

MINUTES OF THE MEETING
TECHNICAL COMMITTEE ON
RESPIRATORY PROTECTION EQUIPMENT
25-27 JANUARY 2011
ORLANDO, FL

Agenda Items 1-3; Call to Order, Introductions of Members and Guests, Committee Procedural Statement

Chairman Rossos called the Committee to order at 08.45 on 25 January 2011. Chairman Rossos welcomed Committee members and guests and asked them to introduce themselves. He gave instructions to the Task Groups for their meetings over the next two days. Staff Liaison David Trebisacci read the NFPA Committee Procedural Statement and asked attendees to sign in on the appropriate Member or Guest sign-in sheet. He reviewed the status of Committee documents, including the milestone timelines. He also reviewed the NFPA 1981 Informal Interpretation regarding the omission of the fifth year testing in the testing cycle required by NFPA 1981, 2007 Edition. Rather than a TIA or a Formal Interpretation, it was agreed that an Informal Interpretation from staff would be acceptable. The staff Informal Interpretation was issued on December 20, 2010. David also reviewed public access to the NFPA web site.

David informed the TC about the next NIOSH Public Meeting in Pittsburgh on March 29, 2011.

Members Present:

Dan Rossos, Chairman	Portland (OR) Fire & Rescue
Steven H. Weinstein, Secretary	Sperian Respiratory Protection, a Division of Honeywell Safety Products (rep. ISEA)
David Trebisacci, Staff Liaison	NFPA
Heinz Ahlers	NIOSH/NPPTL
Chris Anaya	California State Firefighters Association
David Bernzweig	Columbus (OH) Firefighters
Rodney V. Colbert	Fairfax County Fire & Rescue Department
Brian H. Cox	Clovis Fire Department
Deborah Crisher	Virginia Beach Fire Department
William Mundy	FDNY
Ken Warner	KDW Consulting, LLC
John Kuhn	MSA
David Hodson	Draeger Safety UK Ltd
Robert Sell	Draeger Safety
Jerry Phifer	Scott Health & Safety
Beverly Gullledge	Scott Health & Safety

Stephen T. Miles
Clint Kaller
Stephen Sanders
Ian Maxwell
Nick Luzie
David Haston
Craig Martin
Ira Harkness
Jason Allen
Ed Golla
Ruby Ochoa
Paul Bull

NIOSH FFFIPP
L.A. County Fire Department
Safety Equipment Institute
Interspiro
Sperian Respiratory Protection (rep. ISEA)
U.S. Forest Service
ISI
U.S. Navy
Intertek
TRI Air Testing
Trace Analytics LLC
Fairfax County F.D. (Retired)

The following guests were present:

Amy Mensch
Nelson Bryner
Judge Morgan III
John Dinning
Marvin Carroll
Angus Donaldson
Stuart Blenkiron
Henry Fonzi
Paul DeMond
Ken Pietrzycki
Luke Hollmann
Steve Mills
Marco Tekelenburg
Geoff Betsinger
Clint Mayhue
William Finegan

National Institute of Standards & Technology
National Institute of Standards & Technology
Scott Health & Safety
Scott Health & Safety
Scott Health & Safety
Draeger Safety
Draeger Safety
MSA
Ultra Electronics—USSI
Ultra Electronics—USSI
Ultra Electronics—USSI
Ultra Electronics—USSI
MSA
3M
ISI
Bensalem (PA) EMS

Agenda Item 4; Approval of the Meeting Minutes, San Diego, CA; October, 2010

Chairman Rossos asked the TC to review the Minutes of the San Diego meeting.

MOTION BY CLINT KALLER, SECOND BY IAN MAXWELL

To approve the Minutes of the 6-8 October 2010 meeting in San Diego, CA.

MOTION CARRIED

Agenda Item 5; Chairman's Remarks

Chairman Rossos spoke about the process the TC will be following with respect to NIOSH and the buddy breathing issue. He also reviewed the timeline for Committee work on NFPA 1981, NFPA 1852 and NFPA 1989.

Agenda Item 6; Flat Pack Update

Chairman Rossos asked Nelson Bryner to report on a meeting he attended with DHS regarding the flat pack SCBA. Nelson presented the results of the meeting and asked for TC input regarding any concerns the TC might have.

The following are the concerns of the TC:

1. Multiple high pressure connections—the concern is maintaining the integrity of the connection in fire use—perhaps a vibration test necessary
2. Durability of flexible area between arrays, both under pressure and unpressurized; perhaps a flex cycle test necessary
3. Off-gassing of the materials, externally (creating products of combustion) and internally (affecting air quality)
4. Air quality in cylinder at STP over storage time
5. Breathing air temperature in high heat environment
6. Ingress of materials through thermoplastic liner
7. Ability of thermoplastic liner to hold pressure over storage time
8. Thermal performance of thermoplastic liner
9. Thermal performance of resin in outer wrap
10. Elevated temperature during a rapid fill (RIC UAC fitting)
11. Failure mode of pressure vessel during thermal exposure, at the flex points, during filling, following abrasion and under direct projectile impact
12. Strength and integrity of the joints between stainless steel end caps and the plastic liner
13. Conformance of manifold to CGA V1 standard
14. Decon concerns regarding the protective cover and the pressure vessels

Agenda Item 7; Administrative Updates Re 1981 FI and 1984 TIA and the Division of 1981

David Trebisacci had discussed the 1981 FI earlier (see Agenda Items 1-3).

Chairman Rossos asked Dave Haston to speak about the NFPA 1984 TIA. Dave explained the reason for the TIA. The TIA has officially passed TC letter ballot. David Trebisacci said that it will go to the Standards Council for approval at the end of February. It should be published at that time.

Chairman Rossos discussed the division of NFPA 1981. Initially the TC proposed two documents—one for fire applications and one for non-fire applications. The Standards

Administration indicated they would prefer to see a division within one document. The TC discussed the relative merits of both approaches.

MOTION BY DAVID BERNZWEIG; SECOND BY BILL MUNDY

That the Chair establish a Task Group to develop design and performance requirements for a section within NFPA 1981 that addresses certification of a non-structural-fire SCBA.

MOTION CARRIED.

Agenda Item 8; Overview of New 1981 Format and TGs

This was a duplication of the last part of Agenda Item 7 and therefore has been deleted from the Agenda.

Agenda Item 9; Overview of NFPA 1989 and NFPA 1852

The proposals for NFPA 1989 and NFPA 1852 will be reviewed at the next TC meeting.

Agenda Item 10; Update of New High Flow PAPR Assignment

Chairman Rossos asked Heinz Ahlers to speak about NIOSH's Advance Notice of Proposed Rulemaking for PAPRs. Heinz said they anticipate the Notice of Proposed Rulemaking being published around Q3 of the current federal fiscal year, but it could slip to next year. David Trebisacci stated that the TC did not have to take any immediate action on the NFPA High Flow PAPR standard yet and could wait until NIOSH publishes their standard before determining whether the TC needs to develop additional requirements. Chairman Rossos advised the TC to wait, and the TC informally agreed.

Agenda Item 11; Task Group Reports

Task Group on Facepiece Lenses

TG Chairman Chris Anaya reported that the TG discussed pass/fail criteria for the radiant heat test.

The TG agreed on the following test protocol:

Starting with a cylinder filled with 1200 liters of free air volume, and with a breathing machine flow rate of 40 l/min, the SCBA facepiece shall be subjected to a natural gas-fired radiant heat panel array with a heat flux of 15 kw/m² for 5 minutes. At 5 minutes after the radiant heat test exposure has been started, the SCBA mounted on the test mannequin shall be raised 150 mm, +6 mm/-0 mm, and dropped freely to challenge the integrity of the lens after being heated. The pass/fail criterion shall be maintaining a positive pressure in the facepiece for a minimum of 15 minutes following the start of the test.

Any pressure spike caused by the impact of the drop test and measured within a duration of three cycles of the breathing machine and after the apparatus drop shall be disregarded.

The test laboratory shall record the time to failure, should a failure occur.

The TC discussed whether the test added at the Burlington meeting, which involved a 500° F conditioning of the SCBA followed by a Heat and Flame Test, should also be part of the standard, now that a radiant heat test has been developed. Chairman Rossos directed the TG to decide what tests should be included, to develop formal language for those tests, and to have them submitted to David Trebisacci no later than one month prior to the next TC meeting.

Task Group on Communications

TG Chairman Brian Cox reported on the results of the USSI Speech Transmission Index (STI) testing. USSI made a PowerPoint presentation to the TG earlier in the meeting. The test findings were that:

1. There was no correlation between the MRT scores and the STI scores.
2. With a bandwidth of a 15 dBA delta between the background noise and the mask SPL, the STI scores ranged from about .4 to .5 for unamplified facepieces at 1.5 m and about .25 to .35 for unamplified facepieces at 3 m; and about .6 to .85 for amplified facepieces at 1.5 m and about .35 to .6 amplified facepieces at 3 m. See the "Intelligibility Testing Update" PowerPoint attachment to these Minutes.

Chairman Cox said the TG will be working on the formal language for the standard. The target date is to have the language finalized within the TG by April 15.

MOTION BY BRIAN COX; SECOND BY BILL MUNDY

That the TC direct the TG on Communications to identify test and performance criteria for both unamplified and amplified communication systems.

MOTION CARRIED.

Chairman Rossos so directed the TG on Communications.

Task Group on "Buddy Breathers"

TG Chairman Clint Kaller reported on the buddy breather portion of the NIOSH Public Meeting held in December in Pittsburgh. Meeting details and public comments are available at the following URL: <http://www.cdc.gov/niosh/docket/archive/docket147.html>.

The TG voted not to require a universal connection for buddy breathers.

Chairman Rossos directed the TG to develop preliminary language for buddy breather performance requirements to be included in NFPA 1981 should NIOSH rescind or modify its position on buddy breathers and not prohibit such devices.

Agenda Item 12; Old Business

Chairman Rossos reported that the TC will be making a final attempt to contact TC members who have not attended meetings in a long time in order to determine their intent to continue as members of the TC.

Agenda Item 13; New Business

Chairman Rossos solicited suggestions from the Committee regarding possible dates and locations for the next TC meeting (tentatively the week of July 18, 2011).

Heinz Ahlers reported that NIOSH has opened a new docket on combination respirators (Docket #082A). It will remain open until February 12, 2011.

Chairman Rossos informed the TC that the TC on Electronic Safety Equipment is soliciting opinions on PASS sound files they have recorded in order to develop a universal PASS sound.

Agenda Item 14; Adjournment

MOTION BY CLINT KALLER; SECOND BY HEINZ AHLERS

To adjourn.

MOTION CARRIED

Chairman Rossos adjourned the meeting at 3.00 on 27 January 2010.

Respectfully submitted,



Steven H. Weinstein, Secretary

Technical Committee on Respiratory Protection Equipment

Intelligibility Testing Update

25 Jan 11

NFPA 1981 Task Group on Communications

Presented by USSI
(Luke Hollmann, Steve Mills, Paul De Mond)

and Brian H. Cox, Clovis Fire Dept.

Agenda

- Summary of Oct-2010 San Diego Meeting
- STI Background
- STI Setup
- STI Test Procedure
- SCBA Measurements
- Required Additional Testing
- Intelligibility Standard Finalization Timeline

Oct-2010 San Diego Meeting

- Presented Trade Study used to select STI as recommended objective measure of speech intelligibility
- Discussed test goals and objectives
 - Consistency, relevance, etc.
- Continue investigations into theory and practical application of STI measurements
- USSI to host tests of each manufacturer's SCBA and voice amplifier
- Attempt to establish correlation between real-world SCBA MRT scores and STI score
 - Insufficient variance in MRT data for direct correlation

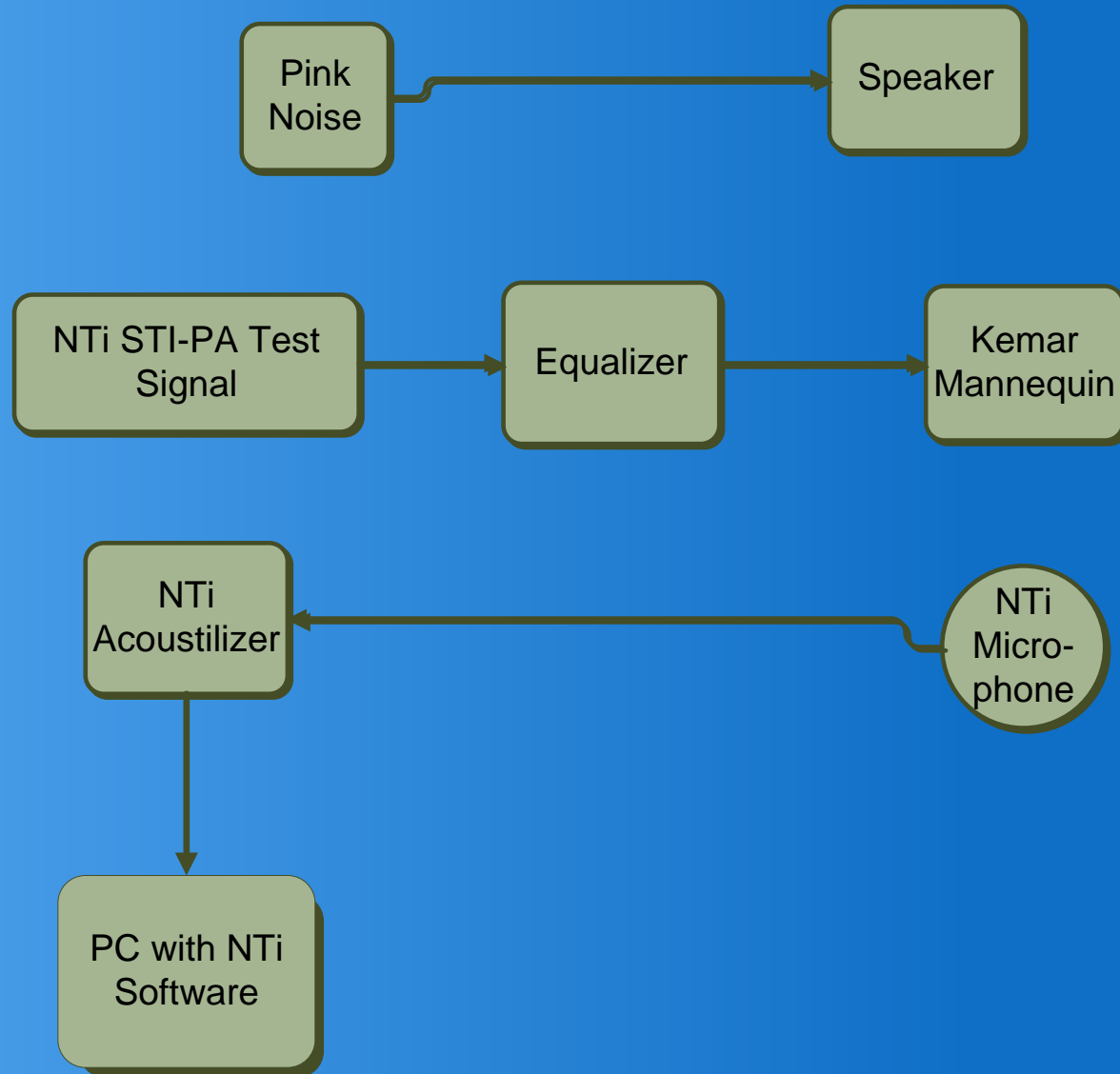
Preliminary STI Testing

- Preliminary measurements
 - Using equipment already on-hand
 - STI Scores higher than research led us to expect
 - Background noise had little effect on scores
- Lesson learned
 - Needed to find more appropriate STI test equipment

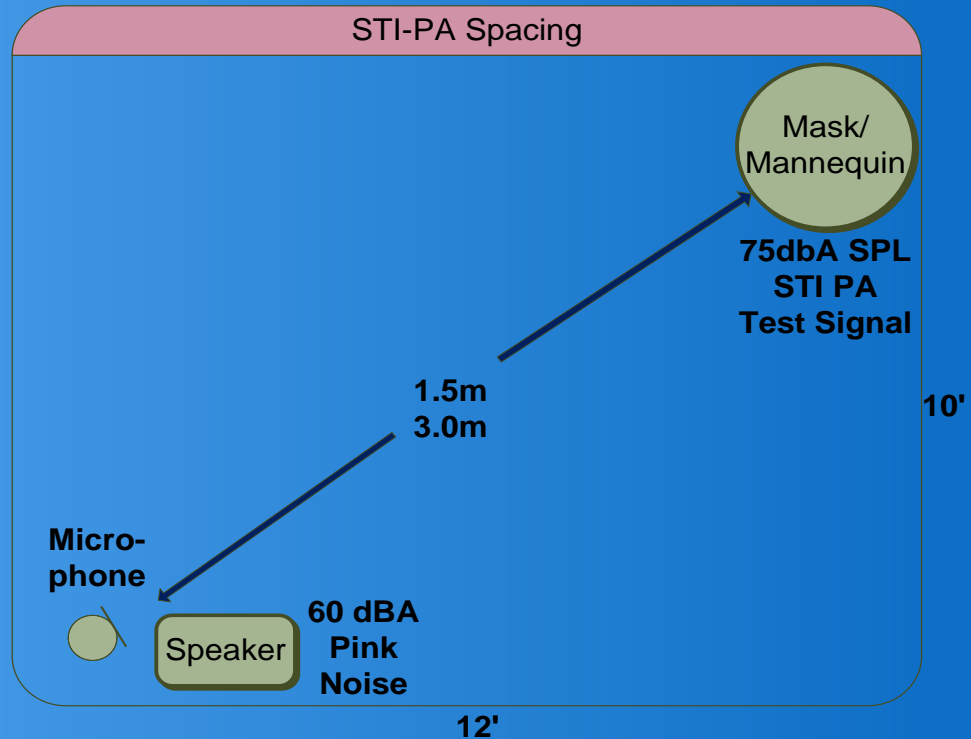
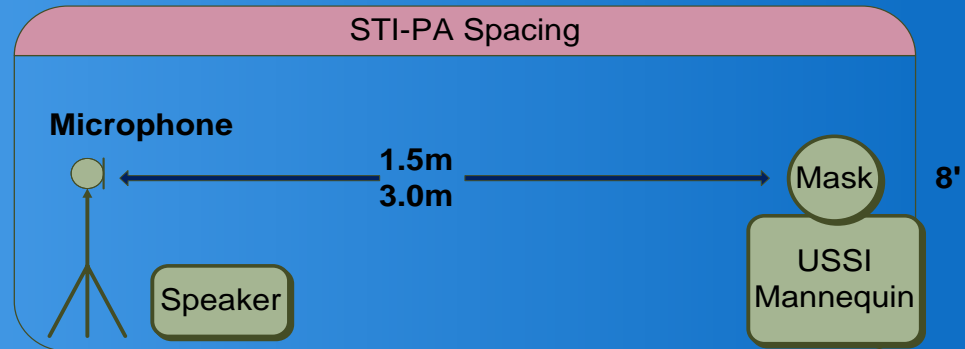
Consultation with STI Developers

- Entered into discussions with (formerly) TNO
 - Dutch research laboratory responsible for IEC STI standard implementation validation
 - “Full” implementation of STI is not commercially available
 - Two independent recommendations to use NTI’s STI-PA implementation
 - One a former TNO developer, the other the chairman of IEC’s STI advisory committee
 - STI-PA used in Europe to test communications from masks in tanks and helicopters
 - Effects of distortion and added noise on STI handled better than previous implementation

STI Test Setup – Block Diagram



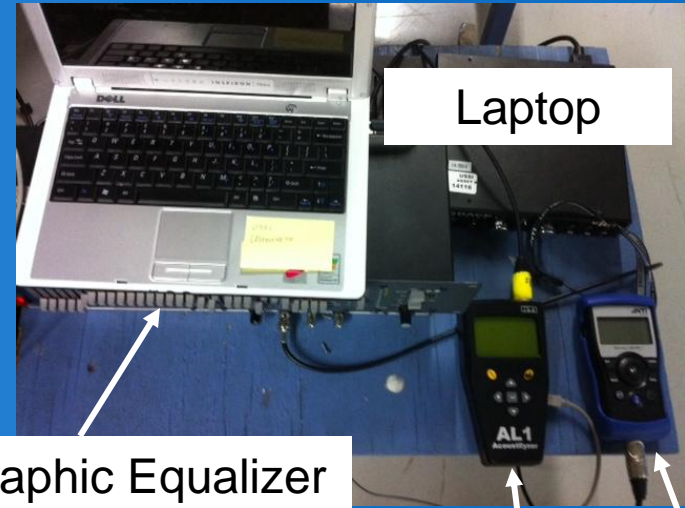
STI Test Setup – Graphic



USSI STI Setup - Photos



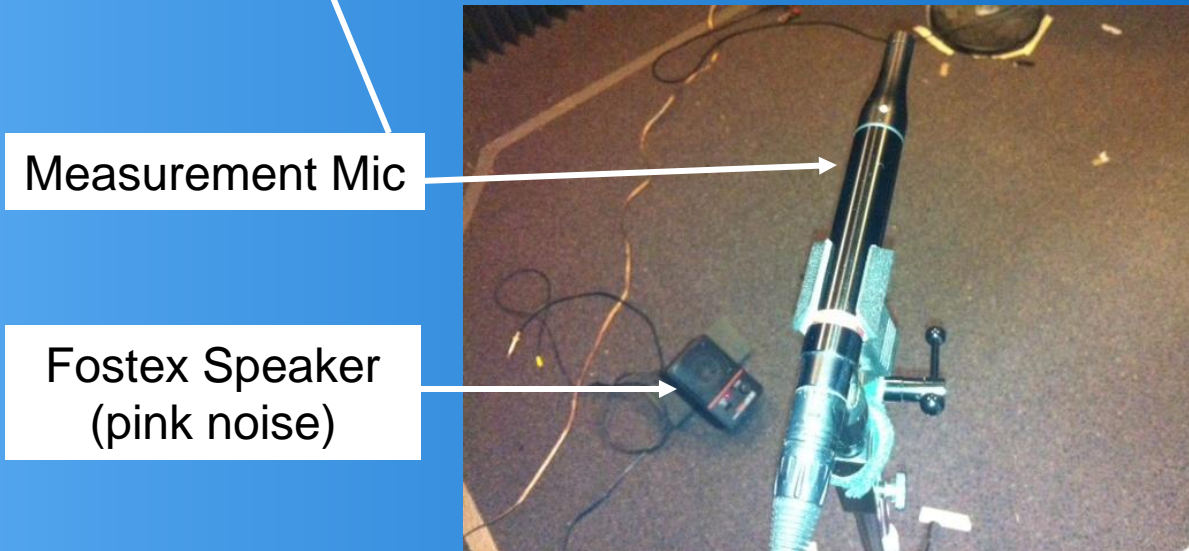
Mannequin



Laptop

Graphic Equalizer

NTI AL1 / MR-PRO

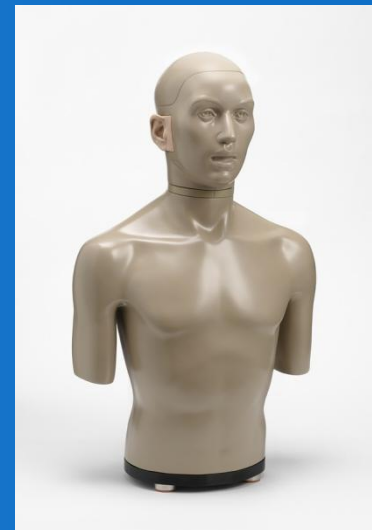


Measurement Mic

Fostex Speaker
(pink noise)

STI Setup - Recommended

- NTI STI-PA kit
- G.R.A.S. 45BM Kemar mannequin
- Graphical audio equalizer
- Audio power amplifier
- Fostex 6301 Powered Speaker (for pink noise)
- NTI MR-PRO signal generator (pink noise)
- Sound room – capable of 3 meter measurements. ≤ 40 dBA SPL
- Approx Cost (less Room!) \$25K



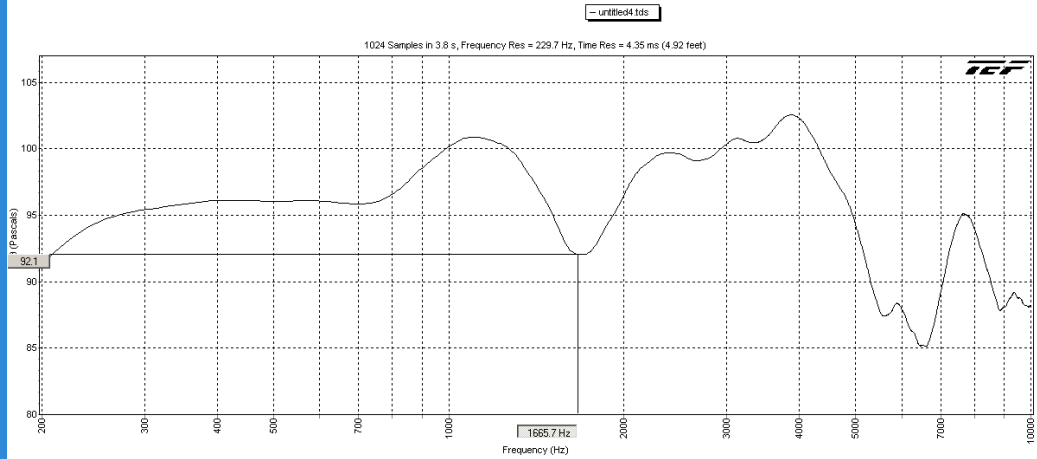
STI Test Procedure

- Mannequin reference level 75 dBA SPL @ 1.5 mtr
- Equalized 'flat' over 100 Hz – 10 KHz
- Measure STI of mannequin alone (reference)
- Measure Mask: STI and SPL
- Measure Voice Amp: STI and SPL
- Distances: 1.5 meters / 3.0 meters
- Pink Noise: None / 60 dBA SPL
 - Equivalent to 85 dB voice with 70 dB pink noise
- Multiple measurements
- Frequency response for informational purposes

Frequency Response

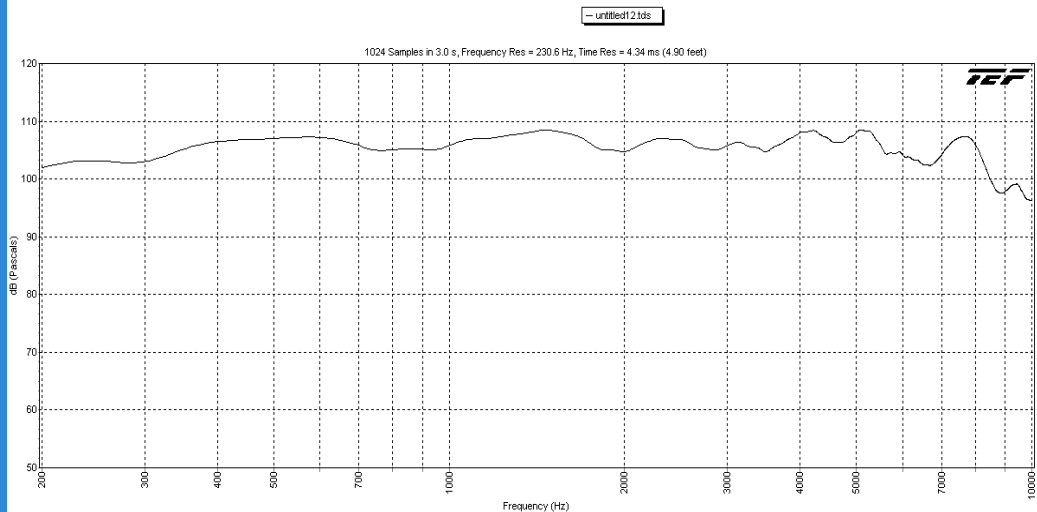
Response of
mannequin
(unequalized)

SteveSTI Test
12/7/2010 9:35:04 AM
Cursor = 92.1 dB at 1665.7 Hz



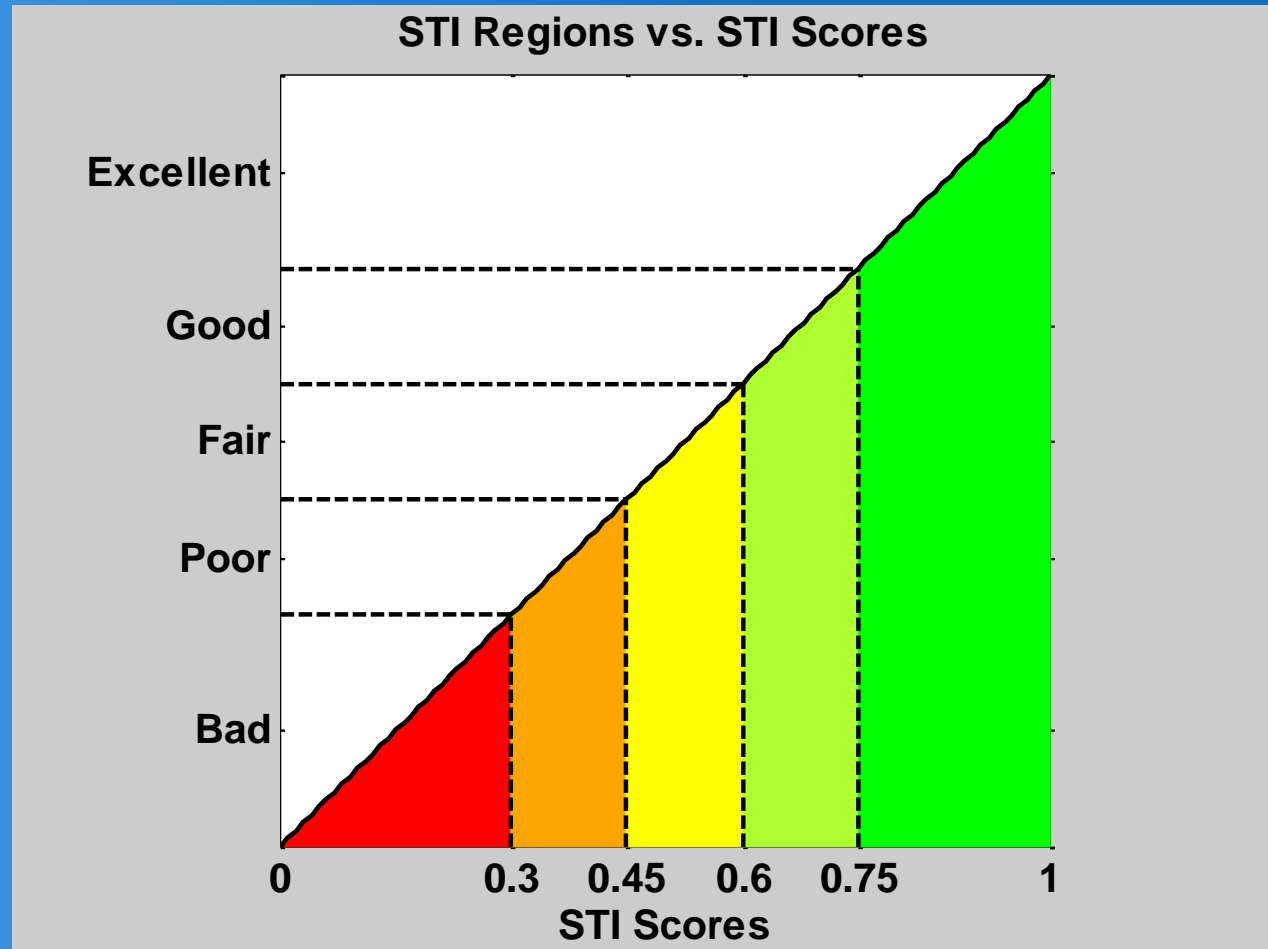
Response of
mannequin
(equalized)

SteveSTI Test
1/12/2011 8:33:27 AM

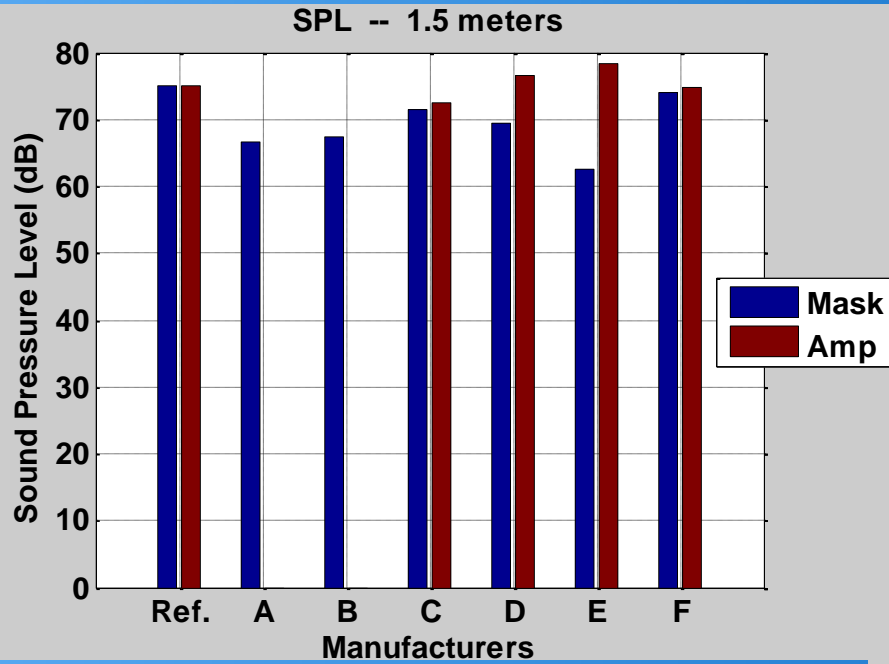


SCBA Measurements – STI Scale

- Industry standard scale developed by STI developers at TNO
- Widely accepted minimum intelligibility for any application is 0.3
 - Must test to determine if this applies to our situation



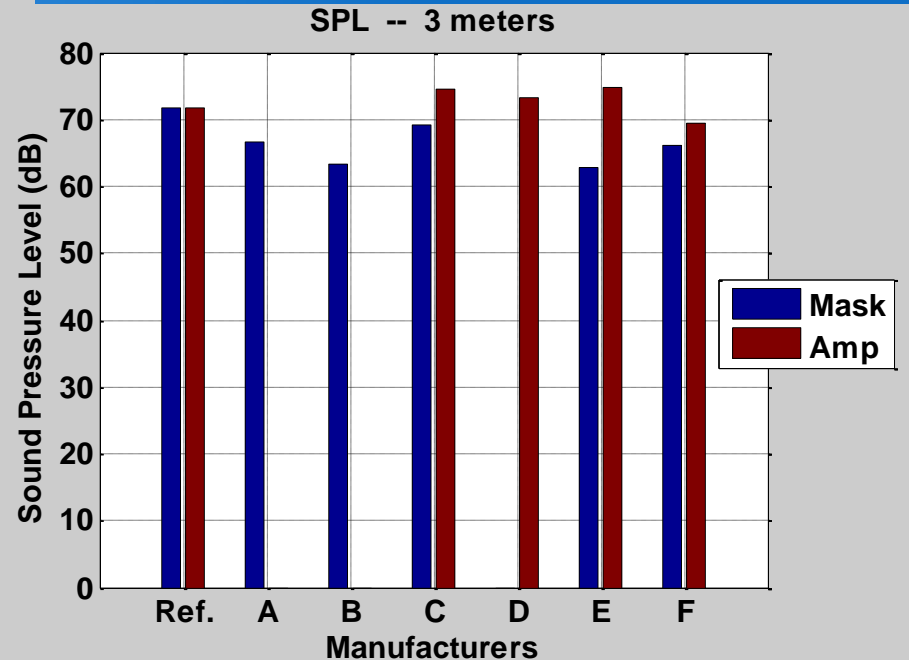
SCBA Measurements



SPL ("volume") - Zoomed out

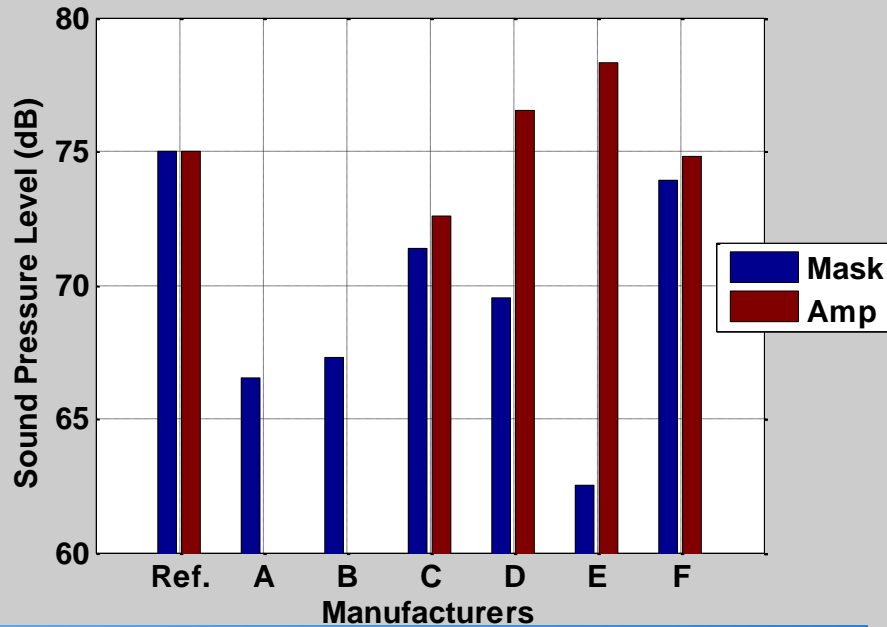
1.5 meters

3 meters



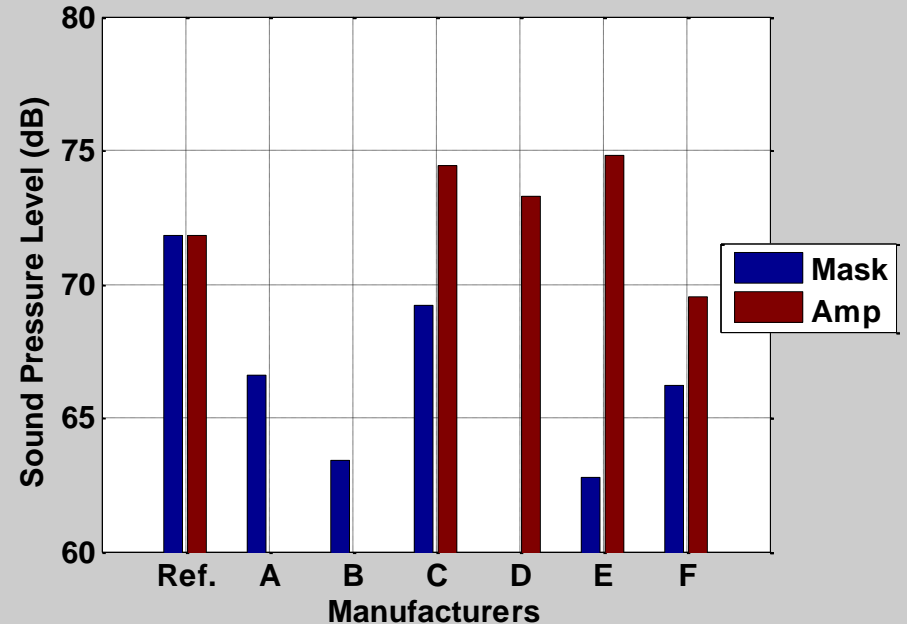
SCBA Measurements

SPL -- 1.5 meters



SPL ("volume") - Zoomed in

SPL -- 3 meters

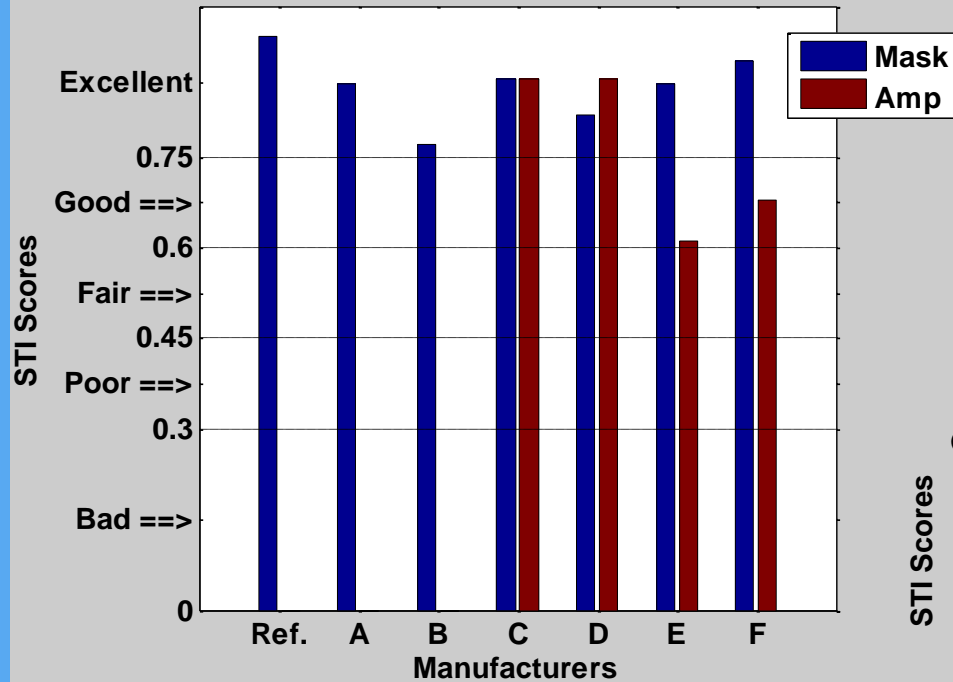


1.5 meters

3 meters

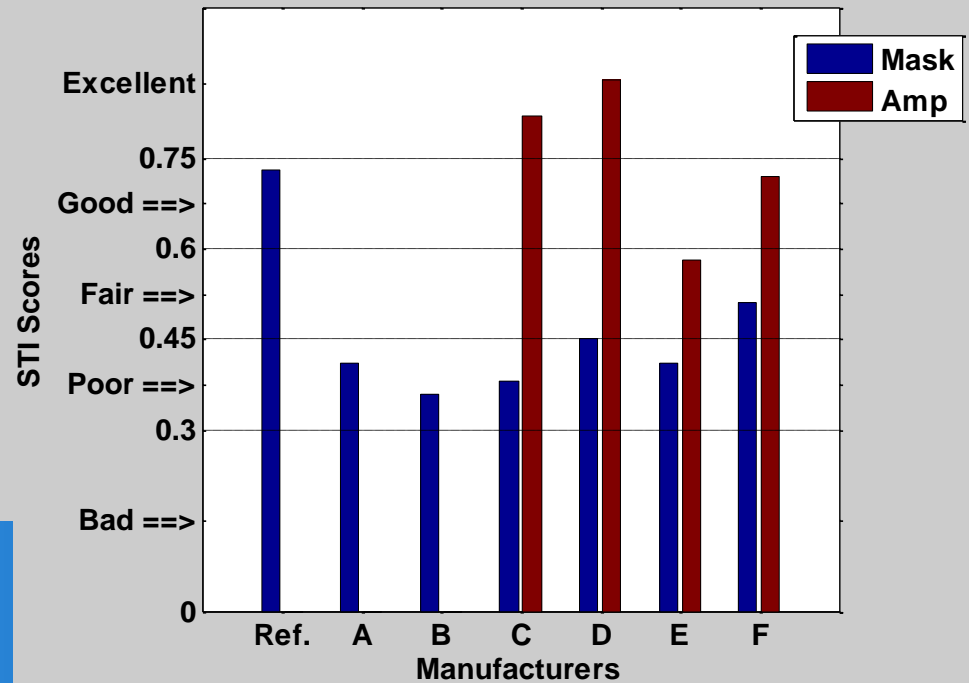
SCBA Measurements

STI -- 1.5 meters -- No Noise



STI scores - 1.5 meters

STI -- 1.5 meters -- 60 dB Pink Noise

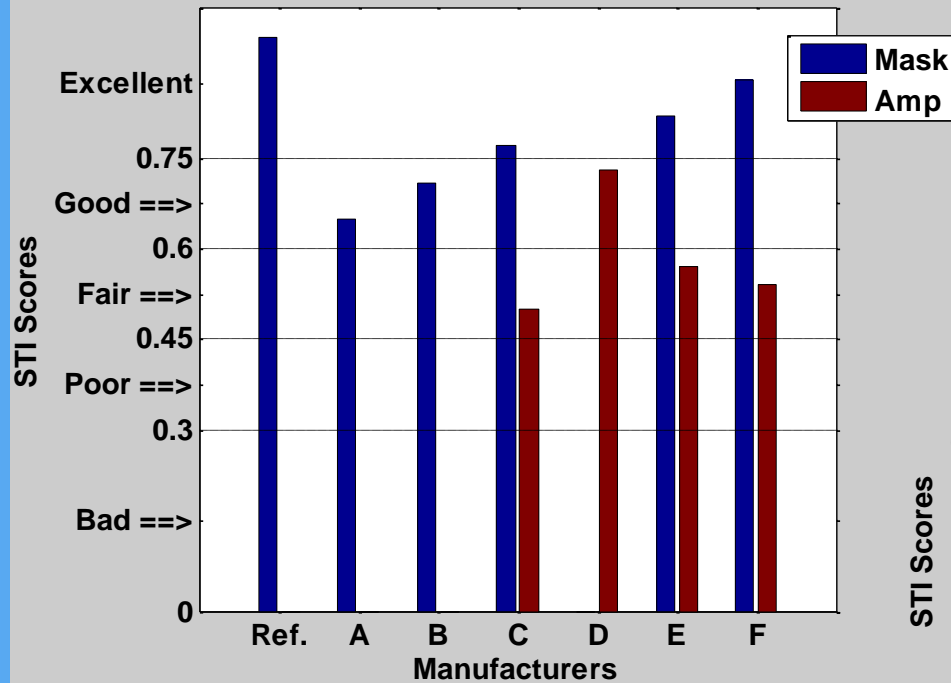


No noise

60 dB Pink Noise

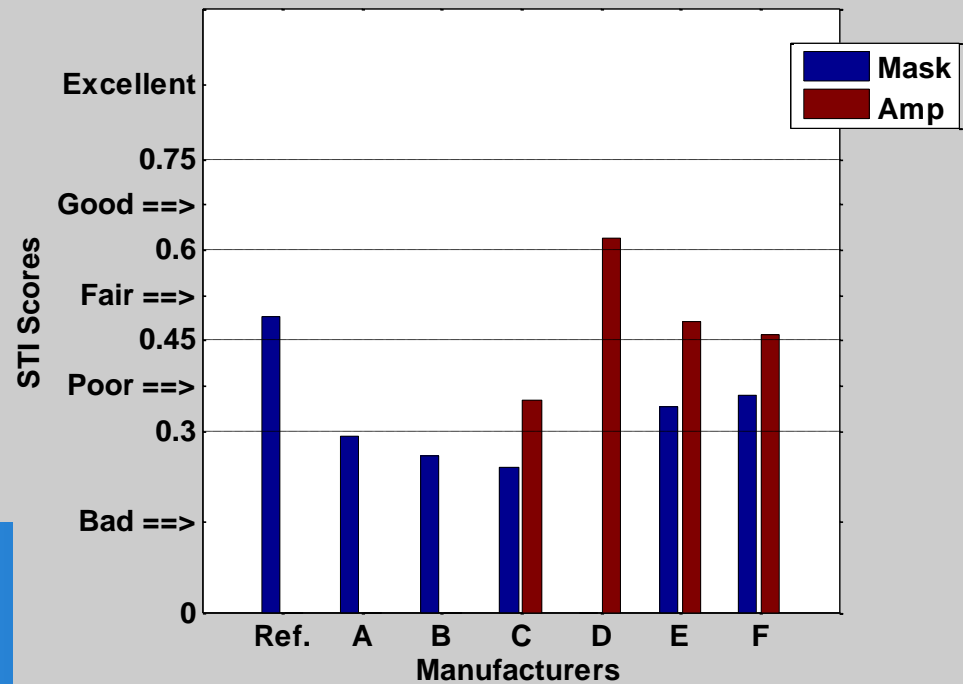
SCBA Measurements

STI -- 3 meters -- No Noise



STI scores - 3 meters

STI -- 3 meters -- 60 dB Pink Noise



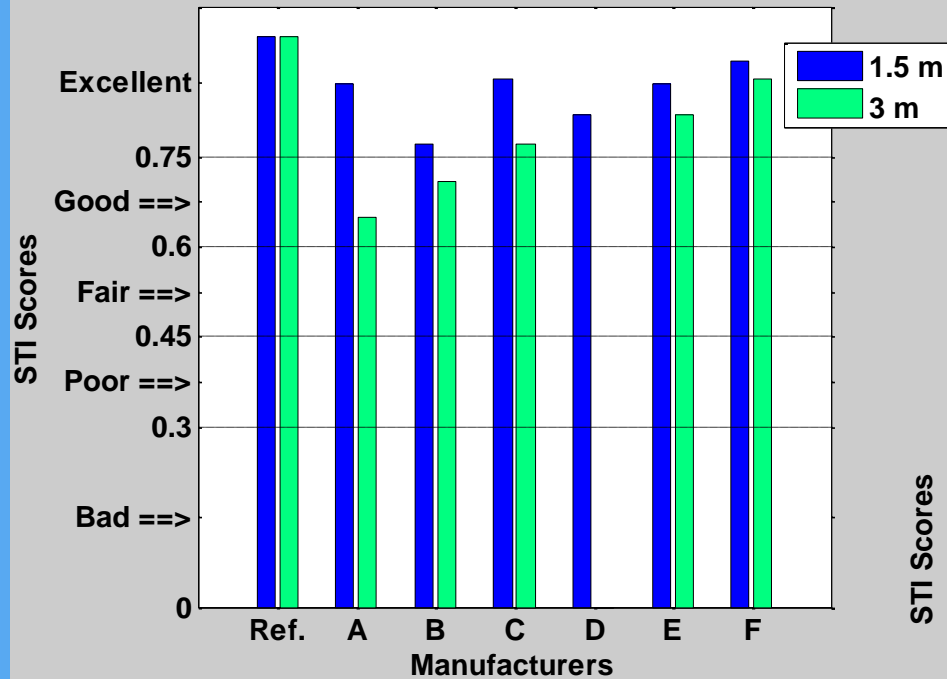
No noise

60 dB Pink Noise

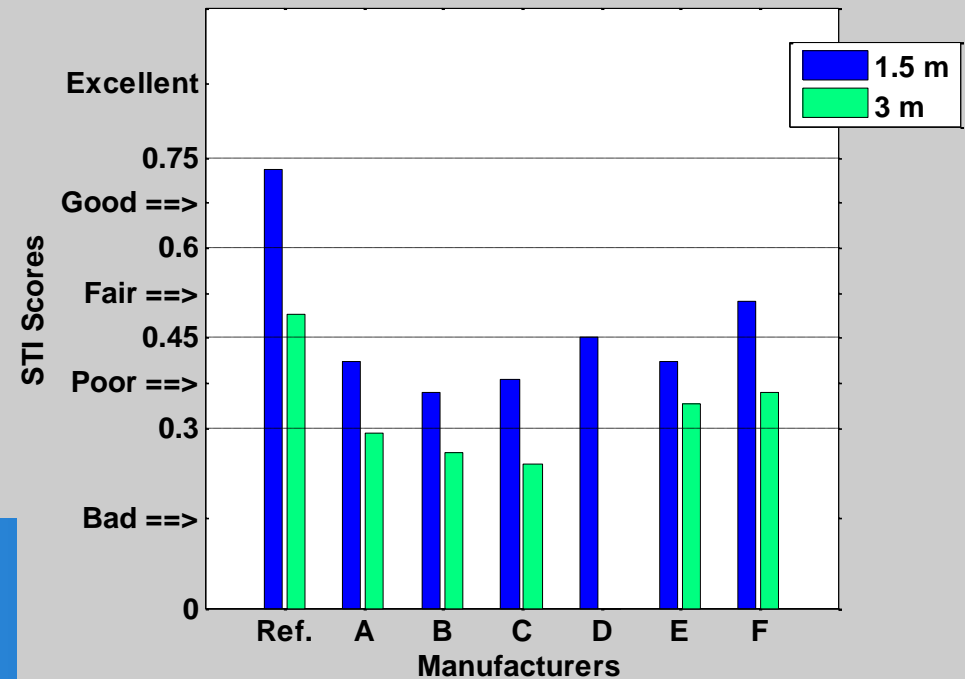
SCBA Measurements

STI scores - Mask Only

STI -- Mask Only -- No Noise



STI -- Mask Only -- 60 dB Pink Noise



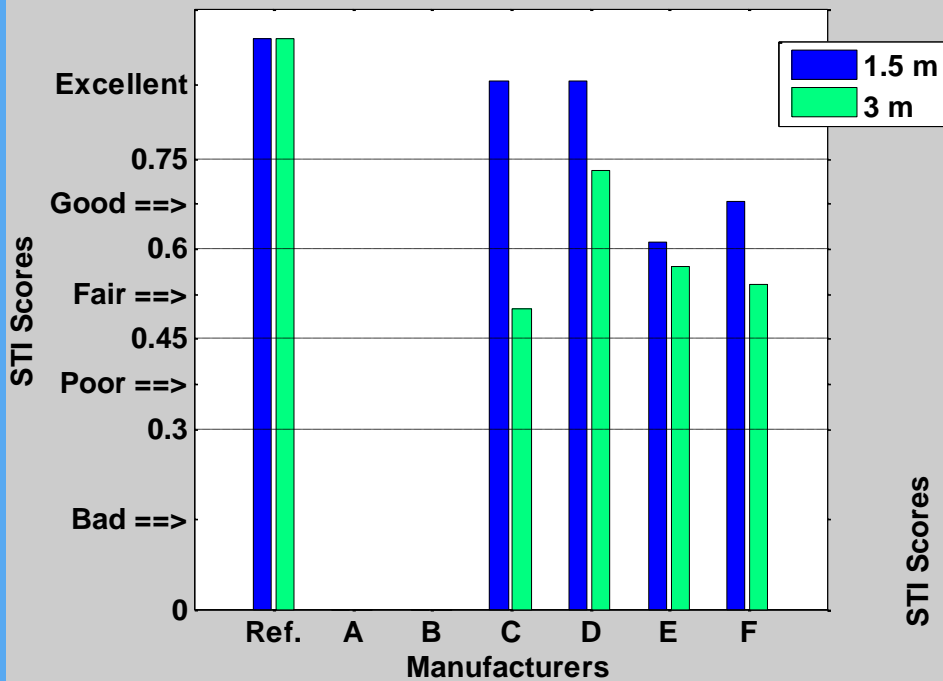
No noise

60 dB Pink Noise

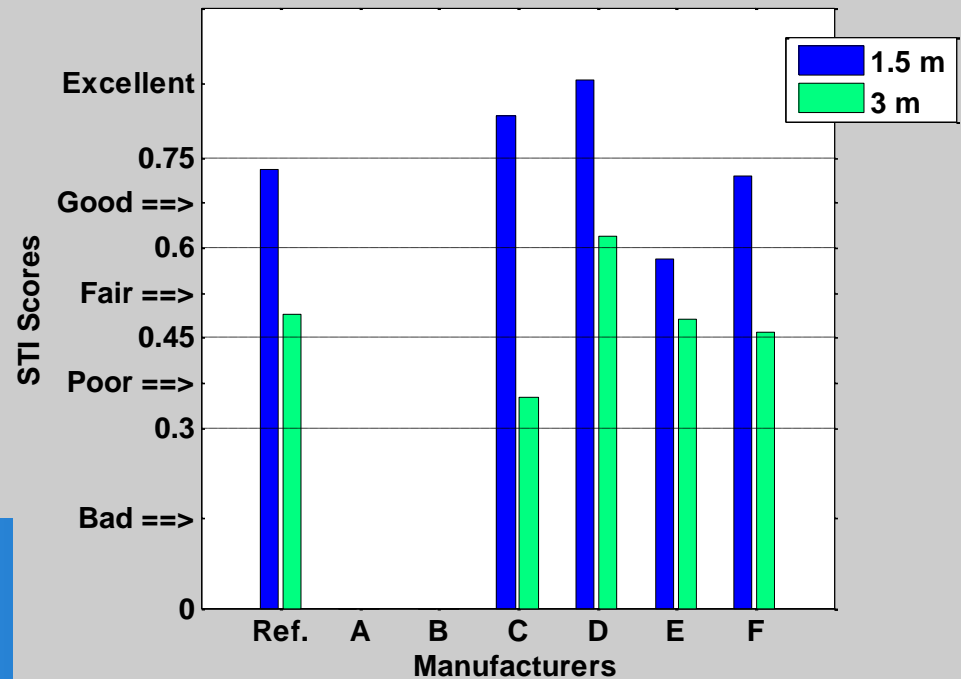
SCBA Measurements

STI scores - Mask with Amp

STI -- Mask with Amp -- No Noise



STI -- Mask with Amp -- 60 dB Pink Noise



No noise

60 dB Pink Noise

Required Additional Testing

- USSI to incorporate new KEMAR mannequin
- SCBA manufacturers to provide multiple masks / voice amplifiers for measurement
- Finalize STI test signal level, background noise level
- Establish expectable variability in the data / measurements
- Conduct STI vs distance measurements at new USSI building
- Determine recommended minimum STI scores for mask and amplifier

Task Group Schedule

