

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555

September 12, 1994

NRC INFORMATION NOTICE 94-65: POTENTIAL ERRORS IN MANUAL BRACHYTHERAPY DOSE CALCULATIONS GENERATED USING A COMPUTERIZED TREATMENT PLANNING SYSTEM

Addressees

All U.S. Nuclear Regulatory Commission medical licensees.

Purpose

NRC is issuing this information notice to alert addressees to an event involving errors in the calculation of dose tables and isodose curves for several brachytherapy treatments and to the potential for errors in computer-generated dose calculations for brachytherapy treatment plans. It is expected that recipients will review the information for applicability to their operation and consider action, as appropriate, to avoid similar problems. However, information contained in this notice does not constitute new NRC requirements; therefore, no specific action nor written response is required.

Description of Event

Recently, NRC was notified of several events, at two NRC-licensed facilities, involving multiple patients receiving manual cesium-137 (Cs-137) brachytherapy treatments. The radiation dose administered to eleven patients was calculated to be in excess of the dose prescribed by the authorized users, by 5 to 30 percent.

The licensees used a Theratronics Theraplan/TP11 treatment planning system to perform the dosimetry calculations for linear Cs-137 sources. Through a detailed review of backup versions of the data files and discussion with Theratronics, the licensees determined that at some point before September 1992, the treatment planning system users re-entered data for Cs-137 as linear sources because a data file had been inadvertently deleted from the system. The Theraplan system, as supplied, contains sample data for radium-226 (Ra-226), iodine-125, and palladium-103 as linear sources, but no similar data for Cs-137. The user must enter 10 parameters to characterize linear sources other than those supplied by the vendor. The user manual and software offers, as an alternative, direct entry of a data table from a published source. However, due to a known "bug" in the version of the program used by this licensee, that option was not available. The computer-generated dose tables that were computed using erroneous data were in error by as much as 20 to 25 percent.

When the treatment planning system was originally set up, the vendor's representative assisted the licensee in entering the treatment parameters, and

9409070084

updated on
9/28/94

PDR I+E Notice 94-065 940912

✓ FOI ID#R-11c
111 Info Notice

the correct values were used. However, based on information provided by Theratronics, review of data files and testing of the software, it appears that when the users re-entered data for the Cs-137 source files in 1992, they entered the value of zero for the filter attenuation coefficient (to correct for attenuation by the source capsule). The software recognized the keyboard entry of zero as selection of an option to use an existing non-zero default value. The users relied upon the screen prompts to reenter the data.

In the case at hand, the software program displayed the value "0.0" both to the user on the screen and in the hard copy printout of the linear source data table entered by the user. The information displayed to the user on the computer monitor for this program did not indicate that the "0.0" was, in fact, a default value. The instructions in the technical manual regarding the use of default values were in a chapter on external beam treatment planning. The user was not aware that a default value selection option existed in this portion of the program, nor that the value zero would not be accepted as a valid numerical entry.¹

Data tables for radium with a platinum filter are commonly used for non-radium sources at some facilities when the sources or treatments are described in milligrams-radium-equivalent (mgRaeq). The Cs-137 line sources with stainless steel filters (source encapsulation wall material) are comparable to Ra-226 sources filtered with 0.5 mm platinum. In this case, the users entered a gamma constant that was equivalent to Ra-226, as filtered by 0.5 mm of platinum. However, because of the default value selected for the attenuation factor when "0.0" was entered, a non-zero value was selected.

The users erroneously checked the computer-generated dose tables against along-and-away dose tables (Quimby tables²) developed for Ra-226 sources filtered by 1.0 mm of platinum. There was a failure to identify the error in the computer-generated dose values that were lower than would have been generated using correct parameters to characterize the Cs-137 sources. If the correct table (for Ra-226 sources filtered by 0.5 mm of platinum) had been used to check the calculations, the discrepancy in the computer-generated dose values would have been identified and could have been adjusted by adjusting the data elements. Coincidentally, the net result of the user's data re-entry and use of an incorrect data table for verification, was that the dose rate

¹ A zero entry might be considered by the user during the process of fitting data computed by the treatment planning system to published data. That process involves an iterative adjustment to fitting factors among the ten data elements entered into the IMPLNT.DAT file until an adequate fit to measured data is obtained. First, it would be typical to adjust the gamma constant (i.e., exposure rate constant) entered into the IMPLNT.DAT file and have the computer recalculate data for comparison with published data. Depending on the success of adjustments to the gamma constant, the next data element to be adjusted would be the filter attenuation coefficient, and that adjustment process might reasonably be expected to include an entry of zero.

² Goodman, Quimby, et al, Physical Foundations of Radiology, Harper and Row

tables calculated by the treatment planning system appeared accurate within approximately 5 percent.

One of the licensees discovered, through routine verification of a patient treatment plan, that the computer-generated dose table had values lower than expected when compared with published dose tables for Cs-137 (Krishnaswamy tables³). After subsequent review and investigation, the licensee detected the error in the selection of one parameter used to define the physical characteristics of the Cs-137 sources.

Although both licensees had a written Quality Management Program (QMP), the treatment planning system that was involved in these events was owned and located at a cancer center that is jointly financed by the two licensees. Because the individual who performed the calculations was employed by the cancer center, neither licensee had detailed procedures to address the treatment planning as part of the QMP. The licensees assumed that the authorized users had responsibility for oversight of all aspects of the patients' treatments and that the licensee need only be aware of those aspects of the treatment actually conducted at the licensee's facility.

Discussion of Root Cause and Contributing Factors

An NRC team consisting of two risk assessment engineers, a medical physicist, and a radiation oncologist identified multiple causes of this event, including: the selection of an inappropriate reference table to check the computer-generated output dose calculations; use of the same incorrect table during the manual checks of the treatment plans; the inadvertent use of the default function for the filter attenuation factor used by the planning computer; lack of an independent review of treatment plans; lack of formal policies to control or record the modification of the planning software; lack of clear, formal policies governing the use of the computerized planning system; lack of oversight by the Radiation Safety Officer (RSO) or Radiation Safety Committee (RSC) at either hospital over the treatment planning for the brachytherapy procedures performed at their facilities; and poor software design and documentation. The team identified software deviations from many accepted standards of user-computer interface design.

Root Cause: The root cause of the brachytherapy events was a failure to adequately validate the data used in the computer planning system. Specifically, an error was made in performing an independent verification of computer-generated dose tables and patient treatment plans.

Software and Erroneous Data Files: Although the validation error in the use of an inappropriate reference table was the root cause of the brachytherapy errors, there was also an error in the data parameter entry such that the computer-generated dose values were too low. According to the licensee, this problem has been corrected in subsequent versions of the software.

³ V. Krishnaswamy, "Dose Distributions about Cs-137 Sources in Tissue," Radiology 105:181-184, 1972.

A meeting was held between NRC and FDA to discuss the computer software problems associated with these events. At the time of the incident, FDA had an Import Alert in effect on the Theraplan treatment planning system resulting from a review of the manufacturer's Good Manufacturing Practices. However, on July 26, 1994, FDA cleared the Theraplan V05B/TP-11 V09B treatment planning system which will allow modifications to be made to existing software, as well as the import of new software. In addition, FDA is working with NRC in its review of this incident.

Other Contributing Factors: There were several other contributing factors as described above. There was no independent review or check of the treatment plans until the patient treatment in which the error was identified. Secondly, there were no formal policies and barriers to control or record the modification of the software or governing the use of the computerized planning system. Formal policies on file modification, and password or key protection may have prevented the loss of the original Cs-137 parameter set. In addition, formal policies governing the use of the planning system could have included mechanisms to handle inadvertent data loss such as use of backup or archived files or use of the technical manual for data reentry. Finally, there was little or no oversight by the RSO or RSC at either hospital over the treatment planning for the brachytherapy procedures performed at their facilities. Furthermore, the inspection findings revealed that the RSO/RSC for both licensees appeared to act as if the manual-afterloading treatment planning performed at the cancer center did not fall under their hospitals' NRC licenses.

General Discussion

This case highlights the importance of verifying data entry and performing independent checks of computer-generated dose tables and treatment plans. In addition, when data files are deleted, by whatever means, users should consider comparing data entry with older versions of the file, if backup files are available, to provide a second means of verifying data entry. This case also emphasizes the need for the manufacturer to provide adequate training for the user, regarding the use of the software in order to understand the logic of programs used in treatment planning systems and the need to be familiar with the conventions used by any software manufacturer for data entry. Although there were instructions in the technical manual indicating that when a default value was available as an option that entering zero or using the return key would result in use of the default value, they were only described in a chapter regarding external beam treatment planning.

Licensees using the Theraplan treatment planning system are encouraged to review computer-generated dose tables for linear sources other than Ra-226, or other sources for which data files have been manually entered, and to review the parameters currently in use on the treatment planning system, to verify their accuracy. In addition, users should ensure that they are familiar with the conventions used for accepting default values and with all parameters for which default values exist.

the conventions used for accepting default values and with all parameters for which default values exist.

Licenses are also reminded of the importance of appropriate oversight of the licensee's radiation safety program and QMP. Radiation therapy has changed in recent years and frequently involves multiple individuals from potentially separate organizations in the planning and administration of radioactive material to patients. In addition, if authorized users treat patients at more than one facility, each facility might have different QMPs. It is critical that licensee management ensure that individuals are properly instructed in the licensee's written QMP and that there are adequate mechanisms for oversight in place to determine that the QMP is effectively implemented by the appropriate individuals to provide high confidence that byproduct material is administered as directed by the authorized user.

This information notice requires no specific action nor or written response. If you have any questions about the information in this notice, please contact the technical contacts listed below, or the appropriate NRC regional office.

Carl J. Paperiello, Director
 Division of Industrial and
 Medical Nuclear Safety
 Office of Nuclear Material
 Safety and Safeguards

Technical contacts: Patricia K. Holahan, NMSS
 (301) 415-7847

Linda L. Kasner, RIV
 (817) 860-8213

*See attached concurrence ** See previous concurrence

OFC	IMAB	E	RIV**	E	IMAB**	E	IMAB**	E	IMOB**	E
NAME	PKHolahan		LKasner		LWCamper		JEGlenn		FCCombs	
DATE	08/30/94		06/03/94		06/27/94		07/06/94		07/11/94	
OFC	OGC		DD/IMNS		DAIMNS		TechEd*			
NAME	STreby		EWBrach		CJPaperiello		EKraus			
DATE	06/ /94		08/3/94		08/30/94		05/24/94			

C = COVER

E = COVER & ENCLOSURE

N = NO COPY

OFFICIAL RECORD COPY/G:\BILLINGS.INR

PDR QUALITY CONTROL ACCESSION LIST

ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS	FILE PACKAGE#	DTC	AA1	DIN	DPN	DR	RA1	SN
NO. OF PAGES	SIZE					AA2				RA2	
FORMAL REPORT NO.						AA3				RA3	
AVL	DLIST										
TITLE/DESCRIPTION											
9409070084	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY
10pp.	A4	PDR	ADOCK 05000003 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000010 G		940912					EUTAPL	
PDR	DF01									EUTBECO	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	01 940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY 01
10pp.	A4	PDR	ADOCK 05000029 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000133 G		940912					EUTBGE	
PDR	DF01									EUTCEIL	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	02 940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY 02
10pp.	A4	PDR	ADOCK 05000155 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000206 G		940912					EUTALPR	
PDR	DF01									EUTYAE	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	03 940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY 03
10pp.	A4	PDR	ADOCK 05000213 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000219 G		940912					EUTCLEI	
PDR	DF01									EUTCPC	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	04 940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY 04
10pp.	A4	PDR	ADOCK 05000220 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000237 G		940912					EUTCPL	
PDR	DF01									EUTCYAP	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	05 940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065			EUTCENY 05
10pp.	A4	PDR	ADOCK 05000244 G		940912		PAPERIELLO, C. J.				
		PDR	ADOCK 05000245 G		940912					EUTDAYP	
PDR	DF01									EUTDE	
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								

PDR QUALITY CONTROL ACCESSION LIST

ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS	FILE PACKAGE#	DTC	AA1	DIN	DPN	DR	RA1	SN
NO. OF PAGES	SIZE					AN1				RN1	
FORMAL REPORT NO.						AN2		RA2		RN2	
AVL DLIST						AN3		RA3		RN3	
TITLE/DESCRIPTION											
9409070084	06	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	06
10pp.	A4		PDR ADDOCK 05000247 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000249 G	940912							
PDR DFO1								EUTDL			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTDPC			
9409070084	07	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	07
10pp.	A4		PDR ADDOCK 05000250 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000251 G	940912							
PDR DFO1								EUTFPC			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTFPL			
9409070084	08	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	08
10pp.	A4		PDR ADDOCK 05000254 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000255 G	940912							
PDR DFO1								EUTGAP			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTGPU			
9409070084	09	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	09
10pp.	A4		PDR ADDOCK 05000259 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000260 G	940912							
PDR DFO1								EUTGSU			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTHLP			
9409070084	10	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	10
10pp.	A4		PDR ADDOCK 05000261 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000263 G	940912							
PDR DFO1								EUTIELP			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTILPR			
9409070084	11	940912	PDR I&E NOTICE94-065	940912	9409070084	TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	11
10pp.	A4		PDR ADDOCK 05000265 G	940912			PAPERIELLO, C. J.				
			PDR ADDOCK 05000266 G	940912							
PDR DFO1								EUTIMEC			
NRC Info Notice 94-065,			"Potential Errors in Manual				Brachytherapy Dose Calculations Generated Using Computerized				
Treatment Planning Sys."								EUTLAPL			

ACCESSION# SN DOC. DATE		FILE LOCATIONS / LEVELS		PDR QUALITY CONTROL ACCESSION LIST		AA1	DIN	DPN DR RA1	SN	
NO. OF PAGES SIZE				FILE PACKAGE#	DTC	AN1		RA2	RN1	
FORMAL REPORT NO.						AN2		RA3	RN2	
AVL DLIST						AN3			RN3	
TITLE/DESCRIPTION										
9409070084	24	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	24
10pp.	A4		PDR ADOCK 05000309 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000311 G		940912				EUTVEPC	
			PDR DF01						EUTVYNP	
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	25	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	25
10pp.	A4		PDR ADOCK 05000312 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000313 G		940912				EUTHIEP	
			PDR DF01						EUTWOLF	
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	26	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	26
10pp.	A4		PDR ADOCK 05000315 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000316 G		940912				EUTWPPS	
			PDR DF01						EUTWPPS	
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	27	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	27
10pp.	A4		PDR ADOCK 05000317 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000318 G		940912				EUTAZPS	
			PDR DF01						EMVOPS	
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	28	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	28
10pp.	A4		PDR ADOCK 05000320 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000321 G		940912				EUSDOEC	
			PDR DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	29	940912	PDR I&E	NOTICE94-065	940912	9409070084	TIIIEIN NOMACDI IEIN-94-065		EUTCENY	29
10pp.	A4		PDR ADOCK 05000322 G		940912		PAPERIELLO, C. J.			
			PDR ADOCK 05000323 G		940912					
			PDR DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			

PDR QUALITY CONTROL ACCESSION LIST

ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS	FILE PACKAGE#	DTC	AA1	DIN	DPN	DR	RA1	SN	
NO. OF PAGES	SIZE					AA2	AN1			RN1		
FORMAL REPORT NO.						AA3	AN2		RA2	RN2		
AVL	DLIST						AN3		RA3	RN3		
TITLE/DESCRIPTION												
9409070084	30	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	30
10pp.	A4		PDR ADDCK 05000324 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000325 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												
9409070084	31	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	31
10pp.	A4		PDR ADDCK 05000327 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000328 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												
9409070084	32	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	32
10pp.	A4		PDR ADDCK 05000329 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000330 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												
9409070084	33	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	33
10pp.	A4		PDR ADDCK 05000331 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000333 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												
9409070084	34	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	34
10pp.	A4		PDR ADDCK 05000334 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000335 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												
9409070084	35	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN	NOMACDI	IEIN-94-065		EUTCENY	35
10pp.	A4		PDR ADDCK 05000336 G	940912					PAPERIELLO, C. J.			
			PDR ADDCK 05000338 G	940912								
PDR DFO1												
NRC Info Notice 94-065, "Potential Errors in Manual Brachytherapy Dose Calculations Generated Using Computerized Treatment Planning Sys."												

PDR QUALITY CONTROL ACCESSION LIST											
ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS		FILE PACKAGE#	DTC	AA1	DIN	DPN DR RA1	SN	
NO. OF PAGES	SIZE	FORMAL REPORT NO.					AN1		RN1		
AVL	DLIST	TITLE/DESCRIPTION					AN2	RA2	RN2		
							AN3	RA3	RN3		
9409070084	36	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	36
10pp.	A4		PDR	ADOCK 05000339	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000341	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				
9409070084	37	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	37
10pp.	A4		PDR	ADOCK 05000344	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000346	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				
9409070084	38	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	38
10pp.	A4		PDR	ADOCK 05000348	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000352	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				
9409070084	39	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	39
10pp.	A4		PDR	ADOCK 05000353	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000354	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				
9409070084	40	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	40
10pp.	A4		PDR	ADOCK 05000171	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000361	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				
9409070084	41	940912	PDR	I&E	NOTICE94-065	940912	9409070084	TIIEIN NOMACDI	IEIN-94-065	EUTCENY	41
10pp.	A4		PDR	ADOCK 05000362	G	940912		PAPERIELLO, C. J.			
			PDR	ADOCK 05000364	G	940912					
			PDR	DF01							
			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized				

ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS	PDR QUALITY CONTROL ACCESSION LIST			DIN	DPN	DR	RA1	SN
				FILE PACKAGE#	DTC	AA1					
NO. OF PAGES	SIZE					AA1					
FORMAL REPORT NO.						AN1				RA2	RA3
AVL DLIST						AN2				RN1	RN2
TITLE/DESCRIPTION						AN3				RN3	
9409070084	42	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000366 G PDR ADDCK 05000368 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	42
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	43	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000369 G PDR ADDCK 05000370 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	43
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	44	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000373 G PDR ADDCK 05000374 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	44
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	45	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000382 G PDR ADDCK 05000387 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	45
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	46	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000388 G PDR ADDCK 05000389 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	46
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								
9409070084	47	940912	PDR I&E NOTICE94-065 PDR ADDCK 05000390 G PDR ADDCK 05000391 G	940912	9409070084	TIIIEIN NOMACDI PAPERIELLO, C. J.	IEIN-94-065			EUTCENY	47
10pp.	A4			940912							
PDR DFO1				940912							
NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."			Brachytherapy Dose Calculations Generated Using Computerized								

PDR QUALITY CONTROL ACCESSION LIST										
ACCESSION#	SN	DOC. DATE	FILE LOCATIONS / LEVELS	FILE PACKAGE#	DTC	AA1	DIN	DPN DR RA1	SN	
NO. OF PAGES	SIZE					AA2	AN1			
FORMAL REPORT NO.						AA3	AN2	RA2	RN1	
AVL DLIST							AN3	RA3	RN2	
TITLE/DESCRIPTION									RN3	
9409070084	48	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	48
10pp.	A4		PDR ADDOCK 05000395 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000397 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	49	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	49
10pp.	A4		PDR ADDOCK 05000400 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000409 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	50	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	50
10pp.	A4		PDR ADDOCK 05000410 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000412 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	51	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	51
10pp.	A4		PDR ADDOCK 05000413 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000414 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	52	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	52
10pp.	A4		PDR ADDOCK 05000416 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000529 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			
9409070084	53	940912	PDR I&E NOTICE94-065	940912	9409070084		TIIEIN NOMACDI IEIN-94-065		EUTCENY	53
10pp.	A4		PDR ADDOCK 05000423 G	940912			PAPERIELLO, C. J.			
			PDR ADDOCK 05000424 G	940912						
PDR DFO1			NRC Info Notice 94-065, "Potential Errors in Manual Treatment Planning Sys."				Brachytherapy Dose Calculations Generated Using Computerized			

000067 RECORDS SCANNED 66 RECORDS PRINTED (1 RECORDS. 65 SUPP.)
ENDING CODE- 1001 LAST KEY- 9409070085