate	Masters' + 2 Years	8 Years

ATTACHMENT J-0200000-09
FY12 PROJECTED MPHA PROJECTS

NOTE: The following is a list of anticipated MPHA Projects for FY12.

Attachment J-0200000-09
Hazard Abatement Program FY2012 Proposed Project Information

Serial	Project Title	Primary Project Category	Risk Assessment Code	Activity Name	Problem
205CT	Fall Protection for Bridge Cranes	Fall Protection	1	TRIREFFAC KINGS BAY GA	Unsafe condition exist on all bridge cranes at TRIREFFAC and SUBASE. When the contractor and the crane inspectors inspect the crane rails they have to walk the rails and check the condition of all hardware on the rails and the rail of the cracks, when they do this there is no safe way to tie off their lanyards. Includes 13 cranes located in 10 buildings/drydock.
259CT	Abate risk of injury from heavy lifting in awkward postures--weapons area.	Ergonomic	2	NAS JRB FORT WORTH TX	Sailors handle live and non-armed weapons to support training efforts while stationed at FT Worth. Sailors move weapons, weapon components, AWSE, and shipping containers between facilities/compounds during restocking efforts. Weapons are also maintained and built up or configured. Weapons station duty requires excessively heavy lifting, combined with high frequency. Weapons and weapon handling equipment by nature is heavy and bulky. Aviations Weapons Support Equipment is configured with adaptors to hold the weapons. The adaptors are lifted into place, by hand, and the weapons are placed upon the adaptors. Many of the adaptors weigh in excess of 30 lbs and can be lifted 50 to 60 times a day depending on the need of the squadron. SOP requires items between 100 lbs and 150 lbs to be lifted by 3 people. Items between 150 and 499 lbs require a 4 person lift, and 6 people are required for items over 500 lbs. The configuration of the AWSE (size, shape, spacing between racks) and weapons does not facilitate 3, 4 people or more lifting equally or in neutral postures. The sidewinder is the most frequently lifted weapon as well as the sparrow. The sidewinder can weigh 215 lbs and the sparrow 470 lbs. Sailors lift weapons and weapons components by hand, using hernia bars and with a fork truck (which has very limited use). Much of the weapons buildup procedure is done by hand. Sailors are required to hold tail pieces (fins) in place as other perform the fastening. Fins can weight 40 lbs or more and are held at shoulder height.
260AN	Fall Protection for NASWI Wash Racks	Fall Protection	2	NORTHWEST REGIONAL DATA	Personnel are washing aircraft while standing greater than 4 feet above ground level with no railing or Fall arrest system in place. Personnel can be as high as 34 feet above the ground with no Fall Protection. Aircraft surfaces are very slippery and wet. History of several Fall mishaps. Several mishaps have occurred. Three mishaps were reported in February alone.

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268CT	Abate Ergonomic Hazards in the Harbor Operations at NS Mayport	Ergonomic	2	NAVSTA MAYPORT FL	No. of people regularly exposed to the hazard: 120 Problem: Harbor Operations is responsible for monitoring harbor activity and activities such as oil recovery and cleaning. They also perform boat maintenance with a number of welders and mechanics. Welders are exposed to a number of hazards, including the intense light created during welding, poisonous fumes, and very hot materials. The major ergonomic risk factors associated with welding are awkward posture and heavy lifting. Workers sustain awkward postures while performing welding operations. Moving parts and supplies for welding requires heavy lifting. The chances of developing WMSDs are increased when risk factors (e.g. awkward posture and force) occur in combination, especially for significant frequency and duration. Workers assume sustained awkward postures during welding operations. Welding on the floor causes workers to squat or kneel which places biomechanical stress on the knees which can lead to fatigue and discomfort. Hyper-flexing the knees in a squatting or kneeling position can result in pressure on the back of the knees which may reduce circulation in the lower extremities. When the work item can not be raised and angled towards the worker, the worker has to adjust his or her body to view and reach the work. Ergonomic related stressors associated with welding include neck inclinations, bent back postures, non-neutral arm positions, wrist deviations, and contact stress to the lower extremities. Working on a boat can force employees to maintain awkward postures in order to perform repairs in constrained spaces. The muscles must apply considerably more contraction force to maintain awkward postures. As the duration of the contraction increases, stress on the muscles also rise. The continuous stress on these muscles can lead to fatigue and discomfort which can be precursors to injury. Static awkward postures impede the flow of blood needed by the muscles to supply nutrients and remove the waste products of muscle metabolism. Reduced blood flow also slows delivery of oxygen to the muscles resulting in a longer recovery time. Waste products, such as lactic acid, can build up in the muscle and cause fatigue. Awkward postures increase the muscular effort required to do the task. The longer or more frequently static loading occurs, the greater the risk of injury due to overuse of muscles, joints, and other tissues. The Ergonomic risk factors associated with the engine shop are excessive force and awkward postures associated with the repair process. Engine repair tasks require frequent heavy lifting and forceful exertions. Strong force exertions can contract the muscles beyond their maximum capability which can lead to fatigue and possible damage to the muscles and other tissues. Frequent heavy lifting, particularly in awkward postures can increase compressive forces in the spine which increases the risk of injury. Workers maintain static awkward postures for extended periods while performing assessments and repairs. While using hand tools, the worker is required to hold arms in an extended position in order to reach the engine and/or to bend the back and neck to properly view the engine.
270CT	Abate Ergonomic Hazards Associated in Shipping/Receiving Area at Shipping and Re	Ergonomic	2	NAF Key West FL	Workers are responsible for receiving as well as packing and crating material for shipment. Workers build packing crates by hand which requires awkward postures and heavy force exertions. Handling large, heavy parts is a very physically demanding task which places stress on the back and upper extremities. The organization is in need of electronic carts for holding test equipment so the workers can perform system tests of radar systems in proper postures Workers also store and issue hazardous materials. Storing items on low and high shelves can require bending and overhead reaching. Lifting items from incoming pallets requires heavy lifting from an awkward posture. Lifting from awkward postures can magnify stress on the spine and increase the risk of developing work-related musculoskeletal disorders.
515CL	Abate Ergonomic Hazard In the Lifting Of Naval Ship Antennas	Ergonomic	2	NAVSHIPYD NORFOLK VA	Naval ship antennas are very large and can measure up to 36 feet long. They come in a variety of shapes and weights, most of which have numerous parts that all require painting. The painter has to manually span the whip antenna between sawhorses and paint the areas he can reach. Wait for the paint to dry, thus holding up other painting operations while the paint is drying, then rotate the antenna to paint the areas that were setting on the sawhorses. He may also paint other antennas in a similar fashion. Ergonomic Risk Factor: Lower back strain from lifting and rotating the antennas and reaching to paint in awkward positions.

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523CL	Fall Protection Air Handling Units/Paint	Fall Protection	2	NAVSTA NORFOLK VA	Inadequate Fall Protection for 2 paint booths/Air Handling Units at Bldg SP-3000
538CL	Abate Ergonomic Hazard In Bldg. 280 Hazardous Storage Facility	Ergonomic	2	NAVSHIPYD NORFOLK VA	Problem: No. of people regularly exposed to hazard: 9 Building 280 hazardous material storage facility receives the vast majority of all hazard material coming into the shipyard. Containers of all sizes arrive on pallets. Each container must be examined, information transcribed, labels printed from hazardous substance management system and applied to each container. Workers do a lot of bending at the waist (Picture 1) when examining containers, applying labels, or applying shrink wrap around containers before being issued. A make-shift platform was built (Picture 2) to raise pallets off the floor but on occasion containers are stacked high (Picture 3), causing workers to reach upward when applying labels or shrink wrap. Ergonomic Risk Factors: Bending at the waist when inspecting, attaching labels, or applying shrink wrap to HAZMAT containers can cause lower back pain and/or discomfort. Excessive high reach can cause the upper limbs to fatigue and develop musculoskeletal disorders.
542CL	Lightning Protection at Air Traffic Control Tower at NAVSTA Norfolk	Electrical	2	NAVSTA NORFOLK VA	Inadequate lightning Protection system at Air Traffic Control Tower at NAVSTA Norfolk. The antennas are taller than lightning rods The down conductors are not properly bonded.
548CL	Abate Ergonomic Hazards @ Laundry	Ergonomic	2	USNA ANNAPOLIS MD	Several ergo hazards exist at Laundry plant - Large "safety pins" require much pressure to open/close and is done throughout work shift. Several carpal tunnel cases already. Laundry check-in station is not ergonomically designed. Personnel manually lift 50-100lb bags of laundry off of conveyer. Laundry carts, which hold approx. 1000 lbs of laundry must be manually pushed/pulled through buildings to load on trucks.
550CL	Ergo: Heavy Lifting awkward posture	Ergonomic	2	NAVSTA NORFOLK VA	One of the responsibilities of Attack Craft Unit 4 (ACU4) is to remove the propeller blades from the hub of the propeller craft during the repair process. Currently the hub is mounted in a fixture and the crews use, for lack of a better word, a long wooden cheater bar to break the blade free of the hub. The cheater bar is attached to the propeller blade so that the end of the cheater bar is about 7 feet above the floor of the shop. Then two or more individuals grab the end of the bar and pull down, until the propeller breaks free. The primary hazard is excessive force in an awkward posture. This is not only a stressful task, it is also a safety hazard.
559CL	Abate Fall hazard on various aircraft	Fall Protection	2	MCAS CHERRY POINT	There are 100-200 people exposed to these Fall hazard on a daily basis. These hazards could cause severe injuries and possibly death. Many of the work platforms do not allow workers to reach certain areas they need to access during the course of there job without exposing them to Fall hazards.
562CL	Abate Ergonomic Hazards in the Dry Dock Pump Wells	Ergonomic	2	NAVSHIPYD NORFOLK VA	Large gate valves, pumps, and electric motors are manually removed for maintenance and repairs. In most cases they are located in awkward places where they have to be rigged with chain Falls/block & tackle and pulled in position to be lowered onto a transport dolly. This evolution will take up to 5 days. Ergonomic Risk Factors: Pulling and pushing on the large pumps, valves, and motors can cause sprains and strains to upper body and lower back.
569CL	Abate Fall Hazard - Window Cleaning Air Traffic Control Tower	Fall Protection	2	NAS CORPUS CHRISTI TX	The catwalk around the outside of the Air Control Tower is accessed in order to perform window cleaning. Anchorage rings for Fall Protection (FP) were installed after construction of the tower; however, no record of load testing IAW 29 CFR 1926.502(b)(4) exists. No record of construction or design plans incorporating FP, IAW DoN Fall Protection GUIDE FOR ASHORE FACILITIES 20May2003 Ch.4.8, can be found. It is unknown whether the existing anchorages meet OSHA and Navy FP standards. Currently window cleaning has been suspended until adequate FP is in place. Neither NASCC nor NAVFACSE Det Corpus Christi have OSHA defined "Competent Persons" in Fall Protection.

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573CL	Lead Control at Naval Station Rota Outdoor Firing Range	LEAD	2	NAVSTA ROTA SP	Periodic workplace monitoring exposure sampling of NAVSTA Rota Firing Range instructors documented overexposure to lead during their extended night / day firearms qualification session. The building 1927 Rota firing range is a very basic and rudimentary facility; lacking the shower and change room and dedicated laundry washer/dryer required by OPNAV & OSHA Stds for proper worker lead hygiene measures. Occupational overexposure to lead can cause significant central nervous system effects AND is a recognized Reproductive Hazard.
575CL	Submarine Countermeasure Area: Ergonomic	Ergonomic	2	NAVSUBSUPP FAC NEW LONDON CT	The countermeasure pods and launch equipment are maintained as part of the overall submarine maintenance. To do this the countermeasure units are removed from the pods and/or the external launch apparatus. As a part of this process, the sailors must support part of the weight of the 500-pound device as the slings are positioned on the countermeasure unit. The unit is then lowered onto chocks approximately 8 inches from the floor. The countermeasure is then disassembled and maintained. Some of the components of the unit weight up to 70 pounds. Several ergonomic solutions are needed in this area. The ergonomic risk factors are excessive weights while lifting, awkward and static postures.
576CL	Mast Shop: Ergonomic	Ergonomic	2	NAVSUBSUPP FAC NEW LONDON CT	In the mast shop various components of the submarine masts are repaired and maintained. The components of the mast are quite heavy and the current work stands appear to lack stability and do not present work to the operators in an ergonomic fashion. The ergonomic risk factors are awkward, static postures, heavy lifting, and the potential for the heavy mast to shift while it is being worked on potentially causing injuries.
579CL	Laundry Facilities: Ergonomic	Ergonomic	2	NAS JACKSONVILL E FL	The laundry at the JAX NAS Gateway Inn and Suites washes and dries sheets, blankets and towels for the facility. Workers also fold the clean laundry. The clean laundry is taken to the other buildings and dirty laundry removed and brought to the facility. It is loaded into a golf cart type vehicle to do so. The bundles of laundry weigh between 20 and 75 pounds. The ergonomic risk factors include awkward, static postures and heavy lifting.
582CL	Ergonomic: Fire House Awkward Posture	Ergonomic	2	NAF Key West FL	NAS Key West has three fire houses, spread over several islands (keys or Quays). The fire fighters are exposed to a great amount of back and postural related stress when they move patients from burning buildings, vehicles, or airplanes.
590CL	Ergonomic hazards at Kings Bay, GA	Ergonomic	2	TRIREFFAC KINGS BAY GA	Ergonomic Hazards exist with the position and force of the foot and the hand operated Dead Man foot switches while operating bridge cranes at Kings Bay Sub Base.
596CL	Lightning and Grounding Protection	Electrical	2	NAS JRB NEW ORLEANS	Inadequate lightening/grounding Protection at Building 33, FRC.

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670AC	Abate Ergonomic Hazards, Midshipmen Dinghy Storage Racks, USNA	Ergonomic	2	USNA ANNAPOLIS MD	Midshipmen and civilian personnel place dinghies in storage racks by hand. Dinghies are about 14' deep, 5' wide, 18" tall and they weigh up to 230lbs, depending on the model. There are 54 dinghies at the Naval Academy, and the storage racks can accommodate 32 at a time. Dinghies are moved for competitive events, summer training operations, as well as for repair. Every summer all of the dinghies are moved when they are in active use. The storage racks have four levels and loading a dinghy can take four to eight people. When a hurricane is approaching, all of the dinghies must be moved which takes up to two days. Personnel usually complain of back pain after a mass movement of the boats. The top rack of the storage system is 98" tall which requires overhead reaching and crawling up on the racks. The ergonomic risk factors associated with dinghy storage include awkward postures and heavy lifting. Personnel risk injury from forceful exertions caused by handling dinghies. Forceful exertions can place high loads on the muscles, tendons, ligaments, and joints being used. Increasing the force required to lift a load also means increasing body demands (i.e. greater muscle exertion is necessary to sustain the increased effort) and imposing greater comprehensive forces on the spine. As force increases, muscles fatigue more quickly. Storing dinghies exceeds the weight limits recommended by Department of Defense Design Criteria Standard for Human Engineering, Military Standard 1472F. The storage system is frequently performed in awkward postures because of the design of the rack system. Personnel usually reach overhead and crawl in the racks to pull the boats into position. Climbing on the racks is a safety hazard which puts personnel at risk for Falls. Supporting a load overhead can be very stressful on the shoulders and the back. Working in awkward postures increases the amount of force needed to accomplish an exertion, complete a task or sustain that posture over time, increasing the risk of injury. When risk factors such as force and awkward posture occur in combination, the risk of developing a WMSD is increased.
678AC	Abate Ergonomic Hazard	Ergonomic	2	USNA ANNAPOLIS MD	Existing ramp for off-loading Laundry trucks weighs approx. 500lbs, and requires two employees to move and attach ramp to truck to off-load carts of laundry. This occurs multiple times daily, and creates a severe back injury potential.
728AP	Abate risk of injury from high spinal forces and Falls during DDS preventive may	Ergonomic	2	SDV TEAM ONE	Preventive maintenance and repair procedures on the DDS are performed by the technicians (16). The PM Service requires external access to the interconnected chambers which are covered by fairings. The fairings/chambers are between 3 and 12 feet off the deck. All work above 4 ft is performed while standing on ladders, the DDs, or the transportation trailer. Fall arrest is not feasible. Fall Protection is not currently provided. Work at this height includes sustained awkward postures and lifting. The 5 fairings (which cover the super structure of the DDS), are between 100-220 lbs, the nose is est. to weigh over 300 lbs. The technicians handle the one-of-a kind; heavy, bulky fairings/nose manually. While the work is performed with the utmost regard for safety, Fall and Ergonomic hazards exist. The fairings are lowered/lifted belay style. A majority (75% or more) of the repair work requires sustained awkward postures. For example the technicians lean forward, past the super structure, to reach the components with less than optimal footing (i.e. on ladders). All work at or below 4 ft is performed standing, sitting or squatting.
744AS	Abate risk of injury during corrosion control measures	Ergonomic	2	SOUTHWEST RMC SAN DIEGO CA	Corrosion control specialists are exposed to a number of physical hazards, most notably heavy lifting, frequent standing and temperature extremes. Technicians are routinely exposed to heat stress conditions due to the high intensity heat during the operation, full protective suit worn and the lack of ventilation in the shop. Temperature extreme is a contributing factor for the development of WMSDs. Technicians exert high hand forces in awkward postures when holding the nozzle assembly in position and especially when pulling the assembly above their shoulders for more slack to reach the other side of the door to be sprayed. Technicians stand during the entire process, they also manhandling the door to turn it on the other side poses potential physical risk. Two people handle the estimated 200lb door.

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762AS	Abate risk of awkward postures and injuries while lifting and transporting mamma	Ergonomic	2	COMMANDER, NAVAL SPECIAL CLEARANCE TEAM ONE	3-4 employees are required to lift a 600 pound zodiac boat above their heads and then push/slide it into the water off of the pier. The beaching cart is a rigid amphibious mobile platform framework used to transport Navy dolphins from their above ground pools to their transport boats. Carts are very difficult to maneuver around . Most operations involving dolphins are conducted from 9-meter or 11-meter RHIBs. However, these RHIBs are too large to launch from the well deck/stern gate of an amphibious ship. Thus, once the Zodiac leaves the amphibious ship via the stern gate, the Zodiac and RHIB merry up and the dolphin and beaching mat are transferred from the Zodiac to a RHIB at sea. This dolphin transfer is typically conducted by three people (due to space limitations on the boats) who have to lift, twist, and slide the dolphin and beaching mat (weighing 500-800 pounds) from one boat to another. There have been several near-mishaps while conducting dolphin transfers. Personnel are exhausted after this transfer and therefore are not able to optimally perform. Dolphins learn a beaching technique in which they can jump from the water onto a 3-section mat that is positioned on a boat. The outer two sections of the beaching mat fold up to form a triangular tube. The trainers must lift the mat with the dolphin, which can weigh a total of 800 pounds, so the mammal is positioned for safe transport.
792AS	Abate risk of injury from awkward and static postures during cytology operations	Ergonomic	2	NAVSTA SAN DIEGO CA	The Cytology operation is used to process various types of tissue samples for the detection of cancerous cells. This is a fast paced, work intensive area which requires constant motion. Due to the nature of the methods used for processing, cytological samples requires concentration and attention to detail which is critical for producing optimally processed samples. The current configuration of the Cytology processing is currently a U shaped corridor. The processing technician continually walks from the specimen receiving/accessioning area at one end of the U, to the processing area at the other end. The technicians work is interrupted in order to receive specimens or customers requiring a trip around the U each time. The technician works around the work areas instead of having the work area around him/her. The west side of the room currently has no sit down work stations for the GYN and non-GYN technicians resulting in prolonged standing. The specimen receiving/accessioning area requires constant twisting because the technicians back is to the customer. A least three members have well documented ergonomic issues and working on these benches often leads to feeling fatigue due the back and knee and foot strain. This is especially true for our processing technician who has had various physical ailment directly attributed to her job. The processing technician has recently suffered severe shoulder and wrist issues that were directly attributed to her job. The injury required treatment that included surgery and a month of convalescent leave for a month. Several months of physical therapy were required during which time limitations were put on her work. Other staff personnel were needed to cover during this period and to assist in some certain tasks during her recovery from injury. NMC San Diego has tried repeatedly to reduce the stressor.
805AS	Ergonomic Support Equipment for ALQ-99 PODs Abate risk of injury from awkward po	Ergonomic	2	NORTHWEST REGIONAL DATA	Repair, maintenance and testing tasks requires sustained awkward postures of the hands/arms, back, neck and shoulders as well as the potential for high spinal forces associated transportation of the assets. Successful redesign of the HRU (with the eHRU) through MPAH project 265AN virtually eliminates the exposure to ergonomic, safety and electrical risk factors which violate OPNAVINST 5100.23G.23
806AS	Fall Protection during P-3/EP-3 Compass Calibrations	Fall Protection	2	NORTHWEST REGIONAL DATA	P-3/EP-3 aircraft have a requirement that each Inertial Navigation System (INS) be calibrated on an annual basis at a minimum. The aircraft is placed on a certified compass rose (north-south line) for this process. Employees are required to be on top of the horizontal stabilizer of the aircraft to make calibration adjustments during the calibration process. All current maintenance stands, JLG's, man lifts, etc are made with steel components which affect the calibration process. All support equipment is moved out of the area during this period so as not to compromise the calibration. The employee is left on top of the horizontal stabilator with no form of Fall Protection/Fall restraint system.

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807AS	Abate risk of injury from awkward heavy lifting and postures for emergency medic	Ergonomic	2	NAWS CHINA LAKE	Ambulance personnel are faced with an ever-changing, uncontrolled work environment in which patients are commonly moved from homes with narrow passageways to the ambulance for transportation to hospitals. Once at the hospital, the ambulance crew transports the patient from the ambulance to the emergency room, and then transfers the patient to a short-term care ward stretcher for treatment. Loading the gurney. At the pick up site, with the patient on the gurney, the ambulance technician position the gurney at the rear of the ambulance. One technician folds up the gurneys legs, disengages the wheel locks, and pushes the gurney into the ambulance. The second technician stands at the side of the gurney to help with guiding and to reassure the patient. During this process the technician at the end of the gurney bears the weight of both the gurney and the weight of both the gurney and the patient while pushing the gurney into the ambulance. The process is complicated because the patients feet interfere with the gurneys base controls and handhold at the foot end Unloading the gurney. The gurney is removed from the ambulance with one technician outside the ambulance at the foot of the gurney and the other technician inside the ambulance. The technician at the foot pulls the gurney out until the base drops and supports the gurney weight. Again, the patients feet can obstruct the handhold and require the technician to bend, Gurney operation. The gurney is raised and lowered with one technician at each end, a. To lower the gurney, the technician at the foot of the gurney disengages a lock located beneath the patients feet. The feet of a tall patient make it difficult for the technician to grasp the mechanism. Locks at the head and the foot of the gurney must be disengaged at the same time. Once the locks are disengaged, the crew bears the weight of both the gurney and the patient while lowering the gurney. If one end disengages without the other, the gurney can Fall. To raise the gurney, the technicians disengage the locks and lift the gurney until they hear an audible indication. Shorter technicians must compensate for the taller technicians height advantage by leaning back. The major ergonomic risk factor for the ambulance technicians is excessive lifting and force due to manual handling of the gurney. The gurneys have limited height positions. Their short wheelbase and small diameter wheels make them unstable on some terrain, thus creating a risk to both the technician and the patient if a gurney Falls. The gurneys are not tension controlled; therefore, the technician bears the weight of the patient and gurney during lifting and lowering. The handles on the foot end of the gurney are under the cot, forcing the technician into awkward postures.
834AS	Correct Electrical Hazards at Pt Mugu	Electrical	2	NAS PT MUGU CA	Electrical and lighting systems at the weapons revetment area are in various states of deterioration due to their exposure to the costal elements and age. Much of the energized electrical system is no longer needed to support aircraft but expose personnel to shock hazards due to the obsolete design, deteriorating structures and lack of electrical safety measures. Many lighting poles are rusted to a point where their continued support is questionable.
835AS	Correct Shock Hazards in Aircraft Maintenance Area.	Electrical	2	NAS PT MUGU CA	Hangar Power Service Points (PSP) for aircraft maintenance are outdated and don't comply with current NEC and MIL-STD requirements thereby posing a serious shock hazard for operating personnel. The PSPs may also fail to support the electrical requirements of new aircraft being assigned which will affect mission readiness.

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848AS	Ergonomic Hazards at San Diego Antenna Shop	Ergonomic	2	SOUTHWEST RMC SAN DIEGO CA	Antenna repair and maintenance tasks expose sailors to high spinal / shoulder forces and sustaining awkward postures. Antennas weigh between 35-245 lbs. Two to three workers manually lift and carry the antenna whip antennas either whole or in sections, in excess of eight times during service. Most antennas are stored on the ground. Handing the whip antennas exceeds the DoD Design Criteria Standard for Human Engineering (MIL-STD-1472F) maximum weight limits for carrying. Carrying objects above the recommended limit places unreasonable stress on the spinal discs. Painting requires force, static/awkward postures, duration, and repetition. Multiple coats, can take 2-3 days, 2-3 hours/day using a 10 lb. spray gun. The AS 1735 antenna are oddly shaped, hard to paint (tight areas), weigh 30 lbs, and have to be manually turned. Sanding/Abrasive Blasting requires force, awkward/static posture, repetition, duration, hand-arm vibration. Exposure are 3-4 hrs/day, 3-4x/week, using a belt sander weighing 18lbs.
851AS	Abate Fall Haz while cleaning insulators in Helix House mezzanine areas	Fall Protection	2	NCTS CUTLER	There is no Fall Protection equipment currently available when the riggers clean the insulators in the mezzanine areas of the 2 Helix Houses.
857AS	Wire Rope Shop	Ergonomic	2	SOUTHWEST RMC SAN DIEGO CA	The wire rope shop is tasked with fabrication of stainless steel nets and frame assemblies to replace fiber safety nets. Technicians begin the fabrication process by laying out a template or pattern for the nets. They position guide pins along a metal frame on an elevated table. The template table is 6x10 (or larger) forcing the technicians into awkward postures (forward flexion and squatting while standing on the table) through 1/3 of the template process. One continuous length of stainless steel cable is then woven through the template and side swage clips. Due to the height and size of the template table, technicians stand on platforms or the template table itself to weave the nets. Technicians are in awkward postures through Â½ of the weaving process. Net clips, specifically designed for use with steel wire is then hand fastened. The technician places a die block beneath the cross section of net, positions the net clip beneath and above the net, places another die block on top of the clip and impacts the block, repeatedly with a mallet, until the net clip secures (or crosses over) creating a fastened junction. 456 net clips are secured per 6x7 net. Each clip requires 3 to 5 impacts blows to ensure closure. The net fabrication process poses an increased risk of injury. The process has a high potential for error during fabrication. One process alteration, detailed below will improve and ensure quality, reduce wasted, increase productivity and virtually eliminate the Ergonomic and safety concerns.
860AS	Abate risk of injury when handling EA-6B/EA-18G Assets	Ergonomic	2	NORTHWEST REGIONAL DATA	The workers are responsible for receipt, distribution, assembly, disassembly and storage of the electronic countermeasure equipment (assets) from EA-6B aircraft. Workers from another area initially remove the pods containing the assets (weighing approximately 1075 pounds depending on the equipment) from the aircraft via a bomb hoist. The assets are extracted from the pod and transferred onto a transportation fixture. Two workers are required to lift and carry the assets while in the fixture (average 350 lbs). A previous MPHA project designed, developed, tested and fabricated an asset handling skid. The skid has reduced the risk factors (which previously violated the MIL-STD). The skid requires minor modifications to meet NAVAIR requirements as well as community wide acceptance.
862AS	Abate risk of back & shoulder injuries during canopy handling procedures	Ergonomic	2	NORTHWEST REGIONAL DATA	5 people are required to lift and move EA-6B canopies a minimum of 5 times during the process from storage to maintenance platform. Objects are lifted from at or above shoulder height to floor level. Canopies weight up to 225 lbs. Canopies value $700K. Work center performs maintenance on 4 canopy's a month but receive up to 8-10 a month which are stored outside work center awaiting maintenance.
873AS	Abate Aircraft Fall Protection Hazards for maintenance personnel	Fall Protection	2	COMMANDER, NAVAL AIR FORCES (CNAF)	Personnel throughout CNAF have inadequate aircraft Fall Protection and are in violation of NAVOSH and OSHA standards when performing maintenance activities for fixed wing and rotary aircraft.

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880AS	Ergonomic Hazards at Naval Medical Center San Diego	Ergonomic	2	NAVMEDCEN SAN DIEGO CA	NMCSD Ergonomic Committee has identified three major ergonomic projects: 1) Characterize personal hand-arm vibration exposure in high exposure groups; 2) Evaluate efficacy of vibration reduction gloves; 3) Compare published NIOSH vibration values of sanding tools vs. actual vibration values for study group for a variety of tools (in use and new products)
255CT	Abate Hazards in Grounding and Lightning Protection Systems	Electrical	3	NAS JRB FORT WORTH TX	Lightning Protection for high risk facilities. Protection of the CNRIC facilities due to the lightning strikes to the facility. Loss of intelligence data, safety of soldiers and sailors. Loss of intelligence computers. Mission loss. Equipment losses. Facility damage. Potential personnel hazard Anti-terrorism Mission loss. Transient Voltage Surge Suppression for high risk facilities. Computer equipment losses. Data loss. Facility equipment losses. Mission loss. Single point grounding with possible cycling currents and voltage. Multiple computer and data loss. Intermittent computer locks up. Over 2 million dollars in electronic assets in each building.
266CT	Abate ergonomic hazards--repair/maintain heating, cooling units & boilers.	Ergonomic	3	NAS JRB FORT WORTH TX	Although the tasks differ fro the boiler and HVAC technicians, the Ergonomic risk factors exposures are very similar. Daily tasks expose the technicians to awkward body positions during PM and repair procedures. Other exposures include infrequent awkward lifting. Sustained and repeated awkward postures: Due to the constrained workspace technicians assume awkward postures that can cause considerable stress to the muscles, ligaments, and tendons. Kneeling and squatting are common positions required to reach items on ground or floor level. These positions, with the knees hyper-flexed result in pressure on the back of the knees that can reduce circulation to the lower extremities. Excessive pressure behind the knee caused by restricted postures can cause leg swelling. In the short term, leg swelling may reduce the temperature of the lower legs, increase heart, rate, and produce discomfort in the legs and feet. In the long term, leg swelling may lead to a number of circulatory disorders including varicose veins. PM often results in awkward and sustained postures because the work is not brought to the worker, therefore the worker must angle his or her body to accommodate the work. Ergonomic stressors associated with boiler or HVAC PM include neck inclinations, bent back postures, non-neutral arm positions, wrist deviations, and contact stress to the lower extremities. While short-term awkward postures are easily tolerated, sustained awkward postures can cause fatigue and discomfort and place the employee at risk of developing WMSDs.
672AC	Ergonomic NNMC Branch Health Clinics	Ergonomic	3	NATNAVMEDC EN BETHESDA MD	Employees engaged in various patient care activities at Branch Health Clinic Philadelphia Naval Business Center and Branch Health Clinic Lakehurst are at risk for ergonomic injuries from a variety of risk factors. These risks include: awkward posture during various patient care activities, prolonged standing during patient care and tasks related to patient care, prolonged sitting while doing tasks related to patient care, prolonged sitting at awkward postures while performing dental care, pushing heavy patients, assisting patients onto tables, into and out of vehicles. The employees at these clinics perform activates identical to operations performed at BHC Dahlgren.
674AC	Abate Ergonomic Hazards in Main Operating Room	Ergonomic	3	NATNAVMEDC EN BETHESDA MD	Employees in the Main Operating Room stand for much of the day, many times exceeding 8 hours for complex surgeries. Standing for long periods can be a strenuous activity that promotes blood pooling in the legs and feet and can result in discomfort and fatigue. In addition, technicians in the OR must push and pull heavy cylinders of medical gases. This causes forceful exertions which can place high loads on the muscles, tendons, ligaments, and joints being used.
867AS	Eliminate Ergonomic issues at Pass & ID	Ergonomic	3	NORTHWEST REGIONAL DATA	The existing counter top desk is not ergonomically designed with the computers installed in a downward position. The workstation cannot be adjusted and it is causing the employees to have neck, shoulder, back and arm pain. Additionally, chairs cannot be adjusted due to the current desk situation.

Serial	Project Title	Primary Project Category	Risk Assessment Code	Activity Name	Problem
868AS	Fall Arrest / Mobile Utilities Support Equipment	Fall Protection	3	NAVBASE VENTURA CTY PT MUGU CA	Military personnel work on top of 40' x 8.5' x 8' steam units 4-6 hrs and power plant / generators 1-2hrs without Fall Protection

NOTE: FOR THE BASE PERIOD OF THIS CONTRACT, THE GOVERNMENT WILL PROVIDE HISTORICAL INFORMATION FOR ALL PROPOSED PROJECTS.

FOR FUTURE OPTION PERIODS, NO HISTORICAL INFORMATION WILL BE AVAILABLE FOR PROPOSED PROJECTS.

ATTACHMENT J-0404000-01
HISTORICAL TRAINING SCHEDULE

The following schedule is provided for the Contractor's reference, the training schedule in each year is expected to be roughly analogous in scope. The MP/HA Program shall determine the locations and dates where training is to be performed each year.

TRAINING SCHEDULE 2010				
Course	**Date**	**Location**	**Number of Instructors**	**Man Days**
Navy Ergo 32 hour course	05-Apr-2010 - - thru - - 09 Apr-2010	Norfolk Virginia	2	10
Navy Ergo 32 hour course	17-May-2010 - - thru - - 20-May-2010	San Diego California	2	10
Navy Ergo 32 hour course - Marines	21-Jun-2010 - - thru - - 24-Jun-2010	Kaneohe Bay Oahu, Hawaii	2	10
Navy Ergo 32 hour course	16-Aug-2010 - - thru - - 19-Aug-2010	Great Lakes Illinois	2	10
Navy Ergo (hands-on) 32 hour course - Marines	20-Sep-2010 - - thru - - 23-Sep-2010	New Orleans Louisiana	3	15
Navy Ergo (Advanced) 2 Day Course	20-March-2010 - - thru - - 21-March-2010	Norfolk Virginia	2	6

ATTACHMENT J-0404000-02
SAMPLE ASSESSMENTS

NOTE: The following sample assessments are provided as information only.

Ergonomics Site Assessment Report

for

Naval Medical Center

San Diego

Pharmacy

Prepared for:

By:

[redacted]

April 2011

Distributed to US Government and authorized agents only.
All other requests for this document shall be referred to:

[redacted]

Executive Summary

The Naval Facilities Engineering Command (NAVFAC) manages the Chief of Naval Operations (CNO) Mishap Prevention and Hazard Abatement (MPHA) program, a centrally managed program that provides technical, engineering, and financial support to Navy shore activities to identify and resolve fall abatement, electrical safety, and ergonomic deficiencies beyond their technical and funding capabilities. Information about the MP/HA program can be found on the NAVFAC website www.navfac.navy.mil/safety and in OPNAVINST 5100.23G, Chapter 12, Hazard Abatement. Benefits from ergonomics include increased quality and productivity, improved health and safety, decreased Workers' Compensation Costs, and improved comfort. For more information on ergonomics and ergonomics technical support available, visit the Ergonomics page at www.navfac.navy.mil/safety.

Naval Medical Center San Diego requested a formal site visit of the pharmacy in support of their ergonomics program and their on-going initiative to reduce work-related musculoskeletal disorders (WMSDs). [redacted] was tasked by NAVFAC Southwest to evaluate the pharmacy and generate findings in an Ergonomics Site Assessment report. A Certified Professional Ergonomist from [redacted] conducted a site visit to identify areas of possible improvement.

A four-hour walkthrough assessment was conducted of various pharmacy work processes and associated workstations. The onsite visit included interviews with the staff and discussions with pharmacy management.

Overall, the organization and layout of the over-the-counter (OTC) supplies, auto-fill center, inpatient dispensing, and storage area are well thought out with regards to minimizing workplace exposure through wasted effort or motion. In addition, walkways allow for easy passage and the open design allows for a less congested feel. Minor recommendations can be found in the discussion section of the report for the controlled medication and intravenous medication work areas. The walk-up windows computer workstations were not evaluated in detail. They are fully adjustable and adjusted to each worker. This area, as well as the inpatient dispensing area, appeared fully compliant with the recommendations in OPNAVINST 5100.23G.23 Appendix B.

The area of greatest concern is the outpatient medication dispensing area. The layout of opposing workstations, dispensing and verification, force the technicians and pharmacists to work in a number of highly repetitive, awkward postures. The primary cause is the retrofitted transfer system between verification and dispensing. In addition, the lighting is dim in this area, which was possibly caused by the retrofit. At first observation, the work surface area (not foot print but work surface table top) seems crowded and insufficient in size. This retrofit again is positioned in an area that was once meant to be open. The exposure puts workers at risk of WMSDs. Recommendations to the Command to reduce the probability of injury include considering equipment purchase[i] and continuing the administrative controls[ii]. A variety of recommendations can be found in the discussion section.

Representative vendor information is included in the recommendations to assist in the evaluation of products and services. Recommendations to the Command include gathering input from the workers, safety specialists, occupational health professionals, and other personnel to evaluate equipment before purchasing. This process will increase product acceptance, test product usability/durability, and take advantage of worker experience.

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Introduction

BACKGROUND

Naval Medical Center San Diego (NMC SD) is the Navy's a premier teaching hospital and referral center for the Armed Forces. There are over 6,000 military and civilian professionals providing state of the art health care to the military community. NMC SD provides care for the wounded from Operations IRAQI FREEDOM and ENDURING FREEDOM, as well as Sailors and Marines preparing to deploy, their family members, and those who have served the nation in the past.

In addition, NMC SD augments several operational platforms, including the USNS MERCY, Casualty Receiving and Treatment Ships, Expeditionary Medical Facilities, and the Marine Expeditionary Force.

PURPOSE

The purpose of this Ergonomics Site Assessment Report is to present recommendations to control work place risk factors as well as provide cost estimates and options for implementing various controls.

APPROACH

The site was visited to obtain an understanding of actual operations by:

1. Observing the process
2. Meetings with local safety personnel and operators
3. Identifying, evaluating, and discussing the ergonomic risk factors.

This Ergonomics Site Assessment Report was developed by incorporating the observations from the site visit with results from the OPNAVINST 5100.23G, chapter 23: *Ergonomic Program* to:

- Evaluate the severity of the exposure to the ergonomics risk factors.
- Identify solutions for controlling the hazards that fit within the constraints of the tasks.
- Provide recommendations for the control measures.

Discussion

The results of the Site Visit and Ergonomics Analysis, including the recommended control measures to reduce the probability of a WMSD, are discussed below[iii].

Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-related Musculoskeletal Disorders (WMSDs) are:

- *Musculoskeletal disorders to which the work environment and the performance of work contribute significantly, or*
- *Musculoskeletal disorders that are aggravated or prolonged by work conditions.*

Inpatient medications

The inpatient work area has a flexible design, meaning the workstations can be adjusted to accommodate the variety of people who access these positions.

Ergonomics Risk Factor Evaluation

The major work place risk factors for the inpatient work area are static postures. Postures can also be awkward if the workstations' adjustable features are not fully utilized. The workstations reviewed were adjusted to each worker.

Recommended Solutions

- Ensure ergonomic training is compliant with OPNAVINST 5100.23G. 2308 for all personnel.
- Utilize the computer workstation checklist in OPNAVINST 5100.23G Appendix B to ensure proper set up for each person who uses the workstation.
- Encourage stretching and flexing during breaks to remove the buildup of waste products in the muscles.
- A computer workstation self-assessment can also be found on the Ergonomics Home page at www.NAVFAC.Navy.mil/safety

Figure 1: Controlled medication work center

Controlled medications

The narcotic dispensing workstation is a low volume area, processing 10 prescriptions per hour. Six specially trained technicians rotate shifts in this area, filling Class 2-5 medications.

Ergonomics Risk Factor Evaluation

The controlled medication work center is low volume, well organized and allows for a variety of technicians to work comfortably through adjustable seating. A stepstool with a larger work platform may be preferred for the shorter stature workers.

Intravenous (IV) medications

The IV room is a high-volume work area. The IV room is a 'clean-room'; a filtered and pressurized environment where sterile IV medications are prepared. The technicians are required to scrub their hands and arms in the outer room and don personal protection equipment (PPE) before entering the clean-room. Once inside, workers stand in front of a laminar airflow hood (LAH) to prepare the medications. Pharmacy technicians practice aseptic techniques, which is a strict set of procedures designed to prevent microbial contamination of medication. The key is to position and manipulate objects (needles, vials, IV bags, etc.) in such a way that sensitive surfaces always face the flow of 'first air', which is the clean air coming out of the LAH filters. Pharmacy workers must also follow strict protocols when mixing ingredients; as adding ingredients in the wrong order can lead to precipitation in the solution.

Figure 2: IV medication room worktable

A major part of the IV room workers job consists of using needles and syringes to extract medications from vials or ampoules and then re-injecting the medication into an IV bag or bottle containing the proper volume and type of delivery vehicle (liquid solutions).

Ergonomics Risk Factor Evaluation

The tables in the IV room are too high for the workers, resulting in awkward shoulder positions. If feasible, the tables should be lowered (or adjusted) to match the stature of the population (either individually or as an aggregate). In addition, because seating is not available, technicians must stand throughout the day. The risk factors in this area are in addition to the cold temperature which in itself is a contributing factor to the development of WMSDs.

Recommended Solutions *Error! Bookmark not defined.*

<u>Interim Recommendations:</u>

- Ensure ergonomic training is compliant with OPNAVINST 5100.23G. 2308 for all personnel.
- Consider sit, stand, or laboratory height seating. If using high cylinder stools, ensure technicians' feet are supported by a foot ring or platform.
- Ensure workers 'warm up' during breaks.
- Stretching should be done cautiously when the body is cold.

Table 1: Representative vendor information

Equipment	Vendor	Product	Figure	Cost Est.
Clean Room Seating	FS Industries 401-421-0314	Deluxe clean room chair – high lift with foot ring		$600
Clean Room Seating	Lab Tech Seating http://www.labtechseating.com/esd-and-cleanroom-seating/ergonomic-esd-clean-room-chairs	Vinyl high bench seat with foot ring		$450
Clean Room Sit Stand Seating	Sit Better http://www.sitbetter.com/sorted/search/lab_esd_cleanroom_chairs/	Backless tall stool with saddle seat and angle		$139

Outpatient medications

The NMC SD pharmacy is a fast paced environment with no room for error. Technicians and pharmacists process 150 to 200 outpatient prescriptions an hour or approximately 2,000 prescriptions a day. Each pharmacist must verify a minimum of 275 prescriptions a day; falling below this threshold can affect their performance evaluation. A single prescription can consist of 1 to 10 individual medications which may include OTC items.

The dispensing area has two sections: one for active duty and the other for retirees/dependents. Within this division, there are four work cells:

1) Walk-up windows - where prescriptions are dropped off and picked up;
2) Dispensing (fill station) - where prescriptions are dispensed and OTCs gathered;
3) Verification - where pharmacist verify dispensed products; and
4) Delivery - where prescriptions are stored until retrieved by the dispensing technician.

The floor layout between the four work cells is efficient; paths do not cross and the shortest route has been taken between receiving the order and delivery.

Once a prescription is received digitally and printed out, the technician, as see in Figure 3, retrieves the prescription and dispenses fast movers from the auto-dispenser. The OTCs or other prescriptions are retrieved and the complete order placed in a basket and onto the white transfer rack. A light indicates to the pharmacist that the prescription is ready for verification. The fast movers, fill area and white transfer system can be seen in the left corner of Figure 3.

The pharmacist is cued that the prescription is ready by the red light and retrieves the basket from the transfer rack as seen in Figure 4. The prescription is then verified and narcotics added, if required. The pharmacist then places the entire order in a bag and moves it to the retrieval/delivery area.

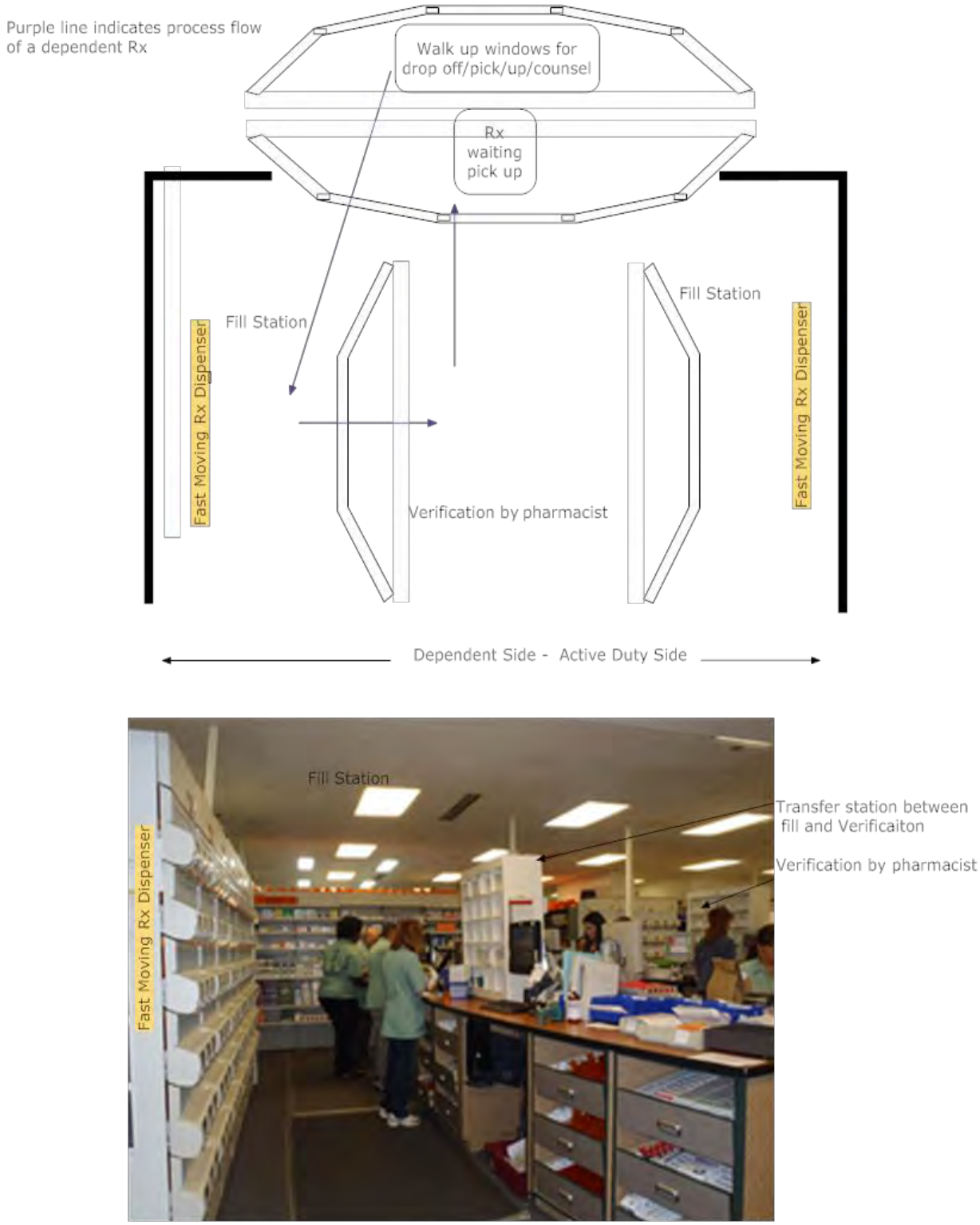


Figure 3: Outpatient floor plan and process flow

Ergonomics Risk Factor Evaluation

Figure 4: Forward reaching at shoulder height

The layout of opposing workstations, dispensing and verification, forces the technicians and pharmacists to work in a number of highly repetitive, awkward postures. The primary cause is the retrofitted transfer system between verification and dispensing as seen in Figures 4 and 5. In addition, the lighting is dim in this area, possibly caused by the retrofit. At first observation, the work surface area (not foot print but tabletop area) seemed crowded and insufficient in size. This retrofit again is positioned in an area that was once meant to be open.

Technicians and pharmacists have to repeatedly reach up to 42" to retrieve the transfer bins, a minimum of 550 (275 x 2) times a day, as seen in Figures 4 and 5. Shorter personnel cannot reach the higher bins in the transfer system located behind the monitors without standing on their tiptoes. The 50 percentile man can easily reach forward and up 29 inches with minor forward flexion. The 50 percentile woman can reach only 27 inches[1].

Figure 5: Transfer system causes excessive forward and upward reaching. Circle indicates the area most difficult to reach.

Once the pharmacists retrieve the prescription, they must verify every medication. The verification requires that they open bottles, which are not sealed and then check the name, color, etc. of the medication as well as the dosage and use directions. This process requires constant neck flexion (looking downward). This exposure is common for pharmacists and technicians, but compounded by some of the monitors being too low at their highest position and dim lighting in this area (which tends to cause even more deviated neck postures to 'see'). Fixing the monitor issue will reduce the cumulative exposure to downward neck flexion. Figure 5 shows how the transfer system is partially blocked by the monitor's adjustability arm.

Two of the people interviewed reported having to see physicians with shoulder/neck pain. The severity and frequency of the discomfort is such that physical therapy, Transcutaneous electrical nerve stimulation (TENS), therapy and medications, have been prescribed. Unfortunately, if the work environment remains unchanged, the pain can escalate into a permanent (none-reversible) disorder.

[1] The measure of man and woman; John Wiley and Sons Inc, pg 12 and 14

Figure 6: Curved design can be seen as well as the low monitor position for taller individuals.

The outpatient counters are at a standard 39" height. It is too high a typing surface for shorter individuals and too low for taller ones. As seen in Figure 5, the keyboard and mouse pad have been placed on items to raise them high enough to accommodate the arms and wrists of taller individuals. Generally, ergonomists design for the tall and accommodate the small. Since platforms are not an option because the environment is in constant motion, adjustable or special accommodations may need to be considered.

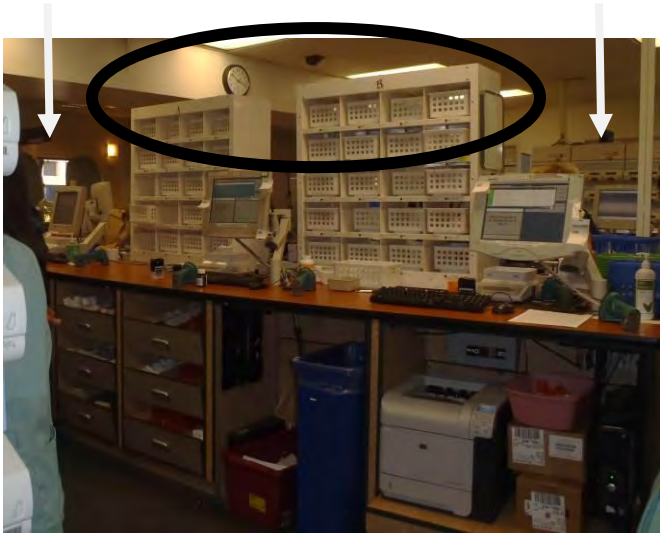


Figure 7: White arrow indicate unused space in the same zone as the existing transfer system. Black circle indicates problematic reaching zone.

Recommended Solutions

There is difficulty in making specific recommendations within this area without obtaining floor and equipment layout plans.

It is noted when implementing one solution, others may be adversely affected. A process that gathers input from all the staff should be considered.

Interim Recommendations:

- Ensure ergonomic training is compliant with OPNAVINST 5100.23G. 2308 for all personnel.
- Encourage the use of rest breaks which include stretching and flexing techniques. The hospital's physical staff may be able to conduct training related to specific body parts affected by the repetitive forward and upward reaching and forward neck flexion.
- Continue to educate the staff on what the neutral standing posture is. Educate staff to use lower, closest row within the transfer station first.
- Remove anything from the work area that is in excess to free up space.
- Provide monitor arms with a greater range of vertical adjustability, see Table 2.
- Replace anti-fatigue matting with one section custom cut.

Long Term Recommendations:

- Ensure adequate lighting at the work location where each pharmacist or technician is standing. Generally, lighting should be perpendicular to the work area (Figure 5 shows it parallel). Task or more focused lighting may be required. Note that adding task lighting can be problematic in a work area which is already crowded. Reconsider the lighting system after choosing a transfer system solution that is appropriate for the pharmacy.
- When feasible, replace the white transfer system with a system that takes advantage of the horizontal space between verification and dispensing (this system uses vertical).
- Retrofitting existing workstations can be problematic. Keyboard trays or adjustable work surface tops can lack stability and mounting points but may be considered as an option for the taller personnel and used on a case by case basis.
- A 'reading' zone can be established with magnification and focused lighting for the pharmacists to read the prescription, the labels, and view the medications with less neck flexion. Note, adding additional equipment reduces usable space.

The retrofitted white transfer system between dispensing and verification (white bins and casement) causes forward and over the shoulder reaching, repetitively. This can be seen in Figures 4 and 5. The system is 5 bins high x 4 bins wide. The height of the system also affects the lighting and possibly airflow.

A possible solution is to lower the bins and reposition them horizontally. This reduces upward reaching while using the same footprint. Unused space in the same zone as the existing system, can be seen in Figure 7.

For example, replace the 5 high x 4 wide arrangement with a 2 high x 4 wide or 1 high x 6 wide arrangement. The latter increases air flow and creates a more open environment that has been shown to be beneficial in pharmacy settings. Recommend purchasing a new transfer system that is longer and lower. Using Figure 7 as a reference, move the bins in the black zone into the area under the white arrows, taking the monitor location of the individual workstations into consideration.

Some of the Rx where spread across multiple bins (i.e. one person's prescription was transferred in more than one white bin). It may be beneficial to increase the bin size, making them deeper. This change would also bring the work closer to the worker further reducing awkward postures but impinging on work surface area.

It is assumed that the original air-flow system incorporated this type of concept; low, easy transfers in an open area. Transfers were easily sent forward onto an air pocket. The air-flow systems curved design can be seen in Figure 6. A curved design indicates the work surface is narrower towards the center and wider at each end of the workstation. This feature can be maximized by moving the individual workstations away, slightly, from the center towards the larger work zone.

Table 2: Representative vendor information

Equipment	Vendor	Product	Figure	Cost Est.
Pole Mount Monitor arms	Ergo In Demand http://www.ergoindemand.com	Flat Screen pole mount		$119
Desk Mount Monitor Arms	Ergo In Demand	Direct LDC desk mount with telescoping pole 12" to 16"		$169

Equipment	Vendor	Product	Figure	Cost Est.
Table Top Lift	Up Time 4 U http://www.uptime4u.com	Workstation ergonomics retro kit		Not listed
Bench Top Magnifier	Boston Watch Exchange http://stores.ebay.com/Boston-Watch-Exchange?_rdc=1	Bench Top Magnifier		$114
Bench Top Magnifier	The GWJ Company http://www.peakoptics.com/	Peak multi-lens desk Loupe		$209

Conclusion

The recommended resolutions, both administrative and engineering, were selected to provide the site with options that can be implemented over time. As personnel change, these resolutions would still apply to the abatement of the ergonomics risk factors. These recommendations present a well rounded set of tools which will allow for protection against the development of WMSDs.

The representative vendor information can assist in the evaluation of products and services to mitigate ergonomic risk factors. Gathering input from the workers and occupational professionals to evaluate and discuss equipment/options before purchasing will increase product acceptance, test product usability/ durability, and take advantage of worker experience.

Administrative controls such as ergonomics training, in conjunction with engineering controls, are effective in reducing mishap events by increasing awareness and reducing the risk factors.

The Command may request additional funds from the Chief of Naval Operations (CNO) Mishap Prevention and Hazard Abatement (MPHA) Program to abate the risk of injury. Naval Facilities Engineering Command (NAVFACENGCOM) manages the CNO Mishap Prevention and Hazard Abatement program, which is a centrally managed fund to correct safety and health deficiencies beyond the funding capabilities of the activity. Information about the MPHA program can be found on the Naval Facilities Engineering Command website www.navfac.navy.mil/safety and in OPNAVINST 5100.23G, chapter 12 Hazard Abatement. Visit http://www.navfac.navy.mil/safety for the MPHA database.

End Notes

[i] Equipment purchase without proper and repeated training will not mitigate risk and may in fact increase hazards.

[ii] Administrative controls are management-controlled work practices and policies designed to reduce exposures to work-related musculoskeletal disorders (WMSDs) hazards by changing the way work is assigned or scheduled. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. Examples of administrative controls that used in the ergonomics context include employee rotation, employer-authorized changes in the pace of work and team lifting. Reference OPNAVINST 5100.23G chapter 2307(h).

[iii] This report does not constitute an endorsement of any particular product or vendor. Rather, it is a recitation of how Navy personnel have addressed a particular work place safety issue or used to visually represent solutions. Neither the Navy nor its employees and agents, warrant any product described in this report for any use, either general or particular.

FINAL REPORT

ELECTRICAL SAFETY HAZARD RESOLUTION DESIGN AND IMPLEMENTATION
NAS JRB New Orleans, LA

October 2010

HA Serial #: 272CT

RENOVATION PERIOD: September/October 2010

[redacted]

ACTIONS: In February of 2009, as a follow-up to a survey of various locations within NAS JRB NOLA conducted in 2008, NAVFAC SW Hazard Abatement Implementation Team electrical and power quality specialists conducted an inspection of the various work centers located within the FRC, the Weapons Magazine Area, and Ground Electronics (Bld 9/10). This inspection was conducted in order to verify and document safety hazards and discrepancies previously brought to light, enable the Team to prepare a detailed Statement of Work (SOW), and to determine the funding required for corrective actions needed to bring the electrical systems into compliance with current commercial and military electrical safety codes.

The inspection revalidated the hazards previously outlined dealing with improper wiring methods, poor grounding measures and poor labeling/circuit identification, all of which could put both personnel and sensitive electronic equipment at risk.

These deficiencies not only presented clear personnel safety hazards but were also violations of SPAWARINST 5100.9D (Navy Shore Electronics Safety Precautions) and NAVAIR 01-1A-512 (Design Guide For Avionics Shop Power Distribution). Discrepancies and hazards noted included:

- Internal bench wiring not properly color-coded
- Ground loops allowing current flow through equipment housings in approximately 59 workbench sections
- Power Supplies improperly wired
- 60 Hz GFCI protection missing from all electronic workbenches
- Improperly sized circuit breaker protection
- Missing safety straps on workbenches
- Loose ground fittings
- Deteriorated wiring, conduits, and electrical boxes on light poles
- Lack of an appropriate lightning arrestor on the main service entrance

NAS JRB NOLA ELECTRICAL SAFETY HAZARD RESOLUTION

On August 16, 2010, as a result of an open competitive bid process, [redacted], San Diego, awarded a firm fixed priced contract to [redacted] to provide the qualified personnel and materials to correct the electrical safety hazards identified.

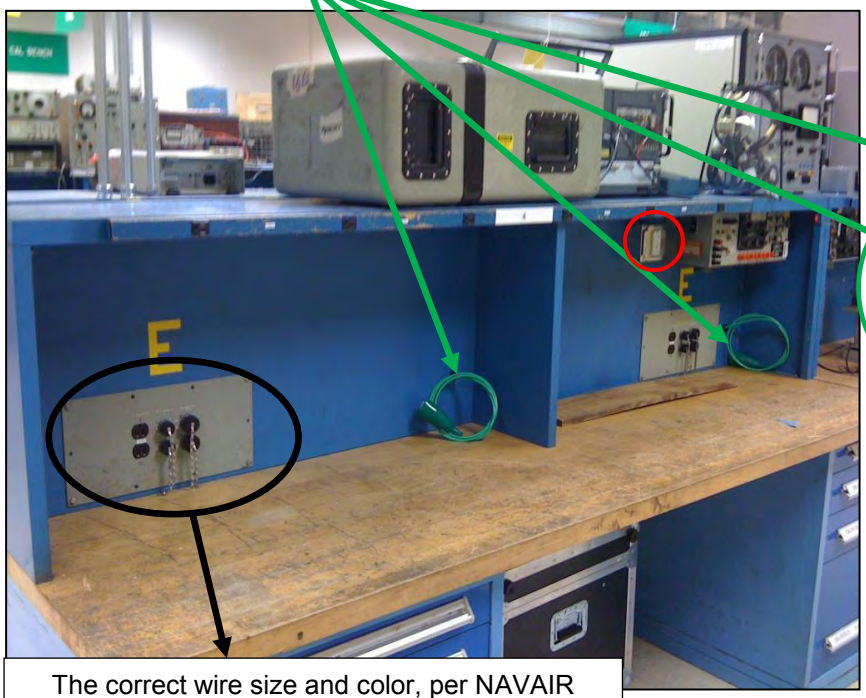
A pre-implementation meeting was held at 0900 on September 9, 2010 in the Public Works (PW) conference room. Representatives from [redacted] the Fleet Readiness Center (FRC), PWD, base Safety and the weapons area were all present to work out security, safety and access requirements prior to the start of the work.

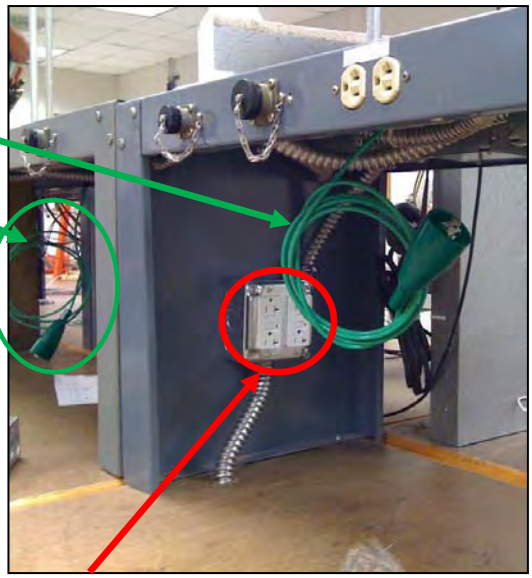
All work was coordinated with the appropriate building/area POCs in order to insure that there would be no disruption of ongoing exercises/workloads. Adrian Valentine and Michael Burt, the base Safety Specialists, were very instrumental in the preplanning and continuing coordination of this project throughout the repair process

On September 13, 2010, [redacted], under the oversight of the [redacted] Electrical Team, started the corrective actions needed to fix these hazards. The entire repair process was completed in 4 weeks and successfully removed all hazards initially addressed and increased the safety environment of both personnel and equipment. A large part of the repair work centered on rewiring the workbenches to conform to NEC, SPAWAR and NAVAIR requirements.

FRC, Building 33

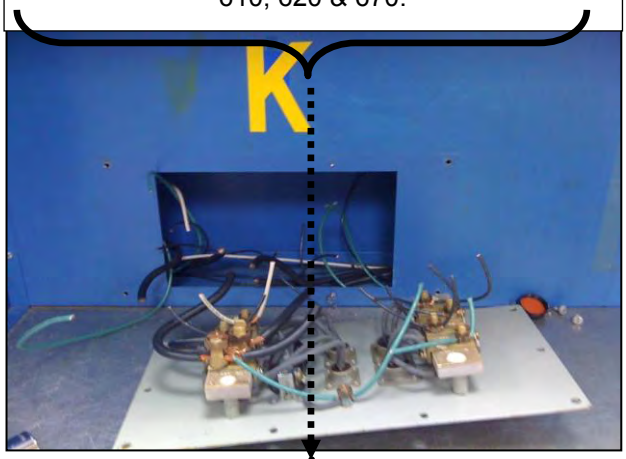
Green Safety straps & clips were added for every four feet of workbench width in work centers 610, 620 & 670.

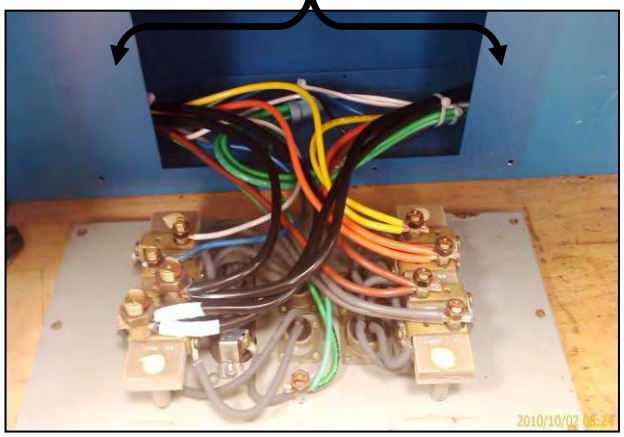


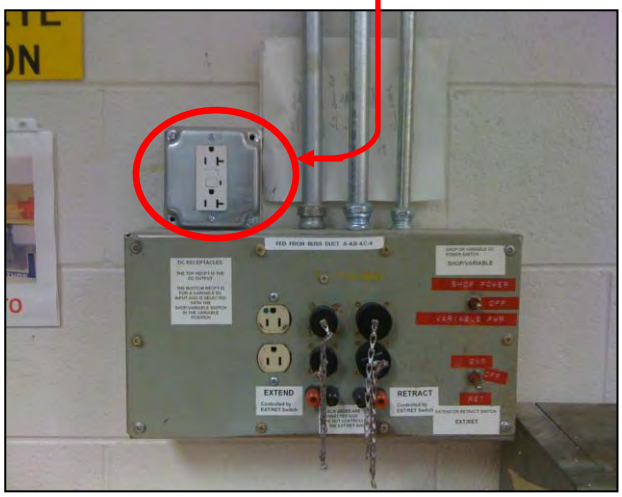


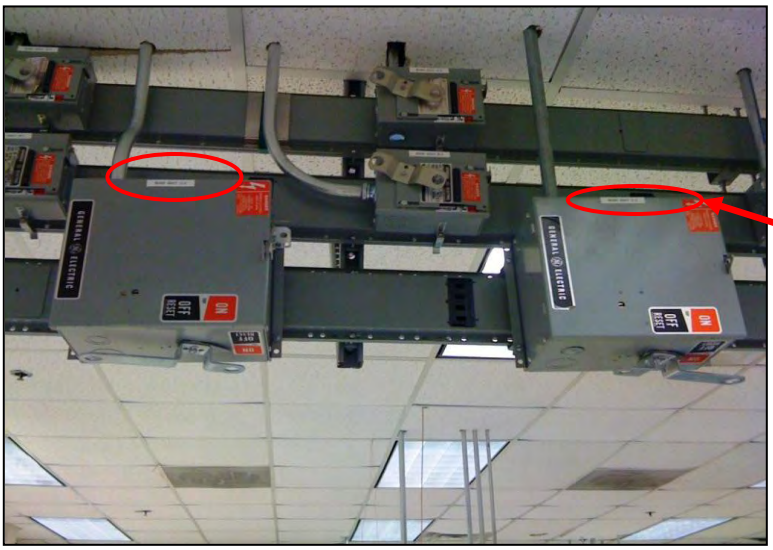
GFCI protection was installed on all 60 Hz circuits, as required by the NEC, to provide shock/fault protection.

The correct wire size and color, per NAVAIR instructions, was installed in the PS1-A power supplies and benches and neutral circuits were isolated from the ground circuits in work centers 610, 620 & 670.

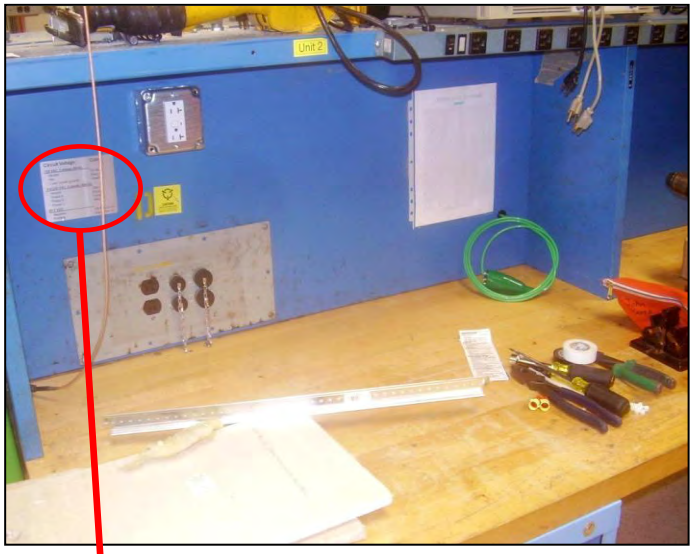


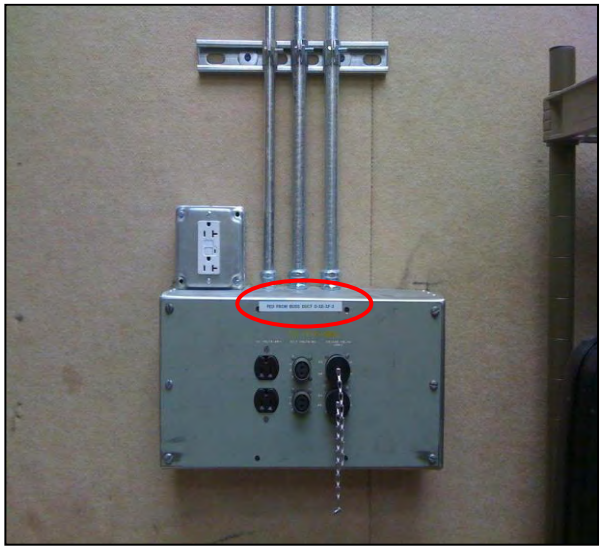






Labels were installed to identify circuit locations and designations. Pictured below, labels on work benches identify the corresponding disconnect in the overhead raceway (left).





An additional circuit was run in WC 620 to meet the operational needs.

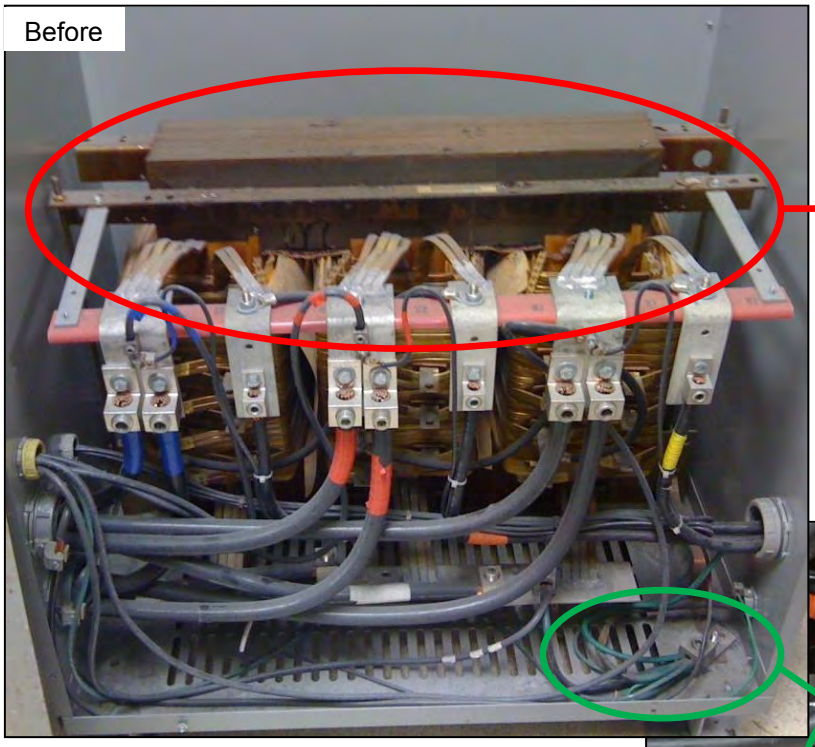
Circuit Voltage	Color
120 VAC, 1-phase, 60-Hz	
Neutral	White
Hot	Black
Case (power ground)	Green
115/200 VAC, 3-phase, 400-Hz	
Neutral	Grey
Phase A	Brown
Phase B	Orange
Phase C	Yellow
27.7 VDC	
Negative	White
Positive	Black

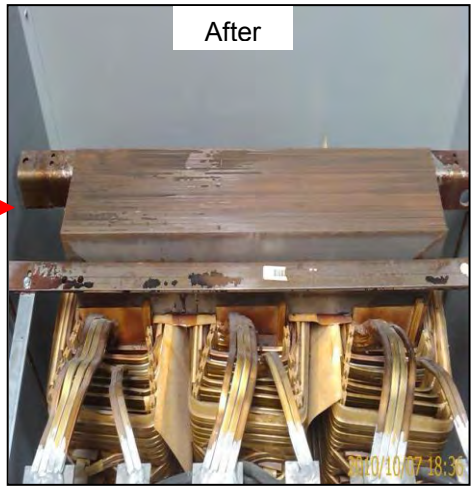
Labels (left) were manufactured by the [redacted] Safety Hazard Abatement team to meet NEC requirements. A raceway containing multiple circuits of different voltages and frequencies must be labeled with the pertinent color code requirements. A label was placed at each work bench entry panel.

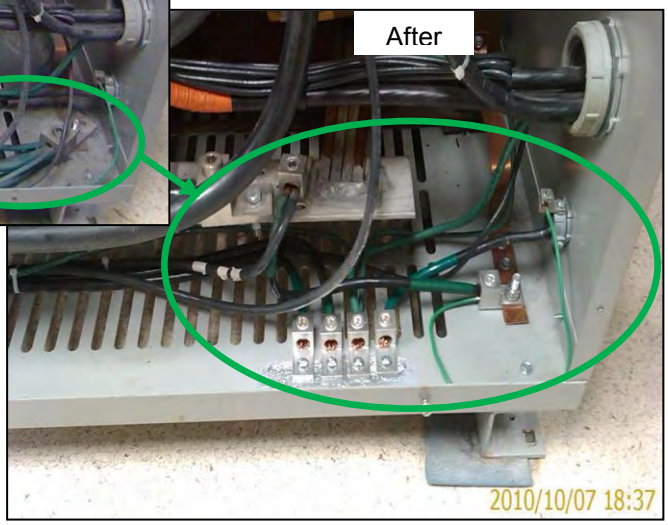
NAS JRB NOLA ELECTRICAL SAFETY HAZARD RESOLUTION

The DC power for Bld 33 was provided by an inadequate single Power Supply (PS) located in the main electrical room (left). Individual dedicated DC PSs were installed in Work Centers 610, 620, & 670.

Transformer DP-1 (below) was inspected during a power quality survey conducted on Building 33

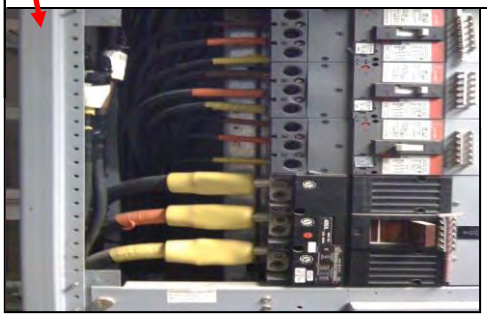




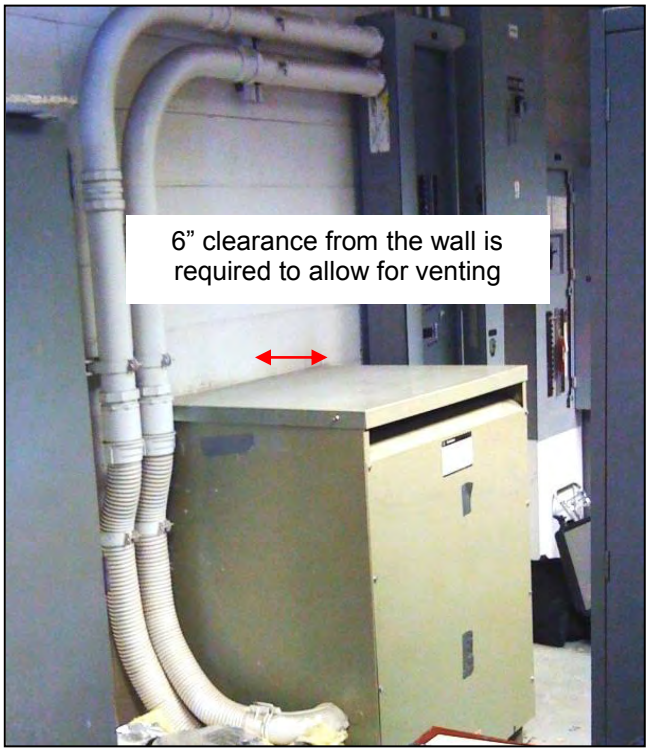


In WC 670 transformer DP-1 was discovered to have two issues requiring correction: 1) substantial corrosion on the core and windings, and 2) improper termination of grounds to a single stud (upper left). Prism Electric cleaned the transformer (upper right) and installed a separate lug for each individual ground.

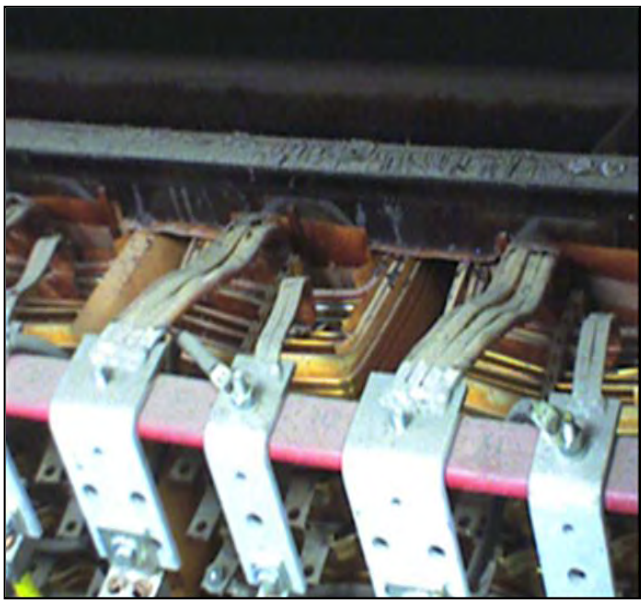
New breaker inserts were set up in the main breaker panel.



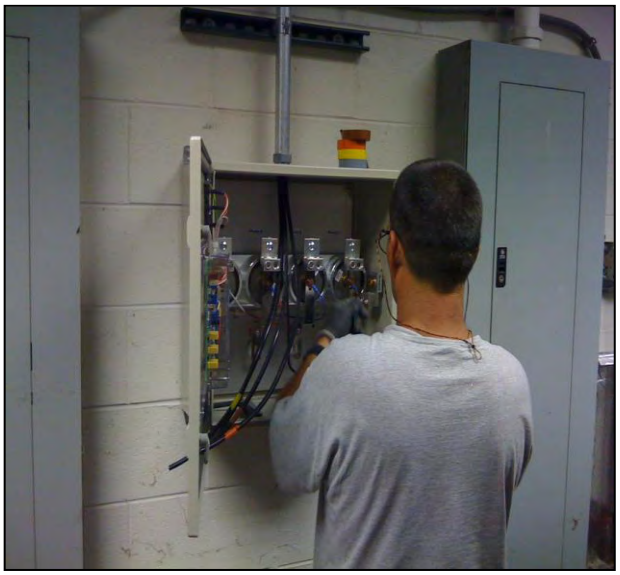
A main ground plate (below) was installed in the electrical room of Bld. 33. The ground plate was tied to the main building ground at the incoming service, which is inside the bottom compartment of the main breaker panel (left).



The transformer in the electrical room was found to have sustained heat damage due to harmonics and improper placement against the wall. Replacement is recommended.



A Trans Voltage Surge Suppressor (TVSS) was set up as the required lightning arrestor on the main service entrance to satisfy UL code compliance for the new lightning system



Ground Electronics (Building 9/10)

A TVSS was installed on the main service entrance to satisfy UL code compliance for the new lightning system of the buildings.

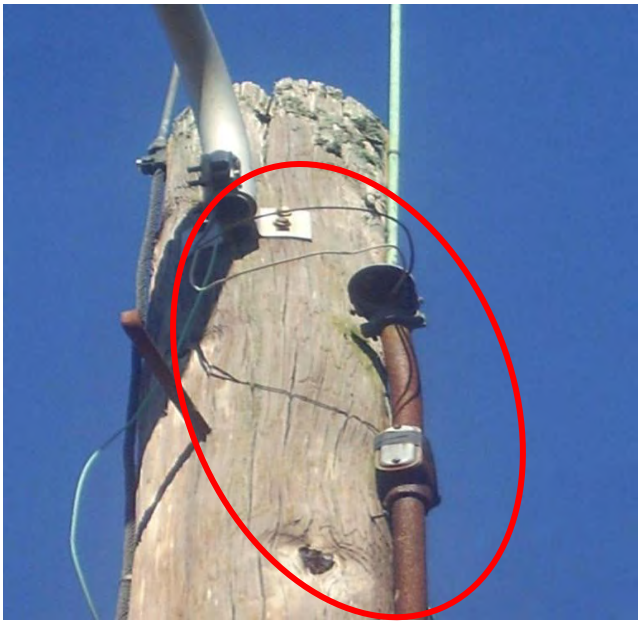
Prism makes pre-installation preparations

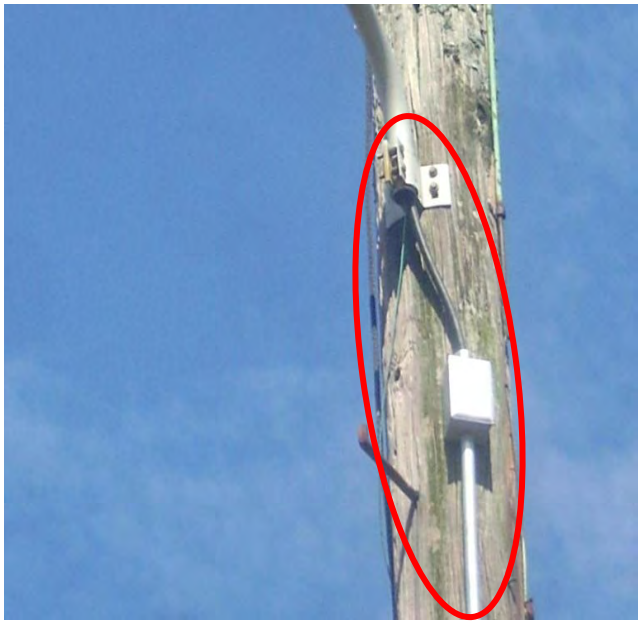
Prism completes installation of the TVSS

Weapons Magazine Area

One of the main objectives in the weapons area was to identify systems no longer in use and remove them to eliminate any potential shock hazard and then clean up whatever was remaining to insure it was safe.

The rusted Unistrut that support the communication electrical boxes were replaced.





Lighting circuit wiring that was decaying in the sunlight, and the rusted conduit they were run in, was replaced.

Corroded grounding connectors were replaced.

Conclusion: All work was completed in accordance with the original schedule and without incident. Throughout the course of the repairs Base Safety and all departments were actively involved. The work performed will not only help to increase the safety of base personnel but it will also significantly increase the reliability of the repair and maintenance activities by improving the quality and stability of the supplied electrical power. A Power Quality study of the FRC electrical system was conducted and revealed hazards that were either directly addressed under this effort or were reported on to the appropriate personnel for future action.

On October 8, 2010, representatives from the FRC, Safety and [redacted] inspected the repairs and modifications performed over the previous 4 weeks. All repairs and modifications were thoroughly explained to everyone's satisfaction.

[redacted]

TASK COMPLETION CERTIFICATE

DATE: 10/08/2010

ACTIVITY: NAS JRB New Orleans, LA, Building 33, Fleet Readiness Center (FRC)

CONTRACT NO: GS09Q08DFD3504 _____ TASK/PO: 9Q0SLSPS106

SYSTEM(s) or WORK PERFORMED(1): Rewired workbenches in FRC work centers (WC) 610, 620, and 670; removed neutral bonds, installed isolated and dedicated 60Hz & 400Hz neutral circuits; added GFCI protection to all 60Hz circuits; added safety straps; trace and labeled circuits; inspected for proper bonding. . Grounding was corrected and corrosion was cleaned from the core of transformer DP-1 (WC 670)
Building 33 Electrical Room: Opened and inspected Frequency Inverters for proper bonding of the derived service neutral to building steel; Set up a main ground plate; Located the main building ground at the incoming service and bonded to main ground plate; Bonded all transformers to the ground plate; Inspect the main ground rod; Established an appropriate Surge Protection Device (SPD) to protect the main electrical service; Set up an appropriate lightning arrestor on the main service entrance; Replaced existing DC power supply with a dedicated power supply for each WC (610, 620 and 670). A power quality study was conducted on the building electrical system.

An operational test and/or applicable inspection has been conducted on the described system (s) or equipment (s). Installation, repairs, or alteration results are:

Please circle one of the following:

SATISFACTORY **UNSATISFACTORY**

TEST/INSPECTION COMMENTS(2): _____

Activity/Government Representative:

TODD C. WOODSON / ATI / LG / PC LPO
(Print name / Rate / Rank / Title)

ATI(SW)
(Signature)

PWC/Safety Representative

Michael BURT
(Print name / Rate / Rank / Title)

(Signature)

[redacted]

(1) Attach supplemental sheets if necessary.
(2) Attach or continue on supplemental sheets as required.

[redacted]

TASK COMPLETION CERTIFICATE

DATE: 10/07/2010

ACTIVITY: NAS JRB New Orleans, LA, Weapons Magazine Area

CONTRACT NO: GS09Q08DFD3504 _____ TASK/PO: 9Q0SLSPS106

SYSTEM(s) or WORK PERFORMED(1): Replaced deteriorated wiring, conduits, electrical boxes, light fixtures, etc. at eight (8) light poles.

An operational test and/or applicable inspection has been conducted on the described system (s) or equipment (s). Installation, repairs, or alteration results are:

Please circle one of the following:

SATISFACTORY **UNSATISFACTORY**

TEST/INSPECTION COMMENTS(2): _____

Activity/Government Representative:

ORTIZ, SAUL / AO1 / LPO
(Print name / Rate / Rank / Title)

(Signature)

PWC/Safety Representative

Adrian Valentine GS-11 (ESO)
(Print name / Rate / Rank / Title)

(Signature)

[redacted]

(1) Attach supplemental sheets if necessary.
(2) Attach or continue on supplemental sheets as required.

[redacted]

TASK COMPLETION CERTIFICATE

DATE: 10/05/2010

ACTIVITY: NAS JRB New Orleans, LA , Building 9/10

CONTRACT NO: GS09Q08DFD3504 TASK/PO: 9Q0SLSPS106

SYSTEM(s) or WORK PERFORMED(1): An appropriate lightning arrestor (TVSS) was installed on the main service entrance of Building 9/10 to satisfy UL code compliance for the new lightning system. Buildings 9/10 house the ground electronics Transmitter/Receiver site that provides all voice communication between aircraft and the tower as well as vital support equipment for the ASR-8 radar. Building 9/10 did not have a lightning protection system.

An operational test and/or applicable inspection has been conducted on the described system (s) or equipment (s). Installation, repairs, or alteration results are:

Please circle one of the following:

SATISFACTORY **UNSATISFACTORY**

TEST/INSPECTION COMMENTS(2): _____

Activity/Government Representative:

MARC H SESSION FTC
(Print name / Rate / Rank / Title)

Marc H Session FTC
(Signature)

PWC/Safety Representative

Adrian Valentine GS-11 ESO
(Print name / Rate / Rank / Title)

(Signature)

[redacted]

(1) Attach supplemental sheets if necessary.
(2) Attach or continue on supplemental sheets as required.

[redacted]

Fall Hazard Site Analysis

NAS North Island
San Diego, CA
(HA# 783AS)

Prepared for

Prepared by

[redacted]

San Diego, CA

September 2009

Distributed to US Government and authorized agents only.
All other requests for this document shall be referred to:

[redacted]

Executive Summary

In two NAVFAC site specific reports, *CR-6388-OCN and CR-6389-OCN*, both dated October 2006, several significant fall hazards were reported - situations in which maintenance personnel place themselves in danger of sustaining injuries by falling while maintaining potable water storage tanks, defined by AWWA Manual M42 as reservoirs since their diameters are greater than their heights. Contracted by NAVFAC SW, [redacted] personnel evaluated seven of the eight listed potable water storage reservoirs and three reservoir valve vaults. The eighth reservoir is no longer utilized as a potable water storage reservoir. Of the seven reservoirs evaluated, three are located on Naval Air Station (NAS) North Island, one is located on Naval Amphibious Base (NAB) Coronado, and the final three are located on Naval Base (NB) Point Loma. The three valve vaults are located on NB Point Loma.

[redacted] personnel visited the sites in April 2009, evaluated the reservoirs, and identified numerous fall hazard situations.

The severity of the identified hazards was ranked using a commercial risk ranking system. Options to resolve the fall hazards were researched, assembled, and evaluated through individual cost/benefit trade-off studies. As a result of the trade-offs, recommended solutions were identified for each hazard and a preliminary cost estimate developed for each solution.

Currently included in the cost estimate for this project are the estimated design, manufacturing, installation, and operational verification costs. The estimated costs also include travel to collect the additional data required for detailed design, installation, and to conduct an operational verification of the equipment. In the development of these costs, an assumption was made that two people would return to the site to obtain the additional required data and that [redacted] personnel would install the solutions. The estimate also assumes that [redacted] engineering personnel will be on site during the entire implementation process including final inspection and sign-off to provide Quality Assurance and to mitigate/authorize any necessary/required modifications.

The 20 hazards documented in this report should be resolved promptly and in an order conducive to safety priority and funding requirements.

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1. INTRODUCTION

1.1 BACKGROUND

Two October 2006 NAVFAC Site Specific Reports, CR-6388-OCN and CR-6389-OCN, entitled, "*Water Storage Tanks Inspection and Assessments,*" identified a variety of fall hazards on three naval bases located in San Diego, CA - situations in which maintenance personnel could be in danger of falling while inspecting/maintaining potable water storage tanks, defined by AWWA Manual M42 as reservoirs since their diameters are greater than their heights. The three bases are Naval Air Station (NAS) North Island, the largest aerospace-industrial complex in the U.S. Navy, Naval Amphibious Base (NAB) Coronado, the West Coast focal point for special and expeditionary warfare training and operations, and Naval Base (NB) Point Loma, the most diverse naval installation in the world consisting of seven facilities: (a) Submarine Base, (b) Fleet Antisubmarine Warfare Training Center, (c) Fleet Combat Training Center Pacific, (d) Space and Naval Warfare Systems Command (SPAWAR), (e) SPAWAR Systems Center, (f) Fleet Intelligence Command Pacific, and (g) Naval Consolidated Brig, Miramar.

1.2 PURPOSE

The purpose of this site analysis is to present [redacted] recommendations for the most effective and efficient ways to control the identified fall hazards and provide a cost impact for implementing these controls. [redacted] was specifically tasked to evaluate fall hazards associated with potable water storage reservoir inspection and maintenance procedures. This evaluation included reviewing and validating the reservoir maintenance procedures in addition to collecting end-user inputs on practical concepts to reduce exposure to fall hazards present during many of these required actions.

1.3 APPROACH

The following outline describes the development process of this Site Analysis:

- Visited the site to obtain an understanding of actual operations and maintenance procedures by meeting with the local safety personnel, operators and maintenance personnel.
- Identified all potential fall hazards.
- Determined the relative risk rating of each identified fall hazard.
- Proposed alternative solutions for controlling the fall hazards.
- Performed cost/benefit trade-off analyses for the proposed solutions.
- Provided recommendations for the most advantageous control measures as well as the related cost impacts for each recommended control measure.

1.3.1 Site Visits

[redacted]s safety personnel, [redacted] visited NAS North Island, NAB Coronado, and NB Point Loma in April 2009. John Sudol, NAS North Island NAVFAC Civil Utilities Engineer, provided the site tour on NAS North Island and NAB Coronado. Sean Bolton, Civil Engineer, James Olson, Tank Inspector, and Mark Nelson, NAVFAC Utilities Supervisor, provided the site tour on NB Point Loma. Discussions relating to tank maintenance and inspection were held with all the individuals named.

Seven potable water storage tanks, defined by AWWA Manual M42 as reservoirs since their diameters are greater than their heights, and three reservoir valve vaults were evaluated to identify possible fall hazards. The identified fall hazards were compared to those cited in the October 2006 NAVFAC Site Specific Reports, CR-6388-OCN and CR-6389-OCN.

1.3.2 Identification of Fall Hazards

The seven reservoirs and three valve vaults were studied and the required maintenance and inspection procedures were evaluated from the aspect of applicable Occupational Safety and Health Administration (OSHA) requirements. Fall hazards were limited to situations in which a person could fall four feet or more as per the guidelines presented in the May 2003 *Department of the Navy Fall-Protection Guide for Ashore Facilities*. The results of this study, including the recommended control measures, are discussed in Section 2.

1.3.3 Risk Rating

A risk rating system developed by [redacted] a recognized leader and authority in fall abatement analysis and training, was used to assess the relative severity of the different fall hazard situations. This system takes into consideration the following factors: fall severity, probability of fall, frequency of exposure to the hazard, proximity of workers to the fall hazard, duration of time workers are in vicinity of the hazard, multiple worker interference, security of workers, numerous environmental factors, and any systems currently used for fall protection. The resulting index number generally ranges between 0 and 25, with 25 being the most severe, although for extremely severe hazards, index numbers greater than 25 are possible.

1.3.4 Hazard Control Options

For each of the fall hazard situations, control options were identified, developed, and evaluated against each other in a cost/benefit trade-off analysis. The options were developed utilizing the "Hierarchy of Control Measures" as presented in section 12.6 of the *Department of the Navy Fall Protection Guide for Ashore Facilities*, dated 20 May 2003, and the "Five Classes of Fall Protection", developed by Gravitec, a similar treatment of the same subject. These guidelines describe an objective methodology for evaluating solutions to fall hazard situations.

There are five approaches to controlling fall hazards ranging from eliminating the hazard to using harnesses and lifelines to arrest a fall. The first step described in both of the fall protection guides is to try to eliminate the hazard. For example, if a valve, which is located at a dangerous height, must be manually actuated or frequently serviced, consideration should first be given to re-routing the piping so that the valve can be relocated to ground level, thereby eliminating the hazard altogether. A full detailed description of the hazard control options listed in order from most preferred to least preferred is found in *Table 1*.

Table 1: Levels of Hazard Control
1. Elimination – A redesign or procedural change that eliminates exposure to a fall hazard; e.g., lowering meters or valves to ground level.
2. Barriers – An approach where workers are physically separated from a fall hazard through the use of barriers; e.g., installing guardrails at an opening or edge.
3. Fall Restraint – An approach that uses a rope or cable to restrict workers' movement such that while attached to the restraint system, it is physically impossible for the workers to expose themselves to a fall situation. The workers are usually required to wear a harness and attach themselves to the restraint system.
4. Fall Arrest – An approach in which workers are allowed to fall, but decelerated safely before they sustain an impact. This approach usually requires the use of a harness and lifeline equipment, or may consist of a horizontal safety net.

Table 1: Levels of Hazard Control
5. Administrative – This approach is used when none of the above can be used or are impractical to implement. It requires explicit documentation stating why none of the above approaches are feasible and detailed procedures for safely performing the work. Advanced planning and training is needed to ensure workers recognize the hazards and know how to undertake the work as safely as possible. This approach might be used for workers that have to install fall protection equipment or where installing the fall protection equipment incurs more risk than performing the task under existing circumstances.

1.3.5 Trade-Off Analysis

Different options were analyzed and evaluated to show which aspects of the alternatives were positive (pros) and which were less positive (cons). These findings, together with preliminary estimated costs, were used as the criteria for recommending a solution. The trade-offs for each hazard are presented in tables found in Section 2.

1.3.6 Estimated Costs

Estimated preliminary costs for design, engineering, manufacturing, installation, and operability verification were used in determining the relative costs of the various alternatives. *Travel costs incurred during installation and other miscellaneous costs were not considered for or included in the trade-off studies' costs. They are included, however, in the total estimated cost for this project.*

2. DISCUSSION

The results of this study, including the recommended control measures, are discussed below and are organized in ascending order by base name and tank number. The identified hazards for each reservoir and the solution options for each hazard are listed in alphabetical order.

2.1 Naval Air Station (NAS) North Island - Tank 1021

Figure 1: Satellite view of tank 1021 (*source Google Maps*)

This 1,000,000-gallon capacity ground level steel potable water storage reservoir is located on NAS North Island near the intersection of Roe Street and Moffett Road near building 427. The reservoir diameter and shell height are 75-feet and 31-feet respectively. A ladder equipped with a cage and a locked security gate is attached to the reservoir with brackets welded to both the ladder and the shell of the reservoir. The bottom of the ladder side rails are located 22½-inches from the ground and the bottom of the cage, whose base is flared, is located more than 9¼-feet from the ground. The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1). The ladder extension height is less than the 42-inch minimum, and therefore, not OSHA compliant per 29CFR§1910.27. The appurtenances located on the low-sloped roof of the reservoir, which require maintenance and/or inspections, are a flanged and bolted manhole, target gauge equipment, and a vent. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e.: a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.1.1 Fall Hazard #1 - Ladder/Cage not OSHA Compliant

The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1) since its depth & width are less than the 27-inch minimum, and its horizontal and vertical members are greater than the 48-inch and 9-1/2 inch maximums respectively. The ladder extensions and cage height above the rooftop are less than the 42-inch minimum, and therefore, not OSHA compliant per 29CFR§1910.27.

2.1.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 9.1.

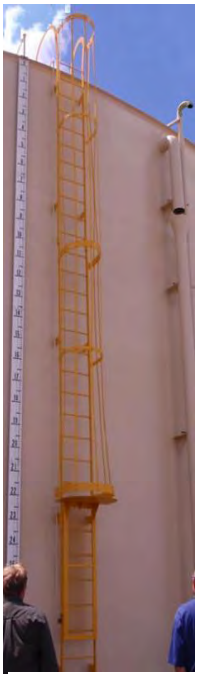

Figure 2: Tank 1021 ladder and cage assembly

2.1.1.2 Solutions Evaluated

1. Add a ladder climbing device and fix the ladder extensions per OSHA regulation 29CFR§1910.27(d)(3). The existing cage will be a redundant form of protection.
2. Add a ladder climbing device, fix the ladder extensions per OSHA regulation 29CFR§1910.27(d)(3), and remove the cage since the cage will be a redundant form of protection.
3. Replace the cage with an OSHA compliant cage per OSHA regulation 29CFR§1910.27(d)(1), and fix the ladder extensions per 29CFR§1910.27(d)(3).
4. Replace the existing ladder with an OSHA compliant ladder per 29CFR§1910.27, which would be equipped with an OSHA compliant cage per 29CFR§1910.27(d)(1) and a security gate.

2.1.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Ladder Climbing Device, Fix Ladder Extensions, and Leave Existing Cage	Ladder climbing device provides complete fall protection. Cage along with locked security gate keeps vandals from gaining access to reservoir.	Must don a harness to utilize the ladder climbing device. Ladder opening remains located directly in front of the flanged & bolted manhole on the rooftop.	4
2. Add Ladder Climbing Device, Fix Ladder Extensions, and Remove Cage	Ladder climbing device provides complete fall protection.	Must don a harness to utilize the ladder climbing device. Ladder opening remains located directly in front of the flanged & bolted manhole on the rooftop. No protection against vandals.	4
3. Fix Ladder Extensions and Replace Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir.	Ladder opening remains located directly in front of the flanged & bolted manhole on the rooftop. Although OSHA compliant, cage does not provide complete fall protection.	2
4. Replace Ladder and Cage	Ladder can be moved to a location not directly in front of the flanged & bolted manhole. Cage along with locked security gate keeps vandals from gaining access to reservoir.	Need to attach ladder to reservoir shell, which may require the need to paint the inside of the reservoir. Although OSHA compliant, cage does not provide complete fall protection.	2

2.1.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to replace the ladder and cage, *Solution 4 Section 2.1.1.2*. Replacing the ladder and cage provides an opportunity to install the ladder in a more convenient location rather than directly in front of the flanged & bolted manhole.

Figure 3: Manhole located directly in front of ladder entrance on rooftop of tank 1021 (*see target gauge equipment to right of manhole*)

2.1.2 Fall Hazard #2 - Unprotected Walking/Working Surface near Ladder Entrance

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the manhole and target gauge equipment located near the ladder entrance.

2.1.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 10.6.

2.1.2.2 Solutions Evaluated

1. Add guardrails around an area enclosing the manhole and target gauge equipment, which will protect personnel from a potential fall hazard as they perform their assigned duties.
2. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the manhole and target gauge equipment.
3. Remove the existing ladder and utilize an aerial work platform to provide access to the manhole and target gauge equipment for maintenance/inspections.

2.1.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Manhole and Target Gauge Equipment	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2
2. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2
3. Remove Ladder and Utilize an Aerial Work Platform	Nothing attaches to the reservoir.	Must don a harness when utilizing the aerial work platform. Personnel would need to coordinate the use of the aerial work platform.	2

2.1.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 2 Section 2.1.2.2*. These partial guardrails will extend at least 6-feet on either side of the flanged & bolted manhole and target gauge equipment per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.2 NAS North Island - Tank 1071

Figure 4: Satellite view of tank 1071 (*source Google Maps*)

This 325,000-gallon capacity ground level steel potable water storage reservoir is located on NAS North Island off Moffett Road next to building 1353 near the Deep Submergence Unit. The reservoir diameter and shell height are 43-feet and 32-feet respectively. A ladder equipped with a cage and a locked security gate is attached to the reservoir with brackets bolted to the ladder and welded to the shell of the reservoir. The bottom of the ladder side rails are located 11⅛-inches from the ground and the bottom of the cage, whose base is not flared, is located approximately 7¼-feet from the ground. The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1). Located at the top of the reservoir and attached to the top of the ladder is a guardrail. The guardrail height is approximately 39-inches. The ladder extension height and top of the cage is less than the 42-inch minimum, and therefore, not OSHA compliant per 29CFR§1910.27. At the top of the fixed ladder, the entrance is protected with a chain. The appurtenances located on the low-sloped roof of the reservoir, which require maintenance and/or inspections, are a roof hatch, telemetry and target gauge equipment, two obstruction lights, a siren light attached to the existing guardrail, and several conduits. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e.: a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.2.1 Fall Hazard #1 - Ladder/Cage not OSHA Compliant

The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1) since its base is not flared, its bottom height is less than the 7-foot minimum, its depth & width are less than the 27-inch minimum, and its vertical members are greater than the 9-1/2 inch maximum. The ladder extensions and cage height above the rooftop are less than the 42-inch minimum, and therefore, not OSHA compliant per 29CFR§1910.27(d)(3).

Figure 5: Tank 1071 ladder and cage assembly

2.2.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 9.1.

2.2.1.2 Solutions Evaluated

1. Add a ladder climbing device and fix the ladder extensions per OSHA regulation 29CFR§1910.27(d)(3). The existing cage will be a redundant form of protection.
2. Add a ladder climbing device, fix the ladder extensions per OSHA regulation 29CFR§1910.27(d)(3), and remove the cage since the cage will be a redundant form of protection.
3. Replace the cage with an OSHA compliant cage per OSHA regulation 29CFR§1910.27(d)(1), and fix the ladder extensions per 29CFR§1910.27(d)(3).
4. Replace the existing ladder with an OSHA compliant ladder per 29CFR§1910.27, which would be equipped with an OSHA compliant cage per 29CFR§1910.27(d)(1) and a security gate.

2.2.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Ladder Climbing Device, Fix Ladder Extensions, and Leave Existing Cage	Ladder climbing device provides complete fall protection. Cage along with locked security gate keeps vandals from gaining access to reservoir.	Must don a harness to utilize the ladder climbing device. Ladder opening remains located directly in front of the hatch on the rooftop.	4
2. Add Ladder Climbing Device, Fix Ladder Extensions, and Remove Cage	Ladder climbing device provides complete fall protection.	Must don a harness to utilize the ladder climbing device. Ladder opening remains located directly in front of the hatch on the rooftop. No protection against vandals.	4
3. Fix Ladder Extensions and Replace Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir.	Ladder opening remains located directly in front of the hatch on the rooftop. Although OSHA compliant, cage does not provide complete fall protection.	2
4. Replace Ladder and Cage	Ladder can be moved to location not directly in front of hatch opening. Cage along with locked security gate keeps vandals from gaining access to reservoir.	Need to attach ladder to reservoir shell, which may require the need to paint the inside of the reservoir. Although OSHA compliant, cage does not provide complete fall protection.	2

2.2.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to replace the ladder and cage, *Solution 4 Section 2.2.1.2*. Replacing the ladder and cage provides an opportunity to install the ladder in a more convenient location rather than directly in front of the hatch opening.

2.2.2 Fall Hazard #2 - Obstruction Lights Maintenance/Inspection

Figure 6: ***TOP PICTURE*** - Obstruction light directly across from ladder entrance on tank 1071; ***BOTTOM PICTURE*** – Second obstruction light on left side of ladder entrance (*circled*)

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while inspecting/maintaining the two perimeter obstruction lights located on opposite sides of the reservoir from one another.

2.2.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 10.6.

2.2.2.2 Solutions Evaluated

1. Add a ladder/platform assembly and guardrails, which enclose the obstruction lights and provide personnel a safe means of inspecting/maintaining them.
2. Add a horizontal lifeline, which acts as a restraint system preventing personnel from falling off the roof while maintaining/inspecting the obstruction lights.
3. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the obstruction lights.
4. Utilize an aerial work platform to provide access to the obstruction lights for maintenance/inspections.

2.2.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Additional Ladder & Platform and Guardrails	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2

Solution	Pros	Cons	Control Level
2. Add Horizontal Lifeline (HLL) Restraint System	Flexibility to move to obstruction lights for maintenance/inspection without fear of falling off the roof.	Must don a harness. Active fall protection system since personnel must attach themselves to the HLL system. Need to attach restraint anchors to the support structure of the cone roof on the reservoir. Training required.	3
3. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2
4. Utilize an Aerial Work Platform	Nothing attaches to the reservoir.	Must don a harness when utilizing the aerial work platform. Personnel would need to coordinate the use of the aerial work platform. Training required.	2

2.2.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 3 Section 2.2.2.2*. These partial guardrails will extend 6-feet on either side of the obstruction lights per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.2.3 Fall Hazard #3 - Unprotected Walking/Working Surface near Ladder Entrance

Figure 7: ***LEFT PICTURE*** (*from furthest to nearest*) - Target gauge & telemetry equipment, conduits, and hatch located near partial guardrail on tank 1071; ***RIGHT PICTURE*** - Siren light attached to partial guardrail and conduits near ladder entrance of tank 1071

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2,

2003 while accessing the hatch, target gauge & telemetry equipment, conduits and siren light located near the ladder entrance.

2.2.3.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 9.2.

2.2.3.2 Solutions Evaluated

1. Add guardrails around an area enclosing the hatch, target gauge & telemetry equipment, conduits and siren light, which will protect personnel from a potential fall hazard as they perform their assigned duties.
2. Extend the guardrails on the reservoir edges so they are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the hatch, target gauge & telemetry equipment, conduits and siren light.
3. Utilize a vacuum anchor restraint system for use with a rope grab system, which prevents personnel from falling off the roof while providing access to the hatch, target gauge & telemetry equipment, conduits and siren light. Personnel would need to devise standard operating procedures to get the vacuum anchor equipment onto the rooftop.

2.2.3.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Roof Appurtenances near Ladder Entrance	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2
2. Extend Existing Guardrails	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2

Solution	Pros	Cons	Control Level
3. Utilize a Vacuum Anchor Restraint System	Nothing permanently attaches to the reservoir. Flexibility to move on the rooftop while connected to the vacuum anchor restraint system.	Must don a harness when utilizing the vacuum anchor restraint system. Active fall protection system since personnel must constantly adjust their rope grab so they never put themselves in a situation where they can fall off the roof by making sure to position the rope grab so its maximum extended length prevents access to the roof edge. Training required.	3

2.2.3.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to extend the existing guardrails, *Solution 2 Section 2.2.3.2*. The guardrails will extend 6-feet beyond the target gauge equipment on one end of the existing guardrail and 6-feet beyond the siren light on the other end of the existing guardrail per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.3 NAS North Island - Tank 1097A

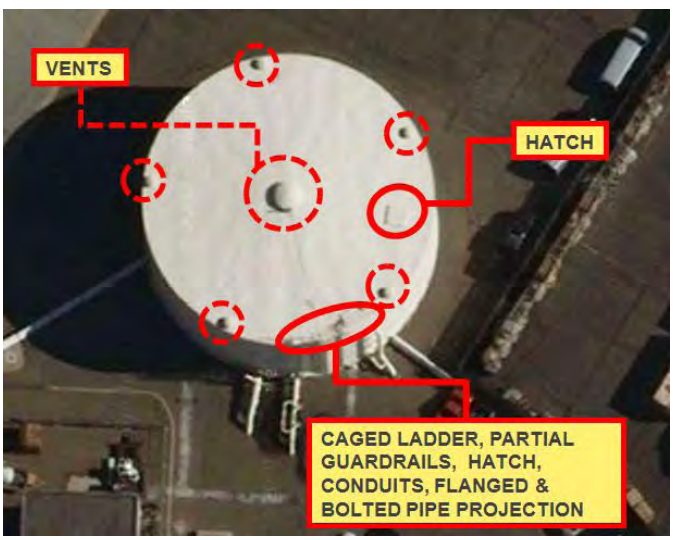

Figure 8: Satellite view of tank 1097A (*source Google Maps*)

This 1,000,000-gallon capacity ground level steel potable water storage reservoir is located on NAS North Island near the intersection of McCain Blvd West and Read Road close to building 1354. The reservoir diameter and shell height are 80-feet and 30-feet respectively. A ladder equipped with a cage, tubular safety rail ladder climbing device, and a locked security gate is attached to the reservoir with brackets welded to both the ladder and the shell of the reservoir. [redacted] personnel were informed that the ladder climbing device is no longer utilized. The bottom of the ladder side rails are located 29-inches from the ground and the bottom of the cage, whose base is not flared, is located approximately 9½-feet from the ground. The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1). Located at the top of the reservoir and attached to the top of the ladder is a guardrail. The existing guardrail is OSHA compliant. The appurtenances located on the low-sloped roof of the reservoir, which require maintenance and/or inspections, are two roof hatches, a flanged and bolted pipe projection, five equally spaced perimeter vents, and a sixth vent and obstruction light located in the approximate center of the roof. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e.: a surface on which

personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.3.1 Fall Hazard #1 - Cage not OSHA Compliant

The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1) since its base is not flared, its bottom height is less than the 7-foot minimum, its depth is greater than the 28-inch maximum, and its vertical members are greater than the 9-1/2 inch maximum.

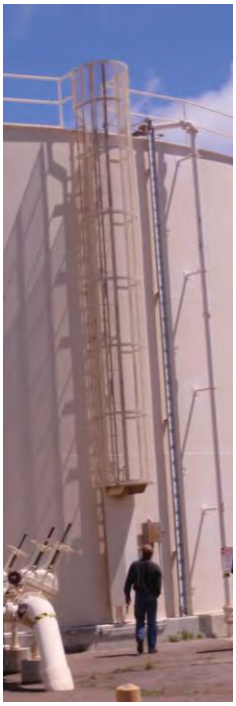

Figure 9: Tank 1097A ladder and cage assembly

2.3.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 7.3.

2.3.1.2 Solutions Evaluated

1. Remove the ladder climbing device, and replace the cage with an OSHA compliant cage per OSHA regulation 29CFR§1910.27(d)(1).
2. Replace the existing ladder with an OSHA compliant ladder per 29CFR§1910.27, which would be equipped with an OSHA compliant cage per 29CFR§1910.27(d)(1) and a security gate.
3. Utilize the existing ladder climbing device. The existing cage will be a redundant form of protection.
4. Utilize the existing ladder climbing device and remove the cage.

2.3.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Remove Ladder Climbing Device & Replace Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir.	Although OSHA compliant, cage does not provide complete fall protection. Galvanic corrosion may be a concern when attaching the OSHA compliant cage to the existing ladder as the specific metal alloy of the existing ladder may be difficult to determine.	2
2. Replace Ladder and Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir. The metal alloys of both the ladder and cage will be known, and therefore, concerns of galvanic corrosion at contact points can be avoided.	Need to attach ladder to reservoir shell, which may require the need to paint the inside of the reservoir. Although OSHA compliant, cage does not provide complete fall protection.	2

Solution	Pros	Cons	Control Level
3. Use Existing Ladder Climbing Device & Leave Existing Cage	Ladder climbing device provides complete fall protection. Cage along with locked security gate keeps vandals from gaining access to reservoir.	Must don a harness to utilize the ladder climbing device.	4
4. Use Existing Ladder Climbing Device & Remove Cage	Ladder climbing device provides complete fall protection.	Must don a harness to utilize the ladder climbing device. No protection against vandals.	4

2.3.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to replace the ladder and cage, *Solution 2 Section 2.3.1.2*. Replacing both the ladder and cage decreases the occurrence of galvanic corrosion at contact points between dissimilar metal alloys since their metal alloys will be known.

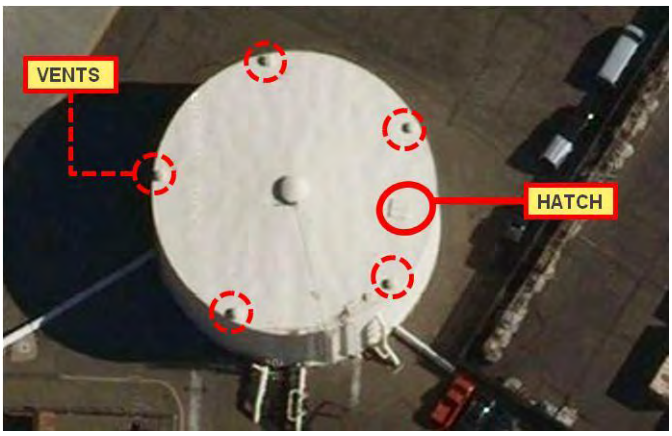

Figure 10: Satellite view showing location of perimeter vents and hatch on rooftop of tank 1097A (*source Google Maps*)

2.3.2 Fall Hazard #2 - Perimeter Vents and Hatch Maintenance/Inspection

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while inspecting/maintaining the five perimeter vents and accessing the perimeter hatch.

2.3.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 10.

Figure 11: ***LEFT PICTURE*** - Two perimeter vents seen in distance behind central rooftop vent; ***RIGHT PICTURE*** – Third perimeter vent and hatch located on tank 1097A rooftop

2.3.2.2 Solutions Evaluated

1. Add guardrails around the entire perimeter of the reservoir protecting personnel from falling 30-feet to the ground while working on any appurtenance located on the roof.
2. Add a horizontal lifeline, which acts as a restraint line preventing personnel from falling off the roof while accessing the hatch and maintaining/inspecting the perimeter vents.
3. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the perimeter vents and hatch.

2.3.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Perimeter of Tank	Free to roam anywhere on the roof without fear of falling off. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Not cost effective. Adds a lot of weight onto the roof of the tank.	2
2. Add Horizontal Lifeline (HLL) Restraint System	Flexibility to move to hatch and perimeter vents for maintenance/inspection without fear of falling off the roof.	Must don a harness. Active fall protection system since personnel must attach themselves to the HLL system. Need to attach restraint anchors to the support structure of the cone roof on the reservoir. Training required.	3
3. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2

2.3.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the edge of the roof, *Solution 3 Section 2.3.2.2*. These partial guardrails will extend 6-feet on either side of each of the perimeter vents and hatch per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.3.3 Fall Hazard #3 - Unprotected Walking/Working Surface near Ladder Entrance

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall

protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the flanged and bolted pipe projection, hatch, and piping located near the ladder entrance.

Figure 12: ***LEFT PICTURE*** *(from furthest to nearest)* - Fourth perimeter vent, flanged bolted pipe projection, hatch, piping and target gauge equipment near partial guardrail on rooftop of tank 1097A; ***CENTER PICTURE*** - Ladder entrance showing existing ladder climbing device; ***RIGHT PICTURE*** – Fifth perimeter vent near partial guardrail on rooftop of tank 1097A

2.3.3.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 7.4.

2.3.3.2 Solutions Evaluated

1. Add guardrails around an area enclosing the flanged & bolted pipe projection, hatch and piping, which will protect personnel from a potential fall hazard as they perform their assigned duties.
2. Extend the guardrails on the reservoir edges so they are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the flanged & bolted pipe projection, hatch, and piping.
3. Utilize a vacuum anchor restraint system for use with a rope grab system, which prevents personnel from falling off the roof while providing access to the flanged & bolted pipe projection, hatch, and piping. Personnel would need to devise standard operating procedures to get the vacuum anchor equipment onto the rooftop.

2.3.3.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Flanged and Bolted Pipe Projection, Hatch, and Piping	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2
2. Extend Existing Guardrails	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2

Solution	Pros	Cons	Control Level
3. Utilize a Vacuum Anchor Restraint System	Nothing permanently attaches to the reservoir. Flexibility to move on the rooftop while connected to the vacuum anchor restraint system.	Must don a harness when utilizing the vacuum anchor restraint system. Active fall protection system since personnel must constantly adjust their rope grab so they never put themselves in a situation where they can fall off the roof by making sure to position the rope grab so its maximum extended length prevents access to the roof edge. Training required.	3

2.3.3.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to extend the existing guardrails, *Solution 2 Section 2.3.3.2*. The guardrails will extend 6-feet beyond the perimeter vents located on either end of the existing guardrail per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.4 Naval Amphibious Base (NAB) Coronado - Tank 152

Figure 13: Satellite view of tank 152 (*source Google Maps*)

This 1,000,000-gallon capacity ground level concrete potable water storage reservoir with aluminum geodesic dome roof is located on NAB Coronado off Tarawa Road near building 509. The reservoir diameter and shell height are 108-feet and 16-feet respectively. A ladder equipped with a cage and a locked security gate is attached to the reservoir with brackets welded to the ladder and bolted to the shell of the reservoir. The bottom of the ladder side rails are located on the ground and the bottom of the cage, whose base is not flared, is located approximately 6½-feet from the ground. The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1), but is also not required per 29CFR§1910.27(d)(1)(ii) since the ladder height is less than the 20-foot minimum required for a cage. [redacted] personnel were informed that reservoir 152 does not have an interior ladder leading into the reservoir from the hatch on the roof, and were requested that one be installed. The appurtenances located on the spherical roof of the reservoir, which require maintenance/inspections, are a hatch and a vent. Maintaining/Inspecting the vent is not considered a fall hazard as it is currently done using an aerial work platform. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e.: a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.4.1 Fall Hazard #1 - Cage not OSHA Compliant

The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1) since its base is not flared, its bottom height is less than the 7-foot minimum, its depth is greater than the 28-inch maximum, and its horizontal and vertical members are greater than the 48-inch and 9-1/2 inch maximums respectively, but it is also not required per 29CFR§1910.27(d)(1)(ii) since the ladder height is less than the 20-foot minimum required for a cage.

Figure 14: Tank 152 ladder and cage assembly

2.4.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 5.5.

2.4.1.2 Solutions Evaluated

1. Leave the existing cage as is, since the reservoir shell height is only 16-feet, and a cage is not required per OSHA regulation 29CFR§1910.27(d)(1)(ii).
2. Remove the cage, since the reservoir shell height is only 16-feet, and a cage is not required per OSHA regulation 29CFR§1910.27(d)(1)(ii).
3. Replace the cage with an OSHA compliant cage per OSHA regulation 29CFR§1910.27(d)(1).
4. Replace the existing ladder with an OSHA compliant ladder per 29CFR§1910.27, which would be equipped with an OSHA compliant cage per 29CFR§1910.27(d)(1) and a security gate.

2.4.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Leave Existing Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir.	Ladder opening remains located directly in front of the hatch on the rooftop. Although unnecessary, the cage remains non-OSHA compliant.	2
2. Remove Cage	Eliminate an unnecessary, flimsy, non-OSHA compliant cage.	Ladder opening remains located directly in front of the hatch on the rooftop. No protection against vandals.	N/A
3. Replace Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir. Replace flimsy, non-OSHA compliant cage with an OSHA compliant cage.	Ladder opening remains located directly in front of the hatch on the rooftop.	2

Solution	Pros	Cons	Control Level
4. Replace Ladder and Cage	Ladder can be moved to location not directly in front of hatch opening. Cage along with locked security gate keeps vandals from gaining access to reservoir. Replace existing ladder/cage assembly with OSHA compliant ladder/cage assembly.	Newly moved ladder/cage assembly requires horizontal platform with guardrails for accessing the hatch on the rooftop.	2

2.4.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to replace the ladder and cage, *Solution 4 Section 2.4.1.2*. Replacing the ladder and cage provides an opportunity to install the ladder in a more convenient location rather than directly in front of the hatch opening.

Figure 15: Hatch located directly in front of ladder entrance on rooftop of tank 152

2.4.2 Fall Hazard #2 - Unprotected Walking/Working Surface near Ladder Entrance

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the hatch located near the ladder entrance. Since this reservoir has a domed roof, a sliding hazard also exists.

2.4.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 6.3.

2.4.2.2 Solutions Evaluated

1. Add a staircase around the reservoir shell, which ends at a platform where personnel can access the hatch.
2. Remove the existing ladder and utilize an aerial work platform to provide access to the hatch for maintenance/inspections.
3. Rotate the ladder making it a through-step ladder and add a work platform which provides a safe access to the hatch.

2.4.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Staircase	Utilizing stairs provides complete fall protection. No training required.	Need to attach staircase to shell of reservoir.	2
2. Remove Ladder and Utilize an Aerial Work Platform	Nothing attaches to the reservoir. Utilizing the aerial work platform with fall restraint PPE provides complete fall protection.	Must don a harness when utilizing the aerial work platform. Personnel would need to coordinate the use of the aerial work platform. Training required.	2
3. Rotate the Ladder and Add Separate Platform	No training required.	Need to attach platform to reservoir. Although OSHA compliant, ladder/caged ladder does not provide complete fall protection.	2

2.4.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to rotate the ladder and add a separate platform, *Solution 3 Section 2.4.2.2*. The ladder will be rotated from its original position making it a step-through ladder as opposed to a side-step ladder when personnel access the platform to perform maintenance/inspection on the hatch access.

2.5 Naval Base (NB) Point Loma - Tank 316

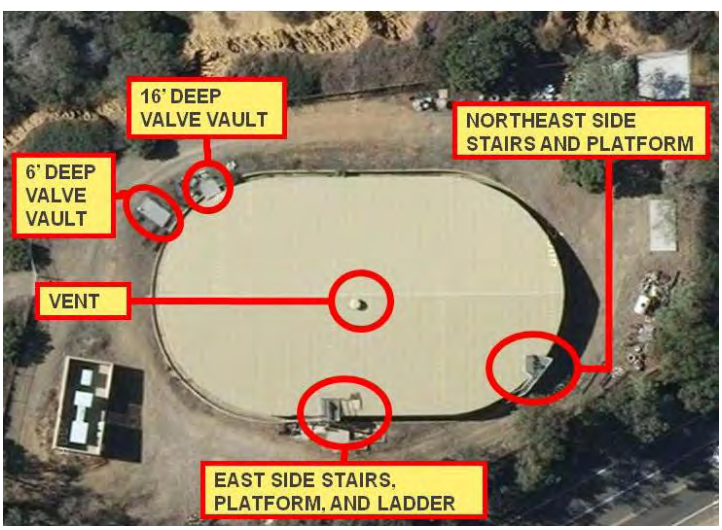

Figure 16: Satellite view of tank 316 (*source Google Maps*)

This partially buried 1,000,000-gallon capacity concrete potable water storage reservoir covered with corrugated metal is located on NB Point Loma off Cambrillo Memorial Drive near transformer pad P-652. The oval reservoir dimensions are 154-feet long by 90-feet wide by 12-feet deep. Two stair assemblies, one on the east side and one on the northeast side of the reservoir, provide access to piping and valve assembly located on the roof. Toe boards are missing on the platform guardrails per OSHA regulation 29CFR§1910.23(c)(1), and the east side platform has rusted members, which may need to be replaced. A ladder located near the east side stair assembly is attached with brackets welded to the ladder and bolted to the shell of the reservoir. At the time of our visit, the bolts attaching the ladder to the shell of the reservoir were missing. The ladder is used to provide access to the roof hatch and vent. These appurtenances located on the steep corrugated roof require maintenance and monthly inspections. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e.: a surface on which personnel are required to walk or work while performing assigned tasks, requires fall

protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003. On the southwest side of the reservoir are two valve vaults: one approximately 6-feet deep and one approximately 16-feet deep. Maintenance personnel must climb down the 6-foot deep vault using an extension ladder, which must be placed into the vault prior to entry. The 16-foot deep vault is accessed by utilizing the individual-rung ladder found in the vault. This individual-rung ladder is not OSHA compliant as the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v).

2.5.1 Fall Hazard #1 - Exterior Ladder is not OSHA Compliant

A ladder located near the east side stair assembly is attached with brackets welded to the ladder and bolted to the shell of the reservoir. At the time of our visit, the bolts attaching the ladder to the shell of the reservoir were missing. The ladder is used to provide access to the roof hatch and vent. Some of the spacing's between the rungs are less than the 12-inch minimum, therefore, making this ladder not OSHA compliant per 29CFR§1910.27(b)(1)(ii).

Figure 17: Tank 316 ladder located near east-side stair/platform assembly

2.5.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 5.5.

2.5.1.2 Solutions Evaluated

1. Remove the ladder and utilize the existing stairs to access the reservoir roof.
2. Replace the ladder with an OSHA compliant ladder per 29CFR§1910.27.

2.5.1.3 Trade-Off Analysis

Solution*	Pros	Cons	Control Level
1. Remove Ladder & Utilize Stairs	Utilizing stairs provides complete fall protection.	Need to install a swing gate/opening in platform guardrails allowing access to hatch and vent on rooftop.	2
2. Replace Ladder	Provides access to hatch and vent on rooftop without altering existing platform.	Although OSHA compliant, ladder does not provide complete fall protection.	N/A

* There are only two viable solution options for this hazard.

2.5.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to remove the ladder and utilize the existing stairs, *Solution 1 Section 2.5.1.2*. Utilizing the stairs provides a safe means of accessing the rooftop through a swing gate, which will be installed in the existing guardrails on the platform.

2.5.2 Fall Hazard #2 - Unprotected Walking/Working Surface near Hatch Entrance

Figure 18: ***LEFT PICTURE*** - Hatch located on tank 316 rooftop (*as seen from east-side stair/platform assembly*); ***RIGHT PICTURE*** - Hatch and east-side platform (*as seen from northeast-side stair/platform assembly*)

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the hatch. Since this reservoir has a steep roof, a sliding hazard also exists.

2.5.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 4.4.

2.5.2.2 Solutions Evaluated

1. Add guardrails around an area enclosing the hatch, which will protect personnel from a potential fall hazard as they perform their assigned duties. To protect personnel from sliding, they are instructed to utilize shoes with slip resistant soles as personal protective equipment (PPE) per OSHA regulation 29CFR§1910.132.
2. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the hatch. To protect personnel from sliding, they are instructed to utilize shoes with slip resistant soles as personal protective equipment (PPE) per OSHA regulation 29CFR§1910.132.
3. Extend the existing platform over the hatch opening. Personnel will safely access the hatch through a hole in the platform.

2.5.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Hatch Entrance	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special.	Need to attach guardrails to the support structure of the corrugated metal roof on the reservoir. Must walk on corrugated roof to access the hatch.	2

Solution	Pros	Cons	Control Level
2. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge. Must walk on corrugated metal roof to access the hatch.	2
3. Extend Existing Platform	Access to hatch is from a walking/working surface. Passive fall protection system, which prevents a fall without doing anything special. Need to attach the platform support structure to the shell of reservoir. No need to walk on corrugated metal roof to access hatch.	Platform limits opening of hatch.	2

2.5.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 2 Section 2.5.2.2*. These partial guardrails will extend 6-feet on either side of the designated working area for the hatch per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

Figure 19: Tank 316 valve vault non-OSHA compliant individual-rung ladder

2.5.3 Fall Hazard #3 - Valve Vault Individual-Rung Ladder not OSHA Compliant

The 16-foot deep vault is accessed by utilizing the individual-rung ladder found in the vault. This individual-rung ladder is not OSHA compliant as the rung is not designed so the foot cannot slide off the end and the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v).

2.5.3.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 8.2.

2.5.3.2 Solutions Evaluated

1. Replace the ladder with an OSHA compliant ladder per 29CFR§1910.27.

2.5.3.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
Replace Ladder	N/A	N/A	N/A

2.5.3.4 Recommended Control Measure

Based on the trade-off analysis, the only viable solution is to replace the existing individual-rung ladder with an OSHA compliant fixed ladder.

2.6 NB Point Loma - Tank 366

Figure 20: Satellite view of tank 366 (*source Google Maps*)

This partially buried 1,000,000-gallon capacity concrete potable water storage reservoir with wooden roof is located on NB Point Loma off Cambrillo Memorial Drive in the Fort Rosecrans Historic District. The oval reservoir dimensions are 156-feet long by 92-feet wide by 13-feet deep. The wooden roof has screening around its perimeter. A stair assembly, which includes the stairs and platform, provides access to the flat roof and is comprised of 1-inch square tubing. The guardrail height is approximately 42¾-inches, and therefore, the guardrail system is not OSHA compliant as the opening in the guardrails is greater than the 19-inch maximum per OSHA regulation 29CFR§1926.502(b)(2)(iv). There is a 14-inch step from the platform to the rooftop. The appurtenances located on the flat roof, which require maintenance and/or inspections, are a roof hatch, two piping and valve assemblies, and two vents. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003. The roof hatch provides access into the water reservoir by means of an internal fixed ladder constructed of 1½-inch square tubing. This ladder, which is OSHA compliant, is attached to the reservoir with brackets welded to the ladder and bolted to the reservoir wall. On the east side of the reservoir is a valve vault separated into two sections: one approximately 9-feet deep and one approximately 8-feet deep. Maintenance personnel must climb down the 9-foot deep section of the vault using the individual-rung ladder found in this section of the vault. This individual-rung ladder is not OSHA compliant as the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v). The 8-foot deep section of the vault is accessed by utilizing the fixed ladder found in this section of the vault. This ladder, which is OSHA compliant, is attached to the vault wall with brackets welded to the ladder and bolted to the vault wall.

2.6.1 Fall Hazard #1 - Guardrails on Existing Platform not OSHA Compliant

Figure 21: Tank 366 stair and platform assembly

The existing platform guardrails, whose height is approximately 42¾-inches, are comprised of 1-inch square tubing, and therefore, the guardrail system is not OSHA compliant as the openings in the guardrails are greater than the 19-inch maximum per OSHA regulation 29CFR§1926.502(b)(2)(iv) and the tube dimensions are too small per OSHA regulation 29CFR§1910.23(e).

2.6.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 4.2.

2.6.1.2 Solutions Evaluated

1. Replace the guardrails with OSHA compliant guardrails per OSHA regulation 29CFR§1926.502(b)(2)(iv).

2.6.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
Replace Guardrails	N/A	N/A	2

2.6.1.4 Recommended Control Measure

Based on the trade-off analysis, the only viable solution is to replace the existing guardrails with OSHA compliant guardrails.

2.6.2 Fall Hazard #2 - Hatch Access and Piping & Valve Assembly Maintenance/Inspection

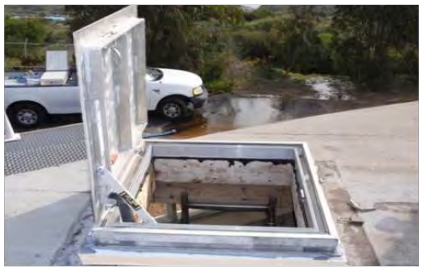

Figure 22: ***LEFT PICTURE*** - Hatch located on east side of stair/platform assembly on tank 366 rooftop (*seen in open position*); ***RIGHT PICTURE*** - Piping & valve assembly located on west side of stair/platform assembly on tank 366 rooftop

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the hatch and inspecting/maintaining the piping & valve assembly located near the roof's edge.

2.6.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 6.4.

2.6.2.2 Solutions Evaluated

1. Add guardrails around an area enclosing the hatch and piping & valve assembly, which will protect personnel from a potential fall hazard as they perform their assigned duties.
2. Add a horizontal lifeline, which acts as a restraint line preventing personnel from falling off the roof while accessing the hatch and maintaining/inspecting the piping & valve assembly.
3. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the hatch and piping & valve assembly.
4. Add restraint anchors to the roof for use with a rope grab system, which will prevent personnel from falling off the roof while accessing the hatch and piping & valve assembly.

2.6.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Hatch and Piping & Valve Assembly	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Need to attach guardrails to the support structure of the wooden roof on the reservoir.	2
2. Add Horizontal Lifeline (HLL) Restraint System	Flexibility to move to hatch and piping & valve assembly for maintenance/inspection without fear of falling off the roof.	Must don a harness. Active fall protection system since personnel must attach themselves to the HLL system. Need to attach restraint anchors to the support structure of the cone roof on the reservoir. Training required.	3
3. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2
4. Add Restraint Anchors	Flexibility to move on the rooftop while connected to the restraint anchors.	Must don a harness. Active fall protection system since personnel must constantly adjust their rope grab so they never put themselves in a situation where they can fall off the roof by making sure to position the rope grab so its maximum extended length prevents access to the roof edge. Need to attach restraint anchors to the support structure of the cone roof on the reservoir. Training required.	3

2.6.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 3 Section 2.6.2.2*. These partial guardrails will extend 6-feet on either side of the hatch and piping & valve assembly per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

Figure 23: Tank 366 valve vault non-OSHA compliant individual-rung ladder

2.6.3 Fall Hazard #3 - Valve Vault Individual-Rung Ladder not OSHA Compliant

Maintenance personnel must climb down the 9-foot deep section of the valve vault using an individual-rung ladder found in this section of the vault. This individual-rung ladder is not OSHA compliant as the rung is not designed so the foot cannot slide off the end and the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v).

2.6.3.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 4.6.

2.6.3.2 Solutions Evaluated

1. Replace the ladder with an OSHA compliant ladder per 29CFR§1910.27.

2.6.3.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
Replace Ladder	N/A	N/A	N/A

2.6.3.4 Recommended Control Measure

Based on the trade-off analysis, the only viable solution is to replace the existing individual-rung ladder with an OSHA compliant fixed ladder.

2.7 NB Point Loma - Tank 372

This 250,000-gallon capacity ground level steel potable water storage reservoir is located on NB Point Loma near the intersection of Ashburn Road and Cambrillo Memorial Drive near drafting hydrant 1314. The reservoir diameter and shell height are 60-feet and 14-feet respectively. A ladder equipped with a cage is attached to the reservoir with brackets welded to both the ladder and the shell of the reservoir. The bottom of the ladder side rails are located 19-inches from the ground and the bottom of the cage, whose base is not flared, is located approximately 8½-feet from the ground. The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1), but is also not required per 29CFR§1910.27(d)(1)(ii) since the ladder height is less than the 20-foot minimum required for a cage. The ladder extensions appear

to be compliant, but need to be verified during data collection and corrected if necessary. The appurtenances located on the low-sloped roof of the reservoir, which require maintenance and/or inspections, are a roof hatch, target gage assembly, a cabinet, a flanged and bolted overflow inlet access, telemetry piping box, a pipe mast, and a vent. The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003. The roof hatch provides access into the water reservoir by means of an internal fixed ladder. This ladder, which is attached to the reservoir with brackets welded to both the ladder and reservoir wall, is OSHA compliant. On the southwest side of the reservoir is a valve vault approximately 9-feet deep. Maintenance personnel must climb down the 9-foot deep vault using the fixed ladder found in the vault. This fixed ladder is not OSHA compliant as the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v).

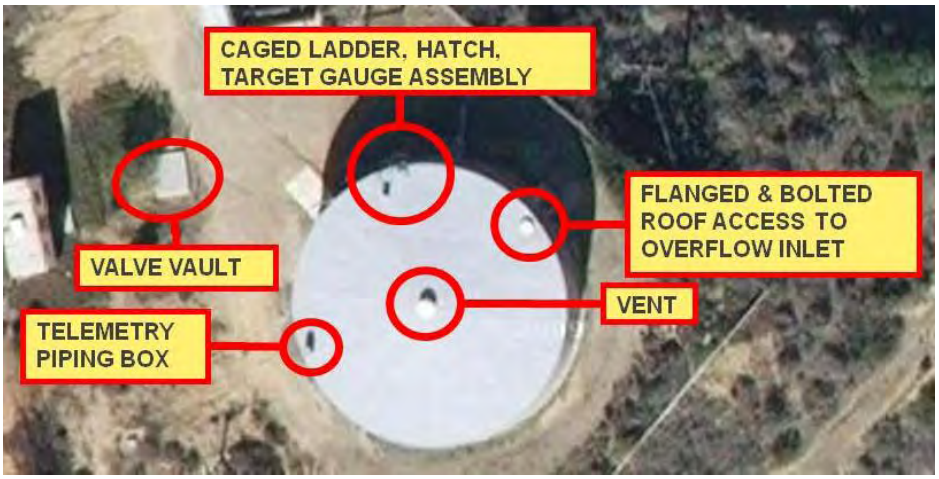

Figure 24: Satellite view of tank 372 (*source Google Maps*)

2.7.1 Fall Hazard #1 - Cage not OSHA Compliant

The cage on the fixed ladder is not OSHA compliant per OSHA regulation 29CFR§1910.27(d)(1) since its base is not flared, its bottom height is less than the 7-foot minimum, and its vertical members are greater than the 9-1/2 inch maximum, but it is also not required per 29CFR§1910.27(d)(1)(ii) since the ladder height is less than the 20-foot minimum required for a cage.

Figure 25: Tank 372 ladder and cage assembly

2.7.1.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 5.5.

2.7.1.2 Solutions Evaluated

1. Leave the existing cage as is, since the reservoir shell height is only 14-feet, and a cage is not required per OSHA regulation 29CFR§1910.27(d)(1)(ii).
2. Remove the cage, since the reservoir shell height is only 14-feet, and a cage is not required per OSHA regulation 29CFR§1910.27(d)(1)(ii).
3. Replace the cage with an OSHA compliant cage per OSHA regulation 29CFR§1910.27(d)(1).
4. Replace the existing ladder with an OSHA compliant ladder per 29CFR§1910.27, which would be equipped with an OSHA compliant cage per 29CFR§1910.27(d)(1) and a security gate.

2.7.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Leave Existing Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir.	Ladder opening remains located directly in front of the hatch on the rooftop. Although unnecessary, the cage remains non-OSHA compliant.	2
2. Remove Cage	Eliminate an unnecessary, flimsy, non-OSHA compliant cage.	Ladder opening remains located directly in front of the hatch on the rooftop. No protection against vandals.	N/A
3. Replace Cage	Cage along with locked security gate keeps vandals from gaining access to reservoir. Replace flimsy, non-OSHA compliant cage with an OSHA compliant cage.	Ladder opening remains located directly in front of the hatch on the rooftop.	2
4. Replace Ladder and Cage	Ladder can be moved to location not directly in front of hatch opening. Cage along with locked security gate keeps vandals from gaining access to reservoir. Replace existing ladder/cage assembly with OSHA compliant ladder/cage assembly.	Newly moved ladder/cage assembly requires horizontal platform with guardrails for accessing the hatch on the rooftop.	2

2.7.1.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to replace the ladder and cage, *Solution 4 Section 2.7.1.2*. Replacing the ladder and cage provides an opportunity to install the ladder in a more convenient location rather than directly in front of the hatch opening.

2.7.2 Fall Hazard #2 - Perimeter Appurtenances Maintenance/Inspection

Figure 26: ***LEFT PICTURE*** - Flanged & bolted overflow inlet located on tank 372 rooftop; ***RIGHT PICTURE*** - telemetry piping box located on opposite side of reservoir from flanged & bolted overflow inlet

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall

greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while inspecting/maintaining the telemetry piping box and pipe mast, and accessing the flanged & bolted overflow inlet.

2.7.2.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 6.4.

2.7.2.2 Solutions Evaluated

1. Add a ladder/platform assembly and guardrails, which enclose the roof perimeter appurtenances and provide personnel a safe means of inspecting/maintaining them.
2. Add a horizontal lifeline, which acts as a restraint line preventing personnel from falling off the roof while maintaining/inspecting the perimeter appurtenances.
3. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the roof perimeter appurtenances.
4. Utilize an aerial work platform to provide access to the roof perimeter appurtenances for maintenance/inspections.

2.7.2.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Additional Ladders & Platforms and Guardrails	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special. No training required.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2
2. Add Horizontal Lifeline (HLL) Restraint System	Flexibility to move to perimeter appurtenances for maintenance/inspection without fear of falling off the roof.	Must don a harness. Active fall protection system since personnel must attach themselves to the HLL system. Need to attach restraint anchors to the support structure of the cone roof on the reservoir. Training required.	3
3. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop. No training required.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2

Solution	Pros	Cons	Control Level
4. Utilize an Aerial Work Platform	Nothing attaches to the reservoir.	Must don a harness when utilizing the aerial work platform. Personnel would need to coordinate the use of the aerial work platform. Training required.	2

2.7.2.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 3 Section 2.7.2.2*. These partial guardrails will extend 6-feet on either side of the flanged & bolted overflow inlet, telemetry piping box, and piping mast per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.7.3 Fall Hazard #3 - Unprotected Walking/Working Surface near Ladder Entrance

Figure 27: Hatch located directly in front of ladder entrance on rooftop of tank 372 (*see target gauge equipment to left of hatch*)

The reservoir roof, defined as a walking/working surface by OSHA regulation 29CFR§1910 Subpart D, i.e., a surface on which personnel are required to walk or work while performing assigned tasks, requires fall protection since personnel are exposed to a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003 while accessing the hatch and inspecting/maintaining the target gauge equipment located near the ladder entrance.

2.7.3.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 6.4.

2.7.3.2 Solutions Evaluated

1. Add guardrails around an area enclosing the hatch and target gauge equipment, which will protect personnel from a potential fall hazard as they perform their assigned duties.
2. Add guardrails on the reservoir edges which are within 6-feet of the walking/working surface per CAL/OSHA regulation 8CCR§6803(f)(7). The guardrails will be 6-feet on either side of the working area required to access the hatch and target gauge equipment.
3. Remove the existing ladder and utilize an aerial work platform to provide access to the hatch and target gauge equipment for maintenance/inspections.

2.7.3.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
1. Add Guardrails around Hatch and Target Gauge Equipment	Free to roam in enclosed area without fear of falling off the roof. Passive fall protection system, which prevents a fall without doing anything special.	Need to attach guardrails to the support structure of the cone roof on the reservoir.	2
2. Add Partial Guardrails along Roof Edge	Only need to attach guardrails to the shell and outer edge of the rooftop.	Active fall protection system since personnel must remain in the "secure" area making sure to always stay 6' away from the unprotected edge.	2
3. Remove Ladder and Utilize an Aerial Work Platform	Nothing attaches to the reservoir.	Must don a harness when utilizing the aerial work platform. Personnel would need to coordinate the use of the aerial work platform.	2

2.7.3.4 Recommended Control Measure

Based on the trade-off analysis, the recommended solution is to add partial guardrails along the roof edge, *Solution 2 Section 2.7.3.2*. These partial guardrails will extend 6-feet on either side of the hatch and target gauge equipment per CAL/OSHA regulation 8CCR§6803(f)(7) protecting personnel from a fall greater than 4-feet per proposed OSHA regulation 29CFR§1910.27(b)(1) published in 68 Federal Register 23528, May 2, 2003.

2.7.4 Fall Hazard #4 - Valve Vault Fixed Ladder not OSHA Compliant

Figure 28: Tank 372 valve vault non-OSHA compliant fixed ladder

On the southwest side of the reservoir is a valve vault approximately 9-feet deep. Maintenance personnel must climb down the 9-foot deep vault using the fixed ladder found in the vault. This fixed ladder is not OSHA compliant as the rung is not designed so the foot cannot slide off the end and the toe room is less than the 7-inch minimum per OSHA regulation 29CFR§1910.27(b)(1)(v).

2.7.4.1 Relative Risk Rating

The relative risk rating for this hazard was calculated to be 4.6.

2.7.4.2 Solutions Evaluated

1. Replace the ladder with an OSHA compliant ladder per 29CFR§1910.27.

2.7.4.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level
Replace Ladder	N/A	N/A	N/A

2.7.4.4 Recommended Control Measure

Based on the trade-off analysis, the only viable solution is to replace the existing fixed ladder with an OSHA compliant fixed ladder.

3. CONCLUSION

Challenges to the inspection and maintenance activities of the potable water storage tanks, defined by AWWA Manual M42 as reservoirs since their diameters are larger than their heights, present numerous fall hazards at three San Diego naval bases: Naval Air Station (NAS) North Island, Naval Amphibious Base (NAB) Coronado, and Naval Base (NB) Point Loma – 20 hazards on 7 reservoirs located on 3 bases. The solutions recommended by [redacted] to abate the fall hazards at this site were chosen with regard to long-term safety and short-term cost effectiveness. Some resolutions will require months of site data collection, design development, and manufacturing time, while others will only require days of data collection, design development, and manufacturing to implement.

[redacted] engineers reviewed previously implemented solutions for potable water storage tanks, and where possible and practical, applied them in order to minimize development time, increase overall cost efficiency, and provide effective compliant resolutions. Based upon the variety of hazards, the resolutions range from as simple a solution as replacing a ladder to adding guardrails or maintenance platform.

Recommended options which resolve multiple hazards at specific sites are counted only once in the cost estimates made for this project. The approximate cost to implement the 20 recommended solutions as described in Section 2 at the three bases listed above includes travel, data collection, engineering support, design, manufacturing, and implementation costs.

3.1 Summary of Recommended Solutions

HAZARD	RECOMMENDATION	QTY
§2.1 - Naval Air Station (NAS) North Island - Tank 1021		
1. Ladder/Cage not OSHA Compliant	4. Replace Ladder and Cage	1
2. Unprotected Walking/Working Surface near Ladder Entrance	2. Add Partial Guardrails along Roof Edge	1
§2.2 - NAS North Island - Tank 1071		
1. Ladder/Cage not OSHA Compliant	4. Replace Ladder and Cage	1
2. Obstruction Lights Maintenance/Inspection	3. Add Partial Guardrails along Roof Edge	1
3. Unprotected Walking/Working Surface near Ladder Entrance	2. Extend Existing Guardrails	1
§2.3 - NAS North Island - Tank 1097A		
1. Cage not OSHA Compliant	2. Replace Ladder and Cage	1
2. Perimeter Vents and Hatch Maintenance/Inspection	3. Add Partial Guardrails along Roof Edge	1
3. Unprotected Walking/Working Surface near Ladder Entrance	2. Extend Existing Guardrails	1
§2.4 - Naval Amphibious Base (NAB) Coronado - Tank 152		
1. Cage not OSHA Compliant	4. Replace Ladder and Cage	1
2. Unprotected Walking/Working Surface near Ladder Entrance	3. Rotate the Ladder and Add Separate Platform	1
§2.5 - Naval Base (NB) Point Loma - Tank 316		
1. Exterior Ladder is not OSHA Compliant	1. Remove Ladder & Utilize Stairs	1
2. Unprotected Walking/Working Surface near Hatch Entrance	2. Add Partial Guardrails along Roof Edge	1
3. Valve Vault Individual-Rung Ladder not OSHA Compliant	Replace Ladder	1

HAZARD	RECOMMENDATION	QTY
§2.6 - NB Point Loma - Tank 366		
1. Guardrails on Existing Platform not OSHA Compliant	Replace Guardrails	1
2. Hatch Access and Piping & Valve Assembly Maintenance/Inspection	3. Add Partial Guardrails along Roof Edge	2
3. Valve Vault Individual-Rung Ladder not OSHA Compliant	Replace Ladder	1
§2.7 - NB Point Loma - Tank 372		
1. Cage not OSHA Compliant	4. Replace Ladder and Cage	1
2. Perimeter Appurtenances Maintenance/Inspection	3. Add Partial Guardrails along Roof Edge	2
3. Unprotected Walking/Working Surface near Ladder Entrance	2. Add Partial Guardrails along Roof Edge	1
4. Valve Vault Fixed Ladder not OSHA Compliant	Replace Ladder	1

[redacted]

Ergonomic Hazard Site Analysis

Explosive Ordinance Disposal Mobile Marine Mammal Systems Point Loma, CA

(HA# 762AS)

Prepared for

Naval Facilities Engineering Command
NAVFAC SOUTHWEST

Prepared by

[redacted]

San Diego, CA

September 2010

Distributed to US Government and authorized agents only.
All other requests for this document shall be referred to:

[redacted]

Executive Summary

A previous study by members of the Explosive Ordinance Disposal Mobile (EODM) Marine Mammal Systems (MMS) command found several ergonomic issues associated with Sailors handling and caring for their Atlantic Bottlenose Dolphins, as well as performing their other activities. [redacted] was tasked by NAVFAC SW to evaluate the hazards and possible solutions for mitigating the hazards associated with these activities.

GDIT personnel visited the site on several occasions. The most recent was in January and May 2010 to evaluate the ergonomic issues EODM MMS unit was experiencing.

The severity of the identified hazards was ranked based on expert judgment of a Certified Professional Ergonomist (CPE). Options to resolve the ergonomic hazards were researched, assembled, and evaluated through individual cost/benefit trade-off studies. As a result of the trade-offs, recommended solutions were identified for each hazard and a preliminary cost estimate developed for each solution.

The estimates shown in the Conclusion and summarized below include the total cost of implementing the recommended changes. This cost estimate provides a rough order of magnitude and will be refined when all factors of the selected option are determined. Currently included are the estimated design, manufacturing, installation, and operational verification costs. The estimated costs also assume that [redacted] engineering personnel will be onsite during the entire implementation process including final inspection and sign-off to provide Quality Assurance and to mitigate/authorize any necessary/required modifications.

The estimated cost for the recommended solutions is $77,000.

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1. INTRODUCTION

1.1 BACKGROUND

The Explosive Ordinance Disposal Mobile (EODM) Marine Mammal Systems (MMS) command has several missions involving the use of Atlantic Bottlenose Dolphins. The Sailors have to manually aid in moving the dolphins, manually move buckets of feed for the dolphins, manually remove the Zodiac boats the dolphins are transported in, and prepare and move food for the dolphins. The dolphins weigh up to 600 pounds, and the mats the dolphins are carried in can weigh up to 200 pounds wet. The Sailors also have to, at times, manually move fuel down the 1,200-foot pier, move the boats around the boat yard, and repair the motors on the rib boats. The Sailors are exposed to a number of ergonomic stressors because of these activities.

1.2 PURPOSE

The purpose of this Hazard Site Analysis is to present [redacted] recommendations for the most effective and efficient ways to control the identified ergonomics risk factors and provide a cost impact for implementing these controls. [redacted] was specifically tasked to evaluate: manually moving the dolphins from the boats to the portable holding pens; manually removing the Zodiac boats from the loading ramp of landing craft; manually moving buckets of feed for the dolphins; manually moving fuel for the various boats, and removing the motors from the rib boats. A CPE analyzed the risk factor exposure and collected end user input on practical concepts to reduce exposure to ergonomics hazards present during these activities.

1.3 APPROACH

This Site Analysis was developed by following the process outlined below:

1. The site was visited to obtain an understanding of actual operations and maintenance procedures by meeting with the local safety personnel, operators and maintenance personnel.
2. Potential ergonomic risk factors were identified.
3. Alternative solutions for controlling the ergonomic hazards were proposed.
4. Cost/benefit trade-off analyses were performed for the proposed solutions.
5. Recommendations were provided for the most advantageous control measures as well as the related cost impacts for each recommended control measure.

1.3.1 Site Visit

[redacted] conducted a site visit to the Point Loma location in January 2010, and [redacted] visited again in May 2010 to collect additional information on the hazards and to discuss potential solutions with the MMS unit. The [redacted] employees met with Jason Clayton concerning the needs of the MMS unit.

1.3.2 Identification of Ergonomic Risk Factors

Six activities were evaluated:

- manually moving the dolphins from the boats to the portable holding pens,
- manually removing the Zodiac boats from the loading ramp of landing craft,
- manually moving buckets of feed for the dolphins,

- moving fuel down the pier,
- removing the motors from the rib boats, and
- moving boats around the yard.

These areas were evaluated from the aspect of OPNAVINST 5100.23G chapter 23 *Ergonomics Program,* which outlines the details behind factors associated with Work-related Musculoskeletal Disorders (WMSDs). The results of this assessment, including the recommended control measures and individual cost estimates, are discussed in Section 2.

1.3.3 Risk Rating

1.3.3.1 Navy Safety and Occupational Heath (SOH) Program Manual 5100.23G, Chapter 23 *Ergonomics Program*

OPNAVINST 5100.23G.2305 states that activities are required to identify ergonomics risk factors; and if identified, are to evaluate the level of control required to mitigate the condition using OPNAVINST 5100.23G.23 Appendix A, Physical Risk Factor Check List, Appendix B, or the JR/PD. Appendix A further states that if a WMSD hazard is identified, the hazard must be reduced below the hazard level (to the caution level) or the lowest amount technologically or economically feasible.

1.3.4 Hazard Control Options

Control options were identified and developed for each of the ergonomic risk factors and evaluated against each other in a cost/benefit trade-off analysis. The options were developed by utilizing the hierarchy of control measures as presented in section E.6.1.3 of the Department of Defense Instruction Safety and Occupation Health Program (DoDI) 6055.1 *Effective design or redesign of a task or workstation*, and 2307 of the Navy Safety and Occupation Heath (SOH) Program Manual (OPNAVINST 5100.23G), a similar treatment of the same subject. These guidelines describe an objective methodology for evaluating solutions to ergonomic risk factors.

There are four basic approaches to controlling ergonomic risk hazards proceeding from eliminating the hazard to using administrative controls. Full descriptions of the hazard control options are listed below in order of highest to lowest priority.

Table 1 - Levels of Hazard Control
1. Elimination – A redesign or procedural change that eliminates exposure to an ergonomic risk hazard; e.g., using a remotely operated soil compactor to eliminate vibration exposure.
2. Engineering Controls – A physical change to the work place; e.g., lowering the unload height of a conveyor.
3. Substitution – An approach that uses tools/material/equipment with lower risk; e.g., replacing an impact wrench with a lower-vibration model.

4. Administrative – This approach is used when none of the above can be used or are impractical to implement. Administrative controls are procedures and practices that limit exposure by control or manipulation of work schedule or the manner in which work is performed. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. If you are unable to alter the job or workplace to reduce the physical stressors, administrative controls can be used to reduce the strain and stress on the work force. Administrative controls are most effective when used in combination with other control methods; e.g., requiring two people to perform a lift.

1.3.5 Trade-Off Analysis

Different options were analyzed and evaluated to show which aspects of the alternatives were positive (pros) and which were less positive (cons). These findings, together with preliminary estimated costs, were used as the criteria for recommending a solution. The trade-offs are presented in tables in Section 2 for each identified hazard.

1.3.6 Estimated Costs

Preliminary costs for design, engineering, manufacturing, installation, and operability verification were estimated for the purpose of determining the relative costs of the various alternatives. *Travel costs incurred during implementation and other miscellaneous costs were not accounted for or included in the trade-off studies' costs. They are included, however, in the costs provided in the Executive Summary.*

2. DISCUSSION

The results of this study, including the recommended control measures, are discussed below.

2.1 Location

Six of the activities the MMS unit performs were evaluated: 1. manually moving the dolphins from the boats to the portable holding pens; 2. manually removing the Zodiac boats from the loading ramp of landing craft; 3. manually moving buckets of feed for the dolphins; 4. moving fuel down the pier; 5. removing the motors from the rib boats; and 6. moving boats around the yard.
.

2.1.1 Ergonomic Hazard #1 – Ergonomic Stressors Related to Manually Moving the Dolphins

The MMS Atlantic Bottlenose dolphins weigh between 400 and 600 pounds and the mat the dolphins are carried in weighs up to 200 pounds wet. Figure 1 shows the cart and the mat. When the dolphins are moved from the boats to the portable holding pens, they must sometimes be manually lifted up to the deck of the transportation cart. This is done because the current cart has a fixed height. The height of the deck of the cart is the same height as the top of the holding pen. In many cases, there are not enough Sailors available to safely lift the dolphin and mat up to the height of the deck. The result is severe stress and strain on the Sailors' backs and legs. Several disabling injuries have occurred because of this operation.

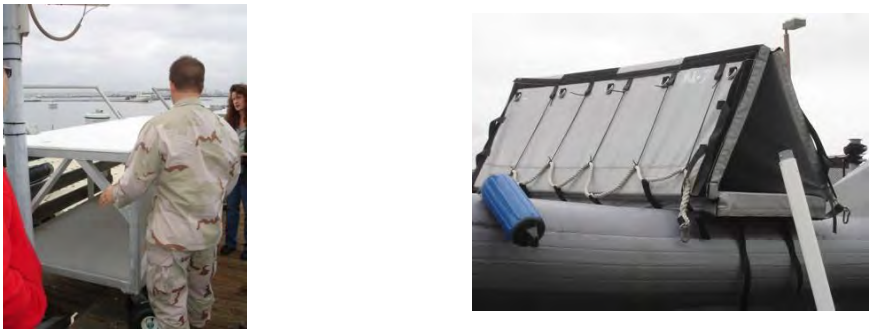

Figure 1: Dolphin Cart and Mat

2.1.1.1 Solutions Evaluated

1. Administrative controls – Ensure there are always enough Sailors to lift the dolphins safely.
2. Height adjustable cart – Provide a height adjustable cart to transport the dolphins from the boats to the pens.

2.1.1.2 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	This is a low cost solution.	On any given day there may not be enough Sailors available to lift the combined weight of 600 to 800-pound dolphin and mat.	4	$0
2. Height adjustable cart	A height adjustable cart will alleviate the need for Sailors to manually lift the dolphin.	Cost of the equipment and its maintenance.	2	18,000 ea. $36,000 total

2.1.1.3 Recommended Control Measure

Based on the trade-off analysis, a height adjustable cart is recommended. The MMS unit is in need of two (2) carts. The carts should be manufactured from stainless steel or other non-corrosive material and the height adjustment should be manual (i. e. wheel operated) or pneumatic.

2.1.2 Ergonomic Hazard #2 – Ergonomic Stressors Related to Manually Moving the Zodiac Boats

The EOD F580 (model number) Zodiac watercraft is used to transport dolphins from the cargo bay of LSD or LHD ships to their work area. The watercraft must be driven onto a ship's tailgate or ramp to load or unload the dolphins. Driving the boats onto the ramp in this fashion has the potential of damaging them. When the boat pulls up on the ramp, personnel must grab a line and pull the boats further up on the ramp and/or carry the watercraft from a ship's ramp to a boat trailer. This method of transport has resulted in back and leg injuries. Figure 2 shows the Zodiac boat.

Figure 2: Zodiac Boat

2.1.2.1 Solutions Evaluated

1. Administrative controls – Ensure there are enough Sailors to perform this activity and they use proper techniques when moving boats.
2. Ergonomically designed Zodiac trailer – Provide a trailer that is designed so that a minimal number of Sailors can safely move the Zodiac boats up the ramp.

2.1.2.2 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	This is a low cost solution.	This will not prevent injuries	4	$0
2. Ergonomically designed trailer	An ergonomically designed trailer that is properly balanced and has good couplings (hand holds) will significantly reduce the potential for injuries associated with this task.	Cost of the equipment and its maintenance.	2	$5000 ea. $20,000 total

2.1.2.3 Recommended Control Measure

Based on the trade-off analysis, an ergonomically designed trailer is recommended. The trailer should be constructed of corrosive resistant materials, have non-pneumatic tires, and have good coupling surfaces. The MMS unit is in need of four (4) of these trailers.

2.1.3 Ergonomic Hazard #3 – Ergonomic Stressors Related to Dolphin Food Transport

A 400 to 600 lb dolphin can eat a great amount of food. The dolphin caregivers have to manually move the food a great distance to feed them. They currently use a type of wheelbarrow to move the food. Though a wheelbarrow is a second class lever and provides mechanical advantage for moving materials, there is still a tremendous amount of stress on the backs and legs of the person using the device, depending on the weight of the load.

2.1.3.1 Solutions Evaluated

1. Administrative controls – There is not an adequate administrative control because if the weight of dolphin food is reduced, then many more trips down the pier are required.
2. Ergonomic feed bucket cart – An ergonomically designed feed bucket cart.

2.1.3.2 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	There is not an adequate administrative control	N/A	---	---
2. Ergonomically designed feed bucket cart	Providing an ergonomically designed feed bucket cart will reduce the amount of back and leg stress on the personnel who transport the dolphin feed. The cart should be battery powered and the unit is in need of two such carts.	Cost of the equipment.	2	$1600 ea. $3200 total

2.1.3.3 Recommended Control Measure

Based on the trade-off analysis, an ergonomically designed feed bucket cart is recommended. The cart must be durable, fabricated from non-corrosive materials and have foam filled tires. The MMS unit is in need of two (2) carts.

2.1.4 Ergonomic Hazard #4 – Manually Moving Fuel

The MMS Sailors, at times, need to move fuel down the pier to the rib boats. Currently they either transport 5-gallon containers of fuel in a cart or use a fuel caddy that is not ergonomic in nature. The pier is approximately 1200 feet long and this activity can be very stressful. Also, the fuel cannot be carried in the same carts that are used to transport food for the marine mammals.

2.1.4.1 Solutions Evaluated

1. Administrative controls – Provide smaller fuel containers.
2. Fuel caddy – Provide a fuel caddy with ergonomic features.
3. Wagon for fuel containers – Provide a wagon with ergonomic features for moving fuel containers.

2.1.4.2 Trade Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	The sailors can carry smaller amounts of fuel and use smaller containers.	This only increases the number of trips the sailors have to make to fuel the boats.	4	$200
2. Fuel caddy with ergonomic features.	Providing a fuel caddy that incorporates ergonomic features will reduce the stress on the MMS sailors and increase the efficiency of the fueling task.	Cost of the equipment.	2	$500 ea. $1000 total

Solution	Pros	Cons	Control Level	Cost
3. Provide a wagon with ergonomic features to move fuel.	A wagon with ergonomic features would allow the MMs sailors to move the fuel more efficiently and with less ergonomic stress than how it is moved currently.	A wagon for moving fuel does not reduce the ergonomic stress to the degree the fuel caddy does.	2	$300 ea. $600 total

2.1.4.3 Recommended Control Measure

Based on the trade-off analysis, a fuel caddy with ergonomic features is recommended. The caddy must be durable, fabricated for marine environments and have large tires to allow it to roll over rough areas of the pier. The MMS unit is in need of two (2) caddies.

2.1.5 Ergonomic Hazard #5 – Removing Boat Motors from Rib Boats

The mechanics assigned to the MMS unit periodically remove the large (up to 800 lb) outboard motors from the rib boats. The mechanics currently do not have an adequate means of removing the motors from the boats. This results in potential back, arm and leg stress and can potentially lead to an accident in which the motor can fall, seriously injuring a sailor.

2.1.5.1 Solutions Evaluated

1. Administrative controls – There is not an adequate administrative control because boat motors can weigh up to 800 pounds.
2. Portable crane – Provide a portable crane to aid in removing the boat motors.

2.1.5.2 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	There is not an adequate administrative control	N/A	---	---
2. Portable crane	A portable crane will eliminate the ergonomic stresses, as well as the safety issues associated with of removing the motors from the rib boats.	Cost of the equipment.	2	$5000.

2.1.5.3 Recommended Control Measure

Based on the trade-off analysis, a portable floor crane is recommended.

2.1.6 Ergonomic Hazard #5 – Moving Boats Around the Yard

The Sailors, at times, have to move the various boats on trailers around the yard. Currently they manually lift up the tongue, and then push and/or pull the boats. This puts tremendous stress on the Sailors legs, back, and arms/shoulders.

2.1.6.1 Solutions Evaluated

1. Administrative controls – Ensure enough Sailors are available to help move the boats.
2. Boat dolly – Provide a boat dolly to move the boats around the yard
3. Tug motor – Provide a tug motor to move the boats around the yard

2.1.6.2 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost
1. Administrative Control	Low cost solution.	There may not be enough Sailors to move the boats safely at any given time.	4	$0
2. Boat dolly	A boat dolly will allow the boats to be moved by one or two Sailors without the degree of ergonomic stressors.	There is a cost of the equipment, but it is low.	2	$200 ea. $400 total
3. Tug Motor	A tug motor would allow the boats to be moved without ergonomic stressors on the Sailors.	Cost and maintenance of the equipment.	2	$3000

2.1.6.3 Recommended Control Measure

Though a tug motor would eliminate the ergonomic stressors, the cost is high and the equipment would need to be maintained. Therefore, a boat dolly is recommended to eliminate the hazard. The MMS unit is in need of two (2) boat dollies.

3. CONCLUSION

To address all the identified ergonomics hazards associated with manually moving the dolphins from the boats to the portable holding pens, manually removing the Zodiac boats from the loading ramp of landing craft, manually moving buckets of feed for the dolphins, manually moving fuel for the boats, removing boat motors from the back of rib boats and moving boats around the yard, the items specified in 3.1 below are recommended.

3.1 Summary of Recommended Solutions

Hazard	Recommendation	Qty	Item Cost
Manually moving the dolphins.	Height adjustable transport cart	2	$18,000 ea. $36,000 total
Manually moving the Zodiac boats.	Ergonomically designed trailer	4	$5,000 ea. $20,000 total
Manually moving feed buckets	Ergonomically designed feed bucket cart	2	$1,600 ea. $3,200 total
Manually moving fuel	Fuel cart	2	$500 ea. $1,000 total
Removing boat motors from rib boats	Portable crane	1	$5,000 total
Moving boats around the yard	Boat dolly	2	$200 ea. $400 total
		Total	$65,600

[redacted]

Hazard Abatement Site Analysis

(HA #728AP)

SEAL Delivery Vehicle Team - 1, Pearl Harbor HI

Dry Dock Shelter

Prepared for

Naval Facilities Engineering Command
NAVFAC SOUTHWEST

Prepared by

[redacted]

San Diego, CA

June 2011

Distributed to US Government and authorized agents only.
All other requests for this document shall be referred to:

[redacted]

Executive Summary

The Naval Facilities Engineering Command (NAVFAC) manages the Chief of Naval Operations (CNO) Mishap Prevention and Hazard Abatement (MP/HA) program, a centrally managed program that provides technical, engineering, and financial support to Navy shore activities to identify and resolve fall abatement, electrical safety, and ergonomic deficiencies beyond their technical and funding capabilities. Information about the MP/HA program can be found on the NAVFAC website www.navfac.navy.mil/safety and in Navy Safety and Occupational Health (OSH) Program Manual (OPNAVINST) 5100.23G, Chapter 12 Hazard Abatement. Benefits from ergonomics include increased quality and productivity, improved health and safety, decreased Workers' Compensation Costs, and improved comfort. For more information on ergonomics and ergonomics technical support available, visit the Ergonomics page at www.navfac.navy.mil/safety.

SEAL Delivery Vehicle Team-1 (SDVT-1) requested a formal site visit in support of their MP/HA Ergonomics Project # 728AP, and their on-going initiative to reduce work-related injuries or illnesses. [redacted] was tasked by NAVFAC Southwest to evaluate the dry dock shelter maintenance task and generate findings in an Ergonomics Hazard Abatement Site Analysis (HA SA) report.

A Certified Professional Ergonomist (CPE) from [redacted] visited the site in August of 2010. This HA SA report is based upon an on-site survey that included interviews with workers, supervisors, and safety and health personnel. Results indicate feasible opportunities to reduce the risk of work-related musculoskeletal disorders (WMSDs). Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-related Musculoskeletal Disorders (WMSDs) are:

- Musculoskeletal disorders to which the work environment and the performance of work contribute significantly, or
- Musculoskeletal disorders that are aggravated or prolonged by work conditions.

The severity of the identified ergonomics hazards and subsequent risk of developing a WMSD was evaluated from the perspective of OPNAVINST 5100.23G Chapter 23 *Ergonomics Program* and Chapter 13 *Fall Protection* .

Options to resolve the ergonomics stressors were researched, assembled, and evaluated through individual cost/benefit trade-off studies. As a result of the trade-offs, recommended solutions were identified for each process and a preliminary cost estimate developed for each solution.

Input from the workers, safety specialists, occupational health professionals, and other personnel was gathered during and after the site visit to formulate the recommendations. This process increases product acceptance and takes advantage of worker experience. The cost estimates in the conclusion to implement the each recommendation is a rough order of magnitude and will be refined when all factors are determined.

In order to address all the identified ergonomics hazards, and to provide the users with a wide range of tools to utilize, [redacted] ecommends providing SDVT-1 with a work platform, walk-behind material mover and four creepers. The estimated cost to implement the recommended equipment is $46,000.

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1. INTRODUCTION

1.1 BACKGROUND

SDVT-1 is based in Pearl Harbor, HI. It is an operational SEAL Delivery Vehicle (SDV), Dry Deck Shelter (DDS) task unit that operates independently from a host submarine. When deployed, SDVs carry qualified Navy divers, SEALs and SDV technicians. Any U.S. submarine can carry SEALs, however the Navy has several submarines that have been specifically modified to carry swimmers and their equipment more effectively, including the installation of DDSs to house SDVs. For most operations, a large submarine would not want to go too shallow, so an SDV is necessary for the final approach to the beach or harbor facility. The DDS can be used to transport and launch an SDV or to "lock out" combat swimmers. It can be installed in about 12 hours and is air-transportable, further increasing special operations flexibility.

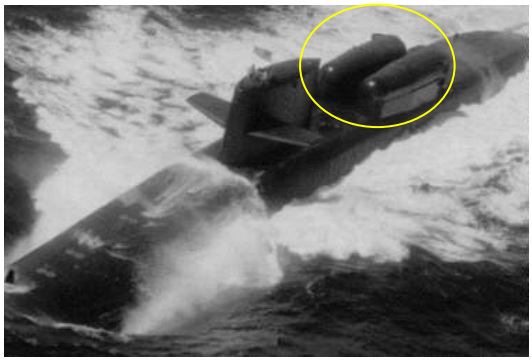

Figure 1: The USS Kamehameha (SSBN-642) underway, fitted with two Dry Dock Shelters (DDS)

The DDS is 9 feet wide, 9 feet high, 38 feet long and consists of three interconnected compartments each capable of independent pressurization. The forward-most compartment, a sphere, is the hyperbaric chamber which is used for treating of injured divers. Through the middle compartment, or transfer trunk, operators enter and exit the submarine and/or either of the other compartments. The third compartment, the hangar, is a cylinder with elliptical ends which houses either the SDV or up to 20 Special Operations Forces personnel with combat rubber raiding craft.

The DDS is connected to the submarine's hatch to permit free passage between the submarine and the DDS while the submarine is underwater and approaching the objective area. Then, with the submarine still submerged, the SEALs can exit the DDS and ascend to the surface, bringing with them equipment and rubber rafts, or they can mount an SDV and travel underwater.

With an expected service life of at least 40 years[1], DDSs will likely continue to support the missions of SDV deployment and swimmer lock-out, serving both the Special Operations Forces and submarine warfare specialties (reference: http://www.navydiver.org/SDVT/default.html).

1.2 PURPOSE

The purpose of this HA SA report is to present [redacted] recommendations for the most effective and efficient ways to control the identified ergonomics and fall risk factors and provide a cost impact for implementing these controls. [redacted] was specifically tasked to evaluate the DDS fairing removal task. A CPE analyzed the risk factor exposure and collected end user input on practical concepts to reduce exposure to ergonomics hazards.

1.3 APPROACH

The site was visited to obtain an understanding of actual operations by:

1. Observing the process
2. Meetings with local safety personnel and operators
3. Identifying, evaluating, and discussing the ergonomic and fall risk factors.

[1] Current est. age 30 years.

This HA SA Report was developed by incorporating the observations from the site visit with results from OPNAVINST 5100.23G, Chapters 23 and 13; *Ergonomic Program* and *Fall Protection* to:

- Evaluate the severity of the exposure to the ergonomics and fall risk factors
- Identify solutions for controlling the hazards that fit within the constraints of the tasks
- Perform cost/benefit trade-off analyses
- Provide recommendations for the control measures as well as the related cost impacts for each.

1.3.1 Site Visit

[redacted] a CPE from [redacted], visited SDVT-1 in August of 2010. Daniel A. Conrady[2] and ETCS Joe Autry were the escorts for the visit.

1.3.2 Identification of Ergonomic Risk Factors

The DDS maintenance task was evaluated from the aspect of OPNAVINST 5100.23G, Chapter 23, *Ergonomics Program,* which outlines the requirements associated with controlling WMSDs. The results of this assessment, including the recommended control measures and individual cost estimates, are discussed in Section 2. OPNAVINST 5100.23G Appendix 23-A provides a validated risk factor checklist for identifying ergonomic stressors.

OPNAVINST 5100.23G.2305 states that activities are required to identify ergonomics risk factors and if identified, are to evaluate the level of control required to mitigate the condition using OPNAVINST 5100.23G.23 Appendix A, Physical Risk Factor Check List. Appendix A further states that if a 'WMSD hazard' is identified, the hazard must be reduced below the hazard level (to the caution level) or the lowest amount technologically or economically feasible.

1.3.3 Hazard Control Options

Control options, identified and developed for the ergonomic risk factors, were evaluated against each other in a cost/benefit trade-off analysis. In some cases, only one feasible control option is possible due to the military specific application or process constraints.

The options were developed by utilizing the hierarchy of control measures as presented in section E.6.1.3 of the Department of Defense Instruction Safety and Occupation Health Program (DoDI) 6055.1 *Effective design or redesign of a task or workstation*, and Section 2307 of the OPNAVINST 5100.23G, a similar treatment of the same subject. These guidelines describe an objective methodology for evaluating solutions to abate ergonomic risk factors.

There are four basic approaches to controlling ergonomic risk hazards proceeding from eliminating the hazard to using administrative controls. Full descriptions of the hazard control options in order of highest priority to lowest if found in Table 1.

Table 1: Levels of Hazard Control

Hazard Control Hierarchy
1. Elimination – A redesign or procedural change that eliminates exposure to an ergonomic risk hazard; e.g., using a remotely operated soil compactor to eliminate vibration exposure.
2. Engineering Controls – A physical change to the work place; e.g., lowering the unload height of a conveyor.

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3. Substitution – An approach that uses tools/material/equipment with lower risk; e.g., replacing an impact wrench with a lower-vibration model.
4. Administrative – This approach is used when none of the above can be used or are impractical to implement. Administrative controls are procedures and practices that limit exposure by control or manipulation of work schedule or the manner in which work is performed. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. If you are unable to alter the job or workplace to reduce the physical stressors, administrative controls can be used to reduce the strain and stress on the work force. Administrative controls are most effective when used in combination with other control methods; e.g., requiring two people to perform a lift.

1.3.4 Trade-Off Analysis

Different options were analyzed and evaluated to show which aspects of the alternatives were positive (pros) and which were less positive (cons). These findings, together with preliminary estimated costs, were used as the criteria for recommending a solution. The trade-offs are presented in tables in Section 2 for each identified hazard.

1.3.5 Estimated Costs

Preliminary costs for the selection, testing, installation, and operability verification were estimated for the purpose of determining the relative costs of the various alternatives. *Travel costs incurred during installation and other miscellaneous costs were not accounted for or included in the trade-off studies' costs. They are included, however, in the costs provided in the Executive Summary of this report.*

2. DISCUSSION

The results of the site visit, ergonomics risk factor evaluation, solution trade-off analysis, and recommended control measures are discussed below.

2.1 SDVT-1 – DDS MAINTENANCE

The technician teams of four perform preventive maintenance (PM) and repair procedures on the DDS. The PM Service requires external access to the interconnected chambers which are covered by fairings. The site visit focused on removal of the six largest fairings covering the forward most and middle compartments as well as safe access to this area during repair and maintenance tasks. The nose is a fairing but referred to separately. Given the equipment available, the four-person team worked exceptionally well together by using constant communication to ensure the utmost regard for personnel and equipment safety.

Figure 2: Bolts, removed with a ratchet, are positioned from 2ft to 9ft above the deck. Much of the work is done while standing on ladders, the side of the DDS, or the side of the trailer (not seen in the figures). This arrangement introduces a number of ergonomics and fall related hazards.

Figure 3: Screwdrivers are placed into empty bolt holes to hold the fairings in place as the last of the bolts are removed. Nylon cord is tied onto the fairing at each end. Two team members on the starboard side lower the fairing down as two team members on the port side guided it.

Personnel access the DDS in one of two possible configurations:

1) the DDS is placed on dunnage (as seen in the Figures) in a bay with no overhead lifting mechanism or

2) the DDS remains on the transportation trailer in a bay with an overhead crane.

Configuration #2 introduces different challenges and advantages; while the trailer provides a larger walking surface and the crane can be used to support and lift the nose and fairings; it interferes with access to the lower fairings and nose (a 3 foot space between DDS and trailer). Configuration #2 creates a greater angle for the ladders. The solutions listed in the recommendations can be used in both bays.

Configuration 1 was reviewed, Figures 2-14. Prior to the observations, the DDS was placed on wooden dunnage and securing bolts removed. Manually removing over 2000 bolts is quite a labor-intensive task. There are a number of awkward working positions due to the various positions of the bolts. The number of connection points (bolts) can be seen in the Figures as silver spots. Electric and pneumatic tooling was discussed during the site visit. Powered tooling was regarded as infeasible due to the

risk of damage to one-of-a-kind fairings. Fairings from one DDS will not fit another; and must be repaired or replaced if damaged. Bolt removal was not observed but is discussed in the risk factor evaluation and recommendation sections which follow.

Fairing removal

The four person team uses ladders to reach and loosen the last few securing bolts on fairing 1, Figure 2. Screwdrivers are placed into the empty bolt holes to support the fairings as the last bolts are removed. As seen in Figure 3, nylon cord is then tied to the outside corners of fairing 1[4]. Two team members on the starboard side lowered the fairing as two team members on the port side guided it, Figures 4 - 5. The process was repeated for each of the five fairings.

Figure 4: Nylon cord is tied onto the fairing at each end. Two team members on the starboard side lower the fairing down as two team members on the port side guided it.

The fairing weights are as follows:

- 1 – 100 lbs
- 2 – 120 lbs
- 3 and 5 - 180 lbs
- 4 - 220 lbs
- Nose - estimated at 400 lbs.

Fairings 3 and 5, which are located on the top of the DDS, are more difficult to access, requiring extended reaches as seen in Figure 7. These fairings also became hung-up on the electrical connections when being lowered, Figure 8. The technicians had to step off the ladder more often when removing these top two fairings and had to physically support a portion of the fairing weight.

Fairing 4, which covers the area shown in Figure 9 weighs 220 lb.

Removing the nose was the most time consuming. A technician positions a mobile crane called a zoom boom with the fork attachment close to the nose of the DDS. Ratchet straps are then attached to the nose and boom, Figures 11-14. Two technicians, one on each side, pull on the ratchet straps as the other two technicians, one on each side, push and guide the nose onto the forks.

[4] Fairings numbered in order removed

Figure 5: Nylon cord is tied onto the fairing at each end. Two team members on the starboard side lower the fairing down as two team members on the port side guided it. Fairing 1 seen in figure 5 weighs 100 lbs.

Figure 6: The process is repeated for fairing 2, which weighs 120 lbs.

Figure 7: Fairing 3, with mate on the starboard side, is more difficult to access. Technicians are 94 inches off the deck.

Figure 8: Fairings 3 and 5 became hung-up during the lower phases on parts of the system requiring team members to lift it away from the DDS while standing on the ladder.

Figure 9: Fairing 4 weighs 220 lb. and covers the entire starboard. This side is exposed the photograph.

Figure 10: Fairings 1, 2 and 3 (3 and 5 are the same).

Figure 11: Ratchet straps are attached to the nose and boom.

Figure 12: Team members pull on the straps and push the nose onto the forks.

Figure 13: Technicians pull on the straps and push the nose onto the forks.

Figure 14: The nose is lowered and moved by three to four personnel. The nose weights approximately 400 lb.

2.1.1.1 Ergonomics Risk Factor Evaluation

The major ergonomic risk factors for the fairing removal task are highly repetitive hand and arm motions, sustained awkward postures, and forces from handling high loads in awkward postures. This exposure is in combination with working on narrow walking surfaces, which are above 4 feet. Fall protection equipment was not provided, although the team followed administrative controls when using ladders. The exposure to the ergonomic risk factors ranks a 'hazard' per OPNAVINST 5100.23G Ch. 23 Ergonomics Program. The exposure must be reduced below the hazard level to the degree technologically or economically feasible.

Team members are required to perform exceedingly high twisting motions with a ratchet to attach/remove literally 1000's of bolts, which hold the fairings in place. Motions that are repeated with little variation may cause fatigue and overuse of the muscles, tendons, and joints that are involved in the exertion. Overuse leads to muscle strain, inflammation of joints and tendons, and increased pressure on nerves. As exposure continues or intensifies (e.g., pace increases) tears in muscle fibers may occur. The more risk factors involved (as in this case moderate to high hand forces and awkward postures), the greater the risk of injury due to overuse and lack of adequate recovery time. Performing repetitive motions in awkward postures (e.g., bent wrists, extended arms) adds significantly to the muscular effort required to perform each motion. The added force hastens the onset of fatigue and increases the likelihood of injury from overuse.

Team members frequently handle heavy/awkward loads while working on unstable footing, at arms' length, overhead and below the knees. None of the human weight handling guidelines addresses lifting

loads on unstable footing (i.e. on ladders). With that assumption, the American Conference of Governmental Industrial Hygienists Threshold Limit Value (TLV) guidance booklet strongly discourages handling in excess of 30 lbs. overhead (if the hands are within 12 inches from the body). The guidance book also discourages handling in excess of 35 lbs. from below knuckle height. Exceeding the TLV places the workforce at an increased risk of injury. During the fairing removal evolution, these limits appear to be repeatedly violated.

Whether it is faring removal or DDS maintenance, much of the work is performed above 4 feet, and therefore places the team in situations in which they are in danger of falling. OPNAVINST 2100.23G Ch. 13 Fall Protection requires a control measure to be implemented.

2.1.1.2 Solutions Evaluated

1. Continue administrative controls of team lifting the fairings, and active communication and monitoring of each team member during the entire process. Promote stretch breaks, rotate workers, and continue to educate workers on the signs and symptoms of WMSDs.
2. A readily mobile, working platform would protect the technicians from a fall while allowing them easy access to the external surface of the DDS thus reducing awkward postures. A work platform (i.e. barrier-type) is second in the hazard control hierarchy for mitigating fall hazards A work platform can also be utilized during DDS preventative maintenance tasks (i.e. not just for fairing removal). A mobile platform similar to the ones used for helicopters with adjustable horizontal planks (fingers), will allow the workers to access the DDS without a gap between the work platform and DDS. The work platform can be used when the DDS is on or off the trailer. The individual horizontal platform planks can be moved into a custom configuration.
3. A walk behind lift/crane used to support, lift, and lower the fairings/nose within the constraints of the bays would improve the safety of handling the fairings. In addition, the equipment would diminish the teams' exposure to repeated or continued forces on the shoulders, back, and hands by reducing the need to manually handle the fairings.
4. Creepers, similar to those in the automotive industry, can be used when removing the bolts or while working on the DDS to support the body and reduce static muscle loading. Creepers can also improve the working posture. The more neutral the posture the more efficiently muscle forces can be applied. In other words, personnel can work more efficiently exerting less muscle force to perform the same task.
5. Continued use of ladders using additional personnel to ensure stability.

2.1.1.3 Trade-Off Analysis

Solution	Pros	Cons	Control Level	Cost per Unit
1. Administrative Control	Low cost. Administration controls work best when in combination with an overall safety and health program and engineering controls.	Administrative controls do not functionally reduce the exposure and must be constantly reinforced.	4	$118
2. Work Platform	Secondary only to elimination for fall hazard. Works in combination with reducing awkward postures for ergonomics.	Moderate cost, training and maintenance required	2 Ergonomics and Falls	$14,000

Solution	Pros	Cons	Control Level	Cost per Unit
3. Walk behind material mover	Eliminates ergonomics risk factors for lifting, easy to use, versatile	Cost, training and maintenance required	1	$21,000
4. Creepers	Low cost, easy to use, versatile	5 year life span, maybe only be used during specific tasks	3	$600
5. Ladders	Cheap and easy to use	High risk of falls and forces workers onto awkward postures	3	unknown

2.1.1.4 Recommended Control Measure

Based on the trade-off analysis, a combination of solutions 2 (work platform), 3 (walk behind material mover), and 4 (creepers) are recommended.

3. CONCLUSION

In order to address all the identified ergonomics hazards associated within the DDS maintenance tasks; [redacted] recommends a work platform, walk behind material mover and creepers

The resolutions recommended for SDVT-1 were selected to provide the site with a set of tools that can be used for DDS maintenance. The resolutions will enhance productivity and decrease the degree of the workers exposure to ergonomics and fall risk factors. The recommendation presents a set of solutions which protect personnel and valuable government property. As personnel change, the resolutions will still apply to the abatement of the ergonomics risk factors.

3.1 Summary of Recommended Solutions

Process	Recommendation	Qty	Total Cost
1. DDS Maintenance	Work platform	1	$14,000
	Walk behind material mover	1	$21,00
	Creepers	4	$2,100
TOTAL			***$37,100***

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2008	205CT	Fall	TRF Kings Bay	Unsafe condition exist on all bridge cranes at TRIREFFAC and SUBASE. When the contractor and the crane inspectors inspect the crane rails they have to walk the rails and check the condition of all hardware on the rails and the rail of the cracks, when they do this ther is no safe way to tie off their lanyards. Includes 14 cranes located in 10 buildings/drydock with 63 individual fall hazards.	Asses fall hazards, develop site analyis and deliver a detailed fabrication and installation design package for custom fall protection solutions to some of the identified fall hazards. Provided an updated status report for the remaining items to be addressed.	Identification, purchase, and delivery of various COTS items	150-250K	X	X	X	X	Mitigation includes assessment. Startup to this project included design of guardrails. What COTs items are being delivered two years after Startup?
FY2008	229CT NOTE - continues in 2009	Fall	NAS Key West	Building A-438, A-931, A-1116 and A-143 all have unguarded loading docks allowing personnel to work on unguarded walking/working surface	Assess fall hazards. Develop mitigation solutions. Delivered a detailed fabrication and installation design package for custom guardrails protecting the appropriate areas located at three different buildings.		50-150K	X	X		X	Continuation from 2008. Assessment and design for construction delivered. Installation by local PWD?
FY2008	254CT	Fall	TRF Kings Bay	There are no adequate tie off points for employees when working on staging areas around submarines; and this creates inadequate fall protection.	After detailed analysis, it was determined that no OSHA violation exists and no MPHA funding is availble for design and construction of mitigations. Analysis was basis for changes to adminstrative and work procedures that mitigated fall hazards.		50-150 K	X			X	Was there an "NOV"?
FY2008	269CT	Fall	NS Mayport	HSL-60 squadron trains and maintains combat ready SH-60B helicopters. Employees frequently assume awkward postures during maintenance. The muscles must apply considerably more contraction force to maintain awkward postures. As the duration of the contraction increases, stress on the muscles also rise. The continuous stress on these muscles can lead to fatigue and discomfort which can be precursors to injury.	Assess fall hazards. Develop mitigation solutions.	Purchase and deliver a customized COTS (narrowed) H-60 maintenance stand.	50-150	X		X		Fall or Ergo hazard? Separate assessment cost from COTS?
FY2008	272CT NOTE: continues in 2010	Electrical	NAS JRB New Orleans	There are grounding, bonding and electrical code issues as well as lightning protection issues at various locations including the VR-54 Hangar, Hangar 263 and Hangar 3; the PAR, AESOS & ASR-8 radar sites; and Building 33, the AIMD. Numerous grounding and bonding connections are either corroded or not present leading to a shock hazard risk to personnel as neutral current is channeled through equipment and facility structures. Varmit infiltration has caused unsaf conditions in power panels. Some inverters used for aircraft power violate current NEC Article 513 requirements and cables don't conform to standards. Aircraft grounding points are not marked or are improperly marked and some are deteriorated and therefore don't provide the impedance required putting maintenance personnel at risk Hangar inverter Power Service Point equipment does not conform to requirements. Lighting protection is absent on Building 33, AIMD, as required by MIL-STD-188-124A and the lightning protection on the ASR-8 has been compromised.	Assess electrical hazards and delivered Site Analysis with recommendations for bringing outdated electrical systems up to modern Code compliant standards.		150-250	X				Project continues in 2010. Cost range includes assessment, design (equipment and construction) and construction.
FY2008	275CT	Fall	NAS JRB New Orleans	Inadequate Fall Protection on Fixed Wing Aircraft while performing maintenance on 4 C-130's for squadron VR-54 pose fall hazards to personnel.	Assess fall hazards. Develop mitigation solutions.	Purchase and deliver COTS vacuum anchor based fall protection system	<25	X	x	X		Does this cost include assessment and COTs purchase?
FY2008	281CT	Fall	NAS Jacksonville	Inadequate fall protection for C-40 aircraft, squadron VR-58, expose maintnenance and inspection personnel to fall hazards.	Assess fall hazards. Develop mitigation solutions.	Purchase and Deliver COTS vacuum anchor based fall protection system	25-50	X		X		Assessment cost shared with other similar project?

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FY2008	501CL, 502CL	Electrical	NAS Oceana / NAS Norfolk	501CL - Numerous electrical and grounding issues/problems at work stations throughout the rooms in Bldg. 513. 502CL - Electrical and grounding safety hazards at numerous electronic workstations throughout Bldg. SP-300 causing electrical shock to personnel.	Updated building(s) electrical grounding and protection systems to code compliant configurations.			X				For this type of "routine" electrical project, what is the value added of the assessment contractor? Won't the construction contractor end up "designing" the solution?
FY2008	508CL	Fall	NS Naples	Personnel exposed to fall hazards while doing maintenance on H-60 Helicopters	Assess fall hazards. Develop mitigation solutions.	Purchase and Deliver COTS H-60 maintenance stand.	50-150	X	X	X		Does construction consist of installation of COTs?
FY2008	616AC	Fall	NF Washington D.C.	Aircraft Maintenance Personnel Working at HEIGHTS OF 30 - 40 FT Depending on type of aircraft, (IE, C20,EA-6B, F-18 OR C-130).	Assess fall hazards. Develop mitigation solutions.	Purchase and Deliver custom E/A-6B tail maitenance stand as well as other stands with integrated self retracting lifelines.	50-150	X	X	X		
FY2008	697AS	Fall	Various	Personnel exposed to fall hazards on aircraft when performing maintenance both at sea and on shore facilities. A resolution to the problem needs to be investigated and developed. An in depth Market Analysis has uncovered a new fall abatement concept called The Wingrip Vacuum System. This portable system is used in commercial aviation and could potentially have a global application to Naval Aviation. However, it would be prudent to subject the Wingrip Systems concept to the multitude of differences between commercial and military maintenance environments by performing a fleet evaluation prior to bulk purchases of the Wingrip Vacuum System.	Provided assessments and	Provided some systems to prospective and willing aircraft wings.	50-150	X				
FY2008	524CL, 715AS	Electrical	Various	524CL - Fleet introduction of H-60-R/S Seahawk helicopters at U.S. Navy CONUS/OCONUS facilities (NAS North Island, NAVSTA Norfolk, NAS Jacksonville, NS Mayport, Anderson AFB, MCBH Kaneohe Bay, NAF Atsugi, and MCAS Iwakuni) presents personnel safety issues related to Point of Service Power. Current power sites are not in compliance with MIL-HDBK-419 or NFPA/NEC electrical codes and thus are potential electrical safety hazards. 715AS - Project expanded to include validation and resolution of emergent electrical safety issues at Navy shore installations which pose imminent life safety risks to personnel through non-compliance with current OSHA, NAVOSH, NFPA/NEC, DoD, and OPNAV safety standards, instructions, directives, and codes.	Provided assessments and recommended resolutions for each electrical issue.		250-500	X			x	
FY2008	753AS	Fall	Various	Brows are used to connect ships to the pier for the transportation of personnel and materials. Brows raise and lower with the tide because one side is attached to the ship. Personnel place pallets on the pier-side to create steps and reduce the distance between the brow and land. Frequently the pallets being used have been discarded because they are worn-out and broken. Pallets should not be used for steps because of their tendency to break and the spacing creates the potential for trip/fall hazards. People who are carrying items on and of ships have reduced visibility and are more likely to fall because they can't see the steps. There were four injuries, including a broken ankle, related to this task in 2005.	Designed, and prototyped various configurations of Brow Stands. Delivered final drawings and several prototyped (as well as the final revision) stands.		250-500	X	X		X	
FY2008	755AS	Fall	NS San Diego	Existing Stanchion and Chains do not meet height requirements for a safe guardrail. The Dry Dock perimeter is a high foot traffic area and the probability of someone tripping and falling against these chain barriers is highly likely. The concern is that chains would be inadequate to prevent someone from falling through the barriers	Delivered a detailed fabrication and installation drawing package for providing new removable guardrails surrounding the perimeter of the Graving Dock.		150-250	X	X		X	

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FY2008	762AS	Ergo	NS Point Loma	Ergonomic hazards: a. three to four employees are required to lift a 600 pound zodiac boat above their heads and then push/slide it into the water off of the pier. b. The beaching cart is a rigid amphibious mobile platform framework used to transport Navy dolphins from their above ground pools to their transport boats. Carts are very difficult to manuever around . c. Most operations involving dolphins are conducted from 9-meter or 11-meter RHIBs. However, these RHIBs are too large to launch from the well deck/stern gate of an amphibious ship. Thus, once the Zodiac leaves the amphibious ship via the stern gate, the Zodiac and RHIB merry up and the dolphin and beaching mat are transferred from the Zodiac to a RHIB at sea. This dolphin transfer is typically conducted by three people (due to space limitations on the boats) who have to lift, twist, and slide the dolphin and beaching mat (weighing 500-800	Contracted 3rd party company to design, fabricate, and deliver various custom component for addressing these hazards, including feed carts, dolphin lifters, zodiac accessories, etc. This company could not deliver adequate solutions by the due date imposed by the contract, and their work was not useable.	Design, fabircation and delivery of : 5 boat lifts 1 dolphin cart 2 slewing arm davit 2 split beaching mats	150-250	X	X	X		
FY2008	768AS	Ergo	NAVMEDCEN San Diego	Employees perform a variety of operations at individual seated and standing workstations to fabricate and repair facial and dental prosthetic appliances. Equipment varies by workstation and task but may include ventilation intake and electric and manual tools. The major ergonomics risk factors are repetitive hand and arm motions in unsupported, awkward postures. The exposure is in combination with contact stress from grasping tools while applying force, and applied contact stress from the sharp bench edges. The tasks also have high visual demands, which require workers to lean forward and assume static postures of the neck and torso for extended periods. The current workstations have storage underneath that prevents the workers from raising the chair high enough to work in a neutral posture. Working in an awkward posture can restrict blood flood and cause the employee to exert more effort to perform a task than working in a neutral position. The neutral posture is the optimal position of the body to exert the greatest force, promote blood flow and nerve conduction and reduce the risk of ergonomics related injury. Workers can spend 6 hours a day at the bench.	Assess ergonomic risk factors. Identify improved work processes.	Identify, purchase and deliver upgraded equipment in the maxillofacial lab (sink bench, case pan storage, workstations).	50-150	X	X	X		
FY2008	769AS	Ergo	NAVMEDCEN San Diego	Employees perform a variety of operations at individual seated and standing workstations to fabricate and repair facial and dental prosthetic appliances. Equipment varies by workstation and task but may include ventilation intake and electric and manual tools. The major ergonomics risk factors are repetitive hand and arm motions in unsupported, awkward postures. The exposure is in combination with contact stress from grasping tools while applying force, and applied contact stress from the sharp bench edges. The tasks also have high visual demands, which require workers to lean forward and assume static postures of the neck and torso for extended periods. The current workstations have storage underneath that prevents the workers from raising the chair high enough to work in a neutral posture. Working in an awkward posture can restrict blood flood and cause the employee to exert more effort to perform a task than working in a neutral position. The neutral posture is the optimal position of the body to exert the greatest force, promote blood flow and nerve conduction and reduce the risk of ergonomics related injury. Workers can spend 6 hours a day at the bench.	Assess ergonomic risk factors. Identify improved work processes.	Upgraded the existing equipment in the porcelain room (sink bench, case pan storage, workstations). Upgraded the existing equipment in the prosthetics area (models and casting bench). Upgraded the blasting bench, polishing bench and two technical workstations	150-250	X	X	X		
FY2008	855AR	Fall	NCTS Cutler	Employees are required to climb to a height of 80-90 feet inside and 90-100' outside to perform maintenance and repairs required on the 2 Helix Houses at NCTAMS LANT Cutler. Inside there is not 100% tie offs for safety lines and outside personnel have to free climb in order to secure safety lines. Maintenance is perform at variable intervals form weekly, monthly, quarterly, or annually. Maintenance climbs usually involve two people for half day.	Assess fall hazards. Identify improved work processes. Oversaw the installation of highly custom engineered solutions, including platforms, ladders, scaffold anchors, etc.	Indentify, purchase, and deliver a customized ladders, platforms and scaffolds.	25-50	X			x	

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2008	790AS	Electrical	Various	Obsolete mobile facility internal wiring is not in compliance with NEC which may cause ground currents. This condition can void the circuit breaker protection and expose van occupants to electrical shocks. Ground currents also degrade Automatic Test Equipment, reducing mission productivity, increasing production equipment maintenance costs, and decreasing operation availability of mission critical assets. Ground current also increase the rate of van structure corrosion as it tends to breakdown the protective paint. Many mobile facility sites may not provide the proper low resistance (<5-ohm) ground system. High resistance grounds may expose van occupants to danger of electrical shock from lightning strikes.	Provided assessments on, and training of end users on how to resolve various electrical hazards related to the MALs vans. Also provided materials to end users for the resolution of electrical hazards. As each mobile facility will have hazards specific to that unit assessment and changes to bring unit into compliance is a continuous process.		150-250	X		X		
FY2009	229CT NOTE: started in 2008	Fall	NAS Key West	Building A-438, A-931, A-1116 and A-143 all have unguarded loading docks allowing personnel to work on unguarded walking/working surface.		Fabricated and delivered custom guardrails for install by local PWD.	250-500K	X	X		X	Installed by local PWD in 2009?
FY2009	258CT	Ergo	NAS Ft. Worth	Warehouse workers build custom shipping containers for freight. Containers are constructed out of wood for items such as wings or fuel cells. Workers do not have a large surface/area or lifting devise for these containers, resulting in items being constructed on the floor and awkward postures assumed by personnel. Also the existing order picker is not matched to the type of pallets used in the warehouse. This results in the workers climbing ladders, picking stock and climbing down the ladder with the stock in their hands. The workers not only risk strain from handling stock in a twisted posture but falls from carrying stock down the rolling ladders. Many cargo container are manually lifted and dragged across the floor because the warehouse does not have a conveyor system or lift other back of their transportation vehicles.	Assess ergonomic risk factors. Identify COTS solutions. Identify improved work processes.	Purchase and deliver various COTS items such as a -large lift table for crate fabrication, -an order picker that can fit down the narrow isles - a flexible conveyor system -transportable dolly for deliveries.	25-50	X		X		COTs as a percentage of total cost? COTs would be a pass-through cost, and not a factor in source selection.
FY2009	265AN	Ergo	NAS Whidbey Island	Technicians are responsible for all aspects of asset repair. Within the transmitter the low band AR1 resides. The AR1 weights 180 lbs and is extracted from the transmitter and transferred onto a cart. The transfer is conducted via an overhead hoist. During the repair process all areas of the AR1 are accessed and the AR1 is manually turned a minimum of 6 times. The rotation is done manually. This submission is a follow-on project to 221 AN which abates the hazards associated with repair of the transmitter. Handling the AR1 requires the technicians to perform heavy lifting in awkward postures as well as assume and maintain awkward postures during the repair. Awkward Posture and Forces: Technicians are routinely lifting in awkward postures. Awkward postures combined with forceful exertions can restrict blood flow and can cause muscle fatigue as well as result in tendon and ligament strain.	Assess ergonomic risk factors. Identify improved work processes.	Design, fabricate, deliver and assemble a fixture which is height adjustable and rotates the AR1 360 degrees.	50-150	X	X	X		Describes the work, but do we need to separate the assessment cost from design, fabrication, and delivery cost?
FY2009	515CL	Ergo	NS Norfolk	Naval ship antennas are very large and can measure up to 36 feet long. They come in a variety of shapes and weights, most of which have numerous parts that all require painting. The painter has to manually span the whip antenna between sawhorses and paint the areas he can reach. Wait for the paint to dry, thus holding up other painting operations while the paint is drying, then rotate the antenna to paint the areas that were setting on the sawhorses. He may also paint other antennas in a similar fashion. See attached picture. Ergonomics Risk Factor: Lower back strain from lifting and rotating the antennas and reaching to paint in awkward positions.	Assess ergonomic risk factors. Identify improved work processes.	Fabricate and deliver a custom Antenna cart and Antenna paint stand.	50-150	X	X			

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2009	517CL	Ergo	Norfolk Naval Shipyard	Rectangular shaped 32 carbon steel shaft keys (120 lbs.) are used to hold the shaft in place. Shaft keys arrive from the foundry in the form of rough ingots and are stored until ready for use. They are manually removed from storage bin and transported via hand truck to the milling machine. Worker lifts shaft key from hand truck (floor level) to height of milling machine. After the key is milled to size specifications it is taken back to the shaft section for fitting. Ergonomics Risk Factors: Lower back strain caused by lifting 120 lb. shaft key; lifting heavy loads from floor level.	Identification, purchase, and delivery of various COTS items including mobile adjustable Lift Carts/Tables.	Identification, purchase, and delivery of various COTS items including mobile adjustable Lift Carts/Tables.	25-50	X		X		
FY2009	532CL	Fall	NAS Oceana	The Air Traffic Control tower at LP-212 does not have an external fire escape ladder. The only passageway into or out of the tower is the stairwell.	Only Phase 1 was completed under this Task Order, but the recommended resolution(s) included an external stairwell attached to the Tower.		50-150	X	X		X	
FY2009	536CL	Ergo	Norfolk Naval Shipyard	Ergonomic Hazards: Prefab structural parts and components arrive on pallets. they are worked in several sections, i.e.: measuring, layout, burning, grinding, welding, cleaning, inspection, and tagging. During this process parts and components are manually lifted, flipped, pushed, and repositioned before being placed on pallets and moved to the next work station. Prefab components that are manually handled can weigh between 35-200 lbs.	Identify, purchase, and deliver COTS walk-behind forklift that lifts from floor to table height.	Identify, purchase, and deliver COTS walk-behind forklift that lifts from floor to table height.	50-150	X		X		
FY2009	706AP	Ergo	NS Norfolk	Employees in the machine shop use trash cans for scrap metal which are dumped by hand into refuse containers. Trash cans weigh from 100 to 400 lbs. and requires -3 people to dump them. Heavy lifting especially when combined with awkward postures can place stress on the spine and increase the risk of developing work-related musculoskeletal disorders (WMSDs). Currently gear boxes are removed from motors on a mobile work stand. Trying to break off the gear box on a moving platform requires excessive force and frequently results in injuries. The supply area is responsible for receiving and storing items. Employees also carry items weighing up to 200 lbs. to/from a mezzanine storage area. Carrying heavy items up/down stairs is stressful to the back and can be a safety hazard because the worker doesn't have three points of contact with the stairs. Some items in storage are too large for the forklift forks so employees have to drag around items weighing up to 600 lbs. Excessive push forces can fatigue the back and legs and increase the risk of wMSDs. Employees are also lifting and moving heavy items stored on pallets in areas that are inaccessible by the fork lift.	Assess ergonomic risk factors. Identify improved work processes.	Identification, purchase, and delivery of various COTS items including a self-dumping hopper, a stair climber, forklift extensions, and several other components to minimize Ergonomic stressors.	25-50	X		X		
FY2009	278CT	Electrical	NS Mayport	Numerous electrical and grounding issues in CASS Shop, TMV Shop, HTS Shop, Building 1553 and workbenches in the FRCSE Shops expose personnel to electrical hazards.	Assess electrical hazards and recommended resolution(s) include bringing several electrical systems and components up to the associated Codes. Only Phase 1 was completed under this Task Order.		50-150	X	X			Pricey assessment (and design).
FY2009	715AS	Electrical	Various	Project expanded to include validation and resolution of emergent electrical safety issues at Navy shore installations which pose imminent life safety risks to personnel through non-compliance with current OSHA, NAVOSH, NFPA/NEC, DoD, and OPNAV safety standards, instructions, directives, and codes.	Provide Phase 1 administration, management, report preparation, other costs not associated with any specific project, emergent issues, and assessments for various electrical hazards, related tasks, including initial evalations before hazard is established, formal training classes, and informal training for Command Safety personnel.		250-500					

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2009	783AS	Fall	NS North Island	5 large water tanks have inadequate fall protection and safety requirements. 20 hazards on 7 resevoirs (tanks) across three bases.	Only Phase 1 was completed under this Task Order, 20 recommended but the recommended resolution(s) included customized guardrails, code-compliant ladders, code-compliant stairways and platforms, and various other modifications.		25-50	X				
FY2009	785AS	Ergo	NS Crane	Assess ergonomic risk factor for the ambulance technicians in excessive lifting and force due to manual handling of the gurneys and stair chairs.	Assess ergonomic risk factor. Develop mitigation solutions.	Indentify, purchase, and deliver various COTS equipment including mats, chairs, writing tablets, and a drum dolly.	<25	X		X		
FY2009	791AS	Ergo	NAS Lemoore	Assess ergonomic risk factor for the ambulance technicians in excessive lifting and force due to manual handling of the gurneys and stair chairs.	Assess ergonomic risk factors. Identify COTS solutions. Identify improved work processes.	Purchase and deliver: -Customized COTS stretchers.	25-50	X		X		
FY2009	793AS	Electrical	MCAS Kaneohe Bay	Personnel safety and hearing is greatly affected when the diesel mobile power cart for the fixed wing aircraft (squadron VR-51) is powered up in the hangar: resulting in unhealthy safety for personnel and unacceptable high cost maintenance for the cart.	Only Phase 1 was completed under this Task Order, but the recommended resolution(s) include bringing several electrical systems and components up to the associated Codes.		50-150	X				
FY2009	797AS	Ergo	NAWS China Lake	Environmental protection specialists are exposed to a number of physical hazards, most notably heavy and awkward lifting, pulling / pushing, frequent standing and temperature extremes. The physically demanding nature of the profession combined with the duration of the exposure (i.e. frequent over-time / frequent handling) places the employees at an increased risk of developing additional or more severe work-related injuries. Environmental protection specialists currently stack empty drums two high on a pallet and use a roll of stretch wrap to secure the drums to the pallet.	Identify, purchase, and deliver modified COTS shrink-wrap machine.	Identify, purchase, and deliver modified COTS shrink-wrap machine.	25-50	X		X		
FY2009	799AS	Ergo	SWRMC	Workers exert unacceptably high forces when performing heavy lifting in awkward postures while maintaining gangways. The combination of heavy lifting and awkward postures during repair processes (working at ground level), places them at increased risk of developing a work-related musculoskeletal disorder.	Assess ergonomic risk factors. Identify improved work processes.	Design, prototype, deliver, re-design, and re-prototype custom tooling and fixtures to assist in the rework of ship accommodation ladders. The final prototypes ended up a sufficient quality to use in the shop and eliminated the hazard.	250-500	X	X			
FY2009	800AS	Ergo	TRF Kings Bay	Workers are subjected to Ergonomic Injury when storing and retrieving Chain Falls and Lever Hoists for storage.	Assess ergonomic risk factors. Identify improved work processes.	Design, purchase, and deliver hardware for a storage and retrieval rack system for all of the various hoisting components. Due to contractual limitation, the hardware is on-site in boxes waiting to be installed.	50-150	X	X			

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2009	802AS	Ergo	TRF Kings Bay	TRIREFFAC Machinists are subjected to Ergonomic Injury when repairing and testing ASW, MSW & HOV pumps. Machinists are required to over reach, twist and overexert their bodies to return the pumps to service.	Assess ergonomic risk factors. Identify improved work processes. Purchase, deliver, and install custom staging (stairs, walkways, platforms and guardrails).		25-50	X	X	X		
FY2009	803AS	Ergo	NAS Fallon	Ambulance technicians in excessive lifting and force due to manual handling of the gurneys and stair chairs.	Assess ergonomic risk factors. Identify COTS solutions. Identify improved work processes.	Purchase and deliver: -Customized COTS stretchers.	25-50	X		X		
FY2009	818AS	Ergo	NS San Diego	During helo maintenance, workers lift and support equipment and hardware which is greater than 50 lbs. This is performed in awkward postures and body positions. Lifting task violates MIL-STD-1472F.	Assess ergonomic risk factors. Identify improved work processes.	Design, and prototype systems for lifting and securing weights into the various areas of the H-60. The final solution ended up being some modified COTS stands and jacks (although the end user originally wanted motorized complex hardware).	50-150	X	X	X		
FY2009	871AR	Ergo	NS New London	Metal angle iron, sheet metal and bar stock has to be stored in multiple locations and handled numerous times during the production process risking potential for personnel injury due to lifting and unnecessary handling.	Assess ergonomic risk factors. Identify improved work processes.	Indentify, purchase, and deliver a customized COTS indexing and storage machine.	50-150	X	X	X		
FY2010	272CT NOTE: started in 2008	Electrical	NAS JRB New Orleans	There are grounding, bonding and electrical code issues as well as lightning protection issues at various locations including the VR-54 Hangar, Hangar 263 and Hangar 3; the PAR, AESOS & ASR-8 radar sites; and Building 33, the AIMD. Numerous grounding and bonding connections are either corroded or not present leading to a shock hazard risk to personnel as neutral current is channeled through equipment and facility structures. Varmit infiltration has caused unsafe conditions in power panels. Some inverters used for aircraft power violate current NEC Article 513 requirements and cables don't conform to standards. Aircraft grounding points are not marked or are improperly marked and some are deteriorated and therefore don't provide the impedance required putting maintenance personnel at risk. Hangar inverter Power Service Point equipment does not conform to requirements. Lighting protection is absent on Building 33, AIMD, as required by MIL-STD-188-124A and the lightning protection on the ASR-8 has been compromised.	Modernized outdated electrical systems up to modern Code compliant standards.		150-250		C			
FY2010	277CT	Electrical	NAS JRB New Orleans	Inadequate lightning protection at weapons area and inadequate grounding protection around flight areas pose fire hazards, explosion and electrical hazards.	Assessed electrical hazards and currently installed systems. Identified mitigation solutions. Modernized outdated electrical systems up to modern Code compliant standards. A NFPA 780 certified lightning protection system was installed on buildings 9, 10 and 33. Repaired and restored magazine lightning protection system on bunkers 80, 83, 87, 392 and 394.		150-250					Assessment Cost? Can assessment be separated from design?
FY2011	TI #0006 - HA-726AP	Electrical	NAS Atsugi, Japan	Electrical safety issues related to the Avionics Intermediate Maintenance Department (AIMD) workbench and 400 Hz power distribution system as well as the 400 Hz Flight Line Electrical Distribution System (FLEDS) systems at NAS Atsugi.	Assess electrical hazards and provide expert electrical safety consultation for identifying potential resolutions.		25-50	X				

Attachment J-0404000-03 Historical Information

Year	MPHA Project Number	Type of Hazard	Facility Location	Detailed Description of Hazard	Assessment and Hazard mitigation provided by vendor	Equipment provided by vendor to mitigate hazards	Total Cost	Assess	Design Fabrication Construction or repair	COTS Purchase	PE Required	Notes
FY2011	TI #0013 - HA-834AS	Electrical	NB Ventura, Pt Mugu, CA	Electrical and lightning systems at the Weapons Revetment Area (Bld 56) are in various states of deterioration due to their exposure to the coastal elements and age. Much of the energized electrical system is no longer needed to support aircraft, but expose personnel to shock hazards due to the obsolete design, deteriorating structures, and lack of electrical safety measures. Many lighting poles are rusted to a point where their continued support is questionable.	Assess electrical hazards and identify steps to remove all non essential electrical systems and replace essential systems as needed. Install new lighting system to provide the necessary coverage needed during critical weapons loading scenarios.		250-500	X				
FY2011	TI #0015 - HA-587CL	Electrical	NAVSTA Norfolk, VA	Electrical Hazards related to aircraft hangar electrical systems. Poor grounding and outdated hangar and flight line aircraft power supplies expose personnel to electrical safety/shock hazards and risk potential damage to mission essential systems and aircraft. Personnel hazards are also present due to the deterioration and/or lack of proper lightning protection systems.	Assess electrical hazards and identify steps to Implement NEC/MIL-STD compliant electrical and NFPA-780 Lightning Protection Systems repairs.		250-500	X				
FY2011	TI #0017 - HA-790AS	Electrical	NAS Miramar, CA & NAS Yuma, AZ	Complete implementation of Support Equipment Bulletin (SEB) 881 efforts for Marine Aviation Logistics Squadrons (MALS) Mobile Facilities (MFs) located at MALS-11, 16 and 46 at MCAS Miramar, and MALS-13 at MCAS Yuma.	Assess electrical hazards and identify steps to implement SEB 881 compliant electrical standards		150-250	X				

NOTE: PREVIOUS CONTRACT(S) INCLUDED CONSTRUCTION. NO CONSTRUCTION IN THIS CONTRACT.

SOME PROJECTS ARE NOT COMPLETED AND MAY BE COMPLETED IN THIS CONTRACT.

ATTACHMENT J-0404000-04
CONTRACT HISTORICAL DATA

(RELEASABLE FOIA INFORMATION)

Contract -	GS07T00BGD0046 Mishap Prevention, Hazard Abatement Program (MPHA) for NAVFAC
Current Contractor's Information -	General Dynamics Information Technology 3430 Camino Del Rio North San Diego, CA 92108
Period of Performance -	March 11, 2008 - December 31, 2010
Award Amount -	Minimum Guarantee - $5,000.00 Maximum Contract Value - $60,000,000.00
Current Contract Value -	$10,660,000.00

NOTE 1: This information is provided for planning purposes only and is not intended to represent the amount of work required by this contract.

ATTACHMENT J-0404000-06
HAZARD ANALYSIS REPORT (HAR)

Hazard Analysis Report

The Hazard Analysis Report (HAR) is a deliverable item that will serve several functions for an MPHA Project. The HAR will provide thorough description of hazard, validation of the hazardous condition, evaluation of the risk posed by the hazard, possible mitigation strategies, and recommended solution(s). The report shall be utilized by the government to determine viability of project moving into Phase II, and by the activity with the hazard to establish interim controls or take action independent of MPHA program and to assist other commands with similar hazards. The hazard analysis shall contain the following elements:

Description of hazard: The narrative of the hazard identifying what parties are affected by the hazard, assignment of responsibility for the hazard and identification of other stakeholders as appropriate. What tasks expose personnel to the hazard and the frequency and duration of the task? The narrative shall also provide the operational or military aspects of the hazard that may pose further challenges as well as worst case scenario. For industrial ergonomics, the physical ergonomics risk factors shall be identified with each task and any appropriate contributing risk factors. The use of pictures, diagrams and or sketches is encouraged to provide full description of hazards.

Validation of hazard: Identification of what standard is not being met and how existing condition is deficient by providing citation. For ergonomics hazard, the validation shall be completion of the Job Requirements and Physical Demands (JRPD) survey/report where appropriate and/or the requirements of OPNAVINST 5100.23G Chapter 23. Detailed information on the JRPD survey methodology can be found by selecting the Tools tab on the Ergonomics page of www.navfac.navy.mil/safety. For ergonomics the applicable standard is OPNAVINST 5100.23G Chapter 23. For fall hazards the applicable standards are OPNAVINST 5100.23G Chapter 13, 29 CFR and ANSI Z359 Fall Protection Code. For electrical hazards the applicable standards are OPNAVINST 5100.23 Chapter 24, NEC and NFPA 70E.

Risk Assessment: Based upon the hazard severity, exposed population, and other relevant factors, a risk assessment based on OPNAVINST3500.39B shall be included. For ergonomics, a numerical ranking derived from the JRPD survey and report will be used, where applicable (see Attachment J-0404000-07, sample JRPD Report).

Mitigation Strategies: The suggested mitigation strategies shall be categorized in accordance with control measures established in OPNAVINST 5100.23 series. The Contractor shall analyze each identified hazard and develop at least three (3) code-compliant alternatives, as applicable, to resolve each hazard. Resolutions may require the design of unique hazard abatement products, procurement of Commercial-Off-The-Shelf (COTs) systems/ equipment, administrative controls, personnel protective equipment, or a combination thereof.

Suggested strategies shall also include pricing data based on experience and/or research. All relevant control measures should be addressed. For ergonomic assessments in which a JRPD survey has been performed, the JRPD report will be attached and referenced in the Site Assessment report. The use of pictures, diagrams and/or sketches is encouraged to provide full description of hazards.

Recommended Mitigation: Based on experience and technical feasibility, identify the mitigation strategy the vendor believes the most appropriate for implementation. The preferred solution is strategy for implementation should be the design of unique hazard abatement products, procurement of Commercial-Off-The-Shelf (COTs) systems/ equipment, or combination thereof that eliminates the hazard or establishes engineering controls. For the recommended solution, the Contractor should provide an implementation plan, detailed and fully developed pricing data, and any other applicable documents. For all other proposed solutions, Contractor shall provide a parametric estimate of costs.

The HAR will be turned over to the activity reporting the hazard for training, awareness and development of interim controls. The MPHA program in consultation with SME may select from the recommendations to have vendor develop a full estimate on one or multiple options. Hazard analysis may require site visit or may be performed by telephone and electronic exchange between reporting activity and vendor.

The Offeror may request that the Government to provide access to site reports of similar type projects or historical site reports for hazard locations and the Government will provide, if available. Although there is a significant amount of information in some of the historical data, there is not necessarily all of the information needed to provide the required elements of the HAR. There is significantly more historical information available for the initial base period anticipated projects than for the option year projects.

ATTACHMENT J-0404000-07

FORMS AND REPORTS

See attached -

1. Sample Job Requirements and Physical Demands (JRPD) SCANTRON Form.

2. Sample accompanying Survey Results Report.

3. SCANTRON Forms may be purchased from:

   SCANTRON
   3975 Continental Drive
   Columbia, PA 17512

   Phone: 1-800-347-7704
   Email: mailto:customer_service@scantron.com
   Website: http://www.scantronforms.com/

   Form No: 245077-1

Department of Defense
Job Requirements and Physical Demands Survey

GENERAL INSTRUCTIONS

- The survey will take approximately 45 minutes to complete.
- Answer all questions to the best of your abilities.
- Please hand in all forms when completed.

MARKING INSTRUCTIONS

- Use only a No. 2 pencil.
- Do not use ink, ballpoint, or felt-tip pens.
- Make solid marks that fill the response area completely.
- Make no stray marks on this form.

CORRECT: ● INCORRECT: ⊘ ⊗ ◒ ◔

Background Information

1. Workplace Identifier
Do not mark unless instructed.

2. Date

MONTH	DAY	YEAR

3. Age

- ○ Under 21
- ○ 21-25
- ○ 26-30
- ○ 31-35
- ○ 36-40
- ○ 41-45
- ○ 46-50
- ○ 51-55
- ○ 56-60
- ○ 60-65
- ○ over 65

4. Gender

- ○ Female
- ○ Male

5. Length of time at this base?

- ○ Under 1 Year
- ○ 1-5 Years
- ○ 6-10 Years
- ○ 11-15 Years
- ○ 16-20 Years
- ○ Over 20 Years

6. Length of time at current job?

- ○ Under 1 Year
- ○ 1-5 Years
- ○ 6-10 Years
- ○ 11-15 Years
- ○ 16-20 Years
- ○ Over 20 Years

7. Have you completed this questionnaire before?

- ○ Yes
- ○ No

8. Department of Defense Component

- ○ Air Force
- ○ Army
- ○ Navy
- ○ Marines
- ○ Army & Air Force Exchange Agency
- ○ Defense Commissary Agency
- ○ Defense Logistics Agency
- ○ National Security Agency
- ○ Other DOD Component

9. Service Component

- ○ Civilian Employee
- ○ Contractor
- ○ Foreign National

Military Only:

- ○ Guard
- ○ Regular
- ○ Reserve

PLEASE DO NOT WRITE IN THIS AREA

26649

Do not mark unless instructed.

Location Information

10. COMMAND	11. INSTALLATION (Base name)	12. ACTIVITY

Organization Information

13. BUILDING

14. ROOM

15. Job Code

Civilian (Job Series)
Example: 0 0 8 0 3
(Safety Engineer)

Army/Marines (MOS)
Example: 7 0 4 1

Air Force (AFSC)
Example: 1 A 1 0 0

Navy NOBC (Officers)
NEC (Enlisted)
Example: 9 5 0 2

16. Pay Plan and Grade

Examples:
GS-5 would be:
G S 0 5
WG-3 would be:
W G 0 3
E-3 (Enlisted) would be:
E 0 3
O-4 (Officer) would be:
O 0 4

A. Description of Work

This section asks you to describe what is involved in your job. Indicate how long you do this work on approximately a daily basis.

Shoulder / Neck

	NEVER	0-2 HOURS	2-4 HOURS	4-8 HOURS
1. I work with my hands at or above chest level. *(Figure A)*	○	○	○	○
2. To get to or to do my work, I must lay on my back or side and work with my arms up	○	○	○	○
3. I must hold or carry materials (or large stacks of files) during the course of my work	○	○	○	○
4. I force or yank components or work objects in order to complete a task	○	○	○	○
5. I reach or hold my arms in front of or behind my body (e.g., using a keyboard, filing, handling parts, performing inspection tasks, pushing or pulling cards, etc.). *(Figure B)*	○	○	○	○
6. My neck is tipped forward or backward when I work. *(Figure C)*	○	○	○	○
7. I cradle a phone or other device between my neck and shoulder. *(Figure D)*	○	○	○	○

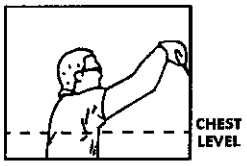


Figure A

Figure B

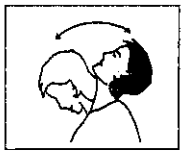


Figure C

Figure D

A. Description of Work (continued)

Hand / Wrist / Arm

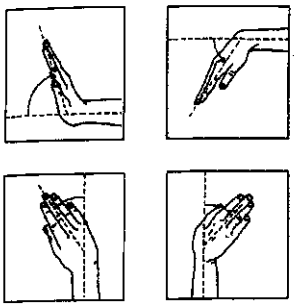


Figure E

Figure F

	NEVER	0-2 HOURS	2-4 HOURS	4-8 HOURS
8. My wrists are bent (up, down, to the thumb or little finger side) while I work. (*Figure E*)	○	○	○	○
9. I apply pressure or hold an item/material/tool (e.g., screwdriver, spray gun, mouse) in my hand for longer than 10 seconds at a time.	○	○	○	○
10. My work requires me to use my hands in a way that is similar to wringing out clothes. (*Figure F*)	○	○	○	○
11. I perform a series of repetitive tasks or movements during the normal course of my work (e.g., using a keyboard, tightening fasteners, cutting meat, etc.)	○	○	○	○
12. The work surface (e.g., desk, bench, etc.) or tool(s) that I use presses into my palm(s), wrists(s) or against the sides of my fingers leaving red marks on or beneath the skin.	○	○	○	○
13. I use my hand/palm like a hammer to do certain aspects of my work	○	○	○	○
14. My hands and fingers are cold when I work	○	○	○	○
15. I work at a fast pace to keep up with a machine production quota or performance incentive	○	○	○	○
16. The tool(s) that I use vibrates and/or jerks my hand(s) and arm(s)	○	○	○	○
17. My work requires that I repeatedly throw or toss items	○	○	○	○
18. My work requires that I twist my forearms, such as when turning a screwdriver	○	○	○	○
19. I wear gloves that are bulky or that reduce my ability to grip.	○	○	○	○
20. I squeeze or pinch work objects with a force similar to that which is required to open a lid on a new jar	○	○	○	○
21. I grip work objects or tools as if I am gripping tightly onto a pencil	○	○	○	○

A. Description of Work (continued)

Back / Torso

	NEVER	0-2 HOURS	2-4 HOURS	4-8 HOURS
22. When I lift, move components, or do other aspects of my work, my hands are lower than my knees. (*Figure G*)	○	○	○	○
23. I lean forward continually when I work (e.g., when sitting, when standing, when pushing carts, etc.)	○	○	○	○
24. The personal protective equipment or clothing that I wear limits or restricts my movement	○	○	○	○
25. I repeatedly bend my back (e.g., forward, backward, to the side, or twist) in the course of my work	○	○	○	○
26. When I lift, my body is twisted and/or I lift quickly. (*Figure H*)	○	○	○	○
27. I can feel vibration through the surface that I stand on or through my seat (e.g., when operating a forklift, truck, etc.)	○	○	○	○
28. I lift and/or carry items with one hand. (*Figure I*)	○	○	○	○
29. I lift or handle bulky items	○	○	○	○
30. I lift materials that weigh more than 25 pounds	○	○	○	○

Figure G

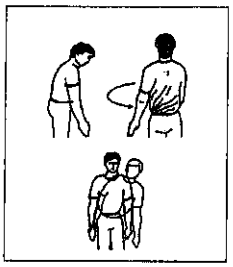


Figure H

Figure I

A. Description of Work (continued)

Legs / Feet

	NEVER	0-2 HOURS	2-4 HOURS	4-8 HOURS
31. My work requires that I kneel or squat. (*Figure J*)	○	○	○	○
32. I must constantly move or apply pressure with one or both feet (e.g. using foot pedals, driving, etc.)	○	○	○	○
33. When I'm sitting, I cannot rest both feet flat on the floor. (*Figure K*)	○	○	○	○
34. I stand on hard surfaces	○	○	○	○

Figure J

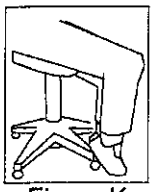


Figure K

Head / Eyes

	NEVER	0-2 HOURS	2-4 HOURS	4-8 HOURS
35. I can see glare on my computer screen or work surface	○	○	○	○
36. It is difficult to hear a person on the phone or to concentrate because of other activity, voices, or noise in/near my work area.	○	○	○	○
37. I must look at the monitor screen constantly so that I do not miss important information (radar scope)	○	○	○	○
38. It is difficult to see what I am working with (monitor, paper, parts, etc.)	○	○	○	○

B. Organizational Factors

This section asks you to describe organizational factors present in your current work environment.

	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
39. I often feel unclear as to what the scope and responsibilities of my job are.	○	○	○	○	○
40. I often feel that I have too heavy of a workload, one that I could not possibly finish during an ordinary workday	○	○	○	○	○
41. I often feel that I will not be able to satisfy the conflicting demands of various people around me.	○	○	○	○	○
42. I often find myself unable to get information needed to carry out my job.	○	○	○	○	○
43. I often do not know what my supervisor thinks of me, or how he/she evaluates my performance.	○	○	○	○	○
44. I often think that the amount of work I have to do interferes with how well it is done.	○	○	○	○	○

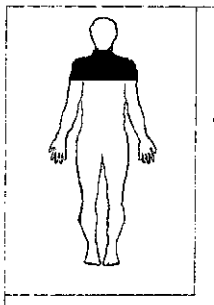
C. Physical Effort

45. How would you describe the physical effort required of your job?

1	2	3	4	5	6	7	8	9	10	11	12	13	1
No exertion at all	Extremely light		Very light		Light		Somewhat hard		Hard		Very hard		Extr hi
○	○	○	○	○	○	○	○	○	○	○	○	○	○

D. Discomfort Factors

This section enables you to identify how your body responds to the demands of your job.



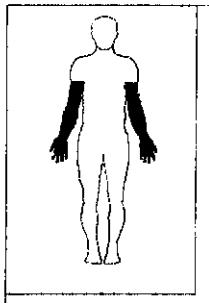
For Shoulder/Neck

46. In the past 12 months have you experienced any discomfort, fatigue, numbness, or pain that *relates to your job*?

○ No ○ Yes

How often do you experience discomfort, fatigue, numbness, or pain in your shoulder/neck region? Mark only one.
- ○ Daily
- ○ Weekly
- ○ Monthly

On average, how severe is the discomfort, fatigue, numbness, or pain in your shoulder/neck region? Mark only one.
- ○ Mild
- ○ Moderate
- ○ Severe



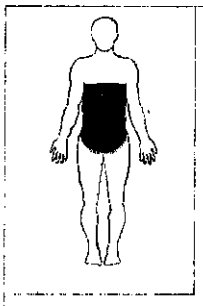
For Hand/Wrist/Arm

47. In the past 12 months have you experienced any discomfort, fatigue, numbness, or pain that *relates to your job*?

○ No ○ Yes

How often do you experience discomfort, fatigue, numbness, or pain in your hands/wrist/arm region? Mark only one.
- ○ Daily
- ○ Weekly
- ○ Monthly

On average, how severe is the discomfort, fatigue, numbness, or pain in your hands/wrist/arm region? Mark only one.
- ○ Mild
- ○ Moderate
- ○ Severe



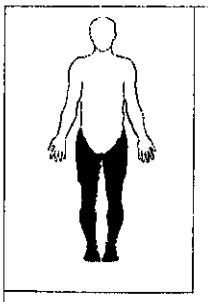
For Back/Torso

48. In the past 12 months have you experienced any discomfort, fatigue, numbness, or pain that *relates to your job*?

○ No ○ Yes

How often do you experience discomfort, fatigue, numbness, or pain in your back/torso region? Mark only one.
- ○ Daily
- ○ Weekly
- ○ Monthly

On average, how severe is the discomfort, fatigue, numbness, or pain in your back/torso region? Mark only one.
- ○ Mild
- ○ Moderate
- ○ Severe



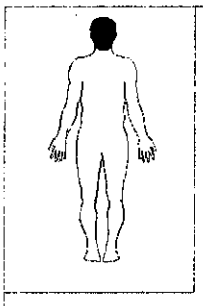
For Legs/Feet

49. In the past 12 months have you experienced any discomfort, fatigue, numbness, or pain that *relates to your job*?

○ No ○ Yes

How often do you experience discomfort, fatigue, numbness, or pain in your legs/feet region? Mark only one.
- ○ Daily
- ○ Weekly
- ○ Monthly

On average, how severe is the discomfort, fatigue, numbness, or pain in your legs/feet region? Mark only one.
- ○ Mild
- ○ Moderate
- ○ Severe



For Head/Eyes

50. In the past 12 months have you experienced any discomfort, fatigue, numbness, or pain that *relates to your job*?

○ No ○ Yes

How often do you experience discomfort, fatigue, numbness, or pain in your head/eyes region? Mark ony one.
- ○ Daily
- ○ Weekly
- ○ Monthly

On average, how severe is the discomfort, fatigue, numbness, or pain in your head/eyes region? Mark only one.
- ○ Mild
- ○ Moderate
- ○ Severe

E. General Questions

51. **In the past 12 months have you seen a health care provider for any pain or discomfort that you think *relates to your job*?** ○ Yes ○ No

52. **Do you experience any work-related pain or discomfort that does not improve when you are away from work overnight or over the weekend?** ○ Yes ○ No

53. **In the past 12 months, has any work-related pain or discomfort caused you difficulty in carrying out normal activities (e.g., job, hobby, leisure, etc.)?** ○ Yes ○ No

54. **Has a health care provider ever told you that you have any of the following conditions which you think might be *related to your work*?** ○ Yes ○ No

Tendonitis / Tenosynovitis	Ganglion Cyst	Trigger Finger
Epicondylitis (Tennis Elbow)	Bursitis	Carpal Tunnel Syndrome
Thoracic Outlet Syndrome	Back Strain	Knee or Ankle Strain
Overuse Syndrome		

55. **Do you have or have you ever had one or more of the following conditions?** ○ Yes ○ No

Wrist Fracture	Hypertension	Kidney Disorders
Thyroid Disorder	Diabetes	Gout
Rheumatoid Arthritis		

F. Work Content

The section below enables you to describe the content of the work that you do in your current job. Fill in the box that describes how frequently you do the task listed, based on the following definitions:

Routine:	**Performed on three or more days per week.**
Non-routine:	**Performed two days a week or less.**
Seasonal:	**Performed only during certain times of the year.**
Never:	**You do not perform this type of work.**

	ROUTINE	NON-ROUTINE	SEASONAL	NEVER
56. Abrading	○	○	○	○
57. Baking	○	○	○	○
58. Bolting/screwing	○	○	○	○
59. Calling (telephone use)	○	○	○	○
60. Chipping	○	○	○	○
61. Cleaning by hand	○	○	○	○
62. Cleaning with high pressure equipment	○	○	○	○
63. Coating/immersing	○	○	○	○
64. Cooking	○	○	○	○
65. Copying	○	○	○	○
66. Crimping	○	○	○	○
67. Cutting/shearing	○	○	○	○
68. Drafting/CAD system use	○	○	○	○
69. Drilling	○	○	○	○
70. Driving (vehicles)	○	○	○	○
71 Excavating	○	○	○	○
72. Filing/general administrative	○	○	○	○
73. Flame cutting/arc cutting	○	○	○	○
74. Folding/fitting	○	○	○	○
75. Gluing/laminating	○	○	○	○
76. Grinding/buffing/polishing	○	○	○	○
77. Hammering	○	○	○	○
78. Lifting	○	○	○	○
79. Loading (pallets, trucks, carts, aircraft)	○	○	○	○
80. Lubricating	○	○	○	○
81. Machining	○	○	○	○
82. Masoning	○	○	○	○
83. Melting	○	○	○	○
84. Molding	○	○	○	○

	ROUTINE	NON-ROUTINE	SEASONAL	NEVER
85. Monitoring (visual displays)	○	○	○	○
86. Mousing (for computer work)	○	○	○	○
87. Nailing	○	○	○	○
88. Opening/closing heavy doors	○	○	○	○
89. Packing/packaging	○	○	○	○
90. Painting/spray painting	○	○	○	○
91. Paving	○	○	○	○
92. Pumping (by hand)	○	○	○	○
93. Riveting/bucking	○	○	○	○
94. Sanding	○	○	○	○
95. Sawing	○	○	○	○
96. Scanning (using bar code readers)	○	○	○	○
97. Sewing	○	○	○	○
98. Soldering/brazing	○	○	○	○
99. Stapling	○	○	○	○
100. Stripping/depainting by hand	○	○	○	○
101. Stripping/depainting mechanically	○	○	○	○
102. Transporting loads on non-powered carts	○	○	○	○
103. Turning valves	○	○	○	○
104. Tying/twisting/wrapping	○	○	○	○
105. Typing/keying	○	○	○	○
106. Welding	○	○	○	○
107. Wheeling loads	○	○	○	○
108. Wiring	○	○	○	○
109. Wrenching/ratcheting	○	○	○	○
110. Writing/illustrating	○	○	○	○
Please write in others here:				
111._____	○	○	○	○
112._____	○	○	○	○

G. Process Improvement Opportunities

Think about your job as a whole, including routine, non-routine or seasonal work.

Read the questions listed below and describe the activities that you or your co-workers think place the greatest demands on your body.

113. Which tasks are the most awkward or require you to work in the most uncomfortable position?

_____

_____

_____

_____

_____

114. Which tasks take the most effort?

_____

_____

_____

_____

_____

115. Are there any tools or pieces of equipment that are notoriously hard to work with? (If possible, provide manufacturer and model)

_____

_____

_____

_____

_____

116. If you could make any suggestions that would help you do your job more easily or faster or better, what would you suggest?

_____

_____

_____

_____

_____

PLEASE DO NOT WRITE IN THIS AREA

26649

Job Requirements and Physical Demands Survey Results for Fleet Logistics Support Squadron Three Zero (VRC-30), San Diego, CA

Background

The Naval Facilities Engineering Command (NAVFAC) manages the Chief of Naval Operations (CNO) Mishap Prevention and Hazard Abatement (MPHA) program, a centrally managed program that provides technical, engineering, and financial support to Navy shore activities to identify and resolve fall abatement, electrical safety, and ergonomic deficiencies beyond their technical and funding capabilities. Information about the MP/HA program can be found on the NAVFAC website www.navfac.navy.mil/safety and in OPNAVINST 5100.23G, Chapter 12, Hazard Abatement.

Fleet Logistics Support Squadron Three Zero (VRC-30), requested assistance through the distribution of the JR/PD and an on-site hazard assessment in support of their on-going initiative to reduce work-related musculoskeletal disorders (WMSDs). Benefits from ergonomics include increased quality and productivity, improved health and safety, decreased Workers' Compensation Costs, and improved comfort.

General Dynamics Information Technology (GDIT) was tasked by NAVFAC Southwest to conduct an on-site ergonomic evaluation, distribute and analyze the JR/PD data, and generate findings in a report.

The Job Requirements and Physical Demands survey (JR/PD) is an active surveillance tool, endorsed by the Department of Defense Ergonomic Working Group (DoD EWG) and used by the tri-services to collect occupational health data. The JR/PD survey is a leading indicator, warning of potential problem areas before actual injuries occur. The JR/PD is anonymous.

The JR/PD survey was developed and validated by the US Air Force to provide a tool unique to ergonomics which:

- Assesses employee exposure to work place risk factors,
- Assesses employee discomfort trends in terms of severity and frequency,
- Provides results (work content and process improvement opportunities) that can be used to establish a plan for specific follow-up within the higher priority shops, and
- Provides unbiased results (overall priority score) that can be used to establish overall priorities for further investigation or intervention on the shop level.

The JR/PD also collects data on improvement suggestions, perceived physical exertion, organizational issues, visits to health care providers, lasting pain and discomfort that is not relieved by work as well as contributing factors for the development of WMSDs.

The survey data can be used as:

- Baseline Data ~ a starting point in establishing an Ergonomics program, choosing shops/areas for interventions based on where EPRAs exist,
- Trending Data ~ to assess if changes in tools, equipment, or procedures reduced the EPRA rating.

For more information on ergonomics and ergonomics technical support available, visit the Ergonomics page at www.navfac.navy.mil/safety

Summary

The JR/PD Overall Priority Score is based upon a combination of exposure (i.e. duration) to work place stressors and employee reported discomfort (both in terms of frequency and severity). An Overall Priority Score of five (5) or greater, on a scale of one to nine (1-9), establishes a task or job as an Ergonomics PRoblem Area (EPRA).

The JRPD was distributed to the aircrew in March of 2011. The results indicate VRC-30 as an EPRA, with an Overall Priority Score of **nine**. Significant exposure to ergonomic risk factors and discomfort ratings were found in the **shoulder/neck**, **hand/arm/wrist**, **back/torso,** and **leg/foot** body regions. In addition, this young population had a-typical results (i.e. significant findings) for lasting pain and discomfort that interrupts their after work activities.

The EPRA score of 9 indicates a high level of exposure to workplace risk factors and severe, lasting discomfort. The aircrew details the difficultly found in the tasks which take place inside of the C2, specifically loading/unloading the seats and handling the heavy cargo. Detailed results of the JR/PD are found in the discussion section.

Discussion

VRC-30

Demographics
Fifteen (out of fifteen respondents) completed the JR/PD survey. An 80 percent response rate is required for statistical significance. Results for VRC-30 are considered significant.

Ninety three percent of the respondents are male, and all are active duty. 47% have been at the current job for 6-10 years. 67% are between 21 and 30 years of age. The percentage of pre-existing injuries and lasting pain and discomfort is considered elevated for this age range. A younger population tends to heal faster and more efficiently than an older population. This is not the case with the aircrew.

Scoring
The JR/PD analysis combines the Risk Factor Exposure Rating with the Discomfort Rating for each body area to result in a score on a scale of one to nine (1-9). Table 1 contains the priority matrix used to determine the numerical and resulting priority score for each body region.

- Low Priority Score = 1- 3
- Medium Priority Score = 4 - 6
- High Priority Score = 7 - 9

A score of 5 or greater is considered a priority and indicated by an asterisk in Table 1. A priority body region score of 5 or greater means there is significant exposure to risk factors and discomfort.

Table 1: Priority Matrix Combining Risk Factor Exposure and Discomfort for a numerical score

		DISCOMFORT RATING		
		High	**Medium**	**Low**
RISK FACTOR EXPOSURE RATING	**High**	**9***	**6***	**3**
	Medium	**8***	**5***	**2**
	Low	**7***	**4**	**1**

Overall Score
The highest body region score is used at the *Overall Priority Score*. An overall priority score of 5 or greater means the area is considered an Ergonomics Problem Area (EPRA),

An area designated, as an EPRA requires attention such as an on-site evaluation for more detailed evaluation or changes to the tools, workstations, equipment, or personnel or procedures.

The results of the JR/PD indicate the aircrew is an ERPA with an overall priority score of **nine.** This is based on the highest body region score, as seen in table 2.

Body Region Score

The **aircrew** has significant exposure to work place risk factors and discomfort as seen in Table 2. The priority score for **all** the body regions, with the exception of the head/eye, are considered significant.

Table 2: Priority Scores, Discomfort and Risk Factor Ratings, and Prevalence for VRC-30

	Body Regions				
	Shoulder/Neck	**Hand/Arm/Wrist**	**Back/Torso**	**Leg/Foot**	**Head/Eye**
Risk Prevalence	**47%**	**33%**	**87%**	**67%**	**27%**
Risk Rating	**Medium**	**Medium**	**High**	**High**	**Low**
Discomfort Prevalence	**60%**	**33%**	**93%**	**33%**	**7%**
Discomfort Rating	**Medium**	**Medium**	**High**	**Medium**	**Low**
BODY REGION PRIORITY SCORE	**5**	**5**	**9**	**7**	**1**
OVER ALL PRIORITY SCORE			**9**		

Risk Prevalence and Rating

The percent of workers exposed to specific work place risk factors and the duration of the exposure, assesses the prevalence of risk for the given body region.

- Low ratings represent less than 30% prevalence
- Medium ratings represent 31% to 60% prevalence
- High ratings represent greater than 61%

The JR/PD survey results indicate a high level risk for **back/torso** and **leg/foot** body regions as well as moderate risk for the **shoulder/neck** and **hand/arm/wrist** body regions.

Discomfort Prevalence and Rating

Discomfort is a leading indicator for many WMSD. The JR/PD survey results indicate a high level discomfort (severity and frequency of occurrence) for **back/torso** body region, as well as moderate discomfort for the **shoulder/neck**, **hand/arm/wrist** and **leg/foot** body regions.

Risk Factor Distribution

The risk factor distribution seen in Table 3, indicate that 60% or more of the population reported exposure to the following risk factors for greater than 2 hours per day:

Shoulder/Neck

- Question 4: Forcing or yanking components or working objects in order to complete a task
- Question 6: Neck tipped forward or back when working

Hand/Arm/Wrist

- Question 17: Work requires repeatedly throwing or tossing items

Back/Torso

- Question 22: Lifting with hands lower than the knees
- Question 25: Repeatedly bending the back
- Question 26: Lifting with the body twisted
- Question 27: Vibration though the surface that they sit or stand upon
- Question 28: Carrying or lifting with one hand
- Question 29: Lifting bulky items
- Question 30: Lifting items in excess of 25 lbs

Legs/Feet

- Question 31: Work requires me to kneel or squat
- Question 34: Standing on hard surfaces

Head/Eyes

- Question 36: Difficulty hearing people or concentrating because the work area is noisy

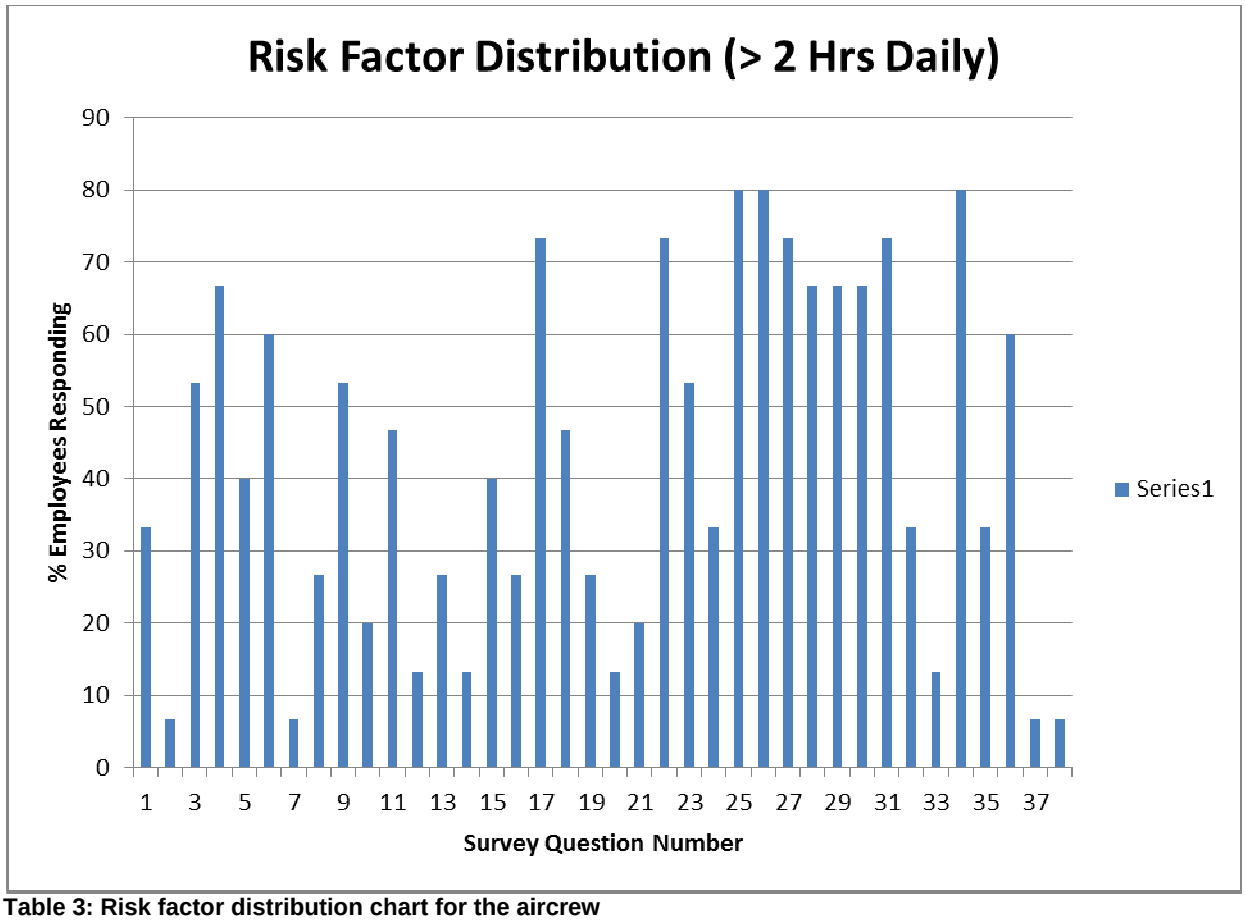


Table 3: Risk factor distribution chart for the aircrew

Organizational Information

Organizational factors contribute to ergonomic stressors. The organizational score for this area was **low,** which indicates job stress factors are not present. Survey respondents were asked if they understood their job responsibilities, if their workload was too heavy, if they are able to get pertinent information, if they received comments on performance, etc. Suggestions to improve stress associated with organizational factors provide workers with more autonomy and improve discussion and feedback between workers and supervisors.

Physical Effort

The survey resulted in a perceived physical exertion score of **12.6.** Respondents were asked to describe the physical effort required of their job on a scale of 1 to 15 where one is no exertion at all and fifteen is maximal exertion. The higher the score the greater the level of physiological exertion present within the activity. A value of **12** is **very hard**, indicating most tasks are considered physically demanding. The physical effort score of hard combined with the lasting pain and discomfort indicates that the tasks are beyond the aircrews ability to heal or recover in their time away from the work site.

Health Care Provider Score
According to the health care provider score **eight (out of fifteen)** or **53%** of the aircrew reported having been to a health care provider in the last 12 months for pain or discomfort that they think is related to their job.

Recovery Time Score
73% of the respondents reported experiencing work-related pain or discomfort that does not improve when away from work overnight or over the weekend. A score above 30% is of high importance.

Activity Interruption Score
93% of the respondents indicated that in the past 12 months, work-related pain or discomfort has caused difficulty in carrying out normal activities (e.g. job, hobby, leisure, etc.). A score above 50% is of high importance.

Previous Diagnosis Score
The survey asks if a health care provider diagnosed any of the following conditions, which might be related to the work environment:

- Tendonitis/Tenosynovitis, Ganglion Cyst, Trigger Finger, Epicondylitis, Bursitis, Carpal Tunnel Syndrome, Thoracic Outlet Syndrome, Back Strain, Knee or Ankle Strain, Overuse Syndrome.

40% of the respondents indicated affirmatively. A score above 30% is of high importance.

Contributing Factors
Respondents were asked if they had ever had one or more of the following conditions:

- Wrist Fracture, Hypertension, Kidney Disorders, Thyroid Disorders, Diabetes, Gout, Rheumatoid Arthritis.

These health conditions are contributing factors and may increase one's risk of developing a musculoskeletal disorder. **26%** of the respondents indicated affirmatively.

Process Improvement Opportunities
This section of the survey allows employees to write in responses to questions. All statements are included exactly as written by the employees with the exception of spelling errors and expletives.

- *Which tasks are the most awkward or require you to work in the most uncomfortable position?*
    - Moving and installing seats. Removing seats.
    - Moving & Lifting seats, cargo, and cage components.
    - Unloading cargo at a fast pace on the boat over the seats because I stay in one spot and toss heavy loads while bending over and twisting my lower back.
    - Seats in aircraft/re-positioning them in and or out of the aircraft.

- Loading and unloading cargo in our airplane. Installing and removing the seats from the aircraft.
- Moving around or loading seats and heavy cargo. Being bent over at the waist for extended periods of time.
- Any work that takes place inside the aircraft. The bulky seats and low ceiling make it difficult and dangerous for any person over 5ft. 5in. tall.
- Loading/unloading aircraft.
- Loading/unloading cargo in the C-2A grayhound.
- Hand loading luggage and heavy cargo inside the aircraft that is not tall enough to stand up straight.
- Loading/unloading cargo/bags on the C-2.
- Removing/installing seats. Loading cargo into an aircraft that I cannot stand up straight in.
- Loading and unloading cargos.

- *Which tasks take the most effort?*
  - Lifting objects and hearing noise constantly.
  - Removing/installing 176 lb. seats.
  - Loading/unloading heavy/large cargo (300+ lbs.)
  - Lifting large crates onto cargo ramp, then pushing them across the nonskid floor.
  - Loading/unloading cargo over/around seats, in-out of cargo cage.
  - Loading/unloading aircraft.
  - The removal and installation of the seats. Cargo comes second, but if it weren't for the seats, the cargo wouldn't be so bad.
  - Loading & unloading. Putting seats in the deck.
  - Loading and unloading cargo.
  - Repositioning seats in or out of the aircraft.
  - Loading and unloading cargo to and from the carrier. Twisting and bending while holding heavy loads.
  - Loading/offloading cargo.
  - Loading/unloading the aircraft.
  - Installing and removing seats, moving them.

- *Are there any tools or pieces of equipment that are notoriously hard to work with?*
  - Seats (859j11000-603).
  - Aircraft seats 859J11000-603.
  - Aircraft seats Part # 859J11000-603.
  - The aircraft seats. They are old and outdated. They are heavy and really hard and awkward to move and place in the deck.
  - Seats and aircraft cage.
  - Aircraft seats.
  - Seats (Grumman).
  - Again, the seats. They are outdated, clumsy, bulky, and falling apart.
  - Aircraft seats.
  - The C-2A Grayhound.

- Passenger seats in the C-2.
- Seats.
- Not applicable on everyday job.

- *If you could make any suggestions that would help you do your job more easily or faster or better, what would you suggest?*
  - Better seats.
  - New aircraft seat design. New aircraft.
  - New aircraft.
  - Replace the aircraft seats with newer seats. Possibly make seats that fold into the side of the aircraft with softer seat pans to sit on. Possibly a roller system in the deck for heavier loads.
  - Design new seats and cages in the aircraft.
  - Re-designing the aircraft seats, making them lighter and easier to use.
  - Design seats that will easily fold into the wall out of newer <u>lighter</u> material.
  - A newer, lighter seat design that could replace the current ones.
  - Lighter aircraft seats. Roller system for cargo loading/unloading.
  - Lighten and de-bulk passenger seat assy's.
  - Create a better mounting system for our life rafts and arch the upper cage members to make the inside of the aircraft taller.
  - Seats that are easier to get out of the way for heavy cargo.
  - Lighter, more comfortable seats that do not have to be removed from the aircraft. Also, a roller system to move cargo in and out to greatly improve lower back and neck issues.
  - Use conveyors to handle heavy objects, instead of lifting.

<u>Recommendations</u>

The EPRA score of 9 indicates a high level of exposure to workplace risk factors and severe, lasting discomfort. The aircrew details the difficultly found in the tasks which take place inside of the C2, specifically loading/unloading the seats and handling the heavy cargo.

Recommendations to the command to reduce the probability of injury are included in the risk assessment report and detailed well by the aircrew in the process review section. Any control, engineering or administrative, to reduce the stressors found when loading and unloading the seats and cargo may reduce the probability of injury.

* * * SAMPLE * * *

July 11, 2011

Bi-Monthly Status Report
NAVFAC Mishap Prevention / Hazard Abatement Program

SIGNIFICANT ITEMS:

- Amended Cost Proposals and Technical Approaches submitted to KO on 7/8/11 for TI 0017 (HA #790AS), TI 0023 (HA #715AS.EM), and TI 0025 (HA #740AS.EM).

HAZARD ABATEMENT PROJECTS:

*Phase I Hazard Abatement Projects (41) (*Issue date*)*:

1. TI 0001 (HA #798AS) - MP/HA Program, Administrative and Financial Management (4/8/11);
2. TI 0002 (HA #715AS) - Electrical Safety Project Management (4/8/11);
3. TI 0003 (HA #740AS) - Ergonomic Safety Project Mgmt (4/8/11);
4. TI 0004 (HA #833AS) - Fall Abatement Project Management (4/8/11);.
5. TI 0006 (HA #726AP) - Electrical Safety, NAS Atsugi (1/27/11);
6. TI 0012 (HA #835AS) - Electrical Safety, Pt Mugu (1/27/11);
7. TI 0013 (HA #834AS) - Electrical Safety, Pt Mugu (1/27/11);
8. TI 0014 (HA #278CT) - Electrical Safety, NAS Mayport (1/27/11);
9. TI 0015 (HA #587CL) - Electrical Safety, NAVSTA Norfolk (1/27/11);
10. TI 0016 (HA #846AS) - Electrical Safety, Pt Mugu (1/27/11);
11. TI 0017 (HA #790AS) - Electrical Safety, MALS Amended (3/21/11);
12. TI 0018 (HA #806AS) - Fall Abatement, NAS Whidbey Is (1/26/11);
13. TI 0019 (HA #546CL) - Fall Abatement, NAS Wash, D.C. (1/26/11);
14. TI 0020 (HA #569CL) - Fall Abatement, NAS Corpus Christi (1/27/11);
15. TI 0021 (HA #884AS) - Ergo Awareness Conferences (2/23/11);
16. TI 0022 (HA #800BS) - PDC Training Support (2/23/11);
17. TI 0023 (HA #715AS.EM) - Emergent Electrical Projects (2/24/11);
18. TI 0024 (HA #883AS.EM) - Emergent Fall Projects (2/24/11);
19. TI 0025 (HA #740AS.EM) - Emergent Ergonomic Projects (2/24/11);
20. TI 0026 (HA #596CL) - Electrical Safety, NAS JRB NOLA (3/30/11);
21. TI 0027 (HA #542CL) - Electrical Safety Norfolk ATCT LP (4/8/11);
22. TI 0029 (HA #562CL) - Ergonomic Safety, NAVSTA Norfolk (3/30/11);
23. TI 0030 (HA #548CL) - Ergonomic Safety, USNA (3/30/11);
24. TI 0031 (HA #805AS) - Ergonomic Safety, FRCNW (4/1/11);
25. TI 0032 (HA #857AS) - Ergonomic Safety, SD Wire Rope (4/8/11);
26. TI 0033 (HA #582CL) - Ergonomic Safety, NAS Key West (4/8/11);
27. TI 0035 (HA #868AS) - Fall Abatement, NBVC Pt Mugu (3/30/11);
28. TI 0034 (HA #575CL) - Ergonomic Safety, New London (4/20/11);
29. TI 0035 (HA #868AS) - Fall Abatement, NBVC Pt Mugu (3/30/11)
30. TI 0036 (HA #523CL) - Fall Abatement, NAVSTA Norfolk (3/30/11);

31. TI 0037 (HA #851AS) - Fall Abatement, NTCS Cutler (3/30/11);
32. TI 0038 (HA #809AS) - Ergonomic Safety, NAVSTA SD, (4/20/11);
33. TI 0039 (HA #515CL) - Ergonomic Safety, NAVSTA Norfolk (4/20/11);
34. TI 0040 (HA #862AS) - Ergonomic Safety, NAS Bangor (3/30/11);
35. TI 0041 (HA #579CL) - Ergonomic Safety, NAS Jacksonville (4/8/11);
36. TI 0042 (HA #590CL) - Ergonomic Safety, NSB Kings Bay (4/8/11);
37. TI 0043 (HA #858AS) - Ergonomic Safety, SWRMC (4/20/11);
38. TI 0044 (HA #576CL) - Ergonomic Safety, New London (4/20/11);
39. TI 0045 (HA $866AS) - Ergonomic Safety, NMC SD (4/20/11);
40. TI 0046 (HA #583CL) - Ergonomic Safety, NAS Key West (4/8/11);
41. TI 0047 (HA #873AS) - Fall Abatement Global (3/30/11).

ACTIVE PHASE I PROJECTS:

TI 0001 (HA #798AS) **– PROGRAM, ADMINISTRATIVE AND FINANCIAL MANAGEMENT**

- Continue to provide program, administrative and financial support to MP/HA Program manager including discussions with KO to clarify technical and financial issues.

TI 0002 (HA #715AS) - **ELECTRICAL SAFETY PROJECT MANAGEMENT**

- Continue to provide project management support to for all active electrical safety projects.

TI 0003 (HA #740AS) **– ERGONOMIC SAFETY PROJECT MANAGEMENT**

- Coordinating with NAVFAC (SW and HQ) to determine final resolution requirements, funding and ability of sites to implement solutions if funding/oversight provided.

TI 0004 (HA #833AS) **– FALL ABATEMENT SAFETY PROJECT MANAGEMENT**

- Continue support for all issued Phase I Fall Abatement Projects.

TI 0006 (HA #726AP) **– ELECTRICAL SAFETY, NAS ATSUGI, JAPAN**

- No activity during this reporting period. No further Phase I activity anticipated until US/JDF squadron assignments finalized.

TI 0012 (HA #835AS), TI 0013 (HA #834AS) and TI 0016 (HA #846AS) **ELECTRICAL SAFETY, NBVC PT MUGU**

- Concurrent Trip Report submitted to/accepted by NAVFAC SW.
- Individual Site Analyses and SOWs in process.

TI 0014 (HA #278CT) **– ELECTRICAL SAFETY, NAS MAYPORT**

- SOW updated to reflect site efforts to mitigate hangar electrical safety issues;
- Site Analysis/SOW submitted to/accepted by NAVFAC SW;
- No further Phase I activity anticipated.

* * * SAMPLE * * *

TI 0015 (HA #587CL) **– ELECTRICAL SAFETY, NAVSTA NORFOLK**

- Concurrent site visit with TI 0027 (HA #542CL) completed;
- Site Analysis/SOWs in process detailing hazards present in and respective code compliant resolutions for individual hangars.

TI 0017 (HA #790AS) **– ELECTRICAL SAFETY, MALS**

- Amended Technical Approach and Cost Proposal submitted to KO 7/8/11.

TI 0018 (HA #806AS) **– FALL ABATEMENT, NAS WHIDBEY ISLAND, WA**

- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0019 (HA #546CL) **– FALL ABATEMENT, NAF WASHINGTON, DC**

- Site Analysis in final internal review; first draft to be submitted to customer week of 11 July;
- No travel required.

TI 0020 (HA #569CL) **– FALL ABATEMENT, NAS CORPUS CHRISTI, TX**

- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0021 (HA #884AS) **- ERGONOMIC AWARENESS TRAINING CONFERENCES**

- Edited training modules to include updated pictures;
- Revised and finalize the Navy Program Course Book for additional printing;
- Distributed requested follow-up information from the course.

TI 0022 (HA #800BS) **- PROFESSIONAL DEVELOPMENT CONFERENCE TRAINING SUPPORT**

- No activity during this reporting period.

TI 0023 (HA #715AS.EM) **- EMERGENT ELECTRICAL PROJECTS**

- Site visits coordinated/scheduled with site POCs: NAS Fallon (25 - 29 July); NAS Whidbey Island (8 - 12 August); and NAS Patuxent River (10 - 16 July) to conduct validation of electrical hazards reported in 2004 surveys and not resolved to date.
- Amended Technical Approach and Cost Proposal submitted to KO 7/8/11.

TI 0024 (HA #883AS.EM) **- EMERGENT FALL ABATEMENT PROJECTS**

- Concurrent site visit to NAVSTA Norfolk conducted 9 - 11 May for two emergent fall abatement projects identified by site personnel;
- As requested by site POC, during visit surveyed/validated two (2) emergent fall hazards - double deck piers and Gable-end Mounted Antennas;
- Trip Report in process.

TI 0025 (HA #740AS.EM) **- EMERGENT ERGONOMIC PROJECTS**

- Reviewed potential emergent projects for 2012 with NAVFAC SME.

* * * SAMPLE * * *

TI 0026 (HA #596CL) **– ELECTRICAL SAFETY, NAS JRB NEW ORLEANS**

- Site visit for week of 22 August 2011 coordinated with POCs.

TI 0027 (HA #542CL) **– ELECTRICAL SAFETY, NAVSTA NORFOLK**

- Conducted concurrent site visit with TI 0015 (HA # 587CL);
- Trip Report submitted to/accepted by NAVFAC SW;
- SOW/Site Analysis to be combined with other lightning protection issues at site; coordinating with POCs to determine status of ATC Tower LP.

TI 0029 (HA #562CL) **– ERGONOMIC SAFETY, NAVSTA NORFOLK**

- Trip Report submitted to/accepted by NAVFAC SW;
- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0030 (HA #548CL) **– ERGONOMIC SAFETY, USNA LAUNDRY**

- TDL issued 30 March 2011;
- Site Analysis submitted to/accepted by NAVFAC SW;
- Site can implement recommended resolution when funding provided.

TI 0031 (HA #805AS) **– ERGONOMIC SAFETY, FRC NW**

- TDL issued 01 April 2011
- Concurrent site visit with TI 0040 (HA #862AS) completed week of 23 May;
- Assist POC with the submission of a MPHA project;
- Update FRC NW on the status of the eHRU project;
- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0032 (HA #857AS) **– ERGONOMIC SAFETY, NAVSTA SAN DIEGO**

- TDL issued 07 April 2011;
- Trip Report submitted to/accepted by NAVFAC SW;
- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0033 (HA #582CL) **– ERGONOMIC SAFETY, NAS KEY WEST**

- TDL issued 07 April 2011;
- Site Analysis submitted to/accepted by NAVFAC SW recommending firehouse emergency rescue resolutions similar to those procured under previous contract (COTS gurneys and stair walkers) for NAS Lemoore/NAS Fallon;
- Site reports no capability (lack of staff) to implement recommended resolution.

TI 0034 (HA #575CL) **– ERGONOMIC SAFETY, NSSF NEW LONDON**

- TDL issued 20 April 2011;
- On-site data collection (week of June 27) for countermeasure handling and repair processes which included demonstrations and detailed solutions discussions with countermeasure personnel.
- Trip Report and Site Analysis in process

* * * SAMPLE * * *

TI 0035 (HA #868AS) **– FALL ABATEMENT, NBVC PT MUGU (MUSE)**

- TDL issued 30 March 2011;
- Site visit conducted week of 11 July 2011;
- Trip Report in process.

TI 0036 (HA #523CL) **– FALL ABATEMENT, NAVSTA NORFOLK**

- Site visit conducted May 9 - 11;
- Trip Report in process.

TI 0037 (HA #851AS) **– FALL ABATEMENT, NCTS CUTLER**

- DRAFT Site Analysis submitted to end user for review.

TI 0038 (HA #809AS) **– ERGONOMIC SAFETY, NAVSTA SAN DIEGO**

- TDL issued 20 April 2011;
- Site visit completed;
- Trip Report and Site Analysis in process.

TI 0039 (HA #515CL) **– ERGONOMIC SAFETY, NAVSTA NORFOLK**

- TDL issued 20 April 2011;
- Site Analysis submitted to/accepted by NAVFAC SW.

TI 0040 (HA #862AS) **– ERGONOMIC SAFETY, NAS BANGOR**

- TDL issued 30 March 2011;
- Concurrent site visit with TI 0031 (HA #805AS) completed week of 23 May;
- Trip Report and Site Analysis submitted to NAVFAC.

TI 0041 (HA #579CL) **– ERGONOMIC SAFETY, NAS JACKSONVILLE**

- TDL issued 07 April 2011;
- Site visit scheduled for week of 18 July 2011.

TI 0042 (HA #590CL) **– ERGONOMIC SAFETY, NSB KINGS BAY**

- TDL issued 07 April 2011;
- Site Analysis submitted to/accepted by NAVFAC.

TI 0043 (HA #858AS) **– ERGONOMIC SAFETY, SWRMC**

- TDL issued 20 April 2011;
- Requested vendor quotes and briefed POC on possible execution plan;
- Trip Report submitted/accepted;
- Site Analysis submitted/accepted.

TI 0044 (HA #576CL) **– ERGONOMIC SAFETY, NSSF NEW LONDON**

- TDL issued 20 April 2011;
- On-site data collection (week of 27 June) for mast repair and maintenance process which included detailed solution discussions with submarine SMEs;
- Trip Report and Site Analysis in process.

* * * SAMPLE * * *

TI 0045 (HA #866AS) **– ERGONOMIC SAFETY, NMC SD HISTOLOGY CLINIC**

- TDL issued 20 April 2011;
- Ensure vendor equipment met clean room specifications;
- Verified work cell configuration and forwarded specifications to POC at NMC SD;
- Site Analysis submitted/accepted by NAVFAC SW.

TI 0046 (HA #583CL) **– ERGONOMIC SAFETY, NAS KEY WEST**

- TDL issued 20 April 2011;
- Site Analysis submitted/accepted by NAVFAC SW.

TI 0047 (HA #873AS) **– GLOBAL FALL ABATEMENT**

- TDL issued 30 March 2011.

NAVFAC PAST PERFORMANCE QUESTIONNAIRE (Form PPQ-0)

CONTRACT INFORMATION (Contractor to complete Blocks 1-4)

1. Contractor Information:

Firm Name:
Address:
Phone Number:
Point of Contact: Contact Phone Number:

2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other (Explain)

Percent of project work performed:
If subcontractor, who was prime (Name/Phone #):

3. Contract Information

Contract Number:
Delivery/Task Order Number (if applicable):
Title:
Location:

Award Date (mm/dd/yy):
Completion Date (mm/dd/yy):

Award Amount:
Final Price:

4. Project Description:

CLIENT INFORMATION (Client to complete Blocks 5-8)

5. Client Information

Name:
Title:
Phone Number:
Email Address:

6. Describe the client's role in the project:

7. Date Questionnaire was completed:

8. Client's Signature:

NOTE: THE CONTRACTOR MAY COLLECT AND RETAIN COMPLETED QUESTIONNAIRES FROM CLIENTS FOR SUBMITTAL TO THE GOVERNMENT. AFTER COMPLETION OF THIS FORM, THIS FORM MAY BE DUPLICATED BY THE CONTRACTOR. THE GOVERNMENT RESERVES THE RIGHT TO VERIFY ANY AND ALL INFORMATION.

TO BE COMPLETED BY CLIENT

ADJECTIVE RATINGS AND DEFINITIONS TO BE USED TO BEST REFLECT YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE

E (EXCELLENT) – Performance meets contractual requirements and exceeds the Client's/Government's expectations. The contractual performance of the element being assessed was accomplished with few minor problems for which corrective actions taken by the contractor were highly effective.

V (VERY GOOD) – Performance meets contractual requirements and exceeds some of the Client's/Government's expectations. The contractual performance of the element being assessed was accomplished with some minor problems for which corrective actions taken by the contractor were effective.

S (SATISFACTORY) – Performance meets contractual requirements. The contractual performance of the element contains some minor problems for which corrective action taken by the contractor appear or were satisfactory.

M (MARGINAL) –Performance does not meet some contractual requirements. The contractual performance of the element being assessed reflects a serious problem for which the contractor has not yet identified corrective actions. The contractor's proposed actions appear only marginally effective or were not fully implemented.

U (UNSATISFACTORY) – Performance does not meet most contractual requirements and/or recovery is not likely in a timely manner. The contractual performance of the element contains serious problem(s) for which the contractor's corrective actions appear or were ineffective.

N (NOT APPLICABLE) – No past performance record is identifiable or the element is not applicable to this project.

PLEASE CIRCLE THE ADJECTIVE RATING WHICH BEST REFLECTS YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE.

1. Ability to meet quality standards specified for technical performance**.**	E V S M U N
2. Compliance with contractual terms and conditions.	E V S M U N
3. Compliance with contract delivery/completion schedules including any significant intermediate milestones.	E V S M U N
4. Quality/integrity of technical data/report preparation efforts.	E V S M U N
5. Adequacy/effectiveness of quality control program and adherence to contract quality assurance requirements.	E V S M U N
6. Effectiveness of overall contract management (including ability to effectively lead, manage and control the program).	E V S M U N
7. Effectiveness of on-site management, including management of subcontractors?	E V S M U N
8. Contractor was reasonable and cooperative in dealing with your staff (including the ability to successfully resolve disagreements/disputes; responsiveness to administrative reports).	E V S M U N
9. Timeliness/effectiveness of contract problem resolution without extensive customer guidance.	E V S M U N
10. Ability to successfully respond to emergency and/or surge situations.	E V S M U N
11. Effectiveness of material management.	E V S M U N
12. Effectiveness of acquisition management.	E V S M U N

13. Contractor proposed innovative alternative methods/processes that reduced cost, improved maintainability or other factors that benefited the client.	E V S M U N
14. Contractor's management of their safety program.	E V S M U N
15. Responsiveness regarding safety issues.	E V S M U N
16. If this was a cost type contract, compliance with established budgets and avoidance of significant and/or unexplained variances (under-runs or over-runs).	E V S M U N
17. If this is/was a Government cost type contract, the Contractor's timeliness in submitting monthly invoices with appropriate back-up documentation and monthly status reports/budget variance reports.	E V S M U N
18. If this is/was a Government cost type contract, the Contractor's accuracy regarding monthly invoices with appropriate back-up documentation and monthly status reports/budget variance reports.	E V S M U N
19. Ability to hire/apply a qualified workforce to this effort.	E V S M U N
20. Ability to retain a qualified workforce on this effort	E V S M U N
21. If this is/was a Government contract, has/was this contract been partially or completely terminated for default or convenience or are there any pending terminations? Indicate if show cause or cure notices were issued, or any default action in comment section below.	Yes No
22. Have there been any indications that the contractor has had any financial problem? If yes, please explain below.	Yes No
23. In summary, provide an overall rating for the work performed by this contractor.	E V S M U N

Any additional comments related to the contractor's performance:

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 1** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 1 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 2** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 2 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 3** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 3 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 4** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 4 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 5** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 5 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 6** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 6 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 7** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 7 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION J, ATTACHMENT JL-2
FACTOR 2 – SPECIALIZED EXPERIENCE PROJECT DATA SHEET

Include a clear narrative explanation as to how **Project 8** provided for your Past Performance (Attachment JL-1) relates to and demonstrates specialized experience in each of the functional requirements as described in the Performance Work Statement, as identified in below chart:

Annex & Spec Item	Project 8 - Specialized Experience
0404000, Spec Item 3.1 Specialized Experience in Industrial Ergonomics Training	
0404000, Spec Item 4.1 Specialized Experience in Industrial Ergonomic Assessments	
0404000, Spec Item 4.1 Specialized Experience in Electrical Assessments	
0404000, Spec Item 4.1 Specialized Experience in Fall Protection Assessments	
0404000, Spec Item 4.2 Specialized Experience in Mitigation Implementation	

Expand as needed
Maximum 2 pages per project

SECTION L, ATTACHMENT JL-3
REQUEST FOR INFORMATION (RFI)

CONTRACT: N62473-11-R-4604, MPHA PROGRAM FOR NAVFAC WORLDWIDE

The Government does not intend to respond to inquiries submitted less than 10 days before the proposal receipt date shown in the solicitation. Please submit questions to Patty Olivas, e-mail: patty.olivas@navy.mil or by fax at (619) 532-1155.

COMPANY / FIRM NAME:			
POC:			
ADDRESS:			
TELEPHONE NUMBER:		FAX NUMBER:	
EMAIL ADDRESS:			
QUESTION 1: QUESTION - -			
SECTION OF RFP - -			
PARAGRAPH - -			
PAGE NUMBER - -			
ADDITIONAL COMMENTS - -			
QUESTION 2: QUESTION - -			
SECTION OF RFP - -			
PARAGRAPH - -			
PAGE NUMBER - -			
ADDITIONAL COMMENTS - -			
QUESTION 3: QUESTION - -			
SECTION OF RFP - -			
PARAGRAPH - -			
PAGE NUMBER - -			
ADDITIONAL COMMENTS - -			
QUESTION 4: QUESTION - -			
SECTION OF RFP - -			
PARAGRAPH - -			
PAGE NUMBER - -			
ADDITIONAL COMMENTS - -			