AN APPROACH TOWARDS THE FINAL DECOMMISSIONING & DEMOLITION OF A MAJOR NUCLEAR FACILITY AT UKAEA WINFRITH

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ABSTRACT

Decommissioning operations have been undertaken since July 2000 by RWE NUKEM on nuclear facilities within Building A59 at Winfrith for the site owners and nuclear site licence holders UKAEA. Work has centred upon the two heavily shielded suites of caves originally used to carry out remote examination of irradiated nuclear fuel elements although other supporting facilities are also involved. Decommissioning operations have steadily advanced to such an extent that the end of the process of decontamination is approaching and plans are being prepared to undertake the demolition of these facilities.

This paper describes some of the significant tasks undertaken during the past year with particular reference to the techniques utilised and the successes and setbacks experienced.
Some emphasis will be given to describing the means of decontamination and disposal of the heavy internal shield doors and wing walls weighing up to 33Te recently recovered from the two cave lines. Additionally, the task of decontaminating the steel and concrete internal surfaces in the cave lines will be described together with the removal of the below floor active drainage system and decontamination of the in-cave floor storage holes. The essential challenge is always to achieve these objectives in a safe and cost-effective manner whilst ensuring that the radiation exposure of the operators is kept as low as reasonably practicable (ALARP).

As the final demolition of the two cave lines is approaching, studies have commenced on developing the most effective means of recovery of many hundreds of internally contaminated steel tubes that penetrate the cave walls. The presence of these items could prevent the adoption of a relatively uncontrolled demolition process and the development of the best means for recovery of the steel tubes, together with the thin walled ventilation ducts also located in the walls, will be described. The objective is to maximize the quantity of material for free release disposal and consequently minimise the amount disposed as low level waste (LLW).

For operational reasons, the demolition of a small section of the smaller of the two cave line structures has already commenced using a standard excavating machine fitted with a hydraulically operated double length breaking spear to enable the full 1.5m depth of the shield wall to be accessed. The work has demonstrated the importance of undertaking this task with the right equipment and expertise and the lessons learnt from this exercise will also be described for

the benefit of others carrying out similar tasks. The means of control of fumes, dust and other factors associated with this particular task will be given special emphasis.

Finally, the paper will explain how the achievement of cost-effective and safe solutions to all these challenges has been greatly assisted by total commitment to a non-adversarial team-working approach between client (UKAEA) and contractor (RWE NUKEM). The decommissioning programme remains ahead of schedule and has been achieved in a safe and efficient manner, demonstrating the worth of adopting this co-operative approach for mutual benefit.

INTRODUCTION

The UKAEA Active Handling Building A59 contains two suites of caves (‘hot cells’) constructed in the 1950s for examination of irradiated nuclear fuel and other very active materials. Decommissioning was initiated in the year 2000 in support of UKAEA's mission, which is to carry out environmental restoration of all its nuclear sites and to put them to alternative uses wherever possible. The principal objectives of the contract, awarded after competitive tender to RWE NUKEM Ltd, are to carry out the full decommissioning and demolition of the building to time and budget in a safe, cost-effective and efficient manner. The contract requires RWE NUKEM to minimise the quantities of LLW and ILW generated throughout the decommisioning whilst remaining below specified levels with both financial rewards and penalties applicable.

The decommissioning plans, mainly but not exclusively centred on the caves, were prepared at the tendering stage and can be linked together to form a number of specific phases:

- Clearance of redundant equipment, benching and services
- Remote cleaning down to target doserate levels to permit man entry
- Man entries to complete the removal of all residual items and carry out surface decontamination down to low levels
- Removal of mobile shielding window units and encast ventilation ducting
- Final decontamination of all internal cave surfaces to de-minimus levels
- Demolition of the two cave line structures
- Clearance of all remaining out-of-cave facilities including decontamination bay and overhead cranes
- Demolition of the building structure
- Removal of the building slab and encast floor storage hole liners and other items

In two earlier papers, (1,2) progress with the decommissioning was reported up to the end of the third of the nine phases of the programme set out above. Over the period covered by this paper, the work of the last year is described with emphasis on those operations of interest to others concerned with decommissioning similar large nuclear facilities. Significant progress has been made with the fourth and fifth phases of the programme and as the sixth phase is approached, lessons learnt will be identified so that others may benefit from the experience.

Decommissioning Progress with North Cave Line

The decommissioning of the North Cave Line (NCL) has continued to make steady progress. The internal partition walls and shield doors were removed along with most components at an earlier stage, (1,2), and the main tasks to be carried out centre on the continued cleaning of active items and removal of contamination from all in-cave surfaces. The forward programme thus contains the following elements:

- Strip out and decontamination of the in-cave active drains
- Decontamination of the in-cave floor storage holes
- Withdrawal of the mobile window plug units from the south face
- Removal of the high residual activity encast ventilation ducting
- Decontamination of whole cave interior to low levels

Following the overall clearance of the whole of the NCL interior it quickly became apparent that there remained areas of residual activity, although contamination levels were low owing to all surfaces having previously been sealed with paint. Monitoring in-cave was difficult to carry out effectively due to the residual activity associated with some surfaces and remaining items not yet cleaned, both tending to raise the local background levels. The thrust of the programme was thus directed towards identification of these areas and items and concerted efforts to remove the activities associated with them.

Pressure Washing of Active Drains and Floor Storage Holes

The A59 building was constructed with a comprehensive active drainage system and the caves were each connected to the system via small covered openings in the centre of the floor. The pipework ran axially along the cave centre towards the east end where they connected to the external system in a below-floor pit. The team removed a shallow layer of mortar from the Cave 6 floor to reveal precast concrete beams which covered the rectangular pit. These heavy items were lifted away with a small mobile hoist to reveal the primary pipework and the connections running out under the floor to the external system. Once the primary pipework had been cleared, the secondary pipework was monitored using a 25mm diameter gamma probe connected to an external ratemeter to reveal contamination in the tens of mSv/h range. The contamination was substantially reduced along the whole length of the secondary pipework using a standard pressure washing head. Care was taken to recover the effluent at the pit using a plastic 'catchpot' and a peristaltic pump. After several cleaning passes the radiation levels had been reduced throughout to <1mSv/h, allowing the system to be sealed until the building base slab is removed at a later stage. The sides and floor of the pit were then scabbled to remove hot spots and after confirmatory monitoring, the rectangular opening in the floor was covered with PVC wrapped scaffolding planks.

In a very similar manner, the seven in-cave floor storage holes were successfully decontaminated. These vertical penetrations in the cave floor were provided to hold fuel elements or other very radioactive items and each originally contained a heavy stepped concrete plug at the top end to provide shielding. After pressure washing and monitoring, these unventilated storage holes had sturdy steel covers welded over them to secure them until the building slab is removed at a much later stage.

Removal of Mobile Window Plugs

During the modifications made to both cave lines in the 1970s, the original non-operational faces were provided with mobile window plug units weighing ~40Te. Each plug contained a zinc bromide window, two manipulators and central light unit and was constructed in a modular fashion using five individual concrete and steel blocks assembled together, (Figure 1).

Fig. 1. Withdrawal and dismantling of the NCL window plug units

This modification was carried out to double the operational capabilities of the caves so that more equipment could be introduced. The NCL was provided with five of these blocks and the SCL with three. The design provided a capability for these units to be hydraulically raised at the outer face and then moved on guidance rails into and out of cave wall recesses using a mechanical actuator. The NCL decommissioning has reached a sufficiently advanced stage to permit all five units to be withdrawn from the south cave wall, allowing them to be decontaminated and dismantled into their component parts. Modular containment panels were installed in-cave over the inner plug unit faces to prevent the spread of loose contamination onto the decontaminated cave inner surfaces during the plug withdrawals. A doorway built into the panels allowed operators to enter from inside the cave and decontaminate the newly exposed surfaces to low levels. Residual contamination was then 'fixed' with paint to allow the modular panels to be cleaned and removed to another position. Later, the painted walls were fully decontaminated as for the rest of the cave line using hand-held Trelawney scabbling units and needle guns/chisels, (2). At the end of these operations, all five plug units had been withdrawn and decontaminated to low levels ready for dismantling. This was a major advance since it removed a significant section of the cave wall ahead of the main demolition. For reasons explained later, this was an important step in the approach to the full demolition of the two separate cavelines inside A59.

Decontamination of In-Cave Surfaces

The next major step in the overall plan then commenced with the final stripping of the painted surfaces inside the cave and removal of residual ‘hotspots’ of activity. Several ‘hideout’ areas were quickly identified by monitoring including many of the encast steel frames associated with the zinc bromide windows. The concrete surfaces were abraded using pneumatically operated chisels to remove local contamination and in many cases this permitted sections of the framework to be cut away and disposed of as LLW. Another common ‘hideout’ area comprised construction joints in the concrete; these were also locally abraded with air chisels to good effect. The walls of the cave are mostly cast concrete but there are also sections of encast steel. As a result a combination of processes was used to remove paint and residual contamination. Many of these have been described before, (1, 2, 3), but one of the most effective tools was the ‘Trelawney’ flail cleaner. This tool contains a series of hardened steel tips held on the ends of six leather strips which are rotated by an electric motor to impact the cave surfaces inside a semicircular housing. The tool is backed by a powerful cyclone-based vacuum system to recover the dusts in an effective way so that the process can proceed efficiently. To date about 80% of all surfaces have been cleared using these techniques and the rest will be completed before the end of the year.

Removal of the Encast Ventilation Ducting

As the process of final surface decontamination proceeded, it became clear that in-cave background radiation levels were still too high to enable small spots of low level activity to be reliably located by beta/gamma probes. Residual activity inside exposed sections of the extract ventilation ducts together with several parts of the cave floor and at the base of the walls were primarily responsible for this background. A start was made on removal of the exposed horizontal sections of the ventilation ducting and the work was extended to include the encast vertical sections. The ducts are about 15 x 45cm in cross section and about 6.5m high, including about 2m in the base slab, each overlaid by reinforced concrete up to about 35cm thick.

Initially teams of operators attempted to remove the concrete using electrically operated ‘jack hammers’ but progress was slow and tiring for the operators. Another method employed involved the drilling of 30mm diameter holes at 10cm intervals into the concrete and filling these holes with expanding grout. Over a period of one to two days the grout expands during solidification to crack the surrounding concrete. This worked tolerably well but the process involved considerable down time whilst the grout became effective and so this process, which initially appeared promising, was abandoned.

Fig. 2. Breaking away concrete from the encast ventilation ducts

Finally, a hydraulically powered concrete burster was used with the drilled holes, having the merit of being very flexible and relative simplicity of operation. The unit cracked the concrete very successfully despite the amount of steel reinforcing that was present. As a result, the outer surface and one side of each of the five ducts were fully exposed within a period of about 5 weeks using a team of 3-4 operators, (Figure 2).

The radiation levels inside the ducts had already been reduced by pressure washing, working from the top end of the horizontal section, (2). Subsequently, the front face of the ducting was progressively cut away in sections to allow the whole of the vertical section down to ground level to be sealed internally with 'Spraylat' water-based adhesive to control residual contamination. The stripping of the adhesive from these surfaces and subsequent re-application allowed local does rates to be reduced by more than a factor of two whilst always maintaining a close control of contamination. This approach demonstrated the benefit of using strippable paints rather than the normal variety in situations of this type. Once opened and sealed internally, the rest of the ducting was removed from the cave wall by local sectioning at ground level and at the upper end. The duct sections were subsequently size reduced and disposed of as LLW. The residue of the horizontal sections of ducting, cleaned at an earlier stage, were also recovered and disposed of in a similar manner. Significant amounts of concrete debris were generated throughout these operations and after monitoring about 10% were disposed of via a free release route along with most of the steel reinforcing. Activity levels on the remainder of the debris were low but it was judged not to be cost effective to carry out detailed sorting and monitoring of these materials to reduce the quantity of LLW generated in this case.

An Approach to Final Monitoring of In-Cave Surfaces

Once the encast ventilation ducting had been removed, attention turned to removal of the residual activity at the cave floor. Using the same tried and tested procedures, the areas of residual activity were pinpointed as being mainly at the floor/wall interface positions and also associated with a pair of steel rails set into the floor. The steel rails were cut away using an angle grinder and the local areas chiseled/abraded to further remove contamination. Similar operations were then carried out at the wall/floor interface to ensure that residual contamination levels were reduced to minimal levels.

Due to the residual activity in the below-floor ventilation ducts and other areas not immediately accessible for removal, such as the many encast steel liner tubes in the walls and roof structure, the task of full decontamination of all cave surfaces has not yet been completed. In order to assist with the final monitoring, some local shielding will be introduced at the floor where required to minimize background radiation. Some shield plugs will also be made and introduced into the steel liner tubes for the same reason. This should enable the final pockets of above-ground activity to be located and removed, so that the final demolition phase can be planned in detail.

Decommissioning Progress with South Cave Line

In the earlier papers (1,2), a commentary was provided on the decommissioning of Building A59 which concentrated upon the NCL as this was the larger of the two main facilities and judged to be more challenging from a decontamination angle. Progress with the overall decommissioning has tended to be replicated at a later stage on the South Cave Line, (SCL), generally using the techniques established from NCL operations. However, some unique new tasks have emerged for the SCL and these are:

- Removal of 90Te ILW compaction unit and waste handling facility
- Decommissioning and removal of the Pickering Hoist
- Removal of encast concrete and lintels above east end of SCL wing walls & door

The two cave lines were both constructed to the same overall design in the 1950s but the SCL was smaller with three individual cave units as against the seven units of the modified NCL. During the intervening years, the SCL has also been modified so that there are now no internal wing walls and doors and the rear (north) face contains three mobile window plug units like those on the NCL. This large single cave is contained on the west side by a pair of wing walls and a shield door, with hydraulically operated flaps above, with an adjoining brick built transfer chamber. At the east end, the cave is enclosed by another set of wing walls and shield door above which is are three concrete lintels and a 1.5m thick cast concrete wall. Immediately outside the east end of this cave is a Pickering Hoist, (Figure 3). This hydraulically operated lift was used to raise nuclear transport flasks from ground level to the SCL roof to allow fissile and other highly active materials to be introduced into or from this facility. The location of this hoist at the east end of the SCL provided a major impediment to some decommissioning operations. However, since the facility was required to support the removal of compacted ILW generated during the decommissioning of the whole building, its use had to be maintained until the flow of ILW became minimal.

The cessation of receipt and packing of ILW allowed the 90Te ILW compactor to be remotely cleaned, dismantled and removed from the cave line along with the small associated bench and waste can holder. Some ingenuity had already been used to keep this unit operative as its significant weight required use of the in-cave hoists to move it and the loaded ILW cans around. The decommissioning of the two in-cave hoists and cleaning and removal of the crane rails upon which they were mounted lead to the temporary use of an A-frame with the ILW compactor. Once the last cans of ILW had been cleared from the building, the whole ILW waste handing system was declared redundant and removed. The press itself has been cleaned and retained to provide a fall-back facility should any significant amounts of ILW be generated elsewhere.

Removal of Pickering Hoist

The Pickering Hoist, Figure 3, is essentially a lift operated by two powerful hydraulic rams mounted on either side of a rigid base structure. The lift is about a 3m cube in size enclosed by an open framework with an access through an interlocked folding door. There are rails across the ground floor and cave roof enabling the flask, mounted on a low wheeled trolley, to be located where required to charge and discharge ILW cans and other items. The wheeled trolley was dismantled and disposed of first and then the main lift and cage structure was cut away leaving the solid base plate, steel support structure and the two large vertical hydraulic rams.

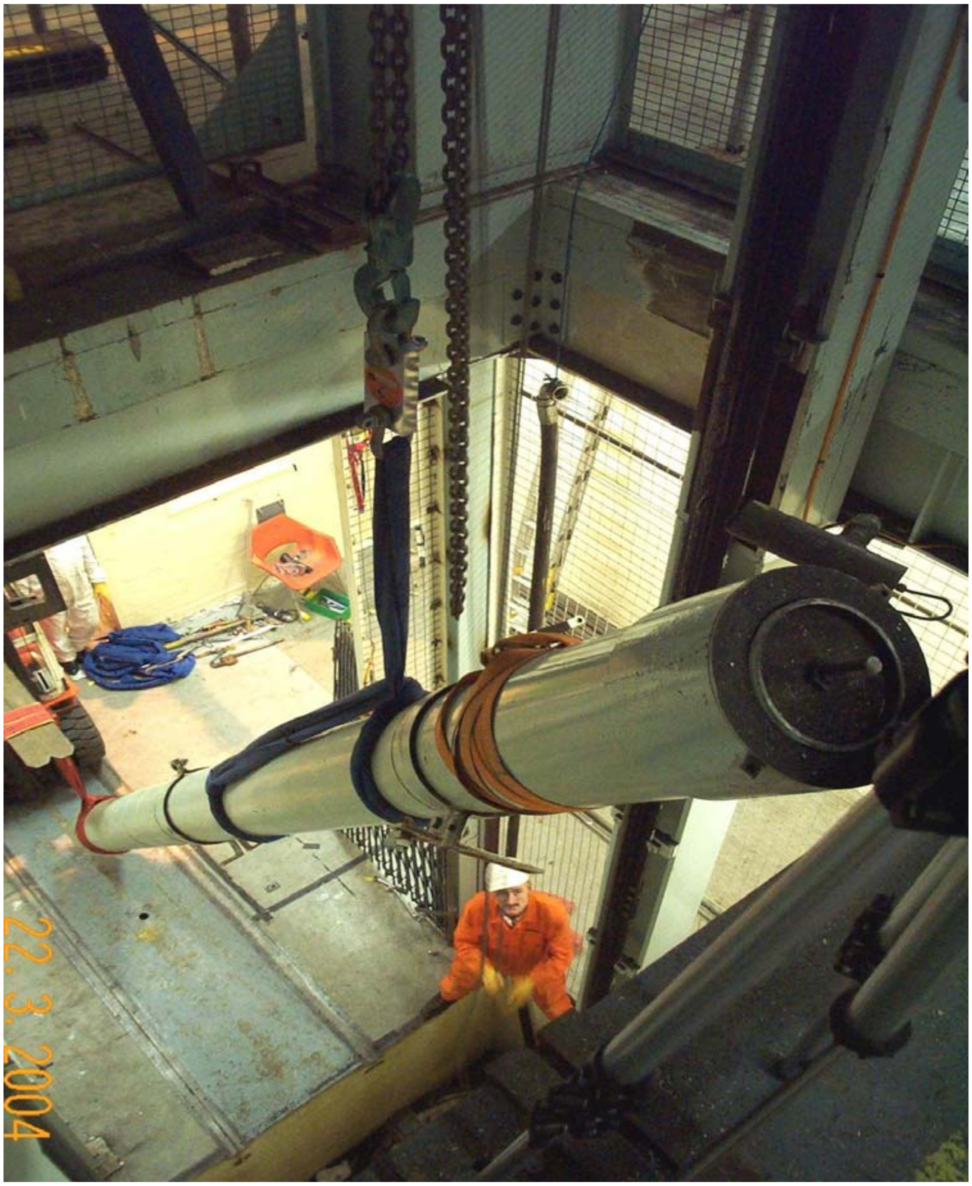

Fig. 3. Dismantling of the Pickering hoist

The rams were secured to the steel support structure so their removal became the first major task. The hydraulic system was isolated electrically and drained, the oil being recovered into polythene lined drums for sampling and subsequent disposal as clean material. The exact weight of each hydraulic cylinder was not recorded and could not be obtained from the original manufacturer. Their masses were thus calculated conservatively and shown to be ~0.5Te, allowing the local steel support structure to be used to attach a ratchet operated chain hoist for lowering the two rams to the ground. A radiation survey showed that these were clean and this allowed their subsequent disposal for scrap. The steel structure was then cut away using a standard gas cutting technique to finally clear the access to the east end of the cave line. All the steel structural materials were confirmed to be clean and this again allowed for their subsequent recycling.

After the Pickering Hoist had been dismantled, the three active drainage pits located in the floor outside the east end of the cave line, together with the base pit from the hoist itself could be accessed and cleaned. The in-cave drains were connected here and the pits contained connections to the NCL system and out towards the five external pits that form part of the site active drainage arrangements. The recovery of the primary pipework, cleaning of the secondary drainage pipes and the other associated tasks replicate those already described for the NCL and will not be repeated here. Once completed, blocks of concrete were placed into the empty pits to fill up the openings allowing them to be cemented over so that they were capable of bearing loads associated with the next task, the removal of the two sets of wing walls and shield doors.

Removal of Encast Concrete over SCL East Wing Walls & Door

The methods used to recover and remove the NCL wing walls and door have been described before, (2). However, for the east end of the SCL, the method of removal was initially thwarted by the presence of the two short and one longer concrete lintel above the wing walls and door and the 1.5m thick reinforced concrete immediately above the lintels. The lintels and some of the concrete had to be removed to create a space above the walls and door to facilitate their removal. On the basis of calculations, a triangular cross-section of about $3m^3$ of reinforced concrete had to be removed.

A number of possible means of removal of this material were considered and for simplicity the use of a tracked hydraulic breaker fitted with a wrecking spear was chosen. Several problems had to be addressed to facilitate the use of this equipment including direction of the diesel engine exhaust gases out of the building and provision of suitable access for the machine. Noise and the generation of dusts in the working area also had to be considered in the context of the operation of the in-building ventilation system.

A long flexible steel tube was attached to the machine exhaust and directed out of the building through a small hole cut in the external skin for the purpose. A short section of enclosing brickwork about 6m high and an associated vertical steel stanchion were removed to provide a larger access to the east end of the cave line for the demolition machine. A water mist spray was also provided in the working area to dampen the dusts and the in-building ventilation system was temporarily shut down whilst work progressed over a weekend. This arrangement was chosen to minimize the impact of the work on other building operations.

In the event, the work did not proceed either as quickly or as effectively as planned. Due to the work taking place about 4m above the ground it was quite difficult to keep the wrecking spear in the position required, particularly due to the extensive steel reinforcement. Further, as the wall was 1.5m thick, the original spear was too short and could not penetrate deeply enough to complete the work. After two weekend periods, about 60% of the task was completed but a double-length spear was required to complete the task. No problems were experienced with fumes and the recovered concrete and steel were found to be uncontaminated. The contractor did not handle the issue of obtaining and fitting a double-length spear well and the completion was delayed by about a month whilst this matter was finally settled. The removal of the final 40% of the material was completed over a further weekend and the area cleared of all rubble and scrap items.

With the benefit of hindsight, consideration might have been given to the use of diamond wire sawing to remove the $3m^3$ of cave wall. This would have required four holes to be drilled through the 1.5m deep concrete to accept the wire rope but once completed the work could have been carried out during normal day operations with little impact on other operations. Nevertheless, useful lessons were learnt from these operations that will guide later demolition activities of this nature.

Decontamination of Wing Walls and Window Plug Blocks

The two cave lines were both constructed with sets of internal wing walls and shield doors and, on one side, sets of mobile window plug units. The five concrete blocks in each unit are held in place by a steel plate about 500mm wide, tack-welded to the steel frame. Once these plates had been cut free, the blocks were progressively recovered using the local 10Ton overhead crane. Each individual block had been constructed around a rectangular steel framework with plates forming the sides of several but not all faces. Decontamination of the unpainted steel down to free release levels has generally been unsuccessful and in this case the external steel plates were cut away in an attempt to dispose of the heavy concrete matrix, which was expected to be uncontaminated.

An area, known colloquially as the ‘squash court’, was set up inside the building to receive heavy concrete blocks and the wing walls to enable the external steel skin to be cut away using electrically powered angle grinders, Figure 4. The location was chosen adjacent to the east end of the NCL with local 40Te Craneage available to handle the loads. There are steel rails set in the floor leading into this area for use with a low wheeled trolley upon which blocks or wing walls up to 40Te in weight could be supported. This trolley had originally been used to handle CAGR fuel transport flasks of similar mass and was a good example of the re-use of apparently redundant equipment. The working area is surrounded by clear plastic sheeting secured to steel uprights and sealed at base and ceiling. The area can be entered through a pair of vertical doors made of similar material with wheeled ends to facilitate opening/closing. The area is ventilated by a powerful air mover which draws air from the facility at about $1.8m^3$/sec through a long steel tube directed across the ceiling and down into one corner of the facility.

The work is always carried out in a similar manner with operators cutting away the steel from all surfaces, turning the block when required to expose the lower face. Care is taken with the radioactive monitoring to ensure that any contamination on the items is controlled before movements are undertaken. The blocks are then moved to a low background area for monitoring of all surfaces. Any residual activity is marked with black spray paint for further attention.

Fig. 4. Removal of steel plates from concrete blocks in the ‘Squash Court’

One further cleaning operation using mechanical chisels to remove the spots of fixed contamination is usually sufficient to fully decontaminate the blocks. The recovered steel is collected up and disposed of as LLW in ISO containers. The vast bulk of the blocks/wing walls is then be disposed of via a free release route with substantial savings in disposal costs. Analysis of core samples taken from some of these blocks has confirmed the absence of radioactive contamination or activation products in these materials, supporting their disposal by these means.

During the operations in the ‘squash court’ there were a couple of incidents with the ventilation system. On two separate occasions small fires were started in the HEPA filter units and on a further two there were small fires in a spark arrestor. The original system was designed with a HEPA and spark arrest filter installed at the end of the flexible metal tube used to draw air out of the facility to the air mover. In essence, the sparks of burning metal produced by the angle grinders were occasionally being drawn into the air mover system such that they were still glowing red hot when they reached the filters. After a couple of abortive attempts to overcome this problem, the system was extensively modified to incorporate a drop-out box for the sparks and the hoses were lengthened to increase the time-of-flight of hot particles to allow them to cool more before reaching the filters. Since these modifications were made the problem has not recurred showing that changes have been fully effective.

Monitoring and Recovery of Encast Steel Tubes from Cave Structures

As the need for demolition of the two cave lines approaches, operations are centering on the final decontamination of all surfaces. The main objective during demolition is to maximize the quantity of free release materials such as steel and concrete and minimise the volume of LLW generated. The presence of many hundreds of internally contaminated steel liners cast into the cave walls and roof has presented a significant challenge to the ability to demolish the cave lines in-situ. However, the recovery of the concrete blocks from the mobile window plug units, which also contain cast-in steel liner tubes, has presented an opportunity to carry out trial recovery of these items away from the cave lines. It is necessary to determine whether or not these tubes be recovered during demolition in such a way that contamination is not spread to the clean bulk concrete matrix during that process.

During the earlier cave decontamination process, all steel liner tubes were swabbed to remove as much of the loose contamination as possible. A range of degreasing and chemical cleaning liquids were used to assist in this process and most liners were reduced to surface contamination levels of $<40Bq/cm^2$. The surfaces were then generally sealed with paint to ensure close control of contamination. A sensitive beta/gamma probe was then used to make measurements of the residual activity in a representative sample of the tubes. Results showed that the radiation levels inside the tubes were generally below 100µSv/h and there was no loose contamination present. Indeed, some tubes contained very little residual contamination, particularly those of larger diameter that had better access and had been cleaned more thoroughly.

The open ends of the tubes were closed by welding thin steel plates over them to contain any residual activity. This enabled the decontaminated concrete blocks recovered from the mobile window plug units to be removed from the building to an external compound after removal from the ‘squash court’. Here the demolition trials are to be undertaken using a powerful hydraulically operated breaker fitted with a wrecking spear, typical of the type that will be employed in due course within the building on the cave line structures. These trials are planned to replicate as far as possible the processes to be used inside the building so that the recovery of the steel liner tubes can be assessed under realistic conditions. Some earlier trials carried out with a BROKK 180 machine, which is relatively small, were 100% successful; however, the rate of recovery was judged to be uneconomic in the context of the scale of work subsequently required.

Client-Contractor Cooperative Working

During any major decommissioning contract, cooperation between client and contractor is a major asset in ensuring that work progresses in a safe yet dynamic way. In this contract a non-adversarial approach has been successfully developed between UKAEA and RWE NUKEM such that the client has full confidence in the way the contractor is carrying out the work. This is particularly demonstrated by the very low incidence of accidents or unusual occurrences, the strong team working spirit of the operators and the regular and fruitful discussions that take place between client and contractor staff in support of the programme. The client’s Operational Controller is in daily contact with the Task Managers running the Contractor’s operations and thus has obtained a detailed knowledge of the work being undertaken. Any concerns the Operations Controller may have are thus quickly addressed and actions taken to close out these issues. The worth of this procedure cannot be over emphasized and the fact that the project has been carried out without incident ahead of programme significantly underscores this point.

CONCLUSION

The decommissioning of the cave lines in Building A59 has advanced in a manner consistent with the required schedule, with demolition of whole building due by November 2006. The decontamination of the cave line internal surrfaces to minimal levels is proving challenging but the development of an effective means of removal of the encast ventilation ducts and other sources of activity has led to a major reduction in background dose rates such that efficient monitoring can now be undertaken. The ability to remove steel plates from the outsides of wing walls and window plug blocks has provided an excellent means of minimising LLW arisings. Recovery of concrete window blocks has also provided an excellent opportunity to develop the demolition techniques away from the building. In particular, it should enable the last major challenge of the decommisioning to be met and overcome, the successful recovery of the many hundreds of internally contaminated steel tubes from the encast concrete of the cave walls and roof.

Once again, a combination of good forward planning, the harnessing of operator enthusiasm and skill, the use of simple and adaptable tooling together with the vital support and confidence of the client are leading steadily towards a successful conclusion to the full decommisioning and demolition of Building A59.

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