Office for Nuclear Regulation

Investigation into a contamination event in the Magnox Reprocessing Facility (MRF).

Project Assessment Report: ONR-SDFW-PAR-17-006
Revision B
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EXECUTIVE SUMMARY

Title

Investigation into a contamination event in the Magnox Reprocessing Facility (MRF).

Background

The Magnox Reprocessing Facility (MRF) takes used Magnox-type fuels and passes them through a series of chemical and mechanical processes, separating out the resulting material into a number of nuclear waste and product streams. Within the MRF, as part of normal daily shift routines, plant staff take a number of process samples to confirm that the plant is operating within expected parameters (for product quality, nuclear materials accountancy and safety purposes).

On 8 January 2017, one of the plant Duly Authorised Persons (DAP) undertook the process sample for the Highly Active (HA) raffinate from the dissolver. Following that action, the DAP continued normal shift activities before exiting the facility at the end of their shift. Upon leaving and using the radiation monitors, the DAP found themselves to be contaminated. The on-shift health physics team within the facility took control of the affected individual, carried out more detailed monitoring and confirmed the extent of contamination, and directed the initial event response in accordance with the licensee's formal arrangements.

The licensee has confirmed that its finalised dose estimate for the affected employee exceeds the Ionising Radiations Regulations 1999 annual limit for an external skin exposure (500 mSv); it has recorded an external skin dose of 1.1 Sv to the affected employee's hand, and that dose has been entered in the individual's dose record.

There were no consequences to other workers or members of the public.

I consider that the event highlights shortfalls in compliance against number of regulations made under the Ionising Radiations Regulations 1999, and under the Health and Safety at Work etc Act 1974.

Basis for Enforcement Decision

Following the completion of my investigation, I conclude that the spread of contamination was primarily due to inadequate procedural adherence by the contaminated individual, and by the supporting health physics monitor.

Applying the principles of ONR's Enforcement Policy Statement via our Enforcement Management Model, gave an initial enforcement expectation that an Improvement Notice be served. However following consideration of the relevant EMM duty holder and strategic factors, I consider that a formal enforcement letter is issued to SL, and a formal verbal warning is given to both individuals.

With regards to the contaminated individual and the shortfalls in his behaviours, I note that the only person to suffer harm from this event is this contaminated individual themselves. In addition it was evident that the individual demonstrated appropriate insight and learning from the event.

Regarding SL I consider that issuing an improvement notice would not be a proportionate response to this event as, when weighing SL's responsibility which contributed to the event, against those of the contaminated individual and the health physics monitor, I consider that the actions and omissions of these individuals were the root causes of the event.

Conclusions and Recommendations

I recommend that ONR should deliver formal verbal warnings to both individuals involved in this event, with specific reference to the expectations of procedural adherence and operations within a controlled area.

I recommend that ONR should deliver a formal enforcement letter to the licensee, summarising those shortfalls in administrative arrangements which they should address in order to minimise the likelihood of reoccurrence.

LIST OF ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
EMM	Enforcement Management Model
EPS	Enforcement Policy Statement
HSE	Health and Safety Executive
HPM	Health Physics Monitor
IN	Improvement Notice
LC	Licence Condition
MRF	Magnox Reprocessing Facility
OI	Operator Instruction
ONR	Office for Nuclear Regulation
PPE	Personal Protective Equipment
SL	Sellafield Limited
SLP	Sellafield Limited Practice
SQEP	Suitably Qualified and Experienced Person

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1 INTRODUCTION

1. The Magnox Reprocessing Facility (MRF) takes used Magnox-type fuels and passes them through a series of chemical and mechanical processes, separating out the resulting material into a number of nuclear waste and product streams. Within the MRF, as part of normal daily shift routines, plant staff take a number of process samples to confirm that the plant is operating within expected parameters (for product quality, nuclear materials accountancy and safety purposes).

2. On 8 January 2017, one of the plant Duly Authorised Persons (DAP) undertook the process sample for the Highly Active (HA) raffinate from the dissolver. Following that action, the DAP continued normal shift activities before exiting the facility at the end of their shift. Upon leaving and using the radiation monitors, the DAP found themselves to be contaminated. The on-shift health physics team within the facility took control of the affected individual, carried out more detailed monitoring and confirmed the extent of contamination, and directed the initial event response in accordance with the licensee's formal arrangements.

3. As a result of the period of time between the sampling activity and the time at which decontamination commenced, and the extent to which skin had been exposed following the sampling activity, the licensee has had to include a number of conservative assumptions relating to duration of exposure, and extent of skin affected. The licensee has, therefore, confirmed that its finalised dose estimate for the affected employee exceeds the Ionising Radiations Regulations 1999 annual limit for an external skin exposure (500 mSv); they have recorded an external skin dose of 1.1 Sv to the affected employee's hand, and that dose has been entered in the individual's dose record.

1.1 PURPOSE

4. This report has been produced to detail the enforcement decisions taken by ONR, in accordance with the ONR's Enforcement Policy Statement (EPS) (Reference 1), and guided by application of the ONR Enforcement Management Model (EMM) (Reference 2). This event was also the subject of an ONR formal investigation, the outcome of which is detailed at the related Combined Investigation and Prosecution Report (Reference 3).

1.2 BACKGROUND

5. The Magnox Reprocessing Facility (MRF) takes used Magnox-type fuels and passes them through a series of chemical and mechanical processes, separating out the resulting material into a number of nuclear waste and product streams. Within the MRF, as part of normal daily shift routines, plant staff take a number of process samples to confirm that the plant is operating within expected parameters (for product quality, nuclear materials accountancy and safety purposes).

6. At approximately 1600 hours on 8 January 2017, the on-shift Plant Operations Controller (POC), who is a Duly Authorised Person (DAP) under the licensee's arrangements, attempted to extract two 5ml samples of high activity aqueous raffinate from sample point 36 on Bulge 56 in the Magnox Reprocessing Plant. This is a daily sample routine, normally carried out by that shift DAP role, and is required in order to monitor the condition of the process liquor within this part of the reprocessing stream, and then used as part of a suite of samples to confirm that the reprocessing operations remain within expected parameters for normal operation.

7. The specific part of the reprocessing stream sampled by sample point 36 is referred to as Primary Separation 1 Aqueous Raffinate (PS1AR), and is the first sample point after the separation of the Plutonium and Uranium streams. It contains a number of active fission products and, as such, a very small amount of this sample liquor would give rise

to a potentially significant worker dose and/or plant contamination. This means that non-visible surface contamination of that liquor would still be significant in terms of the potential dose received, should an individual become contaminated through contact with that affected surface.

8. On this occasion, the sampling was unsuccessful, as an adequate sample could not be extracted from the process flow. Investigations at the time focused on the possibility of either an insufficient vacuum in the sample vials, or a defective sample needle. Both potential scenarios were known to the operators, and they were practised in securing the sample site, arranging for the relevant maintenance team to undertake any required repairs, and then retaking the sample on completion.

9. Once it was clear that the sample had not been achieved (despite using both sample vials), and that this failure had been confirmed by the attending Health Physics Monitor (HPM) (comparison with expected activity levels arising from a successful sample), the shift DAP then disposed of the PPE and used sample vials by wrapping them in the empty respirator bag and placing them in a Low Level Waste (LLW) bin on the red cell top area of plant (which is adjacent to the areas of plant where the sampling took place).

10. The sample bugle plant configuration was restored to its pre-sample line-up, but no post-operations survey was undertaken by either the HPM or the shift DAP, and no personnel survey was carried out by the HPM on the sift DAP. Prior to leaving the area, the shift DAP retrieved a set of keys that they had placed on top of Bulge 56, then left the area and proceeded to a Plant Operations Control meeting, arriving at 1618 hours. They continued their shift within the building, and exited the building at 1810 hours, at which point contamination was detected by the monitoring equipment used as part of the standard controlled area exit procedure.

2 LICENSEE'S RESPONSE TO THE INCIDENT

2.1 INITIAL RESPONSE

11. Following detection of the contamination at the point that the shift DAP attempted to exit the controlled area of the MRF, the facility Health Physics Team Leader (HPTL) co-ordinated the response to the event, securing the site adjacent to the shift DAP, overseeing further monitoring by the on-shift HP team members, and directing further detailed surveys to confirm the source of the contamination.

12. All key areas of the facility were surveyed with a focus on those potentially visited by the shift DAP between the time of the sample, and the point at which they attempted to exit the facility at the end of their shift. No contamination was found on any area of plant other than on the sample bulge used for the sample task. Loose contamination (approx. 11 mSv/hr), which was consistent with the level of contamination found on the shift DAP, was observed on the external surfaces of the sample bulge, adjacent to the area where the shift DAP had left their keys whilst undertaking the sample.

13. In parallel with these survey actions, the contaminated shift DAP was transported to the main site medical centre, which also contains a decontamination facility. The shift DAP remained at that facility from around 1850 until successful completion of decontamination operations at about 0030, which involved confirmation checks via an independent personal monitor. They were then allowed to exit the site.

2.2 FOLLOW UP ACTIONS

14. Immediately following the event, the licensee suspended reprocessing operations and related sampling activities [Reference 4] whilst it undertook initial investigations into the event to confirm if there was a wider systemic issue that needed to be addressed.

15. The licensee initiated and completed a formal internal investigation into the event [Reference 5], which has stated that:

    - The most probable cause of the contamination was through contact with loose contamination which had been present on the sample bulge, either prior to or as a result of the sampling task.
    - The key causes were the failures of both the shift DAP and HPM monitor to adhere to the written instructions and related training and instruction when undertaking the sample task.
    - The dose assessment undertaken was sufficiently conservative, and took account of the uncertainties in terms of time exposed and extent of skin exposed.
    - There are potential modifications in the written instructions that will remove ambiguity and lack of consistency across the sampling operating instruction, the HPM Monitor Instruction, and the overarching risk assessment.

16. The shift DAP has undertaken a re-SQEP task, specifically related to the training task for HA sampling [OJ 0702, HA sampling in MRF], prior to resumption of on-plant duties.

17. The licensee has put in place additional supervision measures for the initial period after this event [Reference 5], with the intention of undertaking a full review at some point thereafter. A second plant DAP is required to supervise the STL during the daily sampling activity, with specific focus on adherence to disposal guidance for waste, and pre and post-job surveys and personnel checks

3 ONR'S ASSESSMENT OF THE INCIDENT

3.1 ONR RELATED INTERVENTIONS

18. As part of a decision to undertake a formal investigation, I undertook a number of meetings with plant staff, and undertook plant walk-downs of the area of plant where the sample bulge was installed, and the associated sample point 36.

19. During the first part of the formal investigation, I also carried out preliminary enquiries to establish a full understanding of the event, and to confirm that the initial planned lines of enquiry were robust and took due account of all possible event causes and contributory factors.

20. As part of those preliminary enquiries, which included structured interviews with all licensee staff, I recorded sufficient information to allow me to assess the licensee's response to the event, to judge the adequacy of their internal investigation, and to make a judgement as to the root and contributory causes of the event.

21. During those enquiries, I noted that Sellafield Limited have assessed the average skin dose over an area of 1cm2 around the knuckle of the index finger or the shift DAP's right hand to be 1.1 Sv [TRIM 2017/78139], which is greater than the relevant IRR99 Schedule 4 dose limit of 500 mSv.

3.2 JUDGEMENT ON ADEQUACY OF LICENSEE RESPONSE

22. At the point that the contamination was first identified (when the shift DAP exited the facility at the end of their shift, approximately two hours after the failed sampling task), the facility Health Physics Team Leader (HPTL) undertook additional sample and survey activities to confirm the extent of contamination within the facility, and to determine if additional control measures were required.

23. For the duration of those checks, movement around the facility was minimised to only that required for safe operation of the reprocessing systems. These actions were in accordance with the wider HP training for contamination events on site, although each specific potential scenario does not have written instructions, due in part to the significant number of such scenarios. I consider that the actions undertaken within the MRF immediately following the identification of the contamination event were adequate, consistent with the licensee's own expectations, and in accordance with its planned emergency response.

24. The shift nurse that oversaw the decontamination actions undertook their task in accordance with written guidance for methods of loose contamination removal, which were successful. The HP team that they directed, who carried out the task of decontamination support and wider management and control of the decontamination area also undertook their activities in accordance with that guidance, with hard copy and electronic logs used to record all key decontamination stages.

25. Both the shift nurse and the support HP team undertook their work using the required Personal Protective Equipment (PPE), comprising TYVEK suit, gloves and respirator. This was in accordance with the written instructions for decontamination of personnel. I consider that the actions undertaken within the decontamination facility (within the site main surgery) immediately following the identification of the contamination event were adequate, consistent with the licensee's own expectations, and in accordance with their planned emergency response.

26. The licensee ceased reprocessing operations until such time as they had confirmed that the event was not indicative of a plant defect, or of a wider systemic shortfall in the conduct of sampling. As part of my investigation, I reviewed the records of decision

making undertaken by the licensee, and reviewed the details of that approach with the Head of Operations for the MRF. I consider that the licensee has acted in a sufficiently conservative manner, and has utilised adequate evidence in support of their decision to restart sampling, and thereby recommence reprocessing operations.

3.3 JUDGEMENT ON ADEQUACY OF LICENSEE INTERNAL INVESTIGATION

27. The licensee has completed a Management Investigation (MI) which I have reviewed as part of my formal investigation. In my opinion the report is adequate; the terms of reference are sufficient in scope and ensure that the licensee is able to identify the underlying causes and thus set appropriate corrective actions to minimise reoccurrence.

28. Additionally, I have reviewed the recommended corrective actions within that report. Whilst the report identifies that the underlying failure to be addressed is the decision of the shift DAP not to recognise that the elevated contamination hazard could still exist, irrespective of if the sample had been taken successfully or not, and the related failing of the HPM to complete the post job survey, it does not consider all the probable reasons why that decision was taken. However, I do not consider that it has missed significant factors regarding such decision making, and so I consider that the licensee's report is adequate.

29. The value of the report corrective actions depend on understanding the motivation for such decisions, as that will determine if the corrective actions are targeted to address the underlying cause. In this instance, I consider that the shift DAP failed to appreciate where and how the hazard might occur during the sampling operations, and the corrective action related to re-SQEPing of that DAP addresses that key shortfall.

3.4 SHORTFALLS IN PROCEDURAL ADHERENCE

30. This sampling task should be completed using a Reference Use instruction [Reference 6], and the related health physics monitoring activities are defined within a separate Monitor Instruction which is treated and marked as equivalent to Reference Use [Reference 7].

31. Conduct of the specific sampling operation (sample point 36) is stated at Operation 6 of the Reference Use OI, and defines the expectation that a pre-job work contamination work area survey will be undertaken by the HPM, with the shift DAP in attendance. The survey was reported to me as having been completed, although no record of that survey is available. Furthermore, the shift DAP was not in attendance for the pre-task survey, and arrived at the sample bulge just before undertaking the sampling task. This is not in accordance with the written instructions for sampling.

32. Completion of the sample extraction steps was in accordance with the relevant steps of the written instruction, up until the point at which it was clear that neither sample vial had achieved a credible sample. The written instruction makes no differential between successful and unsuccessful samples, and it expects that the operators will complete the task, secure the sample site, and carry out all defined post-job activities.

33. At the point that the HPM confirmed that no credible sample had been achieved, they also checked the used sample vials, and then the shift DAP disposed of them (along with related PPE and operational waste from the task) in an adjacent LLW bin. This is not in accordance with either the written instructions for sampling or those for monitoring.

34. Thereafter, the shift DAP picked up keys that they had left on the sample bulge, contrary to wider site guidance on control of equipment/components within a controlled area, and then vacated the sample area with no post job monitoring undertaken. This

is not in accordance with either the written instructions for sampling, or the site and local rules for conduct within a potentially contaminated area.

35. Both the HPM and the shift DAP were trained and qualified for the sampling task that they undertook, and the training records for the shift DAP were checked to confirm that status. The training records for the HPM were not checked at the time of the investigation.

36. The shift DAP role training does not specifically cover this sampling task in detail, but it does include assessment of high activity (HA) sampling operations, of which this sampling task was a subset. The training and assessment of DAP with regard to HA sampling operations covers those generic steps that ensure safety; the pre and post task surveys, the hazards to be controlled during operations, and the procedures to be followed. The Shift Team Leader (STL) role does have specific training relating to HA sampling (OJ 9020), and this training covers the completion of all HA sampling.

37. The licensee has undertaken a risk assessment of "High Active Sampling" [Reference 8], which includes all related control measures for HA sampling within the Magnox Reprocessing Facility (MRF). Those control measures have all been transposed into the relevant written instructions for the task, or confirmed as within wider control documents for control of and/or work within controlled areas. That risk assessment was in force at the time of the event.

3.5 ROOT AND CONTRIBUTORY CAUSES OF THE EVENT

38. I consider that the root cause of this event was the failures of the shift DAP and HPM to ensure that the post task survey and personnel check was undertaken. Had those actions, which are clearly detailed in the written instructions, been completed then the contamination on the work area and the related contamination on the hand of the shift DAP would have been identified in a timely manner, thus minimising the time for dose update to occur prior to decontamination.

39. There is a related contributory failure on the part of the shift DAP (and exacerbated by a lack of suitable challenge from the HPM) regarding the conduct of operations within the area of HA sampling, indicated by the placement of keys on the sample bulge during the sample operation, and the failure to manage the waste in accordance with the written instruction.

40. Based on my preliminary investigations into this specific event, I do not consider that this decision making is indicative of a wider systemic failure within the MRF with regard to HA sampling; interviews with other operational staff indicate that post operations survey and personnel checks are considered a key step in completing the sampling task, whether successful or not.

41. I noted that the licensee has, following the event, carried out a review of all related documentation and training covering this HA sampling task, and has made a number of minor modifications that seek to align and clarify some of the expectations regarding post-task monitoring. I do not consider that such improvements, had they been in place prior to the event, would have prevented this occurrence.

42. Additionally, the licensee has instigated a formal pre-job brief and related supervision of the task. Whilst task supervision may well have reduced the likelihood of the event occurring, I consider that a pre-job brief would have, over time, reduced in value and focus due to the frequent repetition of, and thus familiarity with, the sampling task.

4 IDENTIFICATION OF BREACHES

43. On face value, the primary breach of legislation relates to the exceedance of the IRRs annual does limit for an external skin dose of 500 mSv. It should be noted, also, that this relates to a breach of prescriptive legislation for which the licensee has a strict liability in law. It is my judgement that the licensee failed to comply with their responsibilities under Ionising Radiations Regulations 1999 Regulation 11 which requires that:

> "…*every employer shall ensure that his employees and other persons within a class specified in Schedule 4 are not exposed to ionising radiation to an extent that any dose limit specified in Part I of that Schedule for such class of person is exceeded in any calendar year."*

44. It is my judgement that both the contaminated individual and the HP monitor failed to comply with their responsibilities under Ionising Radiations Regulations 1999 Regulation 34 (1) which requires that:

> "An employee who is engaged in work with ionising radiation … *shall exercise reasonable care while carrying out such work.*"

45. It is my judgement that both the contaminated individual and the HP monitor failed to comply with their responsibilities under HASW Act 1974, section 7 (b), which requires that:

> "…as regards any duty or requirement imposed on his employer or any other person by or under any of the relevant statutory provisions, *to cooperate with him so far as is necessary to enable that duty or requirement to be performed or complied with.*"

46. I have based my judgements on the following:

- Had the licensee incorporated a pre-job brief as an additional control measure, and/or made provision for supervision independent of task delivery, then the opportunities for contamination to occur, or for that that contamination not to be identified at the time of the sampling activity, would have reduced.
- Had the existing procedures been adhered to sufficiently, the shift DAP would have not increased the risk of becoming contaminated, on the basis of his correct use of PPE whilst remaining with the sample area, and not introducing inappropriate equipment (keys) into that controlled area.
- Had the post job survey been completed, the existence of the contamination at the sample site could have been identified, which would have minimised the time before decontamination commenced, and thereby reduced the eventual dose received.
- Had the shift DAP ensured that at all times, when in the vicinity of the sample bulge, they were mindful of the increased hazard presented by the active liquors being sampled, the probability of the surface contamination being transferred to their hand would have been reduced significantly.

5 REGULATORY ENFORCEMENT DECISIONS

47. In evaluating what regulatory enforcement action should be taken as a result of the above reaches consideration has been given to the principles set out in the Enforcement Policy Statement (Reference 1), ONR guidance on the use of the EMM (Reference 2) and the use of the EMM Operational Version 3.2. The related Enforcement Assessment Records (EMM1) are at References 9, 10 and 11 to this PAR.

48. Although this event had the potential to expose other individuals, I have selected Table 2.1 for single/small number of casualties as appropriate, given that a minimal population of the plant undertake such sampling, and that pre-task surveys are undertaken before each and every sample.

49. I consider that in this case the benchmark risk from a radioactive update from routine sampling operation is serious personnel injury (exposure to radiation giving rise to the potential for serous health effects such as cancer) with a nil/negligible likelihood.

50. These judgements result in a risk gap of SUBSTANTIAL and an EMM initial enforcement expectation, prior to taking other factors in account, that an Improvement Notice be issued.

51. I have separated out my enforcement decision into two parts. The first considers the enforcement related to the two individuals; the shift DAP and the HPM, and the second then considers the enforcement relating to the actions of the licensee.

5.1 ENFORCEMENT AGAINST INDIVIDUALS

52. In considering the most appropriate enforcement action for the two individuals, I have raised an EMM1 for each person involved. The EMM form for the shift DAP [Reference 9] and for the HPM [Reference 10] have the same initial enforcement expectation, and duty holder factors have been applied as follows:

53. There is no relevant history of related failures on the part of either individual, and no recent enforcement action pertaining to either person. There is no indication that deliberate advantage was sought, nor was any deliberate decision taken to circumvent the written procedures; both personnel in this event had simply failed to realise the extent of the hazard that was still potentially present when the sampling activity was unsuccessful.

54. In terms of strategic factors that affect the enforcement decision for the individuals, I consider that whilst there appear to have been a number of failings/omissions by the shift DAP and the HPM, I consider that issuing a formal Notice or letter would not be in the public interest.

55. I consider that, in the case of the shift DAP, issuing a formal Notice or letter would not be in the public interest, as the only person to suffer harm from this event is the contaminated individual himself.

56. Additionally, it is my opinion that, in the case of the HPM, issuing a formal Notice of letter would not be in the public interest, as, for the key steps of the procedure which were not followed, there was not an equal burden of responsibility on the part of the HPM, as opposed to the shift DAP. The relevant written instructions at the time of the event placed greater emphasis on the procedural adherence of the shift DAP, as the separate written instructions for the HPM did not cover the handling of the sample vials, should a positive sample not be achieved.

57. I note also that the greatest benefit in terms of sustained compliance with the law will accrue from the increased awareness of the event that both individuals already possess, and which has also already been recognised within the wider DAP and HP community who periodically undertake this task.

58. In addition my investigation identified that the shift DAP has demonstrated appropriate insight and learning from the event regarding potential areas for improved personal performance, and that they have engaged in an open and constructive manner with ONR's investigation to ensure effective learning from the event.

59. Additionally, subsequent discussions with the licensee have indicated that the HPM has also demonstrated appropriate learning and insight from the event, and that the wider HP group undertaking this and other equivalent tasks have already integrated that learning into their work practices.

60. Therefore, I consider that, in this instance, both individuals should receive a formal verbal warning for their failures, highlighting the shortfalls in human performance that both demonstrated, and thus providing a reminder of the expected levels of procedural adherence and self-challenge that I would expect of such roles.

61. In conclusion, through application of duty holder factors and recognition of the limited value of a formal letter or Notice in terms of achieving sustained compliance with the law, I consider that modification of the initial enforcement expectation of an Improvement Notice to a verbal warning for each of the two individuals (shift DAP and HPM) is appropriate.

5.2 ENFORCEMENT AGAINST THE LICENSEE

62. In considering the enforcement action for the licensee, I have raised a single EMM against the organisation [Reference 11].

63. My primary consideration is the regulatory enforcement relating to the strict liability of the breach of the prescriptive annual dose limit in the IRR's (as stated at Section 4). It requires me to consider prosecution of the licensee in respect of that breach, irrespective of the degree of culpability of the licensee. I consider that in this case prosecution is not in the public interest, for the following reasons:

- Prosecution would be a significant and extended distraction to the lead management team and operating staff at the licensed site, and would possibility compromise the focus on timely delivery of high hazard reduction activities.
- Additionally, such a prosecution would also take up significant focus within the Magnox Reprocessing Facility, itself of nationally strategic importance to timely delivery of the Magnox Operating Programme (MOP).
- Whilst culpability is not a test in the consideration of breaches of strict liability, prosecution of the licensee in this instance could have a compromising effect on the proactive approach currently undertaken by the licensee to addressing safety shortfalls at site; they have had very limited influence on the root causes of this event, and may then, in response, inadvertently minimise opportunity for safety improvement as they seek to avoid further prosecution for events where their culpability is equally limited.

64. I have noted that there has been no recent history of sampling contamination events of this nature, nor of failures to follow sampling procedure. Additionally, there has been no previous relevant enforcement action, no deliberate economic advantage was sought, and previous inspections have not identified any shortfalls arising from

licensee actions which would have contributed to this event. Therefore, there are no duty holder factors which modify the initial enforcement expectation.

65. The indicated enforcement action at the EMM (Reference 11) is an Improvement Notice, noting that the IRR annual limit has been exceeded in this event, with the associated strict liability for that breach being held by SL, as the licensee. I consider that the heart of the event was the failure of the two individuals to carry out the defined procedure for sampling, including post-job actions, and my investigations have not identified any part of the licensee's arrangements that contributed significantly to that omission to an extent that the licensee should be also considered equally culpable.

66. However, it is my opinion that the licensee does bear responsibility for ensuring that individuals are periodically reminded of the expected level of both operational and procedural standards, with the specific frequency and approach set by the nature and severity of those hazards being managed.

67. I do not consider that issuing an Improvement Notice would have sufficient regulatory benefit, as the licensee has already undertaken such improvements after the event as I would consider ALARP, and is reviewing this additional arrangements to determine how best to ensure sustained compliance with the law.

68. Additionally, issuing a Notice would potentially add distraction without adding sufficient commensurate safety improvements, and so I consider that the initial enforcement expectation should be modified to a formal regulatory letter, which details the shortfalls in the licensee's performance, and sets out the regulatory expectation in respect of recovery to sustained compliance, whilst recognising what has already been achieved in this regard.

69. Therefore, the EMM1 form for the licensee reflects my judgement that the ONR should write to the licensee, defining those shortfalls in operational oversight and management expectations which are considered to be the responsibility of the licensee, and requiring the licensee to address the shortfalls such that they bring themselves back into sustained compliance with the law.

70. In conclusion, through application of strategic factors and recognition of the lack of culpability on the part of the licensee, I consider that modification of the indicated enforcement expectation of an Improvement Notice to a formal enforcement letter is appropriate.

6 CONCLUSIONS

71. I note that radiological contamination was not transferred outside the Magnox Reprocessing Facility boundary and that no persons received a radiological dose with the exception of the contaminated individual.

72. There were a number of barriers in place to prevent contamination, which was negated by reduced personal operating standards on the part of the individuals undertaking the sampling activity.

73. These findings represent shortfalls in compliance with both the Ionising Radiations Regulations 1999, and the Health and Safety at Work etc Act 1974.

7 RECOMMENDATIONS

74. I recommend that ONR should deliver formal verbal warnings to both individuals involved in this event, with specific reference to the expectations of procedural adherence and operations within a controlled area.

75. I recommend that ONR should deliver a formal enforcement letter to the licensee, summarising those shortfalls in administrative arrangements which they should address in order to minimise the likelihood of reoccurrence.

8 REFERENCES

Reference 1: ONR Enforcement Policy Statement [ONR-ENF-POL-001 Revision 0].

Reference 2: Enforcement Management Model (EMM) [Operational Version 3.2].

Reference 3: ONR Combined Investigation and Prosecution Report [TRIM 2017/115327].

Reference 4: Record of telephone conversation between ONR and SL [TRIM 2017/26821]

Reference 5: Sellafield Limited Management Investigation formal report [TRIM 2017/90000]/

Reference 6: OI 09/02/1.5.001, Issue 22, dated May 2015 [TRIM 2017/100882].

Reference 7: SEP/3.04/HA, Issue 3, dated June 2013 [TRIM 2017/100874].

Reference 8: [redacted], Issue 2, dated December 2014 {TRIM 2017/100884].

Reference 9: Completed EMM1 – Shift DAP [TRIM 2017/102983].

Reference 10: Completed EMM1 – HPM [TRIM 2017/103692].

Reference 11: Completed EMM1 – Sellafield Limited [TRIM 2017/110621].