



Made Possible By
Tim Sparks TACTICAL HEARING.COM
&
Jim Anderson



**MITSUBISHI
CEMENT
CORPORATION**



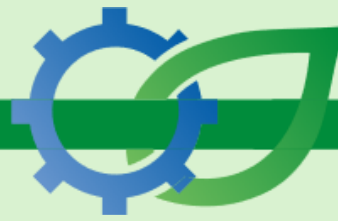
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Sustainable Strength through Innovation



2024
IEEE-IAS/PCA CEMENT CONFERENCE

Denver, Colorado • April 28th - May 2nd



Aligning Regulatory Compliance and Technical Advancement

A Comprehensive Approach to Hearing Protection for Individuals with Hearing Loss in Industrial Environments

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By age 50

About 90% of coal miners
and 49% of metal/nonmetal miners

Have a hearing impairment, versus 10%
of non-miners, according to NIOSH.



Correlation between Hearing Loss and Risk of Developing Dementia

Incidence of Dementia was **61%** Higher Among Moderate to Severe Hearing Loss Individuals Compared to Those with Good Hearing

UCLA Health - Hearing Loss and Risk of Dementia May be Related

March 3 2023



People with Little or No Hearing Loss

Bone Conduction Transmitter with Noise Cancelling Microphone



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- Those with Existing Hearing Loss
Hearing Enhancement Device Specific to Amplitude and Frequencies Impacted.
- OSHA/MSHA Rules
Disallow Hearing Aids to be Used as Hearing Protection
- Noise Reduction Rating (NRR) Testing
Lengthy, Expensive and Must be Approved by MSHA/OSHA Before a Device can be Used as Protection



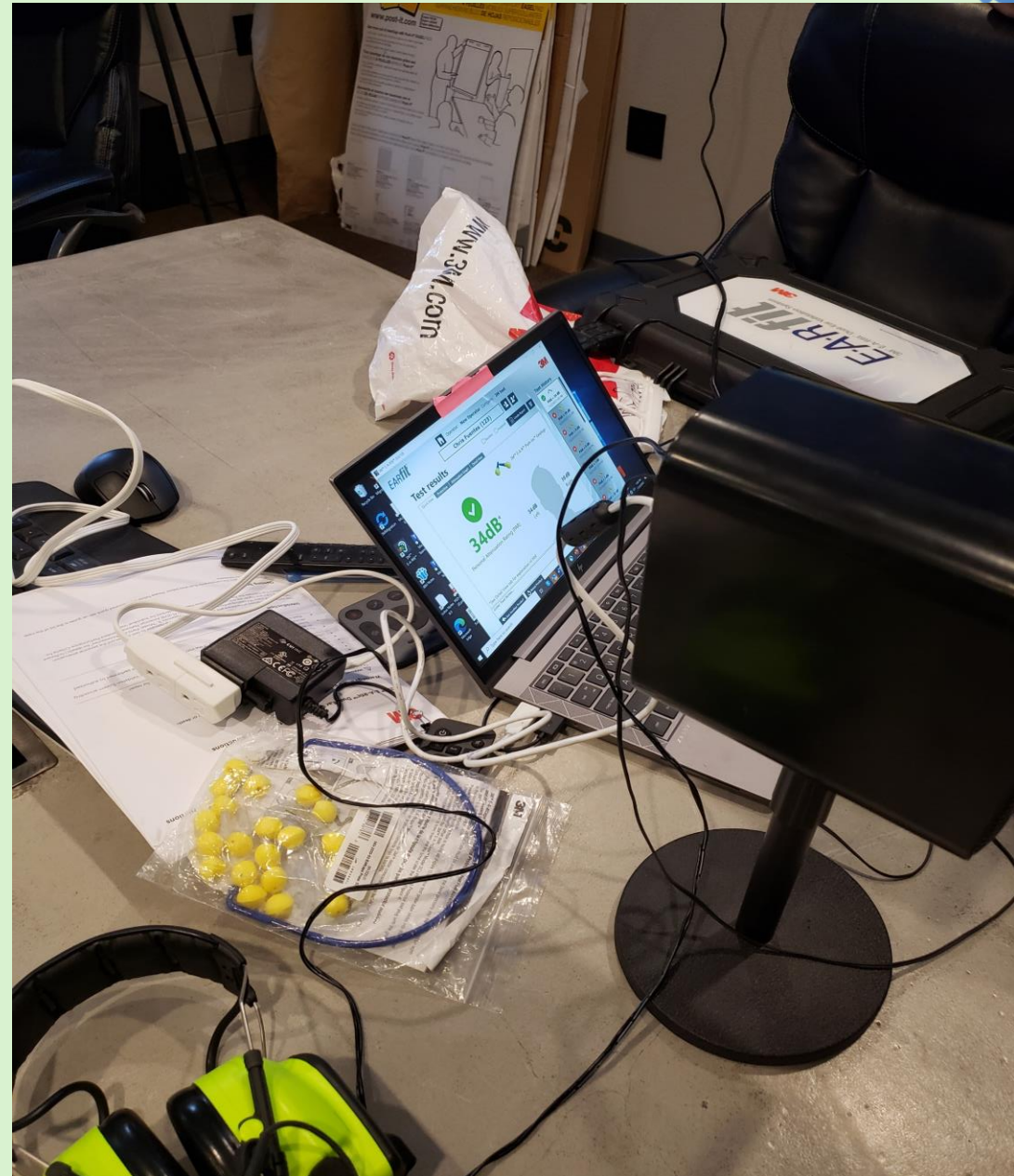
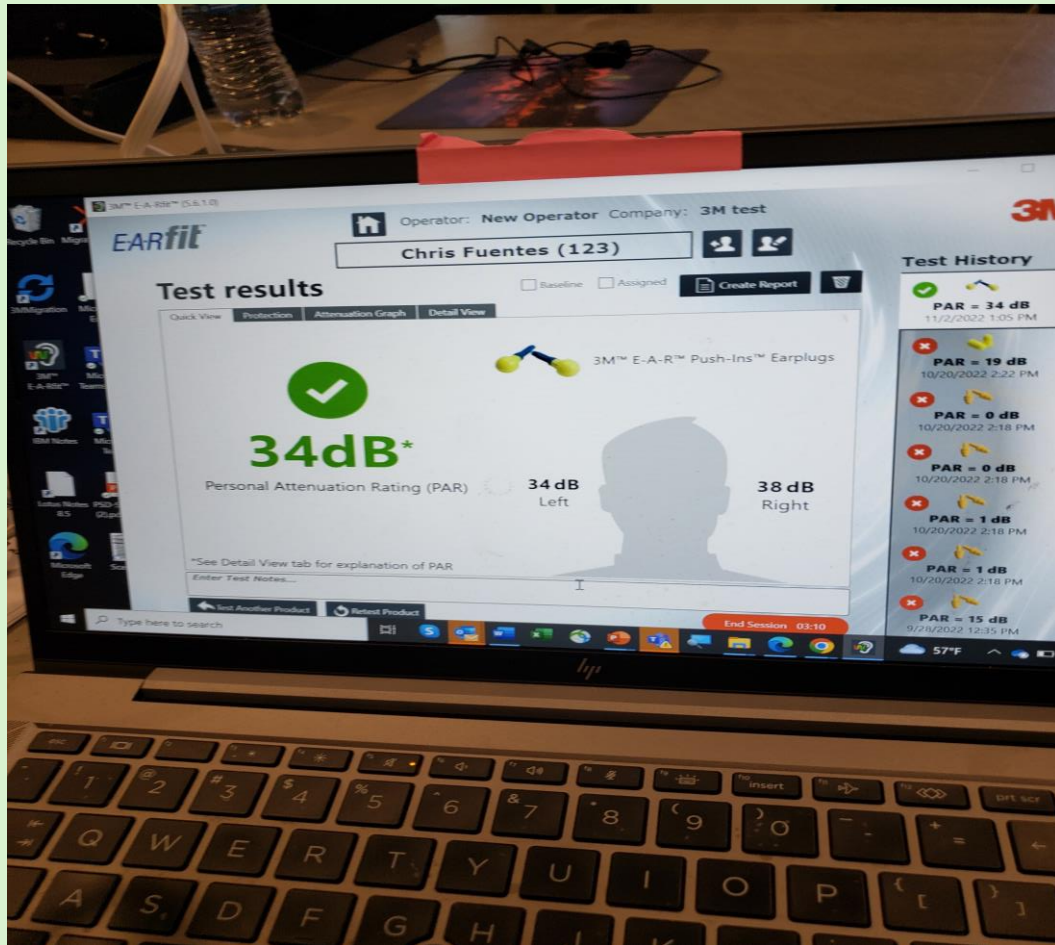
Frequencies Lost First



-- Date --	Type	.5k	1K	2K	3K	4K	6K	8K
02/11/00	REF1	15	15	15	35	35	15	00
05/16/00	MON	15	10	10	50	40	30	00
05/20/02	MON	15	10	10	50	45	35	00
03/06/03	MON	20	15	20	40	50	55	00
01/13/04	REF2	25	25	25	55	45	55	00
01/25/05	MON	40	20	20	55	55	55	00
02/13/06	MON	25	20	20	60	55	55	00
02/22/07	MON	30	30	20	65	65	45	
02/12/08	MON	35	35	35	60	60	70	
04/04/08	MON	30	20	25	60	50	65	
02/09/11	MON	25	20	15	60	55	55	
02/27/13	MON	35	25	20	60	55	60	
03/05/14	MON	40	40	40	70	60	55	
03/05/15	MON	40	40	30	65	55	65	
03/14/16	REF3	40	35	55	70	65	80	
03/21/17	MON	50	50	45	75	65	65	
03/28/18	MON	35	40	45	65	55	55	55
03/20/19	MON	25	30	45	65	65	80	75
03/02/20	MON	35	35	40	65	65	70	65
06/15/21	MON	50	65	65	70	65	75	75

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Test Effectiveness



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Complete Ear Canal Occlusion Facilitates High NRR Rating



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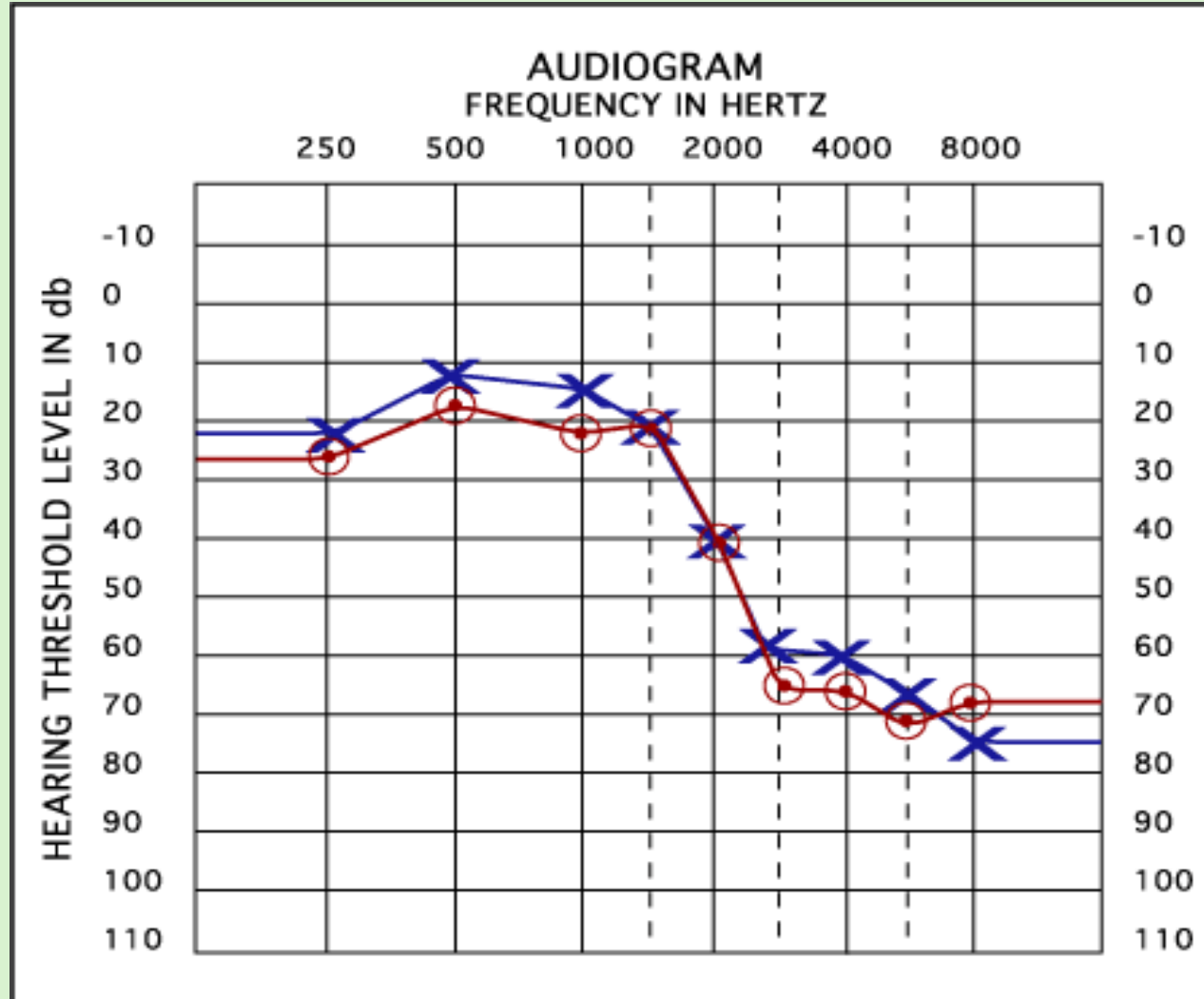
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Programmed to the User Current and Future Needs





- Proof of Concept and Prototyping
- NRR Testing
- Cal OSHA and MSHA Approval

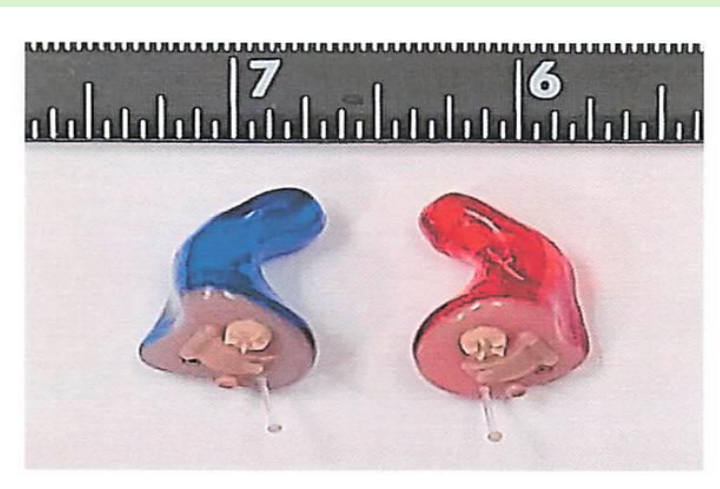


Two-Year + Wait for NRR Testing Done 12/7/22

Accepted by
Cal-OSHA 03/7/2023.
And
MSHA on 05/24/2023



NRR Testing Study



Test Method: ANSI S3.19-1974
 Manufacturer: Tactical Hearing
 Model: Custom

Position: Insert
 Date: 12/7/22
 Test ID: Q7943A

SUBJECT	Frequency in Hz								
	125	250	500	1000	2000	3150	4000	6300	8000
1	28	23	32	30	37	38	42	45	47
	32	26	29	31	39	38	40	45	48
	29	23	31	32	35	37	41	45	49
2	21	26	29	26	37	32	39	46	40
	26	25	28	25	39	33	40	47	41
	22	29	29	27	38	31	37	45	42
3	29	27	34	39	39	44	48	51	45
	32	31	33	37	40	43	48	51	43
	30	29	36	37	39	43	49	53	46
4	36	36	39	40	37	45	48	54	48
	33	32	39	41	38	45	49	55	47
	32	33	42	43	37	49	48	54	47
5	29	26	31	35	32	44	42	43	41
	27	24	32	35	31	44	44	44	40
	31	24	33	34	32	44	44	43	42
6	33	30	33	33	41	48	49	48	42
	37	33	32	33	38	40	46	48	41
	34	29	34	32	42	44	50	45	42
7	27	27	28	37	43	44	44	46	45
	26	27	27	36	42	44	51	44	44
	26	28	28	35	40	45	49	42	42
8	36	36	42	44	40	46	44	49	46
	33	33	40	46	42	43	45	48	48
	29	31	37	42	40	43	43	48	45
9	30	28	28	35	34	35	31	37	41
	28	27	28	33	32	34	33	37	44
	25	27	28	33	34	36	34	39	43
10	36	38	42	40	36	44	42	40	44
	38	36	41	39	37	45	41	40	47
	35	32	38	38	38	42	43	41	45
MEANS	30.3	29.1	33.5	35.6	37.5	41.4	43.4	45.7	44.2
STD. DEV.	4.3	4.1	5.1	5.2	3.2	4.7	5.1	4.8	2.8

CSA Class = AL

NRR = 26 dB

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- Accepted May 2023 (MSHA)
- Implementation at Facility
 - Anyone with a Need Eligible, Currently 37 Employees Participated to Date
- Cal OSHA and MSHA Approval
 - Without Help From Cal OSHA and MSHA Staff This Would Not Have Been Possible
 - Diane Fionda, Charlie Wilson (Cal OSHA)
 - Jennifer VanWey (MSHA)