

These Minutes have not yet been approved for issue by the EHSC.

**WEST CUMBRIA SITES STAKEHOLDER GROUP
ENVIRONMENTAL HEALTH SUB-COMMITTEE**

**MEETING 67 OF THE EHSC
HELD AT CLEATOR MOOR CIVIC HALL
ON 31th May 2007.**

Present:

Professor J Haywood	Chairman
Professor S Jones	Westlakes
Mr R Hargreaves	Six Parishes
Dr M Emptage	Environment Agency
Mr G Davies	NII
Dr N Calvert	Cumbria & Lancs Health Protection Unit
Mr V Emmerson	Copeland Borough Council
Mr T Parker	Sellafield Ltd
Ms S Allen	Sellafield Ltd
Mr N Atherton	Sellafield Ltd
Mr N Marsland	Sellafield Ltd

Apologies:

Cllr S Moffatt	Allerdale Borough Council
Dr S McCready-Shea	NII – represented by Mr G Davies

Public and Press

Ms J Allis-Smith	CORE
Mrs M Higham	Drigg
Mr D Siddall	Whitehaven News

AGENDA ITEM 1. Chairman's introduction

- 1 The Chairman opened the meeting by welcoming those attending, including Mr Neil Marsland presenting the Sellafield Effluent Strategy to the committee, and Mr Nick Atherton who would take over as secretary to the EHSC at the November 07 meeting.

AGENDA ITEM 2. Minutes of Meeting 66

- 2 2.1 As no amendments were raised, the minutes were approved for issue.
- 3 2.2 Matters arising
- 4 Para 40 – monitoring of the Ravenglass/Esk estuary area – Dr Emptage reported that he had talked to Ms Allis-Smith and Mr Forward and will liaise with them to take the monitoring programme forward.
- 5 The publication of the Groundwater Monitoring report was queried, this should have been available but is not yet ready for issue. Mr Hargreaves asked for an early copy if available. Dr Emptage understood the report should be available in the summer, and that work was also commencing to characterise the land and groundwater in the middle of the site. He suggested that both issues could be discussed at the next meeting. Mr Parker agreed with the suggestion. He had given a presentation on this in 2005, there

have been some more measurements since then and more data will be available. This work was now part of the Contaminated Land Group and a representative from there will present the information to the committee.

- 6 Ms Allis-Smith asked if the recent queries about body-parts were within the remit of this committee. Professor Haywood replied that this concerned monitoring of the workforce and that the EHSC does not deal with that. It was an employee issue not an environmental health issue, therefore more likely to be a site liaison issue. Professor Jones commented that as an enquiry had been convened, public discussion was not suitable before the report was made.

AGENDA ITEM 3. Sellafield & Drigg discharges and environmental monitoring 2006 – a preliminary assessment.

- 7 Mr Parker said he intended to give a verbal report on discharges for the previous year, whether they were up or down, and a preliminary assessment of the dose. The majority of discharges depend on the site reprocessing rate – for Magnox 300 tonnes in 2005 and 700 tonnes in 2006, and none for Thorp.
- 8 Aerial radiological discharges for 2006 were generally reduced, a maximum of 65% of the limit. Sb125 had increased since 2005, this was under investigation. Krypton was reduced as Thorp was shut-down. Tritium was up slightly as Magnox had reprocessed 700 tonnes.
- 9 Aerial non-radiological discharges. Mr Parker reported this as less than 3% particularly with regard to NOx
- 10 The critical group dose was similar to the 2005 dose – 13.2 µSv/hr (compared to 13.5 µSv/hr), mainly from historic discharges.
- 11 Liquid radiological discharges for C14 and Ru106 had increased as Magnox reprocessing had increased. Am241 was up, from SEC processing through EARP. Co60 was reduced because of Thorp's limited programme.
- 12 The dose to the public, largely due to historic discharges was 202 µSv, reduced from 205 µSv in 2005, this was influenced by habit changes (seafood consumption)
- 13 Liquid non-radiological discharges – the maximum was 43% of the limit.
- 14 Mr Parker reminded the committee that the LLWR at Drigg would be separating from Sellafield in the near future and will be reported separately. The discharges were very low and overall similar to 2005.
- 15 Dr Emptage said that increases in Cs137 and Sb125 gaseous discharges had occurred in 2006 due to a couple of issues at the Fuel Handling Plant (FHP). For Cs137 there was no significant increase showing against the site limit, but there was against the FHP limit. This had been investigated by the EA and BNGSL, reports were being considered with regard to an enforcement response. It was related to plant operation, which was now understood and rectified, and Cs137 discharges are now lower than they had been for years. The plant was being operated in a better way, giving a reduction in discharges.
- 16 Dr Emptage said that Sb125 gaseous discharges from FHP rose in 2006 and work on plant was ongoing to try to understand this. The plant had not processed much fuel this year, so the source was hard to pin down, work was ongoing. There is also an issue with the sampling method, which is currently being investigated. There is a breakthrough of Sb125 through the discharge sampler, so not all the discharge is being sampled.
- 17 Mr Hargreaves asked if the absolute levels were near to the limits. Mr Parker replied that

discharges were at 65.86% of site limits. Dr Emptage added the impact associated with that is very low less than 1 μSv (0.3 μSv)

AGENDA ITEM 4. Environmental Health Matters

- 18 Professor Jones reported on the 15-Country Collaborative Study on cancer risks to workers in the nuclear industry. Studies of occupational exposures were potentially a better indicator of radiation risks to the public than were studies of the survivors of the Hiroshima and Nagasaki A-bomb attacks. The study combines data on occupationally exposed cohorts in 15 countries, including the UK.

Professor Jones had commented at a previous meeting on an earlier publication in the BMJ during 2005 giving preliminary results of this study. Three papers had now been published in Radiation Research - these covered methodology study design, errors in radiation dosimetry, and mortality from cancer. The results from individual countries showed some variation, with only one country showing a significant association between radiation exposure and mortality from all cancers. However, when all the results were combined a significant relationship between radiation exposure and mortality from cancer was found. The report concludes 'Risk estimates per unit dose from this study are statistically compatible with estimates that serve as the basis for current radiological protection standards. They range from values lower than the BEIR VII estimates up to values that exceed these estimates by a factor of about six for both solid cancers and leukaemia.'

Professor Jones indicated that a further study, dealing with mortality from non-cancer causes of death in these cohorts, was expected to be published by the end of the year.

- 19 The ICRP had approved new recommendations on radiation protection, these were in the process of being published. Professor Jones did not think the recommendations had changed from their earlier thoughts. Stakeholder involvement was emphasised.
- 20 In September 2006, ICRP Publication 101 was issued, assessment of the dose to the representative person and radiation protection. The philosophy was set up in a slightly different way but there was no basic change. The 'representative' person is the critical group by another name.
- 21 Dave Siddall asked if this would alter the dose limits in any way. Professor Jones said there was no sign of this so far, and he did not believe it would.
- 22 Ms Allis-Smith asked if Professor Jones had any idea what would be included in the non-cancer paper, was there any likelihood that it will be of relevance to compensation schemes. Professor Jones had no information on this.
- 23 Professor Haywood asked if the 15 country study and the ICRP talked to each other. Professor Jones replied that he felt that the ICRP will be aware of the 15 nation study. Professor Haywood said that in the 2007 recommendations of the ICRP, some of the risk co-efficients had been reduced. Evidence emerges, the ICRP consults and recommends, Euratom considers and amends the directive, so it can be 6 or 7 or more years later that national governments have to decide if legislation should be changed (could be 10 years). Professor Jones commented that there may need to be faster action if something really major showed up.

AGENDA ITEM 5. Beach Monitoring

- 24 Mr Parker reported that BNGSL had been carrying out new beach monitoring over the last couple of months. Since the 1983 beach incident, the beaches had been routinely monitored. In 1984/85 some finds had been removed. Since then the Sellafield beach had been monitored 2/month and the Drigg/Seascale/Braystones and St Bees areas had been monitored 1/month. Extra monitoring had been done while the pipeline was taken out.
- 25 Because of the finds at Dounreay, more sensitive monitoring equipment was developed. Trials at Sellafield in November 06 and Braystones in January 07 were carried out with the same equipment, an 8 wheeled vehicle carrying a sodium iodide array across the front. The trial had shown that the equipment worked in the Sellafield background of higher Cs137, and the vehicle could cope with the terrain. A programme had been agreed with the EA to monitor 15 hectares of beach before July and 100 hectares in total for the financial year. With this revised monitoring programme there was a 95% probability of detecting 100,000 Bq of Cs137 at a 10cm depth of sand. This was dependant on the speed at which the vehicle monitors. The strandline monitoring programme will continue as before and Mr Parker said he though the more intensive monitoring was likely to continue for the next few years.
- 26 The risk to the public and the sources of the finds, would determine the programme for the longer term. This was more expensive than the existing programme, they had to balance the risk to the public against the cost. They have also employed sodium iodide had-held monitors in areas where the vehicle was unable to go, these gave similar results. BNGSL had consulted with all the Parish Councils which had beach areas to inform them of the monitoring programme.
- 27 The first trial had resulted in 9 'finds', some pebbles with activity adsorbed onto them, and 5 small angular particles – these were under investigation. The second trial, at Braystones, had found 3 angular particles, no pebbles. One of these had Am241 not Cs137, this was unexpected, and a demonstration of how sensitive the machine is.
- 28 The current programme started on 21 May at St Bees where there was 1 'find' (particulate and Am241). This was old material – 25 years old from the isotopic fingerprint – but it is not possible to say at present how it came to be in the environment and how long it had been there.
- 29 The monitoring then moved to the Ehen Spit, which is 3 miles long and includes the beach area traversed by the pipelines. There were 22 'finds' from here – stones, particles and pebbles with absorbed activity. The next area to be monitored would be Seascale beach.
- 30 They had monitored more than 15 hectares before the end of July. With the information to date (which was not complete), the risk to the public is being determined, dependant on the amount of activity on the particles, and the amount of particles in the area, and the risk of ingestion. CEFAS is to carry out a habit survey of people on beaches, this will be built into the risk assessment. The form of material is relevant and is still being determined. The current risk is put at 1 in 100 million – a very low risk, they were working to refine the accuracy of this assessment.
- 31 Mr Hargreaves asked if there were any plans to fracture the pebbles, to see how deep the activity was into the structure. Mr Parker said this was not currently planned, they were looking at the elements involved on the surface, to try to determine where the activity was from (ie which plant) and the age of the discharge. Indications were that it was

- mostly old material. A lot of the material was larger than the mesh size of the strainers put in the pipelines in 1984.
- 32 Dr Emptage asked if a germanium detector was also used, Mr Parker confirmed this – this was used to determine background levels to calibrate the array. It was better to locate the particles etc with a NaI detector and do a full spectrometer assessment in a laboratory. Professor Haywood asked if the Am241 could have come from discarded smoke detectors, Mr Parker said there was plutonium with the finds, so this was unlikely.
- 33 Dr Emptage commented that he had reported at the 2005 meeting, that following a liquid/aqueous waste inspection, an Enforcement Notice had been issued to require BNGSL to undertake work aimed at improving its filtration and other means to exclude particulates from liquid waste. The programme had been produced, but there had been subsequent issues which had delayed the work going forward. A further Enforcement Notice had been issued to ensure the work moved forward in process plants, effluent treatment plants and at discharge points. Work is ongoing, a programme of improvements will be needed.
- 34 Dr Emptage said there were a number of strands of work going on with the beach monitoring and any issues arising from this, he recognised that other parties had an interest – FSA, CBC, COMARE, NDA, NII, HPA etc. He wondered if a multi-agency group should be set up to look at the technical issues of the decisions which may be needed to be taken and asked the committee if they had any view on this, or should the query go to the WCSSG. He reminded members that the Seascale/Sellafield pigeon issue was dealt with by a multi-agency group. Mr Emmerson said that CBC would support this approach. Professor Haywood commented that to insert such a body into the WCSSG would have to go to that group, he could not see any objection to the proposal, but was not sure he could see the advantage of it. Mr Parker suggested the Dounreay particles advisory group, set up several years ago, could perhaps be a model for the proposed group. Mr Hargreaves commented that the objectives for the group need to be clear beforehand – risk assessment or reassurance levels, this needs to inform the size of the group and what it considers. Professor Haywood said it would be helpful to see a proposal on objectives and size of the group for consideration. Professor Jones suggested there was some merit in technical representatives and stakeholder involvement. Mr Parker suggested this should be an item for the agenda at the next meeting, more information would be available by then. Professor Haywood expressed doubt as to what benefit extra information would be for this decision, a firm proposal was more important, to take to the main group Chairman. He concluded that more information on the proposed group was needed, the general reaction from the committee seemed to be favourable, but puzzled. Dr Emptage said if it was decided to go forward with the proposal, he will issue this to members via the secretary.
- 35 Mr Parker said the monitoring information will be available on the new Sellafield website.
- 36 Ms Allis-Smith asked if there were any plans to extend the monitoring further afield – Haverigg and coast to coast areas. Mr Parker said that with the new equipment the St Bees to Ravenglass area was being concentrated on – this will give a distribution plot from which they can refine the programme. It was unlikely that they will move inland, the machine is designed to work on the beach, and he couldn't see a means by which this material would get inland. If there were finds at the strandline, they may need to look

further inland, it was for the EA to set the programme.

- 37 Mr Higham asked how far down the beach did the machine go. Mr Parker said they were going as low as possible at the moment, targeting sand which is where people spend most of their time.
- 38 Ms Allis Smith suggested that silt holds material and they should go for these areas. Mr Parker said they were specifically looking for large amounts of activity in small pieces of material. The survey has however picked up 2 areas of widely spread silt with higher activity. Dr Emptage said there were likely to be problems with the vehicle on silt areas and the background count would be higher, making it more difficult to detect high activity concentrations particles. As to how far and wide the monitoring should go, that would be for the group to consider.

AGENDA ITEM 6. Items of Environmental interest/Works update

- 39 Mr Parker reported that these had mostly been concerned with the beach monitoring. He advised that discharges were related to reprocessing, Thorp was not operating, it had received NII consent to operate and was waiting on availability of downstream plants. These were not likely to be available till summer, this will affect discharges this year.
- 40 The (Separation Area Ventilation) SAV project had received planning permission from Copeland Borough Council. This was the building of a tall stack to replace stacks on buildings that are due for demolition, and will incorporate updated technology. There should be less exposure to the public than from the existing stacks, this will result in a lower impact. This was due for completion in 2011, construction should start in 2008.
- 41 Dr Emptage said he had been involved in the development of plans for this work, making preparations for the places where streams tie into the new system.
- 42 Mr Parker reported that Magnox was shut down due to problems with downstream waste treatment plants – this will affect discharges. Vitrification discharges etc were unaffected.

AGENDA ITEM 7. Overall Effluent Strategy (*Full text of presentation at Appendix A*)

- 43 Mr Marsland said the Overall Effluent Strategy (OSE) feeds into a number of other strategies, eg solid waste etc. He explained what the team does, how the model which they have developed takes the site along an operational to decommissioning timeline, covering 100 process plants and 26 radionuclides.
- 44 The key results were that there was no threat to the current Sellafield discharge limits, predicted discharges comply with the UK discharge strategy (at <1%).
- 45 There was a risk from un-lodged materials. There were opportunities for re-routing liquors round the site, to make best use of existing facilities.
- 46 The model can be used to predict in advance, then 12 months later the team can check if the actual data matches the prediction.
- 47 Professor Haywood noted that future discharges were shown as declining, but asked what about the effect of the historical discharges contribution. He commented that for presentation to members of the public the whole picture needed to be shown. Professor Jones advised that historic data can be modelled. Dr Emptage said that work had been done by Westlakes Scientific Consulting, modelling the historical component, and he agreed that this was quite complicated to present. Professor Haywood said that which plant it came from was interesting, but a member of the public is more likely to want the

whole picture. Also, how fast can the Irish Sea move stuff about to maintain a low level? Dr Emptage welcomed the work, long-term forward planning allowing the site to make best use of the facilities (for example by using spare capacity rather than building new plants). He also saw real value in the work in terms of identifying opportunities for improvements.

- 48 Mr Hargreaves commented that in the overall scheme of things, the nuclear industry only amounted to 10% of discharges, oil and gas also contributed.10%. Neil Marsland said he was aware that they needed to focus more on informing the public.
- 49 Ms Allis-Smith said, as a member of the public, she would want to see the dose she was getting, and asked if the pie chart shown related to a UK average – how did that apply to people living here, on the coast and exposed to historic discharges. She asked for some honesty – a dose from Ravenglass estuary or a Seascale residence.
- 50 Professor Haywood commented that from the figures in the RIFE report, the scientific community has identified a ‘critical group’, but this is not representative of a typical cumbrian, the doses are lower. It remains however, a very thin ‘slice’ of the pie-chart, even for Cumbria – he pointed out that the average dose for a resident of Cornwall was 3 times that of the average UK resident.
- 51 Mrs Higham commented that plans don’t always come to fruition, and asked who turns the valve that lets materials out to sea – human beings? She asked how she could be assured that solvent doesn’t get discharged. Mr Parker replied that plants were designed to minimise the risk of that happening and regulated by the Environment Agency. The intention was to do the right thing, but accidents could happen. He suggested that sometimes the best way was for a person to turn a valve rather than a computer.
- 52 Mr Hargreaves said that looking at the RIFE reports each year, there was a change, for the better and slowly. A slow steady change is better – what is being done is controlled and regulated. He suggested that if a coal-fired power station was asked what it did with ½ ton of uranium from the bottom of its furnaces, the answer would be to dump it outside.
- 53 Dr Emptage said he had suggested the presentation be given, to show people the work that was being done, how effluents in plants and waste discharges to the environment can be minimised. This was timely as there was an ongoing review of the UK discharge strategy due to go to public consultation over the coming period.
- 54 Mr Marsland said that with regard to aerial effluents, similar work had been done, predicting no discharge increases over current levels. They were looking at the decoupling of stacks for plants with different time lines. The only tall stack needed is the SAV (Separation Area Ventilation). The reduction of stacks to roof-top discharges had been looked at, but there were no benefits. The aerial model was being developed to the state of the liquid model.

AGENDA ITEM 8. Regulatory Issues

- 55 Dr Emptage said most of the Environment Agency’s issues had already been covered. It was 2004 when the new authorisation was issued, brought up to date after a long review. The EA wanted the authorisation to be dynamic, able to respond to changes and they had been piloting an annual review process to do this. There had been only minor changes to the authorisation after the first year (2006 review), but significant changes to the environmental monitoring programme had taken place (e.g. major modifications to the

- groundwater monitoring programme and the requirements for enhanced beach monitoring). At the second review (2007 review), there were no changes to the authorisation but underlying aspects had changed (eg wider enhanced beach monitoring). In addition, the limit of detection for analysis within the BNGSL environmental monitoring programme had been standardised to become more aligned to the limits of detection applied in the EA/FSA programmes. This means that check monitoring and BNGSL results will be more comparable, once this works its way through the system.
- 56 Next year the authorisation review will be more significant, Windscale will be included in the Sellafield site – in line with the NDA move to put the site under one operator.
- 57 For the NII Mr Davies had nothing additional to add.

AGENDA ITEM 9. Review of EHSC membership

- 58 The Chairman suggested a review of membership was needed as members had been lost, had never attended, the health organisations had been reorganised etc. The Six Parishes members had been lost, Mr Hargreaves will however still attend and report to the Six Parishes, this had been agreed with the WCSSG Chairman.
- 59 With regard to the health organisations, Dr Calvert from the Health Protection Agency was to be the representative, he has links with the Primary Care Trust and radiation protection
- 60 Mr Emmerson said as an officer of Copeland Borough Council, he has the authority to vote on technical issues, but not on political issues. CBC had 3 ‘seats’ – 1 person will attend, either himself or Mr D Davies.
- 61 Professor Haywood said he would discuss Six Parishes representation with David Moore, the WCSSG Chairman.
- 62 Allerdale Borough Council had been chased and had assured that their nominated representatives were interested in attending meetings, but this had not happened. It was agreed that CBC and ABC should be approached again, and reminded of the objectives of the committee. *[Note: ABC have notified names of two representatives – one of nominees has changed]*.
- 63 Mr Higham asked who does the public get information from. Professor Haywood said the meetings were in public, any member of the public could attend. Mrs Higham said that as elections had just happened there may be a need to re-appoint representatives. Mrs Higham asked how the public could access the minutes, they were not in libraries. She was reminded that minutes are available from the WCSSG web-site.

AGENDA ITEM 10. Any Other Business

- 64 The draft Press Release was discussed and amended for issue to local papers
- 65 The effectiveness of the press release was discussed, the lack of press awareness was highlighted by Mrs Higham and Ms Allis-Smith. They suggested that newspapers should be rung to advise of the meeting, or that adverts be put in the papers. They were advised that this had been tried initially with no better results, and it was dependant on the costs being covered. All the meetings (date/time/venue) were detailed on a widely available card or from the web-site.

APPENDIX A - Presentation to the Environmental Health Sub-Committee - May 07

Overall Effluent Strategy Objectives – Neil Marsland

Overall Effluent Strategy Objectives – What We Do

- Determine the optimum processes and chronology for effluent management during the Sellafield site clean-up programme, balancing all stakeholder constraints and expectations
- Ensure environmental principles are applied in developing the overall integrated strategy
- Compare predicted radioactive discharges against the UK discharge strategy / OSPAR / current authorisation targets
- Aim to simplify ongoing effluent infrastructure to a minimum sustainable position and to avoid adding to the historic assets requiring decommissioning
- Produce effluent strategies that are robust to uncertainties in disposal policy, timing of repositories and ultimate site end-point options
- Provide guidance to British Nuclear Group and the Nuclear Decommissioning Authority on environmental radioactive discharges and supporting DEFRA on the review of the UK discharge Strategy

Overall Effluent Strategy – How we do it

Developed a powerful model which:

- Shows complex interconnectivity across the Sellafield site via dynamic simulation (colour coded) – gives insight into the sequencing of decommissioning
- 100 Process Plants
- 26 Radionuclides and 60 Inactive species per plant
- 350+ Process streams
- 3,800,000 m³/y effluent
- 5 Plant phases (Operations, Post Operational Clean Out, Decomm...etc)
- The first flowsheet simulation for all of the Sellafield site
- Takes into account the effect of fuel burn-up and cooling time on discharges predictions
- Incorporation of OES active pipe and duct work into the Geographical Information system (GIS)
- Includes 10 years of historical liquid discharge data (see demonstration later)
- Independent Peer Review of the model by Lancaster and Warwick Universities and external independent nuclear experts
- Input data and Output fully reviewed by Site Technical Community
- Overall Effluent Strategy work recommended for a national citation by the Environment Agency

Overall Effluents Strategy – Regulator Framework

Key Regulatory Framework for environmental protection:

- International Convention

The 1998 Ministerial meeting of the OSPAR Commission endorsed a strategy with regard to radioactive substances which includes the statement:

“...to prevent pollution of the marine area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances....”

Timetable for implementation

“...by 2020 all discharges, emissions and losses of radioactive substances are reduced to levels where the additional concentrations in the marine environment above historic levels, resulting from such discharges, emissions and losses, are close to zero.”

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- UK National Discharge Strategy 2002 (under review)
This strategy sets out how the UK will comply with the OSPAR agreement.
The main targets that are applicable to reprocessing at Sellafield are:
 - * Total beta liquid discharges to be around 50TBq/yr Beta 5 (excl Tritium) by 2020
 - * Total alpha liquid discharges to be around 0.2TBq/yr by 2020
 - * Tc-99 discharges to be <1TBq/yr by 2020The aims of the UK discharge strategy are for progressive and substantial reduction of radioactive discharges, such that the estimated mean dose to the critical group from liquid effluents is no more than 20 µSv/yr (which is less than 1% of natural background dose)
- UK National Regulation
Discharges of liquid and aerial effluent from the Sellafield site are governed by a series of discharge authorisation limits (SALDAR II)

Overall Effluent Strategy – Scenario LTP 2007 Results

- No threat to current Sellafield site authorisation limits
- Predicted radioactive discharges are small when compared to natural background dose (~2200 µSv)
- Predicted discharges appear compliant with the UK Discharge Strategy targets that are applicable to reprocessing at Sellafield
- 50 TBq/yr (taken as Beta 5) achieved in 2011 - 2012†
- 0.2 TBq/yr Alpha achieved in 2010 - 2011†
- < 1 TBq/yr Tc-99 achieved in 2016†
- Predicted discharges appear consistent with the aims of the UK Discharge Strategy, in that
- Discharge and dose predictions show an overall trend for progressive reduction
- 20µSv/yr Dose to the critical group achieved in 2011- 2012 (subject to dose contributions from other sites)

† Note: the dates shown above indicates the achievement of the targets for the **Total Site Discharge**

[See Fig 1: Scenario LTP2007 – Predicted Dose from Liquid Effluent, Fig 2: Predicted Marine Dose from Sellafield Liquid Effluent v Natural background Dose, Fig 3: Background radiation sources, Fig 4a&b: LTP2007 Predicted Annual Beta 5 & Alpha Discharges from Liquid Effluent]

Overall Effluent Strategy – Residual Uncertainties

- There are residual uncertainties that will not be fully resolved until the work is carried out, including:
 - Risk of sudden unexpected dislodgement of activity, not removed or fixed by POCO or decommissioning activities
 - Legacy Ponds & Legacy Silos – uncertain until retrievals are attempted
 - Uncertainties on activity, volumes and durations associated with POCO, decommissioning and LP&S activities
 - Uncertainties associated with actual plants performance as retrievals / legacy, POCO and decommissioning activities progress i.e. facilities progressively depart from the original operating envelope
 - Discharges from yet to be defined waste treatment plants

Overall Effluent Strategy – Typical Transition Diagram

Uncertainties associated with the phases of the site remediation programme

Parameter	Changes represented (see Fig 5)
Volume	Changes to flowsheeting volumetric throughput rates, as consigning plants cease NO and start remediation activities
Operating Regime	Relates to the operating conditions of the plant changing from continuous to intermittent or batch processing, or vice-versa
Expected end life	Mechanical and structural integrity for continued operation as plant ages beyond its design life or currently assessed lifetime extension.
Presence of solids	Change in the solids loading, particularly as consigning plants enter POCO
Chemistry/Blend	Change in the chemical compositions of the feed
Aggressive Chemicals	Expected decontamination aggressive chemicals during decommissioning

Overall Effluent Strategy - Opportunities being pursued

- Switch Segregated Effluent Treatment Plant (SETP) to Enhanced Actinide Removal Plant (EARP)
 - * Makes best use of capacity in EARP
 - * Mitigates the risk due to unforeseen POCO arisings
- Site Ion Exchange Treatment Contingency Plan
 - * Provides contingency against a sudden unplanned and irrecoverable unavailability of this key facility
- Significant reduction in effluent discharges have been achieved by applying the environmental hierarchy of ‘avoid, minimise, recycle, abate’

How does the Overall Effluent Strategy team help?

- OES provides site-wide environmental impact assessment and effluent route knowledge
- OES have developed a powerful flexible, strategic assessment tool that is used for predicting discharges
- OES can help in rapid assessment of environmental impact of potential discharges and variations of options
- OES are supporting DEFRA on the update of the UK discharge strategy

Overall Effluent Strategy - Summary

Overall Effluent Strategy – Aerial Effluent

Developed a powerful model which:

- Shows complex interconnectivity across the Sellafield site via dynamic simulation (colour coded) – gives insight into the sequencing of decommissioning
- Aerial Effluent Specific
 - >50 Process Plants
 - 26 Radionuclides and 60 Inactive species per plant
 - 230+ Process streams
- 5 Plant phases (Operations, Post Operational Clean Out, Decommissioning...etc)
- The first flowsheet simulation for all of the Sellafield site

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Overall Effluent Strategy – Gate C Key Conclusions

- OES predictions suggest that there will be no increases in discharges during remediation activities above current levels.
- OES predictions suggest that there will be a significant reduction in discharges once commercial reprocessing operations cease.
- Cost-saving opportunities exist to decouple plants that have linked active ventilation systems but different timescales for remediation.
- No requirement for further high stacks for remediation purposes at Sellafield.
- The BNGSL Nuclear Ventilation Group has reviewed the current and near-term technology for aerial abatement from the viewpoint of practical application. Within the scope of the study, it concludes that the current aerial abatement technology at Sellafield is adequate for the duty.
- It is anticipated that the use of localised tenting and ventilation equipment will increase during decommissioning work

Aerial Effluent Strategy – Gate C Key Recommendations

- The decoupling of the following plants from shared ventilation systems should be assessed:
 - * Decoupling EPS1 and ETF from MEP
 - * Decoupling SMP from Thorp
 - * Decoupling WIF from FHP
- Investigate the use of local HEPA filtration in the B38 ventilation extract.
- The replacement of tall stacks with rooftop discharges should be assessed against key criteria, such as critical group dose, increased worker dose, risk reduction, decommissioning access, visual impact and capital expenditure.
- The following areas should be developed post-Strategy Gate C:
 - * The estimates of aerial discharges from open ponds during retrievals of legacy waste and POCO operations.
 - * Improved assessment of the life of stacks and associated equipment.
 - * Improved characterisation of effluents during POCO and decommissioning operations (including effluents due to specific decontamination and decommissioning techniques).

[see Figs 6-9: Overall Effluent Strategy – Predicted Aerial Discharges – Total Alpha, Total Beta, H3 and C14]

[NOTE: A copy of Appendix A with figures referred to in the text can be provided if requested]