Decontamination and Decommissioning Experience at a Sellafield Uranium Purification Plant

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ABSTRACT

Built in the 1950s, this plant was originally designed to purify depleted uranyl nitrate solution arising from reprocessing operations at the Primary Separation and Head End Plant (Fig. 1). The facility was used for various purposes throughout its lifecycle such as research, development and trial based processes. Test rigs were operated in the building from the 1970s until 1984 to support development of the process and equipment now used at Sellafield's Thermal Oxide Reprocessing Plant (THORP).

The extensive decommissioning program for this facility began over 15 years ago. Many challenges have been overcome throughout this program such as decommissioning the four main process cells, which were very highly alpha contaminated. The cells contained vessels and pipeline systems that were contaminated to such levels that workers had to use pressurized suits to enter the cells.

Since decommissioning at Sellafield was in its infancy, this project has trialed various decontamination/decommissioning methods and techniques in order to progress the project, and this has provided valuable learning for other decommissioning projects.

The project has included characterization, decontamination, dismantling, waste handling, and is now ready for demolition during late 2005, early 2006.

This will be the first major facility within the historic Separation Area at Sellafield to be demolished down to base slab level. The lessons learnt from this project will directly benefit numerous decommissioning projects as the cleanup at Sellafield continues.

INTRODUCTION

This paper sets out the experience gained during 15 years of decommissioning operations in the Uranium Purification Plant at Sellafield.
It identifies:

- Decontamination techniques considered and utilized in order to dispose of waste at the lowest possible category.
- Waste handling facilities and options considered.
- Categorization of the wastes being created.

DESCRIPTION OF THE URANIUM PURIFICATION PLANT

Fig. 1. Uranium purification plant

The Uranium Purification Plant is situated centrally in the Separation Area of Sellafield. It is surrounded by numerous sensitive operational plants, pipe-bridges containing highly active services, railways, roads and the active drainage network.

As originally constructed, the Uranium Purification Plant was one of the first generation reprocessing plants. It was designed to recover depleted uranyl nitrate from the Column 3 product arising from the Primary Separation Plant.

The Uranium Purification Plant started uranium purification in 1953. However, the north side of the plant was redesigned, and the commissioning of this new plant started in 1959. This plant was based on the use of mixer settlers for the extraction and backwash of uranium with 20% TBP/OK (Tri-Butyl Phosphate in Odorless Kerosene) as a solvent, and replaced the original air-lift extraction system which used Butex as a solvent. The first batch of active liquor was fed to the new mixer settlers in 1959.

The availability of the new Magnox Reprocessing Plant in 1964 rendered the Uranium Purification Plant redundant. Soon after the new Magnox Plant came on-line, a small part of the southwest cell was utilized for the buffer storage of uranyl nitrate solution, and for the conversion of ‘out of specification’ uranium trioxide powder. This section of the plant remained operational until 1999.

From early 1967, certain sections of the north side of the facility were used to carry out a preliminary separation of N-237 from the fission products and impurities present in medium active concentrates. These operations largely ceased in 1973.
In mid-1979, it was decided that the non-operational plant should be emptied of all liquors, with washout starting in September of that year.

During the late 1970s, the Sellafield Technical Department constructed inactive full scale rigs in the operating areas, outside the northwest and southeast cells. The rigs were in support of THORP operations development, and ran until 1989, at which time they were mothballed in the possible event of erutilization.

In addition to these uses, the Uranium Purification Plant has also been used in various other ways, e.g. dummy rod storage and uranium trioxide drum store on the ground floor, uranyl nitrate buffer storage on the first floor, and the second floor south cell top bulge area was used for storage of shutdown equipment for reprocessing.

Main Building

The main building structure is a rectangular three-story building 45.7m in length (east-west), 27.4m in width (north-south), with a flat roof which is 16.8m high and a penthouse located on the south east corner of the building. The building extended 5.5m on the east side forming a single story annex, which housed an electrical maintenance workshop, engineering stores and offices.

Situated on the ground floor at the west end of the building was the solvent mixing room. It was a brick room 3.3m (east-west) by 2.5m (north-south), and 3.4m high completely sealed from the outside west wall of the building. Up to the 3.5m level, and including the whole annex, the walls are of brick/glazing. Above this, the shell of the building is composed of alternate glazing and corrugated asbestos cement cladding sheets.

Operating areas are annular around the cells on the ground floor (0m) and first floor (4.5m) levels, and extend over the cells on the second floor (9.1m) level.

Cells

The cells are located centrally in the main building structure. They are comprised of a shielded rectangle 23m in length (east-west), 15.2m in width (north-south) and 11.3m high at the highest point. There is also a lower annex attached to the west end of the main shielded area 15.2m wide (north-south), 3.6m length (east-west) and 6m high. The structure is divided longitudinally east-west to give the north and south cells, which are inaccessible from one another. The north side consists of three cells, two large cells and one smaller self-contained cell situated in the northwest annex. The two large cells, northeast and northwest had a ground and first floor level. The south cells are a mirror image of the north cells.

Contained within each of the cells were between 13 and 19 major vessels. In addition to the major vessels were a number of smaller vessels within each of the cells. The southwest cell also contained three operational vessels and associated pipe-work, in support of uranium dissolution for the Magnox Reprocessing operations. All cells contained miles of redundant pipe-work.

Access to the internals of the majority of the in-cell vessels, to determine vessel contents, was not possible without prior provision of access platforms. This involved the provision of engineering services such as platers, scaffolders and riggers. In addition to the access problems, six of the vessels in the northwest cell were fully encapsulated with asbestos lagging.

At the commencement of the decommissioning project, all cells with the exception of the south west cell were redundant. The southwest cell was still an operational cell, although the majority of the plant contained within the cell was redundant. For the redundant plant to be decommissioned whilst the cell was still in operation, a number of constraints were imposed.

Every single vessel and pipe run in the southwest cell had to be traced and identified as being redundant, before it could be cut out. Physical segregation of the operational plant and the redundant plant had to be completed to ensure safe working conditions could be maintained.

During 1979, it was decided that the plant should be emptied of all active liquors and the washout process commenced in September of that year. All vessels associated with the N-237 recovery campaign were emptied and washed repeatedly. There was, however, no evidence to substantiate that some sealed vessels in the north cells (which were used for transferring the medium active concentrates to the N-237 recovery process vessels) did not contain residual liquors.

During this Post Operational Clean Out (POCO), verbal assurances were given by Magnox Reprocessing plant management that all of the vessels in the south cells were washed out with water some time during 1980, with the possible exception of a conditioning vessel contained within the southwest segregated cell. Service lines to the cells were all cut or spaded, and some head tanks and pipe-work in the annular operating area were removed. However, caution would be needed for the decommissioning of the in-cell plant, as no documentary evidence existed from the POCO.

OUT-CELL AREAS

Along with a quantity of redundant plant, service pipe-work and instrument panels, there were a number of redundant major vessels in the out-cell areas. Operating vessels and associated pipe-work belonging to the uranium trioxide dissolution facility, and uranyl nitrate buffer storage plants were located within the annular operating areas inside the building - linking into the vessels and pipe-work within the southwest cell.

The annular operating areas also housed the two Research and Development rigs in support of THORP. These were full scale rigs used during the late 1970s/early 1980s, and were the Pulsed Column Test Rig (PCTR) and the Centrifuge Trials Rig (CTR). Both test rigs were 'mothballed' in 1984, in case they were ever needed in support of THORP operations. The decision came in the late 1990s that these rigs would never be used again, and the rigs were added into the decommissioning scope.

The major lifting systems in the building were located on the second floor of the building. Two 5-ton electric overhead traveling cranes installed during the early 1950s were in differing conditions. The south crane had been continually maintained and operated in support of the Magnox operations, while the north crane had not been used since the early 1980s.

DECOMMISSIONING STRATEGY

A scoping paper was issued in 1990, which outlined the company's objective to decommission the redundant plant and equipment, and leave the building in a state of minimal care and maintenance. The project drivers for decommissioning the Uranium Purification Plant were:

- Plant and equipment located within the redundant cell areas was subject to varying levels of corrosion and general deterioration, and therefore required a decommissioning program which took into account the increasing difficulty in accessing the plant as it deteriorated with time. An alternative would have been to embark on a major maintenance program to extend the safe life of the redundant facilities.

- Following agreement with the Nuclear Installations Inspectorate (NII), it is BNFL policy to carry out post-operational clean out and decommissioning as early as possible following completion of operations, to reduce radiological and conventional safety hazards.

The scoping paper also outlined the decision to carry out the decommissioning project in five separate phases of work. A description of the phases, highlighting some of the key points follows:

Phase 1

- Scheme design of the ventilation systems to allow all vessels within the building to be ventilated via a dedicated ventilation system.
- Out-cell investigations into sample bulges, pipe-work, etc.

In carrying out assessments of the existing ventilation system, it was identified that the current ventilation system was insufficient to support the decommissioning operations and the reprocessing operations. The scheme design incorporated a double High Efficiency Particulate in Air (HEPA) filtered extraction system with a dedicated stack discharge. This included the design of the new ventilation facilities within the confines of the annular operating areas of the building.

The investigation into the sample bulges and pipe-work were to identify any heels of liquor that existed within the system, and the isotopic fingerprint of the remaining radioactivity.
This included breaking into the sample bulges and pipe-work at strategic positions, taking coupon and liquor samples, and analyzing the samples for pre-determined isotopes. The results from the sampling analysis indicated that activity levels within the pipe-work were minimal, and that the anticipated levels within the cells would not be as high as first predicted.

Phase 2

- Preparation of dismantling study to establish the most effective way of dealing with the large vessels inside the cells.
  Some of the vessels within the cells were 8 m in height, supported laterally from structural steel frameworks within the cells. This posed a significant problem in that the steel framework supported approximately two-thirds of the vessel above, and one-third of the vessel below. This left very little headroom within the cells to allow for lifting vessels free of the steel supports. Options considered for these vessels, were:

- Removing the cell roofs, accessing the vessels using the building cranes and lifting out of the cell for size reduction
- Installation of lifting equipment within the cells, and lowering to the ground for size reduction
- Size reduction of the vessels in-cell using plasma arc cutting
- Partial size reduction in-situ, and transfer to a plasma arc cutting facility

The latter of these options was chosen as the preferred solution.

Phase 3

- Removal of out-cell vessels to provide space for decommissioning facilities.
- Ventilation modifications and upgrade to allow suitable ventilation during decommissioning activities.
- Scheme design of decommissioning facilities.

There were various inactive out-cell vessels that needed to be removed, each containing differing industrial safety hazards as opposed to the more prominent radiological hazards usually encountered. Tanks removed included various water tanks, sodium carbonate and nitric acid tanks.

The ventilation modifications designed during Phase 1 were installed inactively and commissioned. Following this, live commissioning was carried out – which included disconnection from the existing live ventilation system. This was extremely complex as the existing ventilation system remained connected to a number of other buildings and operational facilities, with very high potential for blow-backs or cross-contamination between differing building's isotopic fingerprints. The interactions between all relevant plants were managed very closely, and minimal downtime resulted in the changeover taking place effectively.

The scheme design of the decommissioning facilities identified a number of alternative design philosophies that could be adopted in order to achieve the required result of a plasma arc cutting facility chosen during Phase 1. The decommissioning facilities were intended to be fit-for-purpose. The decommissioning of the cells was programmed to last for 2 years, and the new facilities were being designed with a 2 year design life. The design had to minimize, as far as practicable, the amount of waste being introduced by installing the new facilities. The final scheme design resulted in a plasma arc cutter being situated on the ground floor, with a re-circulating particulate filtration system being located on the first floor. To section off areas, single skin partitioning was identified, and PVC curtains for the plasma arc cutting booth, and the decontamination booth. In order to be able to carry out the installation of the new facilities, the scheme design identified areas on the ground and first floors that needed clearing first. This in itself posed a number of difficulties. The first floor housed a control station for in-cell operations, and was made up mostly from asbestos insulated boarding and intricate instrumentation. A number of enclosures had to be designed and installed in order to segregate work areas adequately.

The design of the decommissioning facilities also included a number of different solutions for decontaminating vessels. These ranged from steam cleaning, high pressure water jet washing, acid soaking and chemical decontamination. The option chosen was high pressure water jet washing.

Phase 4
- In-cell investigations and equipment installation.
- Detailed design, procurement, installation and commissioning of decommissioning facilities.
- Decommissioning of the north cells.

The in-cell investigations built upon the sampling program carried out in the sample bulges and pipe-work. The indications from out-cell investigations had indicated that radiological activity levels were insignificant. This appeared to be confirmed with the results from the in-cell sampling. However, this sampling was later proved to be inadequate, and alpha activity within the cells was significantly higher than anticipated.

Equipment installation included lighting, small power and camera systems. The cameras could be viewed in the control room, and along with the ability to monitor the personnel in the cell, water levels in the decontamination booth sump could be monitored. One of the tanks in the northwest cell was used as a holding tank for any liquors found, and any water generated during the decontamination operations would be automatically sent to the holding tank. The liquid waste generated during this process was sampled and sentenced as low-level liquid waste, and discharged via the low active drain to the sea.

The detailed design, procurement and installation of the decommissioning facilities progressed well. A new access route was created in the north wall of the northwest cell by installing new steelwork as a lintel and concrete coring to break through the 3 foot thick reinforced concrete wall. This was repeated in the west wall of the northeast cell to provide access for all the vessels in the north cells.

The commissioning of the facilities did not progress as intended; problems were identified with the re-circulating HEPA filtered ventilation. The extraction was pulling from approximately 600 mm above the ground – differing from traditional systems extracting from above the cutting area. In theory, the extract should have worked, but this was proved to be completely inefficient, and the extract was changed to the more traditional top extract. The HEPA filter in the cutting booth system did work as intended, and aerial discharges to the atmosphere did not increase.

The design of the decommissioning facilities incorporated a hot water pressure washer jet to carry out decontamination of the vessel internals. During active commissioning of the facilities, the pressure washer was found to be largely ineffective in decontaminating the high alpha activity.

Initial decommissioning of the north cells identified using a strippable fixative spray for the cell surfaces to prevent any cross-contamination. This worked well during the early stages of decommissioning, but deterioration of the coating meant that the fixative was patchy in areas, making it difficult to strip it off following vessel and pipe-work removal.

The decommissioning of the north cells identified the problem of the higher than anticipated alpha activity levels within the cells. Work was planned to be carried out by operatives wearing PVC suits and respirators, but high activity in air samplers indicated high airborne alpha activity within the cell areas, resulting in the requirement for operatives to wear air-fed suits. Initial attempts to retain the cell areas as C3 radiological classification resulted in significant decontamination being required. In comparison of workers exposure to contamination, and workers time spent decontaminating, an evaluation identified it was more As Low As Reasonably Practicable (ALARP) to carry out the work in a C5 radiological classification, and carry out decontamination at the end of the cell clearance.

Characterization of the waste from the initial sampling campaign estimated approximately 40 drums of Plutonium Contaminated Waste (PCM) would be produced. More detailed sampling of the vessels and analysis results indicated this would be much greater, somewhere around 2,000 drums of PCM waste were anticipated at this stage. Work to load the waste into 200 L drums was very time consuming, and on average only 6 drums could be filled during a working entry. From the realization of the amount of PCM waste estimated to be generated, studies were carried out to try to find ways to minimize the waste. This involved challenging existing practices, on the Sellafield Site, for the sentencing of PCM waste. The custom and practice during this stage of the work was to sentence all waste as PCM that was greater than 50 counts per second (6.3 pCi) alpha by DP6. By simple calculations of the activity to weight ratio, for impervious materials such as steel, this level could be raised considerably to allow the material to be disposed of as Low-level Waste (LLW).

Technology was not available at the time to carry out internal monitoring of the pipe-work, so there was no possibility of sentencing the waste as anything other than PCM. However, minimization of the volume was identified by using a press. Some of the vessels were up to 40 mm thick stainless steel, and had to be cut into 300 mm square sections to enable manual handling. Decontamination of the individual sections was possible by the use of standard decontamination agents, and it was possible to decontaminate a large number of the vessel sections down to LLW limits.

Phase 5

- Decommission South cells and outcell areas.

Lessons learned in the decommissioning of the north cells were built upon for the south cells. New accesses were created in the north walls of each of the south cells, again providing a route for the vessels to the cutting booth facility. The decommissioning of the south cells had to be more controlled than in the north cells due to the continued operations in the cells by Magnox

Reprocessing. Work had to be planned very carefully due to the space constraints within the cell, and the maneuvering of the vessels through the newly installed openings.

A problem occurred during size reduction operations of one of the vessels from the south cells. This was because the fire resistant curtain that segregated the area from the plasma arc cutting booth set on fire. It was never positively determined what had caused the fire, but it was thought to be a build up of decontaminants on the curtains causing them to become degraded.

Following the completion of the Magnox Reprocessing operations due to their new facility being commissioned, the vessels associated with the uranium trioxide dissolution were also decommissioned.

ADDITIONAL PHASES OF WORK

In addition to the identified phases of work, it was necessary to carry out other packages of work to allow decommissioning to progress.

South Cell Top Bulge Area Clearance

Work during Phase 5 of the decommissioning project, identified a requirement to access the mixer settler vessels within the cells. This could only be carried out by removing the cell roof slabs and shield plates in the cell roof bulge areas, as steelwork supports under the mixer settler vessels would not allow for them to be accessed from underneath.

In order to do this on the south side of the building required the south cell top bulge area to be cleared of the Reprocessing shutdown equipment. However, this equipment had been stored over a number of years, and there was no record of the inventory. The decommissioning project undertook, on behalf of Magnox Reprocessing, to investigate the inventory to establish the status of the equipment, dispose of now redundant equipment, and re-locate operational spares that were still required.

There were 54 items identified within the bulge area. Of these, 34 were originally classed as waste, 16 were unknown, and 4 were operational spares still required in support of the Magnox Reprocessing plant. In total, 53 items were eventually identified, characterized asLLW, size reduced and disposed of. The one remaining operational spare was relocated to another building in the event it may still be needed.

THORP Test Rigs Removal

During July 1998, Phase 4 of the planned decommissioning work, an option study was carried out that highlighted the most effective and efficient manner for decommissioning the THORP test rigs would be to utilize the decommissioning facilities employed during the cell decommissioning. It was then programmed into the decommissioning strategy to include the THORP test rigs removal as part of the decommissioning project. It was, therefore, intended that the THORP Test Rigs dismantling would follow on from the completion of Phase 5, with the benefits being:

- Re-utilization of the decommissioning facilities previously installed for the cell decommissioning, reducing the capital requirement for the project.

- A new access was formed in the south wall of the southwest cell, repeating the design used for the north and south cells. A new hoist-well was created within the building to enable routing of THORP Test Rig vessels down to the ground floor, through the opening in the south wall of the southwest cell, then transfer via the northwest cell into the size reduction area.
- Decommissioning the last plant in the building, would release the building for future reutilization, demolition or leaving in a minimal care and maintenance state. This would result in minimizing the customer’s liabilities.
- Lessons learnt during the cell decommissioning could be transferred directly onto this project. Decontamination of steel using similar techniques resulted in approximately 90% of the stainless steel vessels being released as free release material.
- Small pipe-work was placed inside larger pipe-work to minimize the volume of LLW generated. This was identified during the cell decommissioning to minimize volumes of PCM waste.
- The same project management team was adopted for additional scope that as was used for the decommissioning work and other phases of work. Continuity of work for the team retained the knowledge and experience gained during earlier phases of work.

Although the THORP Test Rigs were only ever operated trace actively, the plant and equipment to be decommissioned still posed problems. One section of the centrifuge support steelwork weighed 6.25-tons, and building cranes were only rated to 5-tons. Significant work was required to provide justification to carry out a one-off lift using both of the 5-ton cranes. The position of the centrifuge support was such that it had to be lifted up to the second floor, traversed across the second floor, and down to ground using the south crane. This required calculations, drawings, equipment for traversing the second floor, and the Sellafield Head Lifting Appliance Engineer. Months of planning resulted in 2 hours work to successfully remove the steel framework.

Additionally, during the THORP Test Rigs dismantling project, various problems were encountered with the removal of bulk liquors from within storage vessels. Nitric acid, uranyl nitrate and TBP/OK were among the liquors. While project management time was spent trying to solve these problems, the decommissioning workers were utilized to carry out size reduction for another customer:

Size Reduction of Skips Owned by the Waste Monitoring and Compaction Plant (WAMAC)

By reutilizing the decommissioning facilities yet again, the decommissioning workers carried out size reduction and disposal of redundant WAMAC skips. The skips, 80 heavy duty and 24 light duty were individually transferred into the decommissioning facilities, where they were size reduced using the plasma arc cutter. Approximately 90% of the waste from the skips was transferred to a wheelabrator facility – reutilizing another decommissioning facility at the site. The steelwork was blasted clean of any paint coatings, and resulted in the steel being sentenced as free release material.

The remaining 10% of the waste was disposed as LLW, combining it with waste from the THORP Test Rigs. The wastes blended well, to give good packing efficiency within the ISO containers destined for direct grouting at the Low-level Waste Repository (LLWR).

BUILDING DISMANTLING

The development of the strategy for the close out of the Uranium Purification Plant was based upon the requirements of the Sellafield Site Licence, interfaces with Sellafield Site Strategies, and several other identified driving forces:

Structural Integrity of the Building

On completion of the decommissioning work, the building would be in a state where it required a significant level of immediate and ongoing upgrade to meet current safety standards. The roof was in a poor state, and would certainly require replacing, and as identified in the cost-benefit analysis, the roof and main building cladding would require replacement every 25 years. Furthermore, the steelwork structure was designed to British Standard BS449, which does not meet current standards, and no account was taken for seismic ability when the building was constructed.[1] This is more so significant for this building, given its congested location within the Separation Area, and its connections to pipe-bridges and services.

Reduction of Customer's Future Liabilities

On completion of the decommissioning work, the building would be in a state where it would require a significant level of upgrade in order to support long-term care and maintenance. Dismantling of the building provided customers and BNFL with a clear route to final discharge of liability for the building.

Release of Land for Alternate Use

Dismantling of the Uranium Purification Plant and the associated annex would release strategic land in the Separation Area for alternate uses in support of other decommissioning projects (Fig. 2). This is particularly important because free space within the Separation Area is currently very limited, requiring inefficient working arrangements by a number of plant's projects.

Regulators

The regulators need to have a clear route defined for removal of remaining hazards associated with the remaining radioactive inventory. Dismantling of the Uranium Purification Plant would provide this.

Possible Future Restrictions

The building cladding is asbestos cement sheeting and is contaminated with radioactivity, requiring disposal as Special Low-level Waste. With the possibility of changes in asbestos legislation, disposal of large quantities of asbestos waste could become more restrictive in the future.

Utilization of Existing Processing Facilities on the Sellafield Site

Existing technologies and equipment are in place to process the large volumes of steelwork and concrete to free release and Very Low-level Waste (VLLW) levels, early dismantling would allow the utilization of these existing systems for the wastes being produced from the Uranium Purification Plant.

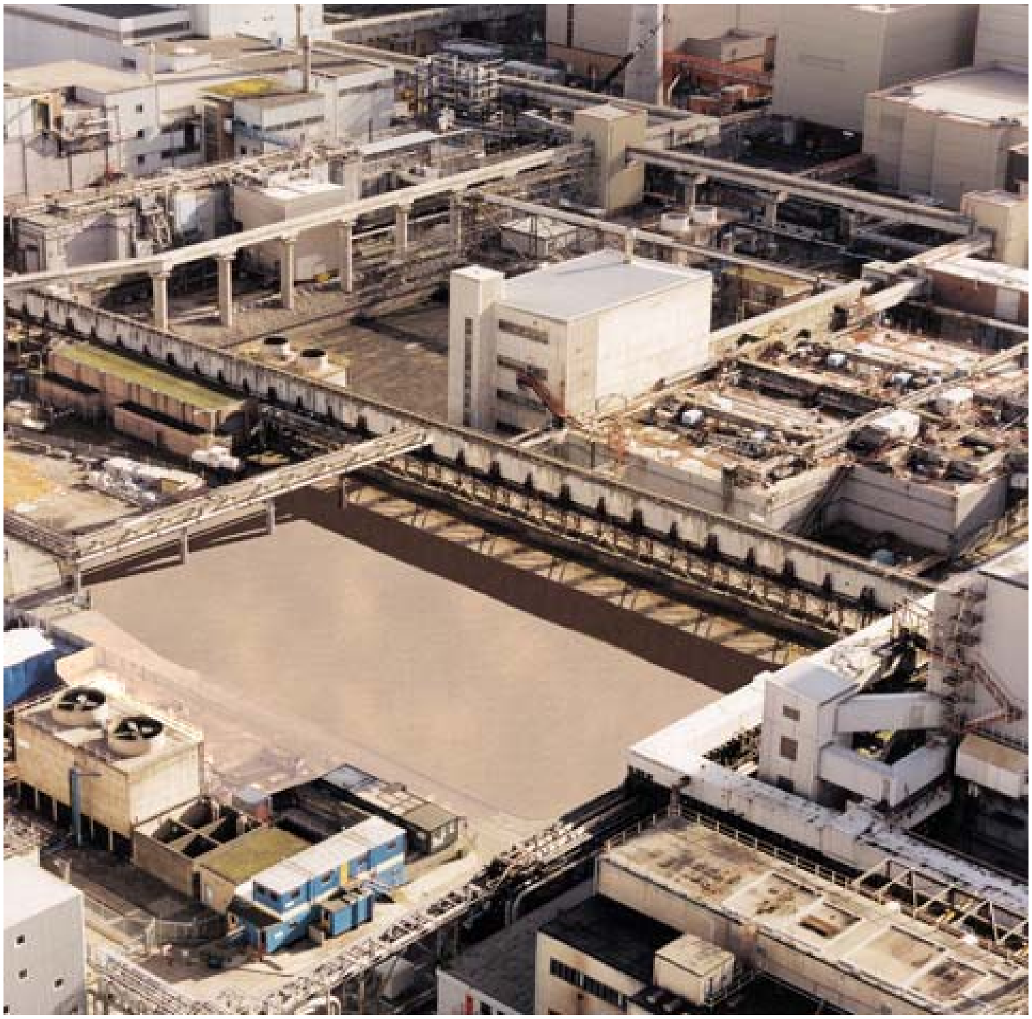

Fig. 2. Conceptual view following demolition of the building to base slab

The justification and strategy for dismantling the Uranium Purification Plant immediately, following completion of the current decommissioning work, was developed by an options study process carried out in July 2000. The study compared the various options generated on cost-benefit grounds. The resulting strategy document was presented to the Technical Strategy Steering Group (Internal Sellafield Committee) in December 2000.

The building dismantling incorporated:

- Removal of all services and feed lines to the building.
- Removal of the decommissioning facilities.
- Decontamination of all in-cell walls and floors.
- Disconnection of the low active drains.
- Removal of the service pipe-bridge, entering the building at the second floor level.
- Removal of all ventilation systems.
- Dismantling of the building.
  The dismantling of the building, as opposed to demolition, was chosen as the preferred option due to the amount of contamination still remaining within the cells. By installing new

steelwork to support the first and second floors, the support from the floors to the cells could be removed, and allow the cells to be dismantled while still having the building fabric as secondary containment.

Annex Demolition
The annex to the Uranium Purification Plant was demolished during March 2002 using conventional demolition techniques, as this part of the building had never contained any radioactive material.

Building Demolition
During 2002, significant problems with the dismantling contractor’s detailed design emerged, identifying a requirement for almost four times the amount of new steelwork as originally considered. This prompted the project team to carry out a review to determine whether dismantlement was still the preferred methodology. The review coincided with a safety pause on work at height at the Sellafield Site, due to a fatal accident in early 2003.

Due to the amount of work at height, and the increased requirement to install the new steelwork, and the flawed design work, the decision was taken to carry out the work using more traditional demolition techniques.

Work has been continuing from 2003 until now to carry out the final decommissioning of the Uranium Purification Plant. The building has one remaining connection to other plants to be removed, and all other services and plant and equipment inside the building have been removed. The cell floors and walls have been decontaminated to ALARP levels, and the resulting airborne release during building demolition is estimated to be less than 27 μCi, which is insignificant when compared to the number of hours that would have been required working at height.

Removal of building cranes and external cladding is planned for late 2005, with demolition of the main building structure planned for early 2006.

CONCLUSION

During decommissioning work in the Uranium Purification Plant, the project has generated:

- Over 1,200 m^3 of LLW
- Over 200 drums of PCM waste (compared to an estimate of over 20,00)
- Approximately 400 m^3 of free release waste
- Over 100 m^3 of low active liquid waste
- 25 m^3 of solvent processed through the (then newly commissioned) Solvent Treatment Plant
- 35 m^3 of uranium contaminated liquor processed through the Magnox Reprocessing Plant

The decommissioning facilities, initially designed and installed for a 2 year life time, were actually used for varying additional purposes for a period of 8 years.

Utilization of the same project team throughout the phases of the decommissioning work has resulted in transferring experience and knowledge across the phases.

Decontamination of the waste to the lowest possible category has been happening for the last 15 years as part of this decommissioning project.

Demolition of the Uranium Purification Plant will be freeing up much needed space in the Separation Area of Sellafield:

REFERENCES

1. BS449 Old British Standard for Steel Design.