CONFIDENCE INTERVAL LOOK-UP TABLE EXPLANATION – 2008
(BASED ON FALL 2007 ASSESSMENT DATA)

A group may meet the Adequate Yearly Progress (AYP) performance expectations in a content area in one of three ways:

- ✓ by meeting or exceeding the target index value,
- ✓ by being close enough to the target index value that it cannot confidently be determined if the group is "truly" below the target, or
- ✓ by meeting the "Safe Harbor" criterion.

This document explains the second way—commonly called "confidence intervals"—and helps walk the user through the associated "look-up" tables.

Student performance varies from year to year for many reasons. Some changes are due to "true" changes in student learning as a result of improvements in teaching or curriculum, for example, while others may be due to factors beyond the control of the school. Most educators are familiar with the "good class/bad class" phenomenon, where changes in the performance of cohorts are simply due to the combination of students in a given class or school in a particular year. This effect is relatively more pronounced in smaller than in larger groups. Members of the New Hampshire Department of Education (NH DOE), along with leaders from approximately 35 other states, believe that when schools are identified for not meeting performance targets, it should not be due to normal variation, so they have chosen an accountability system that minimizes this possibility.

This expected variation is characterized statistically as sampling variability. Models of sampling variability can be used to create confidence intervals. The U.S. Department of Education has given the NH DOE permission to use a confidence interval of 99% in evaluating school and group performance. This means groups in New Hampshire will not be considered to have missed the performance target unless there is less than a 1% chance that their performance differed from the target because of normal variability. In other words, a school will be identified as missing its target only if that decision can be made with 99% confidence. The width of the confidence interval, and therefore the required observed performance necessary for the group to meet AYP requirements, is contingent upon two major factors: the number of students in the group being evaluated (most important) and the observed index score of the group. More details about the actual calculations are found in the last section of this document.

Using the Look-Up Table

If the observed performance (the calculated index value this year) of a group meets or exceeds the required target, or Annual Measurable Objective (AMO), the group will meet AYP requirements and there is no need to use the look-up table. On the other hand, if the observed performance falls below the AMO, the performance of the group is evaluated to determine whether it is confidently different from the AMO or falls within the confidence

intervals. The accompanying look-up table is designed to help school personnel apply confidence intervals without having to perform the statistical calculations.

Separate look-up tables are provided for elementary and middle schools and for high schools since the AMOs are set separately for the different grade levels. To use either look-up table, first find the number of students indicated in the 2008 Performance column of the AYP School Data Report for the group of interest. (This number includes the number of students who participated in the October 2007 NECAP or 2006-07 NH-Alt who were continuously enrolled in the teaching school or district for a full academic year and were not first-year ELL students). Next, look across the table to find the minimum index value necessary to meet AYP requirements in reading and mathematics. If the index value for the particular group exceeds the index value in the table, the group will be considered to have met AYP requirements for this year for the given subject area.

Example

Assume an elementary school has 14 students in the economically disadvantaged group who meet the criteria listed above. The first step is to scan down the first column to the number 14. Then scan to the right to find the minimum index value for reading (71.8) and for mathematics (65.9). The required AMOs for reading (86.0) and mathematics (82.0) are shown at the top of the columns. As can be seen from the table, the required index values associated with lower numbers of enrolled students are noticeably lower than the AMO values. The difference between the AMO value and the required index value is the 99% confidence interval. The same procedure should be used for high school inquiries.

New Hampshire 2008 AYP Index Look-Up Table				
Number of Students Enrolled for a Full Academic Year	**Required Minimum Index Value**			
	Elementary/Middle		**High School**	
	Reading AMO=86.0	**Mathematics AMO=82.0**	**Reading AMO=84.0**	**Mathematics AMO=58.0**
11	70.0	63.8	68.4	36.4
12	70.6	64.6	69.1	37.3
13	71.2	65.3	69.7	38.1
14	71.8	65.9	70.2	38.8
15	72.3	66.5	70.7	39.5

Statistical Notes

When the population variance is unknown in statistical calculations the sample variance is used to estimate the population variance. In this case, the within-school variance of observed student scores is considered an appropriate estimator:

$$\text{var}_{school} = \sum (index_{student} - mean\_index_{school})^2 \Big/ n_{index_{student}} - 1$$

where $index_{student}$ is the index score for each student, $mean\_index_{school}$ is the average index score for the school, and $n_{index\_student}$ is the number of index scores for the school.

There are several ways to calculate an appropriate variance estimate, but after several sets of analyses, the NH DOE accepted the recommendation of the National Center for the Improvement of Educational Assessment to use the average within-school variance of schools around the AMO to calculate the confidence intervals.

The stability of the variance estimate depends on having a sufficient number of schools included in the variance calculation. A simple way to ensure a representative sample of schools is to use all schools within ±½ of a standard deviation of the AMO. This year, AMOs were reset for elementary and middle schools and established for high schools for the first time. Therefore, the elementary and middle school variance estimate was recalculated and the high school variance estimate was calculated for its initial year. At the elementary and middle school level, using all schools within ±½ of a standard deviation of the AMO led to the selection of 100 schools for reading and 124 schools for mathematics. At the high school level, this process resulted in the selection of 53 schools for reading and 51 schools for mathematics. In future years when the within-school variance needs to be recalculated, if the ±½ standard deviation results in the selection of fewer than 50 schools, the width of the sample will be increased to include all schools within ±1 standard deviation of the AMO. If the ±1 standard deviation should ever result in the selection of fewer than 50 schools, the width of the sample will be increased until at least 50 schools have been selected. A sample size of at least 50 schools will help ensure the stability of the variance estimate.