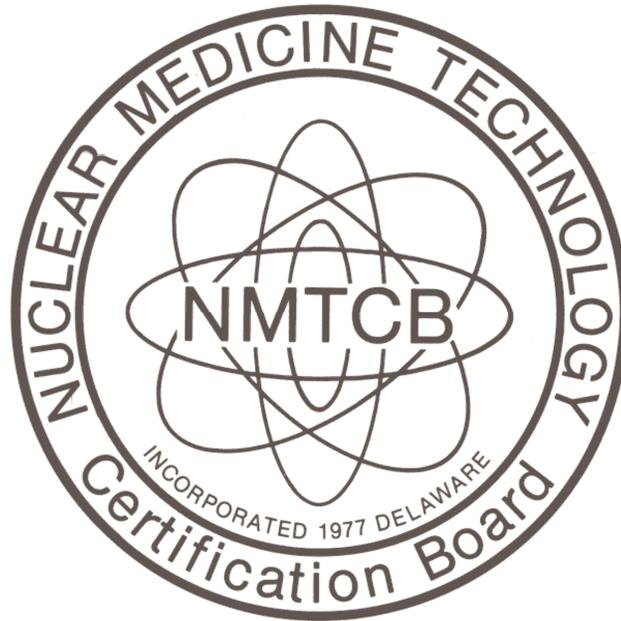


**THE NUCLEAR MEDICINE TECHNOLOGY  
CERTIFICATION BOARD, INC.**

# **N M T C B**

**ANNUAL  
EXAMINATION  
REPORT  
2007**



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## 2007 Statistics At-A-Glance

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### All Examinees

Total Number:	1694	
Total Number Pass:	1469	86.7%
Total Number Fail:	225	13.3%

#### Performance breakdown:

#### Summary Statistics:

Pass:	981	57.9%		Range of Scores	62 to 99
Pass with Distinction:	316	18.6%		Average Score	79.19
Pass with Highest Distinction:	172	10.2%		Standard Deviation	4.406
Fail:	225	13.3%		Median Score	79

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### First-Timers (Nuclear Medicine Program Graduates)

Total Number:	1435	
Total Number Pass:	1316	91.7%
Total Number Fail:	119	8.3%

#### Performance breakdown:

#### Summary Statistics:

Pass:	844	58.9%		Range of Scores	62 to 99
Pass with Distinction:	301	21.0%		Average Score	79.87
Pass with Highest Distinction:	169	11.8%		Standard Deviation	4.166
Fail:	119	8.3%		Median Score	80

---

### Repeaters

Total Number:	152	
Total Number Pass:	68	44.7%
Total Number Fail:	84	55.3%

#### Performance breakdown:

#### Summary Statistics:

Pass:	68	44.7%		Range of Scores	67 to 80
Pass with Distinction:	0	0%		Average Score	74.00
Pass with Highest Distinction:	0	0%		Standard Deviation	2.874
Fail:	84	55.3%		Median Score	74

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### Alternate Eligibility Examinees

Total Number:	107	
Total Number Pass:	85	79.4%
Total Number Fail:	22	20.6%

#### Performance breakdown:

#### Summary Statistics:

Pass:	68	63.6%		Range of Scores	65 to 88
Pass with Distinction:	14	13.1%		Average Score	77.42
Pass with Highest Distinction:	3	2.7%		Standard Deviation	3.919
Fail:	22	20.6%		Median Score	77

# NMTCB Annual Examination Overview 2007



## **Introduction**

This summary report is intended to provide detailed information of the 2007 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 2007.

## **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 twelve years beginning 1996, the year CAT was started, to 2007.

**Table 1.** 1996 - 2007 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%

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 1694 in 2007. Since the beginning of the CAT, the average scaled scores of examinees have been steadily constant around 78 for twelve years.

**Table 2.** 2007 Overall Examinee Performance

	Total Number	Total Number Pass	Pass Percentage for Each Group	Total Number Fail	Fail Percentage for Each Group
Program Graduates	1,435	1316	91.7%	119	8.3%
Repeaters	152	68	44.7%	84	55.3%
Alternate Eligibility	107	85	79.4%	22	20.6%
<b>All Examinees</b>	<b>1,694</b>	<b>1,469</b>	<b>86.7%</b>	<b>225</b>	<b>13.3%</b>

## Program Performance 2007:

Table 3 (page 7) provides a percentile rank of the average score of each program for 2007. 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 85.08, the program is ranked to the 95<sup>th</sup> percentile on the scale.

**Table 3.** Percentiles by school average

Average score	Percentile
92.50	100
86.60	99
86.33	98
85.67	97
85.40	96
85.08	95
84.45	94
84.33	93
84.00	93
83.20	92
83.14	91
82.90	89
82.88	89
82.38	88
82.29	87
82.25	86
82.23	85
82.22	85
82.15	84
82.13	83
82.00	82
81.94	81
81.90	80
81.82	79
81.80	78
81.79	77
81.75	76
81.70	75
81.67	74
81.60	74
81.50	72
81.43	70
81.30	70
81.29	69
81.18	68
81.14	67
81.07	67
81.00	65
80.78	64
80.77	63
80.67	63
80.56	61
80.50	60
80.33	59
80.25	58
80.22	57
80.20	55
80.18	54
80.16	53
80.11	52
80.00	50
79.92	49

Average Score	Percentile
79.88	48
79.83	46
79.71	45
79.67	44
79.60	44
79.56	43
79.50	42
79.43	40
79.42	39
79.41	38
79.33	37
79.27	35
79.25	34
79.20	32
79.14	31
79.12	30
79.00	29
79.86	28
78.80	27
78.78	26
78.76	26
78.75	25
78.67	24
78.60	23
78.57	22
78.53	22
78.47	21
78.43	20
78.33	19
78.25	19
78.16	18
78.14	17
78.00	16
77.93	15
77.87	15
77.75	14
77.70	13
77.62	12
77.60	11
77.25	10
77.24	9
77.00	8
76.86	7
76.67	6
76.27	5
76.22	4
76.17	4
76.13	3
72.00	2
67.00	1
65.50	0

## Examinees Group Performance 2007

### All Examinees:

A total number of 1469 examinees, out of 1694 who attempted, passed the NMTCB certification examination in 2007 (Table 4). Only 172 examinees (10.2% percent) out of those who attempted, passed the examination with highest distinction, and 316 examinees (18.6 percent) passed the examination with distinction. A majority of students, 981 out of 1694, (57.9 percent) simply passed the examination. A total of 225 examinees failed the examination in 2007. A frequency distribution of these examinees' scaled scores is also presented below (Graph 1).

**Table 4.** All 2007 Examinees

Total Number:	1694	
Total Number Pass:	1469	(86.7%)
Total Number Fail:	225	(13.3%)

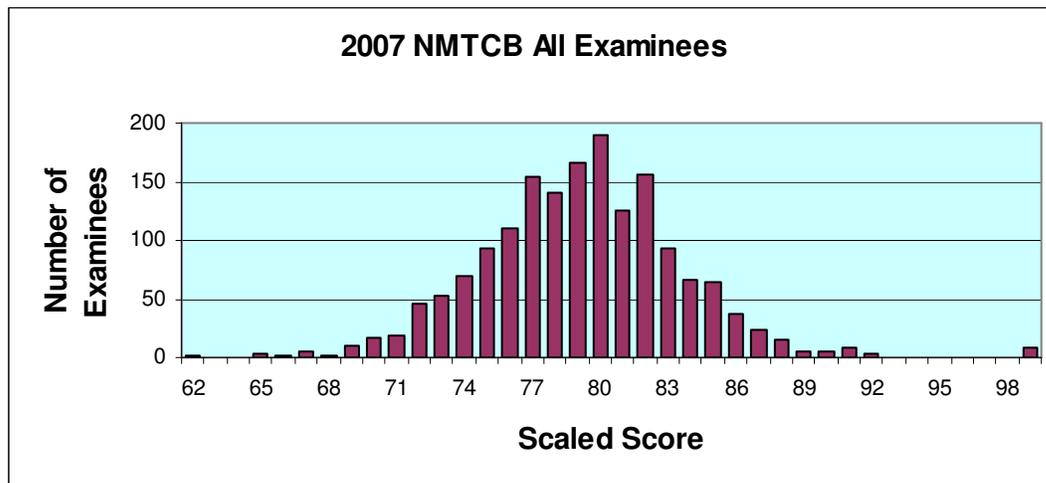
  

<b>Performance breakdown</b>		
Pass:	981	(57.9%)
Pass with Distinction:	316	(18.6%)
Pass with Highest Distinction:	172	(10.2%)
Fail:	225	(13.3%)

Range of scores:	62 through 99
Average score:	79.19
Standard Deviation:	4.406
Median scaled score:	79

**Graph 1.** All 2007 Examinees



**Repeaters:**

Out of the total of 1694, 152 examinees were repeater examinees in 2007 (Table 5). Out of 152, only 68 examinees (44.7 percent) passed the examination; however, none in this group passed the examination with distinction or with highest distinction. A frequency distribution of these repeaters scaled scores is also presented below (Graph 2).

**Table 5:** 2007 Repeaters

Total Number:	152	
Total Number Pass:	68	(44.7%)
Total Number Fail:	84	(55.3%)

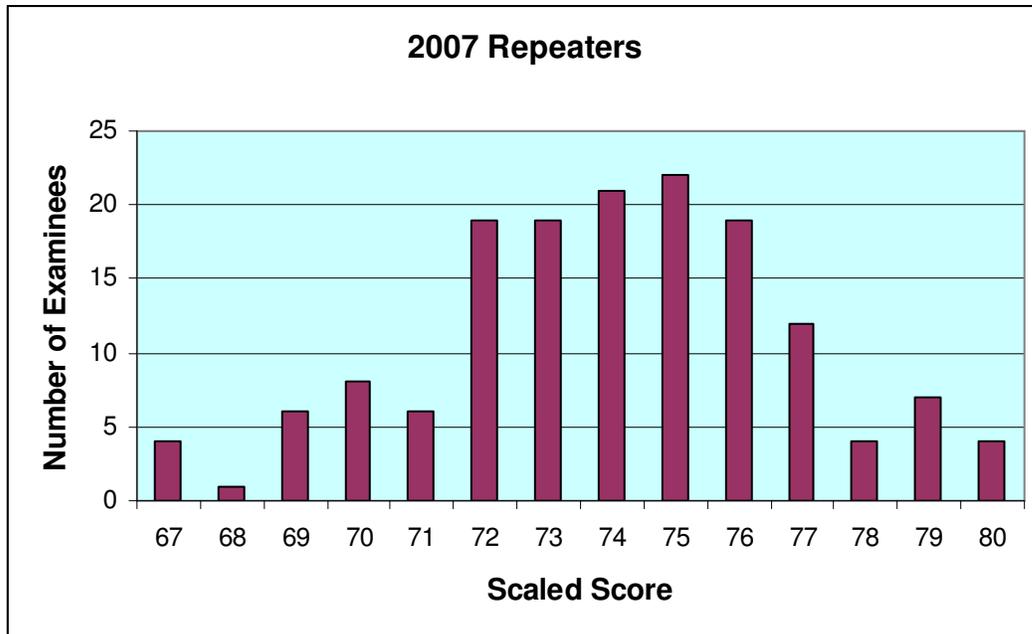
  

<b>Performance Breakdown</b>		
Pass:	68	(44.7%)
Pass with Distinction:	0	(0%)
Pass with Highest Distinction:	0	(0%)
Fail:	84	(55.3%)

Range of scores:	67 through 80
Average score:	74.00
Standard Deviation:	2.874
Median scaled score:	74

**Graph 2.** 2007 Repeaters



**Alternate Eligibility:**

One hundred and seven (107) examinees were alternate eligibility examinees in 2007 (Table 6). A total of 85 out of 107 examinees (79.4 percent) passed the examination. Three candidates passed the examination with highest distinction, fourteen examinees passed with distinction. A frequency distribution of the alternate eligibility examinees is presented below (Graph 3).

**Table 6:** 2007 Alternate Eligibility Examinees

Total Number:	107	
Total Number Pass:	85	(79.4%)
Total Number Fail:	22	(20.6%)

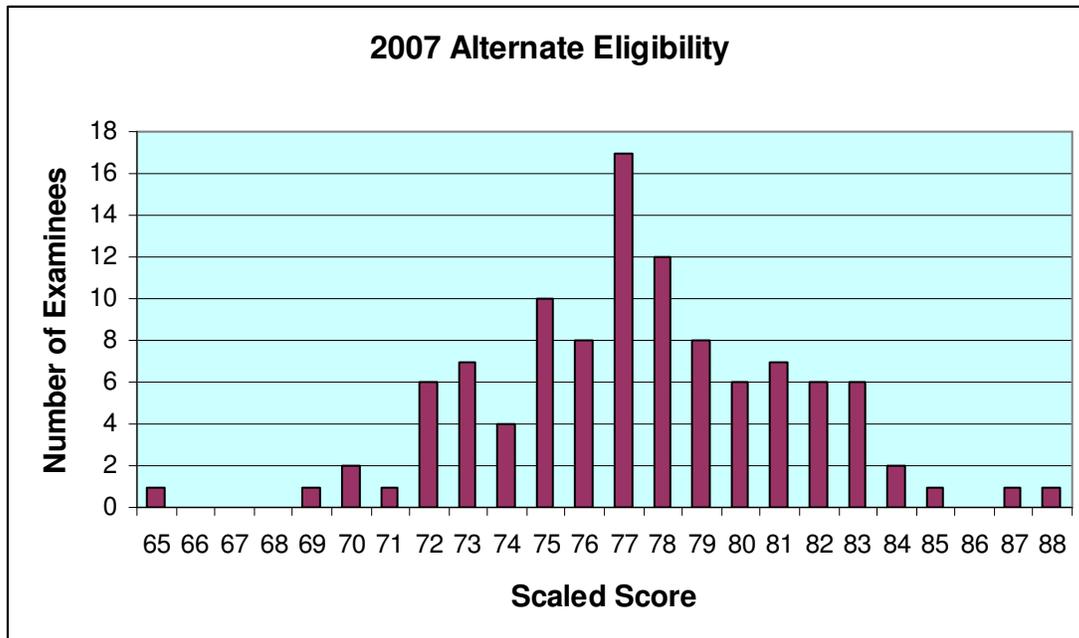
**Performance Breakdown**

Pass:	68	(63.6%)
Pass with Distinction:	14	(13.1%)
Pass with Highest Distinction:	3	(2.7%)
Fail:	22	(20.6%)

Range of scores:	65 to 88
Average score:	77.42
Standard Deviation:	3.919
Median scaled score:	77

**Graph 3.** Alternate Eligibility Examinees



**NMT Program Graduates - First Timers:**

A total number of 1435 out of 1694 examinees (84.7 percent) were graduates of nuclear medicine 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 1316 out of 1435 first-time examinees (91.7 percent) passed the examination in 2007. A total of 169 examinees (11.8 percent) passed the examination with highest distinction and 301 examinees (21.0 percent) passed the examination with distinction. A majority of students, 844 out of 1435, (58.9 percent) simply passed the examination. Only 119 examinees (8.3 percent) of these first-timers did not pass the examination in 2007. A frequency distribution of these first-timers is provided below (Graph 4).

**Table 7.** First Timers (Nuclear Medicine Program Graduates)

Total Number:	1435	
Total Number Pass:	1316	(91.7%)
Total Number Fail:	119	(8.3%)

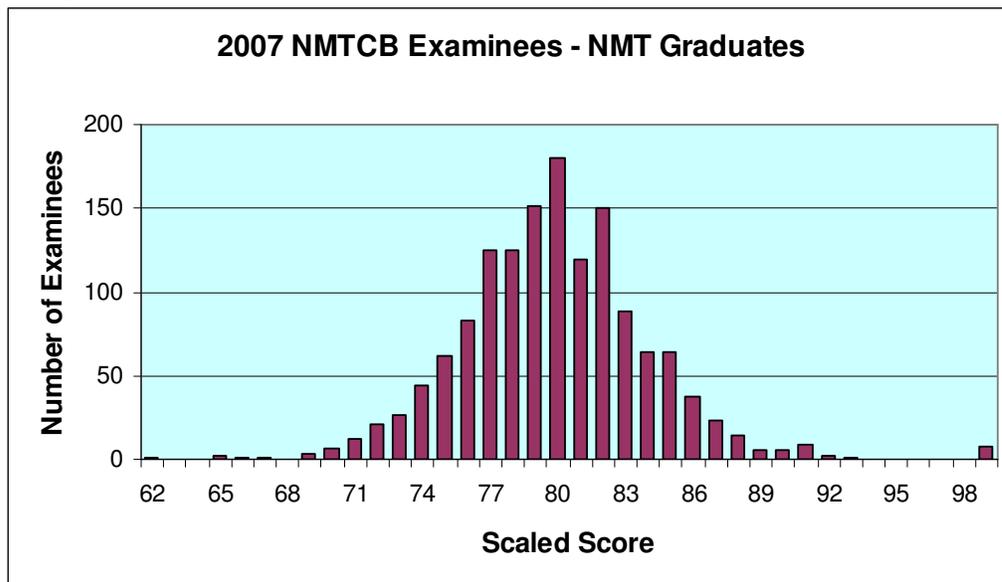
**Performance Breakdown**

Pass:	844	(58.9%)
Pass with Distinction:	301	(21.0%)
Pass with Highest Distinction:	169	(11.8%)
Fail:	119	(8.3%)

Range of scores:	62 to 99
Average score:	79.87
Standard Deviation:	4.166
Median scaled score:	80

**Graph 4.** First Timers (Nuclear Medicine Program Graduates)



## **Summary**

Overall, the year 2007 remains a successful year for both program directors of nuclear medicine technology programs and students of those programs. Ninety-one percent of 1435 examinees who graduated from nuclear medicine programs passed the examination in 2007. Among those examinees who passed the examination in their first attempt, about one out of four (35.7 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.

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