

## Bradwell Site

### Draft Minutes of the 61<sup>st</sup> Local Community Liaison Council (LCLC) Meeting

Mundon Victory Hall  
Wednesday 9 December 2015

**Present:**

LCLC Executive:

**Brian Main**  
**Cllr John White**  
Dr Louise Franks

**LCLC Chairman**  
**Deputy Chairman**  
Clerk

LCLC Members:

**Cllr Brian Beale**  
Jon Black  
**Cllr Dave Bragg**  
**Cllr Paul Burgess**  
Shaun Birkett  
Paul Brown  
**Cllr Stephen Dickson**  
**Cllr Tim Drain**  
**Cllr Mark Durham**  
**Cllr Peter Elliott**  
Stuart Fannin  
**Cllr Adrian Fluker**  
Dr Patrick Haley  
**Cllr Brian Haydon**  
Paul Hetherington  
Jonathan Jenkin  
**Cllr Kevin Knight**  
**Cllr Charles Litscher**  
**Cllr Kerry Martin**  
Keith Nicholson  
Stephen Price  
Scott Raish  
**Cllr Sylvia Wargent**

**Maldon District Council**  
Magnox Ltd, Bradwell EHSSQ Manager  
**West Mersea Town Council**  
**Althorne Parish Council**  
Magnox Ltd, FED and ADAP Project Manager  
Magnox Ltd, Transition Director (and site executive sponsor)  
**Essex County Council**  
**Bradwell Parish Council**  
**Maldon District Council**  
**Maldon District Council**  
Office for Nuclear Regulation  
**Maldon District Council**  
Magnox Ltd, Bradwell Head of Environment  
**Cold Norton Parish Council**  
Magnox Ltd, Communications Manager  
Nuclear Decommissioning Authority  
**Tillingham Parish Council**  
**Cold Norton Parish Council**  
**Maldon District Council**  
Chelmsford County Council  
Magnox Ltd, FED Programme Director  
Magnox Ltd, Bradwell Closure Director  
**West Mersea Town Council**

**Bold type - denotes voting members**

Members of the public in attendance:

Judy Lea – Maldon Society  
Bea Chandler  
Charles Clark  
Graham Farley  
John Harrison



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### 1. INTRODUCTION

2669 The Chairman opened the meeting, reminded attendees to register themselves, apologised and explained the meeting scheduling change and welcomed those present. Chairman reminded attendees to introduce themselves prior to speaking. He later invited new attendees to introduce themselves and the following introductions were made:

- Cllr Brian Hayden – Cold Norton Parish Council
- Cllr Kevin Knight - Tillingham Parish Council

### 2. APOLOGIES FOR ABSENCE

2670 Clerk confirmed apologies had been received from:

- Cllr Robert Boyce – Maldon District Council
- Karl Littlewood - Environment Agency
- John Whittingdale MP
- Dave Moore – Essex Fire and Rescue Service
- Cllr Kay Twitchen – Essex County Council
- Barry Turner
- Cllr Kathy Brown – Braintree District Council
- John Dalton – NDA Radioactive Waste Management
- Cllr Heather Glynn - Rochford District Council
- Cllr Miriam Lewis – Maldon District Council

### 3. APPROVAL OF THE PREVIOUS MINUTES

2671 The LCLC minutes resulting from the 60<sup>th</sup> Meeting held on 3<sup>rd</sup> June 2015 were considered and approved without amendment

### 4. MATTERS ARISING FROM THE PREVIOUS MINUTES

2672 It was agreed that there were no matters arising that were not on the Agenda for discussion today.

### 5 (a) SITE REPORT: Update

2673 Scott Raish, Closure Director, provided a presentation with commentary to update attendees about site activities since the previous LCLC meeting (03.06.15.). The following points were noted:

- VIP Visitor: Stephen Lovegrove, the Permanent Secretary of the Department of Energy and Climate Change, recently visited the site to meet with NDA representatives and Operators.
- Safety and Environment: remains the priority; safety of workers has improved in terms of lower dose rates, reduced number of first aid events and slip, trip and fall campaign improvements. Other initiatives for improved housekeeping, reduction in falls from height and to ensure segregation of people and transport have been implemented.
- Progress towards Care & Maintenance (C&M):
  - 1) *Waste retrieval*: all waste now retrieved from vaults; waste awaiting processing is appropriately stored and monitored; vault decontamination on schedule with 11 of 12 now finished.
  - 2) *Intermediate Level Waste (ILW) Resin*: inaugural campaign to treat ILW resin complete reducing 48m<sup>3</sup> to 12m<sup>3</sup> stored in 24 waste disposal packages and placed into Interim Storage Facility (ISF). The process used is Advanced Vacuum Drying System (AVDS).
  - 3) *Cladding*: almost complete with only east side of reactors ongoing. Cranes to be removed once safe weather conditions prevail.
  - 4) *Deplanting and demolition*: Active Effluent Treatment Plant and Reactor buildings now deplanted and seismic restraints installed in the latter. Former office building demolished.
  - 5) *Fuel Element Debris (FED)*: As part of a company trial of a new disposal route, 16 tonnes of Low Level Waste (LLW) FED has been shipped to the LLW Repository. Further campaigns planned.



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- 6) *ISF*: pre application process to remove the planning condition on the ISF has begun. This would enable ILW from Dungeness and Sizewell A to be stored within the Bradwell ISF.
- Security Arrangements: working with regulators to determine appropriate security in place during C&M. This must be approved as Bradwell will remain a licensed site. Currently being considered with options ranging from: possible unmanned site with remote security arrangements or security presence on site. Irrespective, any incoming ILW for the ISF will arrive with appropriate personnel to ensure secure transfer into the facility. This would not affect entry to C&M.
  - Staffing levels: Graph to explain historical and projected Full Time Equivalent (FTE) staffing levels peaking in 2014 (~950) reducing to date (~580) and onwards to Jan 2017 (~350). Ramp up expected Spring 2017 to 2019 (~500) before falling away once C&M achieved. Explanation given that the original date for achieving C&M was 2027/28. An ambitious accelerated programme aimed for 2015/16 but, while much has been achieved, some areas are further behind than anticipated. The C&M target is now 2019/20. Substantial learning from site will aid subsequent sites to enter C&M more rapidly; Bradwell will be the first site to enter C&M in the Magnox fleet. Process has led to development of local people and companies who have gained vast experience.
  - Key achievements in the programme so far: ILW and FED retrieved; FED plant built and operating; ISF built: ponds drained and decommissioned: Reactor buildings deplanted and seismic ready; active waste drains complete: North end land remediation complete; several buildings removed.
- 2674 Mr S Raish invited questions and Cllr A Fluker sought clarification of why entering C&M had slipped from 2015/16 to 2019/20. Mr S Raish explained that when the competition for the parent body began in 2012 that the plan to enter C&M was end 2015, however, parts of the plan (e.g. completion of FED retrieval & dissolution) did not progress as scheduled. When CFP became the parent body in Sept 2014 it was clear that considerable work was outstanding and that the lifetime plan required revision with the full scope of remaining projects included. At this time the UK entered national austerity and this influenced projected timeframes within the plan. Mr J Jenkin added that the NDA expected a consolidation phase to enable the incoming parent body to reconcile assumptions with the inherited position, advising that a draft business plan would be published early January 2016.
- 2675 Cllr A Fluker questioned whether the staffing increases during 2017-2019 would be locally sourced. Mr S Raish explained that there would be a mix of Magnox employees and specialised contractors required.
- 2676 Cllr P Elliott questioned whether the considerable cost savings anticipated by accelerating into C&M had been forfeited by the extension to 2019/20. He also questioned whether lessons from decommissioning outside the UK had been considered. Mr S Raish addressed the latter describing how 'safe stores' in the USA had been used to inform the final four box model for Bradwell site. Mr S Raish explained that there would still be cost savings compared to the original plan and that the progress into C&M had encountered considerable challenges that had either been overcome or required some adaptation. He praised the operators for their ingenuity and diligence, reminding attendees that Bradwell was the Magnox lead and learn site and that substantial benefit will be gained by all other Magnox sites from the experience developed at Bradwell.
- 2677 Cllr K Martin questioned whether it was a new initiative to bring ILW from Sizewell A to Bradwell for storage and how by hosting the regional ISF, the local community would benefit from the cost savings to the NDA. Chairman advised that the plan to have regional storage to consolidate ILW from Dungeness, Sizewell A and Bradwell at Bradwell site had been discussed at several previous meetings. Mr S Raish advised that Cllr Twitchen from Essex County Council had visited Bradwell site to understand the decommissioning programme and this included the implications of the plan to make use of free space in the ISF. Questioned on community benefit, Mr J Jenkin described the established Magnox socio-economic scheme to help mitigate the impact of decommissioning. He distinguished between socio-economic funding and the community benefit that could be associated with planning consent or linked to planning conditions. He described community benefit as specifically linked to the proposed impact of the construction itself and a standard part of the planning consent process. Chairman clarified that the cost savings generated by a policy of regional ILW storage remained within the NDA budget for the decommissioning of the Magnox fleet and were **not** linked directly with the budget for Bradwell.



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- 2678 Cllr D Bragg questioned how much longer the FED would take to process and what impact this processing would have on the estuary. Mr S Raish advised that there would be presentations describing these matters once all other questions regarding the site update had been answered.
- 2679 Cllr B Beale asked how the ILW resin had been reduced in volume. He questioned why a nitric acid dissolution plant was deployed at Bradwell given the delays this caused to processing FED and whether this plant would be reused at other sites. Mr S Raish explained that the AVDS had been deployed to dry the resin with all liquid removed passing through an abatement plant to ensure clean up. Mr S Raish acknowledged that the FED dissolution process has encountered delays and that work was continuing to improve the throughput of the plant and other disposal routes were being considered, such as the LLW FED trial described earlier. Dr S Price described the nitric acid dissolution plant as considerably faster and producing ten times less effluent than the carbonic acid dissolution plant at Dungeness.
- 2680 Cllr B Beale questioned what volume of Dungeness A and Sizewell A ILW would be stored at Bradwell. Mr Raish clarified that the use of the ISF to store waste from these other sites was at pre-application phase. Clerk quoted LCLC Minutes para 2618 which stated that circa 170 ( $\pm 10$ ) packages were expected to be imported from Dungeness and Sizewell combined.
- 2681 Cllr A Fluker sought and gained confirmation that no ILW would be imported from other sites for treatment in the Bradwell dissolution plant.
- 2682 Mr G Farley reminded attendees that the leak in the abatement plant that had extended the outage period had been reported to the December 2014 LCLC meeting with the statement that the plant would be returned to service by the end of 2014 without risk to anyone. He advised that via a FOI request he had now received the ONR report dated November 2014 and quoted from this. The following points were captured:
- Three safety barriers failed
  - Broader issues question whether installation and commissioning was carried out properly and whether the operators had sufficient skill and experience
  - Leak was only detected by luck and may have been ongoing since the date of commissioning (May 2014)
  - Plant was put into service without operators having a full set of quality controls
  - Time pressures placed on operators due to the shortfall in though put
  - Calibrations associated with the ADAP had still to be undertaken
- 2683 Mr Farley asserted that this was the second radioactive leak that had occurred on site and that Magnox had been fined £250,000 in 2009 for the first leak. He question why these details had not been reported to the LCLC and how the community could have any confidence if ONR themselves had no confidence. Chairman sought clarification of how these issues had been addressed, given that the site report did not cover this.
- 2684 Mr S Fannin responded that an FOI request had been received to release all information surrounding the leak on the dissolution ADAP in September 2014 and that the report being cited by Mr G Farley was actually generated by an internal investigation undertaken by the operators themselves. He concurred that this was highly self-critical report concerning the installation and commissioning of the ADAP (used to neutralise the liquor produced during dissolution prior to discharge into the estuary). A second report generated by Magnox Nuclear Safety Committee was also provided under the FOI and several of the quotes read out by Mr Farley were taken from this. The ONR response was to be pleased with the thoroughness of the Magnox internal reviews and concluded that because the quantity of radioactivity released was very low, significantly below the reporting levels, the leak did not represent a hazard.
- 2685 Mr Farley questioned why the reports were heavily redacted (~ 90%) and took 58 days to be made available. He stated that the ONR actions report had still been withheld. He suggested that this was in breach of the FOI Act. Mr S Fannin clarified that there were two reports; Magnox internal investigation and the Nuclear Safety Committee special report. He advised that the internal report was redacted to remove details like valve identification numbers, pictures of the precise location of the leak, access details for the plant etc as this knowledge would compromise the nuclear security of the plant. Mr S Fannin explained that the redacted parts of the Nuclear Safety Committee report referred to other Magnox sites that were outside the remit of the FOI request, asserting that the heavy redaction was entirely appropriate.



- 2686 Mr S Fannin advised that as the hazard was so low, the incident did not have any foreseeable impact beyond the plant footprint. He added that the quantity of radioactivity was well below formal notification levels (criteria set by the ONR Enforcement Management model) that required the ONR response to be published. The ONR responded to this incident by issuing a formal letter detailing the ONR view that the design, construction, installation and commissioning of the ADAP had significant breaches in terms of the application of good practice. He summarised the issues as follows:
- Flange not properly installed
  - Leak went into intended bund but sensor to activate the alarm for the bund was incorrectly installed
  - The containment of the bund was compromised by inappropriate controls over the installation of the plant
- He summarised that the quality of controls was substandard and that if the level of radioactivity had been higher then further action would have been undertaken by the ONR. He stressed that the ADAP does not present a threat to the nuclear safety of the local area, hence the decision by ONR to issue a formal letter noting the breach of licensed condition requirements in several areas.
- 2687 Mr G Farley questioned why this leak had been classified at INES level 1. Mr S Fannin advised that this categorisation was not based on the quantity of radioactivity released but due to the breakdown of a number of procedural controls.
- 2688 Mr G Farley questioned why the information known was not shared at the LCLC December 2014 meeting. He asserted that this information was only revealed by chance and that the leak was not described as radioactive. Chairman recalled that the leak had been described as a low level radioactive leak (ref LCLC minutes para 2566).
- 2689 Mr Clark posed a question about effluent being discharged into the estuary and was asked to hear the forthcoming presentation about this matter and reiterate his question if it was not fully addressed.
- 2690 Cllr T Drain asked about the reinstatement of the nature trail and Mr P Hetherington provided a slide with a diagram detailing proposals for this. He thanked attendees for their patience about this matter and explained that as the trail is adjacent to the licensed site, allowing others to undertake any maintenance required official approval by a number of parties. Mr P Hetherington agreed to update the LCLC as plans become finalised.
- 2691 Mr Hetherington commented that the Magnox socio-economic plan would be published by January 2016 for comment. He encouraged attendees to submit their feedback.
- 2692 Ms B Chandler questioned the value of the savings generated by Bradwell hosting the regional store. It was clarified that the taxpayer would benefit from Dungeness and Sizewell sites not having to construct their own ISF and that Bradwell per se would no benefit financially.
- 2693 Ms B Chandler asked if these savings would balance against the overspend on Bradwell FED processing. Mr S Raish sought clarification and Chairman advised that the NDA was the central pot for funds, that any savings would benefit this and any extra funding drawn from the central pot.
- 5(b) SITE REPORT: Overview of Bradwell FED Dissolution (FEDD) & Aqueous Discharge Abatement Plant (ADAP)**
- 2694 Dr S Price introduced himself as the FED Programme Director and provided a presentation to explain how the FEDD plant works and how the liquor produced is neutralised and cleaned up by the ADAP prior to discharge into the estuary. Dr S Price explained that a further presentation about the specific content of discharges would be subsequently presented by Dr P Haley.
- 2695 Dr S Price clarified that the FEDD plant was designed, built and commissioned by Costain. He displayed a schematic of the FEDD and explained that the FED takes 2-3hrs to dissolve and that the concentration of the nitric acid was gradually ramped up during this time. Features such as the temperature control and the hydrogen extraction system were pointed out.



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- 2696 Dr S Price compared the FEDD process deployed at Dungeness with that deployed at Bradwell and it was noted that a 60kg load at Bradwell took 2-3hrs to dissolve, whilst the same load at Dungeness took 1 week.
- 2697 Mr J Harrison questioned whether the numbers on the diagram had any significance and Dr S Price clarified that this was a simplified schematic and that the numbers were part of the drawings.
- 2698 A photo taken during construction was displayed and the link between the exterior shape of the reactor vessels and the schematic was explained.
- 2699 A CAD image of the dissolution plant was displayed and the buildings housing the FED reactors and the gas extractors were pointed out. The three towers were described as 'scrubbing units', the components that remove the nitrous oxide from the gaseous effluent. Three interior photo's were displayed that showed different stages of the movement of FED within the FEDD plant.
- 2700 A simplified schematic of the ADAP was displayed. Dr S price described the efficiency of the ADAP as extremely important as this ensures that the effluent being discharged is appropriately cleaned up and neutralised. Dr S Price explained the process of clean up divided into three phases:
- 1) Neutralise acidic liquor with sodium hydroxide: precipitates radioactive sludge containing heavy metals that pass through a filter press (to reduce volume) to containment and effluent that passes to next phase. A poly electrolyte catalyst is used to ensure the process is very efficient.
  - 2) Microfiltration process: 5µm to 1µm to remove any remaining particulates
  - 3) Ion Exchange: series of columns to target the removal of specific radionuclides at high efficiency. Targets are Cobalt-60 and Caesium-137. Both are known to be generated by FEDD and are partially removed by the precipitation phase.
- 2701 A photo showing the microfiltration and ion exchange columns was displayed. A CAD diagram was displayed that illustrates the location of the FEDD and ADAP and the transfer line between them.
- 2702 An overview of the FEDD-ADAP process was displayed with key parameters noted as:
- Process has 15 steps
  - 2 reactor vessels, each able to process 60kg FED, operated concurrently
  - Batch process with continuous operation
  - Volume reduction of >95%
  - All radionuclides retained by ADAP

### 5(c) SITE REPORT: FEDD Discharge Characteristics

- 2703 Dr Patrick Haley provided a detailed presentation (see attached notes) of the metal concentrations and the radioactivity levels measured in FEDD discharges between June 2014 and November 2015. He explained that the plant had undergone a period of prolonged continuous operation throughout July and August 2015 enabling detailed monitoring of actual discharges. Graphs showing the monitoring outcomes from June 2014 – Nov 2015 for metals (Cadmium, Lead and Nickel) and for radionuclides (Caesium-137, Cobalt-60 and Americium-241) were displayed. The graphs included details of the calculated maximum levels before any environmental impact, the Environment Agency (EA) permitted levels and the actual levels detected.
- 2704 The following points were noted from the graphs detailing metals in FEDD effluent:
- Cadmium: Max = 100µg/l, EA permit = 0.4µg/l, peak detected = 0.3µg/l
  - Lead: Max = just below 5000µg/l, EA permit = just above 14µg/l, peak detected = 5µg/l
  - Nickel: Max = ~ 12000µg/l, EA permit = 40µg/l, peak detected = 12µg/l
- Dr P Haley advised that metals are precipitated in phase 1 of the ADAP. He clarified that all measurements were given as a concentration and that each discharge was of between 10m<sup>3</sup> and 15m<sup>3</sup> in terms of volume.
- 2705 Cllr B Haydon questioned why the EA permit levels were considerably lower than the max levels. Dr P Haley explained that the estuary was sampled to identify existing background concentrations of metals and the max level for each metal determined as the highest amount that could be discharged into the estuary without breaching the environmental quality standards. The EA permit levels allow a margin between background and max to ensure that max is never reached.



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- 2706 Ms J Lea suggested that dissolution in water and location of sampling points would be a significant consideration. Dr Haley explained that a dispersion model was used to calculate the maximum concentration of the plume of effluent. He clarified that this was in the centre of the estuary stretching from the discharge point. A map sourced from the EA showing four (of multiple) sampling points for background metal concentrations was displayed. Dr Haley explained that before and after FEDD operations the levels detected reflect that there was no evidence of any increase in relevant metal concentrations in the Blackwater Estuary. He added that despite using the most sensitive monitoring devices, often the concentrations of Lead and Cadmium were often below the limits of detection. The Nickel concentration has remained constant at less than 10% of the Environmental Quality Standards.
- 2707 Cllr A Fluker questioned whether any monitoring was undertaken on the foreshores. Dr P Haley explained that there was no monitoring of conventional metals as the concentrations would be undetectable, however there was monitoring for radioactivity. Two programmes of radioactive monitoring occur; an independent laboratory (commissioned by Magnox) and the EA. Various sample types are tested including fish, silt and others and the EA outcomes are published in the RIFE report.
- 2708 Dr P Haley displayed graphs describing Caesium-137, Cobalt-60 and Americium-241 levels in FEDD effluent. He advised that the EA permit level was 0.7TBq/annum (~196MBq/day). Dr P Haley advised that it was a legal requirement to use the best available techniques to minimise the radioactive content of any discharges and as such the max line on each graph was the internal target set after lab trials to reflect the best that could be achieved to ensure a dose of less than 1 $\mu$ Sv dose (legal limit is 1000 $\mu$ Sv).
- 2709 The following points were noted from the graphs detailing radioactivity in FEDD effluent:
- Caesium-137: max = 1.7MBq/m<sup>3</sup>, actual peak = 1.0MBq/m<sup>3</sup>
  - Cobalt-60: max = 1.7MBq/m<sup>3</sup>, actual peak = 0.2MBq/m<sup>3</sup>
  - Americium: max = 0.1MBq/m<sup>3</sup>, actual peak = 0.07MBq/m<sup>3</sup>
- 2710 Dr P Haley clarified that the three radionuclides were chosen as markers of the levels of radioactivity because Caesium-137 does not precipitate at all (tests the efficiency of the ion exchange phase), Cobalt -60 mostly precipitates (tests whether the microfiltration and ion exchange phases are effective) and Americium-241 is only removed by precipitation (tests the efficiency of the precipitation phase).
- 2711 Cllr A Fluker questioned why the graphs had spikes that coincided in terms of time for levels of each type of radionuclide. Dr P Haley explained that this was because the FED batch being processed at that time was more radioactive to start with. He explained that the FEDD plant was first used to process the lowest activity FED, to ensure confidence that the process was effective at isolating the radioactive and heavy metal content, prior to being used to process more active FED.
- 2712 Mr C Clark questioned why the retrieved FED was not mixed together. Dr P Haley explained that the FED was characterised to enable that classified as LLW to be disposed of at the LLW repository. To answer a subsequent question, he clarified that the radioactivity decay profile is determined by the half life of each radionuclide. This is the set amount of time it takes for a radionuclide to reduce to half of its starting activity.
- 2713 Mr C Clark questioned how the LLW FED was processed and heard that it was compacted and packaged for disposal.
- 2714 Mr C Clark asked whether the process used for drying FED, the Advanced Vacuum Drying System (AVDS) contributed to the liquor that went through the ADAP plant. Dr P Haley explained that the liquor produced from the AVDS did not get processed via the ADAP but did go through an alternative abatement process prior to discharge via a licensed route.
- 2715 Mr G Farley questioned why, if the throughput was so efficient, the period of time for operation of the FEDD had been doubled. Dr P Haley clarified that the throughput had been inconsistent and that continuous operation had occurred during July and August as a trial to show what could be achieved. He added that the process rate was still being optimised.



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- 2716 Chairman requested that Dr Haley was given the opportunity to complete his presentation. Dr P Haley referred to the table describing the EA permit levels, noting that none of these had been breached. He concluded by stating that he had recently received the data from the estuarine monitoring that confirmed that FEDD had had no effect on the quality of the Blackwater, that all levels remained at background levels.
- 2717 Questions were invited and Mr J Harrison asked if the 5µm microfiltration utilised was absolute or nominal. Dr S Price explained that there was a mixture of filters used some nominal and some absolute and that the smallest of these was 1µm. Dr P Haley advised that the efficiency of the microfiltration phase was monitored by testing the turbidity of the effluent and outcomes show a consistent level below 10, the level of turbidity in tap water.
- 2718 Cllr D Bragg questioned how much longer the FEDD plant would be operating for. Mr S Birkett explained that the baseline plan required the throughput rate to be ramped up and that providing this occurred, the FEDD would operate until 2018.
- 2719 Dr P Haley advised that all targets for discharge levels were based on all FEDD to be undertaken over the course of a single year and did not take into account that the actual processing was spread out over several years. He explained that this meant that the worst case environmental impact was considered when setting levels.
- 2720 Mr C Clark led a vote of thanks for the clarification provided. He requested that the presentations were provided with commentary and it was agreed that the presentations would be appended to the minutes.
- 2721 Mr C Clark advised that Tim Deere-Jones had provided a presentation about the Blackwater estuary that referred to other radionuclides. He questioned why these radionuclides had not been mentioned in the site updates today and suggested that it was because these were the radionuclides that were most dangerous. Dr Haley advised that the three chosen radionuclides were markers for the efficacy of the process, that the RIFE report monitored a range of radionuclides in the environment and that a bulk sample of the effluent was sent for a full suite of radionuclide analysis but that this was a lengthy process and took about a year for the results to be produced.
- 2722 Mr C Clark advised his recollection that the LCLC had been informed that the FEDD had stopped processing because of a leak but that they had not been informed when processing had recommenced. Mr S Raish confirmed that the members had been advised of the outage and the restart of the FEDD and Chairman concurred.
- 2723 Ms B Chandler asked for the total volume of effluent discharged to date and what, if the process was ramped up, the predicted future volumes would be. Dr Haley advised that the discharge quantities were in the public domain. Mr C Clark referred to his copy of this data and advised that to date 558m<sup>3</sup> had been discharged. Dr P Haley estimated that throughput could increase to approx 15 batches /month each discharge volume up to 15m<sup>3</sup> – this being a target rather than a limit.
- 2724 Ms J Lea asked if the sampling monitoring sites for radionuclides could be provided. Dr Haley advised that some sample types (like fish) moved around but that silt sample locations should be available.
- 2725 Mr S Raish introduced the site sponsor from the Magnox executive team, Mr Paul Brown. Mr P Brown introduced himself and explained that he would be attending future LCLC meetings and was happy to take questions.
- 2726 Chairman concluded that this was a very helpful site update and in conjunction with site visits had enabled a lot of clarity about the site processes. He stressed the importance of considering the discharge dose (less than 1µSv) in perspective to the regulation limits (1000µSv), describing the hours spent worrying about this as 'straining to swallow a gnat'.

## 6. NUCLEAR DECOMMISSIONING AUTHORITY (NDA) UPDATE

- 2727 Mr Jenkin, NDA Stakeholder Manager, advised that the recent Government spending review meant that, in high levels terms, the NDA will receive £11bn grant over the next four years. In addition, expected income is £5bn, meaning a total of £16bn. This is positive recognition of the importance of



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decommissioning. The NDA has yet to agree funding allocations to each site licence company. Draft business plan will be published on 5<sup>th</sup> January 2016 alongside the draft strategy.

- 2728 Mr Jenkin drew attention to the NDA monthly update for November 2015 and in particular to the following items:
- Supply Chain Event held in Manchester attracted more than 1500 visitors and had 270 exhibition stands, including an Innovation Zone with technology demonstrations
  - Sellafield has installed a 50tonne transfer tunnel to assist with the movement of highly radioactive waste into modern storage facilities prior to consignment to the GDF.
  - Sellafield have now removed 50% of the radioactivity from the Pile Fuel Storage Pond. Ongoing work will remove a further 20% of pond radioactivity by April 2016. This is an important enabling step towards reducing the hazard.
  - EA have granted a permit for the Low Level Waste Repository (LLWR) enabling planning permission to be sought for the phased construction of three new vaults.
  - Oldbury site has now completed defueling with the last fuel planned to leave site in January with ONR verification expected in Spring. This is well ahead of schedule.
  - NDA draft strategy will be published 05.01.16. in time for the formal 6 week public consultation. Final strategy will be submitted to Government Ministers for approval at end of March 2016.
  - NDA website content has moved to [www.gov.uk/nda](http://www.gov.uk/nda) and the old website will be switched off shortly. Any issues with navigating this new site should be addressed to Sophie Palmer ([sophie.palmer@nda.gov.uk](mailto:sophie.palmer@nda.gov.uk)).
  - National Nuclear Archive building is currently being constructed. Archive contents will be accessible to industry, for research and to the public, mostly via the web.
  - NDA subsidiary RWM has consulted (closed 04.12.15.) on the draft National Geological Screening Guidance.
  - Wylfa site will end generation on 30.12.15., some 5years after its original closure date, creating an additional income of £785million.
  - National Stakeholder Event will be held in Manchester on 13-14 January 2016
- 2729 Cllr B Beale sought clarification of the GDF siting process and Mr J Jenkin explained the background of the original process and why this faltered. He confirmed that the process still relied upon a community volunteering explaining that changes to the process include geological screening and clarification of what 'community' involves in terms of representation.
- 2730 Mr J Harrison advised he had attended the RWM information meeting held in Ipswich about the geological screening process and questioned whether the consultation was still open. It was confirmed that this consultation closed on 04.12.15. (<http://www.nda.gov.uk/rwm/national-geological-screening/consultation>)
- 2731 Mr C Clark questioned what would happen if no community volunteered to host the GDF and Mr J Jenkin explained that finding a volunteer community remained Government policy. Mr C Clark suggested that Bradwell could be selected as the site for the GDF as the geology was appropriate. Chairman interjected that this was speculation. Mr J Jenkin reiterated that it was Government policy to find a volunteer community and that from considering the generic design of the GDF that a variety of geologies could be suitable if appropriate engineering was utilised. Mr C Clark suggested that there may be several GDF sites and Chairman asked that this speculation ceased and the agenda progressed.

## 7. OFFICE FOR NUCLEAR REGULATION (ONR) REPORT

- 2732 Mr Stuart Fannin, ONR Site Inspector, introduced himself and provided an overview of ONR regulation of the Bradwell site since the last LCLC. He drew attention to two written reports dated 01.04.15 - 30.06.15. and 01.07.15. - 30.09.15. and summarised that the site were making good progress towards entering C&M. Mr Fannin advised that going forward the ONR would be focussing on residual processes (conditioning of ILW and FEDD) and clarifying the entry requirements to move into C&M.
- 2733 Mr Fannin provided a verbal update of events in the current quarter. He advised that the site had undergone an annual review of safety and security and the environment, hosting a meeting on 10<sup>th</sup> September to discuss outcomes with regulators. He described this meeting as an opportunity to scrutinise operations over the past year, consider the learning and inform the forthcoming year of



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operations. He advised that there was a high quality of internal investigation after events and that a key area going forward was improved control of sub-contractors. Mr S Fannin advised that the annual site demonstration of counter terrorism plan was satisfactory.

- 2734 Mr S Fannin advised that the current strategy for FED was to undergo dissolution, that better characterisation enabled LLW FED to be separated from ILW FED, that changing the strategy to enable LLW FED to be disposed of at the LLW repository required ONR approval and that permissioning was ongoing.
- 2735 Recent small spills of very low level radioactive material within an ILW conditioning facility were described, noted as well below any reportable level, and after investigation, recommendations to improve bunding etc were actioned. Mr S Fannin described this as another example of the positive culture on site with operators taking appropriate action. Another example cited was improvements to working at height and the internal investigation to understand the root cause of these events.
- 2736 Mr S Fannin described the ongoing discussion about the specifications for entering C&M and deliberations about appropriate security. He expressed the ONR preference for having a small security presence on site. He described another consideration was how the site will treat radioactive effluent during C&M as a result of the accumulation of rainwater.
- 2737 The issue with incorrect storage of cladding materials was explained by Mr S Fannin and it was noted that the inner layer of the clad had rusted as a result of not being protected from the weather. The ONR have made recommendations that are now being actioned and the consequences of any cladding failures during C&M will need to be further considered.
- 2738 Another area that has proved challenging is that some of the waste generates hydrogen, meaning that the storage containers used for this will require venting to enable pressure release. This will require a slight modification to the storage conditions which will need to be justified in the safety case. Packaging of waste on site has currently been suspended until this matter is resolved.
- 2739 Cllr D Bragg questioned why materials that rust are being used as cladding. Mr S Fannin clarified that the affected material would not normally be exposed to weather when used to clad the buildings and that it was inappropriate storage that caused this issue. He explained that civil engineer colleagues have advised that the rust can be removed and the metal coated prior to use. Mr C Clark suggested that although the affected material was an inner lining that it would still be affected by condensation which would cause rusting. Mr S Fannin replied that the repaired materials were fit for purpose and that monitoring will be scheduled to ensure that performance remains satisfactory.
- 2740 Mr G Farley questioned whether a report about the described spills would be published. Mr S Fannin replied that because the levels of radioactivity were extremely low, that the threshold for formal reporting had not been reached, however it would be contained in his inspection report. Mr S Fannin clarified that it was not the hazard posed by the radioactivity per se, it was adherence to good practice for transporting radioactive waste that was being recommended. He concluded that the site was safe and continued to make good progress towards hazard reduction and towards entry into C&M.

### **8. ENVIRONMENT AGENCY (EA) REPORT**

- 2741 Chairman advised that Mr K Littlewood, EA Inspector for Bradwell site, had tendered his apologies for this meeting. Chair drew attention to the written report dated June – November 2015 and read out the last paragraph under the section titled Environmental Monitoring: “This radiological dose is far below the UK Government Dose limit for members of the public from man-made sources... and can be compared to the average dose to the population in the UK”. Chairman concluded that the radiation outside of the site is almost immeasurably low. He encouraged members to read the report and address any questions to the EA.

### **13. CHAIRMAN'S FEEDBACK**

- 2742 Chairman advised that he had attended the National Chairs meeting hosted by the NDA and that most of the news from this had already been reported earlier in this meeting with the exception of changes to the secretariat service within Magnox. Bradwell will share share a secretariat with four



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other Magnox sites. He added that he would be monitoring this situation to ensure that there was sufficient support for LCLC meetings.

- 2743 Chairman concluded his feedback by stating that the learning from Bradwell was being exported to other decommissioning sites in the Magnox fleet, adding that whilst limited change at Bradwell site was anticipated, that learning from Bradwell was informing significant changes at other sites. Chairman encouraged members to undertake a site visit, saying that his recent visit had proven very informative. Cllr White concurred.

### 14. ANY OTHER BUSINESS

- 2744 Cllr A Fluker advised that the socio-economic scheme had recently made a considerable donation to Essex Police Authority to provide an automatic number plate recognition scheme. Cllr Fluker expressed concern that the Police had not yet implemented this scheme, advising that he was in contact with the Police Commissioner and would be pursuing this.
- 2745 Chairman advised that the Bradwell Legacy Partnership exists to try to revitalise the economy, to increase tourism and to support the local community. He advised that he is the Chairman of the Community Shop in Bradwell and had just been awarded £25,000 from the socio-economic scheme to enable improvements. He stressed the importance of applying for funds that will help the local economy and encouraged attendees to submit applications.
- 2746 Ms J Lea asked for independent information about the local employment generated by the power station and for real evidence of the economic impact of the power station in the local area. Chairman advised that a Bradwell Socio-Economic Study had already been undertaken by Regeneris Consulting in 2013, for Maldon District Council, commissioned by Magnox. He recalled that Bradwell site contributed £51.2million annually to the local economy (<http://regeneris.co.uk/latest/news/entry/funding-boost-for-the-dengie-peninsula>)
- 2747 Mr C Clark requested a visit to the site to see the FEDD and ADAP. Chairman recommended that interested parties liaise with Site Director, Mr S Raish.
- 2748 Mr G Farley asserted that the FEDD discharge permit expired in June. Chairman advised that the EA had refuted this categorically at the National meeting. Mr G Farley advised that he had correspondence confirming his assertion and Chairman asked that a copy was sent to the LCLC in order that the matter can be investigated further. Mr G Farley agreed adding that the discharges are being contested in the European Union.

### 15. DATE AND TIME OF NEXT MEETING

- 2749 June 2016; date, time and venue to be confirmed.

### 16. CLOSE

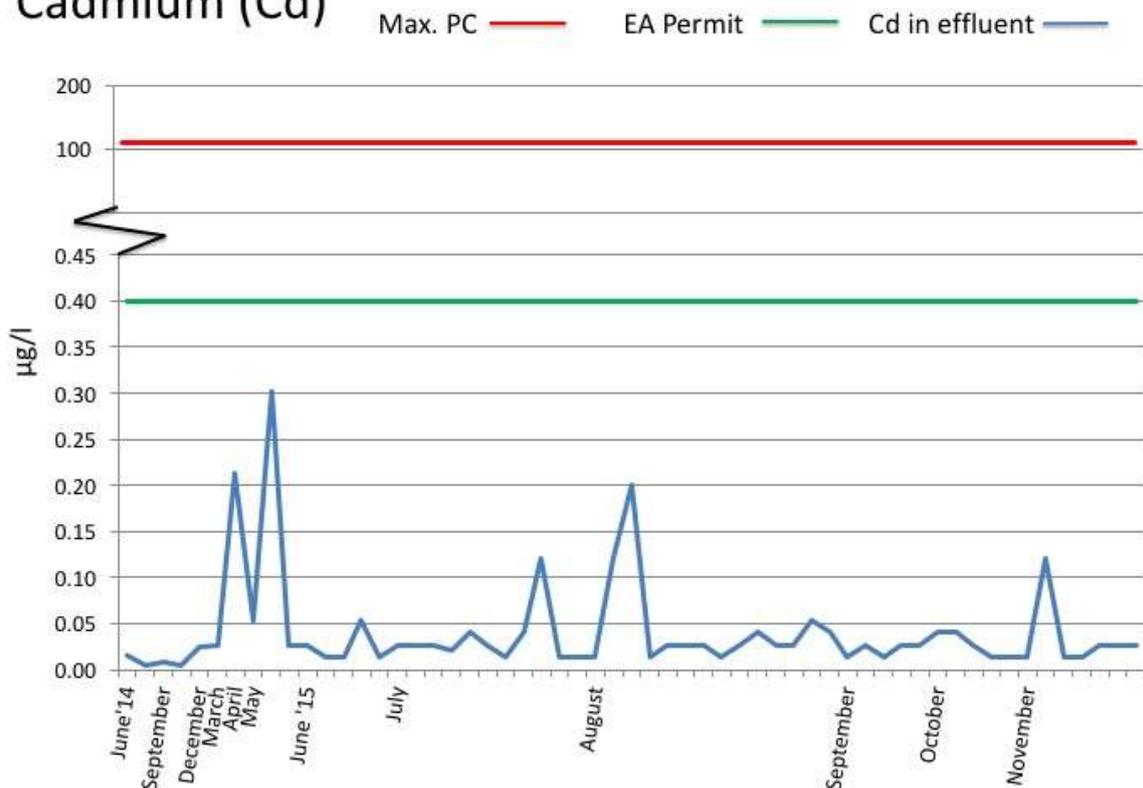
- 2750 Chairman closed the meeting at 13.05.



# Metal concentrations in FED discharges

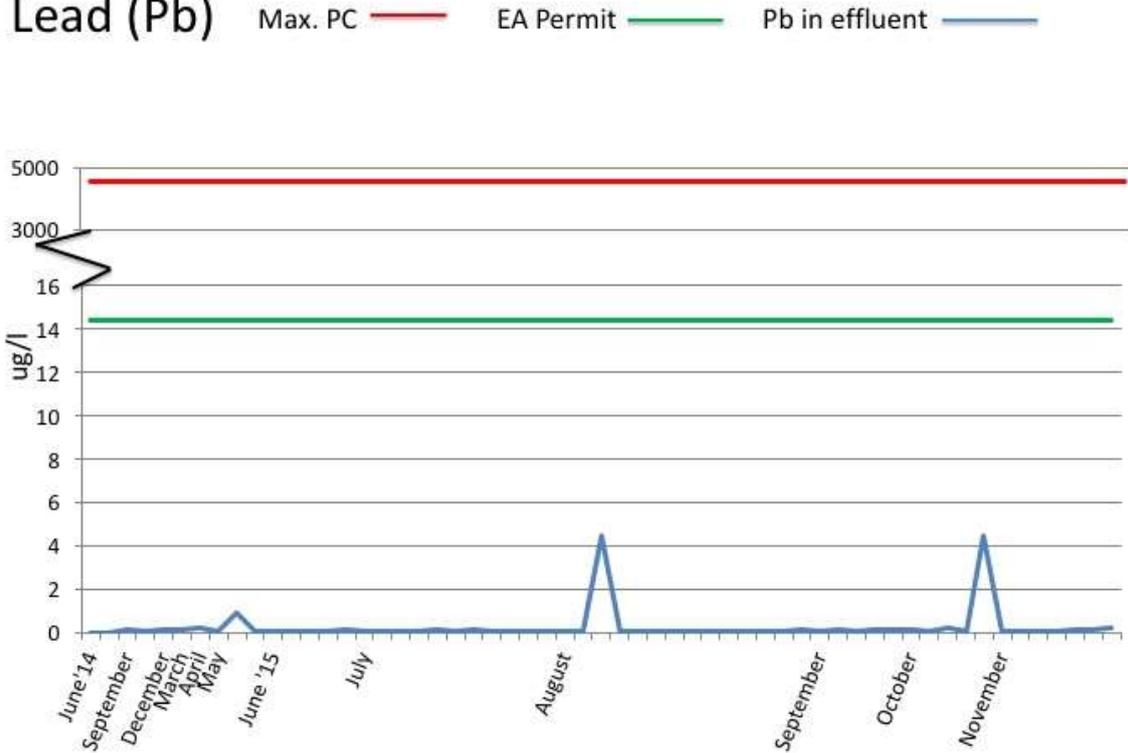
June 2014- November 2015

## Cadmium (Cd)

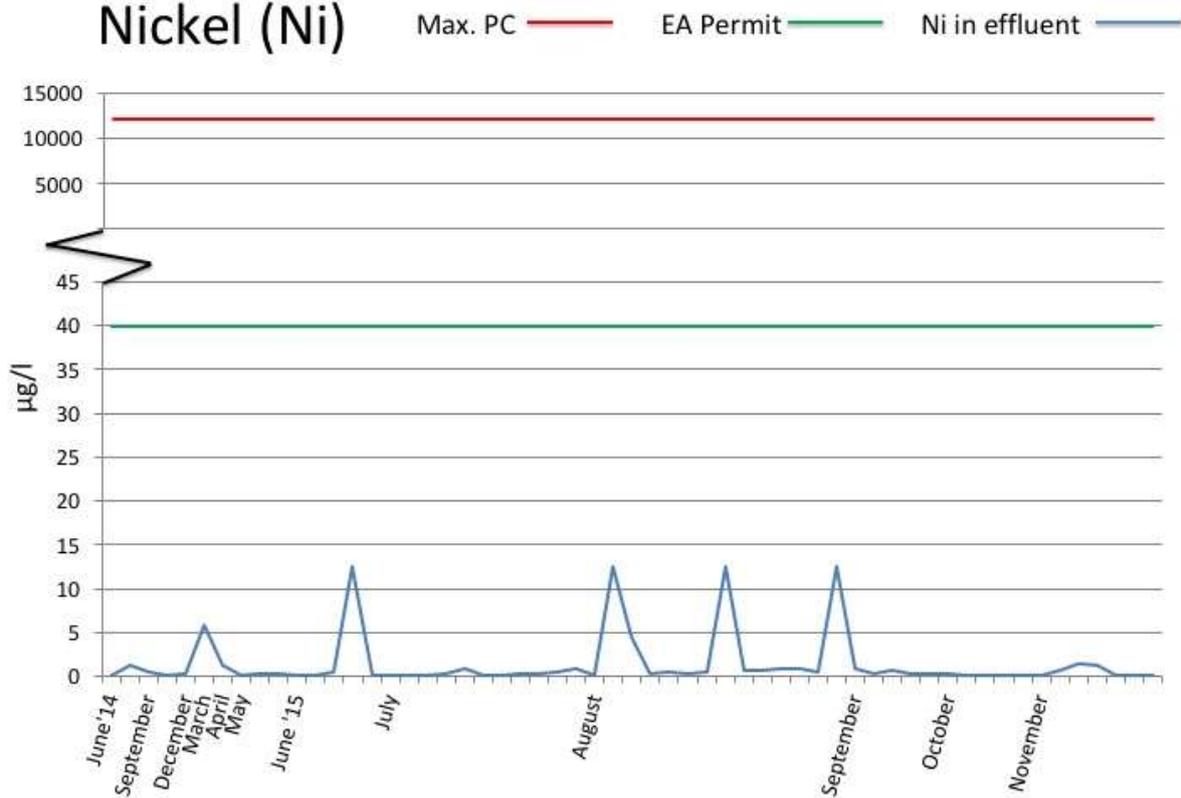




### Lead (Pb)



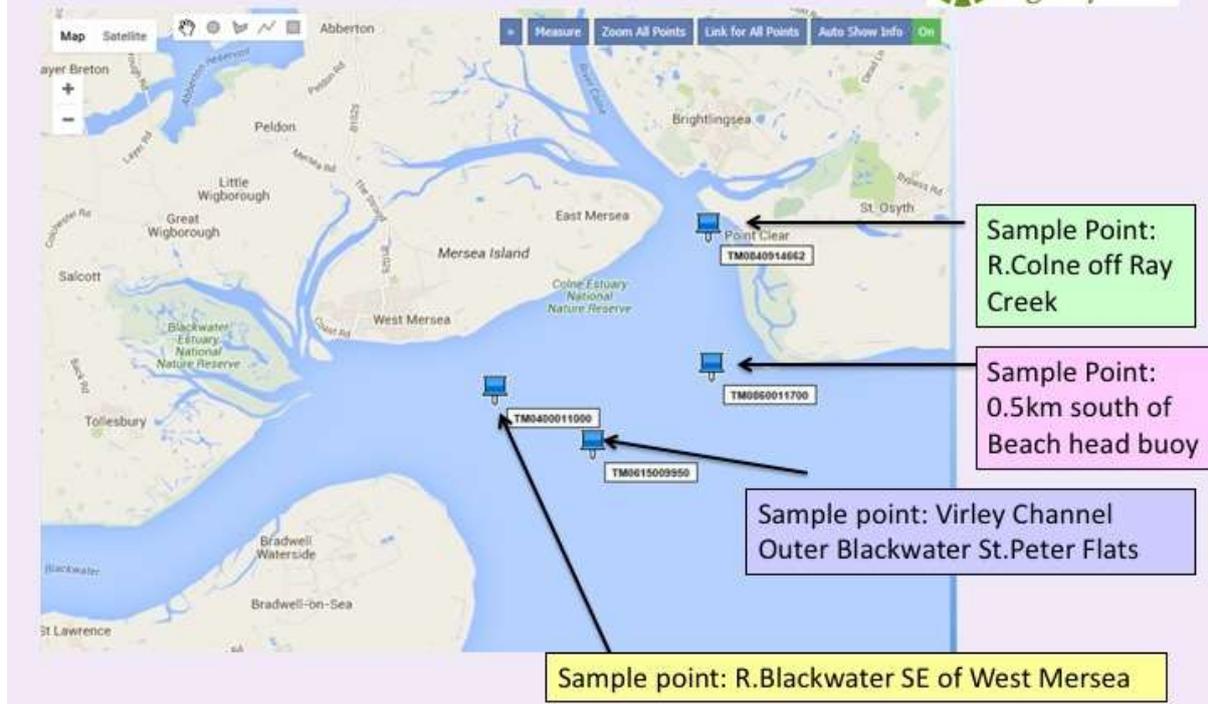
### Nickel (Ni)





## Background metal concentrations

Information provided by



- Lead (Pb) and Cadmium (Cd) remain below limits of detection
- Nickel (Ni) remains less than 10% of Environmental Quality Standards (EQS)
- No evidence of any increase in relevant metal concentrations in the Blackwater Estuary



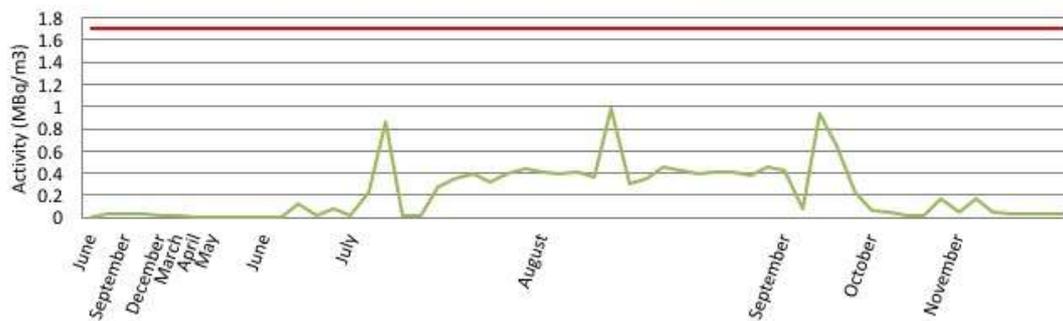
# Radioactivity in FED discharges

June 2014- November 2015

## Caesium- 137

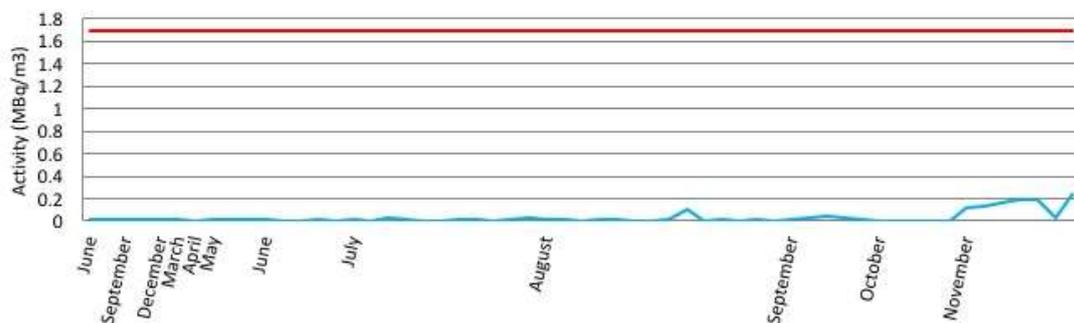
— Cs-137 FMDT — BAT standard Cs-137

EA Permit limit = 0.7TBq  
= ~ 196MBq/day



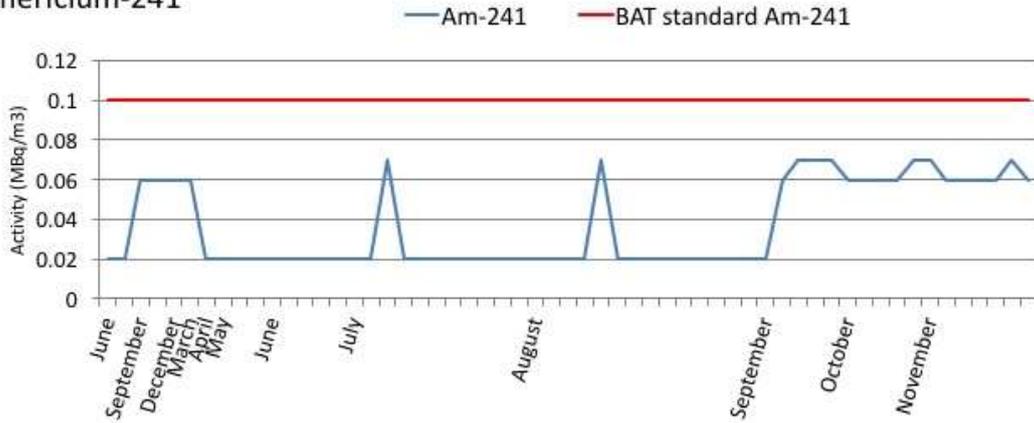
## Cobalt-60

— Co-60 — BAT standard Co-60





Americium-241



**Table S3.2 Specified disposals to water**

Specified waste type	Disposal outlet ref	Source	Radionuclide or group of nuclides	Annual limits	Quarterly Notification level
Aqueous waste	W1-W2 (in total)	As specified below	Tritium	7 TBq	1 TBq
			Caesium-137	0.7 TBq	0.15TBq
			*Other radionuclides* <sup>2</sup>	0.7 TBq	0.15TBq
Aqueous waste	W2	System for discharging treated sewage effluent and storm water to the Blackwater Estuary via the east cooling water outfall	Tritium, Caesium-137 and *Other radionuclides* <sup>2</sup>	1% of the relevant annual limit for W1-W2	Not specified
Aqueous waste	W1	System provided for discharging radioactive wastes from the Final Monitoring and Delay Tanks to the Blackwater Estuary via the east cooling water outfall	No individual limits specified for these disposal outlets		

EPR/ZP3493SQ



## Appendix B: Notes to accompany Dr Patrick Haley's presentation

This presentation shows the actual discharges to the River Blackwater from the FED plant. In the past we have talked about predicted impacts, target environmental performance criteria, mass balances etc. but had not shown actual data as, due to the stop/start nature of the plant's commissioning, we did not have a sufficiently robust data set. In the summer Magnox demonstrated the plant's operability through 30 days of non-stop operation.

The target was exceeded with the plant running continuously through July and August. In this period there were 11 FED discharges in July 2015 and 14 FED discharges in August 2015 so for the first time we have an adequate data set to provide discharge information to the LCLC. The data presented is based upon 57 discharges in total from June 2014- end of November 2015.

The metals chosen for this presentation are those prescribed metals that are limited in the site's Environmental Permit.

The top line on the graph is derived from our environmental risk assessment. This is the maximum concentration of the metal that could be present in the discharge without causing the estuary to breach Environmental Quality Standards (EQS). To calculate this value we obtained information from the Environment Agency from their environmental monitoring programme to establish the background levels of the metals in the estuary before we started dissolving. This was subtracted from the EQS to calculate how much the estuary metal concentration could increase without breaching any EQS. This value is referred to as the maximum process contribution PC. We then used a dispersion factor that came from a complex model that HR Wallingford provided to us to relate the PC back to the maximum concentration that we could discharge from our tank. This line on the graph relates to environmental protection.

The next line on the graph considers the limits in the Environmental Permit. You will notice that we have had to apply a broken scale as these limits are much lower than those from our risk assessment. This is normal for discharges into an estuary such as the Blackwater that has internationally significant ecology designations. In addition we would not have expected the EA to accept our discharges to take up all of the head room such that the estuary became under threat of breaching EQSs so there is no complaint from us about the stringent standards the EA apply.

The line at the bottom of the graph is our actual discharges. In many cases we have actually detected no metals in our discharge but have instead quoted the limit of detection of our instrument. It is good to see that the effluent is so clean that often we cannot detect any metals in it despite us spending significant amounts on each of two state of the art ICP analysis machines and receiving expert consultant advice on how to carry out the monitoring from South West Water. In all cases the metals discharged are below the permit limits and significantly less than the levels we had derived for environmental protection.

(Note data has been converted to concentrations in the Final Delay Tank as EA permit refers to sampling point East Syphon pit and EQSs obviously refer to estuary concentrations.)

Having established that our abatement plant performance is better than the targets we have set for it we next wanted to check that our dispersion model is correct i.e. that there is no accumulation of metals in the estuary. Recently I repeated my request for the EA to supply their estuary monitoring data to compare the estuary concentrations of these metals before



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and after our intensive operations in the summer. From the EA data I chose the sample locations closest to our discharge point. The data shows that lead and cadmium in the estuary are below the limits of detection and Nickel is significantly below the EQS. There has been no evidence of an increase in any of the metals' concentrations following the intense period of discharges in the summer.

The next set of slides show the radiological discharges. The three radionuclides chosen are Cs-137, Am-241 and Co-60 to cover the overall performance of the abatement plant. The Am-241 is only removed at the precipitation stage of the process, Co-60 dominates the dose calculations and is removed at both the precipitation and Co-treat stages and Cs-137 being soluble is only removed at the Cs-treat stage. By covering these three radionuclides all stages of the abatement process are covered as well as the major dose contributors. The limit in a green box on the graph represents the maximum daily discharge that would keep us within our permit limits. Again this is much higher than our performance targets or actual discharges. The way legislation is set up in the UK the permit limit is less relevant than the overriding legal requirement to use Best Available Techniques (BAT) to minimise discharges to the estuary. It is not sufficient to keep inside this limit, we are legally obliged to minimise the discharges. The top line on the graph is our site environmental performance criteria. It was derived from our research and development, mass balance and BAT report that looked at what is the lowest level of discharge that we can achieve. The dose assessments that we have discussed many times in these meetings, whereby the legal dose to the public is 1000 $\mu$ Sv and the public dose from our FED discharges is 1 $\mu$ Sv, is based upon us meeting our environmental performance targets so it is in effect the promise that we have made about our proposed discharges. The bottom line on the graph again shows our actual discharges which have bettered our environmental targets. In some cases the results reported are bounded by the limits of detection of our analytical instruments where no activity could actually be detected in the discharge. It is testament to the performance of the abatement plant that the casing that has been around a nuclear fuel rod can be fully dissolved and the activity be removed so effectively from the solution that we sometimes struggle to detect any activity in the resulting effluent.

Since the slides were prepared I have received our environmental monitoring data from our contractor that covers samples of fish, silt, seaweed etc. taken in the summer period when the plant was in full operation. As expected from such low levels of discharges, there is nothing in the results to suggest any increase in radioactivity accumulated in the estuary. The environmental survey results have been sent to the EA and I expect will be available to view via the link provided in Karl Littlewood's report by the end of the year.