		ADMINISTRATIVE PROCEDURE	Allocation Centre 38A	Reference Number KAH-002	Rev 7
NNR: NO No.:	RADIATION SURVEILLANCE PROGRAMME				PAGE 1
KORC NO	ACCESS Nuclear Restricted	IMPORTANCE CATEGORY SR	NEXT REVIEW DATE 2023-03-20	DATE AUTHORISED 2020-03-20	

COMPILED / REVISED	REVIEWED	AUTHORISED
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SENIOR RADIATION PROTECTION ASSISTANT	SENIOR SUPERVISOR RADIATION PROTECTION	MANAGER RADIATION PROTECTION
DATE 2020-03-23	DATE 2020-03-23	DATE 2020-03-20

THIS PROCEDURE HAS BEEN SEEN AND ACCEPTED BY:

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FCA PROTECTION	ALARA REVIEW YES 2020-02-24	SUPERSEDES KAH-002, Rev 6 dd. 2017-04-26 FULL REVIEW
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1.0 PURPOSE

- 1.1 To describe the process and responsibilities for scheduling and frequency of radiological surveys to ensure the safety of site personnel and the public.

2.0 SCOPE

- 2.1 Applicable to all radiation, airborne and surface contamination surveys and the methods employed to document the radiological results obtained.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

- 3.1.1 **Contamination** – The presence of radioactive substances in or on a material or the human body, or other place where they are undesirable or could be harmful.
- 3.1.2 **Controlled Zones** – Restricted, discrete areas containing radiological hazards where the integrated effective dose to a person may exceed 1 mSv per annum. They are enclosed or demarcated areas classified in accordance with the following zone definitions:
- 3.1.2.1 A **GREEN ZONE** exists where the general area radiation dose rate is less than 25 μ Sv/h.

NOTE: *The following areas are non-controlled zones if radiation levels are less than the stipulated limits:*

- (1) 0,5 μ Sv/h for all office areas.
- (2) 2,5 μ Sv/h for low occupancy office areas.
- (3) 7,5 μ Sv/h for very low occupancy areas provided that:
 - (a) Signposting is installed indicating “Do not Loiter in the Area, Radiation Hazard”.
 - (b) Approval for such is given by the RP Manager or designate.
 - (c) Surveillance is performed on a quarterly basis.

- 3.1.2.2 A **YELLOW ZONE** exists where the general area radiation dose rate is greater than or equal to 25 μ Sv/h but less than 1 mSv/h.
- 3.1.2.3 An **ORANGE ZONE** exists where the general area radiation dose rate is greater than or equal to 1 mSv/h but less than 10 mSv/h.

- 3.1.2.4 A **RED ZONE** is an area where the general area radiation dose rates are greater than or equal to 10mSv/h.
- 3.1.2.5 **RP LOCKED ZONE** – Any area where radiation dose rates can increase rapidly.
- 3.1.3 **Controlled Zone Classification** – The identification of areas within a controlled zone according to specific levels of radiation dose rate and/or levels of contamination.
- 3.1.4 **General Area Radiation Dose Rates** – Are radiation dose rates measured in walkways, access areas, corridors, passages, thoroughfares and at 0,5 m distances from significant sources of radiation, during radiation surveys in order to ensure compliance with the zone definitions given in paragraphs 3.1.2.1 – 3.1.2.4.
- 3.1.5 **Monitoring** – The measurement of dose or contamination for reasons related to the assessment or control of exposure to radiation or radioactive substances and the interpretation thereof.
- 3.1.6 **Outside Plant Areas** – Defined for the purpose of performing surveillance as follows:

Maintenance Service Building, Decontamination Workshop, In-service Inspection Building, Instrument and Electrical Workshops, Low Level Waste Building and all other areas not defined as plant areas.
- 3.1.7 **Plant Areas** – Defined for the purpose of performing surveillance as follows:

The Nuclear Auxiliary Building, Reactor Buildings, Fuel Buildings, Electrical Building and PTR tank areas.
- 3.1.8 **Radiological Survey** – The collection of data, assessment and documentation of the radiological conditions within a given area in order to aid the Eskom ALARA policy. This includes radiation, contamination and airborne surveys.
- 3.1.9 **RADPRO** – Information Management Computer System used by the Radiation Protection Group.
- 3.1.10 **Routine Radiological Survey** – A general area type survey performed to establish and document the radiological conditions within a given area. Assessment of general area radiation dose rates, surface contamination and airborne contamination levels, or any combination of these three, may be included in a radiological survey.
- 3.1.11 **Signposting** – A method derived to visually indicate to radiation workers the levels of radiation dose rate and/or levels of contamination in controlled zones.
- 3.1.12 **Surveillance** – The process used to quantify the levels of radiation or contamination by physical measurement.

3.2 Abbreviations

- 3.2.1 **ALARA** – As Low As Reasonably Achievable
- 3.2.2 **ATE** – Condensate Polishing
- 3.2.3 **APG** – Steam Generator Blowdown
- 3.2.4 **ISI** – In Service Inspection
- 3.2.5 **NAB** – Nuclear Auxiliary Building
- 3.2.6 **NNR** – National Nuclear Regulator
- 3.2.7 **PTR** – Spent Fuel Pit Cooling
- 3.2.8 **RCV** – Chemical and Volume Control
- 3.2.9 **RP** – Radiation Protection
- 3.2.10 **RPC** – Radiation Protection Certificate
- 3.2.11 **RPOO** – Radiation Protection Operations Office
- 3.2.12 **SEK** – Conventional Island Liquid Waste Monitoring and Discharge
- 3.2.13 **SRPA** – Senior Radiation Protection Assistant
- 3.2.14 **TEU** – Liquid Waste Treatment
- 3.2.15 **TD & RM** – Technical Documentation and Records Management
- 3.2.16 **WBC** – Whole Body Count

4.0 REFERENCES

4.1 Referenced Documents

- 4.1.1 238-36, Rev 0a: Operational Radiation Protection Requirements
- 4.1.2 238-54, Rev 0: Radiological Protection Licensing Requirements for Koeberg Nuclear Power Station
- 4.1.3 335-2, Rev 5: Koeberg Nuclear Power Station Management Manual
- 4.1.4 KAA-584, Rev 11: Radiation Instrument Management
- 4.1.5 KAA-632, Rev 10: ALARA Programme
- 4.1.6 KAA-633, Rev 12: Control of Radioactive Sources and X-ray Equipment

- 4.1.7 KAA-634, Rev 11: Responsibilities for the Radioactive Material and Radioactive Waste Control Programme
- 4.1.8 KAA-637, Rev 6: Access Control to Radiological Controlled Zones
- 4.1.9 KSH-011, Rev 10: Radiation Protection Certificate (RPC) Programme Requirements
- 4.1.10 KWH-AL-007, Rev 4: Actions on Detecting Hot Spots

4.2 Applicable Documents

- 4.2.1 KAA-500: The Process for Controlled Documents
- 4.2.2 KGH-001: Preparation and Issue of RPCs Using the New RADPRO RPC Computerised System
- 4.2.3 KGH-003: Radiation Protection Routine Survey Guide
- 4.2.4 KGT-055: General Radiation Protection Training Guide
- 4.2.5 KGT-056: Radiation Protection Department Training Programme Guide
- 4.2.6 KSA-011: The Requirements for Controlled Documents
- 4.2.7 KSH-002: Internal Administration and Control of Procedures
- 4.2.8 KSH-008: Radiation Protection Records, Data and Information Management
- 4.2.9 KWH-S-001: Radiation and Surface Contamination Surveys
- 4.2.10 KWH-S-015: Airborne Contamination Surveys
- 4.2.11 KWH-S-026: Decontamination of Personnel and Skin Dose Assessment due to Personal Contamination
- 4.2.12 KWH-S-037: Classification of Solid Radioactive Materials and the Acceptable ON and OFF Site Packaging Requirements for such Materials
- 4.2.13 KWH-S-041: Radiation Protection Source Control
- 4.2.14 KWH-S-043: Control of Red Radiation Zones and Radiation Protection Locked Zones
- 4.2.15 KWH-S-044: Radiation Protection Requirements for Normal Maintenance Shutdown
- 4.2.16 KWH-S-045: Radiation Protection Requirements for Industrial Radiography On Site

- 4.2.17 KWH-S-046: Radiation Protection Requirements for use of Soil Moisture and Density Gauges Containing Radioactive Sources
- 4.2.18 KWH-S-047: Implementation of the Radioactive Material Control Programme
- 4.2.19 KWH-S-049: Alpha Monitoring Programme
- 4.2.20 KWH-X-001: Radiation Protection Responsibilities for Receiving or Transporting Unirradiated Fuel or Empty Fuel Casks at Koeberg and at other Points Of Its Arrival In Cape Town
- 4.2.21 KWH-X-011: Handling and Sorting of Contaminated Clothing and Protective Equipment in the Hot Laundry

5.0 RESPONSIBILITIES

- 5.1 The responsibilities for the Radiation Protection Surveillance Programme are defined in the Work Flow Responsibility Matrix (Appendix 2).

6.0 PROCEDURE

6.1 Scheduling Routine Radiological Surveys

- 6.1.1 The frequency of routine surveys shall be based on the potential radiological hazards, probability of change in radiological conditions, and frequency of occupancy of the areas involved and type of activities to be performed. The following shall be taken into account when compiling routine sheets:

- (1) As a minimum, daily surveys shall be performed in radiological controlled zones where work is being performed, which may result in a change in radiological conditions, or in accordance with the Radiological Protection Certificates.
- (2) Controlled Zone exit points, when in use, shall be surveyed daily for contamination.
- (3) Designated eating areas used by Controlled Zone workers shall be surveyed monthly, and daily during outages.
- (4) Entrance areas for storage of radioactive material/waste shall be surveyed daily when equipment has been moved into these areas, or else at least weekly.

NOTE: Does not include areas where only sealed sources are stored (e.g. WBC room).

- (5) Clean waste dumps, salvage areas, equipment storage areas located within the Protected Area shall be surveyed quarterly.

6.1.2 Areas within designated satellite Controlled Zones where either general area (50 cm) dose rates exceed 2,5 $\mu\text{Sv/h}$, or surface contamination exceeds 3,7 Bq/cm² ($\beta\gamma$) or 0,37 Bq/cm² (α) averaged over 100 cm², shall be surveyed weekly. Such Controlled Zone includes:

- (1) Decon Workshop
- (2) ISI Storage Area
- (3) Low Level Waste Building
- (4) Hot Chemistry Laboratory
- (5) SEK Area (if dose rates, and/or contamination levels dictate)
- (6) Any other area where any of the above criteria apply.

6.1.3 In the event of a primary to secondary leak, routine surveillance of the secondary systems is required. As a minimum, the following areas shall be surveyed weekly, when or if radiological conditions resulting from the leak warrant it.

- (1) ATE Plant
- (2) SEK Plant
- (3) Main steam outlet pipes (from steam generators) for affected unit on the 9,5 metre level of the Turbine Hall.

NOTE: *If any of the above areas (excluding the SEK plant if Nuclear Island effluent has been diverted to it) prove to be Controlled Zones according to 6.1.3, a more detailed survey of the Turbine Hall and other secondary system areas is required weekly.*

6.1.4 Orange and Red Zone radiation areas shall be inspected on a routine basis to ensure that areas are properly sign posted, barricaded or locked, as necessary. The frequency of these inspections should take into consideration ALARA concerns, location and plant operating modes. Non-accessible areas (e.g. inside containment at power) should be surveyed and inspected only to support work activities.

6.1.5 Surveys in red zones and RP locked zones should be considered non-routine and be performed before entry on an as needed basis, or in accordance with RPC requirements.

- 6.1.6 The Routine Radiological Survey Programme schedules (i.e. daily, weekly, monthly, 3-monthly, etc.) may be modified when:
- (1) Performance of the surveys in question would compromise Eskom ALARA policies.
 - (2) Plant status or changing plant conditions renders the purpose of the surveys invalid.
 - (3) Personnel are required to perform higher priority functions.
- 6.1.7 When the general area radiation dose rate levels in the NAB increase by a factor of 5 due to shielding deficiencies, the shielding design will be reassessed via a separate Radiation Protection surveillance programme.
- 6.1.8 Additional survey and posting guidelines are provided in Appendix 1.
- 6.1.9 The Radiation Surveillance Programme is described in the Work Flow Responsibility Matrix (Appendix 2).

6.2 Completion of Daily / Weekly Routines

- 6.2.1 Each SRPA shall ensure that those routines scheduled for their shift/area, as indicated on the Daily Routine Sheets, are completed.
- 6.2.2 The RP Monitors shall perform and record the radiological surveys in accordance with KWH-S-001 and KWH-S-015.
- 6.2.3 On completion of the routine surveys, the RP Monitors shall place their initials and survey number against the survey, on the Routine Sheet.
- 6.2.4 The SRPA shall review the completed surveys, trend routine survey data and authorise them as required.

6.3 Completion of Monthly and 3-Monthly Routines

- 6.3.1 The relevant Section Head, or his deputy, shall distribute the monthly and, if required, 3-monthly Routine Sheets during the first week of each month. These sheets will note routines due during the month and/or quarter, date due, and the Teams to perform them.
- 6.3.2 On completion of the monthly / quarterly routines, the RP Monitor(s) shall date, enter the survey number, and sign off the appropriate routine(s) completed on the Routine Sheet.
- 6.3.3 The RP Monitors shall perform and record the radiological surveys in accordance with KWH-S-001 and KWH-S-015.
- 6.3.4 The relevant SRPA shall review the completed surveys and authorise them as required.

6.4 General

- 6.4.1 The relevant Section Head, or deputy, shall ensure that all routine surveys are completed as required by verifying the routine sheet package.

NOTE: *The RP Routine Sheets captures all outstanding surveys to be reviewed and authorised before the end of the following shift.*

- 6.4.2 When routine surveys cannot be completed on Public/Eskom Holidays, the responsible SRPA shall arrange that the routine surveys be completed on the preceding day or the following day.
- 6.4.3 Any changes in zone classification, or creation/removal of relevant controlled zone status for an area, shall be reported to the relevant Section Head within one working day.

7.0 RECORDS

- 7.1 The execution of surveys shall be recorded in the RP Operations daily log.
- 7.2 All records shall be retained in accordance with KSH-008.
- 7.3 Survey results will be used to regularly update the Plant Radiological Status records displayed at the entrance into Controlled Zones.

8.0 ATTACHMENTS

Appendix 1 – Posting Guidelines

Appendix 2 – Work Flow Responsibility Matrix – Radiation Protection
Surveillance Programme

Appendix 3 – Justification

APPENDIX 1

POSTING GUIDELINES

OVERVIEW

The intent of posting is to alert personnel of the presence, magnitude and boundaries associated with the various radiological conditions encountered in and around the plant. Posting activities provide personnel with sufficient information to minimise radiation exposure. Each case should be evaluated to assure that posting practices do not detract from the intent to alert personnel to radiological conditions by desensitising personnel through over posting.

POSTING SIGNS

Most of the posting signs are equipped with three or more pockets for placement of sign inserts. These inserts are printed with a variety of posting designations and requirements for entry.

All posting signs for an individual area should have identical inserts.

The outside surface of posting signs should not be written on or marked. Use blank inserts to add necessary information.


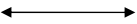
MULTIPLE POSTINGS

When more than one type of radiological condition exists in an area, multiple sign posting is necessary. This may be accomplished by utilising designated inserts which describe all radiological conditions in the same area.

BARRIER MATERIAL


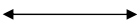
Chain, ribbon, rope, webbing or trellidoors should be used to construct RP barriers. Radiological barrier tape may be used on flat surfaces such as work tables where the use of chain or ribbon is not practical.

WORK FLOW RESPONSIBILITY MATRIX						APPENDIX 2 - RADIATION PROTECTION SURVEILLANCE PROGRAMME									
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [] – Mandatory Requirement () – As Appropriate/Required Flow Path:   Main Flow Secondary Flow	ORGANISATION / FUNCTION												NOTES & REFERENCES		
	RADIATION PROTECTION MANAGER	RELEVANT SECTION HEAD	SRPA DECON	HEAD OF RP ALARA	HEAD OF RP DEVELOPMENT	RP TRAINING	SRPA	RADIATION PROTECTION MONITORS	AUTHORISED PERSON (RP)	SENIOR AUTHORISED PERSON (RP)					
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12			
1.0 Overall Responsibility For RP Surveillance Programme	[R] ↓														
1.1 Ensure that the programme is developed.	[R] —	[S] —	[S] —	[S] —	[S] —	[S]									
1.2 Ensure that procedures are compiled to run the programme.	[R] — ↓	[S] —	[S] —	[S] —	[S] —	[S]							KSH-002		
1.3 Approve/Authorise all procedures associated with the programme.	[R] ↓												KAA-500 KSA-011 KSH-002		
1.4 Delegate to personnel areas of responsibility for the programme.	[R] — ↓	[I] —	[I] —	[I] —	[I]										
1.5 Ensure that the programme is implemented.	[R] — ↓	[S] —	[S] —	[S] —	[S] —	[S]									
1.6 Ensure that adequate manpower is made available to run the programme.	[R] — ↓	[S] —		[S] —	[S]										
1.7 Ensure that personnel who are recruited have the correct qualifications.	[R] ↓														
1.8 Ensure that quality control is maintained on the programme.	[R] — ↓	[S] —	[S] —	[S] —	[S] —	[S] —				[S] —	[S]				
1.9 Apply the frequency at which surveillance is to be carried out.	[R] — ↓	[S] —	[S] —	[S] —	[S]										
1.10 Waiver surveillance requirements.	[R] — ↓	[I] —	[I] —	[I] —	[I]										
1.11 Ensure RPCs are authorised for all surveillance duties performed in Controlled Zones.	[R] — ↓									[S] —	[S]		KGH-001		
2.0 Training															

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	RADIATION PROTECTION MANAGER	RELEVANT SECTION HEAD	SRPA DECON	HEAD OF RP ALARA	HEAD OF RP DEVELOPMENT	RP TRAINING	SRPA	RADIATION PROTECTION MONITORS	AUTHORISED PERSON (RP)	SENIOR AUTHORISED PERSON (RP)			
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
2.1 Identify the training requirements.	[R]	[S]	[S]	[S]	[S]	[S]							KGT-055 KGT-056
2.2 Ensure that personnel are trained.	[R]					[S]							
2.3 Develop training courses.	[A]					[R]							
2.4 Train personnel.		[S]	[S]	[S]	[S]	[R]	[S]						
2.5 Authorise personnel on successful completion of training.	[R]	(S)	(S)	(S)	(S)	[S]							
2.6 Compile on-job training manuals for areas of responsibility.		(S)	(S)	(S)	(S)	[R]							
2.7 Ensure that on-job training is completed.	[R]	[S]	[S]	[S]	[S]		(S)						
2.8 Ensure that only qualified staff carry out RP surveillance duties.	[R]	[S]	[S]				[S]						
2.9 Maintain records of qualified staff.	[I]					[R]							
2.10 Waiver training requirements.	[R]					[I]							
3.0 Routine Surveillance for Plant													
3.1 Develop programme for specific plant areas.	[A]	[R]	(S)	(S)	(S)		[S]	[S]					KWH-S-001 KWH-S-015 KWH-S-043 KGH-003
3.2 Ensure that adequate supplies of calibrated surveillance instruments are available for use.		[R]					[S]						
3.3 Implement programme for all plant areas.		[R]	[S]				[S]	[S]					
		[R]											
3.4 Ensure that the programme is carried out within the plant		[R]					[S]	[S]					

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
areas.													
3.5 Review and authorise all surveillance records for plant areas.		[R]					[S]						The duty SRPA reviews and authorises all RP Routine Sheets as per 6.2.4.
3.6 Ensure that the surveillance of all items leaving plant controlled zones is carried out.		[R]	(S)				[S]	[S]					KWH-S-047
3.7 Assure the surveillance of all personnel requiring decontamination.		[R]					[S]	[S]					KWH-S-026
3.8 Maintain records of all plant surveillance activities.		[R]	[S]				[S]	[S]					KSH-008
4.0 Routine Surveillance for Outside Plant													
4.1 Develop programme for all outside plant areas.	[C]	[R]	(S)	(S)	(S)		[S]	[S]					KWH-S-001 KWH-S-015 KWH-S-043 KGH-003
4.2 Ensure that adequate supplies of calibrated surveillance instruments are available for use.		[R]					[S]						
4.3 Implement programme for all outside plant.		[R]	[S]				[S]	[S]					
4.4 Ensure that the programme is carried out within outside plant.		[R]	[S]				[S]	[S]					
4.5 Review and authorise all surveillance records for outside plant controlled zones.		[R]					[S]						
4.6 Assure the surveillance of all items leaving outside plant controlled zones.		[R]					[S]	[S]					KWH-S-047
4.7 Assure the surveillance of all personnel requiring decontamination when working in outside plant controlled zones.		[R]					[S]	[S]					KWH-S-026
4.8 Assure the surveillance of all radioactive material		[R]					[S]	[S]					KWH-S-001 KWH-S-037 KWH-S-045

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12		
leaving or coming onto site.													KWH-S-046 KWH-S-041 KWH-X-001	
4.9 Assure the surveillance of vehicles that have carried radioactive material either leaving or coming onto site.		[R]					[S]	[S]					KWH-S-001 KWH-S-037 KWH-X-001	
4.10 Assure the surveillance of all protective clothing and equipment before re-use in all controlled zones.		[R]	[S]				[S]	[S]					KWH-X-011 KWH-S-001	
4.11 Maintain the records of all outside plant surveillance activities.		[R]	[S]				[S]	[S]					KSH-008	
5.0 Outage Routine Surveillance Programme														
5.1 Develop programme.	[C]	[R]											KWH-S-001 KWH-S-015 KGH-003 KWH-S-043	
5.2 Implement programme.		[R]	[S]				[S]	[S]						
5.3 Ensure that the programme is carried out.		[R]	[S]				[S]	[S]						
5.4 Review and authorise all outage surveillance records.		[R]					[S]							
5.5 Maintain records of outage surveillance programme.		[R]	[S]				[S]	[S]					KSH-008	
6.0 On-Job Surveillance														
6.1 Ensure that task surveillance is carried out in accordance with RPC requirements.							(S)	[R]					KWH-S-001 KWH-S-015 KGH-001 KWH-S-043 KWH-S-049	KWH-S-044 KWH-S-045 KWH-S-046
6.2 Review and authorise all task surveillance records.		[R]					[S]							
6.3 Maintain records of Task Surveillance Programme.		[R]	[S]				[S]	[S]					KSH-008	
7.0 Sign Posting/Demarcation														

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
7.1 Classify Controlled Zones.							[C]—[R]						KWH-S-001
7.2 Demarcate Controlled Zones.							[C]—[R]						
7.3 Identify Hot Spots.							[C]—[R]						KWH-S-001
7.4 Sign-post Controlled Zones.							[C]—[R]						KWH-S-001
7.5 Display current surveillance data at entry to work areas.							[C]—[R]						KWH-S-001
7.6 Ensure that the correct information is always displayed, and control all changes to information.							[C]—[R]						
8.0 Trending of Radiological Surveys													
8.1 Develop a tool/application to trend surveys.	[C]—				[R]								KWH-S-001
8.2 Select survey points to be trended.	[C]—	[R]—			[S]								KWH-S-001
8.3 Identify/Mark the survey points to be trended.		[R]—						[S]—[S]					KWH-S-001
8.4 Update the tool/application with data from RadPro.							[R]						KWH-S-001
8.5 Investigate any trend deviations and inform relevant section head.							[R]						
8.6 Review zone classification based on data trend.		[I]—					[R]						KWH-S-001
8.7 For an increasing trend, if practical, initiate actions to make trend revert to normal.	[C]—	[R]—			[S]								

APPENDIX 3

JUSTIFICATION

Revision 6

1. Full review.
2. To include requirements for trending radiological surveys. CR 95544

Revision 7

1. Scheduled full review.