



NATIONAL SHIPBUILDING RESEARCH PROGRAM
ADVANCED SHIPBUILDING ENTERPRISE

Reducing Naval Ship Construction & Repair Costs

PORTFOLIO OF R&D PROJECTS

NSRP RISK MANAGEMENT PANEL PROJECT FOR 2012

The 20th Annual Safety Professional Development Conference (PDC)
Hampton Convention Center - Hampton VA
March 2012

Noise Control Methods for Shipbuilding

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Co-funded by NAVSEA & the U.S. Shipbuilding and Repair Industry with additional support from the Navy Program Executive Offices for Aircraft Carriers, Ships and Submarines.

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Goals:

- Measure noise levels generated by common ship yard processes
- Define and describe the most effective control methods in place

Who's Involved?

Project Prime/Lead: Atrium Environmental, Health and Safety Services

Participant Organization: Navy and Marine Corps Public Health Center

Shipyard Participants:

- BAE Southeast Shipyards
- Bath Iron Works
- Vigor Shipyards
- Norfolk Naval Shipyard

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What's the Plan?

- a. Define Noise Control Priorities
- b. Review Historical Information and Test Data
- c. Collect New Comparative Data in 4 Shipyards
- d. Deliver Report Summarizing Exposures, Controls and Recommendations

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Why NOISE? Why NOW?



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NIHL is still a common Occupational Health Hazard!

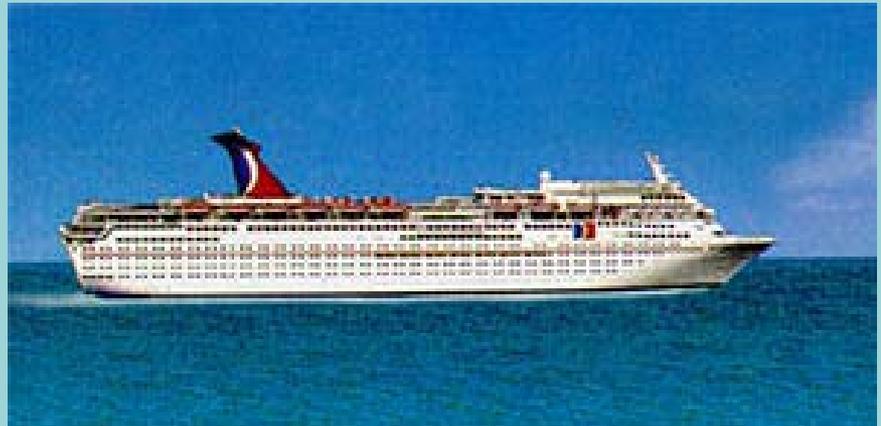
- ❖ NIOSH (2005) Estimates 8 to 9 million U.S. workers exposed to levels capable of producing hearing loss
- ❖ How can you separate non-occupational noise exposure?
- ❖ Other contributing causes of hearing loss (age, illness, medicines, chemicals?)

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It was defined as a priority by the Safety and Health Advisory Committee (SHAC) of the National Shipbuilding Research Program (NSRP)

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OSHA is reviewing Noise Standards
and Holding Stakeholder Meetings



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Navy and DOD have converted to a 3db
Exchange Rate with an 85 dBA TWA
criterion Level

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Control of the COST to Navy and Private employers

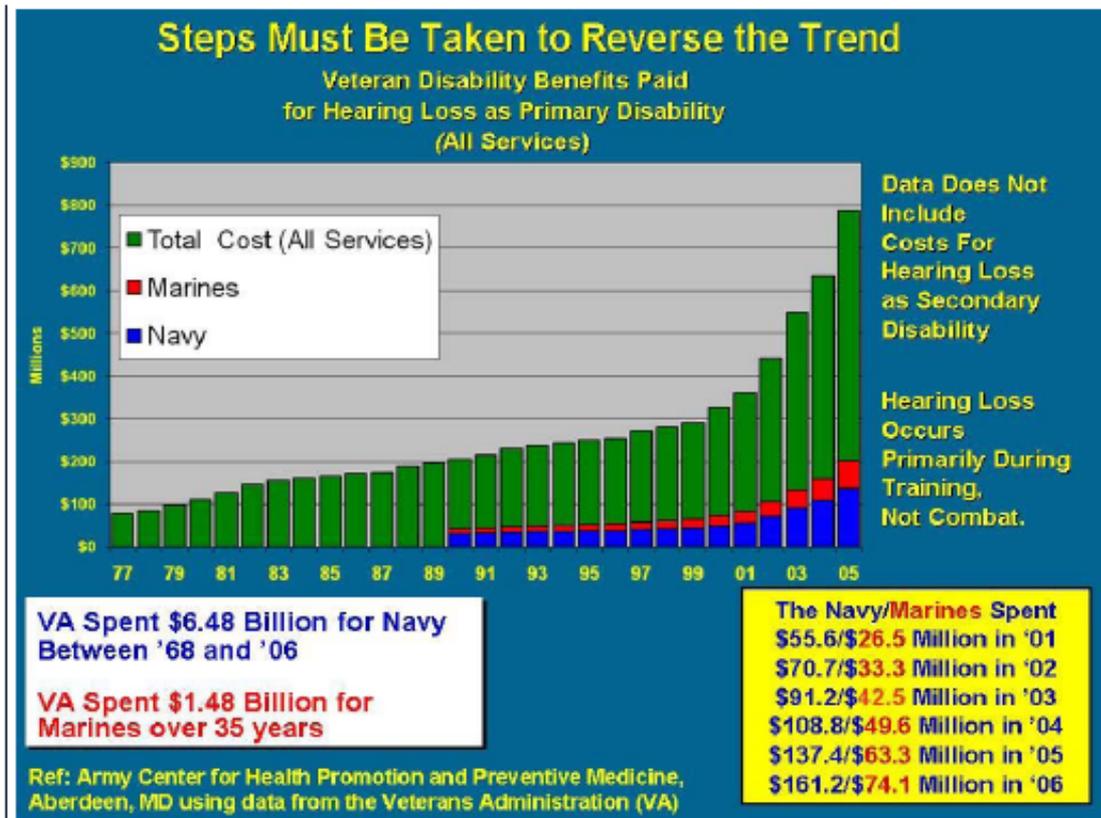


Figure 1. VA Disability Payments Chart

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Major emphasis area in Defense Acquisition Programs for operational advantages;
THINK QUIET ... Red October

In addition to health risk, the immediate threat to mission performance and survivability needs to be considered as in system safety evaluations. An Army evaluation, summarized in the 2001 Military Noise Conference [21] describes the increased risk associated with performance decrement created by noise effects on communication, Table (3)

Table 3 Hearing Loss Degrades Combat Performance - Word Intelligibility

	<i>Good Hearing</i>	<i>Poor Hearing</i>
<i>TIME TO IDENTIFY TARGET</i>	40 sec	90 sec
<i>INCORRECT COMMAND HEARD BY GUNNER</i>	1%	37%
<i>CORRECT TARGET IDENTIFICATION</i>	98%	68%
<i>ENEMY TARGETS KILLED</i>	94%	41%
<i>WRONG TARGET SHOT</i>	0%	8%
<i>TANK CREW KILLED BY ENEMY</i>	7%	28%

Source: Tank Gunner Performance and Hearing Impairment Garinther & Peters, Army RD&A Bulletin 1990, Jan-Feb 1-5)

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Excellent Reference: Kurt Yankaskas (NAVSEA 03C Branch Head, Acquisition), “System Safety Implications and Application of Noise Evaluation and Control in Military Ships,” Presented at 23rd International System Safety Conference, 2005

PROCEEDINGS OF THE 23rd INTERNATIONAL SYSTEM SAFETY CONFERENCE - 2005

System Safety Implications and Applications of Noise Evaluation and Control
in Military Ships

Kurt Yankaskas

Key Words: Noise, Hearing Loss, Risk, Occupational Health, Military Systems, Defense Acquisition

Abstract: Noise associated hearing loss is considered the most common occupational health exposure in general industry and poses particular risk in defense systems and equipment. Impacts may include fiscal considerations (workers compensation and veteran's benefits), decreased communications in combat situations and social environments and increased vulnerability to external detection. Measures to manage hearing loss through aggressive hearing conservation program focusing upon training, protective equipment use and medical monitoring have met with varied and often limited success. System safety assessments have not consistently considered noise and vibration generation and the related human health and performance effects. However, cost-effective technologies for noise controls offer the potential to reduce the human, military and social impacts of hearing loss.

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TASK 1 - Literature Search and Review Historical Data

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Navy NOED Noise Data

- 1986 – 2007 (21 Years)
- 3277 Dosimetry Results, Average Duration: 394 minutes
- Six facilities represented

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ID_NO	SAMPLE DATE	IRC	COMMAND	SHOP CODE	LOCATION	WORKSITE	OPCODE	OPERATION DESCRIPTION	TASK	NOISE SOURCE A	NOISE SOURCE B	NOISE SOURCE C	DURATION	SHIFT/UTLTH	THW (@ dB Exchange Rate)	UNITS
4742	27-Mar-85	NOI158	INOSRPD NORCOLE VA	9702	V-18	LP-29	IND-014-02	Non-Destructive Test, Magnetic Particle Test	MAGNETIC PART. INSPCT.	SPRAY BOOTH			358	8	79.3	80A
4873	17-Sep-86	NOI158	INOSRPD NORCOLE VA	9702	V-18	V-28	IND-014-02	Non-Destructive Test, Magnetic Particle Test	MAGNETIC PART. INSPCT.	INSP BOOTH	SPRAY BOOTH	VACUUMBLAST	319	8	76.9	80A
4981	19-Oct-86	NOI158	INOSRPD NORCOLE VA	9701-011	W-PUMPS	VANOUS NBY	IND-015-99	HM/VM Handling/Cleaning, HIC	TESTING SLUDGE PUMPS	PUMPS			411	8	82	80A
4981	19-Oct-86	NOI158	INOSRPD NORCOLE VA	9701-011	W-PUMPS	VANOUS NBY	IND-015-99	HM/VM Handling/Cleaning, HIC	TESTING SLUDGE PUMPS	PUMPS			428	8	82	80A
5055	06-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	W-VANOUS	CLARIFI	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			465	8	77	80A
5056	06-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			465	8	82	80A
5059	06-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-SM-600	SM-603	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			465	8	81	80A
5064	06-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			468	8	85	80A
5066	07-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			469	8	89	80A
5067	07-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			470	8	84	80A
5068	07-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			466	8	80	80A
5069	07-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			472	8	87	80A
5079	11-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			467	8	88	80A
5082	11-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			421	8	84	80A
5084	11-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			465	8	85	80A
5086	11-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CM-40	CON-43	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			461	8	84	80A
5091	18-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CV-66	USS AMERICA	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			476	8	82	80A
5093	18-May-87	NOI158	INOSRPD NORCOLE VA	200-T1	S-CV-66	USS AMERICA	PRO-001-98	Worksite/Equipment Inspections	NOISE/TE INSPECTIONS	BACKGROUND			495	8	82	80A
5096	29-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-0280	DRYDOCK 08	SER-013-01	Supply/Materials Handling, NEC	OPERATE FORKLIFT	FORKLIFT			419	8	81	80A
5094	29-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-0280	DRYDOCK 08	SER-013-02	Supply/Materials Handling, Material Handling, Equipment/Tools/Operations	OPERATE FORKLIFT	FORKLIFT			411	8	89	80A
5097	21-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	S-CV-66	HAMMERHEAD	SER-013-02	Supply/Materials Handling, Material Handling, Equipment/Tools/Operations	OPERATE FORKLIFT	FORKLIFT			388	8	91	80A
5069	26-May-87	NOI158	INOSRPD NORCOLE VA	64-86	S-CV-67	USS KENNEDY	IND-018-05	Installation, Main Mast Fibers, Installation	INSTALLING FIBERGLASS	BACKGROUND			317	8	88	80A
5062	26-May-87	NOI158	INOSRPD NORCOLE VA	64-82	8-169	BOAT BAY	IND-015-07	Packing/Unpacking Drilling	DRILL/REMOVE BUMPER	BACKGROUND	DRILL		387	8	82	80A
5063	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	8-172	FOUNDER	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE BRIDGE CRANE	8-CR117402			419	8	75	80A
5062	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-DCR138	DC R138	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE DOCK CRANE	DC R138			411	8	89	80A
5061	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-HR013	HAMMERHEAD	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE HAMMERHEAD	CRANE			417	8	79	80A
5064	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-G025	GC R15	SER-013-04	Supply/Materials Handling, Crane Operations	GANTRY CRANE OPS	CRANE			496	8	81	80A
5068	27-May-87	NOI158	INOSRPD NORCOLE VA	64-86	S-CV-66	USS AMERICA	IND-010-04	Internal/External, Abrasive Grinding	GRINDING ON BULLHEAD	GRINDER			411	8	86	80A
5062	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-DCR11	DC R11	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE DOCK CRANE	DC R11			342	8	81	80A
5063	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-DCR4	DC R4	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE DOCK CRANE	DC R4			428	8	90	80A
5068	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	S-CV-66	FUSHE DECK	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE MOBILE CRANE	MC PSH R23			457	8	86	80A
5065	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	W-DCR5	DC R5	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE DOCK CRANE	DC R5			480	8	86	80A
5067	27-May-87	NOI158	INOSRPD NORCOLE VA	709-F1	8-163	BLOCK 163	SER-013-04	Supply/Materials Handling, Crane Operations	OPERATE BRIDGE CRANE	8-CR117159			446	8	90	80A
5076	04-Jun-87	NOI158	INOSRPD NORCOLE VA	116-HZ/1	8-1565	VANOUS BLDG	PRO-001-98	Worksite/Equipment Inspections	PERFORMING AUDITS	BACKGROUND			485	8	80	80A
5078	04-Jun-87	NOI158	INOSRPD NORCOLE VA	126-HZ/12	8-1565	BLDG 1565	PRO-000-90	Professional/Technical and Management	OFFICE/PAPER WORK	BACKGROUND			471	8	66	80A
5106	21-Jul-87	NOI158	INOSRPD NORCOLE VA	64-82	8-169	BOAT BAY	IND-016-01	Fiber Analysis and Composites, Grind/Sand, Mechanical	SANDING ON BOAT	SANDER			466	8	79	80A
5126	05-Aug-87	NOI158	INOSRPD NORCOLE VA	129-HZ	S-SM-600	SPANDER/STAIN	PRO-001-98	Worksite/Equipment Inspections	ELECTRICAL INSPECTIONS	BACKGROUND			449	8	82	80A
5129	05-Aug-87	NOI158	INOSRPD NORCOLE VA	129-HZ	S-SM-600	SPANDER	IND-014-01	Non-Destructive Test, Liquid Penetrant Test	LPT	BACKGROUND			467	8	77	80A
5123	06-Aug-87	NOI158	INOSRPD NORCOLE VA	200-V0	8-2475	OFFICE B. 518	PRO-000-90	Professional/Technical and Management	SHOP CHECKS	BACKGROUND			512	8	81	80A
5122	06-Aug-87	NOI158	INOSRPD NORCOLE VA	200-V0	8-2475	OFFICE B. 518	PRO-000-90	Professional/Technical and Management	SHOP CHECKS	BACKGROUND			480	8	80	80A
5128	29-Oct-87	NOI158	INOSRPD NORCOLE VA	55-H7	8-5129	ACID ROOM	IND-000-07	Degrading, Dipping	CLEANING PIPE	POWER WASH	VENTILATION		401	8	81	80A

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Navy NOED Noise Data

- 750 different noise sources cited (inconsistent data elements)
- Pneumatic hand tools, Abrasive Blasting, Painting, Welding and Ventilation equipment are leading categories

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Navy NOED Noise Data

- Peak of TWA of 119 dBA, 4 dB Exchange Rate
- 25% (844 samples) above 85 dBA
- How many would be above 85 dBA with a 3 dB Exchange Rate?

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TASK 2 - FIELD WORK

- a. Visit 4 Shipyards; BAE Southeast, NNSY, BIW, Vigor
- b. Full Shift Dosimetry and SLM during selected shipyard processes
- c. Get badges

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Participating Shipyard Health and Safety Managers Define Priorities

- a. Selection of areas for testing
- b. Evaluation of new or innovative control measures
- c. Any success stories?

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What About Exchange Rates:

3 Measuring Parameters at One Time !!!

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Dosimeter 1

OSHA HC

Measuring Parameters:

<u>DOSIMETER</u>	<u>1</u>	
Setup Name:		OSHA HC
Criterion:		90 dB
Exchange Rate:		5 dB
Threshold:		80 dB
Upper Limit:		115 dB
Weighting:		SPL:A Pk:Z
Time Constant:		Slow
Alert Level 1:		85 dB
Alert Level 2:		0 dB

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Dosimeter 2

ACGIH / Navy

<u>DOSIMETER</u>	<u>2</u>	
Setup Name:		ACGIH
Criterion:		85 dB
Exchange Rate:		3 dB
Threshold:		80 dB
Upper Limit:		115 dB
Weighting:		SPL:A Pk:Z
Time Constant:		Slow
Alert Level 1:		85 dB
Alert Level 2:		0 dB

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Dosimeter 3

OSHA PEL - Insert parameters

<u>DOSIMETER</u>	<u>3</u>	
Setup Name:		OSHA PEL
Criterion:		90 dB
Exchange Rate:		5 dB
Threshold:		90 dB
Upper Limit:		115 dB
Weighting:		SPL:A Pk:Z
Time Constant:		Slow
Alert Level 1:		90 dB
Alert Level 2:		0 dB

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TASK 3 - Data Analysis and Reporting

- Test results will be sanitized to remove personal or site location data
- Summaries will be prepared to compare and contrast variation by:
 - Job, tool or process
 - Exchange Rate and Measuring Parameters
- Conclusions and Recommendations
 - What effective control measures were observed?
 - What high exposures remain?
 - What follow up action is recommended?

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Goal is to provide an industry-wide evaluation with high value across the U.S. Shipbuilding industry.

- Reduce need for redundant monitoring where representative data may suffice
- Identify and apply innovative approaches to reduce noise exposure
- Reduce claims and losses through application of best-available practices

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Where are we now?

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Task 2 - Field Work is Underway

One shipyard is completed

Three more are scheduled over the next 30 days

Final Report is scheduled for end of October 2012

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Questions??

Speak up, I can't hear you!!!!