

## ***TECHNICAL MEMORANDUM 0806***

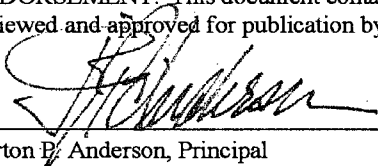
September 25, 2008

Originator: Barton P. Anderson

***Subject: Kodak CFX Gamma Background Survey***

**Revision: 0**

ENDORSEMENT: This document contains the results of research and technical analysis which have been reviewed and approved for publication by:



9/25/08

Barton P. Anderson, Principal

Date

### **1 INTRODUCTION**

- 1.1 In the late fall of 2007, NEXTEP de-fueled the Kodak CFX in accordance with License SNM-1513 and conducted a Radiological Characterization Survey of the basement labyrinth located at the Kodak Research Park in Rochester, NY. The Radiological Characterization Report (RCR), a revised Decommissioning Plan (DPlan), and a Final Status Survey (FSS) Plan were submitted to the Nuclear Regulatory Commission (NRC) in May, 2008. The NRC declined to accept the documents by letter dated August 20, 2008 and requested clarification and/or additional information in three areas.

### **2 SCOPE**

- 2.1 This paper addresses the third question posed by the NRC in their letter which is quoted as follows:

*"The submittal does not provide enough information regarding background gamma measurements as related to the characterization survey. Section 2.2.2 states that gamma background was measured in the cavity during the characterization survey. This area is an affected area as shown in Table 2.1. Explain in more detail the reason for taking gamma background in this area and how this may affect the release criteria."*

### 3 RESULTS AND DISCUSSION

- 3.1 Beta measurements taken throughout the labyrinth during Characterization revealed no evidence of either removable or fixed licensed materials contamination. In addition, gamma measurements taken in the corner of the sub-basement cavity where the CFX was housed (room C1<sup>1</sup>) demonstrated that activation of the surrounding concrete was limited to the walls and floor of room C-1. Consequently, room C2 was considered acceptable for measurement of gamma background. Moreover, in light of the gamma threshold described in the RCR (§2.4.4) and developed in NEXTEP Technical Memorandum (TM) 0801<sup>2</sup>, background was immaterial to the results.
- 3.2 Five minute background counts were performed in the middle of room C2 during Characterization and then were repeated after Characterization once the mounting pad had been removed from room C1. These results are presented in the RCR and in the Table 1 summary below. The lower gamma background value of 2,791 cpm was used to calculate net gamma for comparison to the net gamma scan threshold of 360,000 cpm (RCR §4.1.1). The background value used was considered conservative because gross gamma measurements collected during the Characterization Survey would have contained a gamma background contribution from the activated concrete in the mounting pad.
- 3.3 Additional gamma background data were collected in the laboratory control room above the labyrinth in January along with the matrix-specific beta background measurements used for the RCR. The data are presented in Table A-1 of Attachment A.
- 3.4 Another Gamma background survey was performed in September, 2008 for confirmation purposes. Data were taken at a minimum of one meter from all surfaces and at three locations. These data are presented in Table A-2 of Attachment A.
- 3.5 A summary of the gamma background data expressed as a five minute average count rate is presented in Table 1 for all background surveys taken during the CFX project since de-fueling in November, 2007.

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<sup>1</sup> The sub-basement cavity and labyrinth was divided into 4 separate "rooms" for the purposes of the Characterization Surveys. Room C-1 included the corner of the cavity where the CFX was mounted extending out eight feet from the corner on both walls. Details and diagrams of the rooms used for the survey are presented in the RCR (§2.1) and the DPlan (§3.5).

<sup>2</sup> NEXTEP TM0801 *CFX Gamma Conversion Factors and Survey Thresholds*, A.H. Thatcher, CHP

**Table 1**  
***Gamma Background Summary***

Date	Location	Matrix	Proximity	5m Average (cpm)
Nov '07	Room C2	V	Contact	3,512
Jan '08	CFX Control Room	C	Contact	2,258
		V	Contact	2,166
Feb '08	Room C2	C	Contact	2,791
Sept '08	CFX Control Room	V	1 meter	2,229
	Office at front of CFX	V	1 meter	1,855
	Room C4 Hallway	V	1 meter	2,665

- 3.6 Examination of the data in Table 1 reveals that gamma background increases the deeper one goes into the CFX labyrinth. Background data collected outside and above the sub-basement labyrinth showed lower levels of background ranging from 1,855 to 2,258 cpm.
- 3.7 Since the maximum gross gamma reading obtained in room C1 was 48,640 cpm, alteration of the gamma background value to any of the numbers shown in Table 1 (or to zero) would make no difference when comparing the data with the net gamma threshold of 360,000 cpm (RCR Table 2.6).

#### **4 CONCLUSIONS**

- 4.1 Gamma background increases the deeper one goes into the CFX labyrinth. (§3.6)
- 4.2 Background data collected outside and above the sub-basement labyrinth showed lower levels of background ranging from 1,855 to 2,258 cpm. (§3.6)
- 4.3 Since the maximum gross gamma reading obtained in room C1 was 48,640 cpm, alteration of the gamma background value to any of the measured values (or to zero) would make no difference when comparing the data with the net gamma threshold of 360,000 cpm. (§3.7)

# **ATTACHMENT A**

## **Gamma Background Data Sheets**

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CFX Decommissioning

**Table A-1**  
**January 10<sup>th</sup>, 2008 Background Data**

**Characterization Survey DIRECT Measurement Form**

Date:	Jan-10-2008
Building:	B82
Survey Unit:	BK
Technician:	J.Heyer / M.Morse

3" NaI Detector:	Alpha/Beta Detector		
Detector:	Ludlum 2221 (S/N 126520)      Ludlum 2224-1 (S/N 162414) with 43-89 probe.		
Detector ID #:	with 44-10 probe		
Background:	cpm	Alpha: cpm	Beta: cpm
Cal Date:			
Cal Due:			

Room	Sfc	X	Y	Matrix	Mean Type	ALPHA	BETA/ GAMMA	BETA/ GAMMA	Count Time (Min.)	3" NaI	Smear ID	Remarks
		(In.)	(In.)			(Counts Open)	(Counts Open)	(Counts Closed)		(Counts)		
				C	BK		259	200	1	2257		CFX control room above CFX cavity labyrinth.
				C	BK		266	171	1	2161		
				C	BK		254	181	1	2289		
				C	BK		231	199	1	2320		
				C	BK		264	216	1	2278		
				VT	BK		178	185	1	2128		
				VT	BK		186	164	1	2194		
				VT	BK		219	193	1	2196		
				VT	BK		205	192	1	2172		
				VT	BK		204	236	1	2142		

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Page 1 of 1.

Reviewed: *Mark A. Morse*

QA Approved: *Barton P. Anderson*

## KODAK CFX Decommissioning

**Table A-2**  
***September 10<sup>th</sup>, 2008 Background Data***

**Characterization Survey DIRECT Measurement Form**

Date:	Sept-10-2008
Building:	B82
Survey Unit:	Background
Technician:	M.Morse/J.Heyer

3" NaI Detector:		Alpha/Beta Detector	
Detector:	2221 w/44-10 Probs		
Detector ID #:	S/N 126520 & S/N PR265512		
Background:	cpm	Alpha: cpm	Beta: cpm
Cal Date:	5/28/2008		
Cal Due:	5/28/2009		

[illegible]