

**From:** "OHARA, Kevin" <Kevin.OHARA@mdsinc.com>  
**To:** "Judith Joustra @ NRC" <JAJ@nrc.gov>  
**Date:** 6/21/05 3:16PM  
**Subject:** RE: CFC Responses

P-8

37-30804-02

03036239

Dear Judy,

The MCA analyses are attached. The Ge efficiency calibration for Cobalt energy levels is approximately 2%, primarily due to the increased penetration of high-energy photons.

Best regards,

Kevin  
Kevin P.J. O'Hara  
Senior Radiation Physicist  
Ion Technologies Business Unit

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-----Original Message-----

From: Judith Joustra [mailto:JAJ@nrc.gov]  
Sent: June 21, 2005 1:13 PM  
To: OHARA, Kevin  
Subject: Re: CFC Responses

Also what is the efficiency of your detector for the materials of concern (ie. Co-60)?

>>> "OHARA, Kevin" <Kevin.OHARA@mdsinc.com> 06/21/05 01:00PM >>>

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NRC/ION MATERIALS-002

CFC logistier  
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HEADER INFORMATION in WP007427.S0

Identification	Acquisition
User : G Chupick	Started : May/20/2005 11:13:35AM
MCArd : 1	Stopped : May/20/2005 11:23:36AM
Detector : MCA #2	True Time : 600.072 sec
Geometry : Paper Swipe	Live Time : 600.000 sec
Sample : 1	Dead Time : 0.01 %
Channels : 16384	Gross Count : 1961 counts
	LTC : 1.0000017
	Gross Rate : 3.26834 cps

Sample

Sampled from May/20/2005 11:23:36AM to May/20/2005 11:13:35AM

Energy Calibration May/16/2005 8:53:58AM WP007407.S0  
Resolution Calibration Jul/18/2003 1:58:18PM WP005870.S0  
Efficiency Calibration Aug/6/2003 2:29:47PM WP005916.S0  
Isotope Library NORDION.LIB Aug/12/2002 11:30:02AM

ROI STATISTICS INFORMATION in WP007427.S0

ROI (#)	Error	Centroid keV	FWHM keV	FWTM keV	FWTM/FWHM ratio	H/L ratio
1	115.47 %	663.45	0.12			
2	81.65 %	723.75	0.12	2.70	21.80	6.900/14.90
3	100.00 %	758.75	0.19			
4	2000.00 %	765.80				
5	70.71 %	1173.27				
6	115.47 %	1332.01	0.12			

Errors Quoted at 2 Sigma

ACTIVITY INFORMATION for WP007427.S0

Name	Energy keV	Activity Flag	nCi	Error nCi
Co-60	1173.23	*	0.01338	± 0.00958
Co-60	1332.51	*	0.005767	± 0.006693
Weighted Average			0.009572	± 0.008982
Cs-137	661.62	*	0.002961	± 0.003429
Nb-95	765.82	* <	0.01673	± 0.001552
Zr-95	724.18	*	0.01252	± 0.01029
Zr-95	756.72	*	0.007121	± 0.007151
Weighted Average			0.009533	± 0.008796
Grand Total			0.02207	± 0.01303

Activity (nCi) at May/20/2005 11:13:35AM

Errors Quoted at 2 Sigma

MDA's Quoted at 1.645 Sigma

Flags	Meaning
*	Forced MDA from identification
<	MDA value

Initial  
2005 June 01

Greg Chupick  
050520  
②

HEADER INFORMATION in BKR10133.S0

Identification	Acquisition
User : G Chupick	Started : May/31/2005 4:11:41PM
MCArd : 1	Stopped : May/31/2005 4:45:02PM
Detector : MCA #2	True Time : 2000.249 sec
Geometry : 1 Litre Beaker	Live Time : 2000.000 sec
Sample : 1	Dead Time : 0.01 %
Channels : 8192	Gross Count : 6759 counts
	LTC : 1.0000005
	Gross Rate : 3.3795 cps

Sample  
Sampled from May/31/2005 4:45:06PM to May/31/2005 4:11:41PM

Energy Calibration May/19/2005 8:37:41AM BKR10096.S0  
Resolution Calibration Jul/18/2003 2:47:43PM BKR07543.S0  
Efficiency Calibration Aug/6/2003 3:20:01PM BKR08066.S0  
Isotope Library NORDION.LIB Aug/12/2002 11:30:02AM

*WMAH*  
*200 June 01*

ROI STATISTICS INFORMATION in BKR10133.S0

ROI (#)	Error	Centroid keV	FWHM keV	FWTM keV	FWTM/FWHM ratio	H/L ratio
1	2000.00 %	661.68				
2	2000.00 %	724.22				
3	2000.00 %	756.73				
4	66.67 %	764.67	0.25	3.92	15.80	8.900/6.900
5	103.07 %	1172.89	0.27	2.13	7.90	4.936/3.633
6	37.80 %	1332.39	0.66	1.97	2.98	2.848/5.102

Errors Quoted at 2 Sigma

ACTIVITY INFORMATION for BKR10133.S0

Name	Energy keV	Activity Flag	nCi	Error nCi
Co-60	1173.23	* <	0.03010	± 0.0008412
Co-60	1332.51	*	0.04604	± 0.01745
Weighted Average			0.04604	± 0.01745
Cs-137	661.62	* <	0.02221	± 0.0005087
Nb-95	765.82	*	0.009194	± 0.006134
Zr-95	724.18	* <	0.04746	± 0.001121
Zr-95	756.72	* <	0.04751	± 0.001139
Grand Total			0.05523	± 0.0185

Activity (nCi) at May/31/2005 4:11:41PM  
Errors Quoted at 2 Sigma  
MDA's Quoted at 1.645 Sigma

*Gary Chupick*  
*050601*

Flags	Meaning
*	Forced MDA from identification
<	MDA value

2524

**MDS Nordion** Voice: 613-592-3400 ext.447 March Road Fax: 613-591-7423  
Ottawa, Ontario, Canada K2K 1X8  
www.mds.nordion.com**To:** Jaj@nrc.gov**Date:** June 21, 2005**Sender:** Kevin O'Hara  
Senior Radiation Physicist**Copy:****Total # of pages including this page: 1****Re: Analysis of sample**

Dear Judy,

The .SO files following the energy, resolution and efficiency calibration dates and times refer to the certified data corresponding to that test. For example, the calibration file \*.SO contains the certified peak energies for a calibrated source standard.

Conventionally the MDA is quoted when a peak, or count, is not detected (i.e. is not statistically significant). It is usually calculated as the activity equivalent of a peak area in net counts. In our case, it is converted to nCi. The estimated MDA (minimum detectable activity) for  $^{60}\text{Co}$  in our geometry is approximately 0.01 nCi (10 pCi). The forced MDA from identification means that the user has requested that the software look for peaks for isotopes of interest (Co-60, Nb-95, Zr-95 and Cs-137).

Best regards

A handwritten signature in black ink, appearing to read 'K. O'Hara'.

Kevin O'Hara  
Kevin P.J. O'Hara  
Senior Radiation Physicist  
Ion Technologies Business Unit

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MDS Nordion - Applied Physics/Radiation Measurement  
CFC Responses