DIVESTMENT (WORKER TRANSITION) IN THE CIVIL UK NUCLEAR INDUSTRY

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ABSTRACT

Between 1994 and 1997 UKAEA adopted a policy whereby they would divest a number of non-core teams from their UK sites to contracting organisations.

This paper describes the process undergone on one particular divestment contract, that undertaken by NUKEM Nuclear Ltd (NUKEM) at the Winfrith Technology centre, describing the work undertaken and highlighting the successes and problems encountered with the process.

Work undertaken has included:

- Decommissioning of lead shielded gloveboxes
- Repackaging of HEU fuel
- Repackaging of Sea Disposal packages
- Decommissioning of a concrete shielded cell
- Decommissioning of ‘wet’ storage liners
- Flask Maintenance
- Care and Maintenance of a nuclear facility.

All these tasks were completed within the overall programme and budget and with an excellent safety record.

During these works NUKEM competitively tendered for the follow on works to fully decommission the plant along with the construction of a new plant to immobilise spent ion exchange resins. This large multidisciplinary project Winfrith Operations Maintenance and Decommissioning (WOMAD) commenced in March 2000 and will be complete in December 2008. The project provides secure employment for the skilled divested team whilst giving UKAEA a competitive fixed price solution.

This paper also provides an update on a paper presented at WM97 (Session 44 paper 3 – UK Privatisation of Decommissioning and Radioactive Waste Management Services).

UKAEA’S STRATEGY AND UPDATE ON THE DIVESTMENT PROCESS

Introduction

The UKAEA was created in 1954 by the Atomic Energy Authority Act, which brought together activities that had been carried out within Government since 1946. Its purpose was
to lead the development of nuclear technology in the United Kingdom. Legislation since 1965 allowed the UKAEA to expand into non-nuclear areas of work and to become a major business in contract research and development based on its science and engineering skills and resources. In the early 1970s BNFL and the Radiochemical Centre (which was later floated as Amersham International plc) became separate entities and the Weapons Groups was transferred to the Ministry of Defence. In 1996 AEA Technology plc was floated to redirect its science and engineering skills to serve new markets in the UK public and private sectors and overseas.

UKAEA’s declared mission statement is ‘to restore the environment of our sites in a way which is safe and secure, environmentally responsible, value for money and publicly acceptable. The UKAEA operates on five principal sites (Dounreay, Windscale, Harwell, Culham and Winfrith). In 1996 it had approximately 2,100 employees. The UKAEA’s balance of activity has changed in recent years in line with the progressive reduction of Government’s funding for nuclear research and development programs involving the use of reactors and other active plant. Its focus today is on the efficient and cost effective management of its nuclear decommissioning liabilities. UKAEA is in the public sector. Its prime role is the management and eventual elimination of the decommissioning and other liabilities arising from the UKAEA’s early nuclear work. This work is expected to continue until at least 2050. UKAEA’s core tasks are therefore planning, procurement and contract management. Between 1994 and 1997 UKAEA embarked on a strategy of skill transfer through the divestment of operation teams as means of developing the supply base and increasing competition

Objectives

UKAEA objectives for the divestment process were as follows:

- To provide an opportunity for private sector contractors to acquire relevant experience and expertise and thus enhance competitiveness in the market for decommissioning and waste management services.

- To lay a firm basis for achieving progressive improvement in value for money by increasing competition for Decommissioning and Radioactive Waste Management Operations (DRAWMOPS) work.

- To enhance the competitiveness of the UK in the international market for these services by establishing a broader based competency amongst UK contractors.

- As far as possible to offer staff a secure future with a new employer on terms and conditions comparable to those available to them as employees of UKAEA.

Divestments

Two teams from UKAEA were divested involving a total of 39 staff at 2 locations (Harwell and Winfrith). The selected teams were:

B459/B393.6, Harwell

This was a decommissioning team of 15 people. The work scope for the contract involved the care and maintenance of the active handling building B459 following Stage I
decommissioning. It also required the decommissioning to the end of Stage II of the metallurgy cells in building B393.6. This team was divested to NNC Ltd in early 1997.

A59, Winfrith

This was a radwaste management and decommissioning team involved in support, maintenance and day-to-day operations of the A59 active handling building at Winfrith. The workscope for the divestment included the post operational clean out of caves, waste removal and maintenance. The contract also included provision for the care and maintenance of the waste store in the Dragon reactor. A total of 24 staff were involved in the work. This team was divested to NUKEM in July 1996. The paper will now concentrate on an examination of this particular project.

NUKEM'S OBJECTIVES

NUKEM’s objectives at tender stage for the project and carried forward by the project team were:

- To fully integrate the ex UKAEA personnel into NUKEM
- To secure future work for the Winfrith team at the cessation of the A59 project in July 00.
- Meet programme and budget targets
- Ensure safety was not compromised by the change in management structure
- Secure external work on the Winfrith site
- Secure external work across the UK
- Offer and provide development and for the divested personnel

THE FIRST YEAR & WORKSCOPE

Prior to the divestment date NUKEM mobilised a site team consisting of a Project Manager, Health Physicist and Contracts Engineer. This team were located close to the facility, had access to the facility and were invited to attend the facility planning meetings.

With assistance from other senior NUKEM staff the team were to manage the implementation of the mobilisation plan to effect a smooth changeover, key features of this plan were:

- Transfer payroll data
- Setup pension transfers
- Develop Health and Safety Plan
- Develop Contract Programme
- Setup adjacent accommodation for NUKEM management staff
- Assign/transfer subcontracts
- Implement NUKEM dosimetry and medical regime
- Appoint personnel to key safety posts
All these tasks were completed with few difficulties and on the 28th July 1996 NUKEM became the new employers of the divested A59 team.

The Team

The A59 team consisted of technical staff, who had predominately been involved in the scientific mission of UKAEA. Formerly in the field of post irradiation examination of reactor fuel and latterly in waste management such as sorting, segregation, assay and disposal of wastes on the Winfrith site. They had little training in project management or commercial contracting. They did however possess intimate knowledge of the facility and its legacy. The technical staff was supported by industrial workforce who carried out the tasks at the work face. The disposition of the team was:

Technical staff

Caveline Manager  Responsible for all works carried out within the caveline.

Deputy Caveline Manager  Responsible to the Caveline Manager for the caveline operations.

Operations and Engineering Manager (O&EM)  Responsible for the maintenance of the facility in a safe and operable condition, this was the most senior of the divested team.

Plant Supervisor  Responsible to the O&EM for the implementation of the mechanical and electrical regime within the facility, with line management responsibility for the craftsmen.

Technical Records Officer  Responsible for the maintenance of the legally required nuclear inventory records and the assay of materials.

Operations Foreman  Responsible to the O&EM for the non-craft personnel and their deployment.

Industrial Staff

6 Craftsmen  These personnel carried out the maintenance on the facility and using the workshop manufactured custom tools and equipment in support of the caveline operations.

12 Non Craft (General Workers)  The personnel carried out all non craft operations within the facility. This included,
caveline operations, crane driving, cleaning, operation of decontamination facilities and support to craft operations.

There was natural resentment amongst the team to the divestment process. The staff had been through a long period of uncertainty since the cessation of Post Irradiation Examination (PIE) works in 1992. There were feelings of being cast aside and the fear of joining a contracting organisation, where the culture was perceived to be different from the environment of a Government organisation. In an appreciation of these issues and with a desire to ‘continue as normal’ NUKEM set out within the first year of the contract to avoid any unnecessary change and to concentrate on the work programme, thus avoiding the build up of any further resentment.

This approach has occasionally been criticised by some who say that such a change should be undertaken with a swift re-branding exercise and the imposition of dramatic cultural change. It is the author’s opinion that the chosen route was the correct approach given that they were carrying out similar tasks in the same environment and that the key factor was to ensure that strict safety standards were adhered to.

As can be seen from the team’s strengths the NUKEM team complemented the existing teams skills and form the basis for an integrated business unit that met the needs of the project and develop business across the site. After divestment the team organisation was:

Fig. 1. A59 Organisation Feb 1997, divested team in plain type.

UNDEARTAKING THE WORKS

There were a series of tasks to be completed with the 4 year contract period, there now follows a brief description of the tasks and a discussion on their implementation and their relative success.

Metallurgy Cell POCO & Decommissioning

This was a single lead shielded glovebox operated using gloves and tongs, which was no longer required. Prior to the divestment, a safety case had been prepared by others for the
decommissioning of the cell. The task itself was placed under the management of the Deputy Caveline manager who with a small team completed the project ahead of the programme. The only hold up to the programme occurred when it was apparent that the dose restraint imposed by the safety case was too restrictive. To overcome this the team wrote a modification to allow operations to continue. This prompted the team to endeavour to produce all future safety cases for decommissioning operations ‘in-house’ which would ensure that the in depth specialised knowledge was captured and that the safety case encompassed the actual methodology to be employed.

**Chemistry Cell POCO & Decommissioning**

This was a significantly larger task than the metallurgy cell. It contained a significant radioactive inventory (sources with dose rates up to 1Sv/hr) and had been held in a non-operational care and custody regime. The cell consisted of two linked lead shielded gloveboxes with a small overhead master slave manipulator and horizontal tongs. Viewing was via lead glass windows and posting was via a posting port using a ‘double bag’ method.

Significant challenges needed to be overcome prior to the decommissioning of this cell:

- Refurbish cell to an operational standard.
- Obtain accurate radiological data – required to produce safety case.
- Design and manufacture a flask and transport mechanism to allow posting out of the sources.
- Produce a safety case to allow the decommissioning activities.

All these tasks were completed by the team ‘in house’. Particular note should be given to the mechanical team who produced a modified lead shielded container, remotely operated and secured to a hydraulic platform which allowed transport of the sources to the cavelines for further processing.

This task did not achieve its original set programme with the predominant delays being the safety case production and approval. The task was completed well within the dose uptake limits set and without any safety incidents. However this did not affect the overall contract programme and the skills developed on this task assisted with the Lab 33 tender which is discussed later.

**Dragon Fuel Repacking**

When the Dragon reactor (an experimental high temperature reactor at the Winfrith site) had been de-fuelled the fuel was placed into mild steel containers held within an array of floor stage holes within a fuel store. Monitoring had determined that corrosion could potentially affect the integrity of these containers for long-term storage and their size prevented their transport off site by readily available transport flasks. UKAEA therefore required this fuel to be sorted and repacked into stainless steel containers that were a third of the length of the original containers.
This work commenced prior to the divestment by which time 5 out of 85 containers had been processed. This work was effectively a continuance of the type of in caveline operations with which the team were familiar.

This task was completed successfully with no safety incidents and well within the overall contract programme.

**Cave 9 POCO & Decommissioning**

This was the by far the most challenging task of the contract. Cave 9 was a single caveline unit that had been constructed in the early 1970’s from existing cave infill blocks and cast in-situ reinforced concrete. The traditional approach to this task would have been to dispose of the entire structure (360 tonnes) as low-level waste. However the waste incentivisation element of the contract required that a more novel approach was required.

NUKEM had experience of cleaning and free releasing material from other contracts and developed a protocol that was endorsed by UKAEA and the UK’s Environment Agency that would allow the free release of the concrete structure. This protocol relied on a series of surface smears and the radiological analysis of a series of concrete core samples.

The decommissioning of the cave is covered in detail in a paper prepared by the Project Manager for the task (1), however in brief the following programme was adopted:

1. Transfer of 90 tonne press via roof posting facility to the North Caveline
2. Removal of any ILW using a roof posting facility and flask
3. Cleaning an removal of bench structure via the roof posting facility
4. Remote cleaning of the under bench structure
5. Removal of roof plates
6. Removal of side access door (40 tonne block)
7. Cleaning by man entry into cave
8. Demolition of structure into its constituent blocks, carried out by concrete sawing specialists
9. Cleaning of blocks to ‘free release’ levels using proprietary shot blasting equipment.

This task has continued successfully with only a few remaining blocks to be removed out of the facility. The manoeuvring of the 40 tonne blocks created some challenges and required at times either the uprating of the craneage or the use of tandem lifts using two overhead cranes. The decommissioning was completed well within the dose restraint objectives and served to develop the team skills into decommissioning.

Further works carried out by the team were:

- Repackaging historical waste Graphite processing
- Cave 1 & 2 POCO
- Source processing
- A59 Care and Maintenance
- Dragon complex Care and Maintenance
All these were safely completed to UKAEA’s requirements.

MEETING THE PROGRAMME AND BUDGET

Once the initial novelty of the divestment process had faded the management team’s objectives turned clearly to meeting the business objectives of programme and budget.

In order to provide close control of the budget a strict cost control regime was enforced, this served to identify any extra works that were carried out by the team. Extra works were a concern for the new NUKEM management team as unspecified/unbudgeted works would have had a serious impact on both the project programme and budget. As the divested staff where not used to the client/contractor contract relationship there was a tendency when asked by their former colleagues to vary a task to automatically comply. This whilst being customer friendly was not conducive to good project management. By a process of training and experience the team gradually understood that such requests if always met would hinder progress against the declared programme and cost NUKEM money.

On completion of the project all original specified work had been completed within the programme, and the final account was agreed with no outstanding claims at a value within the original budget levels. This was a significant achievement for a major complex decommissioning project. Traditionally these projects overrun and exceed budgets due to a combination of ill-conceived risk sharing, lack of detail, lack of resources and adversarial contract terms. At the commencement of the project the UKAEA & NUKEM project managers agreed that they had a common objective to complete the task and set out to treat all obstacles with a pragmatic non-adversarial approach to their resolution.

SKILLS DEVELOPMENT OF THE TEAM

One of NUKEM’s declared objectives was to develop the skills of the team to enable them to play a significant role within a contracting organisation. Within UKAEA they had generally carried out very specific detailed tasks, which had not allowed development outside their particular specialism. To broaden the skills base, and to add a degree a self-sufficiency to the Winfrith team, the following initiatives were undertaken:

• Marketing - a technical member of the divested team was allocated 50% of his time to work on marketing, which involved the research of the local Winfrith business leads and presenting these to the Marketing Director.

• Tendering - with assistance from the Project Manager the Caveline Manager prepared the technical approach for a complex tender to decommission a cell, Lab 33, at Dounreay. This was a totally new role as previously new work had been supplied to the team with no requirement for competitive tendering. This was a very successful approach as NUKEM won the tender with a predominant factor being the strong technical approach.

• Multi skilling - the industrial staff generally had strict demarcation lines. This was not an efficient method of undertaking the works and caused over manning on certain
activities. Gradually personnel were trained in both craft and non-craft skills, which required negotiation with their respective unions. This was partly successful but their stills exists considerable resistance to change, which is seen as a threat to jobs.

NEW BUSINESS TO THE TEAM

From the outset one of UKAEA’s objectives of the divestment process was to ‘self seed’ the nuclear contractors with SQEP (Suitably Qualified and Experienced Personnel) so that when it required projects to be undertaken a pool of experienced contractors was available. Competitive quotations could then be requested. Shortly after the award of the A59 contract an ideal opportunity came along to demonstrate this approach. Nestor and Dimple were a pair of experimental low energy reactors which had been de-fuelled and were in a regime of care and custody. NUKEM were short-listed for the award of this contract, but were narrowly beaten.

This brought home the realities of being a contractor to the divested team where work is not guaranteed and has to be won in a competitive market. It caused some resentment against their former employers.

However, new work has been won at the site by the team. In Jan 1999 NUKEM successfully completed the POCO and decommissioning of some former Alpha Laboratories (B41) which were then de-designated for further unrestricted use. This project was completed both to budget and programme and used a combination of the divested teams team skills along with NUKEM management expertise.

Various works have been undertaken by the team. These have generally involved the use of their remote handling experience to develop tooling for other NUKEM projects. Examples of such works have been:

- **Trawsfynydd Fuel Chutes** - an air-powered tool was developed which was used to clean and polish the interior surfaces of the fuel chutes prior to their decommissioning. This was very successful in removing all gross contamination and reducing contact dose levels to a level, which allowed the chutes to be handled.

- **Berkeley Tooling** - NUKEM’s Berkeley project involves the retrieval of thousands of containers of ILW, which need to be opened for segregation and processing. These containers are of various shapes and sizes. Using samples the team developed a series of bespoke tools to be deployed in the Berkeley process cells.

- **Lab 33** - this project, discussed above required, specialist in cell cleaning tools along with a custom built extended reach manipulator. These items were assembled and tested by the Winfrith team. The team also provided support in the preparation of documentation for the project along with specialist support to the HAZOP.
THE NEXT 8 YEARS – WOMAD

In 1998 the UKAEA site management at Winfrith developed a two-streamed strategy to decommission the majority of the nuclear liabilities on the Winfrith site. The two streams were:

WOMAD

This acronym stands for Winfrith Operations Maintenance and Decommissioning and encompassed the major liabilities on the Winfrith site that did not require a long-term care and custody regime. The elements of this project are:

- Operations of A59 for one year - allowing UKAEA to continue to actively use A59 to process ILW and other waste forms.
- Maintain A59 in accordance with Safety case requirements
- Decommission and demolish A59 leaving the site as a brownfield

UKAEA’s declared preferred procurement route for this activity was a competitive fixed price contract

Early Decommissioning

These works involved the decommissioning of all the minor facilities on the Winfrith site for which the UKAEA no longer had a use. As the scope of all these activities had not yet been defined UKAEA’s procurement route was to be a term contract, which had an option for further extensions.

NUKEM pre-qualified to tender for both the projects and after a detailed tender submission and lengthy technical negotiations were awarded the WOMAD project on the 7th March 2000. The contract award at £30M and of 8 years duration is one of the largest decommissioning projects let by UKAEA to a single contractor and should be considered as a confirmation of the success of UKAEA’s divestment process.

UKAEA’S PERSPECTIVE ON THE PROCESS

UKAEA Role

UKAEA is the licensee for all its nuclear sites. A key responsibility requiring demonstration to UKAEA’s regulator under the Nuclear Site Licence was its ability to direct and control work, which henceforth was to be carried out by contractors. The UKAEA, through its modification procedure (this being a safety management change) compliant with Licence Condition 22 identified via a series of tests (the so called SUCO guidelines – Separate Unlicensed Companies or Organisations) how they would retain direction and control. This document was successfully submitted to the regulator, HMNII, for acknowledgement.
A key aspect of UKAEA demonstrating direction and control was having an experienced manager and safety support manager working in the facility. The key responsibilities of these staff were to

- Accept the work programme
- Endorse all operating/maintenance instructions
- Check work was carried out in compliance with authorised instruction
- Halt any work not appropriately authorised (or any work if the situation demands)
- Own the facility safety case and attendant documentation and ensure work was carried out in compliance with it.

**Implementation of New Arrangements**

A small management team from NUKEM worked in a shadow fashion for some months before the new arrangements took place. During and prior to this the staff identified for divestment had engaged in forms of industrial action and political protest against the divestment. In such an environment productivity had inevitably suffered and absenteeism risen. At the time of handover the stability provided from the remaining UKAEA team (who had worked in the facility for many years) greatly assisted the relatively smooth management change.

**Work Programme**

The contracted programme was challenging, even more so at the beginning of the contract because of the low staff productivity. A number of initiatives were developed by NUKEM to address productivity issues and over the course of the contract work rates steadily increased to pre-divestment days. Achievement of programme delivery dates was initially poor but this improved over the contract period, largely reflecting the culture change of the divested team to a programme oriented organisation.

Over the course of the contract all the original objectives were met with a contract value growth of about 7%. This is regarded as a very satisfactory outcome, bearing in mind the inherent difficulties at the start of the contract and experience elsewhere of decommissioning work cost escalation.

**Safety Performance**

UKAEA encourages all staff and contractors to report unusual events, which are subsequently investigated and remedial actions where appropriate implemented. Over the period of the contract many such events have been reported – it is encouraging to note that no serious safety issues have arisen. Positive action in the form of a safety culture survey was implemented by NUKEM with the encouragement of UKAEA following comments made by a number of staff. This identified NUKEM as being regarded as a safety conscious organisation but required some improvements particularly with regard to communication and project management. Various actions have been put in place to address these issues and improvements are visible.
Overall

The divestment process at Winfrith would have been better achieved had UKAEA recognised and planned for the inevitable apprehension of the staff involved. Notwithstanding this the process has successfully shown that in house teams can be transferred to the private sector in a highly regulated industry without compromise to safety whilst delivering good value for money.

NUKEM'S PERSPECTIVE ON THE PROCESS

In 1995 NUKEM (Wastechem Ltd until Oct 1997) was a small contractor in the UK decommissioning market specialising in the implementation of one off projects at client sites in radiological designated areas, supply of HP personnel, and design and supply equipment projects. With sound backing from the parent company (NUKEM Nuklear GMBH) NUKEM’s management team wished to, both expand the service portfolio, increase turnover, increase the company’s profile across the UK nuclear industry and increase the employee skills depth. The divestment process met all four of these objectives:

- Expand Service Portfolio – the project encompassed nuclear operations, maintenance and management of a nuclear active handling facility.
- Increase turnover - the project had an award value of £5.17M (£1.3M/pa) of which over 95% was spent internally as few external subcontractors were required.
- Increase profile - the A59 divestment project attracted consider interest within the industry and the successful outcome has enhanced NUKEM’s reputation for delivering complex projects.
- Increase employee skills depth - with the divestment of the A59 team, NUKEM gained skills in Active Handling, Remote Operations, Manipulator Maintenance, as well as a general R & D engineering capability.

The process of divestment was new to NUKEM in 1995. Traditionally NUKEM’s contracts involved the setting up of a team of staff on client’s sites to carry out the project works. These were usually of short duration and did not allow the set up of a proper establishment at the project location. This also meant that the staff, generally employed on the sites were ‘travelling personnel’. The divestment thus offered the opportunity to acquire a team of staff local to the works.

Looking back over the project it was clearly a success, all objectives were met, it provided a sound basis for new work (WOMAD) and proved to be a worthwhile investment.

CONCLUSION

In this case the divestment process worked well due to a proactive management approach both from client and contractor. All the original objectives of the UKAEA and NUKEM have been successfully achieved. The resistance to change should not be underestimated but with a determined approach and a clear set of objectives success can be achieved.
Safety standards whilst a concern of the unions were never compromised as has been demonstrated with the award to NUKEM of three successive ROSPA Gold safety awards. The divested staff fear of terms and conditions changes were also shown to be unfounded.

REFERENCES

(1) Cave 9 Decommissioning M E Harrison IMechE Radwaste 2000