

FRIDAY 15/03/2002.

s 22(1)(ii) irrelevant

SPECIAL NOTE TO HIFAR HPS
INSTRUCTIONS FROM DUTY DSC.

A release of fission products occurred today at the B23 pond during fuel-rod cropping. The area was affected by high radiation dose rates as a result, viz —

pond ledge level ~ 100 $\mu\text{Sv/h}$ AMBIENT

pond chest level ~ 50 $\mu\text{Sv/h}$ AMBIENT.

pond filtration (at wall) ~ 40 mSv/h @ CONTACT

Tomorrow the duty SSS will switch filtration to the new ion-column outside B23 (corner of building near GATRI).

The DSC has requested (ie instructed) the duty HIFAR HPS at each shift to monitor the radiation dose rate at these points: —

- pond ledge (above cropping pond water) level,
- pond above water at chest level,
- wall filtration equipment,
- external ion column,

and record results in the HIFAR HP log. These checks should be made at least over the weekend and until the DSC instructs otherwise.

Summarize measurements on page opposite.

	SHIFT	POND LEDGE AMBIENT	POND CHEST AMBIENT	WALL FILTER @ CONTACT	EXTERNAL ION-COLUMN @ C
15/3/02 1800	AS ADVISED BY DSC	100 $\mu\text{Sv/h}$	50 $\mu\text{Sv/h}$	40 mSv/h	—
0030	SATURDAY M	50 $\mu\text{Sv/h}$	30 $\mu\text{Sv/h}$	50 mSv/h	
16/3/02 09:00	SATURDAY D	90 $\mu\text{Sv/h}$	30 $\mu\text{Sv/h}$	50 mSv/h	< 1 $\mu\text{Sv/h}$
13:30	(2)	90 $\mu\text{Sv/h}$	30 $\mu\text{Sv/h}$	50 mSv/h	< 2 $\mu\text{Sv/h}$
1800 FH40F1	SATURDAY E	98 $\mu\text{Sv/h}$	45 $\mu\text{Sv/h}$	52 mSv/h	< 3 $\mu\text{Sv/h}$
RAM GENE-1		500 $\mu\text{Sv/h}$	230 $\mu\text{Sv/h}$	off-scale	< 1 $\mu\text{Sv/h}$
17/3/02 100	SUNDAY M	70 $\mu\text{Sv/h}$	50 $\mu\text{Sv/h}$	62 mSv/h	0.5 $\mu\text{Sv/h}$
9/8		511 $\mu\text{Sv/h}$	200 $\mu\text{Sv/h}$	off scale	0.6 $\mu\text{Sv/h}$
09:30	SUNDAY D	130 $\mu\text{Sv/h}$	60 $\mu\text{Sv/h}$	52 mSv/h	5 $\mu\text{Sv/h}$
		1700 $\mu\text{Sv/h}$	270 $\mu\text{Sv/h}$	off-scale	58 $\mu\text{Sv/h}$
1830 FH40F1	SUNDAY E	68 $\mu\text{Sv/h}$	13 $\mu\text{Sv/h}$	47.7 mSv/h	< 3 $\mu\text{Sv/h}$
GENE-1		750 $\mu\text{Sv/h}$	250 $\mu\text{Sv/h}$	off-scale	< 2 $\mu\text{Sv/h}$
16/3/02 09:00	→ #1 Inlet pipe ~ 55 $\mu\text{Sv/h}$ @ 1/8" (Outlet pipe ~ 2 $\mu\text{Sv/h}$ @ 1/8" NEAR GATRI)				
" 10:00	→ #2. CLEAR PIPES EAST SIDE POND WALL 3 mSv/h @ 1/8" (RAM GENE-1)				
	(1800, 16/3/02) CLEAR PIPES EAST SIDE POND WALL				
	270 $\mu\text{Sv/h}$ @ FH40F1, 2450 $\mu\text{Sv/h}$ @ RAM GENE-1				
17/2/02 09:30	CLEAR PIPES E. END OF POND WALL 4.12 mSv/h @ 1/8"; 220 $\mu\text{Sv/h}$ @ RAM GENE-1				
" "	INLET PIPE ION X COLUMN 290 $\mu\text{Sv/h}$ @ 1/8" 6.7 $\mu\text{Sv/h}$ @ (NEAR BUBBLE 1m FROM COLUMN FACE)				
16-3-02	Two survey points: point 1 over water (approx 15") above same cropping				
0030	point 2 over water (approx 15") other end of				
	cropping pond.				
	point 1 @ 0030 = 50 $\mu\text{Sv/h}$				
	point 2 @ 0030 = 30 $\mu\text{Sv/h}$				
	Top Filter = 50 mSv/h				
	bottom filter = 1 mSv/h				

SATURDAY 16/03/2002

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(1850)

Copy survey to RSS

1700

Phoned DSC

s 47F personal

Confirmed the

N.B.

following

(a) The 4 areas for HP survey surrounding the pond. These areas are (i) POND LEDGE LEVEL — area above cropping pond water. Highest dose rate recorded whilst moving detector along length of cropping pond. Hold the detector at the height of the pond wall.

(ii) POND CHEST LEVEL — similar to (i) above however hold the detector at your chest height.

(iii) WALL FILTRATION EQUIPMENT — measure the contact dose rate at the bowl of the 2 filters (the highest dose rate is currently from the top most filter).

(iv) EXTERNAL ION COLUMN — measure the contact dose rate of the in-service column (2 columns are part of plant — both adjacent to each other outside B23 wall near GATRI). Currently the B/J dose rate is $< 1 \mu\text{Sv/h}$ at the column body, top and bottom pipe connection flanges.

(b) Health Physics dose rate checks should be made at each shift. Once per shift — at about 8 hour intervals. DSC has confirmed with

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the frequency of measurements (ignore previous e-mail instruction indicating 4 hourly checks).

(c) As indicated at page 49 of this log, record measurement results in this log AND summarize measurements in tabulated form at page 50. NOTE: Do not change

SATURDAY 16/03/2002

the structure of the (page 50) table — unless ~~the~~ authorised and in consultation with the DSC. [the DSC authorised the use of liquid paper to rearranged data placed incorrectly.] During the survey of the pond area record any other significant measure in this log and summarize the measure at page 50 in the space below the table. If space at page 50 runs-out then start a new summary on a new page within this log.

NOTE

When I surveyed B23 I used 2 dose rate meters — (i) FH40FI high range, and (ii) GENE-1 B/J. See results below.

1800

Surveyed radiation dose rates at B23 pond area as required by DSC. Results: —

POND LEDGE ~ FH40FI 98 $\mu\text{Sv/h}$ AMBIENT

GENE-1 500 $\mu\text{Sv/h}$ AMBIENT

POND CHEST ~ FH40FI 45 $\mu\text{Sv/h}$ AMBIENT

GENE-1 230 $\mu\text{Sv/h}$ AMBIENT

WALL FILTER ~ FH40FI 52 mSv/h @ CONTACT

GENE-1 off scale @ CONTACT

EXT. ION COLUMN ~ FH40FI $< 3 \mu\text{Sv/h}$ @ CONTACT

GENE-1 $< 1 \mu\text{Sv/h}$ @ CONTACT.

When finished at the pond area I left the cage set askew to the pond. This enables quicker HPS entry and exit. Informed and got permission from the duty SRS to leave askew. the surrounding area is properly barred preventing personnel traffic.

Thank-you to 'outside' RO — s 47F personal for help with the B23 survey.

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Sunday 17/3/02

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100 HP Survey of B23 pond as per DSC instructions

Pond level $\gamma = 70 \text{ psch}^{-1}$ $\beta/\gamma = 511 \text{ psch}^{-1}$ Pond chest level $\gamma = 50 \text{ psch}^{-1}$ $\beta/\gamma = 200 \text{ psch}^{-1}$ Filter $\gamma = 62 \text{ msch}^{-1}$ $\beta/\gamma = \text{off scale}$ In-col $\gamma = 0.5 \text{ psch}^{-1}$ $\beta/\gamma = 0.1 \text{ psch}^{-1}$

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SUN 17/3/02 CONT'D

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SUNDAY 17/03/2002

s 22(1)(ii) irrelevant

1800 Surveilled radiation dose rates at B23 pond area
as required by DSC. Results: -

POND LEDGE ~	FH40F1	68 μ Sv/h	AMB
	GENE-1	750 μ Sv/h	AMB
POND CHEST ~	FH40F1	13 48 μ Sv/h	AMB
	GENE-1	250 280 μ Sv/h	AMB
WALL FILTER ~	FH40F1	47.7 82 mSv/h @ CONTACT	
	GENE-1	off scale (7.6 mSv/h @ 15cm)	
EXT ION-COL ~	FH40F1	≤ 3 μ Sv/h @ CONT	
	GENE-1	≤ 2 μ Sv/h @ CONT.	

(all) pipes east end pond wall:

	FH40F1	210 μ Sv/h
	GENE-1	3000 μ Sv/h

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Confidence

Gamma Spectrometry Analysis

January 2003

Due to the design of facility ponds and buildings, small birds periodically enter the confines of the facilities. Because the pond water contained relatively minor levels of radioactivity, this was not a concern over the years. In March of 2002, the water in one pond was contaminated with fission product activity. As a result of concerns stemming from this contamination, analyses were performed on dead birds found in the area of interest.

Because a variety of wildlife live at Lucas Heights, it is customary to find dead birds on site. Of five birds collected, two were identified as contaminated to a minor degree. These two birds were provided to the HIFAR Chemist, who was requested to perform gamma spectrometric analysis to determine the likely source of the contamination. In both cases the analysis was purely qualitative as the birds presented an unusual geometry, which made quantitative analysis difficult. However the relative sizes of the peaks are published with the Region Of Interest (ROI) data present in this report. In addition, it should be noted that the analysis was performed on the whole of the bird and as such no distinction was possible between internal and external contamination.

The spectra obtained from this analysis (using EG&G Ortec's MAESTRO-32) indicated the presence in trace amounts of mixed fission products such as ^{134}Cs , ^{137}Cs , ^{144}Ce , ^{131}I , ^{103}Ru , ^{144}Pr , ^{95}Zr , ^{95}Nb and ^{140}La . In addition to the mixed fission products, the first spectra also indicated the presence of ^{41}Ar , however this is likely to be part of the background spectrum due to the emission of ^{41}Ar from HIFAR.

The presence of the mixed fission products indicated that the birds had been in contact with the contaminated pond. It was noted that Bird No.1 showed higher levels of contamination than Bird No.2. As there was no accurate efficiency data available for the analysis (due to the abnormal geometry), estimations of activities present in Bird No.1 have been made on the efficiency curve obtained from a 10ml vial. A summary of the estimations of the total activity present (internal & external) are presented in Table 1 and the calculations are available in Table 2.

Table 1. Summary of Estimated Total Activity

Radionuclide	Estimated Activity (Bq)
^{144}Ce	2283
^{134}Cs	17
^{137}Cs	23
^{131}I	4
^{95}Nb	17
^{144}Pr	2476
^{103}Ru	4
^{95}Zr	10

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It should be noted that ^{90}Sr is also a mixed fission product, but as a pure beta emitter it would not have been detected in the gamma spectrometry analysis. It is assumed that ^{90}Sr and ^{137}Cs exist in approximately a 1:1 ratio.

No adverse health effects would be expected from this degree of contamination. A cover has since been installed over the pond to minimise the possibility of further issues in this regard.

s 47F personal

Radiation Protection Adviser

May 29, 2003

Inconfidence

Gamma Spectrometry Analysis of Bird No.1

Detector #1 ACQ 08-Jan-2003 at 15:54:16 RT = 5086.6 LT = 5000.0

DSPE-218
bird1

ROI # 1 RANGE: 631 = 79.19keV to 653 = 81.94keV
AREA : Gross = 8889 Net = 5186 +/- 125
CENTROID: 641.88 = 80.55keV
SHAPE: FWHM = 0.99 FW(1/5)M = 1.55
ID: Ce-144 at 80.12keV
Corrected Rate = 64.82 +/- 1.56 cA

ROI # 2 RANGE: 975 = 122.13keV to 997 = 124.88keV
AREA : Gross = 5307 Net = 665 +/- 117
CENTROID: 986.04 = 123.51keV
SHAPE: FWHM = 0.46 FW(1/5)M = 1.42
ID: Ce-144 at 133.53keV
Corrected Rate = 1.23 +/- 0.22 cA

ROI # 3 RANGE: 1057 = 132.37keV to 1081 = 135.36keV
AREA : Gross = 75444 Net = 65352 +/- 311
CENTROID: 1069.26 = 133.90keV
SHAPE: FWHM = 1.06 FW(1/5)M = 1.65
ID: Ce-144 at 133.53keV
Corrected Rate = 121.02 +/- 0.58 cA

ROI # 4 RANGE: 1582 = 197.90keV to 1608 = 201.15keV
AREA : Gross = 1916 Net = -136 +/- 83
CENTROID: 1594.76 = 199.49keV
SHAPE: FWHM = 0.23 FW(1/5)M = 0.38
ID: U-235 at 202.12keV
Corrected Rate = 0.00 +/- 1.66 cA

ROI # 5 RANGE: 2905 = 363.09keV to 2935 = 366.84keV
AREA : Gross = 870 Net = 389 +/- 48
CENTROID: 2917.93 = 364.70keV
SHAPE: FWHM = 1.28 FW(1/5)M = 1.98
ID: I-131 at 364.48keV
Corrected Rate = 0.10 +/- 0.01 cA

ROI # 6 RANGE: 3725 = 465.50keV to 3759 = 469.75keV
AREA : Gross = 481 Net = 26 +/- 47
CENTROID: 3742.28 = 467.66keV
SHAPE: FWHM = 0.16 FW(1/5)M = 0.32
ID: Cs-134 at 475.35keV
Corrected Rate = 0.36 +/- 0.64 cA

ROI # 7 RANGE: 4077 = 509.47keV to 4113 = 513.96keV
AREA : Gross = 851 Net = 290 +/- 56
CENTROID: 4096.04 = 511.84keV
SHAPE: FWHM = 0.76 FW(1/5)M = 1.48
ID: Ru-103 at 497.08keV
Corrected Rate = 0.07 +/- 0.01 cA

ROI # 8 RANGE: 4817 = 601.91keV to 4855 = 606.66keV
AREA : Gross = 966 Net = 641 +/- 49
CENTROID: 4837.92 = 604.52keV
SHAPE: FWHM = 1.33 FW(1/5)M = 1.91

Confidence

ID: Cs-134 at 604.66keV
Corrected Rate = 0.13 +/- 0.01 cA

ROI # 9 RANGE: 5273 = 658.88keV to 5313 = 663.88keV
AREA : Gross = 1813 Net = 1458 +/- 59
CENTROID: 5294.06 = 661.51keV
SHAPE: FWHM = 1.39 FW(1/5)M = 2.20
ID: Cs-137 at 661.62keV
Corrected Rate = 0.34 +/- 0.01 cA

ROI # 10 RANGE: 5552 = 693.74keV to 5592 = 698.74keV
AREA : Gross = 2630 Net = 2452 +/- 59
CENTROID: 5572.55 = 696.31keV
SHAPE: FWHM = 1.64 FW(1/5)M = 2.38
ID: Pr-144 at 696.49keV
Corrected Rate = 32.91 +/- 0.79 cA

ROI # 11 RANGE: 5775 = 721.61keV to 5815 = 726.61keV
AREA : Gross = 477 Net = 279 +/- 37
CENTROID: 5791.64 = 723.69keV
SHAPE: FWHM = 1.70 FW(1/5)M = 2.48
ID: Zr-95 at 724.18keV
Corrected Rate = 0.13 +/- 0.02 cA

ROI # 12 RANGE: 6033 = 753.85keV to 6075 = 759.10keV
AREA : Gross = 483 Net = 297 +/- 38
CENTROID: 6055.28 = 756.63keV
SHAPE: FWHM = 1.04 FW(1/5)M = 2.25
ID: Zr-95 at 756.72keV
Corrected Rate = 0.11 +/- 0.01 cA

ROI # 13 RANGE: 6101 = 762.35keV to 6143 = 767.60keV
AREA : Gross = 1261 Net = 1075 +/- 47
CENTROID: 6127.05 = 765.60keV
SHAPE: FWHM = 1.54 FW(1/5)M = 2.29
ID: Nb-95 at 765.82keV
Corrected Rate = 0.22 +/- 0.01 cA

ROI # 14 RANGE: 6347 = 793.09keV to 6389 = 798.34keV
AREA : Gross = 670 Net = 484 +/- 40
CENTROID: 6367.01 = 795.59keV
SHAPE: FWHM = 1.66 FW(1/5)M = 2.26
ID: Cs-134 at 795.76keV
Corrected Rate = 0.11 +/- 0.01 cA

ROI # 15 RANGE: 10326 = 1290.61keV to 10378 = 1297.12keV
AREA : Gross = 1584 Net = 1522 +/- 44
CENTROID: 10347.69 = 1293.33keV
SHAPE: FWHM = 1.96 FW(1/5)M = 2.93
ID: Ar-41 at 1293.60keV
Corrected Rate = 0.31 +/- 0.01 cA

ROI # 16 RANGE: 11655 = 1456.89keV to 11711 = 1463.90keV
AREA : Gross = 295 Net = 228 +/- 28
CENTROID: 11684.65 = 1460.60keV
SHAPE: FWHM = 0.71 FW(1/5)M = 2.70
ID: K-40 at 1460.75keV
Corrected Rate = 0.43 +/- 0.05 cA

ROI # 17 RANGE: 11882 = 1485.30keV to 11938 = 1492.31keV
AREA : Gross = 289 Net = 260 +/- 22

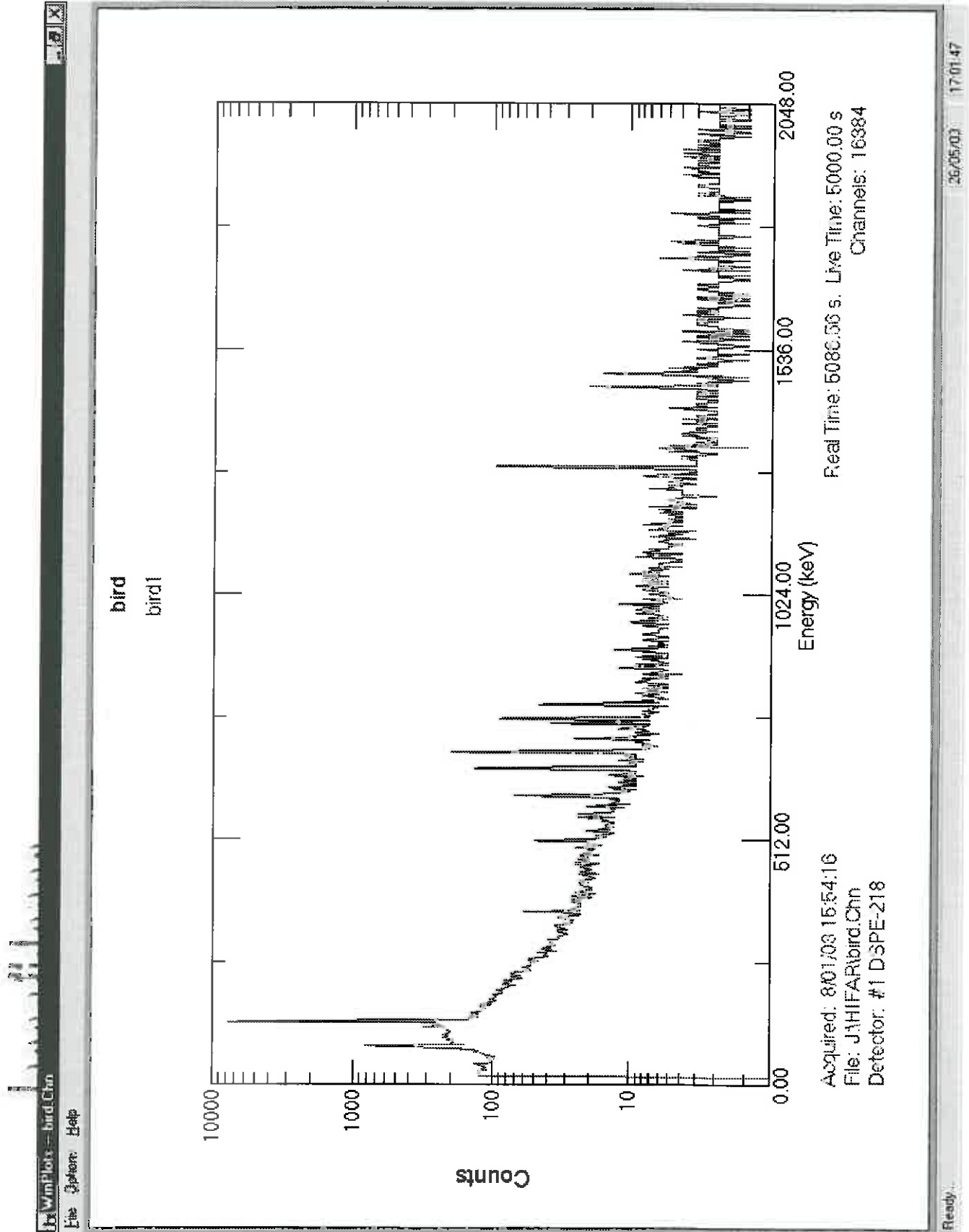
Confidence

CENTROID: 11915.30 = 1489.47keV
SHAPE: FWHM = 1.07 FW(1/5)M = 2.96
ID: Pr-144 at 1489.20keV
Corrected Rate = 17.33 +/- 1.47 cA

Table 2. Activity Calculations for Bird No.1

ROI#	RANGE	(keV)	GROSS	NET	+/-	CENTROID	FWHM	FW(1/5)M	LIBRARY	(keV)	cA	+/-	% Detector Efficiency **	Estimated Activity (Bq)	+/-
1	79.19	81.94	8889	5186	125	80.55	0.99	1.55	Ce-144	80.12	64.82	1.56	3.20%	2026	49
2	132.37	135.36	75444	65352	311	133.9	1.06	1.65	Ce-144	133.53	121.02	0.58	5.30%	2283	11
3	197.9	201.15	1916	-136	83	199.49	0.23	0.38	U-235	202.12	0	1.66	4.60%	0	36
4	363.09	366.84	870	389	48	364.7	1.28	1.98	I-131	364.48	0.1	0.01	2.60%	4	0
5	465.5	469.75	481	26	47	467.66	0.16	0.32	Cs-134	475.35	0.36	0.64	2.10%	17	30
6	509.47	513.96	851	290	56	511.84	0.76	1.48	Ru-103	497.08	0.07	0.01	2.00%	4	1
7	601.91	606.66	966	641	49	604.52	1.33	1.91	Cs-134	604.66	0.13	0.01	1.62%	8	1
8	658.88	663.88	1813	1458	59	661.51	1.39	2.2	Cs-137	661.62	0.34	0.01	1.47%	23	1
9	693.74	698.74	2630	2452	59	696.31	1.64	2.38	Pr-144	696.49	32.91	0.79	1.39%	2368	57
10	721.61	726.61	477	279	37	723.69	1.7	2.48	Zr-95	724.18	0.13	0.02	1.34%	10	1
11	753.85	759.1	483	297	38	756.63	1.04	2.25	Zr-95	756.72	0.11	0.01	1.28%	9	1
12	762.35	767.6	1261	1075	47	765.6	1.54	2.29	Nb-95	765.82	0.22	0.01	1.26%	17	1
13	793.09	798.34	670	484	40	795.59	1.66	2.26	Cs-134	795.76	0.11	0.01	1.22%	9	1
14	1290.61	1297.12	1584	1522	44	1293.33	1.96	2.93	Ar-41	1293.6	0.31	0.01	0.80%	39	1
15	1456.89	1463.9	295	228	28	1460.6	0.71	2.7	K-40	1460.75	0.43	0.05	0.74%	58	7
16	1485.30	1492.31	289	260	22	1489.47	1.07	2.96	Pr-144	1489.2	17.33	1.47	0.70%	2476	210

** No accurate geometric efficiency is available for assay. Detector Efficiency has been used for 10 ml vial.



Inconfidence

Gamma Spectrometry Analysis of Bird No.2

Detector #1 ACQ 20-Jan-2003 at 17:56:37 RT = 5111.6 LT = 5000.0

DSPE-218
bird2

- ROI # 1 RANGE: 627 = 79.41keV to 655 = 82.90keV
AREA : Gross = 1288 Net = 925 +/- 48
CENTROID: 641.63 = 81.23keV
SHAPE: FWHM = 0.76 FW(1/5)M = 1.47
ID: Ce-144 at 80.12keV
Corrected Rate = 11.56 +/- 0.60 cA
- ROI # 2 RANGE: 1053 = 132.51keV to 1083 = 136.25keV
AREA : Gross = 12118 Net = 11405 +/- 119
CENTROID: 1068.88 = 134.49keV
SHAPE: FWHM = 1.04 FW(1/5)M = 1.64
ID: Ce-144 at 133.53keV
Corrected Rate = 21.12 +/- 0.22 cA
- ROI # 3 RANGE: 1150 = 144.61keV to 1180 = 148.35keV
AREA : Gross = 220 Net = 80 +/- 25
CENTROID: 1166.87 = 146.71keV
SHAPE: FWHM = 0.48 FW(1/5)M = 0.67
ID: Ce-141 at 145.45keV
Corrected Rate = 0.03 +/- 0.01 cA
- ROI # 4 RANGE: 2255 = 282.41keV to 2289 = 286.65keV
AREA : Gross = 166 Net = 43 +/- 25
CENTROID: 2277.89 = 285.27keV
SHAPE: FWHM = 0.16 FW(1/5)M = 0.78
No close library match.
- ROI # 5 RANGE: 2897 = 362.50keV to 2933 = 366.99keV
AREA : Gross = 1009 Net = 886 +/- 39
CENTROID: 2914.40 = 364.67keV
SHAPE: FWHM = 1.24 FW(1/5)M = 2.00
ID: I-131 at 364.48keV
Corrected Rate = 0.22 +/- 0.01 cA
- ROI # 6 RANGE: 3192 = 399.31keV to 3228 = 403.80keV
AREA : Gross = 72 Net = -8 +/- 20
CENTROID: 3200.00 = 400.30keV
SHAPE: FWHM = 1.40 FW(1/5)M = 1.52
No close library match.
- ROI # 7 RANGE: 3547 = 443.60keV to 3583 = 448.10keV
AREA : Gross = 49 Net = 0 +/- 15
CENTROID: 3564.70 = 445.81keV
SHAPE: FWHM = 0.31 FW(1/5)M = 0.43
ID: Ba-140 at 437.55keV
Corrected Rate = 0.00 +/- 0.19 cA
- ROI # 8 RANGE: 4484 = 560.55keV to 4524 = 565.55keV
AREA : Gross = 57 Net = 2 +/- 17
CENTROID: 4506.14 = 563.32keV
SHAPE: FWHM = 0.18 FW(1/5)M = 0.31
ID: Cs-134 at 563.26keV
Corrected Rate = 0.00 +/- 0.04 cA

Confidence

ROI # 9 RANGE: 4815 = 601.88keV to 4857 = 607.12keV
AREA : Gross = 98 Net = 76 +/- 14
CENTROID: 4836.96 = 604.62keV
SHAPE: FWHM = 1.05 FW(1/5)M = 1.31
ID: Cs-134 at 604.66keV
Corrected Rate = 0.02 +/- 0.00 cA

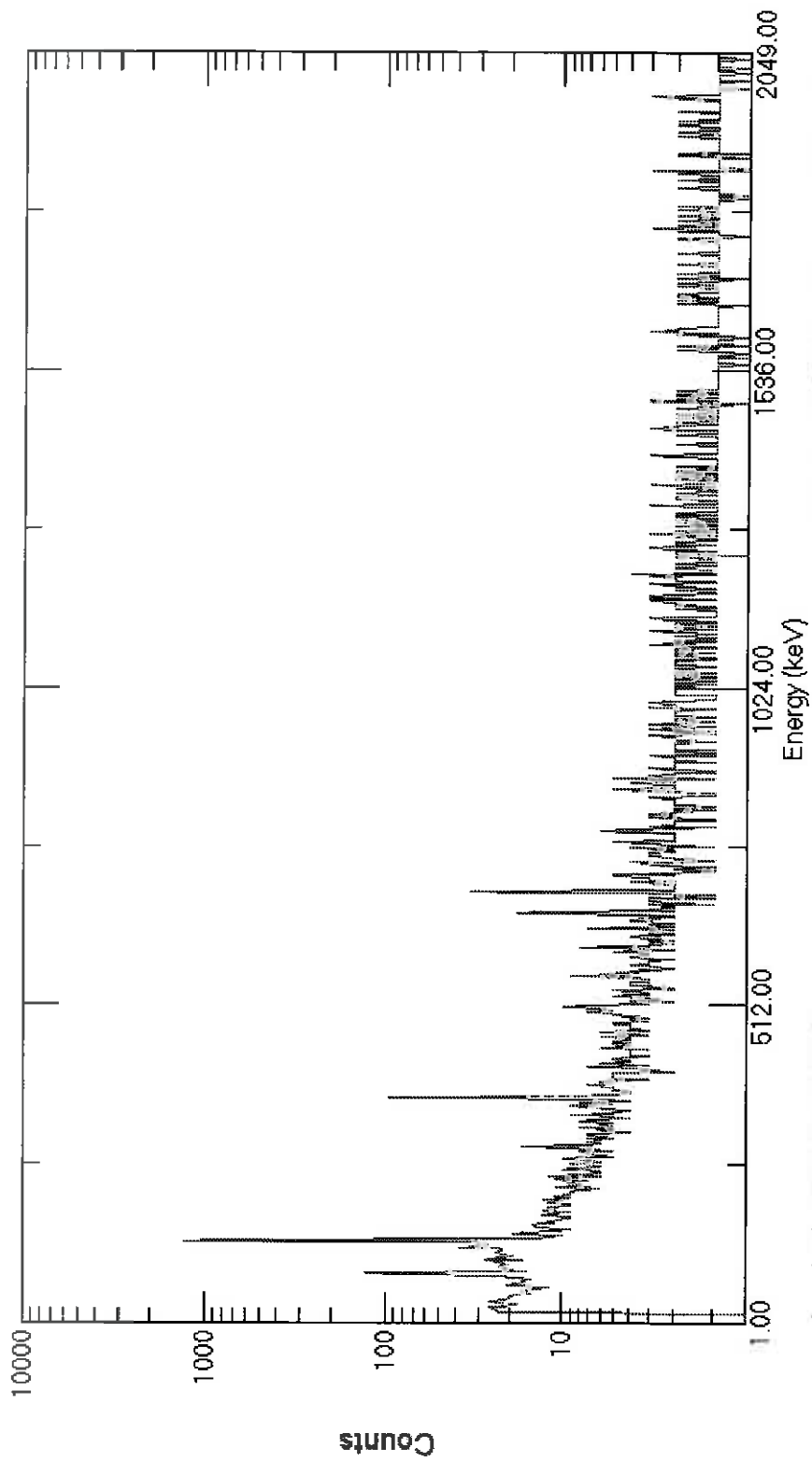
ROI # 10 RANGE: 5075 = 634.34keV to 5115 = 639.33keV
AREA : Gross = 73 Net = 46 +/- 14
CENTROID: 5093.89 = 636.70keV
SHAPE: FWHM = 0.22 FW(1/5)M = 0.95
No close library match.

ROI # 11 RANGE: 5274 = 659.19keV to 5316 = 664.43keV
AREA : Gross = 207 Net = 171 +/- 19
CENTROID: 5292.46 = 661.49keV
SHAPE: FWHM = 0.81 FW(1/5)M = 1.97
ID: Cs-137 at 661.62keV
Corrected Rate = 0.04 +/- 0.00 cA

ROI # 12 RANGE: 5544 = 692.90keV to 5586 = 698.15keV
AREA : Gross = 399 Net = 320 +/- 28
CENTROID: 5571.38 = 696.32keV
SHAPE: FWHM = 1.08 FW(1/5)M = 1.96
ID: Pr-144 at 696.49keV
Corrected Rate = 4.30 +/- 0.38 cA

ROI # 13 RANGE: 6108 = 763.34keV to 6152 = 768.84keV
AREA : Gross = 25 Net = 17 +/- 8
CENTROID: 6129.83 = 766.07keV
SHAPE: FWHM = 0.20 FW(1/5)M = 0.47
ID: Nb-95 at 765.82keV
Corrected Rate = 0.00 +/- 0.00 cA

ROI # 14 RANGE: 6343 = 792.70keV to 6387 = 798.20keV
AREA : Gross = 61 Net = 16 +/- 17
CENTROID: 6364.34 = 795.36keV
SHAPE: FWHM = 0.29 FW(1/5)M = 0.43
ID: Cs-134 at 795.76keV
Corrected Rate = 0.00 +/- 0.00 cA

bird2
bird2

Acquired: 20/01/03 17:56:37
File: J1HIFARbird2.Chn
Detector: #1 DSPE-213

Real Time: 5111.34 s. Live Time: 5000.00 s.
Channels: 16384

B23 pond 65
fuel cropping pond
INSPECTION.

s 47F personal

18/03/2003 10:47

To: s 47F personal
cc:

Subject: Questions without notice

s 47F personal

Please take this into account during your inspection of B23 pond.

s 47F personal

----- Forwarded by s 47F personal on 18/03/2003 10:44 -----

s 47F personal

18/03/2003 09:25

To: s 47F personal
cc:

Subject: Questions without notice

s 47F personal

Did this reach you? Have we replied?

Cd we discuss the fuel pond issues, pls.

s 47F personal

----- Forwarded by s 47F personal on 18/03/2003 09:25 -----

s 47F personal

on 03/03/2003 12:39:06

To: s 47F personal
cc:

Subject: Questions without notice

Dear s 47F personal

Are you able to advise me on the following questions?

Back in July last year there was an accident at ANSTO in the spent fuel cooling pond, I think it was in building 23. The pool was contaminated following an incorrect cropping incident. Am I correct in understanding that the pond is still too contaminated for it to be used to store any additional spent fuel rods since the incident?

If so, how are these highly radioactive rods being stored?

Are they being stored in a situation that has been licensed by ARPANSA? If not has ARPANSA been asked to licence such storage?

When is it anticipated that the pond will be able to be used for its licenced task?

Is ARPANSA able to carry out random, unannounced inspections at ANSTO if it believed that unlicensed activities were being carried out at the site - i.e. as in Iraq for instance? I seem to recall that when the ARPANS Act was up for public examination, inspections had to be requested in advance - and that I objected to this as being 'too polite'.

I have heard that there have been incidents of birds (pigeons) being able to fly in and out of building 23 (?) and being found later lying with feet pointing to heaven, dead. This reminds me of a similar situation at Sellafield when the public was warned not to touch dead birds in the vicinity of the plant. .In a bizarre twist, the story from ANSTO is that, as no-one knows what to do with them, the birds are 'lying in a cupboard'.

Is there anything in the licensing of the plant to protect native fauna? Should the public be warned?

s 22(1)(ii) irrelevant

Regards,

s 47F personal



- att1.htm

Meeting on B23 Cropping Pond Incident

Date: 11 April 2003

Time: 10 am

Venue: Regulatory Branch Conference Room

Present:

s 47F personal

s 47F personal

Background Information

B23 Cropping Pond is licensed as a nuclear installation under Facility Licence FO0044-4C. An incident involving cropping an irradiated fuel occurred on 15 March 2002. ANSTO informed ARPANSA of the incident within 24 hours. ARPANSA Regulatory Branch Staff made several visits and met ANSTO staff to follow up this incident. ARPANSA received the final report on the incident from ANSTO on 18 March 2003.

Discussion Points

1. Discussion took place in the light of the Final Report of Cropping Pond Incident submitted to ARPANSA.
2. It was agreed to keep records of every visit, meeting, discussion and any other communication relevant to any facility in an appropriate format.
3. It was agreed to conduct a two-phase inspection, one covering the health physics aspect and the other covering the engineering aspect. s 47F personal will conduct the inspection on health physics aspect and s 47F personal on Engineering aspect. Details of the inspection will be finalised by these two inspection teams.
4. The purpose and scope of health physics aspects will include:
 - Health physicists involved in providing health physics service; are they qualified and/or accredited?
 - Was there any off-site contamination? If so, why wasn't it reported?
 - Waste generation from the decontamination process.
 - Contamination problems involving birds.
 - Control measures.
 - Operational and radiological protection procedures.
5. The proposed time for inspection covering health physics aspect is first week of May 2003.

s 47F personal



FILE NOTE

File Name: <i>Radiation Regulation Compliance Surveillance - Reports Planned Inspection, Facility Licence F00044-4C</i> <i>s 47F personal</i>	File Number: <i>S2003/00283</i>
Name: <i>[Redacted]</i>	Phone Number: <i>[Redacted]</i> <i>s 47F personal</i>
Organisation: <i>ANSTO</i>	
Date: <i>26/05/03</i>	Time: <i>2:45</i> am/pm Duration: <i>1</i>

Incoming Call

Outgoing Call

Internal Call

Attendance on Associate

Attendance on Client

Drafting

Perusing

Researching

Conferences

<i>Talked to</i> <i>[Redacted]</i> <i>s 47F personal</i>	<i>Radiation Protection Adviser</i>
<i>& Nuclear Technology requesting the gamma-Spectroscopy results of two dead birds.</i>	<i>[Redacted]</i> <i>s 47F personal</i>
<i>returned to the NT for this matter. Subsequently, I talked to</i>	<i>[Redacted]</i> <i>s 47F personal</i>
<i>[Redacted]</i> <i>s 47F personal</i>	<i>requesting the same (@ 2:51 pm)</i>
<i>[Redacted]</i> <i>s 47F personal</i>	<i>[Redacted]</i> <i>s 47F personal</i>
<i>[Redacted]</i> <i>s 47F personal</i>	<i>said that she would talk to the nominee</i>
<i>and get back to me sometime in the late afternoon today.</i>	

ARPANSA Action Required:

Officer: *[Redacted]* *s 47F personal*

Signature: *[Redacted]*

Date: *26/05/03*

FINAL INSPECTION REPORT

RB-INS-03-03

Licence Holder: ANSTO

Licence No: FO0044- 4C

Date of inspection: 14 May 2003

Location: Lucas Heights

ANSTO Fuel Operations Facility

Building 23 Cropping Pond and Spent Fuel Storage in Irradiation Pond

REGULATORY BRANCH

June 2003

1. INTRODUCTION

1.1 PURPOSE AND SCOPE OF INSPECTION

The purpose and scope of the inspection was to check the compliance of operation with the standard licence conditions [3], special licence conditions of the Operating Licence [2] and recommendations for improvement set out in the ARPANSA Safety Evaluation Report [4].

1.2 LEGISLATION OR OTHER REGULATORY REQUIREMENTS RELEVANT TO THIS INSPECTION

According to Section 35 [35(1) and 35(2)] of the Act a controlled facility is subjected to an inspection to check the compliance with the licence conditions. Therefore, a planned inspection was conducted at ANSTO Fuel Operations Facility to confirm the compliance with the licence conditions.

1.3 Documents

The documents sighted during the inspection included:

- (a) Fuel Management and Active handling Instruction, NFI 9.7.38
- (b) Memorandum of Understanding between Waste Operations and Technology Development (WOTD) and Fuel Management and Active Handling (FMAH) Section (November 2001)
- (c) Maintenance Procedure for Fuel management and Active Handling, NFP 9.8
- (d) Service Level Agreement between Engineering and Nuclear Technology, SH 113932 (November 2002, valid until June 2004)
- (e) Organisational chart of Nuclear Technology (November 2002, renewal subject to annual review)
- (f) Memorandum of Understanding between Fuel Management and Active Handling Section and Radiation Technology Group (February 2001, renewal subject to annual review)
- (g) Training Procedure NWP 18.1
- (h) Training and Accreditation for WOTD Operators NWP 18.2
- (i) Gross alpha- and beta-activity distribution during 05 March 2002 to 05 May 2003 at B23 gamma Pond
- (j) Results obtained from dipstick analysis of B23 Irradiation-Liner and B23 Cropping-liner
- (k) ANSTO Internal Independent Investigation report of B23 Cropping Pond Incident (B23 Cropping Pond Incident – March 2002, A investigation by s 47F personal 31 July 2002). (Note: Marked "Private and Confidential").

1.4 Interviews

The following ANSTO staff members were present at the Entrance and Exit meeting:

1. s 47F personal
2. s 47F personal
3. s 47F personal
4. s 47F personal

1.5 Plant and Equipment

The following units of Fuel Operations and its adjacent establishments inspected:

- B23 Cropping Pond
- B23 Irradiation Pond

1.6 Demonstrations

During the conduct of the radiation survey of B23 Cropping Pond and its perimeter, radiation surveys were conducted and contamination control measures implemented.

2. INSPECTION FINDINGS

Effective control

Std LC ¹	Sp LC ²	Items	Compliance	Findings/Observations
	3.5	Service level agreements	Satisfactory	The available service agreements were sighted and were acceptable to ARPANSA. Improvement to the memorandum of understanding between Fuel Operations and Safety and Radiation Sciences should be made in the form of a formal service level agreement.
5		Personal training	Satisfactory	Training records are available. Certificates are awarded to the successful candidates as recognition of the completion of the training course. There are six trained operators in FMAH.
6		Operator accreditation	Satisfactory	An accreditation process is in place. Fuel Operations is in the process of revisiting the word 'accreditation' in terms of competency. It is recommended to involve ARPANSA Regulatory Branch staff during the accreditation interview for some key personnel. It is recommended to include lessons learnt from the incident in the retraining and accreditation program.

¹ Std LC means Standard Licence Condition set out in the ANSTO Handbook

² Sp LC means Special Licence Condition set out in the Facility Licence

Abnormal occurrences, Incidents and Accidents

Std LC	Items	Compliance	Findings/Observations
18	Abnormal occurrences, incidents and accidents	To be determined subject to regulatory review of all reports	There was an incident on 15 March 2002 during cropping of a spent fuel element. ARPANSA was notified about the incident. ARPANSA received the Final Report on the incident from ANSTO on 18 March 2003. s 47F personal carried out an internal independent investigation and prepared the report on 31 July 2002 of this incident and ARPANSA inspectors received a copy of this report in confidence during the inspection. Fuel cropping operation has been suspended since the incident. It is recommended to provide to ARPANSA the dose estimation and dose calculation procedure for the abnormal occurrences, incidents and accidents.
19	Reporting of abnormal occurrences, incidents and accidents	To be determined subject to regulatory review of all reports	ANSTO event report system applies (SD 2.4). See comment above under Standard Licence Condition 18. No clear information on contamination control measures was available in the final report on the incident submitted by ANSTO. It is recommended to include comprehensive contamination-control measures while dealing with abnormal occurrences, incidents and accidents. ARPANSA should be notified prior to the recommencement of the normal operation of B23 cropping pond and relevant updated procedures for B23 cropping pond operation should be subject to ARPANSA examination. ANSTO informed that two dead birds with traces of contamination of Cs-134 and Cs-137 were found in the vicinity of the B23 cropping pond and the bird were subject to gamma-spectroscopy. ARPANSA have requested the copies of the gamma-spectroscopy results.
20(iv)	Records of abnormal occurrences, incidents and accidents	Satisfactory	Details of the records of abnormal occurrences, incidents and accidents were available and the records were in an appropriate quality system.

Radiation Protection Arrangements

Std LC	Sp LC	Rcmdn ³	Items	Compliance	Findings/Observations
30			Radiation protection of employees & others	Satisfactory	Arrangements and procedures for radiation protection are in place. Both administrative and engineering control are in place for radiation protection. Access to the B23 cropping pond is restricted. Two swallows were observed flying out of the building. The roller doors of B23 bay were found open. The cropping pond is covered with corrugated plastic sheet and synthetic net to prevent birds' access to the pond. The measured gamma radiation dose at wall height near the cropping pond was 2.6 mSv/hr as on 06 May 2003. The recent value of total beta activity in the cropping pond area was in the range of 250-500 MBq/m ³ . It is recommended to provide the weekly results of Maypack sample of B23 cropping pond to ARPANSA.
	3.9		Radiological safety procedures/instructions	Satisfactory	Local rules and procedures for radiological safety are in place. The local rules and procedures are implemented by the Area Supervisor and Radiation Protection Adviser. Visitors are always escorted by the Health Physics Surveyor. Clear signage of restriction on entry is in place. Health Physics Surveyor is always available on-site during operation of the pond.
		4.2.1.5(b)	Use of radiation & contamination working notices	Satisfactory	Working areas in the B23 cropping pond is classified as blue contamination and blue radiation area. Controlled areas in the B23 cropping pond are delineated by physical means. Relevant health physics requirements and works instructions are followed to control contamination.

³ Rcmdn means recommendations for improvement set out in the ARPANSA Safety Evaluation Report

Radioactive Waste

Std LC	Sp LC	Rcmdn	Item	Compliance	Findings\Observations
48	3.11	4.2.1.6(a)	Arrangements and procedures for radioactive waste	Satisfactory	NFP 9.12 is referred to for arrangements and responsibilities of waste management. SD 5.7 applies to characterisation of wastes and final characterisation is done by WOTD. A database for radioactive waste is available, developed with the assistance of the ANSTO Information Technology.

Environmental Monitoring

Sp LC	Item	Compliance	Findings\Observations
3.12	Groundwater monitoring	Satisfactory	There are two bore holes (MW11, MW14) in the vicinity of the B23 cropping pond. The sample analysis is done through the ANSTO EMAP system and ANSTO Environment uses their QA system for this purpose. It was informed that no activity was detected in the results of the last quarter. The liner sump samples are analysed by the Nuclear Technology and the results of the last one year 05 May 2002-05 May 2003) was provided to ARPANSA during the inspection. Previously, the outside liner results showed the presence of low activity which may have been due to cross contamination.

Security

Rcmdn	Item	Compliance	Findings\Observations
4.2.1.7(c)	Entry restrictions	Satisfactory	Appropriate security arrangements are in place.

3. CONCLUSIONS

The available arrangements and procedures in the inspected areas as described in Section 2 were found satisfactory except for abnormal occurrences, incidents and accidents. ARPANSA will review the arrangements and procedures pertaining to abnormal occurrences, incidents and accidents including the final report (18 March 2003) and internal investigation report (31 July 2002) of an incident (15 March 2002) involving cropping of a spent fuel element. Generally, the staff consulted were found knowledgeable and responsive about the facility and regulatory affairs.

COMPLIANCE

The operation of the facility complies with the relevant standard and special licence conditions as described in Section 2 of this report. With regard to Licence Holder response and reporting to ARPANSA, Regulatory Branch will review the Final Incident Report (14 March 2003) and the internal ANSTO investigation report (31 July 2002) and advise the CEO of any further actions or follow up are required.

NON-COMPLIANCE

No item was identified as being in non-compliance with the licence conditions during the inspection.

MATTERS FOR CONSIDERATION BY THE LICENCE HOLDER

The inspectors found that the following matters should be taken into account by the Licence Holder in operating the facility.

1. The memorandum of understanding between ANSTO Fuel Operations and Radiation and Safety Science should be in the form of formal service level agreement.
2. ARPANSA Regulatory Branch staff should be invited to participate as observer during the accreditation interviews for one or two key operating personnel. (See findings Section 2, Std LC 6).
3. Lessons learn from the incident should form part of the retraining and accreditation process. (See findings Section 2, Std LC 6).
4. Dose estimation and dose calculation procedures for the abnormal occurrences, incidents and accidents should be provided to ARPANSA. (See findings Section 2, Std LC 18).
5. ARPANSA should be notified prior to the recommencement of the normal operation of B23 cropping pond and relevant updated procedures for B23 cropping pond operation should be subject to ARPANSA examination. (See findings Section 2, Std LC 19).
6. The gamma-spectroscopy results of the two dead birds should be provided to ARPANSA. (See findings Section 2, Std LC 19).
7. There should be better control for opening and closing of the roller door of B23 Bay with the door remaining closed as often as practicable to prevent entry of birds. (See findings Section 2, Std LC 30).
8. A representative few weekly results of Maypack sample of B23 cropping pond should be provided to ARPANSA. (See findings Section 2, Std LC 30).

INSPECTORS

Name

Signature

Date:

16/06/03

Name:

Signature

Date:

16/6/03

INDEXED
F11329

15
49

moved from
S2002/00258

From: s 47F personal on 18/06/2003 12:04

To: s 47F personal

cc:

bcc:

s 47F personal

3/4

Subject: Updates please

s 47F personal as discussed, some responses to s 47F personal queries:

Could you please let me know the outcome of the ARPANSA investigations into the condition of the spent fuel cooling pond that was contaminated almost a year ago? Has it been cleared for normal use yet?

The B23 cropping pond remains out of service. ARPANSA officers inspected the area in May 2003 and were satisfied that appropriate effective control, radiation safety and contamination control measures were in place. ARPANSA will conduct further inspections prior to the facility being returned to normal operation, probably in late 2003.

Associated with this there was the matter of the dead birds. Were they affected by radiation within the pond building and if so what effect would this have on the ANSTO workers in that area?

ANSTO informed ARPANSA that two dead birds were found in the vicinity of the B23 cropping pond in January 2003. The birds were subject to gamma-spectroscopy with traces of contamination found that would be attributable to the birds having access to the B23 cropping pond. From the results, ARPANSA is satisfied that the contamination was very low level and could not have contributed to the birds' demise. Further ARPANSA is satisfied that ANSTO has subsequently taken measures to prevent access by birds to the cropping pond.

----- Forwarded by s 47F personal on 17/06/2003 14:28 -----



s 47F personal

17/06/2003 14:13

To:

cc:

s 47F personal

Subject: Updates please

s 47F personal

Will you prepare a response to s 47F personal email, please, in consultation with s 47F personal on the first two paras and me on the last para.

Many Thanks

s 47F personal

----- Forwarded by s 47F personal on 17/06/2003 14:08 -----

s 47F personal

11/06/2003 16:58

To:

cc:

s 47F personal

Subject: Updates please

----- Forwarded by s 47F personal on 11/06/2003 16:56 -----

s 47F personal

on 11/06/2003 16:35:28



To: [REDACTED] s 47F personal
cc:

Subject: Updates please

Dear [REDACTED] s 47F personal

Could you please let me know the outcome of the ARPANSA investigations into the condition of the spent fuel cooling pond that was contaminated almost a year ago? Has it been cleared for normal use yet?

Associated with this there was the matter of the dead birds. Were they affected by radiation within the pond building and if so what effect would this have on the ANSTO workers in that area?

[REDACTED] s 22(1)(ii) irrelevant

Regards,

[REDACTED] s 47F personal



- att1.htm

s 47F personal

18/06/2003 16:26

To:

s 47F personal

cc:

Subject: Updated information

Dear

s 47F personal

Not on TRIA

s 47F personal has asked me to reply to your email of June 11 requesting updated information on three things:

1. ARPANSA investigations into the Building 23 fuel rod cropping pond contamination that occurred in March 2002;
2. Dead birds found by ANSTO workers within the same building; and

s 22(1)(ii) irrelevant

Firstly, the Building 23 cropping pond remains out of service. ARPANSA officers inspected the area in May 2003 and were satisfied that appropriate effective control, radiation safety and contamination control measures were in place. ARPANSA will conduct further inspections prior to the facility being returned to normal operation, probably in late 2003.

Secondly, ANSTO informed ARPANSA that two dead birds were found in the vicinity of the Building 23 cropping pond in January 2003. The birds were subject to gamma-spectroscopy with traces of contamination found that would be attributable to the birds having access to the pond. Nonetheless, ARPANSA is satisfied that the contamination was very low level and could not have contributed to the birds' demise. ARPANSA is also satisfied that ANSTO has subsequently taken measures to prevent access by birds to the cropping pond.

s 22(1)(ii) irrelevant

I trust the information provided is of assistance.

Regards,

s 47F personal

Public Affairs Officer
Australian Radiation Protection & Nuclear Safety Agency
Phone: s 47F personal

6. Building 23 Pond continues to be an issue because it has not yet been cleaned up. I was informed that there is a problem in Building 23 containing frozen birds. These birds have apparently been swimming in the Bld 23 Pond and become contaminated. It was not made clear if this bird of which one or had been killed to prevent contamination spread

s 22(1)(ii) irrelevant

s 47F personal

(see also)