
Appendix
IV

**NHCA Professional Guide for
Audiometric Baseline Revision**
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Conservation Association)

What Is Baseline Revision?

In a hearing conservation program (HCP), each employee's baseline audiogram gives the reference hearing thresholds for that individual. The results of later monitoring audiograms are compared to the baseline to detect significant changes in hearing thresholds. When significant shifts for the worse are identified, follow-up actions are taken to improve employee protection from noise.

As specified in the Hearing Conservation Amendment (CFR 1910.95) promulgated by the Occupational Safety and Health Administration (OSHA), the baseline may be revised by the reviewing audiologist or physician either for significant improvement in measured thresholds or for persistent standard threshold shift (STS).

Because the baseline audiogram is so important for detecting hearing change and reacting to prevent additional change, NHCA assigned a special committee to develop guidelines for revising audiometric baselines. The 16-member committee conducted research and evaluated various strategies over several years. The guidelines given here, which were approved by the board of NHCA in March 1996, represent the consensus of the committee. Following these guidelines will provide consistency across professional reviewers and audiometric testing service providers, thereby increasing the degree of protection for noise-exposed workers.

Note: although the guidelines require persistence of hearing changes before the baseline is revised, protective follow-up actions for the employee are needed as soon as significant changes for the worse are first shown.

Definitions

OSHA STS: OSHA defines a standard threshold shift (STS) as a change for the worse in either ear of 10 dB or more in the average of thresholds at 2, 3, and 4 kHz, relative to the baseline.

Significant Improvement: OSHA does not specify a definition of significant improvement. However, an example in Appendix F of the Hearing Conservation Amendment illustrates revision of the baseline after an improvement of 5 dB in the average of hearing thresholds at 2, 3, and 4 kHz.

Baseline Audiogram: Initially the baseline is the latest valid audiogram obtained before entry into the HCP. If no appropriate pre-entry audiogram exists, baseline is the first valid audiogram obtained within 6 months of entry into the HCP (12 months for mobile testing). OSHA requires 14 hours of quiet prior to the original baseline.

Monitoring Audiograms: Subsequent to the baseline audiogram, new audiograms are obtained at least annually. To increase the preventive function of audiometry, many professionals suggest performing annual audiograms during the work-shift in order to detect any noise-related temporary threshold shifts which may occur.

Age Corrections: OSHA permits optional application of age correction values (from Appendix F) to annual audiograms when comparing them to baseline for detection of STS, in order to account for median values of age change. Note: many professionals feel that if intervention for threshold shifts is delayed until after age-corrected STS has occurred, then significant hearing changes will not receive needed follow-up attention.

How to Use NHCA's Guidelines

Professional Review

These guidelines are meant to be employed only by a professional reviewer (audiologist or physician). Although the guidelines can be programmed by computer to identify records for potential revision, the final decision for revision rests with a human being. Because the goal of the guidelines is to foster consistency among professional reviewers, human over-ride of the guidelines must be justified by specific concrete reasons.

Separate Consideration of Each Ear

Each monitoring audiogram is compared to the baseline to detect improvement or OSHA STS (or other significant shifts). The two ears are examined separately and independently. If one ear meets the criteria for revision of baseline, then the baseline is revised for that ear only. Therefore, if the two ears show different hearing trends, the baseline for the left ear may be from one test date, while the baseline for the right ear may be from a different test date.

Use of Age Corrections

Age corrections do not apply in considering revisions for improvement. The audiologist or physician may choose whether to apply OSHA-allowed age cor-

rections in evaluating baseline revision for persistent OSHA STS. Rule 2 operates in the same way whether optional age corrections are used or not.

Application Exceptions

These guidelines for baseline revision do not apply to the calculation of the 25-dB average shifts which in many states are recordable on the OSHA log for occupational illness and injury. The original baseline is the appropriate reference for that purpose. Neither do the guidelines apply to identification of other (non-STS) significant threshold shifts for the worse, which may be communicatively or medically important.

The Guidelines

Rule 1: Revision for Improvement

If the average of thresholds for 2, 3 and 4 kHz for either ear shows an improvement of 5 dB or more from the baseline value, and the improvement is present on one test and persistent on the next test, then the record should be identified for review by the audiologist or physician for potential revision of the baseline. The baseline for that ear should be revised to the improved test which shows the lower (more sensitive) value for the average of thresholds at 2, 3, and 4 kHz, unless the audiologist or physician determines and documents specific reasons for not revising. If the values of the three-frequency average are identical for the two tests, then the earlier test becomes the revised baseline.

Rule 2: Revision for Persistent OSHA Standard Threshold Shift

If the average of thresholds for 2, 3 and 4 kHz for either ear shows a worsening of 10 dB or more from the baseline value (OSHA STS), and the STS persists on the next annual test (or the next test given at least 6 months later), then the record should be identified for review by the audiologist or physician for potential revision of the baseline for persistent worsening. Unless the audiologist or physician determines and documents specific reasons for not revising, the baseline for that ear should be revised to the STS test which shows the lower (more sensitive) value for the average of thresholds at 2, 3, and 4 kHz. If both STS tests show the same numerical value for the average of 2, 3, and 4 kHz, then the audiologist or physician should revise the baseline to the earlier of the two tests, unless the later test shows better (more sensitive) thresholds for other test frequencies.

Following an STS, a retest within 30 days of the annual test may be substituted for the annual test if the retest shows better (more sensitive) results for the average threshold at 2, 3, and 4 kHz. If the retest is used in place of the annual test, then the annual test is retained in the record, but it is marked in such a way that it is no longer considered in baseline revision evaluations.

EXAMPLE

Male employee "L.M." born 10/05/63 See far right column for test date.

Test Age Type	Left Ear Thresholds (dB) by frequency (kHz)							No Age Correction				With Age Correction (does not apply to improvement)			
	.5	1	2	3	4	6	8	STS avg.	Change	Reviewer decision	Baseline status	Corr. avg.	Corrected change	Reviewer decision	Baseline status
	22 initial	10	5	5	10	25	40	15	13.3			B			
23 annual	5	5	5	5	25	45	20	11.7	-1.7						
24 annual	0	-5	0	0	25	35	10	8.3	-5.0 impr		RB				RB
25 annual	0	-5	0	0	25	40	20	8.3	-5.0 impr	revise					
26 annual	0	-5	-5	0	20	40	20	5.0	-3.3						
27 annual	0	0	0	5	25	30	10	10.0	1.7			9.0	0.7		
28 annual	5	5	5	5	35	40	15	15.0	6.7			13.7	5.3		
29 annual	5	0	5	10	40	40	15	18.3	10.0 STS		RB	17.0	8.7		
30 annual	10	0	5	10	45	45	20	20.0	11.7 STS		RB	18.3	10.0 STS		
30 retest	10	0	5	10	40	40	15	18.3	10.0 STS	revise		16.7	8.3		
31 annual	5	0	5	15	50	50	30	23.3	5.0			21.3	13.0 STS		
31 retest	5	5	5	10	50	50	35	21.7	3.3			19.7	11.3 STS		RB
32 annual	5	0	5	15	55	55	40	25.0	6.7			22.3	14.0 STS		
32 retest	5	0	5	15	50	55	35	23.3	5.0			20.7	12.3 STS	revise	
33 annual	5	5	5	20	55	55	35	26.7	8.3			26.0	4.3		

If a retest within 30 days of an annual test confirms an OSHA STS shown on the annual test, the baseline will not be revised at that point because the required six-month interval between tests showing STS persistence has not been met. The purpose of the six-month requirement is to prevent baseline revision when STS is the result of temporary medical conditions affecting hearing. Although a special retest after six months could be given if desired to assess whether the STS is persistent, in most cases the next annual audiogram would be used to evaluate persistence of the STS.

Example Description

The example above illustrates how the baseline revision guidelines apply to one audiometric record. The abbreviations used are: B for baseline, RB for revised baseline, STS for OSHA STS, and impr for improvement. Revisions are shown both without use of age corrections, as well as with use of OSHA age corrections (with the choice being up to the professional in charge of revision). In the left ear, baseline is revised in 1988 for persistent improvement, to the test of 11/12/87. Subsequently the left ear shows persistent STS, with revision after the 1993 retest to the test of 5/21/92 (without using age corrections). With age corrections, the left ear shows persistent STS in 1995, with baseline revised to the test of 6/25/94. In the right ear, baseline revision for persistent STS without age corrections occurs in 1994 to the test of 5/28/93. With age corrections, the right baseline is revised in 1996 to the test of 06/01/95.

Note that the table shows values rounded to one tenth of a decibel, resulting in some apparent errors of one-tenth in the columns showing change from baseline. For example, one comparison indicates in the table values that $19.7 - 8.3 = 11.3$ because the underlying values are really $19.67 - 8.33 = 11.34$.

Right Ear Thresholds (dB) by frequency (kHz)								No Age Correction				With Age Correction (does not apply to improvement)				Date of Test
.5	1	2	3	4	6	8	avg.	Change	Reviewer decision	Baseline status	Corr. avg.	Corrected change	Reviewer decision	Baseline status		
15	10	5	5	20	40	15	10.0			B				B	08/03/85	
10	5	0	5	25	35	10	10.0	0							11/04/86	
0	-5	0	5	25	40	20	10.0	0							11/12/87	
0	0	0	0	30	35	15	10.0	0							10/15/88	
0	-5	0	5	35	40	10	13.3	3.3			12.0	2.0			12/12/89	
5	0	0	0	40	40	15	13.3	3.3			11.7	1.7			11/23/90	
0	0	0	5	40	40	15	15.0	5.0			13.0	3.0			04/14/91	
5	0	0	5	45	50	20	16.7	6.7			14.7	4.7			05/21/92	
10	5	5	10	55	45	20	23.3	13.3 STS			21.0	11.0 STS			05/22/93	
5	0	0	10	50	45	15	20.0	10.0 STS		RB	17.7	7.7			05/28/93	
10	5	0	10	50	55	20	20.0	10.0 STS			17.3	7.3			06/10/94	
5	5	0	10	50	55	20	20.0	10.0 STS	revise		17.3	7.3			06/25/94	
5	5	5	15	60	60	25	26.7	6.7			23.3	13.3 STS			05/07/95	
5	0	5	15	55	65	30	25.0	5.0			21.7	11.7 STS			06/01/95	
10	0	5	10	60	60	25	25.0	5.0			21.7	11.7 STS	revise	RB	05/02/96	

Also recall that age corrections are not applied to baseline tests, but only to annual tests. Therefore, in the sections showing calculations with age corrections, the “corrected change” column shows change from the STS average without age corrections for the currently applicable baseline compared to the STS average with age corrections on the current annual test.

