

ISOLUS PROJECT

Project Summary

Babcock Engineering Services – Motherwell Bridge Nuclear

Proposal for the Safe Disposal of Nuclear Submarines

Executive Summary

The MoD has requested proposals from industry regarding the safe disposal of decommissioned nuclear powered submarines. Over the next 30 years up to 27 submarines will be taken out of service. The 11 laid up submarines at Rosyth and Devonport are de-fuelled and future decommissioned submarines will be de-fuelled at Devonport prior to entering the Interim Storage of Laid Up Submarines (ISOLUS) programme.

The continued storage of the 7 laid up submarines at Rosyth is not compatible with the long term development of the Rosyth site hence Babcock Engineering Services (Babcock) seeks that they be removed from Rosyth as early as practicable. The storage of these submarines is also of concern to the public in the local area. Babcock will not agree to store waste from the ISOLUS project at Rosyth and seeks to reduce the number of laid up submarines along with their associated waste as early as practicable in the ISOLUS programme. Babcock believes that the above approach will lead to the minimum number of reactor compartments being on site for the minimum period. Babcock recognises that any plans to remove the submarines from Rosyth must be part of a national solution and this solution needs to be acceptable to the public. Babcock is engaged in the MoD's ISOLUS programme as this is the vehicle through which the national solution will most likely be determined. For this purpose, Babcock has teamed with Motherwell Bridge Nuclear (MBN) who are specialists in the civil nuclear decommissioning programme.

Babcock-MBN's proposal is that 2 submarines per year could be dismantled either at Rosyth, or Devonport. Both of these sites have the infrastructure to support this work safely. The reactor compartments would be cut out of the submarines and subsequently dismantled in a new purpose built facility at Rosyth. The waste would be packaged in the existing modern Active Waste Accumulation facility (AWAF) facility. The low level waste (LLW) would be consigned to Drigg and the intermediate level waste (ILW) would be consigned for interim storage in a new ILW store constructed at either Sellafield or the Ministry of Defence site at Coulport. The ILW will be packaged at Rosyth in a manner suitable for long-term storage in the national repository. When the new national repository for radioactive waste is available the ILW will be consigned from the ILW store to the repository.

The new facilities will be provided with a full safety justification to modern standards and will be operated in a manner that will meet the government's policy for the safe disposal of radioactive waste and environmental protection. Prior to the construction of the facilities and submarine dismantling the appropriate assurances and consents will need to be in place to ensure the availability of the waste disposal routes. On completion of the submarine dismantling process and disposal of all waste the new facilities will also be dismantled and the sites returned to brown field status.

The next phase of the ISOLUS project involves phase 2 of the MoD's public consultation and convergence of the ideas from industry and the public. Babcock-MBN intends to support this process.

Introduction

The Ministry of Defence has consulted with industry and the public on the matter of disposing of decommissioned nuclear submarines. This statement presents a concept proposal for the safe dismantling of the submarines, the recycling of re-usable materials, and the safe storage of irradiated and radioactively contaminated components pending final disposal in a national repository when such a facility comes available.

Babcock Engineering Services and Motherwell Bridge Nuclear (Babcock-MBN) can offer a total solution to the ISOLUS project from the dismantling of nuclear submarines to the design and operation of facilities to pack and dispose of waste through approved disposal routes.

Babcock-MBN's proposal recognises the need for high standards of safety and environmental protection in line with government policy. It acknowledges also public sensitivity to the implications of radioactive waste processing and storage on any site in the UK and it envisages a high degree of public accountability to show that acceptable safety and environmental standards are attained. To this end, it envisages a significant investment of time and commitment on the part of managers to promoting public information.

Project Scope and Timescale

The aim of the ISOLUS Project is to develop a submarine disposal capability for the UK fleet of nuclear submarines. The disposal facilities will be required to deal with a stream of vessels totalling 27 submarines over a period of approximately thirty years.

It is MoD's intention that all submarines will be de-fuelled at Devonport before they are presented for disposal. There are no plans to handle nuclear fuel at Rosyth.

It is expected that 17 decommissioned vessels will be available for dismantling at the beginning of the disposal operation.

Corporate Aims

Babcock aspires to develop Rosyth Business Park on the former dockyard site for a wide range of industrial and commercial business of a non-nuclear nature. In pursuance of this aim the company wishes to have the seven decommissioned submarines that presently are laid up there removed as soon as possible. It is recognised however that the removal of the laid up submarines from Rosyth must be part of an overall national solution to the disposal of nuclear submarines. As the owner of the site, Babcock has a fundamental interest in the ISOLUS Project as the means of securing this aim.

Babcock aims to dispose of all radioactive waste from the Rosyth site as soon as practicable. The storage of complete reactor compartments or waste from the ISOLUS programme at Rosyth is not acceptable. Babcock is of the view that the programme should be completed as early as practicable. The programme will start with the dismantling of the Rosyth submarines and their reactor compartments. When either submarines or reactor compartments are received from Devonport the number of submarines and or reactor compartments on the Rosyth site will be maintained at a level below the current seven.

Babcock, as the owner of the dockyard site, intends that the strategy to dismantle submarines will conform with the nuclear safety and environmental regulation in the UK and the European Community policies and guidance for dealing with nuclear legacy issues.

MBN entirely shares all the Babcock Corporate Aims for Project ISOLUS set out above. MBN is fully committed to complementing the Babcock resources with an experienced team with a proven decommissioning track record at Civil and MoD sites. All the nuclear and environmental engineering techniques used will be the best technology appropriate to the task, meet all regulations and legislation, and have been used on other major decommissioning projects in the nuclear and environmental clean up industry.

Outline of the Babcock-MBN Proposal

The proposal provides for the disposal of all 27 submarines projected for the ISOLUS Project (that is, both those currently laid up at Rosyth and Devonport dockyards and those yet to be taken out of commission) as summarised in the following notes.

- To transport either submarines intact from Devonport to Rosyth and cut out their reactor compartments at Rosyth or to cut out the Reactor Compartments at Devonport and transport them to Rosyth;
- To dismantle the Reactor Compartments from all nuclear submarines in new purpose-built facilities at Rosyth;
- To dispose of non-radioactive wastes via authorised conventional waste disposal routes;
- To dispose of solid Low Level Waste to either Drigg or the new national LLW facility when it becomes available;
- To package Intermediate Level Waste (ILW) into containers in accordance with NIREX procedures ready for transportation off site.
- To transfer packaged Intermediate Level Waste to a purpose-built store at Coulport or Sellafield for interim storage until a national waste facility becomes operational.
- To transfer the ILW packages to the national waste facility when it is available and to decommission all new facilities utilised for the purposes of this work.
- To break up the submarine hulls either at Devonport or Rosyth in existing docks and recycle the metal as re-usable scrap;

It is envisaged that the dismantling of submarines and reactor compartments will commence as soon as practicable after the new facilities become available. The dismantling will start with active commissioning to demonstrate the safe operation of the processes and facilities. It is intended that a Rosyth laid up submarine will be used for this purpose.

The cutting up of radioactive components, their segregation into waste streams and the packaging and processing of the radioactive waste will take place in new purpose-built workshop facilities on a nuclear licensed site at Rosyth Business Park. The containerisation of the waste for transport and disposal to other designated locations will be carried out in the existing Active Waste Accumulation Facility, which is modern and specifically designed for this role.

Description of Facilities Required

Facilities required at Rosyth

The Rosyth Dockyard site has long been an important naval base for refitting and maintaining nuclear submarines, warships and auxiliary ships for the Royal Navy. As such it has an extensive naval and military history, and has site infrastructure and services suitable for supporting the ISOLUS project. It currently contains a nuclear licensed site and it is a deepwater port with safe and secure berthing that can facilitate the transportation and handling requirements of both submarines and reactor compartments with minimal changes to the site licence arrangements and infrastructure.

The Babcock-MBN proposal envisages new workshops and plant being built upon the site to facilitate the dismantling of Reactor Compartments in modern conditions and using modern technology.

The Reactor Compartment dismantling facility will be the principal workshop for cutting up reactor plant components and segregating them into their respective waste streams. It will be designed in accordance with the following aims:

1. To carry out all operations safely.
2. To reduce as far as reasonably practicable the volume of radioactive waste destined for disposal.
3. To minimise the quantity of secondary waste generated by the dismantling and decontamination processes.
4. To segregate the radioactive waste into appropriate process streams for Intermediate Level Waste (ILW), Low Level Waste (LLW), and separate from non-radioactive material.

A wide range of proven cutting techniques is available for the dismantling and volume reduction processes. Their use will depend upon the nature of the debris and secondary waste generated, upon the degree of exposure to radioactive components and upon the containment requirements.

Chemical or mechanical processes will be used where practical, cost-effective and environmentally safe to remove contamination and other undesirable products from the surfaces of plant equipment and components etc. Decontamination has the potential to reduce the exposure to radiation, to reduce the volume of material in the higher waste category, and to enable some materials to be released freely for recycling.

A final reduction in volume will be achieved by the use of hydraulic compactors to compress waste materials before they are packaged for disposal.

The processed radioactive waste will be conditioned in accordance with contemporary standards to render it physically and chemically stable and environmentally inert as required for final disposal.

The final packaging of waste for transport to the disposal site or to the site selected for indefinite storage will be carried out in the existing Active Waste Accumulation Facility (AWAF). Radioactive waste will be removed from Rosyth in accordance with Disposal Authorisations granted under the Radioactive Substances Act.

The proposed facilities, once established at Rosyth, will be used only for the dismantling of UK submarines and reactor compartments under the ISOLUS programme. The experience, knowledge and skills will however be available for use in the nuclear industry in the UK and abroad.

Facilities required at the Waste Storage Site

Babcock-MBN envisages that the interim storage of ILW in a condition fully packaged for permanent disposal will take place at either at Coulport or Sellafield.

At the selected site, a new, purpose built waste storage facility will be required for the interim storage of all ILW arising from Reactor Compartment dismantling operations pending final disposal to the future national waste repository.

The store will be designed and built to current BS/ISO standards, NIREX guidelines and in accordance with industry practice that meets the highest standards of contemporary regulatory requirements. It will provide safe, secure and weatherproof conditions for the long-term storage and eventual retrieval of the waste packages. It will be designed to withstand extreme external hazard conditions and all reasonably foreseeable accident sequences and will be equipped with a comprehensive range of monitoring systems and alarms (such as intruder, fire, radiation, contamination, environment and flood alarms). The building will be equipped with full containment systems to prevent inadvertent releases to the environment.

ILW will be stored in the interim store at either Coulport or Sellafield in locations that enable inspection and allow full retrieval for disposal when the national repository becomes available. All ILW packages in the store will conform to NIREX specifications.

Draft Outline Programme

The following draft outline programme illustrates the main activities envisaged and indicates a general programme for carrying them out. The viability of this programme depends upon early contract negotiations and timely approval by the safety, environmental and transport regulating authorities.

Commence public consultation and information	September 2003
Subject to the solution being accepted commence of facility specification and contract negotiation	April 2004
Agree contract with MoD	September 2005
Nuclear Site Licence application submitted	October 2005
Commence facility design	October 2005
Open public information centre	May 2007
Commence facility construction	October 2007
Complete inactive commissioning of facilities	May 2010

Disposal Authorisations granted	September 2010
First Use and active commissioning	October 2010
Full operation	October 2011

Options for transporting radioactive and other hazardous materials

The following options exist for transporting radioactive and other hazardous materials to and from the Reactor Compartment dismantling site at Rosyth,.

Intact submarines or reactor compartments:	By sea. E.g. Transport on a heavy lift ship.
Intermediate level radioactive waste:	By road, rail or sea.
Low level radioactive waste:	By road or rail.
Non-radioactive hazardous wastes:	By road using a licensed waste contractor.
Free release materials: (Non-radioactive and non-hazardous)	By road, rail or sea, depending upon destination

Safety, Environmental and Local Planning Regulation

Babcock-MBN will need to obtain a modification to the Nuclear Site Licence for the dismantling and disposal of nuclear submarines. All work will be regulated by the Nuclear Installations Inspectorate.

The Ministry of Defence will apply independent regulatory controls to nuclear and radiation safety in accordance with MoD standards. For submarine disposal these standards parallel those adopted by the civil regulating authorities.

Babcock-MBN will apply to the Scottish Environment Protection Agency (SEPA) for authorisations under the Radioactive Substances Act 1993 to dispose of radioactive waste arising from the proposed dismantling operations.

As the submarine dismantling project will require radioactive materials to be transported through the public domain by road and rail and by sea, Babcock-MBN will apply to the Department for Transport for the relevant approvals to transport containerised radioactive materials from this project.

Fife Council is the regional authority responsible for the development of the region and the approval of new industries, for the disposal of non-nuclear waste, and for ensuring public and environmental protection. Babcock-MBN will apply to Fife Council for the relevant Planning approvals.

Outline Safety Strategy

Babcock-MBN will ensure that high standards of safety prevail throughout the project through the use of written safety management arrangements (management procedures) and safety justifications that comply with the conditions attached to the Nuclear Site Licence and the Conditions specified by MoD and other relevant HSE Guidelines.

At the beginning of the design stage, a set of safety targets will be defined for the project that accord with current HSE guidelines and government policy for environmental protection. Facility design will at least conform to these standards and Babcock-MBN will aim to improve upon them so far as is reasonably practicable in order to suppress all risks to workers, to the public and to the environment. By the end of the project design phase, the project will be furnished with an accepted safety case and a set of operating instructions by which the operations will be strictly controlled. The design of the facilities will ensure that they can be safely decommissioned and removed at the end of their useful life.

The primary aim of the safety case will be to identify all radiological safety risks and to define the appropriate risk reduction and consequence mitigation measures. The most significant safety risk encountered in submarine disposal will be related to the removal, treatment and storage of the steel reactor pressure vessel (radiation hazard) and its shield tank. These risks are entirely manageable and appropriate measures will be specified in the safety case.

Construction and commissioning of the facilities will be carried out in accordance with the conditions attached to any Consents granted. The commissioning will be configured to demonstrate that the facility and processes meet the requirements of the approved safety case, and that the operating safety targets have been met.

The development and maintenance of the safety case throughout the life of the project will accord with an approved Safety Justification Strategy. Safety audits, safety reviews, and ALARP reviews will be carried out periodically to confirm that the operation continues to be carried out in accordance with its safety case. Changes to the facilities, the equipment used and the operation will be managed in accordance with safety management arrangements defined for the purpose in order to ensure that the operation always remains within the bound of its safety case and that risks are always as low as reasonably practicable.

Outline Environmental Safety Strategy

Babcock-MBN will ensure that high standards of environmental safety will prevail throughout the project through the application of Best Practicable Environmental Option studies. This approach will inform the preparation of an Environmental Statement, which Babcock-MBN will submit to demonstrate compliance with government policy and regulatory standards.

The Environmental Statement, will identify, describe and assess in an appropriate manner the potential direct and indirect effects of the project on:

- people;
- flora and fauna;
- soil, water, air, climate and the landscape;
- material assets and the cultural heritage;
- other commercial and employment opportunities in the vicinity; and
- the interaction between the factors referred to above.

In order to do this, the project will be examined against key areas of potential environmental impact including air and water pollution, radioactivity, noise, transport, ecology and visual considerations. Measures will be identified, which avoid, mitigate or remedy all significant environmental detriments.

Assurance that environment protection standards defined in the Environmental Statement will be achieved in practice will be demonstrated by the application of Best Practicable Means and the use of written environmental safety management arrangements (environmental management procedures). This process will be regulated by SEPA.

Local Planning Considerations

Babcock-MBN is obliged to fully comply with the local planning requirements and building standards at each site where facilities will be established and will therefore consult with external statutory authorities where necessary on all key matters.

Babcock-MBN believes that the following key environmental considerations of any submarine dismantling operation can be addressed to the satisfaction of the local authorities, local councillors, members of the public and other businesses in the vicinity:

- The suitability of the site and the design, size and scale of the proposed development.
- The acceptability of impacts on people in the vicinity and the local environment during construction and operation of the facility:
 - Noise emissions
 - Particulate and liquid emissions
 - Visual impact
 - Transportation arrangements of materials
 - The safety justification
 - The transportation of wastes
 - The frequency and extent of discharges to water and atmosphere
 - Means of preventing spillage and unplanned releases to atmosphere
 - Environmental monitoring

In assessing the implications of any proposed development for submarine disposal, the local authority may consult with specialist organisations and neighbouring authorities are entitled to examine and comment on the proposals. Babcock-MBN will co-operate with these organisations to demonstrate the viability, sustainability and technical acceptability of its proposal.

Public Assurance

Babcock – MBN intends to participate fully in public consultation and to take onboard comments and to address concerns.

Babcock-MBN believes that public acceptance will be based on:

- (a) having a sound regulatory basis for the project under (i) nuclear licensing (ii) health and safety and (iii) environmental sustainability regimes;
- (b) establishing political agreement to the project at a national and local level;
- (c) clearly defining standards for worker safety, public safety and environmental protection that are both affordable and acceptable to informed members of the public;

- (d) openly demonstrating the achievement of safety standards and environmental conservation;
- (e) maintaining open and transparent channels of information to the public; and
- (f) soliciting informed stakeholder opinion on safety and environmental protection to confirm or guide the company's performance in these matters.

Babcock-MBN recognises the potential for new legislation, changes in government policy, and increased public expectation for openness to arise. Babcock-MBN intends, therefore to encourage and facilitate public inspection throughout the life of the project and thereby maintain public confidence in the nature and scale of the operation.

Conclusion

Babcock-MBN has proposed a total solution to the ISOLUS project. This proposal will form part of the MoD's forthcoming consultation process on industries' proposals. Babcock-MBN believes that public accountability on matters concerning public safety and environmental protection is most important. Babcock-MBN intends to facilitate public inspection throughout the life of the project. It is proposed that a public information centre is provided as part of the facility.

It is fundamental to Babcock-MBN's proposal that all decommissioned submarines and associated radioactive materials are removed as soon as practicable from Rosyth. This includes the dismantling and disposal of the new facilities.

Babcock-MBN considers that its proposal offers the most practicable way of reducing the number of decommissioned submarines currently berthed at Rosyth at the earliest practicable date whilst solving the national submarine lay-up/disposal problem.

Babcock-MBN also considers that the risks to company employees, to the public and to the environment arising from its proposal are entirely manageable by adopting modern technology and safety management practices.

The ISOLUS project is a major national project. When decommissioning of the facilities is taken into account the project will last over 35years. This project will inevitably create significant job opportunities.

To summarise, by this proposal:

- The national problem of disposal of nuclear submarines will be resolved.
- The number of submarines laid up at Rosyth will progressively be reduced to zero.
- All submarine radioactive waste will go to the appropriate national repository.
- The intergenerational equity issues will have been resolved.
- The project will bring economic benefit to the local community and generate jobs throughout its life.