

# **Cost Estimates for Reactor-site Extended Storage Facility Alternatives for Used Nuclear Fuel**

**Alternatives for New Brunswick Power's  
Point Lepreau Reactor Site**

Report of a Study carried out for Ontario Power  
Generation, New Brunswick Power, Hydro-  
Québec and Atomic Energy of Canada Limited

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## Notice to the Reader

"This document has been prepared by CTECH Radioactive Materials Management, a joint venture of Canatom NPM Inc. and RWE NUKEM Ltd. ("Consultant"), to provide conceptual designs and cost estimates for Extended Storage Facilities (ESF) for the long term storage of used nuclear fuel. The scope is more fully described in the body of the document. The Consultant has used its professional judgment and exercised due care, pursuant to a purchase order dated October 2001 (the "Agreement") with Ontario Power Generation Inc. acting on behalf of the Canadian nuclear fuel owners ("the Client"), and has followed generally accepted methodology and procedures in generating the designs and estimates. It is therefore the Consultant's professional opinion that the designs and estimates represent viable concepts consistent with the intended level of accuracy appropriate to a conceptual design, and that, subject to the assumptions and qualifications set out in this document, there is a high probability that actual costs related to the implementation of the proposed design concepts will fall within the specified error margin.

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# Preface

Currently, used nuclear fuel is stored at seven reactor sites in Canada, in both wet and dry storage facilities. The used fuel storage facilities are owned by four companies, and are located on the following reactor sites:

Ontario Power Generation	Pickering, Bruce and Darlington
New Brunswick Power	Point Lepreau
Hydro-Québec	Gentilly
Atomic Energy of Canada Ltd	Chalk River and Whiteshell

This cost estimate report addresses Reactor-Site Extended Storage (RES) alternatives for the Point Lepreau site. Implementation of a RES alternative would provide an extended dry storage facility on a reactor site. In the context of this study extended storage means permanent or indefinite storage with the necessary maintenance and facility repeats. Cost information has been compiled for each of the three RES alternatives for the Point Lepreau site and are described in this report. Separate cost reports have been produced to describe the alternatives for consideration at the Pickering, Bruce and Darlington sites [1], and at Hydro-Québec's Gentilly site [2] and Atomic Energy of Canada Ltd's Chalk River and Whiteshell sites [3].

Other options for the long-term management of Canadian used nuclear fuel include extended storage at a central location (Centralized Extended Storage, CES) or isolation by encapsulation and placement in an underground repository (Deep Geologic Repository, DGR). Other reports describe the cost estimates for a CES facility [4] and the DGR facility [5]. The RES and CES design reports are available should more detailed information be required [6 and 7]. The information in the RES, CES and DGR reports will be used as possible input to a study of options described in the Nuclear Fuel Waste Act, to be carried out by the Nuclear Waste Management Organisation (NWMO). At the end of its study, the NWMO will be required to report to the Government of Canada, setting out its preferred approach for long-term management of used nuclear fuel.

# Summary

This report presents cost estimates for Reactor-site Extended Storage facility alternatives under consideration which can accept used fuel currently stored on the Point Lepreau site. The estimates are based on the conceptual designs for the facility alternatives developed during 2002/2003.

The three alternatives considered for the Point Lepreau site are:

- Silos
- Surface Modular Vault (SMV)
- Vaults in Shallow Trenches (VST)

The estimates include the cost of siting, design and construction of the Reactor Extended Storage facility, and the extended operation of the facility, which will include the periodic replacement of the storage complexes and the repackaging of the fuel bundles into replacement fuel containers. The cost estimates are for the establishment of stand-alone self-sufficient storage facility on an existing reactor site. To allow comparison of costs for each alternative, costs have been compiled for siting, initial construction and operation, and for two major refurbishments and one fuel repackaging event. These activities span a nominal 300 years but in reality a RES facility would be required to operate in perpetuity.

Total costs for the three alternatives that can accept 119,500 fuel bundles at the Point Lepreau site (at 2002 constant dollar prices) are:

- Silos           \$0.89 B
- SMV            \$2.51 B
- VST            \$1.49 B

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**Appendix B** Cost Estimates for Point Lepreau Facilities

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# 1 Introduction

This report presents the cost estimates for the Reactor Extended Storage (RES) facility alternatives under consideration which can accept used fuel produced on the Point Lepreau site.

The estimates are based on RES conceptual designs that only receive CANDU used fuel bundles, generated or resident on the reactor site, which are detailed in Ref. 6. The RES facilities have been developed to store 119,500 fuel bundles.

The fuel at the RES facilities would be in AECL-design fuel basket format.

The three alternatives costed for each site are:

- Silos
- Surface Modular Vault (SMV)
- Vaults in Shallow Trenches (VST)

The estimates are based on the conceptual designs for the facility alternatives developed during 2002/2003.

The estimates include the cost of siting, design and construction of the RES facility, and the extended operation of the facility, which will include the periodic replacement of the storage complexes and the repackaging of the fuel bundles into replacement fuel containers.

The cost estimates are for the establishment of a stand alone self-sufficient storage facility.

In the case of the SMV and VST alternatives, the cost estimate excludes all costs related to the silo-based dry storage facilities existing on the Point Lepreau site. However in the case of the Silos alternative it is assumed that the existing interim facilities are "inherited" and the estimates include all costs for monitoring, maintaining and replacing storage facilities and repackaging fuel following transfer of the last fuel from wet bays into dry storage on the reactor site.

To allow comparison of costs, cost data have been compiled for siting, initial construction and operation, and for two major refurbishments and one fuel repackaging event. However the facility would be required to operate as long as the fuel is hazardous.

## 1.1 PURPOSE OF COST ESTIMATE

The purpose of this report is to document the alternative estimates for an assumed program to site, develop, and operate standalone reactor-site extended storage facilities that will accept used fuel at the Point Lepreau site.

The cost estimate data in this report is intended to allow comparisons to be made with cost estimates for centralized extended storage, or with geologic disposal in an underground repository, which are the subjects of separate reports.

## 1.2 STORAGE OF USED FUEL

The used fuel for which NBP has responsibility is currently stored either in water-filled pools (wet storage), or concrete structures (dry storage). The specific storage location is shown in Figure 1 (location 7). Assumed total fuel inventory is presented in Section 2.2 of this report.

**Figure 1: Existing Fuel Storage Locations in Canada**



### 1.3 LEVEL OF COST ESTIMATION

The RES cost estimates have been developed by scaling or factoring costs from more detailed CES cost estimates documented in Ref. 4. Scaling provides a cost estimate that will approximate a cost estimate based on more detailed estimating procedures; i.e. using estimates of equipment and material take-offs, labour estimates and unit costs.

It should also be noted that the CES conceptual cost estimates are based on incomplete design information, information about technology that is in the early stages of development, and many assumptions about the program and how it will be executed (Ref. 4). As a result there is uncertainty associated with various elements of the CES cost estimates.

Therefore the RES cost estimates presented in this report are, at best, indicative of the expected cost to site, develop, construct and operate an RES facility on the [Point Lepreau](#) site. More accurate cost estimates could be developed based on estimates of labour and other resources and estimates of materials and equipment quantities taken from the conceptual designs documented in Ref. 6.

## 2 Descriptions of RES Facility Alternatives

### 2.1 GENERAL

The RES facility is envisaged as a self-contained, standalone facility, located at the existing reactor site. The RES facility has to accept fuel received in basket format from the existing wet bay or existing storage buildings. A breakdown of the fuel inventory is provided below.



Each RES facility alternative is briefly described in the following sections. Fuller descriptions of the receipt, fuel storage, facility repeats and repackaging events are given in Ref. 6.

## 2.2 DESCRIPTION OF USED FUEL INVENTORY

The cost estimates are based on the conceptual designs which assume each the facility is self-contained, with a capacity to accept the fuel inventory of the reactor site. Each of the RES facility alternatives comprises a used fuel receipt and processing facility, and a fuel container storage complex. Table 1 summarises the assumed used fuel bundle inventory that Point Lepreau reactor site will maintain in storage.

**Table 1: Assumed Used Fuel Inventory for NBP Reactor Extended Storage Facilities**

Location	Used Fuel Bundles	Percentage of Total (%)
Point Lepreau	119,500	100
<b>Total</b>	<b>119,500</b>	<b>100</b>

## 2.3 SILOS FACILITY ALTERNATIVE

The Silos alternative comprises the storage of fuel bundles in stainless steel baskets within self-shielded silos. The concrete silos are arranged in an array on a concrete pad and do not have any weather protection. NBP is currently using silos for the dry storage of their used fuel. The Silos alternative is identified as the 'indigenous' fuel storage alternative for the Point Lepreau site.

## 2.4 SMV FACILITY ALTERNATIVE

The Surface Modular Vault (SMV) alternative comprises the storage of fuel bundles confined in baskets and placed into an array of tubes in a series of engineered vaults within the storage buildings. The fuel baskets are placed in a series of vertical storage tubes within the vault, which ensures that they are correctly aligned and remain in place. The upper end of each storage tube is closed off with a closure shield plug unit. The fuel within the storage tubes is cooled by natural ventilation flow around and through the storage tube array. Fuel is transferred to the SMV facility in the basket transfer flask, which is winched into the building from a road transporter. The modular vaults within a storage building are serviced by a basket handling crane, which provides coverage to each array of storage tubes across a shielded charge hall floor. The basket handling crane can engage with each tube in the array, remove the closure plug (using a gamma gate), position the basket transfer flask and lower fuel baskets into the storage tube.

## 2.5 VST FACILITY ALTERNATIVE

The Vaults in Shallow Trenches (VST) alternative comprises the storage of fuel baskets confined in concrete vaults. The vaults will be housed in a series of parallel, modular chambers with concrete walls, floors and roofs. The vaults will be constructed and mounded over with an

earthen cover. The vaults within each storage chamber can be accessed by a basket handling crane, which provides coverage to the storage tubes in each vault. The basket handling crane can engage with each storage tube, remove the closure plug (using a gamma gate), position the basket transfer flask and lower fuel baskets into the storage tube. The complex will be accessible at ground level. The earthen cover applied over the roof is designed to protect the chamber structures against freeze/thaw and wetting and drying cycles, divert surface water, limit water infiltration, resist weathering, erosion and burrowing animals. The earthen cover will also lessen the visual impact and provide additional physical security to the storage complex.

## 2.6 AUXILIARY FACILITIES

The CES design report (Ref. 7) provides detailed descriptions of the auxiliary facilities that would be required at a stand-alone facility for the centralized extended storage of fuel. The list of CES auxiliary facilities has been reviewed and assumptions have been made about the facilities that would be required to support RES operations on the Point Lepreau site. In particular the following list presents the assumptions about the construction of new auxiliary facilities or the refurbishment of existing facilities at the time when nuclear station is fully decommissioned and the RES facility is transitioning to a standalone operation. The fundamental assumption is that the reactor site will be active and will have a large work force on site until the station is fully decommissioned. Therefore buildings and infrastructure will be maintained and available for use by the RES facility at the time when it must be converted to a stand-alone facility.

Administration and Visitors Building	Building(s) exist on the reactor site and new building(s) not required. Allowance for refurbishment.
Operations Support, Health Physics and Test Facility Building	Operations support and health physics will be housed in processing building or existing buildings and new buildings not required. The test facility building will be constructed at either the NBP or HQ reactor site.
Equipment Storage and Maintenance Building	Building exists on the reactor site and new building not required. Allowance for refurbishment.
Store for Empty Baskets	Building exists on the reactor site and new building not required. Allowance for refurbishment.
Active-Solid Waste Handling Building	Building not required until first repackaging event.
Active-Solid Waste Storage Building	Building not required until first repackaging event.
Active-Liquid Waste Treatment Building	Building not required until first repackaging event. A building will be constructed to serve this reactor site.
Active-Liquid Waste Storage Building	Building not required until first repackaging event.
General Warehouse	Building exists on the reactor site and new building not required. Allowance for refurbishment.
Guardhouse and Perimeter Security System	Building and security system exist on the

	reactor site and new building and system not required. Allowance for refurbishment when RES converts to a standalone facility.
Truck Inspection/Wash Facility	Not required since no fuel is being transported off-site.
Utility Building	Building exists on the reactor site and new building not required. Allowance for refurbishment.

An allowance is included in the cost estimate for initial refurbishment or construction of these buildings. Allowances are included under Operations Indirects (5xx-45-20-50) for the ongoing maintenance and replacement of these buildings.

In addition, a number of systems, features and areas would be required to support site activities.

- Fire Protection Systems
- Security and Communication Systems
- Electrical and Emergency Power
- Sanitary Sewer System
- Potable Water System
- Batch Plant and Construction Materials Storage Area
- Site Materials Storage Area
- Access Roads and Vehicle Compounds

It assumed that these services are available and would be "turned over" to the RES facility during transition to standalone operations. The exception is the batch plant, which does not exist on the reactor site and would not be constructed for RES facilities; i.e. concrete provided by off-site supplier. An allowance is included in the cost estimate for initial refurbishment of these services. Allowances are included under Operations Indirects (5xx-45-20-50) for the ongoing maintenance and replacement of these services.

## 3 Schedule Assumptions

### 3.1 OVERVIEW

The cost estimates for the RES facility alternatives have been phased in accordance with schedules developed for each facility alternative. For the purposes of comparison, each schedule is developed over approximately 300 years. This represents the cumulative time for the establishment of the site, the receipt of fuel and the timeframe for the extended storage and monitoring of the longest lived fuel containers employed by the alternative. Given the lesser service lives of some fuel container types, the schedule identifies time periods when repackaging events have been scheduled, within the extended monitoring timeframe. Detail schedules for each alternative are available on the CD in Appendix C.

## 3.2 SITING AND CONSTRUCTION

For cost estimating purposes it has been assumed that the RES program starts immediately following a government decision, which is assumed to be 1 July 2006 (Y1). A review of potentially suitable extended storage alternatives would start on 1 July 2006 and would be carried out over a 2.5-year period. At the end of the review process, in December 2008 (Y3), a decision would be made to either continue using the existing dry storage facilities for extended storage or to implement a new dry storage technology. These two scenarios are described further below.

In the first scenario, the existing silo-based dry storage facilities would continue to operate and to receive fuel (Silos alternative). New storage structures would be built as per the CNSC Construction Licences already held by NBP and, if necessary, Environmental Assessment approvals would be sought to build additional silos. Following the transfer of the last fuel from wet bays into dry storage, the facility would enter into a period of extended monitoring. Around this time it is assumed that the nearby nuclear station will be fully decommissioned and the RES facility would need to become a standalone facility. During the period of extended monitoring the storage facilities and fuel would be monitored, and the buildings and services would be maintained and refurbished as necessary. This regime of extended monitoring would continue until the silos reach the end of their 100-year service life (Ref. 6).

A new Environmental Assessment (EA) and Construction Licence approval would be sought for the transfer of the fuel when the existing silos-based storage systems reach the end of their service lives. Following receipt of all necessary approvals, facilities would be constructed for the storage of fuel into new silos. After all fuel bundles have been transferred into new storage silos, the entire facility would enter into another period of extended monitoring. The 100-year cycles of extended monitoring and fuel transfer would continue indefinitely. However, once every 300 years the fuel bundles would need to be transferred into new fuel baskets when old baskets reach the end of their service lives.

In summary the siting work will be completed during the periods Y1 to Y3 and Y79 to Y82. The EA process and Construction Licensing process is assumed to occur from Y80 to Y82. For the purposes of this cost estimate it has been assumed that additional future EA approvals would not be required following Y82.

The second scenario, implementation of new SMV or VST technologies, would require an additional 7 years following December 2008 (Y3) to transition to the new dry storage systems. Therefore the earliest in-service date for a new system is assumed to be January 2016 (Y11) on the Point Lepreau site. For the purposes of this cost estimate it is assumed that the 7-year schedule would be comprised of following major activities:

1. Siting and conceptual design studies are carried out and would take one year to complete. When complete, letters of intent are sent to CNSC to prepare sites and to construct new storage facilities.
2. The federal EA process takes 3 years and involves a comprehensive study. NBP would be the proponent in this EA process.
3. Six months to finalise a site preparation and construction licence application following EA approval. Site preparation and construction approval work would proceed in parallel with the EA approval process.

4. Facility construction would take about 2 years to complete and it would be followed by 6 months of commissioning work. Final design work could start in advance of this 2-year construction period.
5. The construction takes place with Point Lepreau coming into service in 2016 (Y11).

In summary the siting work for the SMV and CST alternatives will be completed during the period Y1 to Y7. The EA process and Construction Licensing process is scheduled from Y5 to Y7 prior to construction of the new dry storage facilities.

It is assumed that when the SMV or VST technologies are implemented on the site, the silo-based interim dry storage facilities would continue to operate in parallel until all fuel stored in silos has been transferred to the new storage facilities. In the SMV scenario the last dry storage silo would be emptied and fuel placed in new modular vault storage facilities in Y18. In the VST scenario the last basket would be transferred from interim storage to the VST storage chambers in Y18. After all fuel has been transferred the interim storage facilities would be decommissioned. At that time the SMV and VST facilities would enter into a period of extended monitoring. During this period the SMV facility would undergo periodic facility refurbishment events occurring every 100 years, and repackaging events every 300 years. Similarly the VST facility would undergo periodic facility refurbishment events occurring every 200 years, and repackaging events every 300 years.

The key dates in the assumed implementation schedules are summarised in Table 2. Also shown in the table are the assumed dates when the station is decommissioned. After the date when the station is fully decommissioned it is assumed that the RES facility will not have access to some resources provided by the station and will need to become a stand-alone facility. At that time additional buildings and services would be acquired or existing building refurbished, and additional staff would be retained.

**Table 2: Key Assumed Dates for Implementation at the NBP site**

Milestone	Point Lepreau	
	Nominal	Calendar
Government decision about preferred option and selection of the RES alternative	1	01Jul06
Review of RES alternatives for Point Lepreau and selection of preferred alternative	3	31Dec08
<i>Implementation of RES Alternative</i>		
First basket loaded (Actual Date)		1991
RES based on new dry technology becomes operational	11	1Jan16
<i>Station/Site Decommissioning</i>		
Last unit shutdown and the complete reactor site enters into safe-store mode. Some station staff remains on site until station completely dismantled.	3	31Mar08
Last fuel removed from wet bay and all fuel now in dry storage	13	2018
Reactors and buildings dismantled, site decommissioned, and station staff is no longer present on the reactor site. RES facility becomes a stand-alone operation on the reactor site.	43	31Mar48

### 3.3 SILO OPERATIONS

The Silos alternative schedule and cost estimate assume the fuel inventory is already held in storage, and therefore commences with a period of extended monitoring of the stored fuel. This includes intermediate facility repeat and repackaging events, when baskets will be removed from time served storage silos. Fuel in basket format will be transferred to new storage silos. Periodically, as baskets reach the end of the service lives, fuel will be transferred into replacement baskets, before being returned to replacement storage silos.

The dates for major events during Point Lepreau Silos operations are as follows:

Start of extended monitoring	Y14
Replace storage buildings*	Y83 to 90
Build repackaging facility**	Y284 to Y285
Repackaging event**	Y286 to Y290

\* Repeated every 100 years

\*\* Repeated every 300 years

### 3.4 SMV OPERATIONS

The SMV alternative schedule and cost estimate assume the fuel inventory in basket form is transferred to surface modular vault storage at an early date, followed by extended monitoring of the stored fuel. This period includes the intermediate facility repeat events, when baskets will be removed from time served modular vault buildings. Baskets will be transferred to new modular vault buildings. Periodically, as baskets reach the end of their service lives, fuel will be transferred into new baskets, before being returned to replacement modular vault buildings within the complex.

The dates for major events during Point Lepreau SMV operations are as follows:

Initial fuel receipts	Y11 to Y18
Start of extended monitoring	Y19
Replace storage vaults*	Y109 to Y117
Build repackaging facility**	Y284 to Y285
Repackaging event**	Y286 to Y290

\* Repeated every 100 years

\*\* Repeated every 300 years

### 3.5 VST OPERATIONS

The VST alternative schedule and cost estimate assume the fuel inventory is transferred to storage below ground in storage chambers at an early date, followed by extended monitoring of the stored fuel. This period includes intermediate facility repeat and repackaging events, when time served storage vaults are replaced within the storage chambers. Fuel in basket format will be transferred to new storage vaults. Periodically, as baskets reach the end of the service lives, fuel will be transferred into replacement baskets, before being returned to replacement vaults within the storage chambers.

The dates for major events during Point Lepreau VST operations are as follows:

Initial fuel receipts	Y11 to Y18
Start of extended monitoring	Y19
Replace storage vaults*	Y108 to Y 115
Replace storage chambers**	Y208 to 210
Build repackaging facility***	Y284 to Y285
Repackaging event***	Y286 to Y290

\* Repeated every 100 years

\*\* Repeated every 200 years

\*\*\* Repeated every 300 years

## 4 Cost Estimating Process

### 4.1 BASIS OF ESTIMATE

The cost estimates are based on the processes and activities considered necessary to establish and operate reactor extended storage facilities at the Point Lepreau site. Three conceptual design alternatives have been studied for extended storage of used fuel arising at the Point Lepreau site. A separate cost estimate has therefore been established for each of the three RES alternatives, (Silos, SMV, and VST), giving 3 RES estimates in total.

Each cost estimate assumes the storage inventory appropriate to the site, and is accumulated over a defined period. Used fuel is to be stored at the RES facility indefinitely. To allow comparisons to be made between the facility alternatives, the estimates have been formulated over an extended period of time to capture costs associated with facility repeats and one repackaging event. Beyond the initial fuel receipt period, each estimate covers the activities considered necessary to maintain the facility over a nominal 300-year cycle, including a number of facility repeats and a repackaging event. This 300-year cycle is defined by the service life of the fuel container (the basket). This 300-year cycle of operational activities would be repeated indefinitely for each alternative.

### 4.2 WORK BREAKDOWN STRUCTURE

A work breakdown structure (WBS) was developed for each alternative and is based on the WBS developed for the CES alternatives.

The following prefixes have been used for the alternative specific WBS:

580	Point Lepreau Silos
581	Point Lepreau Surface Modular Vaults (SMV)
582	Point Lepreau Vaults in Shallow Trenches (VST)

### 4.3 METHODOLOGY

The RES cost estimates have been derived from the CES cost estimates (Ref. 4). Each CES cost estimate assumes the combined fuel inventory from all the fuel owners is stored at one location, in both storage cask (and module canister) and in basket format. To produce the RES estimates, the most appropriate CES cost estimates have been factored, to take account of the



specific fuel inventory at the RES site. They have been further modified to consider only those costs relevant to storage of fuel in the format specific to each RES alternative.

To facilitate the factoring exercise, RES WBS schedules have been developed to an equivalent level to those for the CES WBS schedules. Each element on the WBS has been reviewed, and the contribution of the four cost categories (labour, material and equipment, other and contingency) has been considered in turn, and factored.

The scaling factors applied to develop the RES cost estimates consider:

- the reduced fuel inventory
- the reduced size of the storage complex
- the reduced number of fuel containers required for repackaging events
- the reduced quantities of fuel containers and building waste resulting from facility repeats and repackaging events
- reductions in personnel needed to operate the RES facilities

Some cost factors have been reduced to below unity, to reflect issues, such as a reduction in the size of the ancillary facility constructed for the RES facility, or the adoption of existing site services.

It is also recognised that some costs are incurred which are independent of the fuel inventory. The CES costs have therefore been included in full, such as repackaging buildings where similar processing rates to CES designs have been assumed to develop costs for equivalent facilities in the RES estimates.

In some instances, costs have been shared between the NBP and HQ sites (such as fuel integrity monitoring, where a fuel test facility is constructed at only one site), appropriate cost contributions have allocated to site specific estimates. Similarly, where fuel owners adopt similar technologies, it is assumed they make cost contributions to facility designs such as the SMV and VST alternatives and the basket repackaging facilities, rather than support such activities independently.

Some consideration has been given to whether each cost element can be considered as fixed, or step-fixed, and these are identified against each cost element line entry on the WBS schedules. The RES costs elements have been phased to the years identified for specific activities on the WBS schedules.

The structure for the cost estimates has been prepared by the development of the Work Breakdown Structures (WBS) for each alternative cost estimate (refer Figure 5, for typical WBS). Each element on the WBS has been broken down to the most appropriate level, to describe activities with sufficient accuracy for cost estimating purposes. The developed WBS is included in the appendix pertinent to each alternative. The developed cost estimate work elements have also been phased to years, to represent the timing within the cost estimate cycle, when these activities are scheduled.

The estimates are recorded in a series of Microsoft Excel Estimating Workbooks which include scope and cost information. Worksheets within the workbook represent the Level 2 Work Breakdown Structure. Each worksheet includes information on the estimated costs, the calculated contingency, cost categorisation, and the phasing to years for that cost element. The resultant costs are summarised on each worksheet, and carried forward to a summary of costs sheet. Hard copies of the Excel-based estimating workbooks for each alternative are presented

in Appendix B and electronic versions of the cost estimating data are presented on the CD in Appendix C.

Much of the cost estimating information for the processing of baskets, construction of surface storage buildings and the management of fuel inventories have been provided by OPG, on behalf of the fuel owners. The construction of concrete chambers is considered conventional from a civil engineering perspective.

## 4.4 MAJOR ASSUMPTIONS

Major high level assumptions are listed below. More detailed assumptions regarding each facility alternative are presented against each work element within the estimating workbooks in Appendices B.

The major assumptions pertinent the RES program and the NBP site estimates are as follows:

- The system development costs (5xx-20) have been divided between the NBP and HQ sites for those alternatives which are common (SMV and VST), since the development activities are considered to be identical, and largely independent of site considerations.
- The costs associated with detail design (within 5xx-40) of particular alternatives have been divided between the fuel owners adopting that particular RES alternative. For example, those fuel owners adopting the SMV alternative will contribute to the detail design costs for that alternative.
- The costs associated with the construction and maintenance of the 25-year fuel monitoring facility (5xx-45-20-70) have been shared between the NBP and HQ sites. However the cost of the staff required to carry out the fuel inspection work is shared between the 7 reactor sites.
- The program management function for the RES is administered centrally on behalf of the four fuel owning organisations. Regardless of the alternative selected by each fuel owner, each of the seven site estimates is assumed to make a contribution to this program management function.
- The estimate considers costs relating to the implementation of a stand-alone RES facility located on an existing reactor site.
- Detailed final design and the preparation of working drawings for the facility will commence immediately following EA approval and the acquisition of a CNSC Construction Licence.
- The RES facility operations will commence following the construction of the Process Building, ancillary facilities, initial storage complex capacity. Further stages of capacity will be constructed during the facility operations, if required.
- The estimate is based on RES designs that only receive CANDU used fuel bundles from NBP. The design capacity of the RES storage facilities is matched to the fuel inventories of the reactor site.

- The estimate is prepared and budgeted in current Canadian dollars, base January 2002, and is scheduled in elapsed time.

The RES alternative estimates have been scaled from the corresponding CES estimates in Ref 4. The reader is referred to this report for a more detailed description of the many assumptions that were made to develop the CES alternative estimates.

## 4.5 MAJOR EXCLUSIONS

The cost of interim storage on the Point Lepreau site and the cost of decommissioning of the interim storage facilities (except in Silos alternative estimate) are excluded from this cost estimate report. More specifically this report excludes the following:

1. The cost of operating and maintaining the station wet bays before and after station shutdown.
2. The cost of retrieving the fuel from wet bays, preparation of baskets, which includes the draining of wet bay waters from the basket, drying the contents and welding the basket lid to the base.
3. The cost of operating and maintaining existing interim dry storage facilities, and the cost of constructing new interim dry storage facilities on the Point Lepreau site, as necessary, until the RES facilities become operational.
4. The cost of Environmental Assessments and any other related work required for the expansion of existing interim storage facilities on the Point Lepreau site.
5. The cost of decommissioning redundant interim storage facilities after the RES facility has been brought into service and all fuel in interim storage has been transferred to the RES storage facility (except in the Silos alternative estimate).
6. *Silos Alternative*: the cost of interim dry storage facility operations up to the point in time when the last fuel bundle has been retrieved from wet bays and placed into dry storage. In other words the Silos cost estimate starts in Y14 for the Point Lepreau site. This estimate report includes the cost of decommissioning the interim storage facilities.
7. The cost of infrastructure support up to the point in time when the station are fully decommissioned. It is assumed that the Point Lepreau station will be fully decommissioned in Y43. Before the station is fully decommissioned, the RES facilities would have access to station infrastructure support and services including security, site maintenance, administration building, visitor reception building, warehouse buildings, waste management buildings, utility buildings and the common fire protection, electrical, communication, water, and sanitary services. Following station decommissioning, it is assumed that the RES facility would inherit many of these infrastructure support and services in order to be stand-alone facility.

## 5 Summary of Cost Estimates

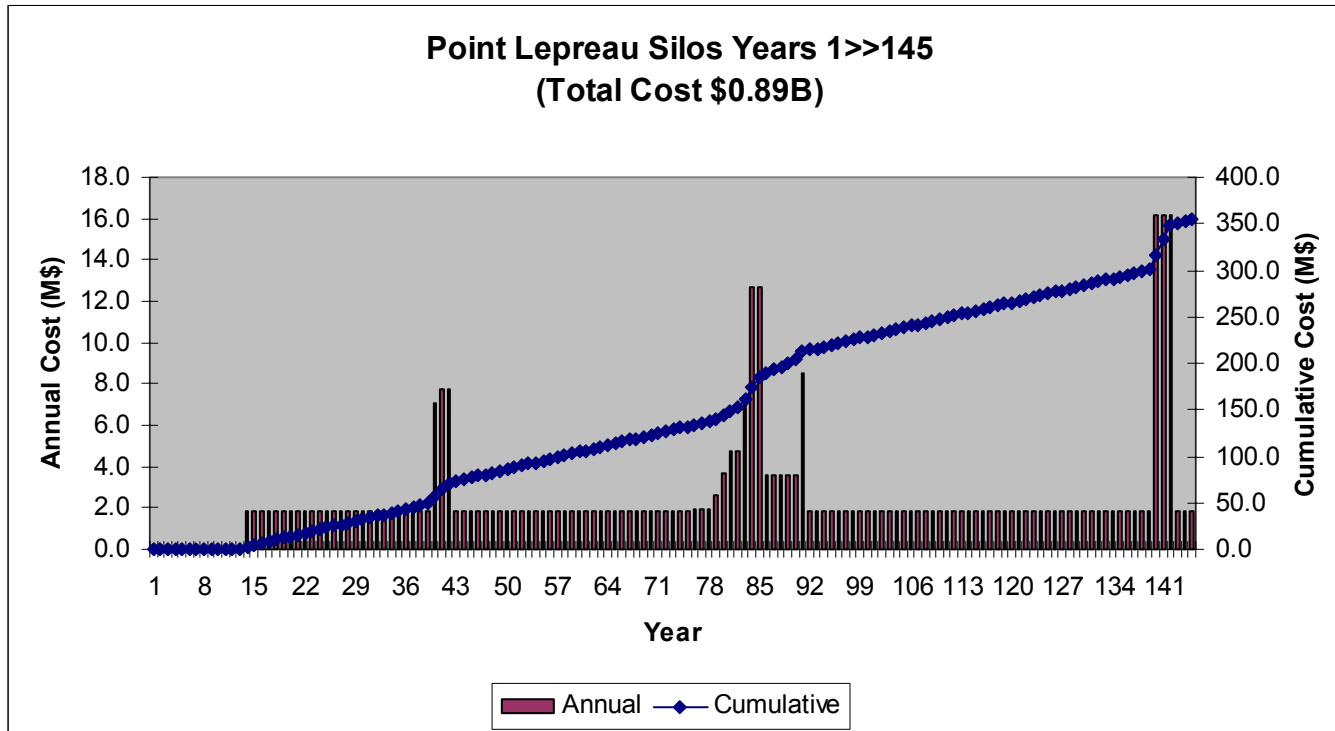
The detailed cost estimates for the siting, construction, and extended operation of the three RES facility alternatives for each site are presented in Appendices B.

For Point Lepreau, the total cost total cost of each facility alternative than can accept 119,500 fuel bundles is approximately:

Silos	\$0.89 B
SMV	\$2.51 B
VST	\$1.49 B

Figures 2 to 4 present the cumulative annual cash flow for the program to site develop, construct and operate each facility alternative over the first 145 years. The next three sections present cost estimates for each RES facility alternative by major work element, cost category and development phase, respectively. More detailed cost data is presented in Appendix B.

**Figure 2: Annual Cash flow projection and cumulative costs for Point Lepreau Silos Facility**



**Figure 3: Annual Cash flow projection and cumulative costs for Point Lepreau SMV Facility**

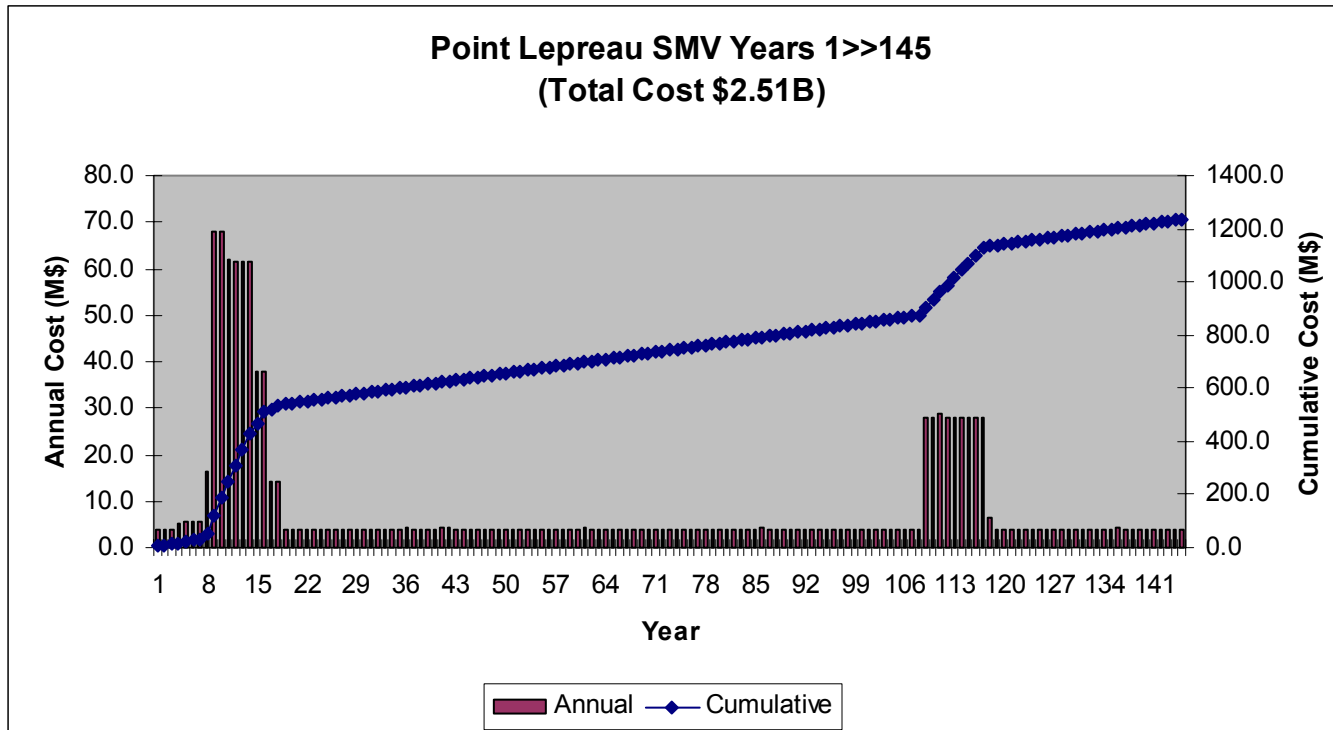


Figure 4: Annual Cash flow projection and cumulative costs for Point Lepreau VST Facility

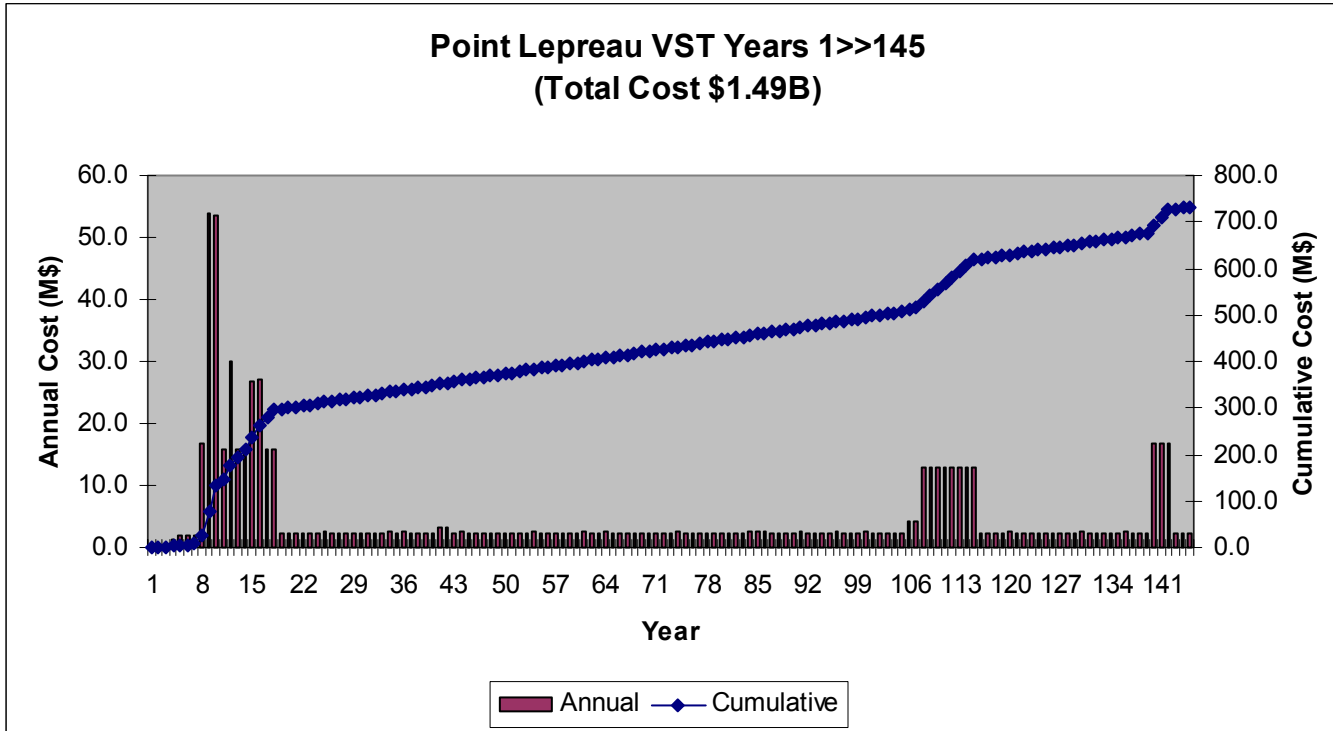
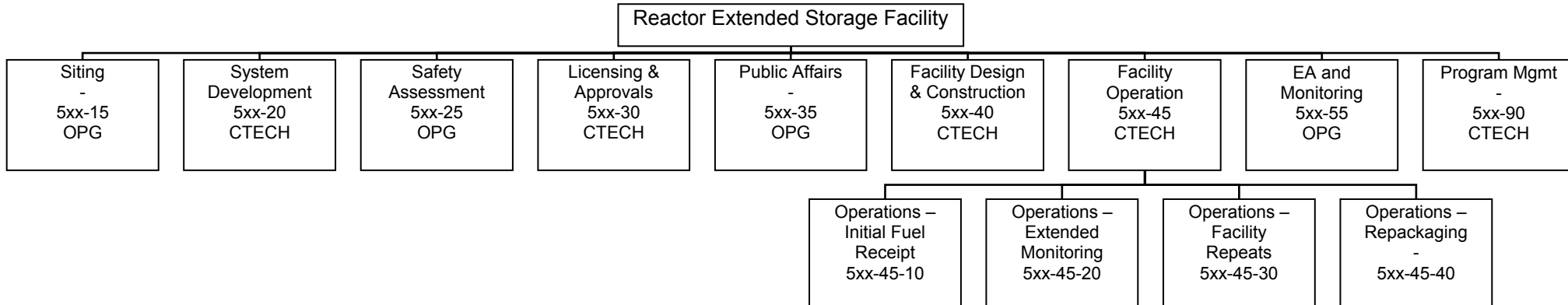


Figure 5: Typical Level 2 Work Breakdown Structure (5xx)

### Reactor Extended Storage Facility Cost Estimate

#### Work Breakdown Structure, Coding and Estimating Responsibilities





**Table 3: Cost Estimates for Reactor Extended Storage Facilities by Level 2 Work Element**

		<b>Cost (2002 K\$)</b>		
		<b>Point Lepreau</b>		
		580	581	582
<b>WBS</b>	<b>Description</b>	<b>Silos</b>	<b>SMV</b>	<b>VST</b>
5xx.15	Siting	824	824	1,003
5xx.20	System Development	6,548	24,012	11,937
5xx.25	Safety Assessment	2,338	3,022	3,022
5xx.30	Licensing and Approvals	23,318	24,214	24,214
5xx.35	Public Affairs	1,718	1,718	1,718
5xx.40	Facility Design and Construction	19,594	153,883	124,288
5xx.45	Facility Operation	811,211	2,277,791	1,292,357
5xx.55	Environmental Assessment and Monitoring	25,771	26,941	26,941
5xx.90	Program Management	487	1,014	1,014
<b>Total Cost (K\$)</b>		<b>891,810</b>	<b>2,513,418</b>	<b>1,486,493</b>

## 5.1 COSTS BY LEVEL 2 WORK ELEMENT

This section describes the work scope of work elements at Level 2 of WBS, irrespective of the RES alternative selected. Figure 5 shows the work elements at Level 2 of the program Work Breakdown Structure (WBS). This is a generic WBS and identified by the prefix number 5xx. There are 9 Level 2 work elements, which cover all the aspects of a program to site, develop and operate a reactor-site extended storage facility.

Table 3 presents total costs at Level 2 of the WBS for each of the alternatives. Separate appendices list all the work elements at the lowest level of the WBS and the costs associated with each of the alternatives are identified by the prefix numbers 580, 581 and 582.

### 5xx-15 Siting

Siting includes all activities related to planning and implementing of a program to locate a suitable location for a RES facility on the reactor site. Planning activities include development of a strategy to locate suitable sites for the RES facilities and public consultation. Implementation activities include site screening, environmental studies and site investigation, as required, at candidate locations on the reactor site.

### 5xx-20 System Development

System development includes all activities related to the optimisation of the conceptual design, and the development of the preliminary designs of the RES facility. The work activities include the preparation of drawings, descriptions, lists of materials, work force requirements, equipment requirements and associated calculations, and the output of these activities will get progressively more detailed as the facility design evolves. It provides design information necessary to support environmental assessments and site licence applications.

Specifically system development includes (where appropriate):

- Container system development work
- Preparation of geotechnical design and specifications
- Preparation of site-dependant designs during the siting process
- System applications including assessment of constructability, development and demonstrations of systems
- Development of performance specifications
- Security and safeguards

System development excludes final design for the RES facility. It also excludes engineering support during the construction and operation of the facility.

### 5xx-25 Safety Assessment

Safety Assessment includes all activities related to predicting the safety of RES facility and its potential impact. Safety assessments would be carried out through all phases of the development and operation of the RES facility. Safety assessments would be completed in support of licence applications. Safety Assessment includes the following work:

- Management of safety assessment work program up to the start of facility operations. After the start of operations the cost of managing the safety assessment program is included under Facility Operations.
- Safety assessment work during siting and construction including preparation of scoping assessment reports and the preparation of Preliminary Safety Assessment Report to support the Construction Licence application.
- Preparation of Final Safety Assessment Report to support the Operating Licence application.
- Updates of Safety Assessment Report, as required, to support Operating Licence renewals.

#### 5xx-30 Licensing and Approvals

Licensing and Approvals includes interactions with all federal, provincial and municipal regulators, preparation and submission of licence applications for siting, construction and operation. Licensing and Approvals includes the following work:

- Liaison with the Canadian Nuclear Safety Commission (CNSC)
- Prepare and submit Construction Licence applications and ensure all necessary documents are submitted to support the applications.
- Establish approvals requirements and obtain all necessary federal, provincial and municipal approvals.
- Prepare and submit Operating Licence applications and ensure all necessary documents are submitted to support the applications.
- Renew and maintain the Operating Licences.

#### 5xx-35 Public Affairs

Public Affairs work includes the development of a public affairs program to support the development and implementation of the public affairs strategy. The public affairs program is implemented through the development phases of the facility. A public affairs program provides information to key-decision makers, stakeholders, potential host communities, media and the general public.

The scope of the public affairs program would include the following:

- Public involvement program
- Impact management program
- Aboriginal affairs program
- Community information program
- Socio-economic impact assessment program
- Government relations program

#### 5xx-40 Facility Design and Construction

Facility Design and Construction includes all activities that are required to prepare the detailed final design drawings of the RES facility. The scope of work includes the provision of facilities necessary to receive and store used fuel bundles, but excludes the on-going construction of storage capacity constructed during facility operations.

#### 5xx-45 Facility Operation

Facility Operations comprises four activities:

- 5xx-45-10 Operations – Initial Fuel Receipt
- 5xx-45-20 Operations – Extended Monitoring
- 5xx-45-30 Operations – Facility Repeats
- 5xx-45-40 Operations – Repackaging

Initial fuel receipt covers the activities necessary to receive, condition and store fuel at the RES facility. For the Silos estimates, the fuel is already in storage, so this element is not addressed.

Extended monitoring covers the long-term management of the stored fuel inventory. Extended monitoring starts when the last storage container is initially placed into storage and continues indefinitely. Throughout the period of extended monitoring there is periodic refurbishment and replacement of storage structures and other buildings, and the periodic repackaging of the fuel.

Facility repeats covers the refurbishment or renewal of the storage complex facilities, which periodically reach the end of their service lives. Fuel bundles will be transferred from one storage structure to another, and the time served storage structure demolished (or refurbished) and replacement structures constructed, within the overall 'footprint' of storage complex.

Repackaging covers the periodic removal of fuel bundles from existing storage containers, which have reached the end of their service life. Fuel containers are transferred from the storage complex to a repackaging facility, where fuel bundles are transferred from an existing storage container to another.

#### 5xx-55 Environmental Assessment and Monitoring

This includes the preparation of Environmental Assessment (EA) documents to support application for a Construction Licence and updates to the EA documents. It has been assumed, for the purposes of this cost estimate, that a federal EA would be triggered under the following two conditions:

1. NBP sends letter of intent to CNSC to construct a new silo-based facility for storage of fuel baskets and to transfer fuel baskets from old silos into new storage silos (i.e. first 100-year repackaging event in the Silos alternative).
2. NBP sends letter of intent to CNSC to construct new storage structures based on new technology and to transfer baskets into new structures (i.e. SMV and VST alternatives).

Note that an EA may also be triggered earlier than the event described in (1) when approval is sought to build additional silos in the years immediately following a decision implement RES on the Point Lepreau site. However the cost of this work is outside the scope of the Silos alternative estimate which starts with extended monitoring (i.e. Y14). EA-related work would include compilation of data, preparation of documents, document printing and attendance at a Hearing.

Environmental monitoring provides the tools and processes for monitoring the environmental performance of the RES facility. The monitoring program would be directed by the RES Environmental Management System (EMS) and the EMS would ensure that the implementing organisation's environmental policy is managed, implemented, checked and periodically reviewed within the overall context of continual improvement. It would provide both the process and assurance, to ensure that the policy is improving the environmental performance of the RES

facility, while also demonstrating management's due diligence with respect to managing the corporation's environmental impacts.

The EMS would require monitoring and continually improving environmental performance. The EMS would encompass all environmental aspects of the RES facility.

The scope of environmental monitoring is restricted to monitoring the potential environmental impacts due to the day-to-day operations of the RES facility. The scope of this work element excludes specialised monitoring of the storage container and storage structure performance (included in 5xx-45).

### 5xx-90 Program Management

Program Management includes all necessary RES program support during the time period prior the start of facility operations. After the start of operations this function is subsumed into the work program captured under Facility Operations (5xx-45).

For the purpose of this cost estimate it has been assumed that the implementation of reactor-site extended storage at each of the seven sites will be managed by a single implementing organisation. Therefore the cost of Program Management is shared between the seven sites. It is assumed the implementing organisation is centrally located and would have the following functions:

- President's office
- Technical development program
- Quality management program
- Safety management program
- Finance and business services
- Human resources

The implementing organisation would receive technical support, as required, from an architect/engineering company throughout all phases of development, construction and operations of the RES facilities.

The estimate for each alternative includes the cost of program management staff overheads, taxes, insurance and legal fees within the various Program Management work elements.

For Silos alternative it assumed that the cost of Program Management is incurred during the nominal 13-year period (Y1-13) leading to the start of extended monitoring on the reactor site. The scope of the Program Management function would be relatively small during this period and work would be related to oversight and co-ordination of waste owner activities on the 7 reactor sites.

For the SMV and VST alternatives it is assumed that the cost of Program Management is incurred over a 10-year period starting in Y1 and until the first storage facility is completed on the Point Lepreau site in Y10.

## 5.2 COSTS BY COST CATEGORY

This section describes the four major cost categories that have been used in the cost estimate for each work element – namely labour, equipment and material, other and contingency. These categories are identical to those applied in the CES cost estimate (Ref. 4), and fuller descriptions are available in that document. A brief description of each categorisation is given below. Table 4 presents costs by category for each of the alternatives.

**Labour cost** is generally considered as salary costs plus labour burden and employee benefit. The labour cost may also include overheads, depending on the organisations involved in the project, or be defined within other work elements, such as 'indirect labour' costs.

**Material and Equipment cost** is the cost of acquiring materials for building construction and permanent equipment. The latter could include equipment used during operations, flasks, transporters, overhead cranes and similar. Material and equipment costs exclude the cost of installation.

**Other costs** include items such as consumables (fuel, utilities and non-permanent materials), permits and fees, taxes, communications costs, furniture, temporary monitoring equipment, and travel and accommodation expenses.

**Contingency cost** is included to improve the accuracy of a cost estimates to compensate for the inherent inaccuracies due to uncertainties in the RES program. The contingency should be large enough to compensate for the maximum range of inaccuracy associated with each estimate. The RES cost estimates are equal to the sum of all work element estimates and their associated contingencies.

Contingency has been assigned to the estimate by work element at the lowest level of the Work Breakdown Structure (WBS). This approach highlights any activities in the estimate subject to significant risk or estimating error, and enables future work to be more focused.

The contingency level applicable to each work element in the CES cost estimate has been assessed, to confirm its applicability to the RES cost estimates. In most instances, the same contingency level has been adopted for the RES estimate work elements. The overall percentage contingency levels for RES cost estimates and CES cost estimates are similar but not exactly the same, given that there are differences in the constituent parts of the cost estimates and certain activities, principally extended monitoring have differing durations.

**Table 4: Cost Estimate for Reactor Extended Storage Facilities as Cost by Category**

Cost Category	Cost (2002 K\$)		
	Point Lepreau		
	580	581	582
	<b>Silos</b>	<b>SMV</b>	<b>VST</b>
Labour	385,024	650,839	587,510
Material and Equipment	149,947	583,363	268,714
Other	169,403	715,913	322,779
Contingency	187,436	563,303	307,490
<b>Total Cost (K\$)</b>	891,810	2,513,418	1,486,494

### 5.3 COSTS BY MAJOR DEVELOPMENT ACTIVITY

The purpose of this section is to summarize the more detailed cost estimates presented in the appendices of this report. The costs have been grouped by major development activity; namely Siting, Construction, and Operation.

#### 5.3.1 Siting

Activities carried out in Siting include development of a site location process, site screening, site evaluations, preparation of safety assessment and environmental impact assessment documents, system development work, a public affairs program, participation in public hearings and preparation of licence applications.

Most of the Siting work for Silos alternative is assumed to commence before the requirement for a new storage array, which must be established before the first 100 year facility repeat event. There would be some work in Y1 to Y3 related to the selection of a preferred alternative for the reactor site.

**Table 5: Siting Costs for Silos Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Siting	All costs captured under 580-15	824
EA& Construction Licence	Costs captured under 580-55-20	2,501
System Development	All costs captured under 580-20. Costs incurred prior to 300-year repackaging event and related to developing new technology for opening baskets and transferring fuel bundles to new baskets	6,548
Safety Assessment	All costs captured under 580-25 except costs related SA work during Operations (580-25-50) and SA to support decommissioning activities (580-25-70)	682
Licensing and Approvals	All costs captured under 580-30 except costs related L&A work for renewal and maintenance of Operating Licence (580-30-70).	2,916
Public Affairs	All costs captured under 580-35.	1,718
Program Management	All costs captured under 580-90. Program management costs are incurred during years prior to start of extended monitoring;	487
Total (K\$)		15,678

**Table 6: Siting Costs for SMV Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Siting	All costs captured under 581-15	824
EA& Construction Licence	All costs captured under 581-55-20	3,127
System Development	All costs captured under 581-20	24,012
Safety Assessment	All costs captured under 581-25 except costs related SA work during Operations (581-25-50) and SA to support decommissioning activities (581-25-70)	1,365
Licensing and	All costs captured under 581-30 except costs	3,580



Approvals	related L&A work for renewal and maintenance of Operating Licence (581-30-70)	
Public Affairs	All costs captured under 581-35	1,718
Program Management	All costs captured under 581-90. Program management costs are incurred during years prior to start of SMV operations.	1,014
<b>Total (K\$)</b>		<b>35,639</b>

**Table 7: Siting Costs for VST Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Siting	All costs captured under 582-15	1,003
EA& Construction Licence	All costs captured under 582-55-20	3,127
System Development	All costs captured under 582-20	11,937
Safety Assessment	All costs captured under 582-25 except costs related SA work during Operations (582-25-50) and SA to support decommissioning activities (582-25-70)	1,365
Licensing and Approvals	All costs captured under 582-30 except costs related L&A work for renewal and maintenance of Operating Licence (582-30-70)	3,580
Public Affairs	All costs captured under 582-35	1,718
Program Management	All costs captured under 582-90. Program management costs are incurred during years prior to start of VST operations.	1,014
<b>Total (K\$)</b>		<b>23,743</b>

### 5.3.2 Construction

The Construction work includes all initial work required to create a stand-alone RES facility with functional surface and underground facilities (if required by the alternative under consideration), and infrastructure are created for the purpose of used fuel storage. Most of the work begins following the receipt of regulatory (CNSC) approval to begin construction and ends when the “cold” and “hot” commissioning of the facilities are completed prior to receiving the first formal shipment of waste for storage operations. Note that construction, as an activity, will continue during the subsequent facility operations. Construction includes clearing of land, surface and/or underground excavation, construction of Processing Building and ancillary facilities, and construction of the first stage of the storage complex.

An overview of the assumed construction schedule is presented in Section 3.2 and the detailed schedules are presented in Appendix B.

**Table 8: Construction Costs for Silos Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Transition to standalone RES facility	All site improvement and facility construction/refurbishment costs incurred at the time when the station is fully decommissioned and the RES must become a standalone operation	17,107
Prior to start of 300-year repackaging	Construction of new waste management facilities specifically required to support the first operations	2,487

event	during the first repackaging event. The cost of new processing building for 300-year repackaging event is captured under Operation costs	
Total (K\$)		19,594

**Table 9: Construction Costs for SMV Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Initial construction	Initial construction of all facilities and services required for SMV operations.	149,931
Transition to standalone RES facility	All site improvement and facility construction/refurbishment costs incurred at the time when the station is fully decommissioned and the RES facility must become a standalone operation	3,952
Total (K\$)		153,883

**Table 10: Construction Costs for VST Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Initial construction	Initial construction of all facilities and services required for VST operations.	120,336
Transition to standalone RES facility	All site improvement and facility construction/refurbishment costs incurred at the time when the station is fully decommissioned and the RES facility must become a standalone operation	3,952
Total (K\$)		124,288

### 5.3.3 Operation

Following initial fuel receipts the facility enters into an indefinite period of extended monitoring. Activities during this period include routine monitoring of fuel, environmental monitoring, facility maintenance, security, and Operating Licence maintenance and renewal. During extended monitoring there are periods of increased activity, when fuel storage facilities will be replaced or refurbished, and fuel storage containers are periodically repackaged. It is assumed that the fuel storage structures will be replaced every 100 years in all alternatives. Once every 300 years there would be a major repackaging event where the fuel would be transferred to new baskets and then placed into new storage structures.

The estimates for facility operation work are structured so that there is first stream of costs related to initial fuel receipts. This is followed by a series extended monitoring costs that would occur in perpetuity. During the extended monitoring program it will be necessary to periodically replace storage structures and to repackage fuel into new storage containers. The costs for these activities are not part of the extended monitoring program and they are incremental to the series of on-going extended monitoring costs.

The Silos estimate does not have any initial fuel receipt costs and therefore the Operation costs for this alternative begins with a series extended monitoring costs.

An overview of the assumed operation schedule is presented in Section 3 and the detailed schedules are presented in the Appendix B.

### 5.3.3.1 Operations - Initial Fuel Receipt

The initial fuel receipt is the period in the life cycle of the RES facility when fuel is received and conveyed to the storage complex. In the case of the Silos alternative, the fuel is already in an appropriate storage complex at the reactor site and therefore the Silos estimate exclude any costs for initial fuel receipt. For the SMV and VST alternatives, the fuel baskets will be transferred from the wet bay and the existing silos into the SMV storage structure or into vaults within concrete storage chambers (VST), respectively. During the initial fuel receipt phase, additional fuel storage capacity will be constructed, expanding the storage complex capacity in a staged manner.

### 5.3.3.2 Operations – Facility Repeats

The facility repeat events occur periodically given that the storage facilities and principal containment structures have a finite life span. Thus it will be necessary to move fuel baskets, from an ageing storage complex to new facilities. Depending on the alternative under consideration, this may be achieved by the staged building of additional storage capacity on the site, permitting the transfer of fuel containers from one storage location to another. Once the used fuel has been transferred and the storage unit has been emptied, the redundant building will be demolished, and a replacement unit is constructed at the same location.

### 5.3.3.3 Operations – Repackaging

Depending on the requirements of the alternative, the used fuel repackaging facility will perform functions relevant to the specific alternative under consideration. It is assumed that the repackaging facility will comprise a shielded cell complex, housed within a large building, configured to perform the activities required by the repackaging event.

The repackaging event, occurring every 300 years based on the service life of baskets into fresh baskets as required.

The shielded cell complex configured for the 300-year repackaging event is capable of allowing the opening of the baskets and the withdrawal of fuel bundles from the baskets. The fuel bundles are transferred to 'fresh' baskets.

**Table 11: Operations - Facility Repeat and Repackaging Costs for Silos Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Storage structure (silos) repeats – 100 yrs	All costs captured under 580-45-30-20. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	28,274
Storage structure (silos) repeats – 200 yrs	All costs captured under 580-45-30-50	28,274
Storage structure (silos) repeats – 300 yrs	All costs captured under 580-45-30-70	28,024
Repackaging basket to basket – 300 yrs	All costs captured under 580-45-40-10-40. Includes construction of new processing building, repackaging operations, acquisition	231,179

	of new baskets and disposal old baskets.	
Program Management in support of periodic facility repeats and repackaging events	All costs captured under 580-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (580-45-20-05)	31,153
<b>Total (K\$)</b>		<b>346,904</b>

**Table 12: Operations - Initial Fuel Receipts, Facility Repeat and Repackaging Costs for SMV Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Initial Fuel Receipts	All costs captured under 581-45-10. Includes operations to package fuel and place into storage, and to construct additional storage structures. Includes cost of Program Management to support these operations.	348,806
Storage building (SMV) repeats – 100 yrs	All costs captured under 581-45-30-20. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	195,019
Storage building (SMV) repeats – 200 yrs	All costs captured under 581-45-30-50	195,019
Storage building (SMV) repeats – 300 yrs	All costs captured under 581-45-30-70	194,419
Repackaging basket to basket – 300 yrs	All costs captured under 581-45-40-10. Includes the cost demolition of old processing building, disposal of waste material, construction of new processing building, repackaging operations, acquisition of baskets and disposal old baskets.	282,525
Program Management in support of periodic facility repeats and repackaging event	All costs captured under 581-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (581-45-20-05) but do not include the Program Management costs included under 581-45-10.	81,742
<b>Total (K\$)</b>		<b>2,323,896</b>

**Table 13: Operations - Initial Fuel Receipts, Facility Repeat and Repackaging Costs for VST Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Initial Fuel Receipts	All costs captured under 582-45-10. Includes operations to package fuel and place into storage, and to construct additional storage structures. Includes cost of Program Management to support these operations.	161,224
Storage structure (vaults) repeats – 100 yrs	All costs captured under 582-45-30-20. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	64,937

Storage structure (vaults) repeats – 200 yrs	All costs captured under 582-45-30-30	64,937
Storage structure (vaults) repeats – 300 yrs	All costs captured under 582-45-30-40	64,612
Storage chamber repeats – 200 yrs	All costs captured under 582-45-30-50. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	40,365
Repackaging basket to basket – 300 yrs	All costs captured under 582-45-40-10-40. In addition repackaging operations described above includes transfer of fuel to new baskets and disposal old baskets.	229,265
Program management during repackaging events	All costs captured under 582-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (582-45-20-05) but do not include the Program Management costs included under 582-45-10.	54,075
<b>Total (K\$)</b>		<b>679,416</b>

#### 5.3.3.4 Operations – Extended Monitoring

Extended monitoring is the period in the life cycle of the RES facility when fuel and storage structures are monitored and effectively commences at the end of initial fuel receipts and continues indefinitely. During this period there are periodic facility repeats and repackaging events.

For the purposes of these cost estimates it is assumed that the extended monitoring program spans a nominal 270-year time period. The extended monitoring program would include monitoring and surveillance activities at the storage structures, a fuel integrity monitoring program, environmental monitoring activities, building and services maintenance activities, work related to maintenance and renewal of the Operating Licence, site security and other site support staff, and a program management function.

It was assumed that the extended monitoring program for each alternative had the following duration:

Silos	277 years
SMV	272 years
VST	272 years

Tables 14 to 16 summarize the extended monitoring costs for each alternative on the Point Lepreau site for each alternative. The scope of each of the cost elements in these tables is described below. More detailed descriptions of scope can be found in the CES estimate report under the equivalent work elements.

Tables 17 and 18 present the data that were used to generate the extended monitoring costs. Table 17 shows the staffing model that was assumed to develop the labour estimates. Table 18 shows the assumed annual costs for material, equipment and other costs that would be incurred during an extended monitoring program on each reactor site. The total cost for the labour and expenses varies between alternatives on the same reactor site due to differences in the assumed duration of the extended monitoring program.

**Table 14: Operations - Extended Monitoring Costs for Silos Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Program Management	All costs captured under 580-45-20-05	161,108
Monitoring & Surveillance	All costs captured under 580-45-20-40	3,323
Operation Indirects	All costs captured under 580-45-20-50	263,061
Common Ancillary Services Operations	All costs captured under 580-45-20-60	34,285
Fuel Integrity Monitoring	All costs captured under 580-45-20-70	2,529
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 580-25-50 & -70	1,655
Operating Licence Renewal	All costs captured under 580-30-70	20,402
Environmental Monitoring	All costs captured under 580-55 except the costs associated with Environmental Assessment and Construction Licensing work (580-55-20)	23,269
<b>Total (K\$)</b>		<b>509,634</b>
Annual Cost	Total cost of extended monitoring divided by duration of 277 years	\$1.84M/a

**Table 15: Operations - Extended Monitoring Costs for SMV Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Program Management	All costs captured under 581-45-20-05	659,938
Monitoring & Surveillance	All costs captured under 581-45-20-40	3,520
Operation Indirects	All costs captured under 581-45-20-50	267,171
Common Ancillary Services Operations	All costs captured under 581-45-20-60	42,702
Fuel Integrity Monitoring	All costs captured under 581-45-20-70	6,930
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 581-25-50 & -70	1,657
Operating Licence Renewal	All costs captured under 581-30-70	20,634
Environmental Monitoring	All costs captured under 581-55 except the costs associated with Environmental Assessment and Construction Licensing work (581-55-20)	23,814
<b>Total (K\$)</b>		<b>1,026,365</b>
Annual Cost	Total cost of extended monitoring divided by duration of 272 years	\$3.77M/a

**Table 16: Operations - Extended Monitoring Costs for VST Alternative (2002 K\$)**

Work Element	Description	Point Lepreau
Program	All costs captured under 582-45-20-05	311,009

Management		
Monitoring & Surveillance	All costs captured under 582-45-20-40	3,263
Operation Indirects	All costs captured under 582-45-20-50	262,385
Common Ancillary Services Operations	All costs captured under 582-45-20-60	33,790
Fuel Integrity Monitoring	All costs captured under 582-45-20-70	2,493
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 582-25-50 & -70	1,657
Operating Licence Renewal	All costs captured under 582-30-70	20,634
Environmental Monitoring	All costs captured under 582-55 except the costs associated with Environmental Assessment and Construction Licensing work (582-55-20)	23,814
Total (K\$)		659,046
Annual Cost	Total cost of extended monitoring divided by duration of 272 years	\$2.42M/a

#### 5xx-45-20-5 Program Management (during extended monitoring)

For the purposes of these cost estimates it is assumed that the program management function is located at a central location (Waste Management Organization) and will service the 7 reactor sites.

Table 17 shows the number of full-time equivalent staff numbers that would be dedicated to the Point Lepreau RES facilities. The WMO is assumed to have 11 full-time staff and 0.8 of these staff are dedicated to servicing the NBP RES facilities. The remainder of the staff will service the RES facilities on the other 6 reactor sites. By comparison the CES estimate has 8 full-time staff in the WMO during extended monitoring.

In addition to labour costs, there are other costs related public affairs expenses, overheads, insurance, community offsets and benefits, legal fees, sales and property taxes. The assumed annual costs for each of these other cost items are listed in Table 18.

#### 5xx-45-20-40 Monitoring and Surveillance

Monitoring and surveillance of the baseline conditions within the storage complex including maintenance of the monitoring systems and evaluation of engineered barriers against performance criteria. Activities include the collection of monitoring data, evaluation of the data and reporting. Includes monitoring of the mimic fuel in a test facility.

It is assumed that 0.5 full-time staff could carry out all required tasks at the Point Lepreau RES facilities. Material and equipment costs are assumed to be \$1K/a.

#### 5xx-45-20-50 Operations Indirects

Operation indirects covers all activities and costs to maintain storage buildings, processing or repackaging buildings and secure the RES facility during extended monitoring. Includes cost of local site management and administrative staff, a regular maintenance crew for the storage

complex and ancillary facilities, and security staff. Where possible the labour would be shared between reactor sites.

For Point Lepreau, other costs are included for material and equipment during refurbishment and replacement work programs for the ancillary facilities (\$75K/a), for armed response capability (\$50K/a) and energy consumption (\$5K/a).

It is assumed that all seven reactor sites will be monitored from one central secure monitoring room. There would be local security staff at each site that could respond to an incident at the site.

#### 5xx-45-20-60 Common Ancillary Facility Operations

This work element covers the cost of periodic refurbishment of the common ancillary facilities and ensuring that all facilities are available for use during the period of extended monitoring. Includes the cost of a major refurbishment of the facilities every 30 years. The cost for replacement of facilities every 100 years is captured elsewhere in the estimate.

#### 5xx-45-20-70 Fuel Integrity Monitoring

It is assumed that the fuel bundles need to be inspected every 25 years to confirm that the bundles are maintaining their integrity. The cost estimate assumes that a crew of 8 people would be used to carry out this inspection work and the same crew would inspect fuel at each of the 7 reactor sites. This estimate includes the construction, operation and maintenance of a monitoring facility to inspect the integrity of a small number of fuel bundles from baskets on a 25-yearly program. Cost of the fuel integrity-monitoring program is shared between the 7 reactor sites. It is assumed that one of the three cask sites and one of the four basket sites would be inspected every 25 years.

In order to inspect the fuel a shielded cell must be available. The CES cost estimate assumes processing building shielded cell can house monitoring facility up to the 100-year repackaging event and the repackaging cell can house the monitoring equipment up to the 200 and 300 year repackaging events. In the case of the Silos, SMV and VST alternatives, there is no processing building shielded cell, so an additional allowance (relative to CES) is included for a cell on the reactor site.

#### 5xx-25-50 Safety Assessment – Facility Operations

Safety assessment work would be carried out support periodic renewal of the facility operation licences. It is assumed that this work would be carried out a central location which would lead to cost savings due to sharing of knowledge and information between reactor sites.

#### 5xx-30-70 Operating Licence Renewal

The operating licenses for the storage facilities will be need to be maintained and renewed during periods of extended monitoring. The extended monitoring operating licence would have longer terms, fewer conditions and a reduced fee relative to the operating licence for a facility when the fuel is being handled. For the purposes of this cost estimate it is assumed that one WMO staff would be dedicated to license renewal work for the 7 reactor sites and the cost of this person would be shared amongst the seven sites.

It is assumed the annual fee for Operating Licenses for the Point Lepreau RES facilities will be \$50K/a (about 0.17 fte/a of CNSC staff time).



### 5xx-55 Environmental Monitoring

The monitoring program encompasses all environmental aspects of the RES facility including monitoring of radiological and non-radiological emissions to:

- Air
- Surface water and groundwater
- Soil
- Flora and Fauna
- Produce

An environmental monitoring program has been assumed to develop cost estimates for the RES alternatives. Should a decision be made to implement a RES alternative on the Point Lepreau site, then discussions would be held with the regulators to define the scope of the programme.

**Table 17: Staffing Model for Extended Monitoring Program (FTE/a)**

Staff Function	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
<b>5xx-45-20-5 Program Management (WMO staff during extended monitoring)</b>									
President	0.2	0.2	0.2	0.1	0.1	0.1	0.1	1	1
Public Affairs	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.5	1
Procurement	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.5	0.33
Quality Assurance	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.5	0.33
Safety	0.1	0.1	0.1	0.05	0.05	0.05	0.05	0.5	0.33
Finance & Business Services	1	1	1	0.25	0.25	0.25	0.25	4	3
HR & Payroll	1	1	1	0.25	0.25	0.25	0.25	4	3
<i>Subtotal</i>	<i>2.6</i>	<i>2.6</i>	<i>2.6</i>	<i>0.8</i>	<i>0.8</i>	<i>0.8</i>	<i>0.8</i>	<i>11</i>	<i>9</i>
<b>5xx-45-20-40 Monitoring &amp; Surveillance</b>									
Monitoring & surveillance of storage structures	1	1	1	0.5	0.5	0.5	0.5	5	5
<b>5xx-45-20-50 Operation Indirects</b>									
Site Management	1	1	1	0.5	0.5	0.5	0.5	5	3
Security (5 shifts)	10	10	10	5	5	5	5	50	17
Central Secure Monitoring Room (5 shifts)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	5	
Administration (invoicing, records, clerical)	0.3	0.3	0.3	0.1	0.1	0.1	0.1	1.6	4
Maintenance of	0.3	0.3	0.3	0.2	0.2	0.2	0.2	1.6	3

Staff Function	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
storage structures									
Maintenance of site infrastructure	0.7	0.7	0.7	0.4	0.4	0.4	0.4	3.4	7
<i>Subtotal</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>67</i>	<i>34</i>
<b>5xx-45-20-60 Common Ancillary Services Operations</b>									
Maintenance & 30-yr refurbishment of ancillary facilities	3	3	3	1	1	1	1	13	5
<b>5xx-45-20-70 Fuel Integrity Monitoring</b>									
8 staff x 10 events over nominal 300 years – same crew for 7 sites. Staff shown as equivalent annual numbers	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.5
<b>5xx-25-50 Safety Assessment – Facility Operation (support O/L Renewal)</b>									
Staff at central location servicing 7 sites	0.25	0.25	0.25	0.08	0.08	0.08	0.08	1	1
<b>5xx-30-70 Operating Licence Renewal</b>									
Staff at central location servicing 7 sites	0.25	0.25	0.25	0.08	0.08	0.08	0.08	1	1

Staff Function	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
5xx-55 Environmental Monitoring									
Program Mgt (shared)	0.5	0.5	0.5	0.1	0.1	0.1	0.1	2	2
Ground Water	0.2	0.2	0.2	0.02	0.02	0.02	0.02	0.68	0.6
Rad Biosphere	1	1	1	0.1	0.1	0.1	0.1	3.4	3.3
Non-rad Biosphere	0.2	0.2	0.2	0.05	0.05	0.05	0.05	0.8	0.8
Human Health	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.15	0.17
<i>Subtotal</i>	<i>1.93</i>	<i>1.93</i>	<i>1.93</i>	<i>0.29</i>	<i>0.29</i>	<i>0.29</i>	<i>0.29</i>	<i>7</i>	<i>7</i>
<b>Total</b>	<b>22</b>	<b>22</b>	<b>22</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>106</b>	<b>62</b>

## Note:

1. Sums may not equal to totals due to rounding.

**Table 18: Annual Expenses During Extended Monitoring Program (2002 K\$/a)**

Cost Item	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
<b>5xx-45-20-5 Program Management (WMO expenses)</b>									
Public Affairs Expense	30	30	30	15	--	15	15	135	100
Overheads	296	296	296	118	118	118	118	1360	926
Insurance	123	123	123	50	50	50	50	569	135
Community Compensation	50	50	50	50	50	50	50	350	68.5
Legal Fees	100	100	100	25	25	25	25	400	400
PST	6	6	6	--	--	--	--	18	16.8
Property Tax – Repackaging Building	336	336	336	157	--	--	--	1165	208
Property Tax – Storage Buildings & Ancillary Facilities	1149	1562	1145	797	--	--	--	4653	818
<i>Subtotal</i>	<i>2,090</i>	<i>2,503</i>	<i>2,086</i>	<i>1,212</i>	<i>243</i>	<i>258</i>	<i>258</i>	<i>8,650</i>	<i>2,672.3</i>
<b>5xx-45-20-40 Monitoring &amp; Surveillance</b>									
Material & Equipment for Monitoring & surveillance of storage structures	1	1	1	1	1	1	1	7	2
<b>5xx-45-20-50 Operation Indirects</b>									
Material & Equipment	150	150	150	75	75	75	75	750	288
Armed Response	300	300	300	50	50	50	50	1100	1,312

Cost Item	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
Energy Consumption	30	30	30	5	5	3	3	106	82
<i>Subtotal</i>	<i>480</i>	<i>480</i>	<i>480</i>	<i>130</i>	<i>130</i>	<i>128</i>	<i>128</i>	<i>1,956</i>	<i>1,682</i>
<b>5xx-45-20-80 Common Ancillary Services Operations</b>									
No expenses	--	--	--	--	--	--	--	--	--
<b>5xx-45-20-70 Fuel Integrity Monitoring</b>									
Material & Equipment for fuel integrity monitoring program	3.3	3.3	3.3	2.5	2.5	2.5	2.5	20	10
Other costs for fuel integrity monitoring program	0.7	0.7	0.7	0.5	0.5	0.5	0.5	4	2
<i>Subtotal</i>	<i>4</i>	<i>4</i>	<i>4</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>3</i>	<i>24</i>	<i>12</i>
<b>5xx-25-50 Safety Assessment - Facility Operation (support O/L Renewal)</b>									
Expenses	1	1	1	0.5	0.5	0.5	0.5	5	4
<b>5xx-30-70 Operating Licence Renewal</b>									
CNSC fees	70	70	70	50	50	50	50	410	200
Travel expenses	2	2	2	1	1	1	1	10	4
<i>Subtotal</i>	<i>72</i>	<i>72</i>	<i>72</i>	<i>51</i>	<i>51</i>	<i>51</i>	<i>51</i>	<i>420</i>	<i>204</i>
<b>5xx-55 Environmental Monitoring</b>									
Program Mgmt - Other	3	3	3	1.5	1.5	1.5	1.5	15	10
Ground Water –	6	6	6	3	3	3	3	30	15.3

Cost Item	Pickering	Bruce	Darlington	Point Lepreau	Gentilly	Chalk River	Whiteshell	RES Total	CES Total
M&E									
Ground Water - Other	4	4	4	2	2	2	2	20	11
Rad Biosphere – M&E	18	18	18	9	9	9	9	90	54.2
Non-rad Biosphere – M&E	6	6	6	3	3	3	3	30	14
Human Health - Other	1	1	1	0.5	0.5	0.5	0.5	5	2.2
<i>Subtotal</i>	<i>38</i>	<i>38</i>	<i>38</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>19</i>	<i>190</i>	<i>106.7</i>
<b>Total (K\$)</b>	<b>2,686</b>	<b>3,099</b>	<b>2,682</b>	<b>1,416.5</b>	<b>447.5</b>	<b>460.5</b>	<b>460.5</b>	<b>11,252</b>	<b>4,683</b>

## Notes:

- Sums may not equal to totals due to rounding.
- Program management (WMO), fuel integrity monitoring and operating licence renewal staff are assumed to centrally located.
- Overheads for centrally located program management staff are assumed to be \$45K/staff and costs are shared between 7 sites. Facility based staff overheads are assumed to be \$8K/staff (see CES DETS for 561-90). For example Pickering has 3.2 centrally located staff and 18.9 facility-located staff leading to \$296K/a in overhead costs.
- Insurance based on premiums paid for a WWMF-type facility when handling fuel - conventional is \$175K/a and nuclear is \$65K/a (see ED026 in Annex 1 of Ref. 5). Assumed 50% reduction of conventional and nuclear liability insurance premiums during extended monitoring when facility is essentially dormant. Vehicle insurance is \$600/vehicle/a where there is 5 vehicles at OPG facilities and 2 vehicles at other facilities.
- OPG property tax based on an assessment of 4.08% on repackaging building and 2.87% on other buildings. During active fuel handling the assessed value of buildings is assumed to be 50% of the construction cost (see ED020 in Annex 1 of Ref. 5) and during extended monitoring assessed value is assumed to be 15% of construction cost. The construction costs for the various buildings are summarized in Section 5.3.2 and 5.3.3. The property tax values for repackaging buildings and storage buildings and ancillary facilities are average values for the three alternatives at each site. Calculated values for each alternative have been included in the cost estimates.  
 NBP property tax values based on an assessment of 2.6% on all buildings. During active fuel handling (facility repeats (15 years total) and basket repackaging events (5 years)) the assessed value of buildings is assumed to be 50% of the construction cost and during extended monitoring assessed value is assumed to be 15% of construction cost. The construction costs for the various buildings are summarized in Section 5.3.2 and 5.3.3. The property tax values for the repackaging building and storage buildings and ancillary facilities are average values for the three alternatives. Calculated values for each alternative have been included in the cost estimates.  
 It is assumed that there is no property tax on facilities located on the Gentilly, Chalk River and Whiteshell sites.

6. One team carries out fuel integrity monitoring program at 7 sites. One basket site and one cask site are inspected every 25 years. Costs are shared between the sites.
7. Operating licence renewal is assumed to occur every 10 years but the costs are annualized.



## 6 Estimation of Long-term Costs

The RES study has been assumed that the facilities would need to operate indefinitely. In order to do so the RES facilities would be refurbished on a regular basis and the fuel would need to be periodically repackaged when fuel containers reach the end of their service life. These refurbishment and repackaging activities would be carried out indefinitely.

This estimate report presents costs in the first 320 years of the RES facility operations for each facility alternative. The 300 years of this time period represents a complete cycle of facility refurbishment and repackaging for all RES facility alternatives. Should it be necessary to define the costs beyond Y300 then the costs for this 300-year period can simple be repeated as required to generate costs, say, for 600, 900 years and so on.

## 7 References

- 1 Cost Estimates for Reactor-site Extended Storage Facility Alternatives for Used Nuclear Fuel. Alternatives for Pickering, Bruce and Darlington Reactor Sites. CTECH Report No: 1105/MD18084/REP/16 - December 2003
- 2 Cost Estimates for Reactor-site Extended Storage Facility Alternatives for Used Nuclear Fuel. Alternatives for Hydro-Québec's Gentilly Reactor Site. CTECH Report No: 1105/MD18084/REP/18 - December 2003
- 3 Cost Estimates for Reactor-Site Extended Storage Facility Alternatives for Used Nuclear Fuel. Alternatives for AECL's Chalk River and Whiteshell Reactor Sites. CTECH Report No: 1105/MD18084/REP/19 - December 2003
- 4 Cost Estimates for Four Centralized Storage Facility Alternatives for Used Nuclear Fuel. CTECH Report No: 1105/MD18084/REP/11 - September 2003
- 5 Cost Estimate for a Deep Geologic Repository for Used Nuclear Fuel. CTECH Report No: CTECH Report No: 1106/MD18085/REP/02 - September 2003
- 6 Conceptual Designs for Reactor-Site Extended Storage Facility Alternatives for Used Nuclear Fuel. Alternatives for New Brunswick Power's Point Lepreau Reactor Site CTECH Report No: 1105/MD18084/REP/13 - April 2003
- 7 Conceptual Designs for Four Centralized Extended Storage Facility Alternatives for Used Nuclear Fuel. CTECH Report No: 1105/MD18084/REP/08 - April 2003.

# APPENDIX A

## Glossary of Terms

**Assumption** – a statement or hypothesis made concerning unknown factors and data that are required to accomplish the cost analysis. Assumptions should be clearly identified in all cost estimating documents.

**Activity** – a basic element of work or task that must be performed in order to complete a project. An activity occurs over a given period of time.

**Allowances** – additional resources included in estimates to cover the cost of known but undefined requirements for an individual activity or work item.

**Conceptual design cost estimate** – an estimate made with conceptual engineering data. This type of estimate should be accurate within +50% or -30% of the most probable final cost.

**Constant dollars** – current, and future costs that reflect the level of prices of a base year. Constant dollars have the effects of inflation removed.

**Contingency** – a separately planned amount used to allow for future situations which may be planned for only in part (sometimes referred to as “known unknowns”). Contingencies are intended to reduce the impact of missing cost or schedule objectives. Contingencies are normally included in the project’s cost and schedule baselines. Contingencies usually exclude changes in scope, quality or unforeseeable major events such as strikes, earthquakes, etc.

**Cost** – the amount measured in money, cash expended, or liability incurred, in consideration of goods and/or services received.

**Cost Estimating** – the determination of quantity and the prediction or forecasting, within a defined scope, of the costs required to provide services, construct and equip a facility, to manufacture goods, or to furnish a space. Costs are determined utilising experience and calculating and forecasting the future cost of required resources, methods, and management within a scheduled time frame. Included in these costs are an assessment and evaluation of risks and uncertainties.

**Equipment cost** – is the cost of acquiring permanent equipment such as heavy equipment (trucks, forklifts, cranes) to be used during operations, container fabrication equipment, and laboratory and office equipment. Equipment cost does not include the labour cost for installing the equipment.

**Fixed cost** – is a cost that is not sensitive to total quantity of waste being shipped or stored, or to facility or system throughput capacity. For example, most development costs, all siting costs, safety assessment, licensing and approval costs, environmental monitoring costs, many infrastructure costs (roads, surface facilities, utilities), program costs (program management, public affairs, administration) are not sensitive to total

quantity of waste or the facility or system throughput capacity. Fixed costs are generally unavoidable costs and must be paid irrespective of total waste quantity or throughput capacity.

**Indirect costs** – (1) in construction, all costs which do not become a final part of the installation, but which are required for the orderly completion of the installation and may include, but are not limited to, field administration, direct supervision, capital tools, start-up costs, contractor's fees, insurance, taxes, etc.; (2) in operations, costs not directly assignable to the end product or process, such as overhead and general purpose labour, or costs of outside operations. Indirect operating cost may include insurance, property taxes or grants in lieu of taxes, maintenance, depreciation, warehousing and loading.

**Labour cost** – the salary plus labour burden. Labour cost may not include overhead costs, which are estimated separately.

**Life cycle costs** – the inclusion of all costs incurred during the total life (from project initiation through to decommissioning) of a facility and/or system, or aggregation of facilities and/or systems. Life cycle cost estimates would include, where applicable, costs for development, siting, licensing, construction, operation, extended monitoring and decommissioning.

**Material cost** – refers to the cost of permanent materials only, consumables are listed under "other costs". When the purchase cost includes installation (e.g. of building materials) the estimator will be requested to provide a cost breakdown indicating separately the material cost and the installation labour cost.

**Milestone** – an important or critical event and/or activity that must occur when scheduled in the project cycle in order to achieve the project objective(s).

**Other costs** – includes items such as consumables (fuel, utilities and non-permanent materials), permits and fees, taxes, duties, licences, royalties, communication costs, furniture, temporary monitoring equipment, and travel and accommodation expenses.

**Program management** – includes all activities in the implementing organization that cannot be identified with work, products or assets within the organization. Program management activities within the implementing organization would include senior management support and direction, administrative and clerical services, financial and business services, quality engineering services, safety program, human resources and payroll services, records management, and procurement services. Program management would include overheads such as the following: taxes or grants in lieu of taxes, insurance, communication services, office space, office furniture, office supplies and general expenses.

**Project management** – labour comprising the implementing agency staff who are directly involved in the administration or execution of scientific and engineering work.

**Step-Fixed Cost** - is a type of fixed cost that is sensitive to changes in total quantity of waste shipped or stored, or to the waste throughput capacity of the facility or system. If the total quantity of waste changes or the waste throughput capacity changes, then the size or number and the associated cost of some infrastructure or capital-cost items will change. Examples of step-fixed costs are the following:

- Waste processing, conditioning and packaging facilities

- Waste package handling equipment
- Storage buildings.

**Work breakdown structure (WBS)** – a hierarchical grouping of work elements, which organises and defines the total scope of the facility or system. Each descending level represents an increasing detailed definition of the work.

## **APPENDIX B**

### **B1 Estimating Workbooks for Point Lepreau Site**

**WBS No 580 – Silos**

**WBS No 581 – SMV**

**WBS No 582 - VST**

Estimating Workbooks are presented in this section and are also available on the CD.

RES ALTERNATIVE  
WBS No 580  
Point Lepreau  
SILOS

FUEL OWNER

NBP

Lev 2	WBS Name	Sheet Totals (\$k)
15	Siting	824
20	System Development	6,548
25	Safety Assessment	2,338
30	Licensing & Approvals	23,318
35	Public Affairs	1,718
40	Facility Design & Construction	19,594
45	Facility Operation	811,211
55	Environmental Assessment and Monitoring	25,771
90	Program Management	487
	<b>Total Cost (\$k)</b>	<b>891,810</b>

**Point Lepreau Silos Alternat 891,810**

<b>Siting Phase</b>	<b>15,678</b>
Siting	824
EA	2,501
System Development	6,548
SA	682
L&A	2,916
Public Affairs	1,718
Program Mgmt	487

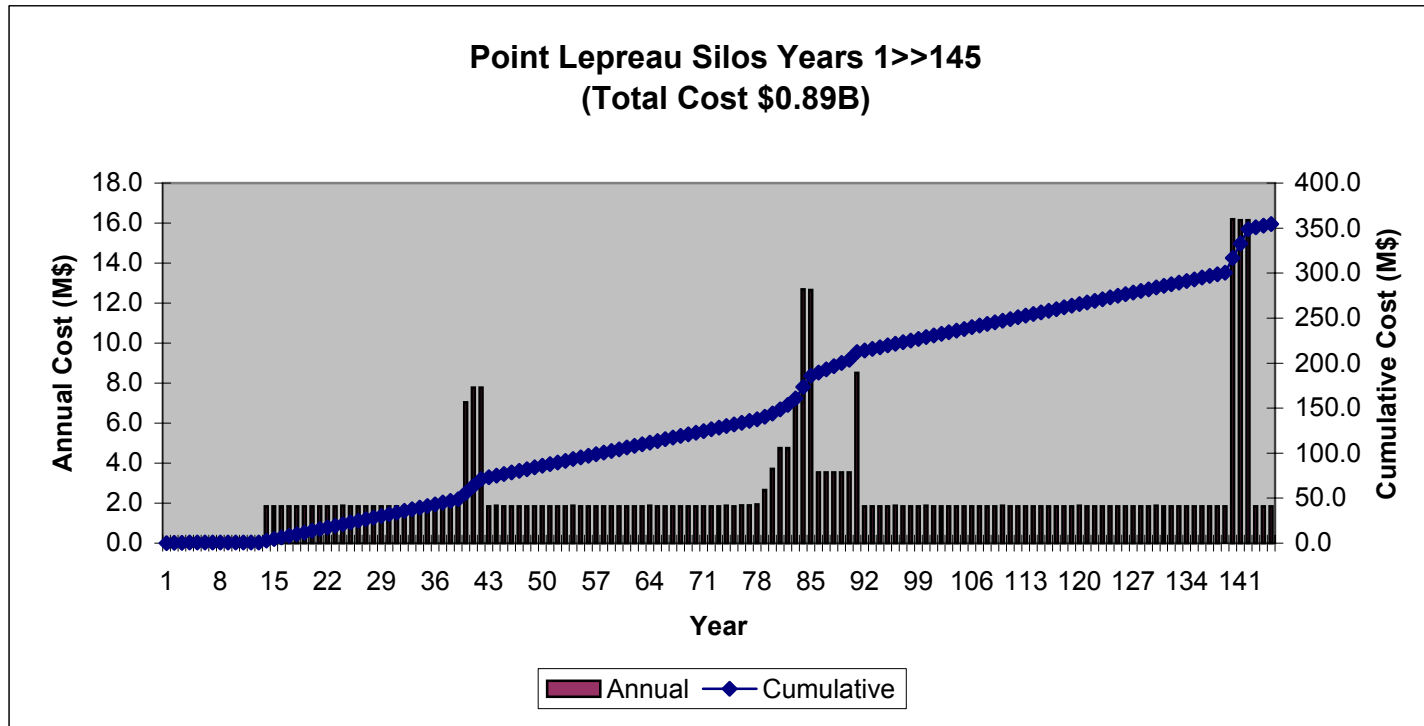
<b>Construction Phase</b>	<b>19,594</b>
Transition to Standalone	17,107
Facilities for 300 yr repackaging	2,487

<b>Operations Phase</b>	<b>856,538</b>
<i>Repeat &amp; Repackaging</i>	<i>346,904</i>
Silos - 100 yrs	28,274
Silos - 200 yrs	28,274
Silos - 300 yrs	28,024
Repackaging B to B - 300 yrs	231,179
PM for Repeats & Repackaging	31,153

<i>Extended Monitoring</i>	<i>509,634</i>
Program Mgmt	161,108
Monitoring Surveillance	3,323
Operation Indirects	263,061
Common Ancillary Services Ops	34,285
Fuel Integrity Monitoring	2,529
SA - Ops & Decommissioning	1,655
L&A - Ops Licence Renewal	20,402
Environmental Monitoring	23,269



Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Annual	170.27	170.27	170.27	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50
Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Annual	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative	0.2	0.3	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9



**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	15	0	0	0	0	0	0	0 Siting	Labour	STEP	OPG	RJH	1	82	7	0	0	NO DATA TO FILL	452.2
580	15	0	0	0	0	0	0 Siting	Materials and Equipment	STEP	OPG	RJH	1	82	7	0	0	0.0		
580	15	0	0	0	0	0	0 Siting	Other	STEP	OPG	RJH	1	82	7	0	0	97.0		
580	15	0	0	0	0	0	0 Siting	Contingency	STEP	OPG	RJH	1	82	7	0	0	274.6		

**INSTRUCTIONS**

Check: Total minus budget Should = 0	Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	452	0%	452.2
Materials and Equipment	0	0.0	0.0
Other	97	0.0	97.0
Contingency	274.6	0.0	274.6
Total	824	0.0	824

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail		Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	Cost \$k		
1	2	3	4	5	6	7	8					CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES				
580	15							<b>Siting</b>																			
580	15	10						SITING MANAGEMENT																			
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites or a factor of 0.08. However due to efficiencies of multiple sites assume a factor of 0.05		Labour	0.05	4897.7	0.05	244.885												245	
										Materials and Equipment	0.05				0	0.05	0									0	1
										Other	0.05							1,300	0.05	65					65		
										Contingency	50%										50%	1.0	154.9		155		
580	15	70						<b>PREFERRED SITE</b>																			
580	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																			
								Assume cost is 10% of a CES greenfield site		Labour	0.1	588.3	0.1	58.83												59	2
										Materials and Equipment	0.1				0	0.1	0									0	
										Other	0.1							120	0.1	12					12		
										Contingency	50%										50%	1.0	35.4		35		
580	15	70	30					<b>PREFERRED SITE - CHARACTERISATION</b>																			
								Assume cost is 10% of a CES greenfield site		Labour	0.1	1484.8	0.1	148.48												148	3
										Materials and Equipment	0.1				0	0.1	0									0	
										Other	0.1							200	0.1	20					20		
										Contingency	0.5										50%	1.0	84.2		84		

<b>Total</b>	<b>824</b>
Check: Should = 0	0

Total	452 Total	0 Total	97 Total	274.6
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

REACTOR EXTENDED STORE								SILOS											
ACTIVITY SUMMARY TO DATA TRANSFER								Point Lepreau											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	20	0	0	0	0	0	0	0 System Development	Labour	STEP	CTECH	AM	279	285	7	0	0	NO DATA TO FILL	4140.5
580	20	0	0	0	0	0	0	0 System Development	Materials and Equipment	STEP	CTECH	AM	279	285	7	0	0		430.0
580	20	0	0	0	0	0	0	0 System Development	Other	STEP	CTECH	AM	279	285	7	0	0		163.4
580	20	0	0	0	0	0	0	0 System Development	Contingency	STEP	CTECH	AM	279	285	7	0	0		1814.2

INSTRUCTIONS																	
															Check: Total minus budget Should = 0	Total Cost	Budget costs to Years by %
ACTIVITY DETAIL ESTIMATE SUMMARY																	
															Check total	Total Cost \$k	
															0%		
Labour															4141	0.0	4140.5
Materials and Equipment															430	0.0	430.0
Other															163	0.0	163.4
Contingency															1814.2	0.0	1814.2
Total															6548	0.0	6548

INSTRUCTIONS																						
Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M	
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

ACTIVITY DETAIL ESTIMATE																						TOTAL								
WBS LEVEL								WBS Description / Detail								Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k
1	2	3	4	5	6	7	8											CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	
580	20							System Development										CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	
580	20	2						SYSTEM DEVELOPMENT MANAGEMENT																						
								Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for operating on both sites. Also for resident storage option selected as future storage method an additional 50% is deducted.								Labour	0.13	6690.40	0.13	878.12										878
								No entry in CES alternative cost category								Materials and Equipment	0.00										0			
								Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for operating on both sites. Also for resident storage option selected as future storage method an additional 50% is deducted.								Other	0.13				300.00	0.13	39.38							39
								Percentage for contingency assumed same as for CES								Contingency	30%										275			
580	20	5						SYSTEM OPTIMIZATION																						

Assume system development shared between 2 sites (NBP & HQ) Therefore factor = 1/2. Also for resident storage option selected as future storage method an additional 50% is deducted. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 30%

Labour	0.18	3303.70	0.18	607.05						607
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No entry in CES alternative cost category

Materials and Equipment	0				0.00	0.00	0.00			0
Other	0.18						120.00	0.18	22.05	22

Assume system development shared between 2 sites (NBP & HQ) Therefore factor = 1/2. Also for resident storage option selected as future storage method an additional 50% is deducted. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 30%

Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.00	188.73	189
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580 20 20

PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DECNT'M)

Assume system development shared between 2 sites (NBP & HQ) Therefore factor = 1/2. Also for resident storage option selected as future storage method an additional 50% is deducted. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%

Labour	0.08	20750.10	0.08	1634.07						1,634
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Allow large reduction due to no cask related feasibility studies and no fuel container dismantling techniques carried out in this RES alternative . Shared between NBP and HQ

Materials and Equipment	0.10				4300.00	0.10	430.00			430
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Assume system development shared between 2 sites (NBP & HQ) Therefore factor = 1/2. Also for resident storage option selected as future storage method an additional 50% is deducted. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%

Other	0.08						895.00	0.08	70.48	70
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Percentage for contingency assumed same as for CES	Contingency	50%						50%	1.00	1067.28	1,067
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580 20 30

STORAGE SYSTEM ENG'NG

<p>Assume system development shared between 2 sites (NBP &amp; HQ) Therefore factor = 1/2. Also for resident storage option selected as future storage method an additional 50% is deducted. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%</p>	Labour	0.08	8143.20	0.08	641.28					641		
	Materials and Equipment	0				0.00	0.00	0.00			0	
	Other	0.08					200.00	0.08	15.75	16		
No entry in CES alternative cost category	Contingency	25%							25%	1.00	164.26	164

580 20 40

**SECURITY & SAFEGUARD ENGIN**

<p>Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Smaller site than CES therefore a further factor of 50% is included</p>	Labour	0.26	1447.70	0.26	380.02					380		
	Materials and Equipment	0				0.00	0.00	0.00			0	
	Other	0.26					60.00	0.26	15.75	16		
No entry in CES alternative cost category	Contingency	30%							30%	1.0	118.7	119

<b>Total</b>	<b>6,548</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	4,141	Total	430	Total	163	Total	1,814.2
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1
- 2
- 3
- 4

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K
580	25							Safety Assessment	Labour	STEP	OPG	RJH	1	290	40			1428.3
580	25							Safety Assessment	Materials and Equipment	STEP	OPG	RJH	1	290	40			241.5
580	25							Safety Assessment	Other	STEP	OPG	RJH	1	290	40			667.9
580	25							Safety Assessment	Contingency	STEP	OPG	RJH	1	290	40			

NO DATA TO FILL

**INSTRUCTIONS**

ACTIVITY DETAIL ESTIMATE SUMMARY	Cost Category	Total Cost	Check total	Total Cost \$k	Check: Total minus budget Should = 0	Budget costs to Years by %
	Labour	1428		1428.3		
	Materials and Equipment					
	Other	242		241.5		
	Contingency	667.9		667.9		
	Total	2338		2338		

**INSTRUCTIONS**

Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint, copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M		
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number	
<b>ACTIVITY DETAIL ESTIMATE</b>																					<b>TOTAL</b>		
WBS LEVEL			WBS Description / Detail			Cost Category			Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k	
1	2	3	4	5	6	7	8																

580	25																							
580	25	10	Safety Assessment					CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES					
580	25	10	SAFETY ASSESSMENT MANAGEMENT																					
			RES = 11 yrs vs CES = 17 yrs. Share costs over 7 sites. Thus factor is 0.08. However due to inefficiencies of multiple sites increase to 0.2					Labour	0.05	5218.2	0.05	260.91											261	
							Materials and Equipment	0.05				0.05											1	
							Other	0.05					850	0.05	42.5							43		
							Contingency	40%								40%	1.0	121.4				121		
580	25	30	SA - SITING																					
			Limited siting work leads to no SA work					Labour		2287.5														2
							Materials and Equipment																	
							Other						3,850											
							Contingency	40%								40%	1.0							
580	25	40	SA - OPERATING LICENSE																					
							Labour	0.1	1540.5	0.1	154.05											154	3	
							Materials and Equipment	0.1				0.1												
							Other	0.1					300	0.1	30							30		
							Contingency	40%								40%	1.0	73.6				74		
580	25	50	SA - FACILITY OPERATIONS																					

RES has 30 renewal events vs 45 in CES. However renewal costs can be shared between 5 sites with same technology; thus reduce factor to 0.08	Labour	0.08	9604.8	0.08	768.384					768		
Expenses at at \$0.5K/a x 277 yrs	Materials and Equipment	1			1							
	Other	1				139	1	139		139		
	Contingency	40%							40%	1.0	363.0	363
SA - DECOMMISSIONING (Processing Facilities)												
RES has 1 decommissioning events - while CES has 3. Costs can be shared between sites with same technology; thus factor to 0.15	Labour	0.1	2449.9	0.1	244.99					245		
Expenses at at \$0.5K/a x 276 yrs	Materials and Equipment	0.1			0.1							
	Other	0.1				300	0.1	30		30		
	Contingency	40%							40%	1.0	110.0	110
<b>Total</b>										<b>2,338</b>		
<b>Check: Should = 0</b>												
Total		1,428		Total		Total		242		Total		667.9
Check: Should = 0		Check: Should = 0		Check: Should = 0		Check: Should = 0		Check: Should = 0				

580 25 70

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Note if appropriate,
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour	STEP	OPG	RJH	14	290	277	0	0	NO DATA TO FILL	3081.5
580	30	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment	STEP	OPG	RJH	14	290	277	0	0	0.0		
580	30	0	0	0	0	0	0 Licensing & Approvals	Other	STEP	OPG	RJH	14	290	277	0	0	15568.2		
580	30	0	0	0	0	0	0 Licensing & Approvals	Contingency	STEP	OPG	RJH	14	290	277	0	0	4668.4		

**INSTRUCTIONS**

	Check: Total minus budget Should = 0		Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
		0%	
Labour	3082	0.0	3081.5
Materials and Equipment	0	0.0	0.0
Other	15568	0.0	15568.2
Contingency	4668.4	0.0	4668.4
Total	23318	0.0	23318

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k	TOTAL			
1	2	3	4	5	6	7	8				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES					
580	30							Licensing & Approvals																			
580	30	30						LIAISON WITH CNSC																			
Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2									Labour	0.2	555	0.2	111										111				
									Materials and Equipment	0.2				0	0.2	0										0	1
									Other	0.2				40	0.2	8										8	
									Contingency	0.3													30%	1.0	35.7	36	
									580	30	50					CNSC CONSTRUCTION LICENCE											
Some inefficiencies gained due to multiple sites									Labour	0.2	2631	0.2	526.2										526	2			
									Materials and Equipment	0.2				0	0.2	0										0	
									Other	0.2				6,264	0.2	1252.8										1,253	
									Contingency	0.25													25%	1.0	444.8	445	
580	30	60					OTHER GOV'NT APPROVALS																				
580	30	60	10				APPROVAL REQUIREMENTS																				
Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2									Labour	0.2	337	0.2	67.4										67				
									Materials and Equipment	0.2				0	0.2	0										0	



		Other	0.2			0	0.2	0								0			
		Contingency	0.25						25%	1.0	16.9					17			
580	30	60	30	FEDERAL APPROVALS															
		Labour	0.2	133	0.2	26.6										27			
		Materials and Equipment	0.2				0	0.2	0							0			
		Other	0.2						0	0.2	0					0			
		Contingency	0.25									25%	1.0	6.7	7				
580	30	60	40	PROVINCIAL APPROVALS															
		Labour	0.2	133	0.2	26.6										27			
		Materials and Equipment	0.2				0	0.2	0							0			
		Other	0.2						0	0.2	0					0			
		Contingency	0.25									25%	1.0	6.7	7				
580	30	60	50	MUNICIPAL APPROVALS															
		Labour	0.2	133	0.2	26.6										27			
		Materials and Equipment	0.2				0	0.2	0							0			
		Other	0.2						0	0.2	0					0			
		Contingency	0.25									25%	1.0	6.7	7				
580	30	65	CNSC OPERATING LICENCE (Initial Application)																
		Labour	0.2	513	0.2	102.6										103			
		Materials and Equipment	0.2				0	0.2	0							0			
		Other	0.2						902	0.2	180.4					180			
		Contingency	0.25									25%	1.0	70.8	71				
580	30	70	CNSC OPERATING LICENCE (Maintenance & Renewal)																
		Labour	0.067	32754	0.067	2194.518										2,195			
		Materials and Equipment	1				0	1	0							0			
		Expenses at \$51K/a x 277 yrs	1						14,127	1	14127					14,127			
		Contingency	0.25									25%	1.0	4,080.4	4,080				
													<b>Total</b>	<b>23,318</b>					
													<b>Check: Should = 0</b>	<b>0</b>					
Total				3,082 Total				0 Total				15,568 Total				4,668.4			
Check: Should = 0				0 Check: Should = 0				0 Check: Should = 0				0 Check: Should = 0				-10,900			

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Note if appropriate,
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K		
580	35							Public Affairs	Labour	STEP	OPG	RJH	1	85	10			NO DATA TO FILL	683.8	
580	35						Public Affairs	Materials and Equipment	STEP	OPG	RJH	1	85	10						
580	35						Public Affairs	Other	STEP	OPG	RJH	1	85	10						461.8
580	35						Public Affairs	Contingency	STEP	OPG	RJH	1	85	10						572.8

**INSTRUCTIONS**

INSTRUCTIONS																	Check: Total minus budget Should = 0	Total Cost \$k	Budget costs to Years by %
<b>ACTIVITY DETAIL ESTIMATE SUMMARY</b>																	Check total	Total Cost \$k	
Labour																	684	683.8	
Materials and Equipment																			
Other																	462	461.8	
Contingency																	572.8	572.8	
Total																	1718	1718	

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k	
1	2	3	4	5	6	7	8				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
580	35							Public Affairs																
580	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
								Labour	0.05	3046.2	0.05	152.31												152
								Materials and Equipment	0.05				0.05											
								Other	0.05								600	0.05	30					30
								Contingency	50%											50%	1.0	91.2		91
580	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
								Labour	0.05	4569.3	0.05	228.465												228
								Materials and Equipment	0.05				0.05											
								Other	0.05								1,450	0.05	72.5					73
								Contingency	50%											50%	1.0	150.5		150
580	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
								Labour	0.05	2528.9	0.05	126.445												126
								Materials and Equipment	0.05				0.05											
								Other	0.05								800	0.05	40					40
								Contingency	50%											50%	1.0	83.2		83

580 35 110

PUBLIC AFFAIRS - PROGRAM MANAGEMENT

Labour	0.05	3530.8	0.05	176.54						177		
Materials and Equipment	0.05				0.05							
Other	0.05					170	0.05	8.5		9		
Contingency	50%								50%	1.0	92.5	93

580 35 120

Community Offsets & Benefits

Labour	0.15		0.15									
Materials and Equipment	0.15				0.15							
Other	0.15					2,072	0.15	310.8		311		
Contingency	50%								50%	1.0	155.4	155

<b>Total</b>	<b>1,718</b>
<b>Check: Should = 0</b>	

Total	684 Total	Total	462 Total	572.8
Check: Should = 0	Check: Should = 0	Check: Should = 0	Check: Should = 0	

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Note if appropriate,
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.

REACTOR EXTENDED STORE								SILOS											
ACTIVITY SUMMARY TO DATA TRANSFER								Point Lepreau											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	40	0	0	0	0	0	0	Facility Design & Construction	Labour	STEP	CTECH	AM	40	285	5	0	0	NO DATA TO FILL	5472.0
580	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment	STEP	CTECH	AM	40	285	5	0	0		8090.2
580	40	0	0	0	0	0	0	Facility Design & Construction	Other	STEP	CTECH	AM	40	285	5	0	0		0.0
580	40	0	0	0	0	0	0	Facility Design & Construction	Contingency	STEP	CTECH	AM	40	285	5	0	0		6032.2

**INSTRUCTIONS**

ACTIVITY DETAIL ESTIMATE SUMMARY																		
															Check total	Total Cost \$k	Check: Total minus budget Should = 0	Budget costs to Years by %
															0.0	5472.0		
															0.0	8090.2		
															0.0	0.0		
															0.0	6032.2		
															0.0	19594		

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL		WBS Description / Detail		Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k		
1	2	3	4	5	6	7	8	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	

580	40							Facility Design & Construction												
580	40	10						SITE & IMPROVEMENTS												
								a 10% allowance of the CES costs, applied to the site improvements	Labour	0.10	45,930.4	0.1	4,593.0							4,593
									Materials and Equipment	0.10			58,350.0	0.1	5,835.0					5,835
								no property acquisition required	Other	0.00					3,375.0	0.0	0.0			0
								Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	5,214.0	5,214
580	40	30						COMMON ANCILLARY FACILITIES												
580	40	30	10					ADMIN AND SUPPORT FACILITIES												
580	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG												
								Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	486.3	0.0	0.0						comment 7	0
									Materials and Equipment	0.0			784.2	0.0	0.0					0
								No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0			0
								Percentage for contingency assumed same as for CES	Contingency	20%							20%	1.0	0.0	0
580	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG												
								Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,294.8	0.0	0.0						comment 7	0

						Materials and Equipment	0.0		1,612.6	0.0	0.0						0
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	20%						20%	1.0	0.0	0
580	40	30	10	3		EQUIP STORAGE AND MAINT'CE BLDG											
						Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,262.1	0.0	0.0					comment 7	0
							Materials and Equipment	0.0		1,675.0	0.0	0.0					0
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	20%						20%	1.0	0.0	0
580	40	30	10	5		ACTIVE SOLID WASTE HDLG BLDG											
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	459.9	0.3	138.0						138
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Materials and Equipment	0.3		1,135.0	0.3	340.5					341
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	143.5	144
580	40	30	10	6		SOLID WASTE STORAGE AREA											
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	458.8	0.3	137.6						138
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Materials and Equipment	0.3		437.5	0.3	131.3					131
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	80.7	81
580	40	30	10	7		ACTIVE LIQ/W TRT'MT BLDG											
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	359.4	0.3	107.8						108
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Materials and Equipment	0.3		1,727.0	0.3	518.1					518
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	187.8	188
580	40	30	10	8		LOW LVL LIQ/W STRG BLDG											
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	373.7	0.3	112.1						112
						A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Materials and Equipment	0.3		1,426.0	0.3	427.8					428
						No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0			0
						Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	162.0	162
580	40	30	10	9		WAREHOUSE BLDG											

580	40	30	10	10	Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	470.9	0.0	0.0					comment 7	0				
						Materials and Equipment	0.0				550.0	0.0	0.0						0	
						Other	0.0							0.0	0.0	0.0				0
						Contingency	20%											20%	1.0	0.0

GUARDHOUSE AND SECURITY FENCE

580	40	30	10	10	Building and security exist therefore new building and fence not required. Allowance for refurbishment covered in ***/45/20/50	Labour	0.0	631.2	0.0	0.0					comment 7	0				
						Materials and Equipment	0.0				553.7	0.0	0.0						0	
						Other	0.0							0.0	0.0	0.0				0
						Contingency	20%											20%	1.0	0.0

TRUCK INSPN / WASH STATION

580	40	30	10	11	not req'd as no fuel transported off site	Labour	0.0	872.2	0.0	0.0					comment 7	0				
						Materials and Equipment	0.0				1,075.0	0.0	0.0						0	
						Other	0.0							389.4	0.0	0.0				0
						Contingency	20%											20%	1.0	0.0

UTILITY BLDG

580	40	30	10	12	Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,023.2	0.0	0.0					comment 7	0				
						Materials and Equipment	0.0				1,257.0	0.0	0.0						0	
						Other	0.0							0.0	0.0	0.0				0
						Contingency	30%											30%	1.0	0.0

TEST FACILITY CONSTRUCTION

580	40	30	10	13	Taken as being independent of fuel inventory stored. Same size bldg as CES. Facility will be shared by NBP and HQ therefore cost will be 50% of CES costs.	Labour	0.5	766.8	0.5	383.4							383				
						Materials and Equipment	0.5				1,675.0	0.5	837.5							838	
						Other	0.0							0.0	0.0	0.0					0
						Contingency	20%											20%	1.0	244.2	244

OTHER SITE SYSTEMS

FIRE PROTECTION SYSTEMS

580	40	30	20	1	assumed available and turned over to RES during transition	Labour	0.00	1,022.2	0.0	0.0					comment 7	0				
						Materials and Equipment	0.00				676.2	0.0	0.0						0	
						Other	0.0							0.0	0.0	0.0				0
						Contingency	25%											25%	1.0	0.0

SECURITY AND COMMUNICATION SYSTEM

580	40	30	20	2	assumed available and turned over to RES during transition	Labour	0.00	607.5	0.0	0.0					comment 7	0			
						Materials and Equipment	0.00				600.0	0.0	0.0						0
						Other	0.0							0.0	0.0	0.0			

				Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	0.0	0	
580				<b>ELECTRICAL AND EMERGENCY POWER</b>											
580	40	30	20	3	assumed available and turned over to RES during transition	Labour	0.00	1,939.6	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			1,932.0	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	0.0	0
580	40	30	20	4	<b>SANITARY SEWER SYSTEM</b>										
					assumed available and turned over to RES during transition	Labour	0.00	339.2	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			310.5	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	0.0	0
580	40	30	20	5	<b>POTABLE WATER SYSTEM</b>										
					assumed available and turned over to RES during transition	Labour	0.00	371.6	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			148.0	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	0.0	0
580	40	30	20	6	<b>RETENTION/SEDIMENTATION POND</b>										
					assumed available and turned over to RES during transition	Labour	0.00	874.4	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			189.6	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	30%					30%	1.0	0.0	0
580	40	30	20	7	<b>STORM WATER DETENTION POND</b>										
					assumed available and turned over to RES during transition	Labour	0.00	387.8	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			93.5	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	30%					30%	1.0	0.0	0
580	40	30	20	8	<b>CONSTN MAT'L STOCKPILE AREA</b>										
					not req'd, concrete brought in as req'd from off-site	Labour	0.00	1,039.2	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			625.0	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	15%					15%	1.0	0.0	0
580	40	30	20	9	<b>SITE MATERIALS STORAGE AREA</b>										
					assumed available and turned over to RES during transition	Labour	0.00	1,169.5	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			655.0	0.0	0.0			0
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0
					Percentage for contingency assumed same as for CES	Contingency	15%					15%	1.0	0.0	0
580	40	30	20	10	<b>ACCESS ROADS AND VEHICLE COMPOUNDS</b>										
					assumed available and turned over to RES during transition	Labour	0.00	1,319.9	0.0	0.0				comment 7	0
						Materials and Equipment	0.00			1,866.9	0.0	0.0			0

No entry into cost category	Other	0.0					0.0	0.0	0.0				0
Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0	0

580 40 30 30

CONST'N INDIRECTS ANCILLARY FACILITIES

assumed available and turned over to RES during transition	Labour	0.00	4,406.4	0.0	0.0								comment 7	0
	Materials and Equipment	0.00				6,610.9	0.0	0.0						0
No entry into cost category	Other	0.0					0.0	0.0	0.0					0
Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0	0	

<b>Total</b>	<b>19,594</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	5,472	Total	8,090	Total	0	Total	6,032.2
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

1 Cost information on silos extracted from OPG R.Heystee email date 11-01-03 : 'PLGS dry canister costs for RES costing' cost includes; materials supply, construction, testing and project management: \$60K per canister Fall 2001 dollars. Labour and materials split approx. 33% materials/67%labour

- 2
- 3
- 4



**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	45	0	0	0	0	0	0	0 Facility Operation	Labour	STEP	CTECH	AM	14	290	277	0	0	NO DATA TO FILL	355464.0
580	45	0	0	0	0	0	0 Facility Operation	Materials and Equipment	STEP	CTECH	AM	14	290	277	0	0	137271.6		
580	45	0	0	0	0	0	0 Facility Operation	Other	STEP	CTECH	AM	14	290	277	0	0	151097.6		
580	45	0	0	0	0	0	0 Facility Operation	Contingency	STEP	CTECH	AM	14	290	277	0	0	167378.1		

**INSTRUCTIONS**

Check: Total minus budget Should = 0	Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$K
Labour	355464	0.0	355464.0
Materials and Equipment	137272	0.0	137271.6
Other	151098	0.0	151097.6
Contingency	167378	0.0	167378.1
Total	811211	0.0	811211

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number	
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated		
<b>ACTIVITY DETAIL ESTIMATE</b>																		<b>TOTAL</b>		
WBS LEVEL		WBS Description / Detail		Cost Category		Factor		Labour			Materials and other Equipment			Other			Contingency			Cost \$K
1	2	3	4	5	6	7	8													

580	45	Facility Operation		CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES			
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580	45	20	OPERATIONS - EXTENDED MONITORING																						
580	45	20	5	PROGRAM MANAGEMENT																					
					Labour	0.082	312,354.0	0.1	25,636.2											25,636	6				
					Materials and Equipment	0.0			0.0	0.0	0.0											0			
					Other	1.00					108,620.8	1.0	108,620.8											108,621	5
					Contingency	20%								20%	1.0	26,851.4			26,851						

Entries in CES DET applicable to RES but duration 277 yrs RES & 300 years CES therefore 277/300 = 0.923. Program management spread over 7 sites with Pt Lepreau assumed to have 0.8 staff vs 9 in CES. Thus combined factor = 0.082

No entry in CES alternative cost category

Annual cost = \$705/a x 277 yrs

Percentage for contingency assumed same as for CES

580	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING																					
					Labour	0.04	49,716.0	0.0	1,938.6											1,939	6				
					Materials and Equipment	1.00			277.0	1.0	277.0											277	7		
					Other	0.0					0.0	0.0	0.0											0	
					Contingency	50%								50%	1.0	1,107.8			1,108						

CES monitoring and surveillance duration was 300 yrs for 4717 baskets, RES is 277 years for 1992 baskets. Pt Lepreau assumed to have 0.5 staff for RES vs 5 in CES. Combined factor based on duration, fuel inventory and staffing levels.

annual costs = \$1k/a x 277 years

No entry in CES alternative cost category

Percentage for contingency assumed same as for CES

580	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)															
<p>Entries in CES DET applicable to RES but duration 277 years RES &amp; 300 years CES. Staff for RES = 7 vs 34 in CES. Combined factor = 277/300 x 7/34. M&amp;E costs are \$75k/a x 277 years. Armed response = \$50k/a + energy costs at \$5k/a. total = \$55k x 277 years</p>				Labour	0.19	875,048.0	0.2	166,344.9						166,345	6				
				Materials and Equipment	1.00			20,775.0	1.0	20,775.0						20,775	7		
				Other	1.00					15,235.0	1.0	15,235.0						15,235	7
				Contingency	30%							30%	1.0	60,706.5	60,706				
				Percentage for contingency assumed same as for CES															

580	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)															
<p>RES has duration 277 years, CES has 300 years. RES staff is 1 vs 5 in CES. Factor is 277/300 x 1/5. No entry in CES alternative cost category</p>				Labour	0.18	148,529.0	0.2	27,428.4						27,428	6				
				Materials and Equipment	0.0			0.0	0.0	0.0						0			
				Other	0.0					0.0	0.0	0.0						0	
				Contingency	25%							25%	1.0	6,857.1	6,857				
				Percentage for contingency assumed same as for CES															

580	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)															
<p>RES has duration 277 years, CES has 300 years. RES staff is 0.1 vs 0.5 in CES. Factor is 277/300 x 0.1/0.5. annual M+E costs is \$2.5k/a x 277 years. Other costs is \$0.5k/a x 277 years</p>				Labour	0.2	4,631.0	0.2	855.2						855	6				
				Materials and Equipment	1.0			692.5	1.0	692.5						693	7		
				Other	1.0					138.5	1.0	138.5						139	7
				Contingency	50%							50%	1.0	843.1	843				
				Percentage for contingency assumed same as for CES															

580	45	30		OPERATIONS - FACILITY REPEATS															
580	45	30	20	SILOS 100 YEAR REPLACEMENT															
580	45	30	20	10	DEMOLISH EXISTING STORAGE SILOS														
<p>costs taken from CES basket vault demolition, rated at \$104 per tonne of reinforced concrete. Each silo = 115 tonne x 222 silos =25,530Te. Split 50/50 labour/materials. No costs in this category</p>				Labour	12765.00	0.104	12,765.0	1,327.6						1,328	3				
				Materials and Equipment	12765.00			0.104	12,765.0	1,327.6						1,328	3		
				Other	0					0.0	0.0	0.0						0	
				Contingency	30%							30%	1.0	796.5	797				
				Percentage for contingency assumed same as for CES															

580	45	30	20	20	SILO CONSTRUCTION														
<p>222 silos constructed at this point with total capacity of 1992 baskets cost per silo = \$60K. Allow 67% labour 33% materials. No costs in this category</p>				Labour	148.74	60.0	148.7	8,924.4						8,924	1				
				Materials and Equipment	73.26			60.0	73.3	4,395.6						4,396	1		
				Other	0					0.0	0.0	0.0						0	
				Contingency	30%							30%	1.0	3,996.0	3,996				
				Percentage for contingency for silos construction assumed same as for CES basket vaults construction															

580	45	30	20	30	TRANSFER OPERATIONS														
<p>assume same transfer rate as CES CVSB basket vault transfer. CVSB has 4717 baskets, RES has 1992 baskets, ratio = 0.42. No costs in this category. Armed response included at rate of \$50k/a based on 5 years duration - see note 8.</p>				Labour	0.42	990.0	0.42	418.1						418					
				Materials and Equipment	0.00			0.0	0.0	0.0						0			
				Other	1					250.0	1.0	250.0						250	8
				Percentage for contingency assumed same as for CES basket vaults construction															

Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	200.4	200
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580 45 30 20 40

WASTE DISPOSAL

No costs in this category	Labour	0	0.0	0.0	0.0							0		
No costs in this category	Materials and Equipment	0				0.0	0.0	0.0				0		
costs taken from CES basket vault waste disposal, rated at \$200 per tonne of reinforced concrete. Each silo = 115 tonne x 222 silos =25,530Te.	Other	25530						0.2	25,530.0	5,106.0		5,106	3	
	Contingency	30%									30%	1.0	1,531.8	1,532

580 45 30 50

SILOS 200 YEAR REPLACEMENT

assumed same as 100 yr replacement	Labour					10,670.0						10,670	
assumed same as 100 yr replacement	Materials and Equipment							5,723.2				5,723	
assumed same as 100 yr replacement	Other									5,356.0		5,356	
assumed same as 100 yr replacement	Contingency											6,524.8	6,525

580 45 30 70

SILOS 300 YEAR REPLACEMENT

assumed same as 100 yr replacement	Labour					10,670.0						10,670	
assumed same as 100 yr replacement	Materials and Equipment							5,723.2				5,723	
assumed same as 100 yr replacement	Other									5,106.0		5,106	9
Percentage for contingency assumed same as for CES	Contingency											6,524.8	6,525

580 45 40

OPERATIONS - REPACKAGING

580 45 40 5

PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)

	Labour	0.05	389,170.0	0.1		20,482.6						20,483	
Entries in CES DET applicable to RES but duration 30 years RES = 3x(2yr licensing 1yr demolish prev. bldg, 2yr const'n, 5yr operations) & 114 years CES therefore 30/114 = 0.263. Program management spread over 7 sites, recognising inefficiency use 20 %													
No entry in CES alternative cost category	Materials and Equipment	0.0					0.0	0.0	0.0			0	
property tax based on 15 year duration (3 events x 5 years)	Other	1.00						5,478.2	1.0	5,478.2		5,478	10
Percentage for contingency assumed same as for CES	Contingency	20%										5,192.2	5,192

580 45 40

580 45 40 10 40

OPERATIONS - REPACKAGING

COMMON ANCILLARY FACILITIES (REPLACEMENT)

only require full ancillary buildings (13) at 300yr RPBB event, for 100 & 200yr facility repeats, the replacement of 7 ancillary buildings is required. Therefore combined factor = ((7/13)*2) + 1	Labour	2.1	21,056.2	2.1		43,732.1						43,732	
	Materials and Equipment	2.1						29,785.1	2.1	61,861.4		61,861	
No entry in CES alternative cost category	Other	0.00								0.0	0.0	0.0	0
Percentage for contingency assumed same as for CES	Contingency	22%										23,230.6	23,231

580 45 40 10 600 30

ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)

duration 24 years RES compared to 30 years CES. Factor =24/30 = 0.8	Labour	0.8	11,882.0	0.8		9,505.6						9,506	2
No entry in CES alternative cost category	Materials and Equipment	0.0					0.0	0.0	0.0			0	
No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0		0	

Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	2,376.4	2,376
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580 45 40 40

BASKET TO BASKET 300 YEAR REPACKAGING

580 45 40 40 05

CONSTRUCTION FACILITIES - REPACK'NG PLANT Basket (RPB)

assumed same facility as CES therefore factor = Labour = 1		1.0	476.1	1.0	476.1							476
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			354.6	1.0	354.6					355
assumed same facility as CES therefore factor = Other = 1		1.0					228.4	1.0	228.4			228
same contingency as for CES	Contingency	30%							30%	1.0	317.7	318

580 45 40 40 10

PROCESSING BUILDING - REPACK'NG PLANT Basket (RPB)

580 45 40 40 10 20

RPBB EQUIP. DESIGN, SUPPLY & INSTALL

580 45 40 40 10 20 10

RECEIPT & TRANSFER (EQUIP)

assumed same facility as CES therefore factor = Labour = 1		1.0	70.8	1.0	70.8							71
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			1,415.0	1.0	1,415.0					1,415
assumed same facility as CES therefore factor = Other = 1		1.0					74.3	1.0	74.3			74
same contingency as for CES	Contingency	30%							30%	1.0	468.0	468

580 45 40 40 10 20 20

BASKET TO BASKET FUEL TRANSFER

assumed same facility as CES therefore factor = Labour = 1		1.0	2,319.4	1.0	2,319.4							2,319
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			11,597.0	1.0	11,597.0					11,597
assumed same facility as CES therefore factor = Other = 1		1.0					695.8	1.0	695.8			696
same contingency as for CES	Contingency	30%							30%	1.0	4,383.7	4,384

580 45 40 40 10 20 30

BASKET DECONTAMINATION

assumed same facility as CES therefore factor = Labour = 1		1.0	854.6	1.0	854.6							855
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			4,563.0	1.0	4,563.0					4,563
assumed same facility as CES therefore factor = Other = 1		1.0					256.4	1.0	256.4			256
same contingency as for CES	Contingency	30%							30%	1.0	1,702.2	1,702

580 45 40 40 10 30

RPBB BUILDING DESIGN AND CONSTRUCTION

assumed same facility as CES therefore factor = Labour = 1		1.0	4,160.0	1.0	4,160.0							4,160
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			4,280.0	1.0	4,280.0					4,280
assumed same facility as CES therefore factor = Other = 1		1.0					832.0	1.0	832.0			832
same contingency as for CES	Contingency	30%							30%	1.0	2,781.6	2,782

580 45 40 40 10 60

BUILDING SERVICES (RPB)

assumed same facility as CES therefore factor = Labour = 1		1.0	4,447.8	1.0	4,447.8							4,448
assumed same facility as CES therefore factor = Materials and Equipment = 1		1.0			4,153.8	1.0	4,153.8					4,154
assumed same facility as CES therefore factor = Other = 1		1.0					1,309.4	1.0	1,309.4			1,309
same contingency as for CES	Contingency	25%							25%	1.0	2,477.8	2,478

580 45 40 40 10 70

COMMISSIONING (RPB)

	assumed same facility as CES therefore factor = 1	Labour	1.0	668.2	1.0	668.2							668		
	No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0		
	assumed same facility as CES therefore factor = 1	Other	1.0						126.3	1.0	126.3		126		
	same contingency as for CES	Contingency	50%									50%	1.0	397.3	397

580 45 40 40 10 80

CONSTN INDIRECTS (RPB)															
	assumed same facility as CES therefore factor = 1	Labour	1.0	6,299.6	1.0	6,299.6							6,300		
	No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0		
	assumed same facility as CES therefore factor = 1	Other	1.0						241.5	1.0	241.5		242		
	same contingency as for CES	Contingency	30%									30%	1.0	1,962.3	1,962

580 45 40 40 400

CONSTRUCTION MANAGEMENT (RPB)															
	assumed same facility as CES therefore factor = 1	Labour	1.0	4,690.6	1.0	4,690.6							4,691		
	No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0		
	No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0		0		
	same contingency as for CES	Contingency	30%									30%	1.0	1,407.2	1,407

580 45 40 40 500

COMMISSIONING MANAGEMENT (RPB)															
	assumed same facility as CES therefore factor = 1	Labour	1.0	113.3	1.0	113.3							113		
	No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0		
	assumed same facility as CES therefore factor = 1	Other	1.0						13.5	1.0	13.5		14		
	same contingency as for CES	Contingency	50%									50%	1.0	63.4	63

580 45 40 40 600

REPACKAGING OPERATIONS (RPB)															
	Labour for repackaging operations for CES is for a fuel inventory of 4717 baskets. RES has 1992 baskets requiring repackaging. The cost factor is a ratio of the fuel inventory = 1992/4717 = 0.422	Labour	0.42	3,960.8	0.4	1,672.7							1,673		
	the same factor for labour is used for procurement of new baskets	Materials and Equipment	0.42				23,585.0	0.4	9,960.0				9,960		
	the same factor for labour is used for waste disposal of old baskets	Other	0.42						378.0	0.4	159.6		160		
	same contingency as for CES	Contingency	30%									30%	1.0	3,537.7	3,538

580 45 40 40 700

OPERATION INDIRECTS (RPB)															
	operation indirect labour costs for CES are for a duration of 10 yrs RES operations are for 5 yrs therefore a factor of 0.5 is used	Labour	0.5	2,678.3	0.5	1,339.2							1,339		
	Assume same spares and consumables required as identical equipment is used for both CES & RES. Therefore factor = 1	Materials and Equipment	1.0				172.8	1.0	172.8				173		
	Assume energy consumption for running of facility can be factored relative to duration of facility operation = 5/10yrs = 0.5. Armed response included at rate of \$50k/a based on 5 years duration - see note 8.	Other	1.0						1,870.0	1.0	1,870.0		1,870		
	same contingency as for CES	Contingency	30%									30%	1.0	1,014.6	1,015

580 45 40 40 800

STORAGE OPERATIONS (RPB)													
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Labour for storage operations for CES is for a fuel inventory of 4717 baskets. RES has 1992 baskets requiring repackaging. The cost factor is a ratio of the fuel inventory = 1992/4717 = 0.422	Labour	0.42	990.2	0.4	418.2						418		
No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0	
No entry in CES alternative cost category	Other	0.0							0.0	0.0	0.0	0	
same contingency as for CES	Contingency	30%							30%	1.0	125.4	125	
											<b>Total</b>	<b>811,211</b>	
											<b>Check: Should = 0</b>	<b>0</b>	
Total		355,464		Total		137,272		Total		151,098		Total	167,378.1
Check: Should = 0		0		Check: Should = 0		0		Check: Should = 0		0		Check: Should = 0	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Cost information on silos extracted from OPG R.Heystee email date 11-01-03 : 'PLGS dry canister costs for RES costing' cost includes; materials supply, construction, testing and project management: \$60K per canister Fall 2001 dollars. Labour and materials split approx. 33% materials/67%labour
- 2 ancillary ops factored from CES CVSB. In CES this cost was for a 30 year period (covering 1 facility repeat and 1 repackaging event). for RES this covers 100/200&300year facility repeats & 300y repackaging 3x8 (1 demolish prev (y63), 2 const.n of 222 silos (y84,85) 5 ops for transfer) = 24
- 3 costs for silos demolition and waste disposal based on unit cost factors obtained for demolition of basket storage vaults in CVSB alternative
- 4
- 5 705k\$/a made up of expenses from table 18 in report (15+118+50+50+25). + Property tax at 2.6% of assessed building value (during ext. monitoring at 15%) of silos and ancillary buildings const'n cost (ie. \$17,316K + 17,077K)
- 6 staffing levels obtained from table 17 in cost estimate report 1105/MD18084/REP/17
- 7 annual costs for Labour/M&E and Other, obtained from table 18 in cost estimate report 1105/MD18084/REP/17
- 8 armed response costs during 'fuel handling' based on rate of \$100k/a. Due to \$50k/a for armed response included in extended monitoring, this means an additional \$50k/a is to be included for the duration of the facility repeat transfers/repackaging events (\$50k + \$50k = \$100k)
- 9 armed response not captured in 300 yr facility repeat for fuel transfers, as it is covered in basket repackaging at 300yr event
- 10 property tax for facility repeats and repacking based on 3 events at 5 years each duration. Tax based on assessed building value of silos and ancillary buildings. 15% of this tax is covered in ext. monitoring. The rate is increased to 50% for fuel handling events. Therefore the difference of 35% is included at the facil repats/repackaging entry. An additional cost is also included for property tax of the repackaging building over 5 years.

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**SILOS  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Labour	STEP	OPG	RJH	14	290	277	0	0	NO DATA TO FILL	14130.0
580	55	0	0	0	0	0	0 Environmental Assessment and Monitoring	Materials and Equipment	STEP	OPG	RJH	14	290	277	0	0	4155.0		
580	55	0	0	0	0	0	0 Environmental Assessment and Monitoring	Other	STEP	OPG	RJH	14	290	277	0	0	1538.5		
580	55	0	0	0	0	0	0 Environmental Assessment and Monitoring	Contingency	STEP	OPG	RJH	14	290	277	0	0	5947.1		

**INSTRUCTIONS**

	Check: Total minus budget Should = 0		Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	14130	0%	14130.0
Materials and Equipment	4155	0.0	4155.0
Other	1539	0.0	1538.5
Contingency	5947.1	0.0	5947.1
Total	25771	0.0	25771

**INSTRUCTIONS**

Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint, copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number	
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated		
<b>ACTIVITY DETAIL ESTIMATE</b>																						<b>TOTAL</b>	
WBS LEVEL			WBS Description / Detail			Cost Category			Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k	
1	2	3	4	5	6	7	8																

Total NBP fuel inventory is about 3% of CES inventory. Therefore it is assumed that the costs of EA & Monitoring program are significantly less than for CES. However there will be a "fixed" cost component to some costs which limit the amount by which costs can be reduced.

580	55		Environmental Assessment and Monitoring	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES
580	55	10	EA & MONITORING PROGRAM MANAGEMENT												
			Costs are incurred over the period Y14 to Y290 or 277 yrs vs 347 yrs in CES. RES has 0.1 staff vs 2 staff in CES. Factor is 277/347 x 0.1/2 = 0.04	Labour	0.04	70306	0.04	2812.24							2,812
			Expenses at \$1.5K/a x 277 yrs	Materials and Equipment	1		0	1	0					0	
				Other	1				416	1	416			416	
				Contingency	0.3							3228.24	0.3	968.472	968
580	55	20	CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT												

Assume C/L & EA process spans 3 years (Y80 to Y82) with with some preparation work in Y79; ie total of 4 years. Due to multiple sites with same technology can share costs	Labour	0.2	7471	0.2	1494.2							1,494
	Materials and Equipment	0.2				0	0.2	0				0
	Other	0.2						2,150	0.2	430		430
	Contingency	0.3								1924.2	0.3	577.26

580 55 40

GROUNDWATER MONITORING

Costs span the period Y14 to Y290 or 277 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.6 in CES. Factor is $276/330 \times 0.02/0.6 = 0.028$ .	Labour	0.028	37158	0.028	1040.424							1,040
	M&E at \$3K/a x 277 yrs	1				831	1	831				831
	Expenses at \$2K/a x 277 yrs	1						554	1	554		554
	Contingency	0.3								2425.424	0.3	727.6272

580 55 50

RADIOLOGICAL BIOSPHERE MONITORING

Costs span the period Y14 to Y290 or 277 yrs vs 330 ys for CES. RES staff is 0.1 vs 3.3 staff in CES. Factor is 0.025	Labour	0.025	217280	0.025	5432							5,432
	M&E at \$9K/a x 277 yrs	1				2493	1	2493				2,493
	Other	1						0	1	0		0
	Contingency	0.3								7925	0.3	2377.5

580 55 60

NON-RAD BIOSPHERE MONITORING

Costs span the period Y14 to Y290 or 277 yrs vs 330 in CES. RES staff is 0.05 staff vs 0.8 staff in CES. Factor is $277/330 \times 0.05/0.8 = 0.052$	Labour	0.052	53590	0.052	2786.68							2,787
	M&E at \$3K/a x 277 yrs	1				831	1	831				831
	Other	1						0	1	0		0
	Contingency	0.3								3617.68	0.3	1085.304

580 55 80

HUMAN HEALTH MONITORING

Costs span the period Y14 to Y290 or 277 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.17 in CES. Factor is $277/330 \times 0.02/0.17 = 0.098$	Labour	0.098	5760	0.098	564.48							564
	Materials and Equipment	1				0	1	0				0



Expenses at 0.5K/a x 277 yrs

Other	1		139	1	138.5			139
Contingency	0.3					702.98	0.3	210.894

<b>Total</b>	<b>25,771</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	14,130 Total	4,155 Total	1,539 Total	5,947.1
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

REACTOR EXTENDED STORE										SILOS									
ACTIVITY SUMMARY TO DATA TRANSFER										Point Lepreau									
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
580	90	0	0	0	0	0	0	0 Program Management	Labour	STEP	CTECH	AM	1		13	13	0	0	171.4
580	90	0	0	0	0	0	0	0 Program Management	Materials and Equipment	STEP	CTECH	AM	1		13	13	0	0	0.0
580	90	0	0	0	0	0	0	0 Program Management	Other	STEP	CTECH	AM	1		13	13	0	0	234.8
580	90	0	0	0	0	0	0	0 Program Management	Contingency	STEP	CTECH	AM	1		13	13	0	0	81.2

NO DATA TO FILL

**INSTRUCTIONS**

Check: Total minus budget Should = 0		Budget costs to Years by %
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ACTIVITY DETAIL ESTIMATE SUMMARY	Cost Category	Total Cost	Check total	Total Cost \$k
	Labour	171	0%	171.4
	Materials and Equipment	0	0.0	0.0
	Other	235	0.0	234.8
	Contingency	81.2	0.0	81.2
	Total	487	0.0	487

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number	
WBS LEVEL	WBS Description / Detail	Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	Total Cost is calculated	Cost \$k											
1	2	3	4	5	6	7	8	580	90	Program Management										

**Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 7% for Pt Lepreau**

based on 5 staff. Assume 3 x OPG01, 2 x OPG03 for 13 year duration

no entry

The following expenses: Public affairs, overheads, insurance, community compensation & legal fees for the duration

Contingency as CES value

	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	CES	Factor	RES
Labour	0.07	2448.8436	0.07	171.419052								171
Materials and Equipment	0			0	0	0						0
Other	0.07					3354	0.07	234.78				235.1
Contingency	20%								20%	1.0		81.2

Total	487
Check: Should = 0	0

Total 487  
Check: Should = 0

171 Total 0 Total 235 Total 81.2  
Check: Should = 0 0 Check: Should = 0 0 Check: Should = 0 0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 other costs made up of expenses from table 18 in report (15+118+50+50+25).
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.

<b>RES ALTERNATIVE</b> <b>WBS No 580</b> <b>SILOS</b> <b>Point Lepreau</b>	Cost Category	Total K\$
	Labour	385,024
	Materials and Equipment	149,947
	Other	169,403
	Contingency	187,436
<b>Total Cost</b>	<b>891,809.79</b>	

															<b>891,810</b>
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	Responsible	Cost Category	WBS Type	Start Year	End Year	Dur'n	Contingency	Total K\$
580	15	0	0	0	0	0	0	RJH	Labour	STEP	1	82	7	0	452
580	15	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	82	7	0	0
580	15	0	0	0	0	0	0	RJH	Other	STEP	1	82	7	0	97
580	15	0	0	0	0	0	0	RJH	Contingency	STEP	1	82	7	0	275
580	20	0	0	0	0	0	0	AM	Labour	STEP	279	285	7	0	4,141
580	20	0	0	0	0	0	0	AM	Materials and Equipment	STEP	279	285	7	0	430
580	20	0	0	0	0	0	0	AM	Other	STEP	279	285	7	0	163
580	20	0	0	0	0	0	0	AM	Contingency	STEP	279	285	7	0	1,814
580	25	0	0	0	0	0	0	RJH	Labour	STEP	1	290	40	0	1,428
580	25	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	290	40	0	0
580	25	0	0	0	0	0	0	RJH	Other	STEP	1	290	40	0	242
580	25	0	0	0	0	0	0	RJH	Contingency	STEP	1	290	40	0	668
580	30	0	0	0	0	0	0	RJH	Labour	STEP	14	290	277	0	3,082
580	30	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	14	290	277	0	0
580	30	0	0	0	0	0	0	RJH	Other	STEP	14	290	277	0	15,568
580	30	0	0	0	0	0	0	RJH	Contingency	STEP	14	290	277	0	4,668
580	35	0	0	0	0	0	0	RJH	Labour	STEP	1	85	10	0	684
580	35	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	85	10	0	0
580	35	0	0	0	0	0	0	RJH	Other	STEP	1	85	10	0	462
580	35	0	0	0	0	0	0	RJH	Contingency	STEP	1	85	10	0	573
580	40	0	0	0	0	0	0	AM	Labour	STEP	40	285	5	0	5471.98
580	40	0	0	0	0	0	0	AM	Materials and Equipment	STEP	40	285	5	0	8090.15
580	40	0	0	0	0	0	0	AM	Other	STEP	40	285	5	0	0
580	40	0	0	0	0	0	0	AM	Contingency	STEP	40	285	5	0	6032.157
580	45	0	0	0	0	0	0	AM	Labour	STEP	14	290	277	0	355,464
580	45	0	0	0	0	0	0	AM	Materials and Equipment	STEP	14	290	277	0	137,272
580	45	0	0	0	0	0	0	AM	Other	STEP	14	290	277	0	151,098
580	45	0	0	0	0	0	0	AM	Contingency	STEP	14	290	277	0	167,378
580	55	0	0	0	0	0	0	RJH	Labour	STEP	14	290	277	0	14,130
580	55	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	14	290	277	0	4,155
580	55	0	0	0	0	0	0	RJH	Other	STEP	14	290	277	0	1,539
580	55	0	0	0	0	0	0	RJH	Contingency	STEP	14	290	277	0	5,947
580	90	0	0	0	0	0	0	AM	Labour	STEP	1	13	13	0	171
580	90	0	0	0	0	0	0	AM	Materials and Equipment	STEP	1	13	13	0	0
580	90	0	0	0	0	0	0	AM	Other	STEP	1	13	13	0	235
580	90	0	0	0	0	0	0	AM	Contingency	STEP	1	13	13	0	81

RES ALTERNATIVE  
WBS No 581  
POINT LEPREAU  
SURFACE MODULAR VAULTS

FUEL OWNER  
  
(SMV)

NEW BRUNSWICK POWER

Lev 2	WBS Name	Sheet Totals (\$k)
15	Siting	824
20	System Development	24,012
25	Safety Assessment	3,022
30	Licensing & Approvals	24,214
35	Public Affairs	1,718
40	Facility Design & Construction	153,883
45	Facility Operation	2,277,791
55	Environmental Assessment and Monitoring	26,941
90	Program Management	1,014
	<b>Total Cost (\$k)</b>	<b>2,513,418</b>

**Point Lepreau SMV Alternative** **2,513,418**

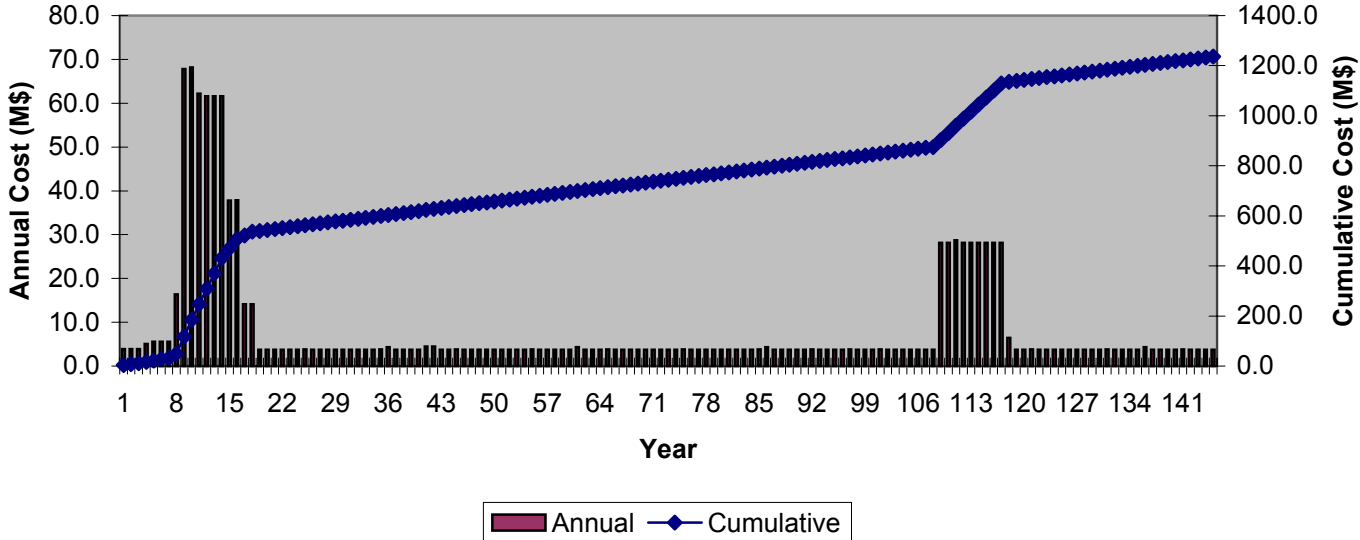
<b>Siting Phase</b>	<b>35,639</b>
Siting	824
EA	3,127
System Development	24,012
SA	1,365
L&A	3,580
Public Affairs	1,718
Program Mgmt	1,014

<b>Construction Phase</b>	<b>153,883</b>
Initial construction	149,931
Transition to Standalone	3,952

<b>Operations Phase</b>	<b>2,323,896</b>
<i>Repeat &amp; Repackaging</i>	<i>1,297,531</i>
Initial Fuel receipts	348,806
SMV - 100 yrs	195,019
SMV - 200 yrs	195,019
SMV - 300 yrs	194,419
Repackaging B to B - 300 yrs	282,525
PM for Repeats & Repackaging	81,742

<i>Extended Monitoring</i>	<i>1,026,365</i>
Program Mgmt	659,938
Monitoring Surveillance	3,520
Operation Indirects	267,171
Common Ancillary Services Ops	42,702
Fuel Integrity Monitoring	6,930
SA - Ops & Decommissioning	1,657
L&A - Ops Licence Renewal	20,634
Environmental Monitoring	23,814

**Point Lepreau SMV Years 1>>145**  
**(Total Cost \$2.51B)**



**REACTOR EXTENDED STORE SURFACE MODULAR VAULTS (SMV)**  
**ACTIVITY SUMMARY TO DATA TRANSFER POINT LEPREAU**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	15	0	0	0	0	0	0	0 Siting	Labour	STEP	OPG	RJH	1	7	7	0	0	NO DATA TO FILL	452.2
581	15	0	0	0	0	0	0 Siting	Materials and Equipment	STEP	OPG	RJH	1	7	7	0	0	0.0		
581	15	0	0	0	0	0	0 Siting	Other	STEP	OPG	RJH	1	7	7	0	0	97.0		
581	15	0	0	0	0	0	0 Siting	Contingency	STEP	OPG	RJH	1	7	7	0	0	274.6		

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
--	---	----------------------------------

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	452	0.0	452.2
Materials and Equipment	0	0.0	0.0
Other	97	0.0	97.0
Contingency	274.6	0.0	274.6
<b>Total</b>	<b>824</b>	<b>0.0</b>	<b>824</b>

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
				Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail		Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	Cost \$k
1	2	3	4	5	6	7	8					CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		

581	15							<b>Siting</b>				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES			
581	15	10						SITING MANAGEMENT																		
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites or a factor of 0.08. However due to efficiencies of multiple sites assume a factor of 0.05		Labour	0.05	4897.7	0.05	244.885											245	
										Materials and Equipment	0.05				0	0.05	0								0	1
										Other	0.05							1,300	0.05	65				65		
										Contingency	50%										50%	1.0	154.9	155		
581	15	70						<b>PREFERRED SITE</b>																		
581	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																		
								Assume cost is 10% of a CES greenfield site		Labour	0.1	588.3	0.1	58.83											59	2
										Materials and Equipment	0.1				0	0.1	0								0	
										Other	0.1							120	0.1	12				12		
										Contingency	50%										50%	1.0	35.4	35		
581	15	70	30					<b>PREFERRED SITE - CHARACTERISATION</b>																		
								Assume cost is 10% of a CES greenfield site		Labour	0.1	1484.8	0.1	148.48											148	3
										Materials and Equipment	0.1				0	0.1	0								0	
										Other	0.1							200	0.1	20				20		
										Contingency	0.5										50%	1.0	84.2	84		

<b>Total</b>	<b>824</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	452 Total	0 Total	97 Total	274.6
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

REACTOR EXTENDED STORE								SURFACE MODULAR VAULTS (SMV)											
ACTIVITY SUMMARY TO DATA TRANSFER								POINT LEPREAU											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	20	0	0	0	0	0	0	System Development	Labour	STEP	CTECH	AM	1	7	7	0	0	NO DATA TO FILL	16121.9
581	20	0	0	0	0	0	0	System Development	Materials and Equipment	STEP	CTECH	AM	1	7	7	0	0		430.0
581	20	0	0	0	0	0	0	System Development	Other	STEP	CTECH	AM	1	7	7	0	0		1422.0
581	20	0	0	0	0	0	0	System Development	Contingency	STEP	CTECH	AM	1	7	7	0	0		6038.6

INSTRUCTIONS																	
															Check: Total minus budget Should = 0		Budget costs to Years by %

ACTIVITY DETAIL ESTIMATE SUMMARY			Cost Category	Total Cost	Check total	Total Cost \$k
					0%	
			Labour	16122	0.0	16121.9
			Materials and Equipment	430	0.0	430.0
			Other	1422	0.0	1422.0
			Contingency	6038.6	0.0	6038.6
			Total	24012	0.0	24012

INSTRUCTIONS																						
Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M	
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

ACTIVITY DETAIL ESTIMATE																								TOTAL						
WBS LEVEL								WBS Description / Detail								Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$K
1	2	3	4	5	6	7	8											CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	
581	20							System Development										CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	
581	20	2						SYSTEM DEVELOPMENT MANAGEMENT																						
								Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for customization to both sites.								Labour	0.26	7980.70	0.26	2094.93										2,095
								No entry in CES alternative cost category								Materials and Equipment	0.00										0			
								Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for customization to both sites.								Other	0.26										79			
								Percentage for contingency assumed same as for CES								Contingency	30%										652			
581	20	5						SYSTEM OPTIMIZATION																						
								Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 50%								Labour	0.26	5011.20	0.26	1315.44										1,315
								No entry in CES alternative cost category								Materials and Equipment	0										0			



Other  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 50%

0.26			120.00	0.26	31.50				32
------	--	--	--------	------	-------	--	--	--	----

Percentage for contingency assumed same as for CES Contingency

30%						30%	1.00	404.08	404
-----	--	--	--	--	--	-----	------	--------	-----

581 20 20

PROCESS SYSTEM ENGIN (PACK'G, REPACK'G & DECNTM)

Labour  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required and no processing bldg (except repackaging) therefore a further reduction of 70%

0.16	30642.60	0.16	4826.21						4,826
------	----------	------	---------	--	--	--	--	--	-------

Materials and Equipment  
 Allow reduction due to no cask related feasibility studies and no fuel container dismantling techniques carried out in this RES alternative, and shared between NBP and HQ

0.10			4300.00	0.10	430.00				430
------	--	--	---------	------	--------	--	--	--	-----

Other  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required and no processing bldg (except repackaging) therefore a further reduction of 70%

0.16			895.00	0.16	140.96				141
------	--	--	--------	------	--------	--	--	--	-----

Percentage for contingency assumed same as for CES Contingency

50%						50%	1.00	2698.59	2,699
-----	--	--	--	--	--	-----	------	---------	-------

581 20 30

STORAGE SYSTEM ENGIN

Labour  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No additional factors as new technology at this site

0.53	14295.80	0.53	7505.30						7,505
------	----------	------	---------	--	--	--	--	--	-------

Materials and Equipment  
 No entry in CES alternative cost category

0			0.00	0.00	0.00				0
---	--	--	------	------	------	--	--	--	---

Other  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No additional factors as new technology at this site

0.53			2200.00	0.53	1155.00				1,155
------	--	--	---------	------	---------	--	--	--	-------

Percentage for contingency assumed same as for CES Contingency

25%						25%	1.00	2165.07	2,165
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581 20 40

SECURITY & SAFEGUARD ENGIN

Labour  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Smaller site than CES therefore a further factor of 50% is included

0.26	1447.70	0.26	380.02						380
------	---------	------	--------	--	--	--	--	--	-----

Materials and Equipment  
 No entry in CES alternative cost category

0			0.00	0.00	0.00				0
---	--	--	------	------	------	--	--	--	---

Other  
 Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Smaller site than CES therefore a further factor of 50% is included

Contingency  
 Percentage for contingency assumed same as for CES

0.26	60.00	0.26	15.75	16				
30%	30%	1.0	118.7	119				
<table border="1"> <tr> <td>Total</td> <td>24,012</td> </tr> <tr> <td>Check: Should = 0</td> <td>0</td> </tr> </table>				Total	24,012	Check: Should = 0	0	
Total	24,012							
Check: Should = 0	0							
Total	16,122	Total	430	Total	1,422	Total	6,038.6	
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1
- 2
- 3
- 4

**REACTOR EXTENDED STORE SURFACE MODULAR VAULTS (SMV)**  
**ACTIVITY SUMMARY TO DATA TRANSFER POINT LEPREAU**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K
581	25							Safety Assessment	Labour	STEP	OPG	RJH	1	290	40			1843.3
581	25							Safety Assessment	Materials and Equipment	STEP	OPG	RJH	1	290	40			315.0
581	25							Safety Assessment	Other	STEP	OPG	RJH	1	290	40			863.3
581	25							Safety Assessment	Contingency	STEP	OPG	RJH	1	290	40			

NO DATA TO FILL

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
--	---	----------------------------------

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	1843	0.0	1843.3
Materials and Equipment			
Other	315		315.0
Contingency	863.3	0.0	863.3
Total	3022	0.0	3022

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	Cost \$k
1	2	3	4	5	6	7	8				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		

581	25							<b>Safety Assessment</b>																		
581	25	10						SAFETY ASSESSMENT MANAGEMENT RES = 10 yrs vs CES = 17 yrs. Share costs over 7 sites. Thus factor is 0.08. However due to inefficiencies of multiple sites increase to 0.2	Labour	0.1	5218.2	0.1	521.82												522	
									Materials and Equipment	0.1				0.1												1
									Other	0.1						850	0.1	85						85		
									Contingency	40%								40%	1.0	242.7				243		
581	25	30						SA - SITING Limited siting work leads to no SA work	Labour		2287.5															2
									Materials and Equipment							3,850										
									Other																	
									Contingency	40%								40%	1.0							
581	25	40						SA - OPERATING LICENSE	Labour	0.2	1540.5	0.2	308.1												308	3
									Materials and Equipment	0.2				0.2												
									Other	0.2						300	0.2	60						60		
									Contingency	40%								40%	1.0	147.2				147		
581	25	50						SA - FACILITY OPERATIONS RES has 30 renewal events vs 45 in CES. Renewal costs can be shared between 5 sites with same technology; thus reduce factor to 0.08	Labour	0.08	9604.8	0.08	768.384													768
									Materials and Equipment	1				1												
								Expenses at \$0.5K/a x 280	Other	1						140	1	140							140	

581 25 70

SA - DECOMMISSIONING (Processing Facilities)									
Contingency	40%					40%	1.0	363.4	363
Labour	0.1	2449.9	0.1	244.99					245
Materials and Equipment	0.1			0.1					
Other	0.1				300	0.1		30	30
Contingency	40%					40%	1.0	110.0	110
Total		1,843 Total		Total		315 Total		863.3	
Check: Should = 0		Check: Should = 0		Check: Should = 0		Check: Should = 0			

RES has 1 decommissioning events - while CES has 3. Costs can be shared between sites with same technology; thus factor to 0.15

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Note if appropriate,
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.

REACTOR EXTENDED STORE								SURFACE MODULAR VAULTS (SMV)											
ACTIVITY SUMMARY TO DATA TRANSFER								POINT LEPREAU											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour	STEP	OPG	RJH	1	290	290	0	0	NO DATA TO FILL	3291.4
581	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment	STEP	OPG	RJH	1	290	290	0	0		0.0
581	30	0	0	0	0	0	0	0 Licensing & Approvals	Other	STEP	OPG	RJH	1	290	290	0	0		16079.5
581	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency	STEP	OPG	RJH	1	290	290	0	0		4842.7

INSTRUCTIONS																			
															Check: Total minus budget Should = 0		Budget costs to Years by %		
ACTIVITY DETAIL ESTIMATE SUMMARY																			
																		Check total	Total Cost \$k
																		0%	
Labour																		0.0	3291.4
Materials and Equipment																		0.0	0.0
Other																		0.0	16079.5
Contingency																		0.0	4842.7
Total																		0.0	24214

INSTRUCTIONS																			
Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number
ACTIVITY DETAIL ESTIMATE				Cost Category		Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL
WBS LEVEL		WBS Description / Detail														Cost \$k			
1	2	3	4	5	6	7	8												

		In general L&A costs are assumed to be less than for a CES facility. In some cases the costs are shared between the seven sites																			
581	30	Licensing & Approvals		CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES			
581	30	30	LIAISON WITH CNSC																		
		Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2		Labour	0.2	555	0.2	111												111	
				Materials and Equipment	0.2				0	0.2	0							0	1		
				Other	0.2							40	0.2	8				8			
				Contingency	0.25										25%	1.0	29.8	30			
581	30	50	CNSC CONSTRUCTION LICENCE																		
		Some inefficiencies gained due to multiple sites		Labour	0.25	2631	0.25	657.75												658	2
				Materials and Equipment	0.25				0	0.25	0							0			
				Other	0.25							6,264	0.25	1566				1,566			
				Contingency	0.25										25%	1.0	555.9	556			
581	30	60	OTHER GOV'NT APPROVALS																		
581	30	60	10	APPROVAL REQUIREMENTS																	
		Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2		Labour	0.2	337	0.2	67.4												67	

Materials and Equipment	0.2		0	0.2	0					0
Other	0.2				0	0.2	0			0
Contingency	0.25							25%	1.0	16.9

581 30 60 30

FEDERAL APPROVALS

Labour	0.25	133	0.25	33.25						33
Materials and Equipment	0.25				0	0.25	0			0
Other	0.25				0	0.25	0			0
Contingency	0.25							25%	1.0	8.3

581 30 60 40

PROVINCIAL APPROVALS

Labour	0.25	133	0.25	33.25						33
Materials and Equipment	0.25				0	0.25	0			0
Other	0.25				0	0.25	0			0
Contingency	0.25							25%	1.0	8.3

581 30 60 50

MUNICIPAL APPROVALS

Labour	0.25	133	0.25	33.25						33
Materials and Equipment	0.25				0	0.25	0			0
Other	0.25				0	0.25	0			0
Contingency	0.25							25%	1.0	8.3

581 30 65

CNSC OPERATING LICENCE (Initial Application)

Labour	0.25	513	0.25	128.25						128
Materials and Equipment	0.25				0	0.25	0			0
Other	0.25					902	0.25	225.5		226
Contingency	0.25							25%	1.0	88.4

581 30 70

CNSC OPERATING LICENCE (Maintenance & Renewal)

CES duration is 330 years. Costs incurred in RES during period Y11 to Y290 or 280 years. RES is assumed to have 0.8 staff vs 1 staff in CES. Thus factor is 280/330 x 0.8/1 = 0.068

Expenses at \$51K/a x 280 yrs

Labour	0.068	32754	0.068	2227.272						2,227
Materials and Equipment	1				0	1	0			0
Other	1					14,280	1	14280		14,280
Contingency	0.25							25%	1.0	4,126.8

<b>Total</b>	<b>24,214</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	3,291	Total	0	Total	16,080	Total	4,842.7
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

**REACTOR EXTENDED STORE SURFACE MODULAR VAULTS (SMV)**  
**ACTIVITY SUMMARY TO DATA TRANSFER POINT LEPREAU**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	35	0	0	0	0	0	0	Public Affairs	Labour	STEP	OPG	RJH	1	10	10	0	0	NO DATA TO FILL	683.8
581	35	0	0	0	0	0	Public Affairs	Materials and Equipment	STEP	OPG	RJH	1	10	10	0	0	0.0		
581	35	0	0	0	0	0	Public Affairs	Other	STEP	OPG	RJH	1	10	10	0	0	461.8		
581	35	0	0	0	0	0	Public Affairs	Contingency	STEP	OPG	RJH	1	10	10	0	0	572.8		

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
--	---	----------------------------------

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	684	0%	683.8
Materials and Equipment	0	0.0	0.0
Other	462	0.0	461.8
Contingency	572.8	0.0	572.8
Total	1718	0.0	1718

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	Cost \$k
1	2	3	4	5	6	7	8				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		

581	35	45						Public Affairs			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
581	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
								Labour	0.05	3046.2	0.05	152.31												152
								Materials and Equipment	0.05				0	0.05	0									0
								Other	0.05							600	0.05	30						30
								Contingency	50%										50%	1.0	91.2			91
581	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
								Labour	0.05	4569.3	0.05	228.465												228
								Materials and Equipment	0.05				0	0.05	0									0
								Other	0.05							1,450	0.05	72.5						73
								Contingency	50%										50%	1.0	150.5			150
581	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
								Labour	0.05	2528.9	0.05	126.445												126
								Materials and Equipment	0.05				0	0.05	0									0
								Other	0.05							800	0.05	40						40
								Contingency	50%										50%	1.0	83.2			83
581	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
								Labour	0.05	3530.8	0.05	176.54												177
								Materials and Equipment	0.05				0	0.05	0									0
								Other	0.05							170	0.05	8.5						9
								Contingency	50%										50%	1.0	92.5			93

581 35 120

Community Offsets & Benefits

Labour	0.15	0	0.15	0						0		
Materials and Equipment	0.15			0	0.15	0				0		
Other	0.15					2,072	0.15	310.8		311		
Contingency	50%								50%	1.0	155.4	155
										<b>Check: Should = 0</b>	<b>1,718</b>	
Total			684	Total		0	Total	462	Total	572.8		
Check: Should = 0			0	Check: Should = 0		0	Check: Should = 0	0	Check: Should = 0	0		

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 Note if appropriate,
- 2 Correspondence description
- 3 Special request from fuel owner
- 4 Misc.



**REACTOR EXTENDED STORE SURFACE MODULAR VAULTS (SMV)  
ACTIVITY SUMMARY TO DATA TRANSFER POINT LEPREAU**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	40	0	0	0	0	0	0	0 Facility Design & Construction	Labour	STEP	CTECH	AM	8	285	7	0	0	NO DATA TO FILL	28913.7
581	40	0	0	0	0	0	0 Facility Design & Construction	Materials and Equipment	STEP	CTECH	AM	8	42	7	0	0	66911.6		
581	40	0	0	0	0	0	0 Facility Design & Construction	Other	STEP	CTECH	AM	8	42	7	0	0	28385.5		
581	40	0	0	0	0	0	0 Facility Design & Construction	Contingency	STEP	CTECH	AM	8	42	7	0	0	29672.0		

**INSTRUCTIONS**

ACTIVITY DETAIL ESTIMATE SUMMARY																				
INSTRUCTIONS																				
Check: Total minus budget Should = 0																				
Budget costs to Years by %																				
Check total																				
Total Cost \$k																				
Labour																		28914	0.0	28913.7
Materials and Equipment																		66912	0.0	66911.6
Other																		28386	0.0	28385.5
Contingency																		29672.0	0.0	29672.0
Total																		153883	0.0	153883

**INSTRUCTIONS**

INSTRUCTIONS																	
Insert lower level WBS numbers as required																	
Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required																	
Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15																	
A Use appropriate CES cost																	
B Apply Factor																	
C Calc RES cost value																	
D Use appropriate CES cost																	
E Apply Factor																	
F Calc RES cost value																	
G Use appropriate CES cost																	
H Apply Factor																	
I Calc RES cost value																	
J Use appropriate CES cost																	
K Apply Factor																	
L Calc RES cost value																	
M Total Cost is calculated																	
Add Basis of estimate Note Ref Number																	

ACTIVITY DETAIL ESTIMATE																																			
WBS LEVEL																																			
WBS Description / Detail																																			
Cost Category																																			
Factor																																			
Labour																																			
Materials and other Equipment																																			
Other																																			
Contingency																																			
TOTAL Cost \$k																																			
581	40																																		
#####	40	10																																	
<b>Facility Design &amp; Construction</b>																																			
<b>SITE IMPROVEMENTS</b>																																			
a 10% allowance of the CES costs, applied to the site improvements																																			
Labour																		0.10	45,930.4	0.1	4,593.0											4,593			
Materials and Equipment																		0.10				58,350.0	0.1	5,835.0									5,835		
No additional land acquisition costs necessary																		0.0							3,375.0	0.0	0.0						0		
Percentage for contingency assumed same as for CES																		50%										50%	1.0	5,214.0		5,214			
<b>COMMON ANCILLARY FACILITIES</b>																																			
<b>ADMIN AND SUPPORT FACILITIES</b>																																			
<b>ADMIN AND VISITOR RECEPTION BLDG</b>																																			
Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50																																			
Labour																		0.0	486.3	0.0	0.0												comment 7	0	
Materials and Equipment																		0.0				784.2	0.0	0.0										0	
No entry in CES alternative cost category																		0.0							0.0	0.0	0.0							0	
Percentage for contingency assumed same as for CES																		20%										20%	1.0	0.0			0		
<b>OPS SUPPT &amp; HEALTH PHYSICS BLDG</b>																																			
Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50																																			
Labour																		0.0	1,294.8	0.0	0.0													comment 7	0
Materials and Equipment																		0.0				1,612.6	0.0	0.0											0
No entry in CES alternative cost category																		0.0							0.0	0.0	0.0								0
Percentage for contingency assumed same as for CES																		20%										20%	1.0	0.0			0		

581	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																						
					Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,262.1	0.0	0.0														comment 7	0		
						Materials and Equipment	0.0				1,675.0	0.0	0.0												0		
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	0.0				0		
581	40	30	10	5	ACTIVE SOLID WASTE HDLG BLDG																						
					A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	459.9	0.3	138.0															138		
						Materials and Equipment	0.3				1,135.0	0.3	340.5												341		
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	143.5				144		
581	40	30	10	6	SOLID WASTE STORAGE AREA																						
					A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	458.8	0.3	137.6																138	
						Materials and Equipment	0.3				437.5	0.3	131.3													131	
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	80.7				81		
581	40	30	10	7	ACTIVE LIQ/W TRT'MT BLDG																						
					A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	359.4	0.3	107.8																108	
						Materials and Equipment	0.3				1,727.0	0.3	518.1													518	
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	187.8				188		
581	40	30	10	8	LOW LVL LIQ/W STRG BLDG																						
					A 30% allowance of the CES costs, applied to the refurbishment of the existing site facilities.	Labour	0.3	373.7	0.3	112.1																112	
						Materials and Equipment	0.3				1,426.0	0.3	427.8													428	
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	162.0				162		
581	40	30	10	9	WAREHOUSE BLDG																						
					Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	470.9	0.0	0.0															comment 7	0	
						Materials and Equipment	0.0				550.0	0.0	0.0												0		
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	0.0				0		
581	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																						
					Building and security exist therefore new building and fence not required. Allowance for refurbishment covered in ***/45/20/50	Labour	0.0	631.2	0.0	0.0																comment 7	0
						Materials and Equipment	0.0				553.7	0.0	0.0												0		
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0										0		
					Increased contingency than CES due to RES facility footprint size not confirmed and therefore length of fence, not yet known	Contingency	20%												20%	1.0	0.0				0		
581	40	30	10	11	TRUCK INSP'N / WASH STATION																						
					not req'd as no fuel transported off site	Labour	0.0	872.2	0.0	0.0															comment 7	0	
						Materials and Equipment	0.0				1,075.0	0.0	0.0												0		
					No entry in CES alternative cost category	Other	0.0						389.4	0.0	0.0										0		
					Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	0.0				0		
581	40	30	10	12	UTILITY BLDG																						
					Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,023.2	0.0	0.0															comment 7	0	

					allowance for retrofits covered in ***/45/20/50	Materials and Equipment	0.0			1,257.0	0.0	0.0							0	
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	0.0		0	
581	40	30	10	13	<b>TEST FACILITY</b>															
					Taken as being independent of fuel inventory stored. Same size bldg as CES. Facility will be shared by NBP and HQ therefore cost will be 50% of CES costs.	Labour	0.5	766.8	0.5	383.4									383	
						Materials and Equipment	0.5			1,675.0	0.5	837.5							838	
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	244.2		244	
581	40	30	20		<b>OTHER SITE SYSTEMS</b>															
581	40	30	20	1	<b>FIRE PROTECTION SYSTEMS</b>															
					assumed available and turned over to RES during transition	Labour	0.00	1,022.2	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			676.2	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0		0	
581	40	30	20	2	<b>SECURITY AND COMMUNICATION SYSTEM</b>															
					assumed available and turned over to RES during transition	Labour	0.00	607.5	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			600.0	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0		0	
581	40	30	20	3	<b>ELECTRICAL AND EMERGENCY POWER</b>															
					assumed available and turned over to RES during transition	Labour	0.00	1,939.6	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			1,932.0	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0		0	
581	40	30	20	4	<b>SANITARY SEWER SYSTEM</b>															
					assumed available and turned over to RES during transition	Labour	0.00	339.2	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			310.5	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0		0	
581	40	30	20	5	<b>POTABLE WATER SYSTEM</b>															
					assumed available and turned over to RES during transition	Labour	0.00	371.6	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			148.0	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	0.0		0	
581	40	30	20	6	<b>RETENTION/SEDIMENTATION POND</b>															
					assumed available and turned over to RES during transition	Labour	0.00	874.4	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			189.6	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	0.0		0	
581	40	30	20	7	<b>STORM WATER DETENTION POND</b>															
					assumed available and turned over to RES during transition	Labour	0.00	387.8	0.0	0.0									comment 7	0
						Materials and Equipment	0.00			93.5	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	0.0		0	

581	40	30	20	8	CONSTN MAT'L STOCKPILE AREA														
					not req'd, concrete brought in as req'd from off-site	Labour	0.00	1,039.2	0.0	0.0						comment 7	0		
						Materials and Equipment	0.00			625.0	0.0	0.0						0	
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	15%							15%	1.0	0.0	0		
581	40	30	20	9	SITE MATERIALS STORAGE AREA														
					assumed available and turned over to RES during transition	Labour	0.00	1,169.5	0.0	0.0						comment 7	0		
						Materials and Equipment	0.00			655.0	0.0	0.0						0	
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	15%							15%	1.0	0.0	0		
581	40	30	20	10	ACCESS ROADS AND VEHICLE COMPOUNDS														
					assumed available and turned over to RES during transition	Labour	0.00	1,319.9	0.0	0.0						comment 7	0		
						Materials and Equipment	0.00			1,866.9	0.0	0.0						0	
					No entry into cost category	Other	0.0				0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	0.0	0		
581	40	30	30		CONSTN INDIRECTS ANCILLARY FACILITIES														
					assumed available and turned over to RES during transition	Labour	0.00	4,406.4	0.0	0.0						comment 7	0		
						Materials and Equipment	0.00			6,610.9	0.0	0.0						0	
					No entry into cost category	Other	0.0				0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	0.0	0		
581	40	40			STORAGE CONSTRUCTION (Stage 1)														
581	40	40	10	5	CONSTRUCTION FACILITIES														
					Construction of RES SMV facility, total capacity 220 tubes. CES stage 4 construction is 600 tubes.	Labour	0.55	469.5	0.55	257.2						257			
						Materials and Equipment	0.55			312.0	0.55	170.9						171	
						Other	0.55				112.0	0.55	61.3						61
					Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	146.8	147		
581	40	40	10	10	STORES ENGINEERING														
					factor for services taken as same as for construction	Labour	1.00	6,841.7	1.00	6,841.7						6,842			
					factor for services taken as same as for construction	Materials and Equipment	0.00			0.0	0.00	0.0						0	
					factor for services taken as same as for construction	Other	0.00				0.0	0.00	0.0						0
					Percentage for contingency averaged from figures used in CES	Contingency	30%							30%	1.0	2,052.5	2,053		

581	40	40	10	20	STORES EQUIPMENT DESIGN, SUPPLY AND INSTALL'N															
					Factor for equipment taken from CES with reduction for loss of CHM	Labour	0.40	5,476.2	0.40	2,190.5										2,190
					Factor for equipment taken from CES with reduction for loss of CHM	Materials and Equipment	0.40				12,131.7	0.40	4,852.7							4,853
					Factor for equipment taken from CES with reduction for loss of CHM	Other	0.40						0.0	0.40	0.0					0
					Percentage for contingency averaged from figures used in CES	Contingency	13%									13%	1.0	880.4		880
581	40	40	10	30	SURFACE MODULAR VAULT DESIGN AND CONSTRUCTION															
					Construction of RES SMV facility, total capacity 220 tubes. CES stage 4 construction is 600 tubes.	Labour	0.60	2,692.0	0.60	1,615.2										1,615
					Price based pro rata on CES stage 4 with module and CHM prices subtracted. Design element of cost shared between NBP and HQ, design element identified and divide by 2	Materials and Equipment	0.60				89,285.0	0.60	53,571.0							53,571
						Other	0.60						47,112.2	0.60	28,267.3					28,267
					Percentage for contingency averaged from figures used in CES	Contingency	20%									20%	1.0	16,690.7		16,691
581	40	40	10	40	COMMISSIONING															
					Factor applied to CES	Labour	0.60	164.7	0.60	98.8										99
					Same allowance applied as CES	Materials and Equipment	0.00				12,131.7	0.00	0.0							0
					Same allowance applied as CES	Other	0.00						0.0	0.00	0.0					0
					Price based pro rata on CES stage 4 with module and CHM prices subtracted	Contingency	40%									40%	1.0	39.5		40
581	40	40	10	50	CONSTN INDIRECTS															
					Factor applied to CES	Labour	0.70	17,624.6	0.7	12,337.2										12,337
					Factor applied to CES	Materials and Equipment	0.70				110.0	0.7	77.0							77
					Factor applied to CES	Other	1.00						0.0	1.0	0.0					0
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	3,724.3		3,724
581	40	500			COMMISSIONING MANAGEMENT															
					Factor applied to CES	Labour	0.7	144.5	0.7	101.2										101
					Factor applied to CES	Materials and Equipment	0.0				0.0	0.0	0.0							0
					Factor applied to CES	Other	0.7						28.9	0.7	20.2					20
					Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	60.7		61
581	40	600			EQUIPMENT, SPARES and CONSUMABLES.															
					No entry into cost category	Labour	0.0	0.0	0.0	0.0										0
					Factor applied to CES	Materials and Equipment	0.7				214.1	0.7	149.9							150
					consumption for construction of 1 storage bldg and ancillary buildings	Other	0.00						0.0	0.0	0.0					0
					Contingency included in cost (built into power consumption calculation)	Contingency	30%									30%	1.0	45.0		45
581	40	650			ENERGY CONSUMPTION															
					No entry into cost category	Labour	0.0	0.0	0.0	0.0										0
					No entry into cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
					consumption for construction of storage facility and ancillary buildings	Other	0.10						366.3	0.1	36.6					37
					Contingency included in cost (built into power consumption calculation)	Contingency	0%									0%	1.0	0.0		0

Total	153,883
Check: Should = 0	0

Total	28,914 Total	66,912 Total	28,386 Total	29,672.0
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

**REACTOR EXTENDED STORE**      **SURFACE MODULAR VAULTS (SMV)**  
**ACTIVITY SUMMARY TO DATA TRANSFER**      **POINT LEPREAU**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	45	0	0	0	0	0	0	0 Facility Operation	Labour	STEP	CTECH	AM	11	291	281	0	0	NO DATA TO FILL	584012.3
581	45	0	0	0	0	0	0 Facility Operation	Materials and Equipment	STEP	CTECH	AM	11	291	281	0	0	511821.5		
581	45	0	0	0	0	0	0 Facility Operation	Other	STEP	CTECH	AM	11	291	281	0	0	667304.5		
581	45	0	0	0	0	0	0 Facility Operation	Contingency	STEP	CTECH	AM	11	291	281	0	0	514652.8		

**INSTRUCTIONS**

Check: Total minus budget Should = 0	Budget costs to Years by %
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ACTIVITY DETAIL ESTIMATE SUMMARY	Cost Category	Total Cost	Check total	Total Cost \$K
			0%	
	Labour	584012	0.0	584012.3
	Materials and Equipment	511821	0.0	511821.5
	Other	667305	0.0	667304.5
	Contingency	514653	0.0	514652.8
	Total	2277791	0.0	2277791

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

ACTIVITY DETAIL ESTIMATE																TOTAL						
WBS LEVEL								WBS Description / Detail								Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	Cost \$K
1	2	3	4	5	6	7	8															

581	45							<b>Facility Operation</b>														
581	45	10						OPERATIONS FUEL TRANSFER														
581	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER														
								Labour	0.1	118,334.0	0.1	6,311.1							6,311			
								CES factor reduced due to revised duration, Program management spread over 7 sites, recognising inefficiency use 20 %														
								No entry in CES alternative cost category														
								property tax for initial 8 years	1.00				0.0	0.0	0.0					0		
								Other	1.00							7,594	1.0	7,593.6		7,594		
								Percentage for contingency assumed same as for CES	20%										20%	1.0	2,780.9	2,781
581	45	10	10					<b>PROCESS BUILDING OPERATIONS</b>														
								Fuel inventory 1992 baskets, (CES 4717). Throughput rate 0.5 of CES.	0.21	78,324.0	0.21	16,538.2							16,538			
								No module canister (or baskets) to be procured														
								No provision in CES	0.00				255,840.0	0.00	0.0					0		
								Other	0.00							131,349.0	0.0	0.0		0		
								Percentage for contingency assumed same as for CES	50%										50%	1.0	8,269.1	8,269
581	45	10	20					<b>COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPT)</b>														
								Independent of fuel inventory RES duration 8 years compared to 30 year CES.	0.27	32,676.3	0.27	8,713.7							8,714			
								No entry in CES alternative cost category	0.0				0.0	0.0	0.0					0		

				No entry in CES alternative cost category	Other	0.00				131,349.0	0.0	0.0			0		
				Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	2,178.4	2,178	
581	45	10	25	MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPT)													
				Fuel inventory 1992 baskets, (CES 4717). RES duration 8 years compared to 30 year CES.	Labour	0.11	3,900.0	0.11	439.2							439	
				No relevant entry in CES alternative cost category	Materials and Equipment	0.00			53.0	0.00	0.0					0	
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0			0	
				Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	219.6	220	
581	45	10	30	OPERATION INDIRECTS (FUEL TRANSFER)													
				Factor due to reduced admin & maintenance. Security and site infrastructure similar to CES, CES additional fuel receipt security/armed response omitted. Duration 8 years (CES 30), but using 90% utilisation. Other category is for energy consumption only.	Labour	0.2	115,547.0	0.24	27,731.3							27,731	
					Materials and Equipment	0.2			1,284.0	0.2	308.2						308
					Other	0.2					16,380.0	0.2	3,931.2				3,931
					Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	9,591.2	9,591
581	45	10	40	STORAGE OPERATIONS													
				Fuel inventory 1992 baskets, (CES 4717). RES duration 8 years	Labour	0.42	30,696.0	0.42	12,963.0							12,963	
				Fuel inventory 1992 baskets, (CES 4717). RES duration 8 years	Materials and Equipment	0.42			200.0	0.4	84.5					84	
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0			0	
				Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	3,914.2	3,914	
581	45	10	50	ADDITIONAL STORAGE CONSTRUCTION													
581	45	10	50	STORAGE CONSTRUCTION STAGE 2													
				factor for storage const'n stage 2 taken pro rata from CES stage 2	Labour	0.48	14,792.5	0.48	7,051.7							7,052	
				factor for storage const'n stage 2 taken pro rata from CES stage 2	Materials and Equipment	0.48			91,538.7	0.48	43,637.4					43,637	
				factor for storage const'n stage 2 taken pro rata from CES stage 2	Other	0.48					46,846.7	0.48	22,332.3			22,332	
				Percentage for contingency averaged from CES	Contingency	30%							30%	1.0	21,906.4	21,906	
581	45	10	50	STORAGE CONSTRUCTION STAGE 3													
				factor for storage const'n stage 3 taken as same as stage 2	Labour	0.48	14,792.5	0.48	7,051.7							7,052	
				factor for storage const'n stage 3 taken as same as stage 2	Materials and Equipment	0.48			91,538.7	0.48	43,637.4					43,637	
				factor for storage const'n stage 3 taken as same as stage 2	Other	0.48					46,846.7	0.48	22,332.3			22,332	
				Percentage for contingency averaged from CES	Contingency	30%							30%	1.0	21,906.4	21,906	
581	45	10	50	STORAGE CONSTRUCTION STAGE 4													
				factor for storage const'n stage 4 taken as same as stage 2	Labour	0.48	14,792.5	0.48	7,051.7							7,052	

factor for storage const'n stage 4 taken as same as stage 2	Materials and Equipment	0.48		14,819.0	0.48	7,064.4				7,064	
factor for storage const'n stage 4 taken as same as stage 2	Other	0.48					46,846.7	0.48	22,332.3	22,332	
Percentage for contingency averaged from CES	Contingency	30%						30%	1.0	10,934.5	10,935

581 45 20  
581 45 20 5

OPERATIONS - EXTENDED MONITORING  
PROGRAM MANAGEMENT

272 years RES & 300 years CES therefore 272/300 = 0.907. Program management spread over 7 sites with Pt Lepreau assumed to have 0.8 staff vs 9 in CES. Thus combined factor = 0.081	Labour	0.081	312,652.0	0.08	25,197.4					25,197	3
No entry in CES alternative cost category	Materials and Equipment	0.0		0.0	0.0	0.0				0	
Annual cost = \$1640/a x 272 yrs	Other	1.00					446,187	1.0	446,187.2	446,187	2
Percentage for contingency assumed same as for CES	Contingency	40%						40%	1.0	188,553.8	188,554

581 45 20 40

MONITORING AND SURVEILLANCE - EXTENDED MONITORING

CES monitoring and surveillance duration was 300 yrs for 4717 baskets, RES is 273 years for 1992 baskets. Pt Lepreau assumed to have 0.5 staff for RES vs 5 in CES. Combined factor based on duration, fuel inventory and staffing levels.	Labour	0.04	53,849.0	0.0	2,069.4					2,069	3
annual costs = \$1k/a x 277 years	Materials and Equipment	1.00			277.0	1.00	277.0			277	4
No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0	0	
Percentage for contingency assumed same as for CES	Contingency	50%						50%	1.0	1,173.2	1,173

581 45 20 50

OPERATION INDIRECTS (EXTENDED MONITORING)

Entries in CES DET applicable to RES but duration 273 years RES & 300 years CES. Staff for RES = 7 vs 34 in CES. Combined factor = 273/300 x 7/34. M&E costs are \$75k/a x 273 years. Armed response = \$50k/a + energy costs at \$5k/a. total = \$55k x 277 years	Labour	0.19	907,516.0	0.19	170,025.8					170,026	3
	Materials and Equipment	1.00			20,475.0	1.00	20,475.0			20,475	4
	Other	1.00					15,015.0	1.0	15,015.0	15,015	4
Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	61,654.7	61,655

581 45 20 60

COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)

RES has duration 273 years, CES has 300 years. RES staff is 1 vs 5 in CES. Factor is 273/300 x 1/5	Labour	0.18	148,529.0	0.18	34,161.5					34,161	3
No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0			0	
No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0	0	
Percentage for contingency assumed same as for CES	Contingency	25%						25%	1.0	8,540.4	8,540

581 45 20 70

FUEL INTEGRITY MONITORING (25 YEARLY)

RES has duration 273 years, CES has 300 years. RES staff is 0.1 vs 0.5 in CES. Factor is 273/300 x 0.1/0.5	Labour	0.2	24,724.0	0.2	4,499.8					4,500	3
annual M+E costs is \$2.5k/a x 277 years	Materials and Equipment	1.0			692.5	1.0	692.5			693	4
Other costs is \$0.5k/a x 277 years	Other	1.0					138.5	1.0	138.5	139	4
Percentage for contingency averaged form CES	Contingency	30%						30%	1.0	1,599.2	1,599



581 45 30  
581 45 30 20

OPERATIONS - FACILITY REPEATS  
STORAGE VAULT 100 YEAR REPLACEMENT

Labour for demolition of previous vaults and construction of new = factor 220/4400 tube qty, labour for fuel transfer = 9/30 (years for transfer) common factor =0.3	Labour	0.30	154,896.8	0.3	46,469.0							46,469	
const'n materials = building to house 220 tubes RES, 4400 tubes CES	Materials and Equipment	0.17			563,645.8	0.2	93,408.9					93,409	
waste disposal = vaults for 220 tubes RES, 4400 tubes CES factor =0.05 Includes Armed response included at rate of \$50k/a based on 5 years duration - see note 5.	Other	0.05					447,765.3	0.1	22,638.3			22,638	5
Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	32,503.2	32,503

581 45 30 50

STORAGE VAULTS 200 YEAR REPLACEMENT

assumed same as 100 yr replacement	Labour	0.30	154,896.8	0.3	46,469.0							46,469	
assumed same as 100 yr replacement	Materials and Equipment	0.17			563,645.8	0.2	93,408.9					93,409	
assumed same as 100 yr replacement	Other	0.05					447,765.3	0.1	22,638.3			22,638	5
Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	32,503.2	32,503

581 45 30 70

STORAGE VAULTS 300 YEAR REPLACEMENT

assumed same as 100 yr replacement	Labour	0.30	154,896.8	0.3	46,469.0							46,469	
assumed same as 100 yr replacement	Materials and Equipment	0.17			563,645.8	0.2	93,408.9					93,409	
assumed same as 100 yr replacement	Other	0.05					447,765.3	0.1	22,138.3			22,138	6
Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	32,403.2	32,403

581 45 40  
581 45 40 5

OPERATIONS - REPACKAGING  
PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)

Entries in CES DET applicable to RES but duration 30 years RES & 114 years CES therefore 30/114. Program management spread over 7 sites, recognising inefficiency use 20 % No entry in CES alternative cost category	Labour	0.05	360,064.0	0.1	18,950.7							18,951	
	Materials and Equipment	0.0			0.0	0.0	0.0					0	
property tax based on 15 year duration (3 events x 5 years) see note 7	Other	1.00					49,167.3	1.0	49,167.3			49,167	7
Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	13,623.6	13,624

581 45 40 10

BASKET TO BASKET 300 YEAR REPACKAGING

581 45 40 10 20

CONSTRUCTION FACILITIES - REPACK'NG  
PLANT BASKET (RPB)

RPB Repackaging plant similar to CES facility	Labour	1.0	476.1	1.0	476.1							476	
RPB Repackaging plant similar to CES facility	Materials and Equipment	1.0			354.6	1.0	354.6					355	
RPB Repackaging plant similar to CES facility1	Other	1.0					228.4	1.0	228.4			228	
Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	317.7	318

581 45 40 10 30

PROCESSING BUILDING - REPACK'NG PLANT  
BASKET (RPB)

581	45	40	10	30	20		RPB EQUIP. DESIGN, SUPPLY & INSTALL											
581	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)											
							RPB Repackaging plant similar to CES facility1	Labour	1.0	106.6	1.0	106.6						107
							RPB Repackaging plant similar to CES facility 1	Materials and Equipment	1.0			2,132.0	1.0	2,132.0				2,132
							RPB Repackaging plant similar to CES facility 1	Other	1.0					111.9	1.0	111.9		112
							Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	705.2	705
581	45	40	10	30	20	20	BASKET TO BASKET FUEL TRANSFER (EQUIP)											
							Equipment similar to CES facility	Labour	1.0	3,721.1	1.0	3,721.1						3,721
							Equipment similar to CES facility	Materials and Equipment	1.0			18,605.6	1.0	18,605.6				18,606
							Equipment similar to CES facility	Other	1.0					1,116.3	1.0	1,116.3		1,116
							Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	7,032.9	7,033
581	45	40	10	30	20	30	BASKET DECONTAMINATION (EQUIP)											
							Equipment similar to CES facility	Labour	1.0	961.0	1.0	961.0						961
							Equipment similar to CES facility	Materials and Equipment	1.0			4,805.0	1.0	4,805.0				4,805
							Equipment similar to CES facility	Other	1.0					288.3	1.0	288.3		288
							Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	1,816.3	1,816
581	45	40	10	30	30		RPB, BUILDING DESIGN & CONSTN											
							RPB Repackaging plant similar to CES facility	Labour	1.00	8,000.0	1.0	8,000.0						8,000
							RPB Repackaging plant similar to CES facility	Materials and Equipment	1.00			7,768.3	1.0	7,768.3				7,768
							RPB Repackaging plant similar to CES facility	Other	1.00					1,600.0	1.0	1,600.0		1,600
							Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	5,210.5	5,210
581	45	40	10	30	60		BUILDING SERVICES (RPB)											
							RPB plant similar to CES facility	Labour	1.00	9,120.0	1.0	9,120.0						9,120
							RPB plant similar to CES facility	Materials and Equipment	1.00			7,199.9	1.0	7,199.9				7,200
							RPB plant similar to CES facility	Other	1.00					2,527.2	1.0	2,527.2		2,527
							Percentage for contingency assumed same as for CES	Contingency	25%						25%	1.0	4,711.8	4,712
581	45	40	10	30	70		COMMISSIONING (RPB)											
							RPB plant similar to CES facility	Labour	1.00	1,169.3	1.0	1,169.3						1,169
							No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0				0
							RPB plant similar to CES facility	Other	1.00					218.3	1.0	218.3		218
							Percentage for contingency assumed same as for CES	Contingency	50%						50%	1.0	693.8	694
581	45	40	10	30	80		CONSTN INDIRECTS (RPB)											

					RPB plant similar to CES facility. reduction Of 22.5% due to share of design element of costs between NBP and HQ	Labour	1.00	9,838.6	1.0	9,838.6									9,839	
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0	
					RPB plant similar to CES facility	Other	1.00					481.1	1.0	481.1					481	
					Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	3,095.9			3,096	
581	45	40	10	40	COMMON ANCILLARY FACILITIES (REPLACEMENT)															
					comment 7															
					Reduced ancillary facilities support stand-alone RES facility at 100 and 200 year events therefore factor = (7/12 x 2) +1	Labour	2.2	21,056.2	2.2	45,621.8									45,622	
					No entry in CES alternative cost category	Materials and Equipment	2.2				29,785.1	2.2	64,534.4						64,534	
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	27,539.0			27,539	
581	45	40	10	500	COMMISSIONING MANAGEMENT (RPB)															
					RPB plant similar to CES facility, but no casks or modules	Labour	0.7	219.0	0.7	153.3										153
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0	
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	76.7			77	
581	45	40	10	600	REPACKAGING OPERATIONS (RPB)															
					repackaging of 1992 baskets	Labour	0.10	118,823.0	0.10	11,882.3										11,882
					procurement of 1992 RES baskets compared to 8528 CES module canisters	Materials and Equipment	0.04				255,840.0	0.04	9,960.0						9,960	
					disposal of 1992 RES baskets compared to 8528 CES modules canister and 34112 modules	Other	0.03					43,594.8	0.03	1,338.6					1,339	
					Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	6,954.3			6,954	
581	45	40	10	600 30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)															
					duration 5 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.17	11,882.0	0.17	1,980.3										1,980
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0	
					No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	495.1			495	
581	45	40	10	700	OPERATION INDIRECTS (RPB)															
					duration 5 years RES compared to 30 years CES. Factor =5/30 = 0.17	Labour	0.17	13,976.2	0.17	2,329.4										2,329
					duration 5 years RES compared to 30 years CES. Factor =5/30 = 0.18	Materials and Equipment	0.17				351.6	0.2	58.6						59	
					duration 5 years RES compared to 30 years CES. Factor =5/30 = 0.17. Armed response included at rate of \$50k/a based on 5 years duration - see note 5.	Other	0.17					16,200.0	0.2	2,950.0					2,950	
					Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	1,601.4			1,601	
581	45	40	10	800	STORAGE OPERATIONS (RPB)															
					transfer of 1992 baskets, RES compared to 8528 canisters CES	Labour	0.23	2,093.9	0.23	489.1										489
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0	

No entry in CES alternative cost category      Other  
 Percentage for contingency assumed same as for Contingency  
 CES

0.0		0.0	0.0	0.0		0
30%					30%	146.7
					1.0	147

Total	584,012	Total	511,821	Total	667,305	Total	514,652.8
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

<b>Total</b>	<b>2,277,791</b>
<b>Check: Should = 0</b>	<b>0</b>

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1 other costs made up of expenses from table 18 in report (15+118+50+50+25). + Property tax at 2.6% of assessed building value (during ext. monitoring at 15%) of SMVs and ancillary buildings const'n cost (ie. \$337383K + \$17,077K) but due to storage facilities built on a rolling basis an additional 50% reduction is included
- 2 other costs made up of expenses from table 18 in report (15+118+50+50+25). + Property tax at 2.6% of assessed building value (during ext. monitoring at 15%) of SMVs and ancillary buildings const'n cost (ie. \$337383K + \$17,077K)
- 3 staffing levels obtained from table 17 in cost estimate report 1105/MD18084/REP/17
- 4 annual costs for Labour/M&E and Other, obtained from table 18 in cost estimate report 1105/MD18084/REP/17
- 5 armed response costs during 'fuel handling' based on rate of \$100k/a. Due to \$50k/a for armed response included in extended monitoring, this means an additional \$50k/a is to be included for the duration of the facility repeat transfers/repackaging events (\$50k + \$50k = \$100k)
- 6 armed response not captured in 300 yr facility repeat for fuel transfers, as it is covered in basket repackaging at 300yr event
- 7 property tax for facility repeats and repacking based on 3 events at 5 years each duration. Tax based on assessed building value of smvs and ancillary buildings. 15% of this tax is covered in ext. monitoring. The rate is increased to 50% for fuel handling events. therefore the difference of 35% is included at the facility repeats/repackaging. An additional cost is also included for property tax of the repackaging building over 5 years.

REACTOR EXTENDED STORE								SURFACE MODULAR VAULTS (SMV)											
ACTIVITY SUMMARY TO DATA TRANSFER								POINT LEPREAU											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
581	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour	STEP	OPG	RJH	4	290	287	0	0	NO DATA TO FILL	14856.3
581	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment	STEP	OPG	RJH	4	290	287	0	0		4200.0
581	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other	STEP	OPG	RJH	4	290	287	0	0		1667.5
581	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency	STEP	OPG	RJH	4	290	287	0	0		6217.1

**INSTRUCTIONS**

ACTIVITY DETAIL ESTIMATE SUMMARY	Cost Category	Total Cost	Check total	Total Cost \$k
	Labour	14856	0%	14856.3
	Materials and Equipment	4200	0.0	4200.0
	Other	1668	0.0	1667.5
	Contingency	6217.1	0.0	6217.1
	Total	26941	0.0	26941

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	
ACTIVITY DETAIL ESTIMATE		WBS Description / Detail		Cost Category		Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL
WBS LEVEL		WBS Description / Detail		Cost Category		Factor	Labour			Materials and other Equipment			Other			Contingency			Cost \$k
1	2	3	4	5	6	7	8												

581	55			Environmental Assessment and Monitoring		CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES			
581	55	10			EA & MONITORING PROGRAM MANAGEMENT															
				Total NBP fuel inventory is about 3% of CES inventory. Therefore it is assumed that the costs of EA & Monitoring program are significantly less than for CES. However there will be a "fixed" cost component to some costs which limit the amount by which costs can be reduced.																
				Costs are incurred over the period Y4 to Y290(when repackaging ends) or 287 yrs vs CES at 347 yrs. RES has 0.1 staff vs CES with 2 staff. Factor is 287/347 x 0.1/2 = 0.041		Labour	0.041	70306	0.041	2882.546							2.883			
				Expenses at \$1.5K/a x 287 yrs		Materials and Equipment	1				0	1	0				0			
						Other	1				430		1	430					430	
						Contingency	0.3							3312.546		0.3	993.7638		994	
581	55	20			CNCS CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT															
				Assume C/L & EA process spans 3 years (Y5 to Y7) with with some preparation work in Y4; ie total of 4 years. Due to multiple sites with same technology can share costs		Labour	0.25	7471	0.25	1867.75							1.868			

Materials and Equipment	0.25		0	0.25	0				0
Other	0.25					2,150	0.25	537.5	538
Contingency	0.3							2405.25	722
								0.3	721.575

581 55 40

GROUNDWATER MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.6 in CES. Factor is 280/330 x 0.02/0.6 = 0.028.

Labour	0.028	37158	0.028	1040.424					1,040
M&E at \$3K/a x 280 yrs	1			840	1	840			840
Expenses at \$2K/a x 280 yrs	1					560	1	560	560
Contingency	0.3							2440.424	732
								0.3	732.1272

581 55 50

RADIOLOGICAL BIOSPHERE MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs for CES. RES staff is 0.1 vs 3.3 staff in CES. Factor is 0.026

Labour	0.026	217280	0.026	5649.28					5,649
M&E at \$9K/a x 280 yrs	1			2520	1	2520			2,520
	1					0	1	0	0
Contingency	0.3							8169.28	2,451
								0.3	2450.784

581 55 60

NON-RAD BIOSPHERE MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs in CES. RES staff is 0.05 staff vs 0.8 staff in CES. Factor is 280/330 x 0.05/0.8 = 0.053

Labour	0.053	53590	0.053	2840.27					2,840
M&E at \$3K/a x 280 yrs	1			840	1	840			840
	1					0	1	0	0
Contingency	0.3							3680.27	1,104
								0.3	1104.081

581 55 80

HUMAN HEALTH MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.17 in CES. Factor is 280/330 x 0.02/0.17 = 0.1

Labour	0.1	5760	0.1	576					576
M&E at \$3K/a x 280 yrs	1			0	1	0			0
Expenses at 0.5K/a x 280 yrs	1					140	1	140	140
Contingency	0.3							716	215
								0.3	214.8

Total	14,856 Total	4,200 Total	1,668 Total	6,217.1
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

REACTOR EXTENDED STORE										SURFACE MODULAR VAULTS (SMV)										
ACTIVITY SUMMARY TO DATA TRANSFER										POINT LEPREAU										
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K		
581	90	0	0	0	0	0	0	0 Program Management	Labour	STEP	CTECH	AM	1	10	10	0	0	NO DATA TO FILL		664.0
581	90	0	0	0	0	0	0	0 Program Management	Materials and Equipment	STEP	CTECH	AM	1	10	10	0	0	NO DATA TO FILL		0.0
581	90	0	0	0	0	0	0	0 Program Management	Other	STEP	CTECH	AM	1	10	10	0	0	NO DATA TO FILL		180.6
581	90	0	0	0	0	0	0	0 Program Management	Contingency	STEP	CTECH	AM	1	10	10	0	0	NO DATA TO FILL		168.9

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
--	---	----------------------------------

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	664	0%	664.0
Materials and Equipment	0	0.0	0.0
Other	181	0.0	180.6
Contingency	168.9	0.0	168.9
Total	1014	0.0	1014

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

ACTIVITY DETAIL ESTIMATE								WBS LEVEL		WBS Description / Detail		Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	TOTAL	Cost \$k
1	2	3	4	5	6	7	8	581	90	Program Management									

Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 7% for PtLepreau

based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 10year duration

no entry

the following expenses: Public affairs, overheads, insurance, community compensation & legal fees

Contingency as CES value

	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	CES	Factor	RES	
Labour	0.07	9486.204	0.07	664.03428								664	
Materials and Equipment	0			0	0	0						0	
Other	0.07						2580	0.07	180.6			181	
Contingency	20%									20%	1.0	168.9	169

Total	1,014
Check: Should = 0	0

Total	664	Total	0	Total	181	Total	168.9
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0



<b>RES ALTERNATIVE</b> <b>WBS No 581</b> <b>SURFACE MODULAR VAULTS (SMV)</b> <b>POINT LEPREAU</b>	Cost Category	Total K\$
	Labour	650,839
	Materials and Equipment	583,363
	Other	715,913
	Contingency	563,303
<b>Total Cost</b>	<b>2,513,418.26</b>	

**2,513,418**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	Responsible	Cost Category	WBS Type	Start Year	End Year	Dur'n	Contingency	Total K\$
581	15	0	0	0	0	0	0	RJH	Labour	STEP	1	7	7	0	452
581	15	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	7	7	0	0
581	15	0	0	0	0	0	0	RJH	Other	STEP	1	7	7	0	97
581	15	0	0	0	0	0	0	RJH	Contingency	STEP	1	7	7	0	275
581	20	0	0	0	0	0	0	AM	Labour	STEP	1	7	7	0	16,122
581	20	0	0	0	0	0	0	AM	Materials and Equipment	STEP	1	7	7	0	430
581	20	0	0	0	0	0	0	AM	Other	STEP	1	7	7	0	1,422
581	20	0	0	0	0	0	0	AM	Contingency	STEP	1	7	7	0	6,039
581	25	0	0	0	0	0	0	RJH	Labour	STEP	1	290	40	0	1,843
581	25	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	290	40	0	0
581	25	0	0	0	0	0	0	RJH	Other	STEP	1	290	40	0	315
581	25	0	0	0	0	0	0	RJH	Contingency	STEP	1	290	40	0	863
581	30	0	0	0	0	0	0	RJH	Labour	STEP	1	290	290	0	3,291
581	30	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	290	290	0	0
581	30	0	0	0	0	0	0	RJH	Other	STEP	1	290	290	0	16,080
581	30	0	0	0	0	0	0	RJH	Contingency	STEP	1	290	290	0	4,843
581	35	0	0	0	0	0	0	RJH	Labour	STEP	1	10	10	0	684
581	35	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	10	10	0	0
581	35	0	0	0	0	0	0	RJH	Other	STEP	1	10	10	0	462
581	35	0	0	0	0	0	0	RJH	Contingency	STEP	1	10	10	0	573
581	40	0	0	0	0	0	0	AM	Labour	STEP	8	285	7	0	28913.67706
581	40	0	0	0	0	0	0	AM	Materials and Equipment	STEP	8	42	7	0	66911.59032
581	40	0	0	0	0	0	0	AM	Other	STEP	8	42	7	0	28385.52524
581	40	0	0	0	0	0	0	AM	Contingency	STEP	8	42	7	0	29672.02279
581	45	0	0	0	0	0	0	AM	Labour	STEP	11	291	281	0	584,012
581	45	0	0	0	0	0	0	AM	Materials and Equipment	STEP	11	291	281	0	511,821
581	45	0	0	0	0	0	0	AM	Other	STEP	11	291	281	0	667,305
581	45	0	0	0	0	0	0	AM	Contingency	STEP	11	291	281	0	514,653
581	55	0	0	0	0	0	0	RJH	Labour	STEP	4	290	287	0	14,856
581	55	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	4	290	287	0	4,200
581	55	0	0	0	0	0	0	RJH	Other	STEP	4	290	287	0	1,668
581	55	0	0	0	0	0	0	RJH	Contingency	STEP	4	290	287	0	6,217
581	90	0	0	0	0	0	0	AM	Labour	STEP	1	10	10	0	664
581	90	0	0	0	0	0	0	AM	Materials and Equipment	STEP	1	10	10	0	0
581	90	0	0	0	0	0	0	AM	Other	STEP	1	10	10	0	181
581	90	0	0	0	0	0	0	AM	Contingency	STEP	1	10	10	0	169

RES ALTERNATIVE

FUEL OWNER

NBP

WBS No 582

Point Lepreau

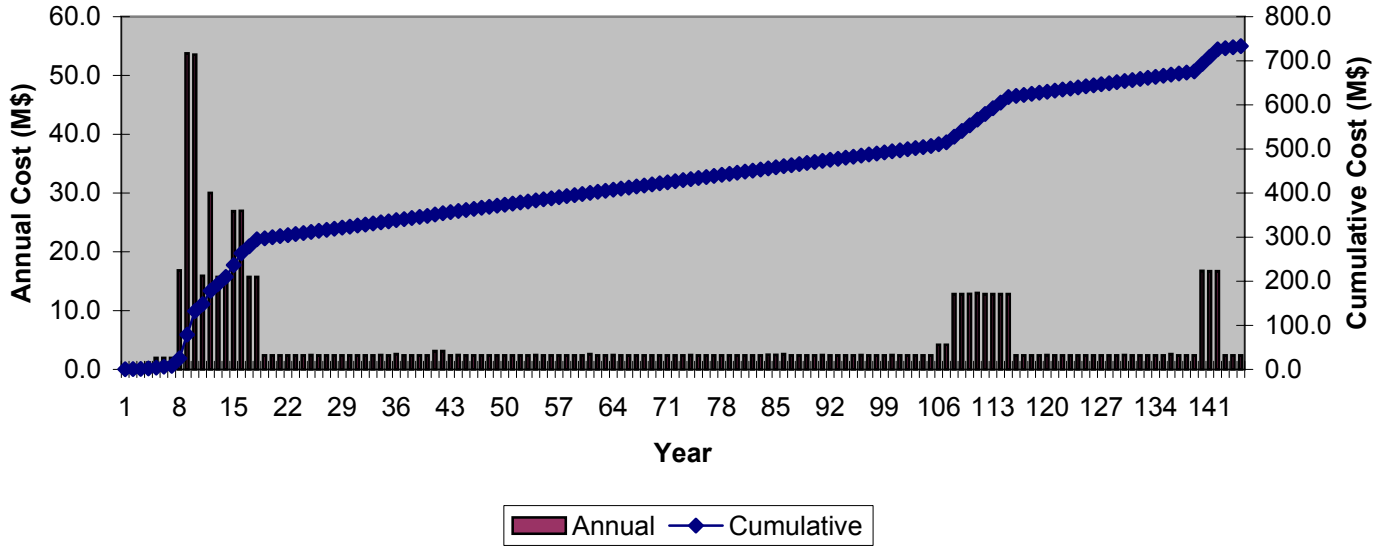
VAULTS IN SHALLOW TRENCHES

(VST)

Lev 2	WBS Name	Sheet Totals (\$k)
15	Siting	1,003
20	System Development	11,937
25	Safety Assessment	3,022
30	Licensing & Approvals	24,214
35	Public Affairs	1,718
40	Facility Design & Construction	124,288
45	Facility Operation	1,292,357
55	Environmental Assessment and Monitoring	26,941
90	Program Management	1,014
	<b>Total Cost (\$k)</b>	<b>1,486,493</b>

<b>Point Lepreau VST Alternative</b>	<b>1,486,493</b>
<b>Siting Phase</b>	<b>23,743</b>
Siting	1003
EA	3,127
System Development	11,937
SA	1,365
L&A	3,580
Public Affairs	1,718
Program Mgmt	1,014
<b>Construction Phase</b>	<b>124,288</b>
Initial construction	120,336
Transition to Standalone	3,952
<b>Operations Phase</b>	<b>1,338,462</b>
<i>Repeat &amp; Repackaging</i>	<i>679,416</i>
Initial Fuel Receipts	161,224
Vaults - 100 yrs	64,937
Vaults - 200 yrs	64,937
Vaults - 300 yrs	64,612
Storage chamber replacement - 200 yrs	40,365
Repackaging B to B - 300 yrs	229,265
PM for Repeats & Repackaging	54,075
<i>Extended Monitoring</i>	<i>659,046</i>
Program Mgmt	311,009
Monitoring Surveillance	3,263
Operation Indirects	262,385
Common Ancillary Services Ops	33,790
Fuel Integrity Monitoring	2,493
SA - Ops & Decommissioning	1,657
L&A - Ops Licence Renewal	20,634
Environmental Monitoring	23,814

**Point Lepreau VST Years 1>>145**  
**(Total Cost \$1.49B)**



REACTOR EXTENDED STORE								VAULTS IN SHALLOW TRENCHES (VST)											
ACTIVITY SUMMARY TO DATA TRANSFER								Point Lepreau											
WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
582	15	0	0	0	0	0	0	Siting	Labour	STEP	OPG	RJH	1	7	7	0	0	NO DATA TO FILL	555.9
582	15	0	0	0	0	0	0	Siting	Materials and Equipment	STEP	OPG	RJH	1	7	7	0	0		0.0
582	15	0	0	0	0	0	0	Siting	Other	STEP	OPG	RJH	1	7	7	0	0		113.0
582	15	0	0	0	0	0	0	Siting	Contingency	STEP	OPG	RJH	1	7	7	0	0		334.4

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
--	---	----------------------------------

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	556	0%	555.9
Materials and Equipment	0	0.0	0.0
Other	113	0.0	113.0
Contingency	334.4	0.0	334.4
Total	1003	0.0	1003

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

ACTIVITY DETAIL ESTIMATE																TOTAL						
WBS LEVEL								WBS Description / Detail								Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	Cost \$k
1	2	3	4	5	6	7	8															

582	15							Siting														
582	15	10						SITING MANAGEMENT														
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites, due to efficiencies of multiple sites assume a factor of 0.05	Labour	0.05	4897.7	0.05	244.885						245			
									Materials and Equipment	0.05			0	0.05	0						0	1
									Other	0.05					1,300	0.05	65			65		
									Contingency	50%											155	
582	15	70						PREFERRED SITE														
582	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING														
								Assume cost is 20% of a CES greenfield site	Labour	0.15	588.3	0.15	88.245						88	2		
									Materials and Equipment	0.15			0	0.15	0						0	
									Other	0.15					120	0.15	18			18		
									Contingency	50%											53	
582	15	70	30					PREFERRED SITE - CHARACTERISATION														
								Assume cost is 20% of a CES greenfield site	Labour	0.15	1484.8	0.15	222.72						223	3		
									Materials and Equipment	0.15			0	0.15	0						0	
									Other	0.15					200	0.15	30			30		
									Contingency	0.5											126	

**Total** 1,003  
**Check: Should = 0** 0

Total	556 Total	0 Total	113 Total	334.4
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

**REACTOR EXTENDED STORE VAULTS IN SHALLOW TRENCHES (VST)**

**ACTIVITY SUMMARY TO DATA TRANSFER**

**Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
582	20	0	0	0	0	0	0	0 System Development	Labour	STEP	CTECH	AM	279	285	7	0	0	NO DATA TO FILL	7932.6
582	20	0	0	0	0	0	0 System Development	Materials and Equipment	STEP	CTECH	AM	279	285	7	0	0	430.0		
582	20	0	0	0	0	0	0 System Development	Other	STEP	CTECH	AM	279	285	7	0	0	279.6		
582	20	0	0	0	0	0	0 System Development	Contingency	STEP	CTECH	AM	279	285	7	0	0	3294.8		

**INSTRUCTIONS**

Check: Total minus budget Should = 0  
Budget costs to Years by %

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	7901	0.0	7932.6
Materials and Equipment	430	0.0	430.0
Other	311	0.0	279.6
Contingency	3294.8	0.0	3294.8
Total	11937	0.0	11937

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail		Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	Cost \$k
1	2	3	4	5	6	7	8					CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		

582	20							System Development				CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
-----	----	--	--	--	--	--	--	--------------------	--	--	--	-----	--------	-----	-----	--------	-----	-----	--------	-----	-----	--------	-----	--	--

582	20	2						SYSTEM DEVELOPMENT MANAGEMENT																		
									Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for customization to both sites.	Labour	0.26	6690.40	0.26	1756.23											1,756	
									No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0		
									Assume smaller size management team as for CES 50%, but shared between NBP and HQ, with a 5% allowance for customization to both sites.	Other	0.26					300.00	0.26	78.75							79	
									Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	550.5	550		

582	20	5						SYSTEM OPTIMIZATION																		
									Assume system development shared between 2 sites (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 30%	Labour	0.37	3303.70	0.37	1214.11											1,214	
									No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00							0		

	Assume system development shared between 2 sites Other (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 30%	0.37				120.00	0.37	44.10		44		
	Percentage for contingency assumed same as for CES	30%							30%	1.00	377.46	377

582 20 20

**PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NTM)**

	Assume system development shared between 2 sites Labour (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%	0.16	20750.10	0.16	3268.14						3,268	
	Allow reduction due to no cask related feasibility studies and no fuel container dismantling techniques carried out in this RES alternative, and shared between NBP and HQ	0.10				4300.00	0.10	430.00			430	
	Assume system development shared between 2 sites Other (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%	0.16						895.00	0.16	140.96	141	
	Percentage for contingency assumed same as for CES	50%							50%	1.00	1919.55	1,920

582 20 30

**STORAGE SYSTEM ENG'NG**

	Assume system development shared between 2 sites Labour (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%	0.16	8143.20	0.16	1282.55						1,283	
	No entry in CES alternative cost category	0				0.00	0.00	0.00			0	
	Assume system development shared between 2 sites Labour (NBP & HQ) Therefore factor = 1/2. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. No cask/module related work required therefore a further reduction of 70%	0.16						200.00	0.16	31.50	32	
	Percentage for contingency assumed same as for CES	25%							25%	1.00	328.51	329

582 20 40

**SECURITY & SAFEGUARD ENG'NG**

	Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Smaller site than CES therefore a further factor of 50% is included	0.26	1447.70	0.26	380.02						380
	No entry in CES alternative cost category	0				0.00	0.00	0.00			0

Divide between NBP and HQ. Assume additional documentation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Smaller site than CES therefore a further factor of 50% is included

Percentage for contingency assumed same as for CES

Other	0.26	60.00	0.26	15.75	16
Contingency	30%	30%	1.0	118.7	119
<b>Total</b>				<b>11,937</b>	
<b>Check: Should = 0</b>				<b>0</b>	
Total	7,901	Total	430	Total	311
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0
				3,294.8	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1
- 2
- 3
- 4



REACTOR EXTENDED STORE VAULTS IN SHALLOW TRENCHES (VST)
ACTIVITY SUMMARY TO DATA TRANSFER Point Lepreau

Table with columns: WBS\_1, WBS\_2, WBS\_3, WBS\_4, WBS\_5, WBS\_6, WBS\_7, WBS\_8, WBS Desc, Cost Category, Type, Owner, Responsible, Start Yr, End Yr, Dur'n, Total Hrs, Contingency, Total \$K. Rows include Safety Assessment activities with costs ranging from 315.0 to 1843.3.

INSTRUCTIONS

Check: Total minus budget Should = 0
Budget costs to Years by %

ACTIVITY DETAIL ESTIMATE SUMMARY

Summary table with columns: Cost Category, Total Cost, Check total, Total Cost \$k. Rows for Labour (1843), Materials and Equipment (315), Other (863.3), Contingency (863.3), Total (3022).

INSTRUCTIONS

Table with columns: Insert lower level WBS numbers as required, Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required, Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15, and columns A through M for cost breakdown.

ACTIVITY DETAIL ESTIMATE

Table with columns: WBS LEVEL, WBS Description / Detail, Cost Category, Factor, Labour, Materials and other Equipment, Other, Contingency, TOTAL, Cost \$k.

Main activity detail table with columns: WBS\_1-8, WBS Desc, Cost Category, Factor, CES, RES, and columns A-M. Rows include Safety Assessment, SA - SITING, SA - OPERATING LICENSE, and SA - FACILITY OPERATIONS with detailed cost breakdowns.

582 25 70

SA - DECOMMISSIONING (Processing Facilities)

RES has 1 decommissioning events - while CES has 3. Costs can be shared between sites with similar technology; thus factor to 0.15

Contingency	40%					40%	1.0	363.4	363
Labour	0.1	2449.9	0.1	244.99					245
Materials and Equipment	0.1				0.1				
Other	0.1					300	0.1	30	30
Contingency	40%						40%	1.0	110.0

<b>Total</b>	<b>3,022</b>
<b>Check: Should = 0</b>	

Total	1,843	Total	315	Total	863.3
Check: Should = 0		Check: Should = 0		Check: Should = 0	

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**VAULTS IN SHALLOW TRENCHES (VST)  
Point Lepreau**

WBS.1	WBS.2	WBS.3	WBS.4	WBS.5	WBS.6	WBS.7	WBS.8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
582	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour	STEP	OPG	RJH	1	290	290	0	0	NO DATA TO FILL	3291.4
582	30	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment	STEP	OPG	RJH	1	290	290	0	0	0.0		
582	30	0	0	0	0	0	0 Licensing & Approvals	Other	STEP	OPG	RJH	1	290	290	0	0	16079.5		
582	30	0	0	0	0	0	0 Licensing & Approvals	Contingency	STEP	OPG	RJH	1	290	290	0	0	4842.7		

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	3291	0%	3291.4
Materials and Equipment	0	0.0	0.0
Other	16080	0.0	16079.5
Contingency	4842.7	0.0	4842.7
<b>Total</b>	<b>24214</b>	<b>0.0</b>	<b>24214</b>

**INSTRUCTIONS**

Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M				
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number			
<b>ACTIVITY DETAIL ESTIMATE</b>																					<b>TOTAL</b>				
WBS LEVEL			WBS Description / Detail			Cost Category			Factor			Labour			Materials and other Equipment			Other			Contingency			Cost \$k	
1	2	3	4	5	6	7	8																		

582	30							Program Management															
582	30							Licensing & Approvals															
582	30	30						LIAISON WITH CNSC															
								Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2	Labour	0.2	555	0.2	111										111
									Materials and Equipment	0.2				0	0.2	0							0
									Other	0.2						40	0.2	8				8	
									Contingency	0.25									25%	1.0	29.8	30	
582	30	50						CNSC CONSTRUCTION LICENCE															
								Some inefficiencies gained due to multiple sites	Labour	0.25	2631	0.25	657.75									658	
									Materials and Equipment	0.25				0	0.25	0						0	
									Other	0.25						6,264	0.25	1566				1,566	
									Contingency	0.25									25%	1.0	555.9	556	
582	30	60						OTHER GOV'NT APPROVALS															
582	30	60	10					APPROVAL REQUIREMENTS															
								Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.057. However due to inefficiencies of multiple sites increase to 0.2	Labour	0.2	337	0.2	67.4									67	
									Materials and Equipment	0.2				0	0.2	0						0	
									Other	0.2						0	0.2	0				0	
									Contingency	0.25									25%	1.0	16.9	17	
582	30	60	30					FEDERAL APPROVALS															
									Labour	0.25	133	0.25	33.25									33	
									Materials and Equipment	0.25				0	0.25	0						0	
									Other	0.25						0	0.25	0				0	

				Contingency	0.25					25%	1.0	8.3	8
582	30	60	40	PROVINCIAL APPROVALS									
				Labour	0.25	133	0.25	33.25					33
				Materials and Equipment	0.25			0	0.25	0			0
				Other	0.25					0	0.25	0	0
				Contingency	0.25						25%	1.0	8.3
582	30	60	50	MUNICIPAL APPROVALS									
				Labour	0.25	133	0.25	33.25					33
				Materials and Equipment	0.25			0	0.25	0			0
				Other	0.25					0	0.25	0	0
				Contingency	0.25						25%	1.0	8.3
582	30	65		CNSC OPERATING LICENCE (Initial Application)									
				Labour	0.25	513	0.25	128.25					128
				Materials and Equipment	0.25			0	0.25	0			0
				Other	0.25					902	0.25	225.5	226
				Contingency	0.25						25%	1.0	88.4
582	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)									
				<div style="border: 1px solid orange; padding: 2px;">                     CES duration is 330 years. Costs incurred in RES during period Y11 to Y290 or 280 years. RES has 0.8 staff vs 1 staff in CES. Factor is 280/330 x 0.08/1 =                 </div>	0.068	32754	0.068	2227.272					2,227
				Materials and Equipment	1			0	1	0			0
				Expenses at \$51K/a x 280 yrs	1					14,280	1	14280	14,280
				Contingency	0.25						25%	1.0	4,126.8
													<b>Total</b> 24,214 <b>Check: Should = 0</b> 0
				Total		3,291	Total		0	Total	16,080	Total	4,842.7
				Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0	0	Check: Should = 0	0

**REACTOR EXTENDED STORE**  
**ACTIVITY SUMMARY TO DATA TRANSFER**

**VAULTS IN SHALLOW TRENCHES (VST)**  
**Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
582	35	0	0	0	0	0	0	0 Public Affairs	Labour	STEP	OPG	RJH	1	10	10	0	0	NO DATA TO FILL	683.8
582	35	0	0	0	0	0	0 Public Affairs	Materials and Equipment	STEP	OPG	RJH	1	10	10	0	0	0.0		
582	35	0	0	0	0	0	0 Public Affairs	Other	STEP	OPG	RJH	1	10	10	0	0	461.8		
582	35	0	0	0	0	0	0 Public Affairs	Contingency	STEP	OPG	RJH	1	10	10	0	0	572.8		

**INSTRUCTIONS**

INSTRUCTIONS																				
ACTIVITY DETAIL ESTIMATE SUMMARY																				
Check: Total minus budget Should = 0																				
Budget costs to Years by %																				
Check total																				
Total Cost \$k																				
Labour																		684	0.0	683.8
Materials and Equipment																		0	0.0	0.0
Other																		462	0.0	461.8
Contingency																		572.8	0.0	572.8
Total																		1718	0.0	1718

**INSTRUCTIONS**

INSTRUCTIONS																	
Insert lower level WBS numbers as required																	
Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required																	
Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15																	
A Use appropriate CES cost																	
B Apply Factor																	
C Calc RES cost value																	
D Use appropriate CES cost																	
E Apply Factor																	
F Calc RES cost value																	
G Use appropriate CES cost																	
H Apply Factor																	
I Calc RES cost value																	
J Use appropriate CES cost																	
K Apply Factor																	
L Calc RES cost value																	
M Total Cost is calculated																	
Add Basis of estimate Note Ref Number																	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail																		TOTAL									
								Cost Category																		Cost \$k									
								Factor																											
								Labour																		Materials and other Equipment		Other		Contingency					
								CES																		Factor		RES		CES		Factor		RES	
582	35							Public Affairs																											
582	35	45						PUBLIC AFFAIRS - PREFERRED SITE																											
								0.05	3046.2	0.05	152.31													152											
								0.05				0	0.05	0													0								
								0.05						600	0.05	30													30						
								50%									50%	1.0	91.2													91			
582	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																											
								0.05	4569.3	0.05	228.465													228											
								0.05				0	0.05	0													0								
								0.05						1,450	0.05	72.5													73						
								50%									50%	1.0	150.5													150			
582	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																											
								0.05	2528.9	0.05	126.445													126											
								0.05				0	0.05	0													0								
								0.05						800	0.05	40													40						
								50%									50%	1.0	83.2													83			
582	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																											
								0.05	3530.8	0.05	176.54													177											
								0.05				0	0.05	0													0								
								0.05						170	0.05	8.5													9						
								50%									50%	1.0	92.5													93			
582	35	120						Community Offsets & Benefits																											
								0.15	0	0.15	0													0											
								0.15				0	0.15	0													0								

Other	0.15		2,072	0.15	310.8		311
Contingency	50%					50%	1.0 155.4 155
<b>Total</b>							<b>1,718</b>
<b>Check: Should = 0</b>							<b>0</b>
Total	684	Total	0	Total	462	Total	572.8
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**VAULTS IN SHALLOW TRENCHES (VST)  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K
582	40	0	0	0	0	0	0	Facility Design & Construction	Labour	STEP	CTECH	AM	8	285	7		0	47074.7
582	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment	STEP	CTECH	AM	8	285	7		0	44491.7
582	40	0	0	0	0	0	0	Facility Design & Construction	Other	STEP	CTECH	AM	8	285	7		0	5757.9
582	40	0	0	0	0	0	0	Facility Design & Construction	Contingency	STEP	CTECH	AM	8	285	7		0	26963.5

NO DATA TO FILL

**INSTRUCTIONS**

Check: Total minus budget Should = 0		Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	47075	0.0	47074.7
Materials and Equipment	44492	0.0	44491.7
Other	5758	0.0	5757.9
Contingency	26963.5	0.0	26963.5
Total	124288	0.0	124288

**INSTRUCTIONS**

Insert lower level WBS numbers as required			Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required			Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15			A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number					
									Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated						
<b>ACTIVITY DETAIL ESTIMATE</b>																					<b>TOTAL</b>						
<b>WBS LEVEL</b>			<b>WBS Description / Detail</b>			<b>Cost Category</b>			<b>Factor</b>			<b>Labour</b>			<b>Materials and other Equipment</b>			<b>Other</b>			<b>Contingency</b>			<b>Cost \$k</b>			
1	2	3	4	5	6	7	8																				

582	40							<b>Facility Design &amp; Construction</b>																
582	40	10						<b>SITE &amp; IMPROVEMENTS</b>																
								a 10% allowance of the CES costs, applied to the site improvements	Labour	0.1	45,930.4	0.1	4,593.0											4,593
									Materials and Equipment	0.1			58,350.0	0.1	5,835.0									5,835
								no property acquisition required	Other	0.00					3,375.0	0.0	0.0						0	
								Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	5,214.0			5,214	
582	40	30						<b>COMMON ANCILLARY FACILITIES</b>																
582	40	30	10					<b>ADMIN AND SUPPORT FACILITIES</b>																
582	40	30	10	1				<b>ADMIN AND VISITOR RECEPTION BLDG</b>																
								Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	486.3	0.0	0.0										comment 7	0
									Materials and Equipment	0.0			784.2	0.0	0.0									0
								No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0						0	
								Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	0.0			0	
582	40	30	10	2				<b>OPS SUPPT &amp; HEALTH PHYSICS BLDG</b>																
								Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,294.8	0.0	0.0										comment 7	0
									Materials and Equipment	0.0			1,612.6	0.0	0.0									0
								No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0						0	
								Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	0.0			0	

582	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																
					Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	1,262.1	0.0	0.0									comment 7	0	
						Materials and Equipment	0.0				1,675.0	0.0	0.0							0	
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0					0	
					Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	0.0		0	
582	40	30	10	5	ACTIVE SOLID WASTE HDLG BLDG																
					A 30% allowance of CES costs applied to the refurbishment of the existing site facilities	Labour	0.3	459.9	0.3	138.0											138
						Materials and Equipment	0.3				1,135.0	0.3	340.5								341
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	143.5		144	
582	40	30	10	6	SOLID WASTE STORAGE AREA																
					A 30% allowance of CES costs applied to the refurbishment of the existing site facilities	Labour	0.3	458.8	0.3	137.6											138
						Materials and Equipment	0.3				437.5	0.3	131.3								131
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	80.7		81	
582	40	30	10	7	ACTIVE LIQ/W TRT'MT BLDG																
					A 30% allowance of CES costs applied to the refurbishment of the existing site facilities	Labour	0.3	359.4	0.3	107.8											108
						Materials and Equipment	0.3				1,727.0	0.3	518.1								518
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	187.8		188	
582	40	30	10	8	LOW LVL LIQ/W STRG BLDG																
					A 30% allowance of CES costs applied to the refurbishment of the existing site facilities	Labour	0.3	373.7	0.3	112.1											112
						Materials and Equipment	0.3				1,426.0	0.3	427.8								428
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	162.0		162	
582	40	30	10	9	WAREHOUSE BLDG																
					Building exists therefore new building not required until 100 year replacement. Therefore allowance for refurbishment covered in ***/45/20/50	Labour	0.0	470.9	0.0	0.0										comment 7	0
						Materials and Equipment	0.0				550.0	0.0	0.0								0
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0						0
					Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	0.0		0	
582	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																
					Building and security exist therefore new building and fence not required. Allowance for refurbishment covered in ***/45/20/50	Labour	0.0	631.2	0.0	0.0										comment 7	0
						Materials and Equipment	0.0				553.7	0.0	0.0								0
						Other	0.0						0.0	0.0	0.0						0
					Increased contingency than CES due to RES facility footprint size not confirmed and therefore length of fence, not yet known	Contingency	20%									20%	1.0	0.0		0	
582	40	30	10	11	TRUCK INSP'N / WASH STATION																





				Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	0.0	0	
582	40	30	20	6	RETENTION/SEDIMENTATION POND										
				assumed available and turned over to RES during transition	Labour	0.00	874.4	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				189.6	0.0	0.0			0
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	0.0	0
582	40	30	20	7	STORM WATER DETENTION POND										
				assumed available and turned over to RES during transition	Labour	0.00	387.8	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				93.5	0.0	0.0			0
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	30%						30%	1.0	0.0	0
582	40	30	20	8	CONSTN MAT'L STOCKPILE AREA										
				not req'd, concrete brought in as req'd from off-site	Labour	0.00	1,039.2	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				625.0	0.0	0.0			0
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	15%						15%	1.0	0.0	0
582	40	30	20	9	SITE MATERIALS STORAGE AREA										
				assumed available and turned over to RES during transition	Labour	0.00	1,169.5	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				655.0	0.0	0.0			0
				No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	15%						15%	1.0	0.0	0
582	40	30	20	10	ACCESS ROADS AND VEHICLE COMPOUNDS										
				assumed available and turned over to RES during transition	Labour	0.00	1,319.9	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				1,866.9	0.0	0.0			0
				No entry into cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	25%						25%	1.0	0.0	0
582	40	30	30	CONSTN INDIRECTS ANCILLARY FACILITIES											
				assumed available and turned over to RES during transition	Labour	0.00	4,406.4	0.0	0.0					comment 7	0
					Materials and Equipment	0.00				6,610.9	0.0	0.0			0
				No entry into cost category	Other	0.0					0.0	0.0	0.0		0
				Percentage for contingency assumed same as for CES	Contingency	25%						25%	1.0	0.0	0
582	40	40	STORAGE CONSTRUCTION STAGE 1												
				STORAGE CHAMBERS DESIGN & CONSTN											
				Construction of the storage chambers complex. Based on CVST CES stage 1 storage const'n of 4 chambers and access tunnel. 2 chambers length approx 100m for RES as opposed to 4 CES chambers at length 160m. Therefore factor due to length & quantity & use 6/10 rule. The CES design	Labour	0.50	72,832.7	0.50	36,244.0						36,244

	content for stages 2,3&4 has been omitted. The remaining stage 1 design content of the labour cost is split 50/50 between 2 sites (HQ&NBP)	Materials and Equipment	0.50		59,932.2	0.50	29,824.3			29,824
	travel expenses for contactors same factor as labour and materials	Other	0.50				7,290.0	0.50	3,627.8	3,628
	Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	17,424.0
582	40	50	<b>STORAGE VAULTS DESIGN &amp; CONST'N</b>							
	Costs taken from CVST CES storage const'n stage 3 costs. Factor dictated by quantity of vaults constructed, RES = 3 initially built, CES cost was for 24. Includes crane, trolley, & gamma gate	Labour	0.29	16,320.0	0.29	5,358.7				5,359
		Materials and Equipment	0.29			16,200.0	0.29	6,577.2		6,577
	travel expenses for contactors same factor as labour and materials	Other	0.29				7,290.0	0.29	2,093.5	2,094
	Percentage for contingency assumed same as for CES	Contingency	25%					25%	1.0	3,507.4
582	40	650	<b>ENERGY CONSUMPTION</b>							
	No entry into cost category	Labour	0.00	0.0	0.00	0.0				0
	No entry into cost category	Materials and Equipment	0.00			0.0	0.00	0.0		0
	consumption for the construction of stage 1 storage chambers and ancillary buildings	Other	0.10				366.3	0.10	36.6	37
	Percentage for contingency assumed same as for CES	Contingency	0%					0%	1.0	0.0

<b>Total</b>	<b>124,288</b>
<b>Check: Should = 0</b>	<b>0</b>

Total	47,075 Total	44,492 Total	5,758 Total	26,963.5
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1
- 2
- 3
- 4

**REACTOR EXTENDED STORE VAULTS IN SHALLOW TRENCHES (VST)**

**ACTIVITY SUMMARY TO DATA TRANSFER**

**Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K	
582	45	0	0	0	0	0	0	0 Facility Operation	Labour	STEP	CTECH	AM	11	290	280	0	0	NO DATA TO FILL	510607.8
582	45	0	0	0	0	0	0 Facility Operation	Materials and Equipment	STEP	CTECH	AM	11	290	280	0	0	219592.4		
582	45	0	0	0	0	0	0 Facility Operation	Other	STEP	CTECH	AM	11	290	280	0	0	297924.6		
582	45	0	0	0	0	0	0 Facility Operation	Contingency	STEP	CTECH	AM	11	290	280	0	0	264232.0		

**INSTRUCTIONS**

Check: Total minus budget Should = 0

Budget costs to Years by %

**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$K
Labour	510020	0%	510607.8
Materials and Equipment	219592	0.0	219592.4
Other	298513	0.0	297924.6
Contingency	264232	0.0	264232.0
Total	1292357	0.0	1292357

**INSTRUCTIONS**

Insert lower level WBS numbers as required		Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required		Insert cost category name in all estimate lines - Hint, copy and text paste from rows 12 thro 15		A	B	C	D	E	F	G	H	I	J	K	L	M	
						Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	Add Basis of estimate Note Ref Number

ACTIVITY DETAIL ESTIMATE								TOTAL													
WBS LEVEL								WBS Description / Detail													
								Cost Category													
								Factor													
								Labour			Materials and other Equipment			Other			Contingency			Cost \$K	
1	2	3	4	5	6	7	8	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
582	45							Facility Operation													
582	45	10						OPERATIONS FUEL TRANSFER													
582	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER													
								0.05	110,251.0	0.1	5,880.1										5,880
								0.0			0.0	0.0	0.0							0	
								1.0					4,473	1.0	4,473.2					4,473	3
								20%									20%	1.0	2,070.6	2,071	
582	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)													
								0.11	6,500.0	0.1	732.0										732
								0.75			53.0	0.8	39.8							40	
								0.0					0.0	0.0	0.0					0	
								50%								50%	1.0	385.9	386		

582 45 10 30

OPERATION INDIRECTS (FUEL TRANSFER)

Factor due to reduced admin & maintenance. Security and site infrastructure similar to CES. CES additional fuel receipt security/armed response omitted. Duration 8 years (CES 30), but using 90% utilisation. Other category is for energy consumption only.	Labour	0.240	115,547.0	0.6	73,179.8													73,180
	Materials and Equipment	0.240				1,284.0	0.2	308.2										308
	Other	0.240							16,380.0	0.2	3,931.2							3,931
	Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	23,225.7			23,226

582 45 10 40

STORAGE OPERATIONS

smaller fuel inventory therefore shorter duration for transfer operations 8 yrs for remaining fuel compared to 30 yrs CES	Labour	0.27	29,706.0	0.3	7,921.6													7,922
none applicable to basket fuel alternatives	Materials and Equipment	0.0				300.0	0.0	0.0										0
No entry in CES alternative cost category	Other	0.0							0.0	0.0	0.0							0
Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,376.5				2,376

582 45 10 50

ADDITIONAL STORAGE CONSTRUCTION

582 45 10 50 10

STORAGE DESIGN & CONST'N STAGE 2 (VAULTS)

labour for additional 3 vaults factor = (3/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Labour	0.29	16,320.0	0.29	4,686.7													4,687	1
labour for additional 3 vaults factor = (3/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Materials and Equipment	0.29				16,200.0	0.29	4,652.2										4,652	1
labour for additional 3 vaults factor = (3/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Other	0.29							7,290.0	0.29	2,093.5							2,094	1
Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	2,858.1				2,858	1

582 45 10 50 20

STORAGE DESIGN & CONST'N STAGE 3 (VAULTS)

labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Labour	0.23	16,320.0	0.23	3,674.6													3,675	1
labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Materials and Equipment	0.23				16,200.0	0.23	3,647.6										3,648	1
labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Other	0.23							7,290.0	0.23	1,641.4							1,641	1
Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	2,240.9				2,241	1

582 45 10 50 30

STORAGE DESIGN & CONST'N STAGE 4 (VAULTS)

labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Labour	0.23	16,320.0	0.23	3,674.6													3,675	1
labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Materials and Equipment	0.23				16,200.0	0.23	3,647.6										3,648	1
labour for additional 2 vaults factor = (2/24)^.6 ratio of number of RES vaults to CES with 6/10 rule applied	Other	0.23							7,290.0	0.23	1,641.4							1,641	1
Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	2,240.9				2,241	1

582 45 20  
582 45 20 5

OPERATIONS - EXTENDED MONITORING  
PROGRAM MANAGEMENT

Labour	0.081	312,354.0	0.1	25,173.4						25,173	5	
<p>Entries in CES DET applicable to RES but duration 272 yrs RES &amp; 300 years CES therefore <math>272/300 = 0.907</math>. Program management spread over 7 sites with Pt Lepreau assumed to have 0.8 staff vs 9 in CES. Thus combined factor = 0.081</p>												
No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0			0		
<p>Annual cost = \$860/a x 272 yrs</p>												
Other	1.00						234,001	1.0	234,000.6	234,001	4	
Percentage for contingency assumed same as for CES	Contingency	20%							20%	1.0	51,834.8	51,835

582 45 20 40

MONITORING AND SURVEILLANCE -EXTENDED MONITORING

Labour	0.04	49,716.0	0.0	1,903.6						1,904	5	
<p>CES monitoring and surveillance duration was 300 yrs for 4717 baskets, RES is 272 years for 1992 baskets. Pt Lepreau assumed to have 0.5 staff for RES vs 5 in CES. Combined factor based on duration, fuel inventory and staffing levels.</p>												
Materials and Equipment	1.00				272.0	1.0	272.0			272	6	
<p>annual costs = \$1k/a x 272 years</p>												
No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0	0		
Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	1,087.8	1,088

582 45 20 50

OPERATION INDIRECTS (EXTENDED MONITORING)

Labour	0.19	875,048.0	0.2	166,344.9						166,345	5	
<p>Entries in CES DET applicable to RES but duration 273 years RES &amp; 300 years CES. Staff for RES = 7 vs 34 in CES. Combined factor = <math>273/300 \times 7/34</math>. M&amp;E costs are \$75k/a x 273 years. Armed response = \$50k/a + energy costs at \$5k/a. total = \$55k x 273 years</p>												
Materials and Equipment	1.00				20,475.0	1.0	20,475.0			20,475	6	
Other	1.00						15,015.0	1.0	15,015.0	15,015	6	
Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	60,550.5	60,550

582 45 20 60

COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)

Labour	0.18	148,529.0	0.2	27,032.3						27,032	5	
<p>RES has duration 273 years, CES has 300 years. RES staff is 1 vs 5 in CES. Factor is <math>273/300 \times 1/5</math></p>												
No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0			0		
No entry in CES alternative cost category	Other	0.0					0.0	0.0	0.0	0		
Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	6,758.1	6,758

582 45 20 70

FUEL INTEGRITY MONITORING (25 YEARLY)

Labour	0.2	4,631.0	0.2	842.8						843	5
<p>RES has duration 273 years, CES has 300 years. RES staff is 0.1 vs 0.5 in CES. Factor is <math>273/300 \times 0.1/0.5</math></p>											
Materials and Equipment	1.0				682.5	1.0	682.5			683	6
<p>annual M+E costs is \$2.5k/a x 273 years</p>											

<p>Other costs is \$0.5k/a x 273 years <i>Includes Armed response included at rate of \$50k/a based on 5 years duration - see note 5.</i></p>		Other	1.0							136.5			137	6
		Contingency									1.0	830.9		831

582 45 30  
582 45 30 20

OPERATIONS - FACILITY REPEATS

VAULTS 100 YEAR REPLACEMENT															
replace all 10 vaults. CES has cost for replacing 24 therefore labour cost factor = 10/24		Labour	0.42	43,775.7	0.4	18,239.9								18,240	
each vault materials cost = \$675k therefore from CES materials total cost (which is for 24 vaults) deduct 14x\$675k to leave remaining materials costs for 10 vaults and associated equipment		Materials and Equipment	1.00				29,170.000	1.0	29,170.0					29,170	
electrical consumption for const'n of vaults and waste disposal is related to quantity of vaults, use factor 10/24. Includes Armed response included at rate of \$50k/a based on 5 years duration - see note 5.		Other	0.42				5,500.0	0.4	2,541.7					2,542	7
Percentage for contingency assumed same as for CES		Contingency	30%							1.0	14,985.5		14,985		

582 45 30 30

VAULTS 200 YEAR REPLACEMENT															
assume same costs as for 100 year vault replacement		Labour	0.42	43,775.7	0.4	18,239.9								18,240	
assume same costs as for 100 year vault replacement		Materials and Equipment	1.00				29,170.000	1.0	29,170.0					29,170	
assume same costs as for 100 year vault replacement		Other	0.42				5,500.0	0.4	2,541.7					2,542	7
assume same costs as for 100 year vault replacement		Contingency	30%							1.0	14,985.5		14,985		

582 45 30 40

VAULTS 300 YEAR REPLACEMENT															
assume same costs as for 100 year vault replacement		Labour	0.42	43,775.7	0.4	18,239.9								18,240	
assume same costs as for 100 year vault replacement		Materials and Equipment	1.00				29,170.000	1.0	29,170.0					29,170	
assume same costs as for 100 year vault replacement		Other	0.42				5,500.0	0.4	2,291.7					2,292	8
assume same costs as for 100 year vault replacement		Contingency	30%							1.0	14,910.5		14,910		

582 45 30 50

STORAGE CHAMBERS 200 YEAR REPLACEMENT														
CES has 16 chambers, RES has 2 chambers therefore factor = 2/16^0.6		Labour	0.29	110,400.0	0.3	31,704.1								31,704
no entry in CES		Materials and Equipment	0.00				0.000	0.0	0.0					0
CES has 16 chambers, RES has 2 chambers therefore factor = 2/16^0.6		Labour	0.29				2,048.4	0.3	588.2					588
Percentage for contingency assumed same as for CES		Contingency	25%							1.0	8,073.1		8,073	

582 45 40  
582 45 40 5

OPERATIONS - REPACKAGING  
PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)

					Labour	0.05	440,778.0	0.1	23,198.8									23,199
					Entries in CES DET applicable to RES but duration 30 years RES = 3x(2yr licensing 1yr demolish prev. bldg, 2yr const'n, 5yr operations) & 114 years CES therefore 30/114. A further factor included due to program management shared equally between 7 sites this factor is increased to include inefficiency of single site based program management team (use 20%). No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0						0
					property tax based on 15 year duration (3 events x 5 years) see note 9	Other	1.00						21,863.9	1.0	21,863.9			21,864.9
					Percentage for contingency assumed same as for CES	Contingency	20%							20%	1.0	9,012.5		9,013
582	45	40	10	40	COMMON ANCILLARY FACILITIES (REPLACEMENT) only require full ancillary buildings (13) at 300yr RPBB event, for 100 & 200yr facility repeats, the replacement of 7 ancillary buildings is required. Therefore combined factor = ((7/13)*2) + 1	Labour	2.1	21,056.2	2.1	43,732.1								43,732
					No entry in CES alternative cost category	Materials and Equipment	2.1			29,785.1	2.1	61,861.4						61,861
					Percentage for contingency assumed same as for CES	Other	0.00						0.0	0.0	0.0			0
					Percentage for contingency assumed same as for CES	Contingency	22%							22%	1.0	23,230.6		23,231
582	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING) duration 24 years RES compared to 30 years CES. Factor =24/30 = 0.8	Labour	0.8	11,882.0	0.8	9,505.6							9,506
					No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0						0
					No entry in CES alternative cost category	Other	0.0						0.0	0.0	0.0			0
					Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	2,376.4		2,376
582	45	40	40		BASKET TO BASKET 300 YEAR REPACKAGING													
582	45	40	40	05	CONSTRUCTION FACILITIES - REPACK'NG PLANT Basket (RPB) assumed same facility as CES therefore factor = 1	Labour	1.0	476.1	1.0	476.1								476
					assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0			354.6	1.0	354.6						355
					assumed same facility as CES therefore factor = 1	Other	1.0						228.4	1.0	228.4			228
					same contingency as for CES	Contingency	30%							30%	1.0	317.7		318
582	45	40	40	10	PROCESSING BUILDING - REPACK'NG PLANT Basket (RPB)													
582	45	40	40	10	20	RPBB EQUIP. DESIGN, SUPPLY & INSTALL												
582	45	40	40	10	20	10	RECEIPT & TRANSFER (EQUIP) assumed same facility as CES therefore factor = 1	Labour	1.0	70.8	1.0	70.8						71
					assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0			1,415.0	1.0	1,415.0						1,415
					assumed same facility as CES therefore factor = 1	Other	1.0						74.3	1.0	74.3			74
					same contingency as for CES	Contingency	30%							30%	1.0	468.0		468



582	45	40	40	10	20	20	BASKET TO BASKET FUEL TRANSFER													
							assumed same facility as CES therefore factor = 1	Labour	1.0	2,319.4	1.0	2,319.4							2,319	
							assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0				11,597.0	1.0	11,597.0				11,597	
							assumed same facility as CES therefore factor = 1	Other	1.0				695.8	1.0	695.8				696	
							same contingency as for CES	Contingency	30%							30%	1.0	4,383.7	4,384	
582	45	40	40	10	20	30	BASKET DECONTAMINATION													
							assumed same facility as CES therefore factor = 1	Labour	1.0	854.6	1.0	854.6							855	
							assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0				4,563.0	1.0	4,563.0				4,563	
							assumed same facility as CES therefore factor = 1	Other	1.0				256.4	1.0	256.4				256	
							same contingency as for CES	Contingency	30%							30%	1.0	1,702.2	1,702	
582	45	40	40	10	30		RPBB BUILDING DESIGN AND CONSTRUCTION													
							assumed same facility as CES therefore factor = 1	Labour	1.0	4,160.0	1.0	4,160.0							4,160	
							assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0				4,280.0	1.0	4,280.0				4,280	
							assumed same facility as CES therefore factor = 1	Other	1.0				832.0	1.0	832.0				832	
							same contingency as for CES	Contingency	30%							30%	1.0	2,781.6	2,782	
582	45	40	40	10	60		BUILDING SERVICES (RPB)													
							assumed same facility as CES therefore factor = 1	Labour	1.0	4,447.8	1.0	4,447.8							4,448	
							assumed same facility as CES therefore factor = 1	Materials and Equipment	1.0				4,153.8	1.0	4,153.8				4,154	
							assumed same facility as CES therefore factor = 1	Other	1.0				1,309.4	1.0	1,309.4				1,309	
							same contingency as for CES	Contingency	25%							25%	1.0	2,477.8	2,478	
582	45	40	40	10	70		COMMISSIONING (RPB)													
							assumed same facility as CES therefore factor = 1	Labour	1.0	668.2	1.0	668.2							668	
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0	
							assumed same facility as CES therefore factor = 1	Other	1.0				126.3	1.0	126.3				126	
							same contingency as for CES	Contingency	50%							50%	1.0	397.3	397	
582	45	40	40	10	80		CONSTN INDIRECTS (RPB)													
							As for RPM, - assume Design accounts for approx 45% of the total constn indirect costs (information on ratio obtained from CES SMV Processing building). These costs can be shared between the 2 sites (HQ & NBP) therefore factor = (100-45)+45/2 = 77.5% (or 0.78)	Labour	0.78	6,299.6	0.8	4,882.2								4,882
								Materials and Equipment	0.0				0.0	0.0	0.0				0	
								Other	0.78				241.5	0.8	187.2				187	
							same contingency as for CES	Contingency	30%							30%	1.0	1,520.8	1,521	
582	45	40	40	400			CONSTRUCTION MANAGEMENT (RPB)													
							assumed same facility as CES therefore factor = 1	Labour	1.0	4,690.6	1.0	4,690.6							4,691	
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0	

					No entry in CES alternative cost category	Other	0.0			0.0	0.0	0.0			0	
					same contingency as for CES	Contingency	30%						30%	1.0	1,407.2	1,407
582	45	40	40	500	COMMISSIONING MANAGEMENT (RPB)											
					assumed same facility as CES therefore factor = 1	Labour	1.0	113.3	1.0	113.3						113
					No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0			0	
					assumed same facility as CES therefore factor = 1	Other	1.0				13.5	1.0	13.5		14	
					same contingency as for CES	Contingency	50%						50%	1.0	63.4	63
582	45	40	40	600	REPACKAGING OPERATIONS (RPB)											
					Labour for repackaging operations for CES is for a fuel inventory of 4717 baskets. RES has 1992 baskets requiring repackaging. The cost factor is a ratio of the fuel inventory = 1992/4717 = 0.422	Labour	0.42	3,960.8	0.4	1,672.7						1,673
					the same factor for labour is used for procurement of new baskets	Materials and Equipment	0.42			23,585.0	0.4	9,960.0			9,960	
					the same factor for labour is used for waste disposal of old baskets	Other	0.42				378.0	0.4	159.6		160	
					same contingency as for CES	Contingency	30%						30%	1.0	3,537.7	3,538
582	45	40	40	700	OPERATION INDIRECTS (RPB)											
					operation indirect labour costs for CES are for a duration of 10 yrs RES operations are for 5 yrs therefore a factor of 0.5 is used	Labour	0.5	2,678.3	0.5	1,339.2						1,339
					Assume same spares and consumables required as identical equipment is used for both CES & RES. Therefore factor = 1	Materials and Equipment	1.0			172.8	1.0	172.8			173	
					Assume energy consumption for running of facility can be factored relative to duration of facility operation = 5/10yrs = 0.5. Armed response included at rate of \$50k/a based on 5 years duration - see note 5.	Other	0.5				3,240.0	0.5	1,870.0		1,870	
					same contingency as for CES	Contingency	30%						30%	1.0	1,014.6	1,015
582	45	40	40	800	STORAGE OPERATIONS (RPB)											
					Labour for storage operations for CES is for a fuel inventory of 4717 baskets. RES has 1992 baskets requiring repackaging. The cost factor is a ratio of the fuel inventory = 1992/4717 = 0.422	Labour	0.42	990.2	0.4	418.2						418
					No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0			0	
					No entry in CES alternative cost category	Other	0.0				0.0	0.0	0.0		0	
					same contingency as for CES	Contingency	30%						30%	1.0	125.4	125

Total	1,292,357
Check: Should = 0	0

Total	510,020 Total	219,592 Total	298,513 Total	264,232.0
Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0 Check: Should = 0	0

### BASIS OF ESTIMATE NOTES - Insert references and notes

1 costs for silos demolition and waste disposal based on unit cost factors obtained for demolition of basket storage vaults in CVSB alternative

2 ancillary ops factored from CES CVSB. In CES this cost was for a 30 year period (covering 1 facility repeat and 1 repackaging event). for RES this covers 100/200&300year facility repeats & 300y repackaging 3x8 (1 demolish prev (y83). 2 const.n of 222 silos (y84,85) 5 ops for transfer) = 24

3 other costs made up of expenses from table 18 in report (15+118+50+50+25). + Property tax at 2.6% of assessed building value (during ext. monitoring at 15%) of VSTs and ancillary buildings const'n cost (ie. \$137,3583K + \$17,077K) but due to storage facilities built on a rolling basis an additional 50% reduction is included

4 other costs made up of expenses from table 18 in report (15+118+50+50+25). + Property tax at 2.6% of assessed building value (during ext. monitoring at 15%) of VSTs and ancillary buildings const'n cost (ie. \$137358K + \$17,077K)

5 staffing levels obtained from table 17 in cost estimate report 1105/MD18084/REP/17

6 annual costs for Labour/M&E and Other, obtained from table 18 in cost estimate report 1105/MD18084/REP/17

7 armed response costs during 'fuel handling' based on rate of \$100k/a. Due to \$50k/a for armed response included in extended monitoring, this means an additional \$50k/a is to be included for the duration of the facility repeat transfers/repackaging events (\$50k + \$50k = \$100k

8 armed response not captured in 300 yr facility repeat for fuel transfers, as it is covered in basket repackaging at 300yr event

9 property tax for facility repeats and repacking based on 3 events at 5 years each duration. Tax based on assessed building value of smvs and ancillary buildings. 15% of this tax is covered in ext. monitoring. The rate is increased to 50% for fuel handling events. therefore the difference of 35% is included at the facil repeats/repackaging. An additional cost is also included for property tax of the repackaging building over 5 years.

**REACTOR EXTENDED STORE  
ACTIVITY SUMMARY TO DATA TRANSFER**

**Vaults in Shallow Trenches (VST)  
Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K
582	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Labour	STEP	OPG	RJH	4	290	287	0	0	14856.3
582	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Materials and Equipment	STEP	OPG	RJH	4	290	287	0	0	4200.0
582	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Other	STEP	OPG	RJH	4	290	287	0	0	1667.5
582	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Contingency	STEP	OPG	RJH	4	290	287	0	0	6217.1

NO DATA TO FILL

**INSTRUCTIONS**

	Check: Total minus budget Should = 0	Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$K
Labour	14856	0%	14856.3
Materials and Equipment	4200	0.0	4200.0
Other	1668	0.0	1667.5
Contingency	6217.1	0.0	6217.1
<b>Total</b>	<b>26941</b>	<b>0.0</b>	<b>26941</b>

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint: copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	TOTAL Cost \$K
1	2	3	4	5	6	7	8								

582	55	10	Program Management					Environmental Assessment and Monitoring										
582	55	10	EA & MONITORING PROGRAM MANAGEMENT															
			Costs are incurred over the period Y4 to Y290 (when repackaging ends) or 287 yrs vs CES at 347 yrs. RES has 0.1 staff vs CES with 2 staff. Factor is 287/347 x 0.1/2 = 0.041					Labour	0.041	70306	0.041	2882.546					2,883	
			Expenses at \$1.5K/a x 287 yrs					Materials and Equipment	1			0	1	0			0	
								Other	1				430	1	430		430	
								Contingency	0.3						3312.546	0.3	993.7638	994
582	55	20	CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT															
			Assume C/L & EA process spans 3 years (Y5 to Y7) with some preparation work in Y4; ie total of 4 years. Due to multiple sites with same technology can share costs					Labour	0.25	7471	0.25	1867.75					1,868	
								Materials and Equipment	0.25			0	0.25	0			0	
								Other	0.25				2,150	0.25	537.5		538	
								Contingency	0.3						2405.25	0.3	721.575	722

582 55 40

GROUNDWATER MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.6 in CES. Factor is 280/330 x 0.02/0.6 = 0.028.

Labour	0.028	37158	0.028	1040.424						1,040
M&E at \$3K/a x 280 yrs	1			840	1	840				840
Expenses at \$2K/a x 280 yrs	1					560	1	560		560
Contingency	0.3							2440.424	0.3	732.1272

582 55 50

RADIOLOGICAL BIOSPHERE MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 ys for CES. RES staff is 0.1 vs 3.3 staff in CES. Factor is 0.026

Labour	0.026	217280	0.026	5649.28						5,649
M&E at \$9K/a x 280 yrs	1			2520	1	2520				2,520
	1					0	1	0		0
Contingency	0.3							8169.28	0.3	2450.784

582 55 60

NON-RAD BIOSPHERE MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 in CES. RES staff is 0.05 staff vs 0.8 staff in CES. Factor is 280/330 x 0.05/0.8 = 0.053

Labour	0.053	53590	0.053	2840.27						2,840
M&E at \$3K/a x 280 yrs	1			840	1	840				840
	1					0	1	0		0
Contingency	0.3							3680.27	0.3	1104.081

582 55 80

HUMAN HEALTH MONITORING

Costs span the period Y11 to Y290 or 280 yrs vs 330 yrs in CES. RES staff is 0.02 vs 0.17 in CES. Factor is 280/330 x 0.02/0.17 = 0.1

Labour	0.1	5760	0.1	576						576
	1			0	1	0				0
Expenses at 0.5K/a x 280 yrs	1					140	1	140		140
Contingency	0.3							716	0.3	214.8

Total	26,941
Check: Should = 0	0

Total	14,856	Total	4,200	Total	1,668	Total	6,217.1
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

**REACTOR EXTENDED STORE VAULTS IN SHALLOW TRENCHES (VST)  
ACTIVITY SUMMARY TO DATA TRANSFER Point Lepreau**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	WBS Desc	Cost Category	Type	Owner	Responsible	Start Yr	End Yr	Dur'n	Total Hrs	Contingency	Total \$K
582	90	0	0	0	0	0	0	0 Program Management	Labour	STEP	CTECH	AM	1	10	10	0	0	664.0
582	90	0	0	0	0	0	0	0 Program Management	Materials and Equipment	STEP	CTECH	AM	1	10	10	0	0	0.0
582	90	0	0	0	0	0	0	0 Program Management	Other	STEP	CTECH	AM	1	10	10	0	0	180.6
582	90	0	0	0	0	0	0	0 Program Management	Contingency	STEP	CTECH	AM	1	10	10	0	0	168.9

NO DATA TO FILL

**INSTRUCTIONS**

	Check: Total minus budget Should = 0		Budget costs to Years by %
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**ACTIVITY DETAIL ESTIMATE SUMMARY**

Cost Category	Total Cost	Check total	Total Cost \$k
Labour	664	0.0	664.0
Materials and Equipment	0	0.0	0.0
Other	181	0.0	180.6
Contingency	168.9	0.0	168.9
Total	1014	0.0	1014

**INSTRUCTIONS**

Insert lower level WBS numbers as required	Insert Activity description @ Row 23 and subordinate activities identified by WBS - Estimator to add further detail as required	Insert cost category name in all estimate lines - Hint; copy and text paste from rows 12 thro 15	A	B	C	D	E	F	G	H	I	J	K	L	M	Add Basis of estimate Note Ref Number
			Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Use appropriate CES cost	Apply Factor	Calc RES cost value	Total Cost is calculated	

**ACTIVITY DETAIL ESTIMATE**

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour	Materials and other Equipment	Other	Contingency	TOTAL	Cost \$k
1	2	3	4	5	6	7	8									

582 90 Program Management

<p><b>Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 7% for PtLepreau</b></p> <p>based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 10year duration</p> <p>no entry</p> <p>the following expenses: Public affairs, overheads, insurance, community compensation &amp; legal fees</p> <p>Contingency as CES value</p>	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	CES	Factor	RES				
	0.07	9486.204	0.07	664.03428	0	0	0	0.07	2580	0.07	180.6	20%	1.0	168.9	169	
	0			0	0	0										0
																181
																664

<b>Total</b>	<b>1,014</b>
<b>Check: Should = 0</b>	<b>0</b>

Total 664 Total 0 Total 181 Total 168.9  
 Check: Should = 0 0 Check: Should = 0 0 Check: Should = 0 0 Check: Should = 0 0

**BASIS OF ESTIMATE NOTES - Insert references and notes**

- 1
- 2
- 3
- 4

<b>RES ALTERNATIVE</b> <b>WBS No 582</b> <b>VAULTS IN SHALLOW TRENCHES (VST)</b> <b>Point Lepreau</b>	Cost Category	Total K\$
	Labour	587,510
	Materials and Equipment	268,714
	Other	322,779
	Contingency	307,490
<b>Total Cost</b>	<b>1,486,493</b>	

**1,486,493**

WBS_1	WBS_2	WBS_3	WBS_4	WBS_5	WBS_6	WBS_7	WBS_8	Responsible	Cost Category	WBS Type	Start Year	End Year	Dur'n	Contingency	Total K\$
582	15	0	0	0	0	0	0	RJH	Labour	STEP	1	7	7	0	556
582	15	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	7	7	0	0
582	15	0	0	0	0	0	0	RJH	Other	STEP	1	7	7	0	113
582	15	0	0	0	0	0	0	RJH	Contingency	STEP	1	7	7	0	334
582	20	0	0	0	0	0	0	AM	Labour	STEP	279	285	7	0	7,933
582	20	0	0	0	0	0	0	AM	Materials and Equipment	STEP	279	285	7	0	430
582	20	0	0	0	0	0	0	AM	Other	STEP	279	285	7	0	280
582	20	0	0	0	0	0	0	AM	Contingency	STEP	279	285	7	0	3,295
582	25	0	0	0	0	0	0	RJH	Labour	STEP	1	290	40	0	1,843
582	25	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	290	40	0	0
582	25	0	0	0	0	0	0	RJH	Other	STEP	1	290	40	0	315
582	25	0	0	0	0	0	0	RJH	Contingency	STEP	1	290	40	0	863
582	30	0	0	0	0	0	0	RJH	Labour	STEP	1	290	290	0	3,291
582	30	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	290	290	0	0
582	30	0	0	0	0	0	0	RJH	Other	STEP	1	290	290	0	16,080
582	30	0	0	0	0	0	0	RJH	Contingency	STEP	1	290	290	0	4,843
582	35	0	0	0	0	0	0	RJH	Labour	STEP	1	10	10	0	684
582	35	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	1	10	10	0	0
582	35	0	0	0	0	0	0	RJH	Other	STEP	1	10	10	0	462
582	35	0	0	0	0	0	0	RJH	Contingency	STEP	1	10	10	0	573
582	40	0	0	0	0	0	0	AM	Labour	STEP	8	285	7	0	47074.6944
582	40	0	0	0	0	0	0	AM	Materials and Equipment	STEP	8	285	7	0	44491.6765
582	40	0	0	0	0	0	0	AM	Other	STEP	8	285	7	0	5757.88434
582	40	0	0	0	0	0	0	AM	Contingency	STEP	8	285	7	0	26963.5308
582	45	0	0	0	0	0	0	AM	Labour	STEP	11	290	280	0	510,608
582	45	0	0	0	0	0	0	AM	Materials and Equipment	STEP	11	290	280	0	219,592
582	45	0	0	0	0	0	0	AM	Other	STEP	11	290	280	0	297,925
582	45	0	0	0	0	0	0	AM	Contingency	STEP	11	290	280	0	264,232
582	55	0	0	0	0	0	0	RJH	Labour	STEP	4	290	287	0	14,856
582	55	0	0	0	0	0	0	RJH	Materials and Equipment	STEP	4	290	287	0	4,200
582	55	0	0	0	0	0	0	RJH	Other	STEP	4	290	287	0	1,668
582	55	0	0	0	0	0	0	RJH	Contingency	STEP	4	290	287	0	6,217
582	90	0	0	0	0	0	0	AM	Labour	STEP	1	10	10	0	664
582	90	0	0	0	0	0	0	AM	Materials and Equipment	STEP	1	10	10	0	0
582	90	0	0	0	0	0	0	AM	Other	STEP	1	10	10	0	181
582	90	0	0	0	0	0	0	AM	Contingency	STEP	1	10	10	0	169

## **B2 Cost Estimate Schedules for Point Lepreau Site**

**WBS No 580 – Silos**

**WBS No 581 – SMV**

**WBS No 582 - VST**

Cost estimate schedules to lowest WBS level are presented in this section and are also available on the CD.



LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsibl e	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt	1 2	
		01	02	03	04	05	06	07	08											1	2
1	1	580																		ALL DB AC SITING	
2	2	580	15							Db Sm											
3		580	15	10						Db Act	FIXED	OPG	RJH	1	82	7					
4		580	15	70						Db Sm											
5		580	15	70	10					Db Act	FIXED	OPG	RJH	79	79	1					
6		580	15	70	30					Db Act	FIXED	OPG	RJH	79	79	1					
7																					
8																					
9	2	580	20							Db Sm											
10	3	580	20	02						Db Act	FIXED	CTECH	AM	279	285	7					
11	3	580	20	05						Db Act	FIXED	CTECH	AM	279	282	4					
12	3	580	20	20						Db Act	FIXED	CTECH	AM	279	285	7					
13	3	580	20	30						Db Act	FIXED	CTECH	AM	279	285	7					
14	3	580	20	40						Db Act	FIXED	CTECH	AM	282	282	1					
15																					
16	2	580	25							Db Sm											
17	3	580	25	10						Db Act	FIXED	OPG	RJH	1	85	11					
18	3	580	25	30						Db Act	FIXED	OPG	RJH	78	79	2					
19	3	580	25	40						Db Act	FIXED	OPG	RJH	84	85	2					
20	3	580	25	50						Db Act	FIXED	OPG	RJH	24	290	30					
21	3	580	25	70						Db Act	FIXED	OPG	RJH	285	285	1					
22																					
23	2	580	30							Db Sm											
24	3	580	30	30						Db Act	FIXED	CTECH	RJH	76	79	4					
25	3	580	30	50						Db Act	FIXED	CTECH	RJH	80	82	3					
26	3	580	30	60						Db Sm											
27	4	580	30	60	10					Db Act	FIXED	CTECH	RJH	76	79	4					
28	4	580	30	60	30					Db Act	FIXED	CTECH	RJH	80	85	6					
29	4	580	30	60	40					Db Act	FIXED	CTECH	RJH	80	85	6					
30	4	580	30	60	50					Db Act	FIXED	CTECH	RJH	80	85	6					
31	3	580	30	65						Db Act	FIXED	CTECH	RJH	84	85	2					
32	3	580	30	70						Db Act	FIXED	CTECH	RJH	14	290	277					
33																					
34	2	580	35							Db Sm											
35	3	580	35	45						Db Act	FIXED	OPG	RJH	79	79	1					
36	3	580	35	50						Db Act	FIXED	OPG	RJH	80	82	3					
37	3	580	35	70						Db Act	FIXED	OPG	RJH	83	85	3					
38	3	580	35	110						Db Act	FIXED	OPG	RJH	1	85	10					
39	3	580	35	120						Db Act	FIXED	OPG	RJH	83	85	3					
40																					
41	2	580	40							Db Sm											
42	3	580	40	10						Db Act	STEP FIXED	CTECH	GA	40	40	1					
43	3	580	40	30						Db Sm											
44	4	580	40	30	10					Db Sm											
45	5	580	40	30	10	01				Db Act	STEP FIXED	CTECH	GA	*	*	*					

LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsibl e	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt	1	2
		01	02	03	04	05	06	07	08												
46	5	580	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	GA	*	*	*				
47	5	580	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	GA	*	*	*				
48	5	580	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	GA	284	285	2				
49	5	580	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	GA	284	285	2				
50	5	580	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	GA	284	285	2				
51	5	580	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	GA	284	285	2				
52	5	580	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	GA	*	*	*				
53	5	580	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA	*	*	*				
54	5	580	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	GA	Not required for RES						
55	5	580	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA	*	*	*				
56	5	580	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA	41	42	2				
57	4	580	40	30	20					OTHER SITE SYSTEMS	Db Sm										
58	5	580	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA	*	*	*				
59	5	580	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA	*	*	*				
60	5	580	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA	*	*	*				
61	5	580	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA	*	*	*				
62	5	580	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA	*	*	*				
63	5	580	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA	*	*	*				
64	5	580	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA	*	*	*				
65	5	580	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA	*	*	*				
66	5	580	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA	*	*	*				
67	5	580	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA	*	*	*				
68	4	580	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA	41	42	2				
69	3	580	40	40						STORAGE CONSTRUCTION (STAGE 4)	Db Sm										
70										<b>* Existing buildings and services adopted by RES facility.</b>											
71	2	580	45							<b>FACILITY OPERATION</b>	Db Sm										
72	4	580	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM	14	290	277				
73	4	580	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING	Db Act	STEP FIXED	CTECH	AM	14	290	277				
74	4	580	45	20	50					OPERATION INDIRECTS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM	14	290	277				
75	4	580	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA	14	290	277				
76	4	580	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM	14	290	277				
77	3	580	45	30						OPERATIONS - FACILITY REPEATS	Db Sm										
78	4	580	45	30	20					SILOS 100 YEAR REPLACEMENT											
79	5	580	45	30	20	10				DEMOLISH EXISTING STORAGE SILOS	Db Act	STEP FIXED	CTECH	AM	83	83	1				
80	5	580	45	30	20	20				SILO CONSTRUCTION	Db Act	STEP FIXED	CTECH	AM	84	85	2				
81	5	580	45	30	20	30				TRANSFER OPERATIONS	Db Act	STEP FIXED	CTECH	AM	86	90	5				
82	5	580	45	30	20	40				WASTE DISPOSAL	Db Act	STEP FIXED	CTECH	AM	91	91	1				

LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsibl e	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt	1	2
		01	02	03	04	05	06	07	08												
83	4	580	45	30	50					SILOS 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM	183	190	8				
84	4	580	45	30	70					SILOS 300 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM	283	290	8				
85	3	580	45	40						OPERATIONS - REPACKAGING	Db Sm										
86	4	580	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM	81	290	30				
87	5	580	45	40	10	40				COMMON ANCILLARY FACILITIES REPLACEMENT	Db Act	STEP FIXED	CTECH	GA	140	285	9				
88	6	580	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	GA	83	290	24				
89	4	580	45	40	40					BASKET TO BASKET 300 YEAR REPACKAGING	Db Sm										
90	5	580	45	40	40	05				CONSTRUCTION FACILITIES - REPACK'NG PLANT Basket (RPB)	Db Act	STEP FIXED	CTECH	AM	284	285	2				
91	5	580	45	40	40	10				PROCESSING BUILDING - REPACK'NG PLANT Basket (RPB)	Db Sm										
92	6	580	45	40	40	10	20			RPBB EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm										
93	7	580	45	40	40	10	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM	284	285	2				
94	7	580	45	40	40	10	20	20		BASKET TO BASKET FUEL TRANSFER	Db Act	STEP FIXED	CTECH	AM	284	285	2				
95	7	580	45	40	40	10	20	30		BASKET DECONTAMINATION	Db Act	STEP FIXED	CTECH	AM	284	285	2				
96	6	580	45	40	40	10	30			RPBB BUILDING DESIGN AND CONSTRUCTION	Db Act	STEP FIXED	CTECH	AM	284	285	2				
97	6	580	45	40	40	10	60			BUILDING SERVICES (RPB)	Db Act	STEP FIXED	CTECH	AM	285	285	1				
98	6	580	45	40	40	10	70			COMMISSIONING (RPB)	Db Act	STEP FIXED	CTECH	AM	285	285	1				
99	6	580	45	40	40	10	80			CONST'N INDIRECTS (RPB)	Db Act	STEP FIXED	CTECH	AM	284	285	2				
100	5	580	45	40	40	400				CONSTRUCTION MANAGEMENT (RPB)	Db Act	STEP FIXED	CTECH	AM	284	285	2				
101	5	580	45	40	40	500				COMMISSIONING MANAGEMENT (RPB)	Db Act	STEP FIXED	CTECH	AM	285	285	1				
102	5	580	45	40	40	600				REPACKAGING OPERATIONS (RPB)	Db Act	STEP FIXED	CTECH	AM	286	290	5				
103	5	580	45	40	40	700				OPERATION INDIRECTS (RPB)	Db Act	STEP FIXED	CTECH	AM	286	290	5				
104	5	580	45	40	40	800				STORAGE OPERATIONS (RPB)	Db Act	STEP FIXED	CTECH	AM	286	290	5				
105																					
106	2	580	55							<b>ENVIRONMENTAL MANAGEMENT SYSTEM</b>	Db Sm										
107		580	55							<b>EA &amp; MONITORING PROGRAM</b>	Db Sm										
108		580	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH	14	290	277				
109		580	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL	Db Act	FIXED	OPG	RJH	80	82	3				
110		580	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH	14	290	277				
111		580	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH	14	290	277				
112		580	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH	14	290	277				
113		580	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH	14	290	57				
114																					
69	2	580	90							<b>PROGRAM MANAGEMENT (Yrs 01 to 13)</b>	Db Act	STEP FIXED	CTECH	AM	1	13	13				

LINE No	Level sp	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Respo nsible	WBS Comm ents	Ammend ment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Sc he du le	Sch e du le Amn
										<b>SURFACE MODULAR VAULT (SMV) - NBP POINT LEPREAU</b>												
1	2	581	15							<b>SITING</b>	Db Sm											
2	3	581	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	7	7			
3	3	581	15	70						PREFERRED SITE	Db Sm											
4	4	581	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			4	4	1			
5	4	581	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH			4	4	1			
6																						
7	2	581	20							<b>SYSTEM DEVELOPMENT</b>												
8	3	581	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Sm	FIXED	CTECH	AM			1	7	7			
9	3	581	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			1	4	4			
10	3	581	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			1	7	7			
11	3	581	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			1	7	7			
12	3	581	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			4	4	1			
13																						
14	2	581	25							<b>SAFETY ASSESSMENT</b>												
15	3	581	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Sm	FIXED	OPG	RJH			1	10	10			
16	3	581	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			3	4	2			
17	3	581	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			8	9	2			
18	3	581	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			16	290	30			
19	3	581	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			289	290	2			
20		581									Db Act	FIXED	OPG	RJH								
21	2	581	30							<b>LICENSING &amp; APPROVALS</b>												
22	3	581	30	30						LIAISON WITH CNSC	Db Sm						1	4	4			
23	3	581	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	RJH			5	7	3			
24	3	581	30	60						OTHER GOV'NT APPROVALS												
25	4	581	30	60	10					APPROVAL REQUIREMENTS	Db Sm	FIXED	CTECH	RJH			1	4	4			
26	4	581	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	RJH			5	10	6			
27	4	581	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	RJH			5	10	6			
28	4	581	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	RJH			5	10	6			
29	3	581	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	CTECH	RJH			9	10	2			
30	3	581	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	RJH			11	290	280			
31		581																				
32	2	581	35							<b>PUBLIC AFFAIRS</b>												
33	3	581	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Sm						4	4	1			
34	3	581	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			5	7	3			
35	3	581	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			8	10	3			
36	3	581	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	10	10			
37	3	581	35	120						COMMUNITY OFFSETS and BENEFITS	Db Act	FIXED	OPG	RJH			8	10	3			
38		581																				
39	2	581	40							<b>SMV FACILITY DESIGN AND CONSTRUCTION</b>												
40	3	581	40	10						SITE & IMPROVEMENTS		FIXED	CTECH	GA			8	8	1			
41	3	581	40	30						COMMON ANCILLARY FACILITIES												
42	4	581	40	30	10					ADMIN AND SUPPORT FACILITIES												
43	5	581	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG		STEP FIXED	CTECH	GA			*	*	*			
44	5	581	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BDLG		STEP FIXED	CTECH	GA			*	*	*			
45	5	581	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG		STEP FIXED	CTECH	GA			*	*	*			

LINE No	Level sp	WBS Desc								Output	Type	Owner	Respo nsible	WBS Comm ents	Ammend ment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Sc he du le	Sch edule Amn
		01	02	03	04	05	06	07	08												
46	5	581	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	STEP FIXED	CTECH	GA			284	285	2			
47	5	581	40	30	10	06				SOLID WASTE STORAGE AREA	STEP FIXED	CTECH	GA			284	285	2			
48	5	581	40	30	10	07				ACTIVE LIQ/W TRTMT BLDG	STEP FIXED	CTECH	GA			284	285	2			
49	5	581	40	30	10	08				LOW LVL LIQ/W STRG BLDG	STEP FIXED	CTECH	GA			284	285	2			
50	5	581	40	30	10	09				WAREHOUSE BLDG	STEP FIXED	CTECH	GA			*	*	*			
51	5	581	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	STEP FIXED	CTECH	GA			*	*	*			
52	5	581	40	30	10	11				TRUCK INSP'N / WASH STATION	STEP FIXED	CTECH	GA			Not required for RES					
53	5	581	40	30	10	12				UTILITY BLDG	STEP FIXED	CTECH	GA			*	*	*			
54	5	581	40	30	10	13				TEST FACILITY	STEP FIXED	CTECH	GA			41	42	2			
54	4	581	40	30	20					OTHER SITE SYSTEMS											
55	5	581	40	30	20	01				FIRE PROTECTION SYSTEMS	STEP FIXED	CTECH	GA			*	*	*			
56	5	581	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	STEP FIXED	CTECH	GA			*	*	*			
57	5	581	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	STEP FIXED	CTECH	GA			*	*	*			
58	5	581	40	30	20	04				SANITARY SEWER SYSTEM	STEP FIXED	CTECH	GA			*	*	*			
59	5	581	40	30	20	05				POTABLE WATER SYSTEM	STEP FIXED	CTECH	GA			*	*	*			
60	5	581	40	30	20	06				RETENTION/SEDIMENTATION POND	STEP FIXED	CTECH	GA			*	*	*			
61	5	581	40	30	20	07				STORM WATER DETENTION POND	STEP FIXED	CTECH	GA			*	*	*			
62	5	581	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	STEP FIXED	CTECH	GA			*	*	*			
63	5	581	40	30	20	09				SITE MATERIALS STORAGE AREA	STEP FIXED	CTECH	GA			*	*	*			
64	5	581	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	STEP FIXED	CTECH	GA			*	*	*			
65	4	581	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	STEP FIXED	CTECH	GA			41	42	2			
66	3	581	40	40						STORAGE CONSTRUCTION (STAGE 1)											
67	5	581	40	40	10	05				CONSTRUCTION FACILITIES	STEP FIXED	ALSTEC	CC			9	10	2			
68	5	581	40	40	10	10				STORES ENGINEERING	STEP FIXED	ALSTEC	CC			9	10	2			
69	4	581	40	40	10	20				STORES EQUIP. DESIGN, SUPPLY & INSTALL	STEP FIXED	ALSTEC	CC			9	10	2			
70	4	581	40	40	10	30				SURFACE MODULAR VAULT DESIGN AND CONST'N	STEP FIXED	ALSTEC	CC			9	10	2			
71	4	581	40	40	10	40				COMMISSIONING	STEP FIXED	ALSTEC	CC			10	10	1			
72	4	581	40	40	10	50				CONST'N INDIRECTS	STEP FIXED	ALSTEC	CC			9	10	2			
73	3	581	40	500						COMMISSIONING MANAGEMENT	STEP FIXED	CTECH	AM			10	10	1			
74	3	581	40	600						EQUIPMENT, SPARES AND CONSUMABLES	STEP FIXED	CTECH	AM			10	10	1			
75	3	581	40	650						ENERGY CONSUMPTION	STEP FIXED	CTECH	AM			10	10	1			
76		581								<b>* Existing buildings and services adopted by RES facility.</b>											
77	2	581	45							<b>FACILITY OPERATION</b>											
78	3	581	45	10						OPERATIONS INITIAL FUEL TRANSFER											
79	4	581	45	10	05					PROGRAM MANAGEMENT	VARIABLE	CTECH	AM			11	18	8			
80	4	581	45	10	10					BASKET PROCESSING OPERATIONS	VARIABLE	CTECH	AM			11	18	8			
81	4	581	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL TRANSFER)	VARIABLE	CTECH	GA			11	18	8			
82	4	581	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL TRANSFER)	VARIABLE	CTECH	AM			11	18	8			
83	4	581	45	10	30					OPERATION INDIRECTS (INITIAL FUEL TRANSFER)	VARIABLE	CTECH	AM			11	18	8			
84	4	581	45	10	40					STORAGE OPERATIONS	VARIABLE	CTECH	AM			11	18	8			
85	4	581	45	10	50					ADDITIONAL STORAGE CONSTRUCTION											
86	5	581	45	10	50	10				STORAGE CONSTRUCTION (STAGE 2)	VARIABLE	CTECH	AM			11	12	2			
87	5	581	45	10	50	20				STORAGE CONSTRUCTION (STAGE 3)	VARIABLE	CTECH	AM			13	14	2			
88	5	581	45	10	50	30				STORAGE CONSTRUCTION (STAGE 4)	VARIABLE	CTECH	AM			15	16	2			
89	3	581	45	20						OPERATIONS - EXTENDED MONITORING											
90	4	581	45	20	05					PROGRAM MANAGEMENT	VARIABLE	CTECH	AM			19	290	272			

LINE No	Level sp	WBS Desc								Output	Type	Owner	Respo nsible	WBS Comm ents	Ammend ment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Sc he du le	Sch e du le Amn
		01	02	03	04	05	06	07	08												
91	4	581	45	20	40					MONITORING AND SURVEILLANCE (EXTENDED)		VARIABLE	CTECH	AM			19	290	272		
92	4	581	45	20	50					OPERATION INDIRECTS (MONITORING)		VARIABLE	CTECH	AM			19	290	272		
93	4	581	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)		VARIABLE	CTECH	GA			19	290	272		
94	4	581	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)		FIXED	CTECH	AM			11	286	4		
95	3	581	45	30						OPERATIONS - FACILITY REPEATS											
96	4	581	45	30	20					VAULT 100 YEAR REPLACEMENT		STEP	ALSTEC	CC			109	117	9		
97	4	581	45	30	30					VAULT 200 YEAR REPLACEMENT		STEP	ALSTEC	CC			209	217	9		
98	4	581	45	30	40					VAULT 300 YEAR REPLACEMENT		STEP	ALSTEC	CC			283	291	9		
99	3	581	45	40						OPERATIONS - REPACKAGING											
100	4	581	45	40	05					PROGRAM MANAGEMENT FACILITY REPEATS & REPACKAGING		VARIABLE	CTECH	AM			109	290	30		
101	4	581	45	40	10					BASKET TO BASKET (B to B) 300 YEAR REPACKAGING											
102	5	581	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT B TO B		STEP	CTECH	AM			284	285	2		
103	5	581	45	40	10	30				REPACKAGING BUILDING - REPACK'NG PLANT B to B											
104	6	581	45	40	10	30	20			RB, B-B EQUIP. DESIGN, SUPPLY & INSTALL											
105	7	581	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			285	285	1		
106	7	581	45	40	10	30	20	20		BASKET TO BASKET FUEL TRANSFER (EQUIP)		STEP	CTECH	AM			285	285	1		
107	7	581	45	40	10	30	20	30		BASKET DECONTAMINATION (EQUIP)		STEP	CTECH	AM			285	285	1		
108	6	581	45	40	10	30	30			RB, BB BUILDING DESIGN & CONST'N		STEP	CTECH	AM			284	285	2		
109	6	581	45	40	10	30	60			BUILDING SERVICES (RP BB)		STEP	CTECH	AM			284	285	2		
110	6	581	45	40	10	30	70			COMMISSIONING (RP BB)		STEP	CTECH	AM			285	285	1		
111	6	581	45	40	10	30	80			CONST'N INDIRECTS (RP BB)		STEP	CTECH	AM			284	285	2		
112	5	581	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)		STEP	CTECH	GA			284	285	2		
113	5	581	45	40	10	500				COMMISSIONING MANAGEMENT (RP BB)		STEP	CTECH	AM			285	285	1		
114	5	581	45	40	10	600				REPACKAGING OPERATIONS (RP BB)		STEP	CTECH	AM			286	290	5		
115	6	581	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)		VARIABLE	CTECH	GA			286	290	5		
116	5	581	45	40	10	700				OPERATION INDIRECTS (RB, B-B)		VARIABLE	CTECH	AM			286	290	5		
117	5	581	45	40	10	800				STORAGE OPERATIONS (RB, B-B)		VARIABLE	CTECH	AM			286	290	5		
118		581																			
119	2	581	55							<b>ENVIRONMENTAL MANAGEMENT SYSTEM</b>											
120	3	581	55	10						EA & MONITORING PROGRAM MANAGEMENT		FIXED	OPG	RJH			4	290	287		
121	3	581	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL		FIXED	OPG	RJH			5	7	3		
122	3	581	55	40						GROUNDWATER MONITORING		FIXED	OPG	RJH			11	290	280		
123	3	581	55	50						RADIOLOGICAL BIOSPHERE MONITORING		FIXED	OPG	RJH			11	290	280		
124	3	581	55	60						NON-RAD BIOSPHERE MONITORING		FIXED	OPG	RJH			11	290	280		
125	3	581	55	80						HUMAN HEALTH MONITORING		FIXED	OPG	RJH			11	290	280		
126		581																			
127		581																			
128	2	581	90							<b>PROGRAM MANAGEMENT (YEARS 1 TO 10)</b>		STEP FIXED	CTECH	AM			1	10	10		

LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hedule Amn Co	Sche dule Amn Co	5 1
		01	02	03	04	05	06	07	08													
1	1	582																				ALL SITING
2	2	582	15																			
3	3	582	15	10												1	7	7				
4	3	582	15	20																		
5	4	582	15	20	10											4	4	1				
6	4	582	15	20	40											4	4	1				
7																						
8	2	582	20																			
9	3	582	20	02												279	285	7				
10	3	582	20	05												279	282	4				
11	3	582	20	20												279	285	7				
12	3	582	20	30												279	285	7				
13	3	582	20	40												282	282	1				
14																						
15	2	582	25																			
16	3	582	25	10												1	10	10				
17	3	582	25	30												3	4	2				
18	3	582	25	40												8	9	2				
19	3	582	25	50												16	290	30				
20	3	582	25	70												84	85	6				
21																						
22	2	582	30																			
23	3	582	30	30												1	4	4				
24	3	582	30	50												5	10	6				
25	3	582	30	60																		
26	4	582	30	60	10											1	4	4				
27	4	582	30	60	30											5	10	6				
28	4	582	30	60	40											5	10	6				
29	4	582	30	60	50											5	10	6				
30	3	582	30	65												9	10	2				
31	3	582	30	70												11	290	280				
32																						
33	2	582	35																			
34	3	582	35	45												4	4	1				
35	3	582	35	50												5	7	3				
36	3	582	35	70												8	10	3				
37	3	582	35	110												1	10	10				
38	3	582	35	120												8	10	3				
39																						
40	2	582	40																			
41	3	582	40	10												8	8	1				
42	3	582	40	30																		
43	4	582	40	30	10																	
44	5	582	40	30	10	01										*	*	*				
45	5	582	40	30	10	02										*	*	*				
46	5	582	40	30	10	03										*	*	*				
47	5	582	40	30	10	05										284	285	2				
48	5	582	40	30	10	06										284	285	2				
49	5	582	40	30	10	07										284	285	2				
50	5	582	40	30	10	08										284	285	2				
51	5	582	40	30	10	09										*	*	*				

LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Amn Co dmnt	5
		01	02	03	04	05	06	07	08												
52	5	582	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA			*	*	*		
53	5	582	40	30	10	11				TRUCK INSP'N / WASH STATION (build at RPBB event)	Db Act	STEP FIXED	CTECH	GA			Not required for RES				
54	5	582	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
55	5	582	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA			41	42	2		
56	4	582	40	30	20					OTHER SITE SYSTEMS	Db Sm										
57	5	582	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
58	5	582	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
59	5	582	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA			*	*	*		
60	5	582	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
61	5	582	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
62	5	582	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
63	5	582	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
64	5	582	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
65	5	582	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
66	5	582	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
67	4	582	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA			41	42	2		
68	3	582	40	40						STORAGE DESIGN & CONSTRUCTION STAGE 1 (STORAGE CHAMBERS)	Db Act	STEP FIXED	CTECH	GA			9	10	2		
69	3	582	40	50						STORAGE DESIGN & CONSTRUCTION STAGE 1 (STORAGE CHAMBERS)	Db Act	STEP FIXED	CTECH	GA			9	10	2		
70	3	582	40	600						EQUIPMENT, SPARES AND CONSUMABLES	Db Act	STEP FIXED	CTECH	AM			10	10	1		
71	3	582	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM			10	10	1		
72										* Existing buildings and services adopted by RES facility.											
73	2	582	45							<b>FACILITY OPERATION</b>	Db Sm										
74	3	582	45	10						OPERATIONS INITIAL FUEL TRANSFER	Db Sm										
75	4	582	45	10	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			11	18	8		
76	4	582	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM			11	18	8		
77	4	582	45	10	30					OPERATION INDIRECTS (INITIAL FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM			11	18	8		
78	4	582	45	10	40					STORAGE OPERATIONS (INITIAL FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM			11	18	8		
79	4	582	45	10	50					ADDITIONAL STORAGE CONSTRUCTION	Db Sm										
80	5	582	45	10	50	10				STORAGE DESIGN & CONSTRUCTION STAGE 2 (VAULTS)	Db Act	STEP FIXED	CTECH	GA			12	12	1		
81	5	582	45	10	50	20				STORAGE DESIGN & CONSTRUCTION STAGE 3 (VAULTS)	Db Act	STEP FIXED	CTECH	GA			15	15	1		
82	5	582	45	10	50	30				STORAGE DESIGN & CONSTRUCTION STAGE 4 (VAULTS)	Db Act	STEP FIXED	CTECH	GA			16	16	1		
83	3	582	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm										
84	4	582	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			19	290	272		
85	4	582	45	20	40					MONITORING AND SURVEILLANCE	Db Act	STEP FIXED	CTECH	AM			19	290	272		
86	4	582	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM			19	290	272		
87	4	582	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA			19	290	272		
88	4	582	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM			11	286	4		
89	3	582	45	30						OPERATIONS - FACILITY REPEATS	Db Sm										
90	4	582	45	30	20					BASKET VAULTS 100 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	GA			108	115	8		
91	4	582	45	30	30					BASKET VAULTS 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	GA			208	215	8		



LINE No sp sht	Level	WBS Desc								Output	Type	Owner	Responsible	WBS Comm ents	Ammen dment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Amn Co dmnt	Sche dule Amn Co dmnt	5 1		
		01	02	03	04	05	06	07	08															
92	4	582	45	30	40											283	290	8						
93	4	582	45	30	50											208	210	3						
94	3	582	45	40																				
95	4	582	45	40	05											106	290	30						
96	5	582	45	40	10	40										140	285	9						
97	6	582	45	40	10	600	30									108	290	24						
98	4	582	45	40	40																			
99	5	582	45	40	40	05										284	285	2						
100	5	582	45	40	40	10																		
101	6	582	45	40	40	10	20																	
102	7	582	45	40	40	10	20	10								284	285	2						
103	7	582	45	40	40	10	20	20								284	285	2						
104	7	582	45	40	40	10	20	30								284	285	2						
105	6	582	45	40	40	10	30									284	285	2						
106	6	582	45	40	40	10	60									285	285	1						
107	6	582	45	40	40	10	70									285	285	1						
108	6	582	45	40	40	10	80									284	285	2						
109	5	582	45	40	40	400										284	285	2						
110	5	582	45	40	40	500										285	285	1						
111	5	582	45	40	40	600										286	290	5						
112	5	582	45	40	40	700										286	290	5						
113	5	582	45	40	40	800										286	290	5						
114																								
115	2	582	55																					
116	3	582	55	10												4	290	287						
117	3	582	55	20												4	7	4						
118	3	582	55	40												11	290	280						
119	3	582	55	50												11	290	280						
120	3	582	55	60												11	290	280						
121	3	582	55	80												11	290	280						
122																								
123	2	582	90													1	10	10						

# APPENDIX C

## C1 COST ESTIMATE DATABASE CD

The contents of the attached CD comprise three folders. Each folder, identified by a WBS number, represents an estimate for each alternative.

Each WBS folder contains an Estimating Workbook and Detail Work Breakdown Structure Schedule for the specific site alternative.

<b>Folder No.</b>	<b>Alternative</b>	<b>Site</b>
580	Silos	Point Lepreau
581	SMV	Point Lepreau
582	VST	Point Lepreau