**THE NUCLEAR MEDICINE TECHNOLOGY
CERTIFICATION BOARD, INC.**

N M T C B

ANNUAL
EXAMINATION
REPORT
2008

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2008 Statistics At-A-Glance

All Examinees

Total Number:	1712	
Total Number Pass:	1478	86.3%
Total Number Fail:	234	13.6%

Performance breakdown: **Summary Statistics:**

Pass:	967	56.5%		Range of Scores	62 to 99
Pass with Distinction:	326	19.0%		Average Score	79.30
Pass with Highest Distinction:	185	10.8%		Standard Deviation	4.375
Fail:	234	13.7%		Median Score	79

First-Time Examinees (Nuclear Medicine Program Graduates)

Total Number:	1437	
Total Number Pass:	1318	91.7%
Total Number Fail:	119	8.2%

Performance breakdown: **Summary Statistics:**

Pass:	826	57.4%		Range of Scores	62 to 99
Pass with Distinction:	312	21.7%		Average Score	80.1
Pass with Highest Distinction:	180	12.5%		Standard Deviation	4.132
Fail:	119	8.2%		Median Score	80

Repeat Examinees

Total Number:	135	
Total Number Pass:	54	40%
Total Number Fail:	81	60%

Performance breakdown: **Summary Statistics:**

Pass:	53	39.3%		Range of Scores	66 to 83
Pass with Distinction:	1	0.7%		Average Score	73.87
Pass with Highest Distinction:	0	0%		Standard Deviation	2.535
Fail:	81	60.0%		Median Score	74

Alternate Eligibility Examinees

Total Number:	140	
Total Number Pass:	106	75.7%
Total Number Fail:	34	24.2%

Performance breakdown: **Summary Statistics:**

Pass:	88	62.8%		Range of Scores	69 to 92
Pass with Distinction:	13	9.2%		Average Score	77.22
Pass with Highest Distinction:	5	3.5%		Standard Deviation	3.866
Fail:	34	24.2%		Median Score	76

NMTCB Annual Examination Overview
2008

Introduction

This summary report is intended to provide detailed information of the 2008 certification examinations. The report is prepared to primarily meet the need of program directors and administrators. It contains sections addressing the issues of computer adaptive test (CAT) for classification, scaled score information and examination performance. The performance section further includes summary of data by different groups of examinees and visual aids for the year 2008.

Computer Adaptive Test (CAT) for Classification.

In July 1996, the NMTCB began offering a computer adaptive test (CAT) for classification in association with ACT, Inc., The CAT for classification is designed to render a pass/fail decision. That is, in a CAT of this type, examinees are NOT rank-ordered along a score scale according to measured ability; rather, the emphasis is on providing an accurate classification relative to a set pass/fail criterion. In order to administer a CAT for classification, the items themselves are ranked at the decision point on the score scale according to their ability to classify accurately and quickly. Each item in the item pool is associated with the information on its difficulty (the proportion of examinees answering an item correctly) and discrimination (the ability of an item to distinguish between passing and failing individuals) levels. An item that has a difficulty level at or near the passing score and has good discrimination will be a better item for decision-making than another item that is too difficult or too easy or has little ability to discriminate between those examinees who should pass and those who should fail. All items in the pool were classified based on the statistics obtained from the Item Response Theory (IRT) by the psychometric staff at ACT, Inc.

A "classification" CAT is still adaptive in that those examinees whose abilities are far from the passing score (in either direction) will require fewer test items for classification than those whose ability is at or near the passing score. The test will adapt by test length rather than by item difficulty. For the classification CAT, the items that are administered to each and every candidate are the same type: there are no "difficult items for better examinees" or "easier items for poorer examinees." Each examinee answers a total of 80 to 90 items, and the items are different for each examinee.

Items for the classification CAT are selected in the following approximate proportions for each of four content domains of nuclear medicine technology. I. Radiation safety (15%), II. Instrumentation (20%), III. Clinical procedures (45%), and IV. Radiopharmacy (20%).

Decisions for pass/fail were based on the passing score from the benchmark examination administered in September 1993. The September 1993 examination was the first test developed under the current test blueprint. The algorithm used in the classification CAT adjusts for differences in test form difficulty. For example, examinees that receive a CAT that is easier relative to the benchmark exam must answer more items correctly to receive a passing score. Conversely, if a candidate receives a set of items that is more difficult, he/she would be required to answer fewer questions correctly to pass the exam. In essence, each CAT administered is equated so the passing level is appropriate for the set of items selected for administration to each examinee.

The CAT for classification, while providing a high degree of confidence in the pass/fail decision, does not allow the same analysis of individual performance and subgroup performance obtained with the paper and pencil exam. In the past, because all examinees that sat at the same administration of a test took the same test, comparative information was obtained. Because the primary purpose of the CAT exam is to classify examinees as pass or fail, CAT for classification selects items that are optimal for minimizing errors in

classification, a critical consideration in occupation certification programs. Examinees whose ability estimates are close to the passing score require more items to make a pass/fail decision; whereas, those that are clearly significantly above the pass/fail mark need fewer items. Examinees are required to answer every item presented; however, they are permitted to review and change their responses.

Scaled Score Information:

Examination results are reported in terms of the scaled score, the mean scaled score, and a measure of the variability of the scaled score distribution -- the standard deviation.

As noted above, the main objective of the NMTCB CAT is to obtain a pass/fail decision with a high degree of precision. However it was recognized that there are occasions when there is a need to know whether an examinee's performance is close to the passing score or a distance from it. Consequently, scaled scores were developed and reported beginning midway through the 1997 testing cycle and subgroup performance in rank order was made available at this time, also. The scaled score is a transformation of the IRT value that is calculated based on the examinee's responses to the items presented during the examination. The scaled passing score was set to 75. That is, the ability estimate obtained from IRT required to pass the examination was "anchored" at 75. It is very important to note that the scaled score value is not a percentage value. Classifications of passing were set up as "Pass" for a scaled value of 75 through 81, "Pass with Distinction" for a scaled value of 82 through 84 and "Pass with Highest Distinction" for a scaled value of 85 or better.

Overall Examinee Performance:

Please refer to Table 1 for a general overview of the examination. This table presents the number of examinees who took the test, their average scaled score and the pass rate for thirteen years beginning 1996, the year CAT was started, to 2008.

Table 1. 1996 - 2008 NMTCB CAT Examinees

	Number of Examinees	Mean Scaled Score	Overall Pass Rate	Pass Rate for NMT Program Graduates
1996	671	78.9	88.1%	94.4%
1997	757	78.8	85.6%	92.4%
1998	664	78.4	83.8%	92.9%
1999	696	78.3	83.9%	93.0%
2000	792	78.2	81.0%	90.4%
2001	879	77.9	81.9%	90.1%
2002	1072	78.02	78.6%	88.4%
2003	1327	77.99	79.9%	87.1%
2004	1459	78.35	82.6%	91.6%
2005	1652	78.74	84.1%	90.0%
2006	1590	79.05	87.9%	93.7%
2007	1694	79.19	86.7%	91.7%
2008	1712	79.30	86.3%	91.7%

From Table 1, it can be seen that the number of examinees taking the test ranged from a low candidate volume of 664 in 1998 to a high candidate volume of 1712 in 2008. Since the beginning of the CAT, the average scaled scores of examinees have been steadily constant around 78 for thirteen years.

Table 2. 2008 Overall Examinee Performance

	Total Number	Total Number Pass	Pass Percentage for Each Group	Total Number Fail	Fail Percentage for Each Group
Program Graduates	1,437	1318	91.7%	119	8.2%
Repeat Examinees	135	54	40.0%	81	60.0%
Alternate Eligibility	140	106	75.7%	34	24.2%
All Examinees	1,712	1,478	86.3%	234	13.6%

Program Performance 2008:

Table 3 (page 7) provides a percentile rank of the average score of each program for 2008. It provides school's average score and the percentile rank of each score. For

example, if the average scaled score of students graduating from a program is 85.00, the program is ranked to the 97th percentile on the scale.

Table 3. Percentiles by school average

Average Score	Percentile	Average Score	Percentile	Average Score	Percentile
90.17	100	80.57	56	76.91	8
88.86	99	80.50	54	76.83	7
85.83	98	80.44	52	76.67	6
85.80	97	80.43	52	76.62	6
85.00	97	80.33	50	76.38	5
84.33	96	80.30	49	76.20	4
84.17	95	80.25	48	75.78	3
84.14	94	80.19	47	75.75	3
83.60	94	80.17	46	75.50	2
83.57	93	80.11	45	75.00	1
83.43	92	80.08	45	74.50	0
83.33	91	79.93	44		
83.29	90	79.92	43		
83.17	90	79.91	42		
83.14	89	79.90	42		
83.00	87	79.88	41		
82.83	84	79.83	40		
82.77	84	79.58	39		
82.63	83	79.56	39		
82.29	82	79.44	38		
82.22	81	79.41	37		
82.13	80	79.40	36		
82.08	79	79.33	35		
82.00	78	79.29	35		
81.86	77	79.21	34		
81.83	77	79.15	32		
81.80	76	79.14	32		
81.75	75	79.13	30		
81.74	74	79.11	29		
81.70	74	79.00	27		
81.67	73	78.88	26		
81.64	72	78.80	25		
81.60	71	78.56	24		
81.50	71	78.42	23		
81.37	70	78.27	22		
81.36	69	78.25	21		
81.29	68	78.20	20		
81.10	68	78.08	19		
81.09	67	78.00	18		
81.08	66	77.91	16		
81.07	65	77.85	16		
80.90	65	77.82	15		
80.86	63	77.75	14		
80.80	62	77.62	13		
80.78	61	77.60	13		
80.77	61	77.57	12		
80.76	60	77.44	11		
80.75	59	77.40	10		
80.67	58	77.05	10		
80.58	57	76.93	9		

Examinees Group Performance 2008

All Examinees:

A total of 1478 out of 1712 examinees, who attempted, passed the NMTCB certification examination in 2008 (Table 4). Out of those who attempted, 185 examinees (10.8 percent) passed the examination with highest distinction, and 326 examinees (19.0 percent) passed the examination with distinction. A total of 234 examinees failed the examination in 2008. A frequency distribution of all examinees' scaled scores is also presented below (Graph 1).

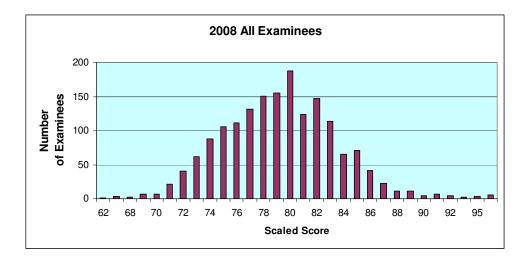**Table 4.** All 2008 Examinees

Total Number:	1712	
Total Number Pass:	1478	(86.3%)
Total Number Fail:	234	(13.6%)

Performance breakdown

Pass:	967	(56.5%)
Pass with Distinction:	326	(19.0%)
Pass with Highest Distinction:	185	(10.8%)
Fail:	234	(13.7%)

Range of scores:	62 through 99
Average score:	79.30
Standard Deviation:	4.375
Median scaled score:	79

Graph 1. All 2008 Examinees
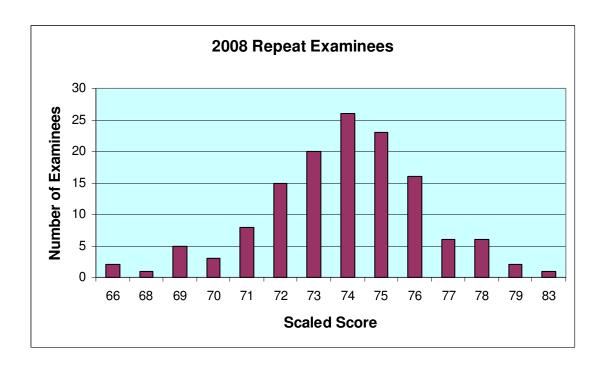

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Repeat Examinees:

135 examinees were repeat examinees in 2008 (Table 5). Of those 54 examinees (40.0 percent) who passed the examination; one person in this group passed the examination with distinction. None passed with highest distinction. A frequency distribution of these repeat examinees scaled scores is also presented below (Graph 2).

Table 5: 2008 Repeat Examinees

Total Number:	135	
Total Number Pass:	54	(40.0%)
Total Number Fail:	81	(60.0%)

Performance Breakdown

Pass:	53	(39.3%)
Pass with Distinction:	1	(0.7%)
Pass with Highest Distinction:	0	(0%)
Fail:	81	(60.0%)

Range of scores:	66 through 83
Average score:	73.87
Standard Deviation:	2.535
Median scaled score:	74

Graph 2. 2008 Repeat Examinees

Alternate Eligibility:

One hundred and forty (140) examinees qualified to sit for the examination through alternate eligibility in 2008 (Table 6). A total of 88 out of 140 examinees (62.8 percent) passed the examination. Five candidates passed the examination with highest distinction, thirteen examinees passed with distinction. A frequency distribution of the alternate eligibility examinees is presented below (Graph 3).

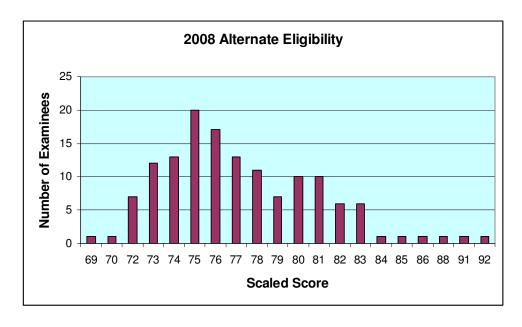**Table 6:** 2008 Alternate Eligibility Examinees

Total Number:	140	
Total Number Pass:	106	(75.7%)
Total Number Fail:	34	(24.2%)

Performance Breakdown

Pass:	88	(62.8%)
Pass with Distinction:	13	(9.2%)
Pass with Highest Distinction:	5	(3.5%)
Fail:	34	(24.2%)

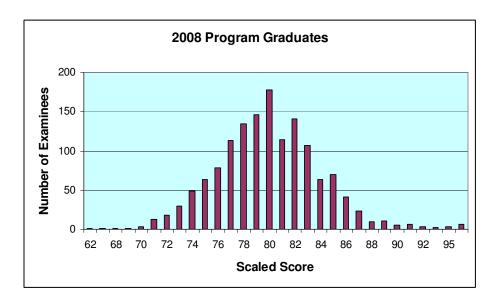| Range of scores:	69 to 92
Average score:	77.22
Standard Deviation:	3.866
Median scaled score:	76

Graph 3. Alternate Eligibility Examinees

NMT Program Graduates - First Time Examinees:

A total of 1437 out of 1712 examinees (91.7 percent) were graduates of nuclear medicine technology training programs (Table 7). All of the scores reported in this section are from graduates taking the NMTCB exam for the first-time. A total of 1318 out of 1437 first-time examinees (91.7 percent) passed the examination in 2008. A total of 180 examinees (12.5 percent) passed the examination with highest distinction and 312 examinees (21.7 percent) passed the examination with distinction. Only 119 examinees (8.2 percent) of these program graduate first-time examinees did not pass the examination in 2008. A frequency distribution of these first-time examinees is provided below (Graph 4).

Table 7. First Time Examinees (Nuclear Medicine Program Graduates)

Total Number:	1437	
Total Number Pass:	1318	(91.7%)
Total Number Fail:	119	(8.8.2%)

Performance Breakdown

Pass:	826	(57.4%)
Pass with Distinction:	312	(21.7%)
Pass with Highest Distinction:	180	(12.5%)
Fail:	119	(8.2%)

Range of scores:	62 to 99
Average score:	80.1
Standard Deviation:	4.132
Median scaled score:	80

Graph 4. First Time Examinees (Nuclear Medicine Program Graduates)

Summary

Overall, the year 2008 was a successful year for both program directors of nuclear medicine technology programs and students of those programs. Ninety-one percent of 1437 examinees who graduated from nuclear medicine technology training programs passed the examination in 2008. Among those examinees who passed the examination in their first attempt, about one out of three (33.9 percent) passed the examination with distinction or highest distinction.

As always, the NMTCB remains sensitive to the needs of the program directors and their students. The Board is committed to offering the premier certification program for nuclear medicine technologists. Please let us know if there is anything that should be included in future exam reports. We welcome your comments/suggestions.

NMTCB

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