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Radioactive Materials Management

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

Alternatives for Pickering, Bruce and Darlington Reactor Sites

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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"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.

This document is meant to be read as a whole, and sections or parts thereof should not be read or relied upon out of context. In addition, the report contains assumptions, data, and information from a number of sources and, unless expressly stated otherwise in the document, the Consultant did not verify those items independently. Notwithstanding this qualification, the Consultant is satisfied that the updated conceptual designs and cost estimates were carried out in accordance with generally accepted practices in a professional manner.

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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 Pickering, Bruce and Darlington sites. 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 Pickering, Bruce and Darlington sites and are described in this report. Separate cost reports have been produced to describe the alternatives for consideration at the New Brunswick Power [1], Hydro-Québec [2] and Atomic Energy of Canada Ltd [3] sites.

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 Pickering, Bruce and Darlington sites. The estimates are based on the conceptual designs for the facility alternatives developed during 2002/2003.

The three alternatives considered for the Pickering, Bruce and Darlington sites are:
- Casks in Storage Buildings (CSB)
- Surface Modular Vaults (SMV)
- Casks Shallow Trenches (CST)

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 929,624 fuel bundles at the Pickering site (at 2002 constant dollar prices) are:
- CSB $3.63 B
- SMV $5.37 B
- CST $4.60 B

Total costs for the three alternatives that can accept 1,490,967 fuel bundles at the Bruce site (at 2002 constant dollar prices) are:
- CSB $4.65 B
- SMV $6.61 B
- CST $6.09 B

These costs include the cost of storing 22,256 AECL fuel bundles currently in interim storage at the Douglas Point site and that would be transferred to a RES facility on the Bruce site.

Total costs for the three alternatives that can accept 976,096 fuel bundles at the Darlington site (at 2002 constant dollar prices) are:
- CSB $3.57 B
- SMV $5.34 B
- CST $4.60 B

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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 Pickering, Bruce and Darlington sites.

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

Pickering	929,624 fuel bundles
Bruce	1,490,967 fuel bundles
Darlington	876,096 fuel bundles

The majority of the fuel at the RES facilities would be in OPG-design fuel module format, and will be stored long term in either in storage casks or module canisters. A small quantity of the fuel is received at the Bruce RES facility in AECL-designed baskets. Thus, each conceptual design for the Bruce site makes provision for the storage of fuel in both formats.

The three alternatives costed for each site are:
- Casks in Storage Buildings (CSB)
- Surface Modular Vaults (SMV)
- Casks in Shallow Trenches (CST)

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 CST alternatives, the cost estimate excludes all costs related to the cask-based dry storage facilities existing on the Pickering and Bruce sites and planned for the Darlington site. However in the case of the CSB alternatives 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 each 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

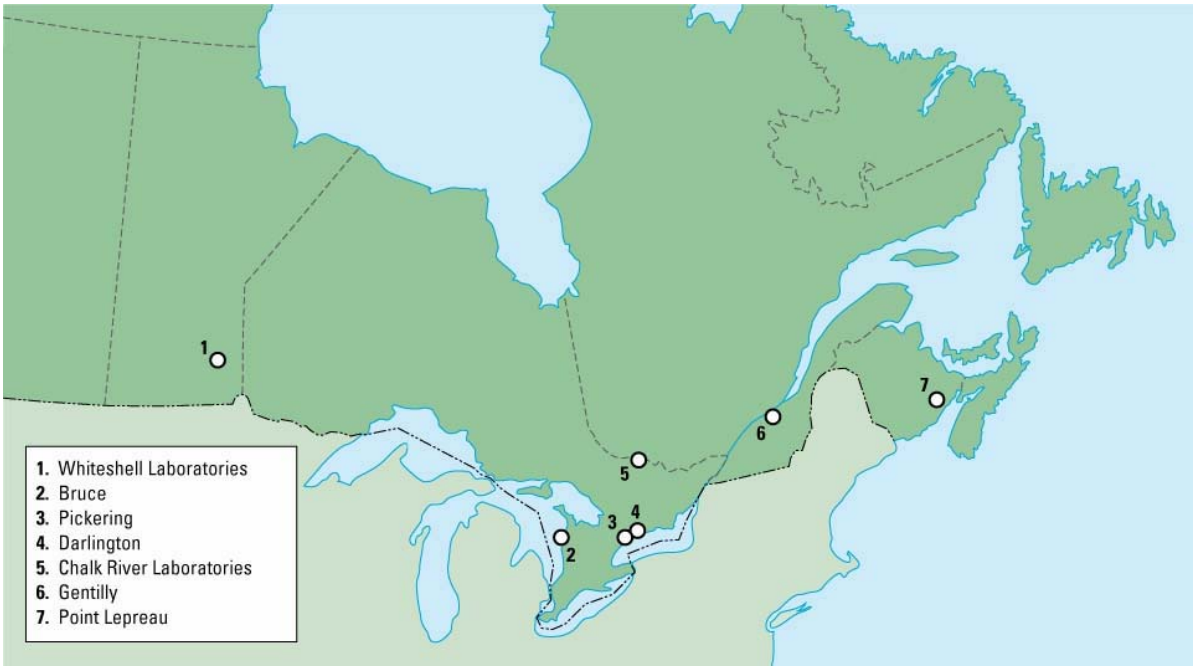
The purpose of this report is to document the alternative estimates for an assumed program to site, develop, and operate standalone reactor-site extended storage facilities that will accept used fuel at the Pickering, Bruce and Darlington sites.

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 OPG has responsibility is currently stored either in water-filled pools (wet storage), or concrete structures (dry storage). The specific storage locations are shown in Figure 1 (locations 2, 3 and 4). 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 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 Pickering, Bruce and

Darlington sites. 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 in module format from the wet bays and in casks (DSCs) from existing dry storage buildings. A small amount of AECL fuel that is currently stored at the Douglas Point dry storage facility would be transferred in casks to a RES facility on the Bruce site. 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 each OPG reactor site will maintain in storage.

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

Location	Used Fuel Bundles	Percentage of Total (%)
Pickering	929,624	28.2
Bruce*	1,490,967*	45.2
Darlington	876,096	26.6
Total	**3,296,687**	**100**

(*Includes 22,256 used fuel bundles presently stored at the Douglas Point storage facility)

2.3 CSB FACILITY ALTERNATIVE

The Casks in Storage Buildings (CSB) alternative comprises the storage of fuel bundles in self shielded storage casks. The storage casks are arranged within a series of independent storage buildings. The CSB alternative is identified as the 'indigenous' fuel storage alternative for the Pickering, Bruce and Darlington sites. A small inventory of AECL's basket fuel will be transferred into purpose built storage casks at the Bruce site, once the existing storage silos in which they are presently housed approach the end of their service lives.

2.4 SMV FACILITY ALTERNATIVE

The Surface Modular Vault (SMV) alternative would require the construction of a new processing building and new storage vaults on the Pickering, Bruce and Darlington sites. Fuel would be transferred from the wet bays and the interim dry storage facilities into the SMV facility.

The SMV alternative comprises the storage of fuel bundles confined in module canisters and placed into an array of tubes in a series of engineered vaults within the storage buildings. The module canisters 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. The modular vaults within a storage building are serviced by a common canister-handling machine (CHM), which provides coverage to each array of storage tubes across a shielded charge hall floor. The CHM can engage with each tube in the array, remove the closure plug, and lower module canisters into the storage tube. The storage buildings are linked together by an access corridor below the charge face level for transporting fuel baskets and module canisters to the buildings. Local to each storage tube array are a series of receipt ports, accessible to the CHM, which link with the access corridor below. Individual module canisters are hoisted into the charge machine, through the appropriate receipt port.

A new SMV processing building would be constructed at the Pickering, Bruce and Darlington sites. Four fuel modules are loaded into a module canister within the module transfer cell in the processing building. The loaded module canisters are then transferred and welded in the welding area, before being discharged into the module canister transfer flask, on module cell bogie. The module canister transfer flask is then transferred to the load/unload port below surface modular vault charge machine.

At the Bruce SMV facility, a small annex adjacent to the module storage buildings will house the basket fuel inventory, in a purpose built vault.

2.5 CST FACILITY ALTERNATIVE

The Casks in Shallow Trenches (CST) alternative would require the construction of new concrete storage chambers on the Pickering, Bruce and Darlington sites and the chambers would have an earthen cover. Fuel would continue to be processed in the processing buildings existing on each site. Casks would be transferred from the processing buildings to the storage chambers. Casks stored in storage buildings would also be transferred to the storage chambers.

The CST alternative comprises the storage of fuel modules confined in self shielded casks. The casks are housed in a series of parallel, modular chambers with concrete floors, walls and roofs and mounded over with earth cover. The chambers are interconnected at both ends with corridors to form a complex accessible by a ramp from ground level. The earth covers provides weather protection for the concrete chambers and added physical protection. The earth cover also lessens the visual impact of the storage complex. 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.

One stream of fuel is transferred from the wet bays to the Processing Building, loaded into storage casks and then transferred to the storage chambers in the RES facility, using the storage cask transporter. Another stream of fuel, already housed in storage casks within existing storage buildings will be transferred to storage chambers, as existing storage buildings are progressively emptied. Storage casks arriving at the RES facility are inspected on arrival, then directed to the dedicated storage chamber, where they are stacked two high. The cask

transporter positions the casks on the lower tier within the appropriate storage chamber. The chamber crane facilitates the final movement of the cask, from the transfer position to the cask storage position, on the upper tier.

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 Pickering, Bruce and Darlington sites. 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 stations are fully decommissioned and the RES facility is transitioning to a standalone operation on each site. The fundamental assumption is that the reactor sites will be active and will have a large work force on site until the stations are 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 sites 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. One new test facility will be constructed and will serve three reactor sites.
Equipment Storage and Maintenance Building	Building exists on the reactor sites and new building not required. Allowance for refurbishment.
Storage Cask/Module Canister Store	Building exists on the reactor sites 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. One building will be constructed to serve three reactor sites.
Active-Liquid Waste Storage Building	Building not required until first repackaging event.
General Warehouse	Building exists on the reactor sites and new building not required. Allowance for refurbishment.
Guardhouse and Perimeter Security System	Building and security system exist on the reactor sites and new building and system not required. Allowance for refurbishment.
Truck Inspection/Wash Facility	Not required since not fuel is being transported off-site.

Utility Building	Building exists on the reactor sites 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 any reactor sites 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 E.

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. In both scenarios there would be

extensive consultation with the local communities during the 6-year period (i.e. Fall 2002 to 2008) leading up to a decision in December 2008. These two scenarios are described further below.

New storage structures would be built as per the Canadian Nuclear Safety Commission (CNSC) Construction Licences already held by NBP and, if necessary, Environmental Assessment approvals would be sought to build additional storage buildings.
In the first scenario, the existing cask-based dry storage facilities would continue to operate and to receive fuel (CSB alternative). New storage structures would be built as per the Canadian Nuclear Safety Commission (CNSC) Construction Licences already held by OPG and, if necessary, Environmental Assessment approvals would be sought to build additional storage buildings. 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 stations 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 dry storage containers (casks) reach the end of their 100-year service life.

A new Environmental Assessment (EA) and Construction Licence approval would be sought for repackaging of the fuel when the cask-based storage systems reach the end of their service lives. Separate EA approvals would be sought for the new repackaging facilities on the Pickering, Bruce and Darlington sites. Following receipt of all necessary approvals, facilities would be constructed for the repackaging of fuel into new casks. After all fuel modules have been transferred into new casks and casks placed into new storage buildings the entire facility would enter into another period of extended monitoring. The 100-year cycles of extended monitoring and repackaging would continue indefinitely. However once every 300 years the fuel bundles would need to be transferred into new fuel modules when old modules reach the end of their service life.

In summary the siting work for the CSB alternative will be completed during the following time periods:

Pickering	Y1 to Y3 & Y84 to Y87
Bruce	Y1 to Y3 & Y91 to Y94
Darlington	Y1 to Y3 & Y95 to Y98

For CSB, the EA process and Construction Licensing process is assumed to occur at Pickering from Y85 to Y87, at Bruce from Y92 to Y94 and at Darlington from Y96 to Y98. For the purposes of this cost estimate it has been assumed that additional future EA approvals would not be required following Y98.

The second scenario, implementation of new SMV or CST technologies, would require an additional 7 years following December 2008 (Y3) to transition to the new dry storage systems on each of the reactor sites. Therefore the earliest in-service date for a new system is assumed to be January 2016 (Y11) on the Pickering site followed by Bruce in Y13 and Darlington in Y15. 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 on each reactor site and would take one year to complete. When complete, letters of intent are sent to CNSC to prepare sites and to construct three (3) new storage facilities.
2. The federal EA process takes 3 years and involves three comprehensive studies; one each for the Pickering, Bruce and Darlington sites. OPG would be the proponent in each EA process.
3. Six months to finalise a site preparation and construction licence application for each site 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 in a rolling program with Pickering coming into service first in 2016 (Y11), Bruce in 2018 (Y13) and Darlington in 2020 (Y15).

In summary the siting work for the SMV and CST alternatives will be completed during the following time periods:

Pickering	Y1 to Y7
Bruce	Y1 to Y9
Darlington	Y1 to Y11

For SMV and CST, the Construction Licensing and Environmental Assessment (EA) approvals process is scheduled from Y5-Y7 at Pickering, Y7 to Y9 at Bruce and Y 9 to Y11 at Darlington prior to construction of the new dry storage facilities

It is assumed that when the SMV or CST technologies are implemented on each reactor site, the cask-based interim dry storage facilities would continue to operate in parallel until all fuel stored in casks has been transferred to the new storage facilities. In the SMV scenario the last dry storage cask would be emptied and fuel placed in new module canisters in Y48 on the Pickering site, Y54 on the Bruce site and Y49 on the Darlington site. In the CST scenario the last cask would be transferred from interim storage to the CST storage chambers in Y39 on the Pickering site, and Y44 on the Bruce and Darlington sites. After all fuel has been transferred the interim storage facilities would be decommissioned. At that time the SMV and CST 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 CST facility would undergo periodic facility refurbishment events occurring every 200 years, and repackaging events every 100 years.

The key dates in the assumed implementation schedules are summarised in Table 2. Also shown in these tables are the assumed dates when stations are decommissioned. After the dates when stations are 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 stand-alone facility. At that time additional buildings and services would be acquired or existing buildings refurbished, and additional staff would be retained.

Table 2: Key Assumed Dates for Implementation on Pickering, Bruce and Darlington sites

Milestone	Pickering		Bruce		Darlington	
	Nominal	Calendar	Nominal	Calendar	Nominal	Calendar
Government decision about preferred option and selection of the RES alternative	1	01Jul06	1	01Ju06	1	01Jul06
Review of RES alternatives for Pickering, Bruce and Darlington reactor sites, and selection of preferred alternative	3	31Dec08	3	31Dec08	3	31Dec08
Implementation RES Alternative						
First DSC loaded (Actual Date)		Jan96		Mar03		Oct07
CSB alternative receives last cask	33	31Dec38	36	31Dec41	40	31Dec45
SMV alternative becomes operational	11	1Jan16	13	1Jan18	15	1Jan20
SMV alternative receives last canister	48	31Dec53	54	31Dec59	49	31Dec54
CST alternative becomes operational	11	1Jan16	13	1Jan18	15	1Jan20
CST alternative receives last cask	39	31Dec44	44	31Dec49	44	31Dec49
First repackaging event (CSB & CST) including Douglas Point fuel	91	2096	98	2103	102	2107
First repackaging event (SMV)	311	2316	313	2318	315	2320
Station Decommissioning						
Last unit shutdown and the complete reactor site enters into safe-store mode. Some station staff remains on site until station completely dismantled.	20	31Dec25	22	30Jun27	28	31Dec33
Last fuel module removed from wet bay and all fuel now in dry storage (1)	33	31Dec38	36	31Dec41	40	31Dec45
Last reactor unit dismantled, site decommissioned, and station staff is no longer present on the reactor site. RES facility would have to become a stand-alone operation on the reactor site (2).	54	31Dec59	54	31Dec59	62	31Dec67

Notes:
1. Dates taken from Ref 6.
2. Based on assumption that all reactors operate a nominal 40 years.

3.3 CSB OPERATIONS

The CSB schedules assume the fuel inventory is already held in storage, and therefore commences with a period of extended monitoring of the stored fuel. They include intermediate facility repeat and repackaging events, when storage casks will be removed from time served storage buildings. Fuel in module format will be transferred to new storage casks. These new storage casks will be transferred to new storage buildings. Periodically, as modules and baskets reach the end of the service lives, fuel will be transferred into replacement modules and baskets, before being returned to replacement storage buildings.

The dates for major events during Pickering CSB operations are as follows:

Start of extended monitoring	Y34
Replace storage buildings*	Y88 to 99
Build repackaging facility*	Y87 to Y90
Repackaging event*	Y91 to Y99

*Repeated every 100 years

The dates for major events during Bruce CSB operations are as follows:

Start of extended monitoring	Y37
Replace storage buildings*	Y95 to Y111
Build repackaging facility*	Y94 to Y97
Repackaging event*	Y98 to Y111

*Repeated every 100 years

The dates for major events during Darlington CSB operations are as follows:

Start of extended monitoring	Y41
Replace storage buildings*	Y99 to Y110
Build repackaging facility*	Y98 to Y101
Repackaging event*	Y102 to Y110

*Repeated every 100 years

3.4 SMV OPERATIONS

The SMV schedules assume the fuel inventory is converted to module canister storage at an early date, followed by extended monitoring of the stored fuel. They include the intermediate facility repeat and repackaging events, when module canisters will be removed from a time served modular vault building transferred to a new modular vault building. Similarly, baskets will be removed from an existing modular vault building and transferred to a new modular vault building, at the end of the modular vault service life. Periodically, as modules and baskets reach the end of the service lives, fuel will be transferred into replacement modules and baskets, before being returned to replacement modular vault buildings within the complex.

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

Initial fuel receipts	Y11 to Y48
Start of extended monitoring	Y49
Replace storage vaults*	Y108 to Y119
Build repackaging facility**	Y309 to Y310
Repackaging event**	Y311 to Y319

*Repeated every 100 years

** Repeated every 300 years

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

Initial fuel receipts	Y13 to Y54
Start of extended monitoring	Y55
Replace storage vaults*	Y112 to Y123
Build repackaging facility**	Y311 to Y312
Repackaging event**	Y313 to Y322

*Repeated every 100 years
** Repeated every 300 years

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

Initial fuel receipts	Y15 to Y49
Start of extended monitoring	Y51
Replace storage vaults*	Y113 to Y124
Build repackaging facility**	Y313 to Y314
Repackaging event**	Y315 to Y323

*Repeated every 100 years
** Repeated every 300 years

3.5 CST OPERATIONS

The CST schedules 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. They include intermediate facility repeat and repackaging events, when time served storage casks will be removed from storage chambers. Fuel in module format will be transferred to new storage casks. These new storage casks will be transferred to new storage chambers. Periodically, as modules and baskets reach the end of the service lives, fuel will be transferred into replacement modules and baskets, before being returned to replacement storage chambers.

The dates for major events during Pickering CST operations are as follows:

Initial fuel receipts	Y11 to Y39
Start of extended monitoring	Y40
Replace storage chambers*	Y187 to 199
Build repackaging facility**	Y87 to Y90
Repackaging event**	Y91 to Y99

*Repeated every 200 years
** Repeated every 100 years

The dates for major events during Bruce CST operations are as follows:

Initial fuel receipts	Y13 to Y44
Start of extended monitoring	Y45
Replace storage chambers*	Y194 to Y211
Build repackaging facility**	Y94 to Y97
Repackaging event**	Y98 to Y111

*Repeated every 200 years
**Repeated every 100 years

The dates for major events during Darlington CST operations are as follows:

Initial fuel receipts	Y15 to Y44
Start of extended monitoring	Y45
Replace storage chambers*	Y200 to Y210
Build repackaging facility**	Y98 to Y101
Repackaging event**	Y102 to Y110

*Repeated every 200 years
**Repeated every 100 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 Pickering, Bruce and Darlington sites. Each of the three conceptual designs is required to store used fuel arising at the Pickering, Bruce and Darlington sites. A separate cost estimate has therefore been established for each of the three RES alternatives, (CSB, SMV, and CST), giving 9 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 repackaging events. 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 repackaging events as necessary. This 300-year cycle is defined by the service life of the fuel containers, such as modules, baskets and module canisters. 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:

571 Pickering Casks in Storage Buildings (CSB)
572 Pickering Surface Modular Vaults (SMV)
573 Pickering Casks in Shallow Trenches (CST)

574 Bruce Casks in Storage Buildings (CSB)
575 Bruce Surface Modular Vaults (SMV)
576 Bruce Casks in Shallow Trenches (CST)

577 Darlington Casks in Storage Buildings (CSB)
578 Darlington Surface Modular Vaults (SMV)
579 Darlington Casks in Shallow Trenches (CST)

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 three OPG 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, it is assumed that the sites make cost contributions to facility designs such SMV and CST facilities and the design of module 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 11, 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 Appendices B to D and the electronic versions of the cost estimating data are presented on the CD in Appendix E.

Much of the cost estimating information for the processing of storage casks, construction of surface storage buildings and the management of casks has been provided by OPG. 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 to D respectively.

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

- The system development costs (5xx-20) have been divided equally between the three OPG sites, 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, operation and maintenance of the 25-year fuel monitoring facility (5xx-45-20-70) have been allocated between the three OPG sites. The facility is assumed to be constructed at the Bruce site, but will provide information on fuel integrity to the three OPG 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, and 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 OPG. The design capacity of the RES storage facilities is matched to the fuel inventories of the reactor sites.

- The scope of this cost study excludes consideration of non-standard fuels.

- 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 Pickering, Bruce and Darlington sites and the cost of decommissioning of the interim storage facilities (except in CSB alternative estimates) 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 and the preparation of the fuel for transfer to the Processing Building. Preparation of casks includes placing lid and transfer clamp, draining cask and preparation of module transfer flask (SMV alternative only) including placing and bolting lid and draining flask.

3. The cost of operating and maintaining existing interim dry storage facilities, and the cost of constructing new interim dry storage facilities on the Bruce, Pickering, Darlington sites, 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 Pickering, Bruce and Darlington sites.

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 CSB alternative estimates).

6. *CSB 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 CSB cost estimate starts in Y34 for the Pickering site, Y37 for the Bruce site and Y41 for the Darlington site. This estimate report includes the cost of decommissioning the interim storage facilities.

7. *Bruce site:* It is assumed that the operation of AECL's interim dry storage facilities at Douglas Point will continue to end of 2044. The cost for operating this dry storage facility

and the preparation of fuel for transfer to the Bruce RES facility are excluded from the estimates. Preparation includes the retrieval of the fuel baskets from the silos, the transfer of baskets into casks, and placing the lid and transfer clamp on the cask in preparation for transfer of the cask.

8. The cost of infrastructure support up to the point in time when stations are fully decommissioned. It is assumed that the Pickering and Bruce stations will be fully decommissioned in Y54, and the Darlington stations in Y62. Before the stations are 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 facilities would inherit many of these infrastructure support and services in order to be stand-alone facilities on each reactor site.

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 to D respectively.

For Pickering, the total cost total cost of each facility alternative than can accept 929,624 fuel bundles is approximately:
CSB $3.63 B
SMV $5.37 B
CST $4.60 B

For Bruce, the total cost total cost of each facility alternative than can accept 1,490,967 fuel bundles (includes 22,256 bundles of AECL fuel currently stored at Douglas Point) is approximately:
CSB $4.65 B
SMV $6.61 B
CST $6.09 B

For Darlington, the total cost total cost of each facility alternative than can accept 876,096 fuel bundles is approximately:
CSB $3.57 B
SMV $5.34 B
CST $4.60 B

Figures 2 to 10 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 the appendices.

Figure 2: Annual Cash flow projection and cumulative costs for Pickering CSB Facility

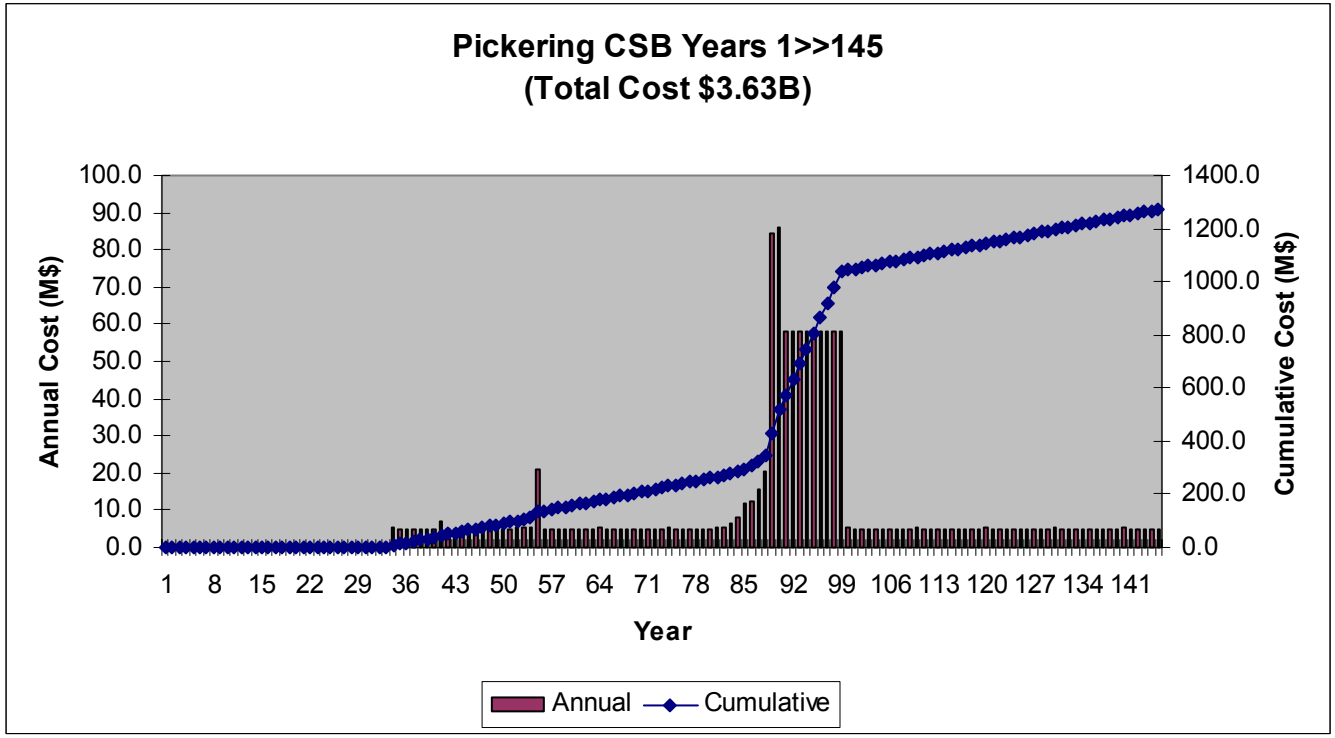


Figure 3: Annual Cash flow projection and cumulative costs for Pickering SMV Facility

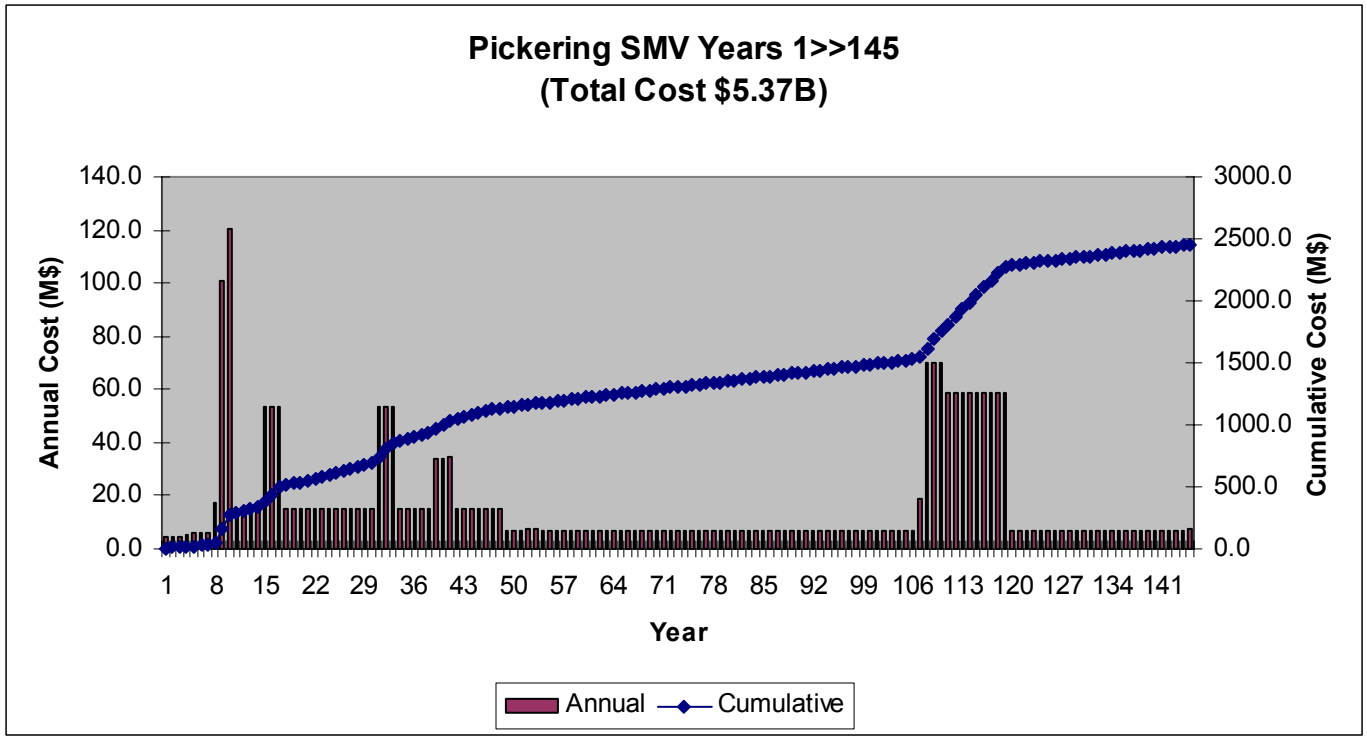


Figure 4: Annual Cash flow projection and cumulatative costs for Pickering CST Facility

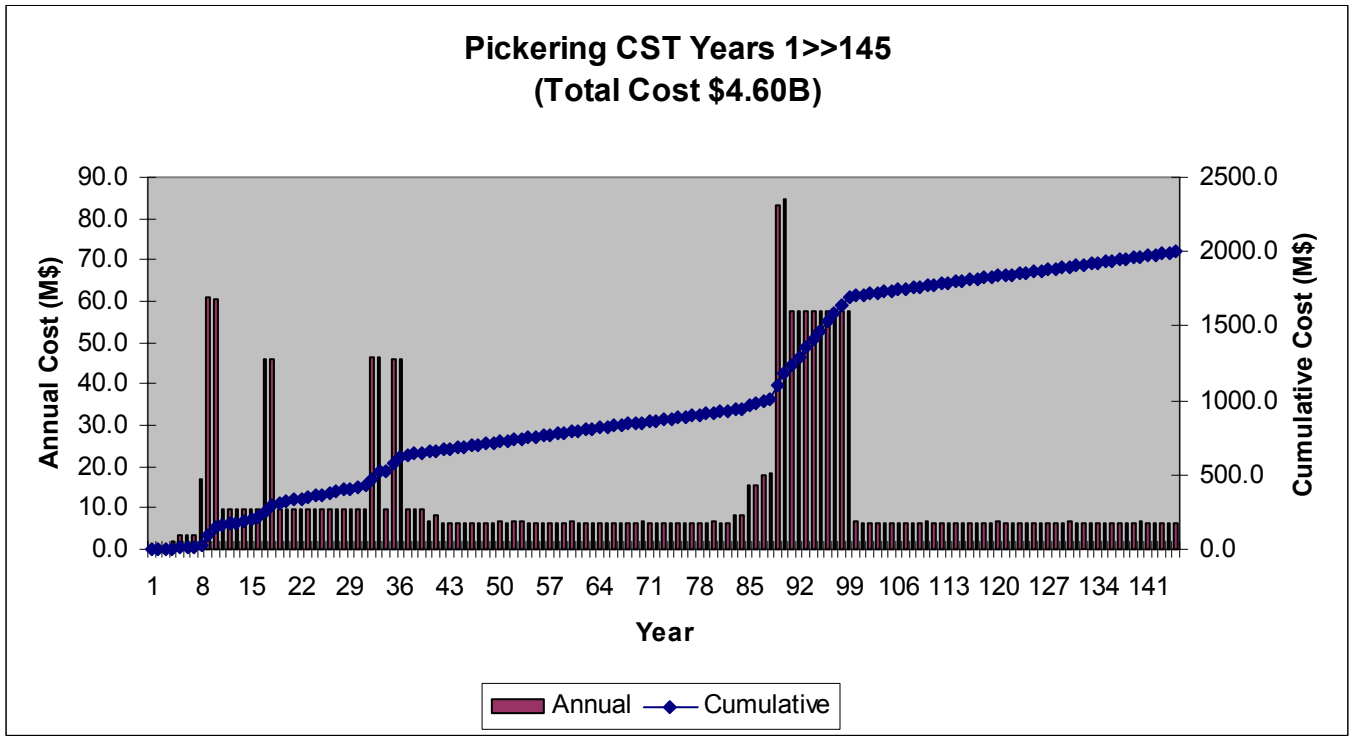


Figure 5: Annual Cash flow projection and cumulative costs for Bruce CSB Facility

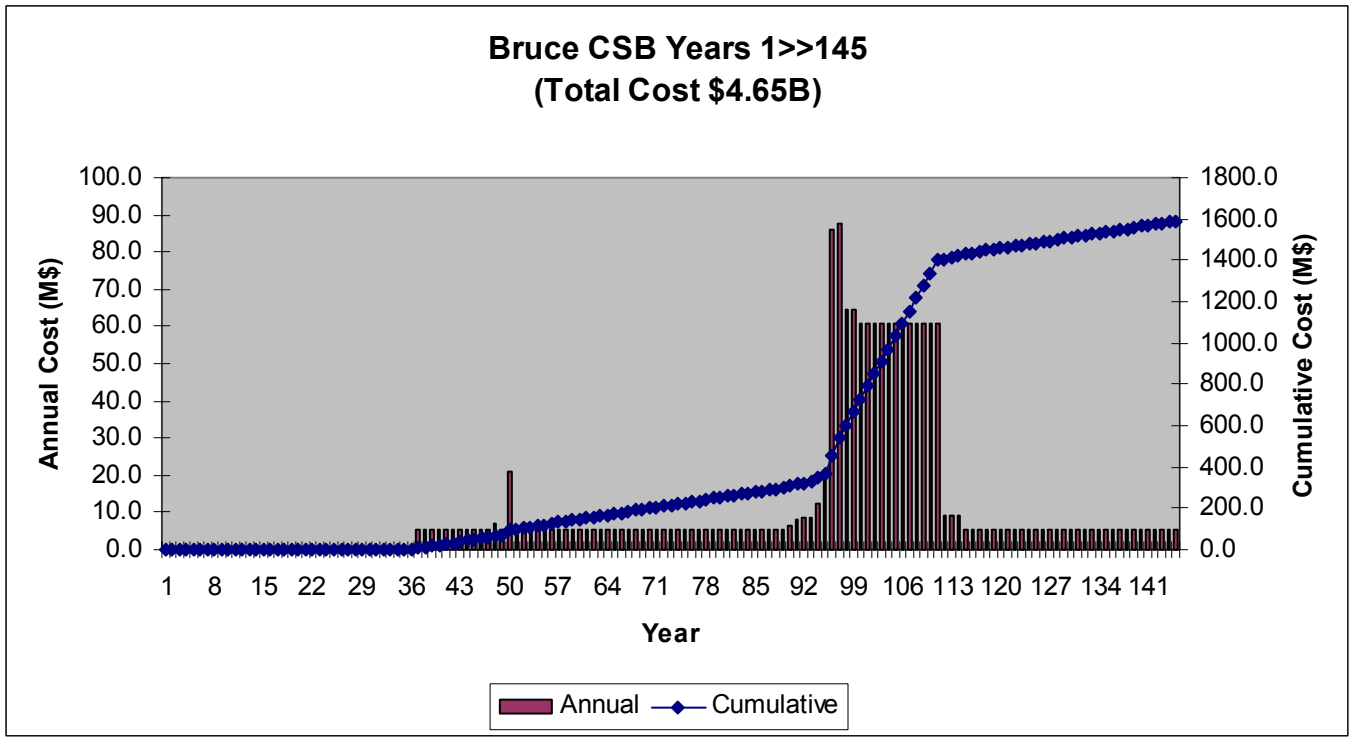


Figure 6: Annual Cash flow projection and cumulative costs for Bruce SMV Facility

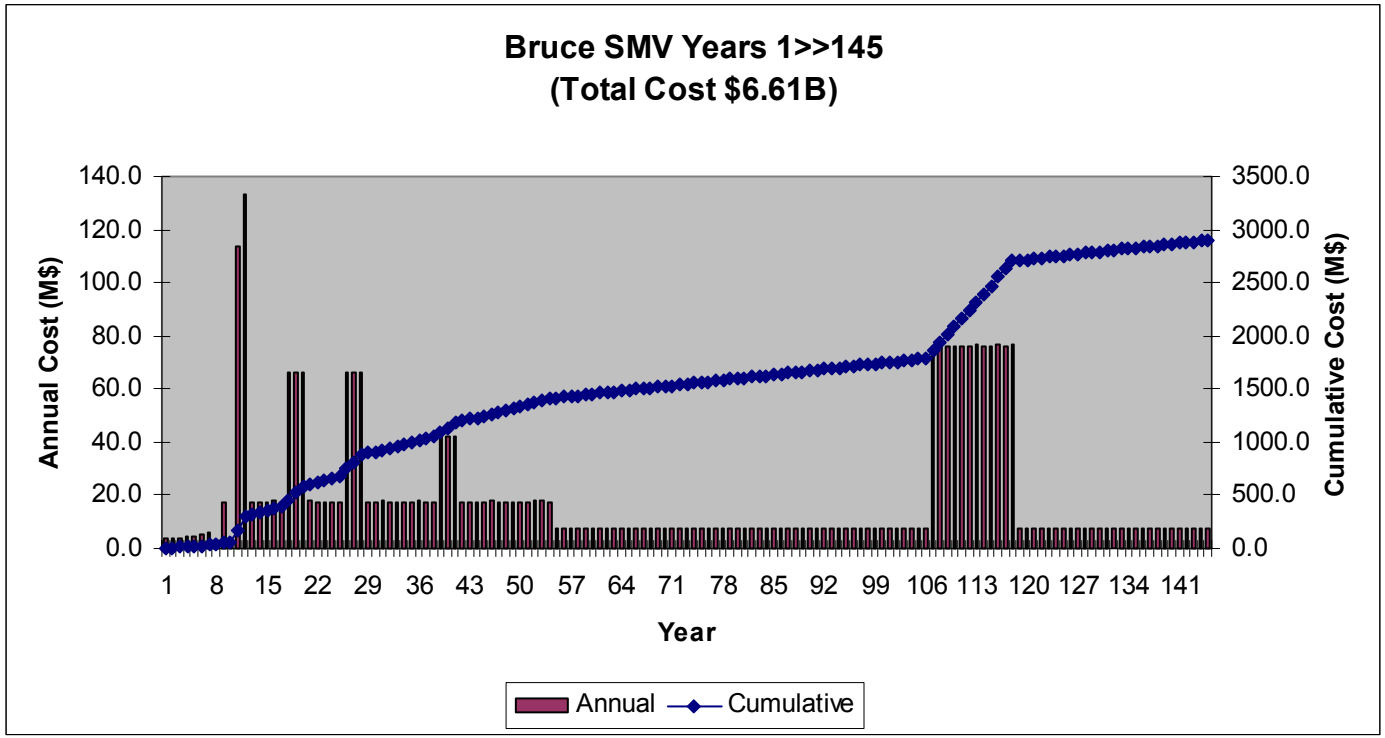


Figure 7: Annual Cash flow projection and cumulative costs for Bruce CST Facility

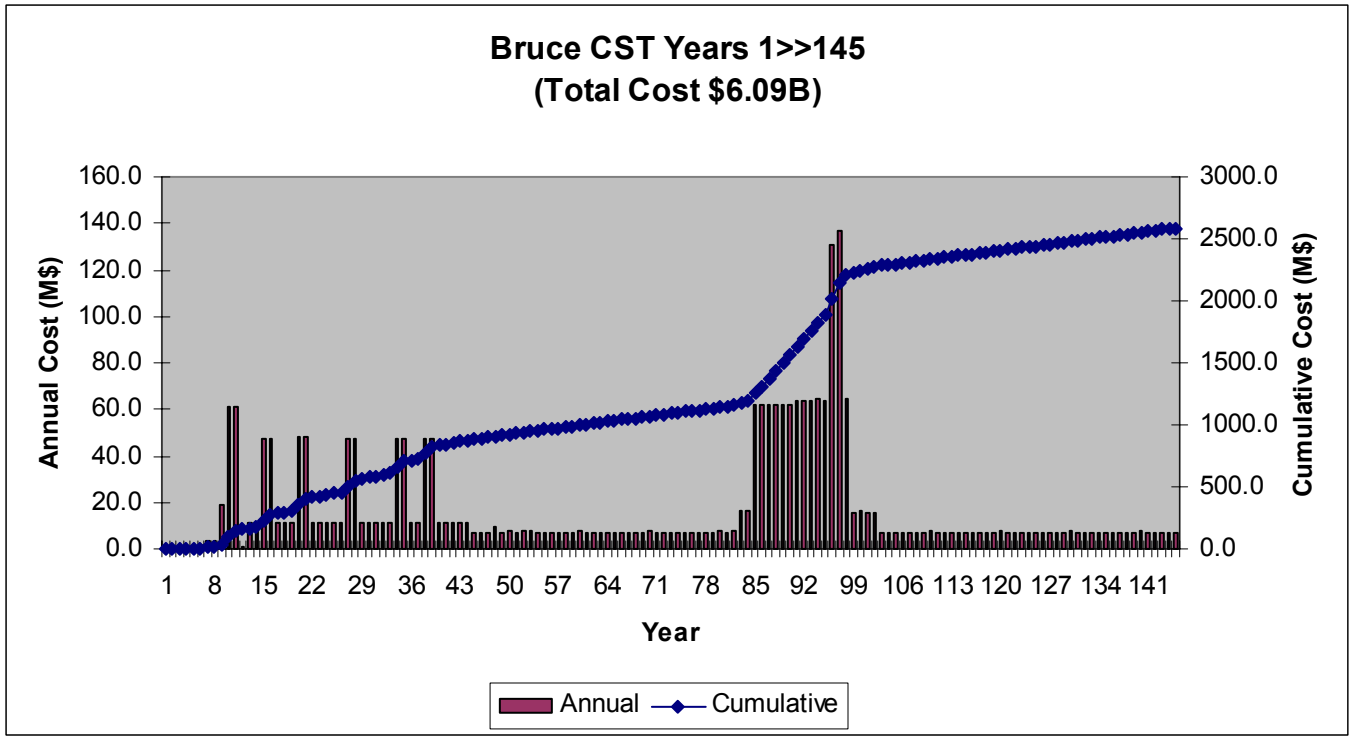


Figure 8: Annual Cash flow projection and cumulative costs for Darlington CSB Facility

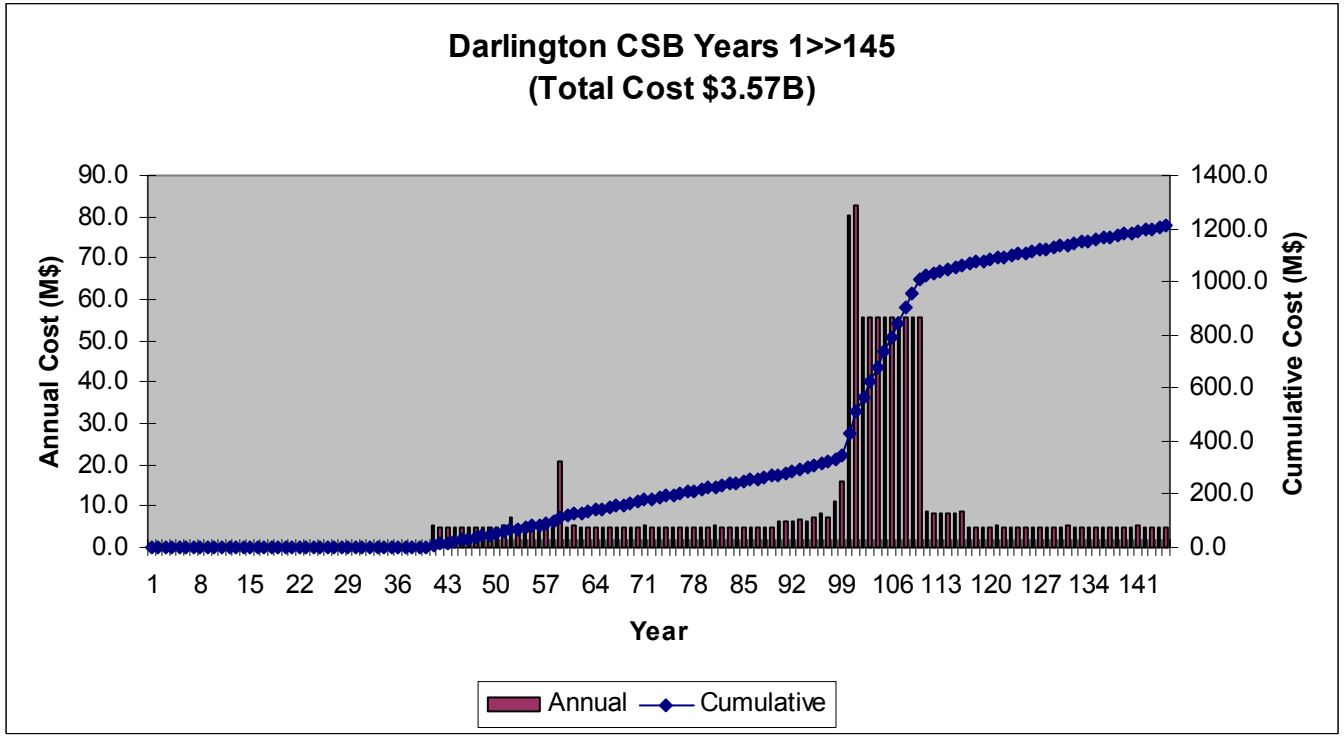


Figure 9: Annual Cash flow projection and cumulative costs for Darlington SMV Facility

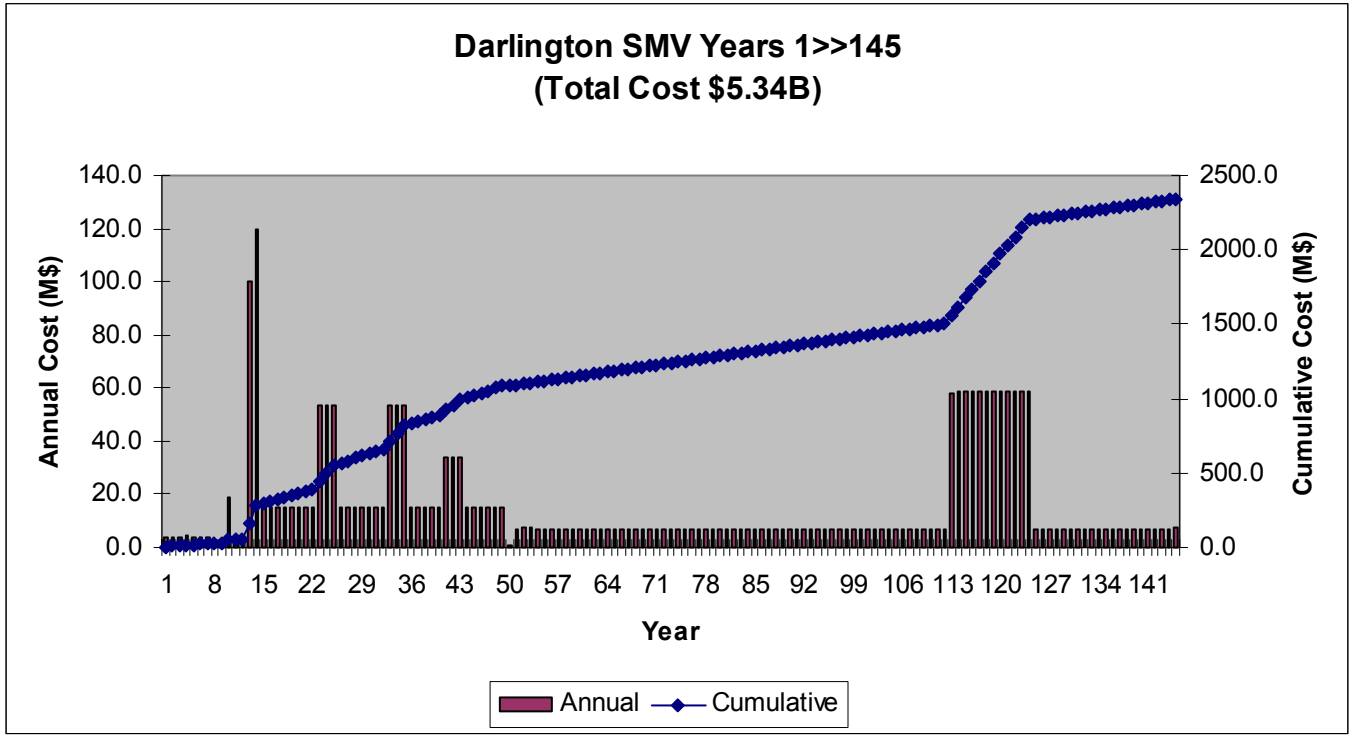


Figure 10: Annual Cash flow projection and cumulative costs for Darlington CST Facility

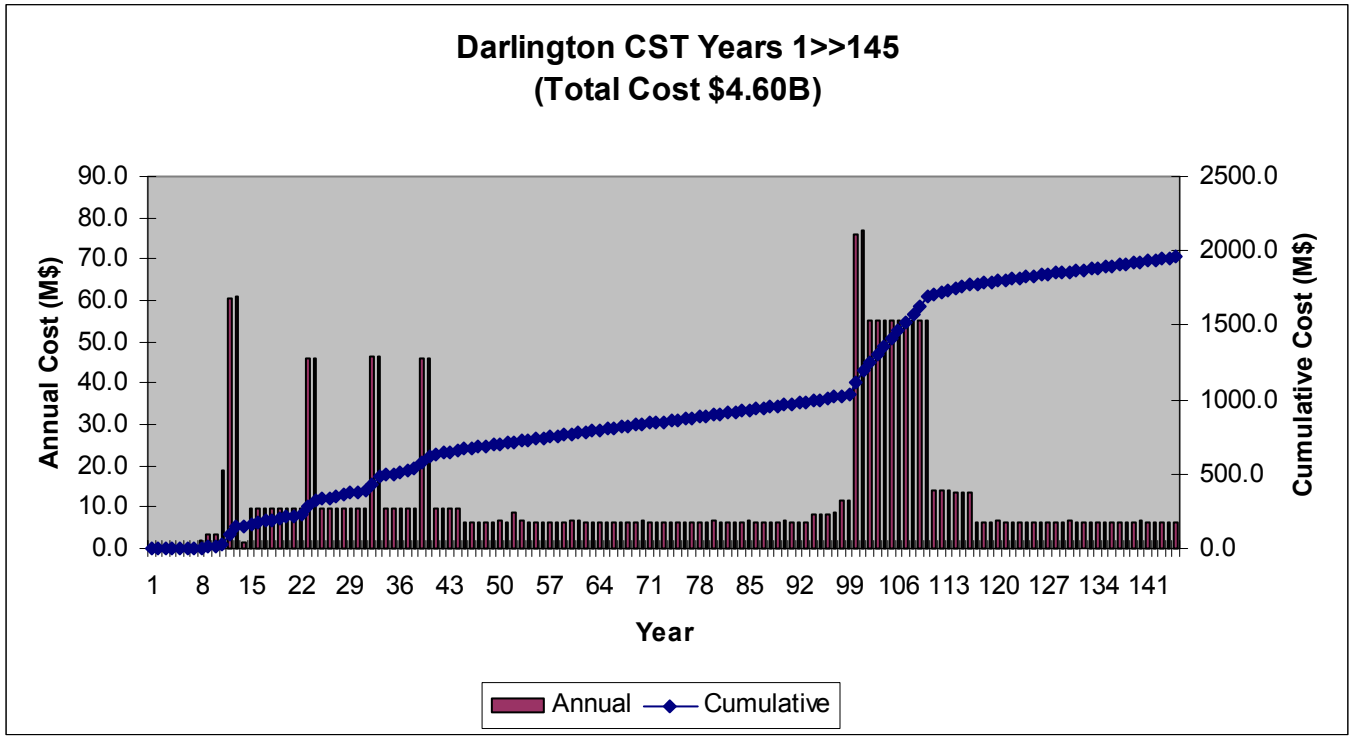


Figure 11: Typical Level 2 Work Breakdown Structure (5xx)

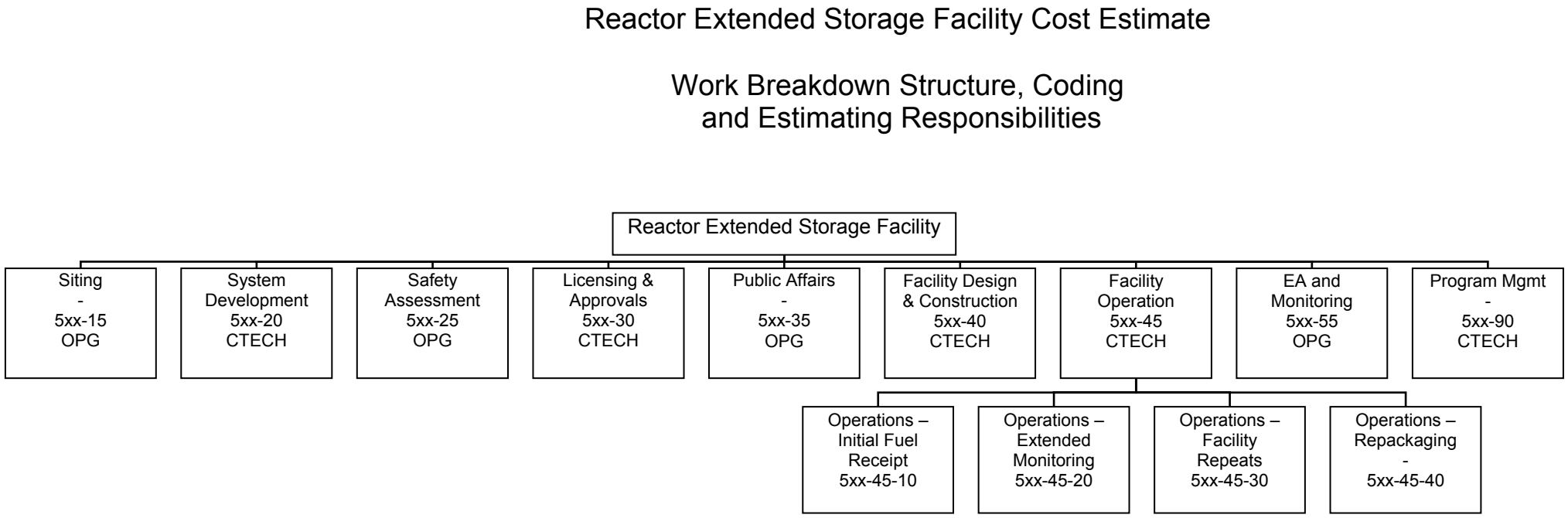


Table 3: Cost Estimates for Reactor Extended Storage Facilities by Level 2 Work Element

		Cost (2002 K$)								
		Pickering			Bruce			Darlington		
		571	572	573	574	575	576	577	578	579
WBS	**Description**	**CSB**	**SMV**	**CST**	**CSB**	**SMV**	**CST**	**CSB**	**SMV**	**CST**
5xx.15	Siting	824	824	1,003	824	824	1,003	824	824	1,003
5xx.20	System Development	8,031	22,974	10,675	8,031	22,974	10,675	8,031	22,974	10,675
5xx.25	Safety Assessment	5,700	5,875	6,671	5,714	5,931	6,685	5,706	5,929	6,681
5xx.30	Licensing and Approvals	37,086	42,469	38,597	37,986	41,715	39,906	37,446	40,923	39,397
5xx.35	Public Affairs	3,281	3,281	3,281	3,281	3,281	3,281	3,281	3,281	3,281
5xx.40	Facility Design and Construction	19,143	236,423	137,872	19,143	263,184	137,872	19,143	236,423	137,872
5xx.45	Facility Operation	3,426,661	4,905,313	4,250,505	4,434,253	6,115,291	5,724,265	3,359,146	4,872,794	4,237,284
5xx.55	Environmental Assessment and Monitoring	130,747	152,559	142,803	135,599	151,426	164,404	132,615	152,559	158,989
5xx.90	Program Management	1,402	4,474	4,474	1,402	5,369	5,369	1,402	6,264	6,264
	Total Cost (K$)	3,632,875	5,374,192	4,595,882	4,646,233	6,609,995	6,093,460	3,567,594	5,341,972	4,601,446

Note:
Totals in tables may not equal summated values due to rounding arrangements within Cost Estimating Workbooks.

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 11 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 571, 572, 573 (Pickering), 574, 575, 576 (Bruce), 577, 578 and 579 (Darlington).

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 each of the reactor sites. 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 three reactor sites.

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 CSB 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 that a federal EA would be triggered under any of the following conditions:
1. OPG sends letter of intent to CNSC to construct a new facility for packaging of fuel into new storage containers and to place repackaged fuel in new storage structures (i.e. SMV alternative and first 100-year repackaging event in CSB alternative)
2. OPG sends letter of intent to CNSC to construct new storage structures and to transfer casks into new structures (i.e. CST alternative).

Note that an EA may also be triggered earlier than the event described in (1) when approval is sought to build additional storage buildings in the years immediately following a decision to implement RES on the Pickering, Bruce and Darlington sites. However the cost of this work is outside the scope of the CSB alternative estimates which starts with extended monitoring. 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 CSB alternatives it assumed that the cost of Program Management is incurred during the nominal 40-year period leading to the start of extended monitoring on the reactor sites. 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 CST alternatives it is assumed that the cost of Program Management is incurred over a 15-year period starting in Y1 and until the last facility is brought into service on the Darlington site in Y15.

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$)								
	Pickering			Bruce			Darlington		
	571	572	573	574	575	576	577	578	579
	CSB	**SMV**	**CST**	**CSB**	**SMV**	**CST**	**CSB**	**SMV**	**CST**
Labour	1,078,599	1,237,588	1,290,632	1,235,568	1,359,685	1,508,516	1,074,873	1,231,324	1,313,257
Material and Equipment	1,062,493	1,398,943	1,148,422	1,502,668	1,776,998	1,647,221	1,022,988	1,389,859	1,111,162
Other	704,756	1,684,735	1,193,427	897,022	2,186,950	1,660,407	700,393	1,677,523	1,214,199
Contingency	787,027	1,052,925	963,401	1,010,975	1,286,362	1,277,317	769,340	1,043,267	962,828
Total Cost (K$)	3,632,875	5,374,192	4,595,882	4,646,233	6,609,995	6,093,460	3,567,594	5,341,972	4,601,446

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 CSB alternatives is assumed to commence before the requirement for fuel repackaging facilities, 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 sites.

Table 5: Siting Costs for CSB Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
Siting	All costs captured under 5xx-15	824	824	824
EA& Construction Licence	Costs captured under 5xx-55-20	3,007	3,007	3,007
System Development	All costs captured under 5xx-20. Costs incurred prior to 100-year repackaging event and related to developing new technology for opening casks and transferring modules to new casks.	8,031	8,031	8,031
Safety Assessment	All costs captured under 5xx-25 except costs related SA work during Operations (5xx-25-50) and SA to support decommissioning activities (5xx-25-70)	811	811	811
Licensing and Approvals	All costs captured under 5xx-30 except costs related L&A work for renewal and maintenance of Operating Licence (5xx-30-70).	2,910	2,910	2,910
Public Affairs	All costs captured under 5xx-35.	3,281	3,281	3,281
Program Management	All costs captured under 5xx-90. Program management costs are incurred during years prior to start of extended monitoring;	1,402	1,402	1,402
Total (K$)		20,266	20,266	20,266

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

Work Element	Description	Pickering	Bruce	Darlington
Siting	All costs captured under 5xx-15	824	824	824
EA& Construction Licence	All costs captured under 5xx-55-20	3,752	3,752	3,752
System Development	All costs captured under 5xx-20	22,974	22,974	22,974
Safety Assessment	All costs captured under 5xx-25 except costs related SA work during Operations (5xx-25-50) and SA to support decommissioning activities (5xx-25-70)	1,365	1,365	1,365
Licensing and Approvals	All costs captured under 5xx-30 except costs related L&A work for renewal and maintenance of Operating Licence (5xx-30-70)	3,753	3,580	3,697

Public Affairs	All costs captured under 5xx-35	3,281	3,281	3,281
Program Management	All costs captured under 5xx-90. Program management costs are incurred during years prior to start of SMV operations.	4,474	5,369	6,264
Total (K$)		40,423	41,145	42,157

Table 7: Siting Costs for CST Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
Siting	All costs captured under 5xx-15	1,003	1,003	1,003
EA& Construction Licence	All costs captured under 5xx-55-20	3,752	3,752	3,752
System Development	All costs captured under 5xx-20	10,675	10,675	10,675
Safety Assessment	All costs captured under 5xx-25 except costs related SA work during Operations (5xx-25-50) and SA to support decommissioning activities (5xx-25-70)	1,365	1,365	1,365
Licensing and Approvals	All costs captured under 5xx-30 except costs related L&A work for renewal and maintenance of Operating Licence (5xx-30-70)	3,580	3,580	3,586
Public Affairs	All costs captured under 5xx-35	3,281	3,281	3,281
Program Management	All costs captured under 5xx-90. Program management costs are incurred during years prior to start of CST operations.	4,474	5,369	6,264
Total (K$)		28,130	29,025	29,926

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 the appendices.

Table 8: Construction Costs for CSB Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
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	16,655	16,655	16,655
Prior to start of 100-year repackaging event	Construction of new waste management facilities specifically required to support the first operations during the first repackaging event. The cost of new processing building for 100-year repackaging event is captured under Operation costs	2,487	2,487	2,487
Total (K$)		19,143	19,143	19,143

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

Work Element	Description	Pickering	Bruce	Darlington
Initial construction	Initial construction of all facilities and services required for SMV operations.	232,959	259,720	232,959
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	3,464	3,464	3,464
Total (K$)		236,423	263,184	236,423

Table 10: Construction Costs for CST Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
Initial construction	Initial construction of all facilities and services required for CST operations.	134,371	134,371	134,371
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	3,500	3,500	3,500
Total (K$)		137,872	137,872	137,872

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 will be repackaged every 100 years in the CSB and CST alternatives and that the storage structures will be replaced every 100 years in all alternatives. Once every 300 years there would be a major repackaging event were the fuel would be transferred to new fuel modules or new baskets and then placed into new containers.

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 CSB estimates do 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 appendices.

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 CSB alternatives, the fuel is already in an appropriate storage complex at the reactor sites and therefore the CSB estimates exclude any

costs for initial fuel receipt. Depending on the RES alternative under consideration (SMV), fuel will require conversion in a processing building into a format appropriate for long term storage. For CST alternatives, the fuel will be transferred from existing processing buildings and surface storage buildings, into storage chambers, once constructed. 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, module canisters and storage casks 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 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.

There are two repackaging events, which require consideration. One event, based on a 100-year service life of the storage casks (applicable to CSB, and CST alternatives), requires the removal of modules (or in the case of Bruce) removal of baskets containing fuel from existing storage casks, and repackaging in fresh storage casks. These repackaging events coincide with the facility repeat events above.

The other repackaging event, occurring every 300 years based on the service life of modules, module canisters and baskets requires the removal and transfer of fuel bundles to fresh modules, module canisters and baskets as required.

The shielded cell complex configured for the 300-year repackaging event for CSB and CST is capable of allowing the opening of the storage casks, withdrawal of the modules and withdrawal of fuel bundles from the modules. The fuel bundles are transferred to ‘fresh’ modules, which are then be loaded into a new storage cask. For the SMV alternative, the shielded cell complex has the capability to open module canisters, withdraw the existing modules, transfer fuel to ‘fresh’ modules, and encase these modules in a new welded canister.

The shielded cell complex at Bruce will also have the capability to handle and withdraw fuel from baskets. In the CSB and CST alternatives, a shielded cell is configured to accept basket storage casks, and permit the removal of the fuel baskets stored within. The SMV shielded cell will also be configured to accept a stream of baskets, during the 300 year repackaging event.

The shielded cell complex permits the opening of seal welded baskets and the withdrawal of the fuel bundles within. The fuel bundles are inserted into ‘fresh baskets’, and the basket assembly seal welded.

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

Work Element	Description	Pickering	Bruce	Darlington
Storage building repeats – 100 yrs	All costs captured under 5xx-45-30-20. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	68,486	105,022	68,486
Storage building repeats – 200 yrs	All costs captured under 5xx-45-30-50	68,486	102,729	68,486
Storage building repeats – 300 yrs	All costs captured under 5xx-45-30-70	68,486	102,729	68,486
Repackaging module to cask – 100 yrs	All costs captured under 5xx-45-40-10. Includes the cost demolition of old processing building, disposal of waste material, construction of new processing building, repackaging operations, acquisition of new casks and disposal old casks.	601,467	845,635	579,841
Repackaging module to cask – 200 yrs	All costs captured under 5xx-45-40-20	601,467	845,635	578,171
Repackaging module to module – 300 yrs	All costs captured under 5xx-45-40-30. In addition repackaging operations described above includes transfer of fuel to new modules and disposal old modules.	671,121	915,289	644,516
Program Management in support of periodic facility repeats and repackaging events	All costs captured under 5xx-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (5xx-45-20-05)	154,521	232,525	154,521
Total (K$)		2,234,033	3,149,563	2,162,508

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

Work Element	Description	Pickering	Bruce	Darlington
Initial Fuel Receipts	All costs captured under 5xx-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.	838,675	1,080,464	786,574
Storage building repeats – 100 yrs	All costs captured under 5xx-45-30-20. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	532,819	726,817	532,819
Storage building repeats – 200 yrs	All costs captured under 5xx-45-30-30	537,703	726,817	537,703
Storage building repeats – 300 yrs	All costs captured under 5xx-45-30-40	532,819	819,045	532,819
Repackaging module to module – 300 yrs	All costs captured under 5xx-45-40-10. Includes the cost demolition of old processing building, disposal of waste material, construction of new processing building, repackaging operations, acquisition of new casks and disposal old casks.	558,098	677,771	558,098
Program Management in support of periodic facility repeats and repackaging event	All costs captured under 5xx-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (5xx-45-20-05) but do not include the Program	257,316	303,151	255,933

	Management costs included under 5xx-45-10.			
Total (K$)		3,257,429	4,334,065	3,203,946

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

Work Element	Description	Pickering	Bruce	Darlington
Initial Fuel Receipts	All costs captured under 5xx-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.	479,514	703,215	487,106
Storage chamber repeats – 200 yrs	All costs captured under 5xx-45-30-50. Includes the cost of demolition of old storage structures, disposal of waste materials and construction of new structures.	61,183	78,034	61,183
Repackaging module to cask – 100 yrs	All costs captured under 5xx-45-40-10. Includes the cost demolition of old processing building, disposal of waste material, construction of new processing building, repackaging operations, acquisition of new casks and disposal old casks.	602,993	849,005	581,301
Repackaging module to cask – 200 yrs	All costs captured under 5xx-45-40-20	601,621	847,633	579,929
Repackaging module to module – 300 yrs	All costs captured under 5xx-45-40-30. In addition repackaging operations described above includes transfer of fuel to new modules and disposal old modules.	671,275	953,075	649,583
Program management during repackaging events	All costs captured under 5xx-45-40-05. These costs are incremental to ongoing Program management costs captured under Program Management during extended monitoring (5xx-45-20-05) but do not include the Program Management costs included under 5xx-45-10.	310,802	519,594	310,802
Total (K$)		2,727,389	3,950,556	2,669,903

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 300-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:

CSB
Pickering 266 years
Bruce 276 years
Darlington 270 years

SMV
Pickering 270 years
Bruce 267 years
Darlington 273 years

CST
Pickering 260 years
Bruce 268 years
Darlington 267 years

Tables 14 to 16 summarize the extended monitoring costs for each alternative on the Pickering, Bruce and Darlington sites. 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 use 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. These annual expenses were assumed to be the same for all alternatives on each reactor site, with the exception of property taxes, which are specific to the alternative under consideration. 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 CSB Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
Program Management	All costs captured under 5xx-45-20-05	495,178	566,207	495,178
Monitoring & Surveillance	All costs captured under 5xx-45-20-40	40,988	41,003	40,994
Operation Indirects	All costs captured under 5xx-45-20-50	552,755	570,371	555,251
Common Ancillary Services Operations	All costs captured under 5xx-45-20-80	98,772	102,114	100,257
Fuel Integrity Monitoring	All costs captured under 5xx-45-20-70 & -80	4,935	4,995	4,959
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 5xx-25-50 & -70	4,889	4,903	4,895
Operating Licence Renewal	All costs captured under 5xx-30-70	34,176	35,076	34,536
Environmental Monitoring	All costs captured under 5xx-55 except the costs associated with Environmental Assessment and Construction Licensing work (5xx-55-20)	127,740	132,593	129,609
Total (K$)		1,359,432	1,457,261	1,365,678
Annual Cost	Total cost of extended monitoring divided by duration of 266 years for Pickering, 276 years for Bruce, 270 years for Darlington	$5.11M/a	$5.28M/a	$5.06M/a

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

Work Element	Description	Pickering	Bruce	Darlington
Program Management	All costs captured under 5xx-45-20-05	945,131	1,081,496	949,963
Monitoring & Surveillance	All costs captured under 5xx-45-20-40	14,944	14,940	14,949
Operation Indirects	All costs captured under 5xx-45-20-50	569,602	567,717	583,857
Common Ancillary Services Operations	All costs captured under 5xx-45-20-80	109,169	108,055	111,025
Fuel Integrity Monitoring	All costs captured under 5xx-45-20-70	9,037	9,019	9,055
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 5xx-25-50 & -70	4,510	4,566	4,564
Operating Licence Renewal	All costs captured under 5xx-30-70	38,716	38,136	37,227
Environmental Monitoring	All costs captured under 5xx-55 except the costs associated with Environmental Assessment and Construction Licensing work (5xx-55-20)	148,807	147,674	148,807
Total (K$)		1,839,916	1,971,602	1,859,446
Annual Cost	Total cost of extended monitoring divided by duration of 270 years for Pickering, 267 years for Bruce, 273 years for Darlington	$6.81M/a	$7.38M/a	$6.81M/a

Table 16: Operations - Extended Monitoring Costs for CST Alternative (2002 K$)

Work Element	Description	Pickering	Bruce	Darlington
Program Management	All costs captured under 5xx-45-20-05	845,314	1,073,510	869,298
Monitoring & Surveillance	All costs captured under 5xx-45-20-40	38,724	40,991	40,989
Operation Indirects	All costs captured under 5xx-45-20-50	537,636	554,003	553,379
Common Ancillary Services Operations	All costs captured under 5xx-45-20-60	96,544	100,257	98,772
Fuel Integrity Monitoring	All costs captured under 5xx-45-20-70 & -80	4,899	4,947	4,942
Safety Assessment – Facility Operation & Decommissioning	All costs captured under 5xx-25-50 & -70	5,306	5,320	5,316
Operating Licence Renewal	All costs captured under 5xx-30-70	35,017	36,327	35,811
Environmental Monitoring	All costs captured under 5xx-55 except the costs associated with Environmental Assessment and Construction Licensing work (5xx-55-20)	139,051	160,651	155,237
Total (K$)		1,702,491	1,976,007	1,763,745
Annual Cost	Total cost of extended monitoring divided by duration of 260 years for Pickering, 268 years for Bruce, 267 years for Darlington	$6.55M/a	$7.37M/a	$6.61M/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 Pickering, Bruce and Darlington RES facilities. The WMO is assumed to have 11 full-time staff and 8.4 of these staff are dedicated to servicing the OPG RES facilities. The remainder of the staff will service the RES facilities on the other 4 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.

Property taxes are a significant cost during extended monitoring. However the estimation of future property taxes for RES facilities on the reactor sites is subject to many uncertainties and therefore there is a large “error band” associated with these estimates.

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 3 full-time staff could carry out all required tasks at the Pickering, Bruce and Darlington RES facilities. Material and equipment costs are assumed to be $1K/a for each site.

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.

Other costs are included for material and equipment during maintenance programs for the ancillary facilities ($150K/a), for armed response capability ($300K/a) and energy consumption ($30K/a) per site.

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 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 casks 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 the100-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 CSB and CST there is no processing building shielded cell so an additional allowance (relative to CES) is included for a cell on each 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 Pickering, Bruce and Darlington RES facilities will be $210K/a (about 0.7 fte/a of CNSC staff time) or $70K per site.

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

The program would also include on-going monitoring of human health of the population in the vicinity of the RES.

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
5xx-45-20-5 Program Management (WMO staff during extended monitoring)									
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
Subtotal	*2.6*	*2.6*	*2.6*	*0.8*	*0.8*	*0.8*	*0.8*	*11*	*9*
5xx-45-20-40 Monitoring & Surveillance									
Monitoring & surveillance of storage structures	1	1	1	0.5	0.5	0.5	0.5	5	5
5xx-45-20-50 Operation Indirects									
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
Subtotal	*13*	*13*	*13*	*7*	*7*	*7*	*7*	*67*	*34*
5xx-45-20-60 Common Ancillary Services Operations									
Maintenance & 30-yr refurbishment of ancillary facilities	3	3	3	1	1	1	1	13	5
5xx-45-20-70 Fuel Integrity Monitoring									
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
5xx-25-50 Safety Assessment – Facility Operation (support O/L Renewal)									
Staff at central location servicing 7 sites	0.25	0.25	0.25	0.08	0.08	0.08	0.08	1	1
5xx-30-70 Operating Licence Renewal									
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
Subtotal	*1.93*	*1.93*	*1.93*	*0.29*	*0.29*	*0.29*	*0.29*	*7*	*7*
Total	**22**	**22**	**22**	**10**	**10**	**10**	**10**	**106**	**62**

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
5xx-45-20-5 Program Management (WMO expenses)									
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
Subtotal	*2,090*	*2,503*	*2,086*	*1,212*	*243*	*258*	*258*	*8,650*	*2,672.3*
5xx-45-20-40 Monitoring & Surveillance									
Material & Equipment for Monitoring & surveillance of storage structures	1	1	1	1	1	1	1	7	2
5xx-45-20-50 Operation Indirects									
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
Subtotal	*480*	*480*	*480*	*130*	*130*	*128*	*128*	*1,956*	*1,682*
5xx-45-20-80 Common Ancillary Services Operations									
No expenses	--	--	--	--	--	--	--	--	--
5xx-45-20-70 Fuel Integrity Monitoring									
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
Subtotal	*4*	*4*	*4*	*3*	*3*	*3*	*3*	*24*	*12*
5xx-25-50 Safety Assessment - Facility Operation (support O/L Renewal)									
Expenses	1	1	1	0.5	0.5	0.5	0.5	5	4
5xx-30-70 Operating Licence Renewal									
CNSC fees	70	70	70	50	50	50	50	410	200
Travel expenses	2	2	2	1	1	1	1	10	4
Subtotal	*72*	*72*	*72*	*51*	*51*	*51*	*51*	*420*	*204*
5xx-55 Environmental Monitoring									
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
Subtotal	*38*	*38*	*38*	*19*	*19*	*19*	*19*	*190*	*106.7*
Total (K$)	**2,686**	**3,099**	**2,682**	**1,416.5**	**447.5**	**460.5**	**460.5**	**11,252**	**4,683**

Notes:

1. Sums may not equal to totals due to rounding.
2. Program management (WMO), fuel integrity monitoring and operating licence renewal staff are assumed to centrally located.
3. 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.
4. 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.
5. 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 last 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 Y320 then the costs for this 300-year period can simple be repeated as required to generate costs, say, for 620, 920 years and so on.

7 References

1 Cost Estimates 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/17 - 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 Pickering, Bruce and Darlington Reactor Sites CTECH Report No: 1105/MD18084/REP/12 - 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 <u>not</u> 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 Pickering Site

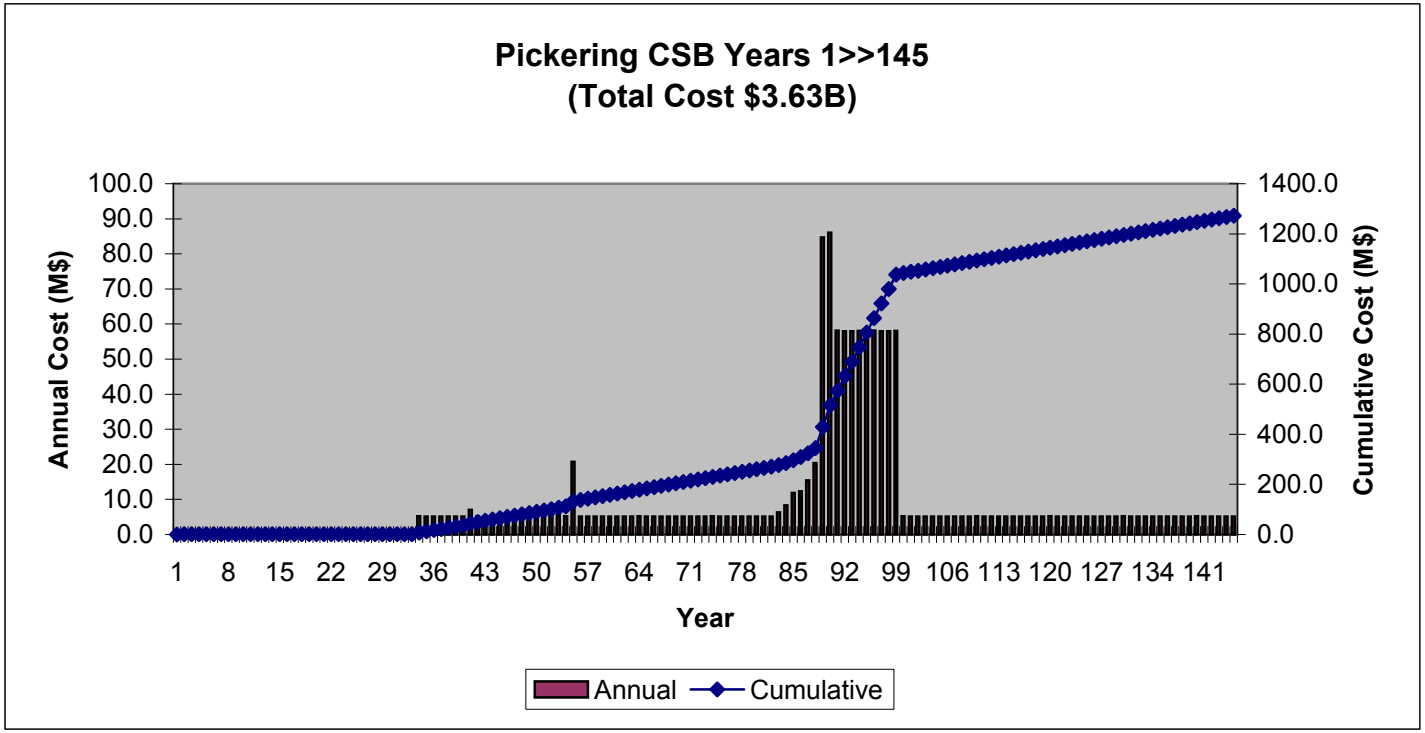
WBS No 571 – CSB
WBS No 572 – SMV
WBS No 573 - CST

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

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 571
PICKERING
CASKS IN STORAGE BUILDINGS **(CSB)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	8,031
25	Safety Assessment	5,700
30	Licensing & Approvals	37,086
35	Public Affairs	3,281
40	Facility Design & Construction	19,143
45	Facility Operation	3,426,661
55	Environmental Assessment and Monitoring	130,747
90	Program Management	1,402
	Total Cost ($k)	**3,632,875**

Pickering CSB Alternative	**3,632,875**
Siting Phase	**20,266**
Siting	824
EA	3,007
System Development	8,031
SA	811
L&A	2,910
Public Affairs	3281
Program Mgmt	1402
Construction Phase	**19,143**
Transition to Standalone	16,655
Before 100-yr Repackaging	2,487
Operations Phase	**3,593,466**
Repeat & Repackaging	*2,234,033*
SB - 100 yrs	68,486
SB - 200 yrs	68,486
SB - 300 yrs	68,486
Repackaging - 100 yrs	601,467
Repackaging - 200 yrs	601,467
Repackaging M to M - 300 yrs	671,121
PM for Repeats & Repackaging	154,521
Extended Monitoring	*1,359,432*
Program Mgmt	495,178
Monitoring Surveliance	40,988
Operation Indirects	552,755
Common Ancillary Services Ops	98,772
Fuel Integrity Monitoring	4,935
SA - Ops & Decommissioning	4,889
L&A - Ops Licence Renewal	34,176
Environmental Monitoring	127,740


Pickering CSB Years 1>>145
(Total Cost $3.63B)
Annual Cost (M$)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Cumulative Cost (M$)
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	87	7	0	0	NO DATA TO FILL	452.2
571	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	87	7	0	0		0.0
571	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	87	7	0	0		97.0
571	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	87	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	
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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency			TOTAL	
											CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	Cost $k	
571	15							**Siting**																
571	15	10						SITING MANAGEMENT																
								Costs incurred Y1 to Y3 & Y84 to Y87 or 7 years. Overall scope of siting program is much samller relative to CES.	Labour	0.05	4897.7	0.05	244.885											245
									Materials and Equipment	0.05				0	0.05	0								0
									Other	0.05							1,300	0.05	65					65
									Contingency	50%										50%	1.0	154.9		155
571	15	70						PREFERRED SITE																
571	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 10% of a CES greenfield site (Y84)	Labour	0.1	588.3	0.1	58.83											59
									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
571	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 10% of a CES greenfield site (Y84)	Labour	0.1	1484.8	0.1	148.48											148
									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

Total	**824**
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

BASIS OF ESTIMATE NOTES - Insert references and notes

1
2
3
4

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	83	89	7	0	0	NO DATA TO FILL	5137.5
571	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	83	89	7	0	0		451.5
571	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	83	89	7	0	0		203.2
571	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	83	89	7	0	0		2238.7

INSTRUCTIONS

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

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost			
Labour	5137	*0.0*	5137.5
Materials and Equipment	452	*0.0*	451.5
Other	203	*0.0*	203.2
Contingency	2238.7	*0.0*	2238.7
Total	8031	*0.0*	8031

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
571	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
571								**OPG has 3 sites Pickering, Bruce and Darlington. CSB (Casks in Storage Buildings) is a storage alternative applicable to each site. The system development for the CSB alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CSB workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.**															
571	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and 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	Labour	0.18	6690.40	0.18	1170.82										1,171
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and additional 50% is deducted. Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Other	0.18							300.00	0.18	52.50				53

			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	367.0	367
571	20	5	SYSTEM OPTIMIZATION																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Labour	0.18	3303.70	0.18	578.15											578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Other	0.18							120.00	0.18	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.00	179.74	180
571	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Labour	0.11	20750.10	0.11	2178.76											2,179
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.11				4300.00	0.11	451.50								452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Other	0.11							895.00	0.11	93.98					94
			Percentage for contingency assumed same as for CES	Contingency	50%											50%	1.00	1362.12	1,362
571	20	30	STORAGE SYSTEM ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Labour	0.11	8143.20	0.11	855.04											855
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Other	0.11							200.00	0.11	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.00	219.01	219
571	20	40	SECURITY & SAFEGUARD ENG'NG																

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69												355
No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00									0
Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25							60.00	0.25	14.70						15
Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8			111

Total	**8,031**
Check: Should = 0	**0**

Total	5,137	Total	452	Total	203	Total	2,238.7		
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

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	25							Safety Assessment	Labour		OPG	RJH	1	299	269			3628.2
571	25							Safety Assessment	Materials and Equipment		OPG	RJH	1	299	269			
571	25							Safety Assessment	Other		OPG	RJH	1	299	269			443.5
571	25							Safety Assessment	Contingency		OPG	RJH	1	299	269			1628.7

NO DATA TO FILL

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	3628
Materials and Equipment	
Other	444
Contingency	1628.7
Total	5700

Check: Total minus budget Should = 0		Budget costs to Years by %
Check total	**Total Cost $k**	**% >>>>**
Should = 100% --->		
	3628.2	
	443.5	
	1628.7	
	5700	

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
571	25							**Safety Assessment**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
571	25	10						SAFETY ASSESSMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	Labour	0.05	5218.2	0.05	260.91										261
									Materials and Equipment	0.05				0.05									
									Other	0.05						850	0.05	42.5					43
									Contingency	40%									40%	1.0	121.4		121
571	25	30						SA - SITING																
								Y83 & Y84 Very limited siting activities leads no SA costs	Labour		2287.5												
									Materials and Equipment														
									Other							3,850							
									Contingency	40%									40%	1.0			
571	25	40						SA - OPERATING LICENSE																
								Y88 to Y89	Labour	0.15	1540.5	0.15	231.075										231
									Materials and Equipment	0.15				0.15									
									Other	0.15						300	0.15	45					45
									Contingency	40%									40%	1.0	110.4		110
571	25	50						SA - FACILITY OPERATIONS																

			RES has 30 renewal events vs 45 in CES giving a factor of 0.66. However renewal costs can be shared between with same technoilogy; thus reduce factor to 0.25 (Y34 to Y299)	Labour	0.25	9604.8	0.25	2401.2													2,401
				Materials and Equipment	1				1												
			Expenses at $1K/a x 266 yrs = $266K	Other	1						266	1	266								266
				Contingency	40%										40%	1.0	1,066.9				1,067
571	25	70	SA - DECOMMISSIONING (Processing Facilities)																		
			RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technoilogy; thus factor to 0.3 Prior to repackaging events	Labour	0.3	2449.9	0.3	734.97													735
				Materials and Equipment	0.3				0.3												
				Other	0.3						300	0.3	90								90
				Contingency	40%										40%	1.0	330.0				330
																				Total	**5,700**
																				Check: Should = 0	
						Total		3,628	Total			Total		444	Total		1,628.7				
						Check: Should = 0			Check: Should = 0			Check: Should = 0			Check: Should = 0						5700

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

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	30	0	0	0	0	0	0	Licensing & Approvals	Labour		OPG	RJH	34	299	266	0	0	NO DATA TO FILL	9075.5
571	30	0	0	0	0	0	0	Licensing & Approvals	Materials and Equipment		OPG	RJH	34	299	266	0	0		0.0
571	30	0	0	0	0	0	0	Licensing & Approvals	Other		OPG	RJH	34	299	266	0	0		20593.2
571	30	0	0	0	0	0	0	Licensing & Approvals	Contingency		OPG	RJH	34	299	266	0	0		7417.2

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Total Cost $k	Budget costs to Years by %
				% >>>
Labour	9076	*0.0*	9075.5	
Materials and Equipment	0	*0.0*	0.0	
Other	20593	*0.0*	20593.2	
Contingency	7417.2	*0.0*	7417.2	
Total	37086	*0.0*	37086	

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																	
								In general L&A costs are assumed to be less than for a CES facility since dealing with well developed technology on an existing site. In some cases the costs are shared between the seven sites which further reduces costs.																
571	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
571	30	30						LIAISON WITH CNSC																
								Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.058. However due to inefficiencies of multiple sites increase to 0.2 (Y81 to Y84)	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	
571	30	50						CNSC CONSTRUCTION LICENCE																
								Can share knowledge between sites Efficiencies gained through sharing of knowledge bewteen sites. Licensing process shorter than CES at 7yrs with RES being 3 years (Y85 to Y87). CES involves comprehensive with Panel and RES would likely be a comprehensive with no Panel.	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	

571	30	60		OTHER GOVN'MT APPROVALS																
571	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 (Y81 to Y84).	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
571	30	60	30	FEDERAL APPROVALS																
					Y85 to Y90	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
571	30	60	40	PROVINCIAL APPROVALS																
					Y85 to Y90	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
571	30	60	50	MUNICIPAL APPROVALS																
					Y85 to Y90	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
571	30	65		CNSC OPERATING LICENCE (Initial Application)																
					Y89 & Y90	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
571	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																
					CES duration is 330 years. Costs incurred in RES during period Y34 to Y299 or 266 years. Thus a factor of 81%. Some effeciencies gained because of renewal on three sites. Thus assume 25% factor.	Labour	0.25	32754	0.25	8188.5										8,189
						Materials and Equipment	1				0	1	0							0
					Expenses at $72K/a x 266 yrs = $19,152K	Other	1							19,152	1	19152				19,152
						Contingency	0.25										25%	1.0	6,835.1	6,835
																	Total			**37,086**
																	Check: Should = 0			**0**
								Total		9,076	Total		0	Total		20,593	Total		7,417.2	
								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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	35							Public Affairs	Labour		OPG	RJH	1	90	10			1367.5
571	35							Public Affairs	Materials and Equipment		OPG	RJH	1	90	10			
571	35							Public Affairs	Other		OPG	RJH	1	90	10			820.0
571	35							Public Affairs	Contingency		OPG	RJH	1	90	10			1093.8

NO DATA TO FILL

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	1368
Materials and Equipment	
Other	820
Contingency	1093.8
Total	3281

Check: Total minus budget Should = 0		Budget costs to Years by %
Check total	**Total Cost $k**	**% >>>**
	1367.5	
	820.0	
	1093.8	
	3281	

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

ACTIVITY DETAIL ESTIMATE

										A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
571	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	Cost $k	
571	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
								Y84	Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0.1										
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
571	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
								Y85 to Y87	Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0.1										
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
571	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
								Y88 to Y89	Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0.1										
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
571	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																

			Y1 to Y3 & Y84 to Y90	Labour	0.1	3530.8	0.1	353.08												353
				Materials and Equipment	0.1					0.1										
				Other	0.1							170	0.1	17						17
				Contingency	50%										50%	1.0	185.0			185
571	35	120	Community Offsets & Benefits																	
			Y88 to Y90	Labour	0.25		0.25													
				Materials and Equipment	0.25					0.25										
				Other	0.25							2,072	0.25	518						518
				Contingency	50%										50%	1.0	259.0			259
																			Total	**3,281**
																			Check: Should = 0	
						Total		1,368	Total			Total		820	Total		1,093.8			
						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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	51	90	5	0	0	NO DATA TO FILL	5344.2
571	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	51	90	5	0	0		7811.0
571	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	51	90	5	0	0		36.6
571	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	51	90	5	0	0		5950.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	5344		*0.0*	5344.2	
Materials and Equipment	7811		*0.0*	7811.0	
Other	37		*0.0*	36.6	
Contingency	5950.8		*0.0*	5950.8	
Total	19143		*0.0*	19143	

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
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				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		
571	40							**Facility Design & Construction**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
571	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 additional land acquisition costs neccesary	Other	0.0							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
571	40	30						COMMON ANCILLARY FACILITIES																
571	40	30	10					ADMIN AND SUPPORT FACILITIES																
571	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0									comment 7		0
									Materials and Equipment	0.00				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
571	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0									comment 7		0
									Materials and Equipment	0.00				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

571 40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				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
571 40	30	10	4	STORAGE CASK STORE																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				1,892.0	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
571 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	0.30	459.9	0.3	138.0												138
					Materials and Equipment	0.30				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
571 40	30	10	6	SOLID WASTE STORAGE AREA																		
				ACTIVE SOLID WASTE HDLG BLDG	Labour	0.30	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	0.30				437.5	0.3	131.3									131
					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
571 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	0.30	359.4	0.3	107.8												108
					Materials and Equipment	0.30				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
571 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	0.30	373.7	0.3	112.1												112
					Materials and Equipment	0.30				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
571 40	30	10	9	WAREHOUSE BLDG																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				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
571 40	30	10	10	GUARDHOUSE AND SECURITY FENCE																		
				building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				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%	1.25	0.0	0
571	40	30	10	11	TRUCK INSP'N / WASH STATION														
					not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0								comment 7	0
						Materials and Equipment	0.00				1,075.0	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
571	40	30	10	12	UTILITY BLDG														
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0								comment 7	0
						Materials and Equipment	0.00				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
571	40	30	10	13	TEST FACILITY CONSTRUCTION														
					Facility will be constructed at Bruce, taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3 OPG sites therefore factor 0.33.	Labour	0.3	766.8	0.3	255.6									256
						Materials and Equipment	0.3				1,675.0	0.3	558.3						558
					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	20.0%									20%	1.0	162.8	163
571	40	30	20		OTHER SITE SYSTEMS														
571	40	30	20	1	FIRE PROTECTION SYSTEMS														
					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
571	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM														
					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
571	40	30	20	3	ELECTRICAL AND EMERGENCY POWER														
					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
571	40	30	20	4	SANITARY SEWER SYSTEM														
					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

571 40	30	20	5	POTABLE WATER SYSTEM																			
				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
571 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
571 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
571 40	30	20	8	CONST'N 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
571 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
571 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
571 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
571 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

allowance for consumption for construction of 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	**19,143**
Check: Should = 0	**0**

Total	5,344	Total		7,811	Total		37	Total		5,950.8	
Check: Should = 0	0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	45							Facility Operation	Labour		CTECH	AM	34	299	266			NO DATA TO FILL	962984.8
571	45							Facility Operation	Materials and Equipment		CTECH	AM	34	299	266				1046250.6
571	45							Facility Operation	Other		CTECH	AM	34	299	266				679316.0
571	45							Facility Operation	Contingency		CTECH	AM	34	299	266				738109.6

INSTRUCTIONS

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

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Total Cost $k		
Labour	962985	962984.8		
Materials and Equipment	1046251	1046250.6		
Other	697705	679316.0		
Contingency	738110	738109.6		
Total	3445050		*0.0*	3426661

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																	
571	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
571	45	20						OPERATIONS - EXTENDED MONITORING																
571	45	20	5					PROGRAM MANAGEMENT																
								Entries in CES DET applicable to RES but duration 266 years RES & 300 years CES therefore 266/300 of labour costs. Pickering assuemd to have 2.6 staff vs 9 in CES. Thus factor is 26%.	Labour	0.26	312,354.0	0.26	81,212.0									81,212	
								No entry in CES alternative cost category	Materials and Equipment																
								Annual cost = $1246/a x 266 yrs	Other	1.00							331,436.0	1.0	331,436.0				331,436	1
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	82,529.6	82,530	
571	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING																
								Reduced duration to CES (266/300). One staff for RES vs 5 in CES. Combined factor = (266/300) x (1/5) = 0.2	Labour	0.18	150,328.0	0.18	27,059.0									27,059	
								Annual costs = $1K/a x 266 yrs	Materials and Equipment	1.00				266.0	1.0	266.0							266	
								No entry in CES alternative cost category	Other															
								Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	13,662.5	13,663	
571	45	20	50					OPERATION INDIRECTS (EXTENDED MONITORING)																

					Labour	0.34	875,048.0	0.34	297,516.3													297,516
				Entries in CES DET applicable to RES but duration 266 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 266/300 x 13/34 = 0.34. Annual M&E costs are $150K/a x 266 yrs = $39900K	Materials and Equipment	1.00				39,900.0	1.0	39,900.0									39,900
					Other									87,780.0								87,780
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 266 years = $87,780K																	
				Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	127,558.9			127,559
571	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																		
				RES has duration 266 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 266/300 x 3/5 = 0.532	Labour	0.53	148,529.0	0.53	79,017.4													79,017
				No entry in CES alternative cost category	Materials and Equipment																	
				No entry in CES alternative cost category	Other																	
				Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.0	19,754.4			19,754
571	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																		
				RES duration is 266 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 266 yrs = $877.8K. Other costs is $0.7K/a x 266 yrs = $186.2K.	Labour	0.2	4,631.0	0.20	926.2													926
					Materials and Equipment	1.0				877.8	1.0	877.8										878
					Other	1.0							186.2	1.0	186.2							186
				Percentage for contingency assumed same as for CES	Contingency	50%											50%	1.0	995.1			995
571	45	20	80	RECEIPT & TRANSFER (EQUIP)																		
				No entry in CES alternative cost category	Labour																	
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5				3,000.0	0.5	1,500.0										1,500
				No entry in CES alternative cost category	Other																	
				Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	450.0			450
571	45	30		OPERATIONS - FACILITY REPEATS																		
571	45	30	20	STORAGE BUILDINGS 100 YEAR REPLACEMENT																		
				labour for demolition of previous stores and construction of new = factor 5/17 (0.29) (stores qty) labour for fuel transfer = 9/30 (years for transfer) factor = 9/30= (0.3) use 0.3	Labour	0.30	89,923.0	0.30	26,976.9													26,977
				const'n materials = 5 bldgs RES, 17 bldgs CES factor =5/17	Materials and Equipment	0.30				41,803.0	0.3	12,540.9										12,541
				waste disposal = 5 bldgs RES, 17 bldgs CES factor =5/17	Other	0.30							43,879.0	0.3	13,163.7							13,164
				Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	15,804.5			15,804
571	45	30	50	STORAGE BUILDINGS 200 YEAR REPLACEMENT																		
				assumed same as 100 yr replacement	Labour	0.30	89,923.0	0.30	26,976.9													26,977
				assumed same as 100 yr replacement	Materials and Equipment	0.30				41,803.0	0.3	12,540.9										12,541
				assumed same as 100 yr replacement	Other	0.30							43,879.0	0.3	13,163.7							13,164
				Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	15,804.5			15,804

571	45	30	70			STORAGE BUILDINGS 300 YEAR REPLACEMENT																
						assumed same as 100 yr replacement	Labour	0.30	89,923.0	0.30	26,976.9										26,977	
						assumed same as 100 yr replacement	Materials and Equipment	0.30				41,803.0	0.3	12,540.9							12,541	
						assumed same as 100 yr replacement	Other	0.30							43,879.0	0.3	13,163.7				13,164	
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	15,804.5	15,804	
571	45	40				OPERATIONS - REPACKAGING																
571	45	40	5			PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																
							Labour	0.16	389,170.0	0.16	61,447.9										61,448	
						Entries in CES DET applicable to RES but duration 45 years RES 3x(2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 9yr operations) & 114 years CES therefore45/114 of labour cost s. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).															
						No entry in CES alternative cost category	Materials and Equipment															
						property tax based on 45 year duration (3x15 year periods)	Other	1.00							67,320.0	1.0	67,320.0				67,320	2
						Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	25,753.6	25,754	
571	45	40	10			MODULE TO CASK 100 YEAR REPACKAGING																
571	45	40	10	10		DECOMMISSIONING OF EXISTING FACILITIES																
						assume decommissioning of existing process building (from interim period) same costs as CES process building	Labour	1.0	2,357.4	1.00	2,357.4										2,357	
						No entry in CES alternative cost category	Materials and Equipment															
							Other	1.0							3,207.7	1.0	3,207.7				3,208	
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,669.5	1,670	
571	45	40	10	20		CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1										476	
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6							355	
						RPM Repackaging plant same as CES facility therefore factor = 1	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	
571	45	40	10	30		PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																
571	45	40	10	30	20	RPM EQUIP. DESIGN, SUPPLY & INSTALL																
571	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2										276	
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0							5,523	
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							290.0	1.0	290.0				290	
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,826.8	1,827	

571	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6								2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1					11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							685.4	1.0	685.4		685
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	4,317.9	4,318
571	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3								2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4					13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							823.0	1.0	823.0		823
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,184.8	5,185
571	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)													
							No entry in CES alternative cost category	Labour												
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0					5,055
							No entry in CES alternative cost category	Other												
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,516.5	1,517
571	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0								233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0					2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							128.0	1.0	128.0		128
							Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	538.6	539
571	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2								8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7					8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							1,624.3	1.0	1,624.3		1,624
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,593.3	5,593
571	45	40	10	30	60		BUILDING SERVICES (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2								11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4					9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							3,486.7	1.0	3,486.7		3,487
							Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	5,994.6	5,995
571	45	40	10	30	70		COMMISSIONING (RPM)													

						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8												1,253
						No entry in CES alternative cost category	Materials and Equipment																
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					232.1	1.0	232.1								232
						Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	742.5					742
571	45	40	10	30	80	CONST'N INDIRECTS (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3												14,668
						No entry in CES alternative cost category	Materials and Equipment																
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					518.6	1.0	518.6								519
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	4,556.1					4,556
571	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7														
						replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2												21,056
							Materials and Equipment	1.00			29,785.1	1.0	29,785.1								29,785
						No entry in CES alternative cost category	Other																
						Percentage for contingency assumed same as for CES	Contingency	22%								22%	1.0	11,185.1					11,185
571	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8												274
						No entry in CES alternative cost category	Materials and Equipment																
						No entry in CES alternative cost category	Other																
						Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	136.9					137
571	45	40	10	600		REPACKAGING OPERATIONS (RPM)																	
						repackaging of 2421 RES casks compared to 8528 CES factor = 2421/8528	Labour	0.28	118,823.0	0.28	33,732.5												33,732
						procurement of 2421 RES casks compared to 8528 CES factor = 2421/8528	Materials and Equipment	0.28			788,840.0	0.3	223,942.5										223,943
						disposal of 2421 RES casks compared to 8528 CES factor = 2421/8529	Other	0.28					110,864.0	0.3	31,473.0								31,473
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	86,744.4					86,744
571	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																	
						duration 12 years RES (1 demolish prev, 2const'n, 9 transfer ops) compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.4	11,882.0	0.40	4,752.8												4,753
						No entry in CES alternative cost category	Materials and Equipment																
						No entry in CES alternative cost category	Other																
						Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	1,188.2					1,188
571	45	40	10	700		OPERATION INDIRECTS (RPM)																	

						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	16,070.0	0.30	4,821.0								4,821
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				380.5	0.3	114.2					114
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0		4,860
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,938.5	2,939
571	45	40	10	800		STORAGE OPERATIONS (RPM)															
						transfer of 2421 casks RES compared to 8528 casks CES	Labour	0.28	2,093.9	0.28	594.4								594
						No entry in CES alternative cost category	Materials and Equipment												
						No entry in CES alternative cost category	Other												
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	178.3	178
571	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING															
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Labour				109,331.8										109,332
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Materials and Equipment							309,948.0							309,948
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Other									47,557.2					47,557
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Contingency													134,629.7	134,630
571	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING															
571	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING															
						Costs taken as same as 200 year repackaging	Labour				109,331.8										109,332
						Costs taken as same as 200 year repackaging	Materials and Equipment							309,948.0							309,948
						Costs taken as same as 200 year repackaging	Other									47,557.2					47,557
						Costs taken as same as 200 year repackaging	Contingency													134,629.7	134,630
571	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS															
571	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL															
						No entry in CES alternative cost category	Labour														
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5					6,472
						No entry in CES alternative cost category	Other												
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,941.5	1,941
571	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1								372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1					372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							74.4	1.0	74.4		74
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	245.6	246

571	45	40	30	30	60	BUILDING SERVICES (MM)																	
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9											384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5										311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							97.9	1.0	97.9							98
						Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	198.1				198
571	45	40	30	30	70	COMMISSIONING(MM)																	
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1											334
						No entry in CES alternative cost category	Materials and Equipment																	
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							53.2	1.0	53.2							53
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	193.7				194
571	45	40	30	30	80	CONST'N INDIRECTS (MM)																	
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8											724
						No entry in CES alternative cost category	Materials and Equipment																	
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							25.5	1.0	25.5							26
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	224.8				225
571	45	40	30	600		REPACKAGING OPERATIONS (Module to Module)																	
						MM repackaging operations factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Labour	0.28	17,823.5	0.28	5,065.8											5,066
						Module procurement factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.28				102,336.0	0.3	29,086.1										29,086
						module waste disposal factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Other	0.28							35,817.6	0.3	10,180.1							10,180
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	13,299.6				13,300
									Total		962,985	Total		1,046,251	Total		697,705	Total		738,109.6		
									Check: Should = 0			Check: Should = 0			Check: Should = 0			Check: Should = 0					

Total	**3,426,661**
Check: Should = 0	

BASIS OF ESTIMATE NOTES - Insert references and notes

1 1246k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (71950k$) at rate 2.87%)

2 1496k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (71950k$) at rate 2.87%). this tax runs for 3X15 years = 45 years. A portion of this tax over 45 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)

3

4

5

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

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
571	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour		OPG	RJH	34	299	266	0	0	NO DATA TO FILL	90021.4
571	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	34	299	266	0	0		7980.0
571	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other		OPG	RJH	34	299	266	0	0		2665.5
571	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency		OPG	RJH	34	299	266	0	0		30079.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
Labour	90021		*0.0*	90021.4	
Materials and Equipment	7980		*0.0*	7980.0	
Other	2666		*0.0*	2665.5	
Contingency	30079.8		*0.0*	30079.8	
Total	130747		*0.0*	130747	

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																	
								Total OPG fuel inventory on 3 sites is 93% of CES inventory. Therefore it is assumed that the total cost of EA & Monitoring program is same as total cost for CES. Therefore have assumed that the annual costs would be same as for CES and that there would be reduction due to shorter duration of program. Exceptions are noted below.																
571	55							**Environmental Assessment and Monitoring**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
571	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y34 (start of ex. Monitoring) to Y299 (when repackaging ends) or 266 yrs vs CES at 347 yrs. RES has 0.5 staff vs 2 staff in CES. Factor is 266/347 x 0.5/2 = 0.192	Labour	0.192	70306	0.192	13498.752										13,499
									Materials and Equipment	1				0	1	0								0
								Expenses at $3K/a x 266 years = $798K	Other	1							798	1	798					798
									Contingency	0.3										14296.752	0.3	4289.0256		4,289
571	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years (Y85 to Y87) with with some preparation work in Y84; ie total of 4 years. Due to multiple sites with same technology can share costs and thus reduce costs relative to CES. EA process is simplier since repeat of same technology at existing storage site.	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	0.25								2405.25	0.25	601.3125		601
571	55	40	GROUNDWATER MONITORING														
			RES = 266 yrs vs CES = 330 yrs. Factor is 266/330 x 0.2/0.6 = 0.269 (Y34 to Y299)	Labour	0.269	37158	0.269	9995.502									9,996
			M&E @ $6K/a x 266 yrs = $1,596K	Materials and Equipment	1				1596	1	1596						1,596
			Expenses @ $4K/a x 266 yrs = $1064K	Other	1					1,064	1	1064					1,064
				Contingency	0.3								12655.502	0.3	3796.6506		3,797
571	55	50	RADIOLOGICAL BIOSPHERE MONITORING														
			RES = 266 yrs vs CES = 330 yrs. Factor is 266/330 x 1/3.3 = 0.244 (Y34 to Y299)	Labour	0.244	217280	0.244	53016.32									53,016
			M&E costs at $18K/a x 266 yrs = $4,788K	Materials and Equipment	1				4788	1	4788						4,788
				Other	1					0	1	0					0
				Contingency	0.3								57804.32	0.3	17341.296		17,341
571	55	60	NON-RAD BIOSPHERE MONITORING														
			RES = 266 yrs vs CES = 330 yrs. Factor is 266/330 x 0.2/0.8 = 0.202 (Y34 to Y299)	Labour	0.202	53590	0.202	10825.18									10,825
			M&E costs at $6K/a x 266 yrs = $1,596K	Materials and Equipment	1				1596	1	1596						1,596
				Other	1					0	1	0					0
				Contingency	0.3								12421.18	0.3	3726.354		3,726
571	55	80	HUMAN HEALTH MONITORING														
			RES = 266 yrs vs CES = 330 yrs. Factor is 266/330 x 0.03/0.17= 0.142	Labour	0.142	5760	0.142	817.92									818
				Materials and Equipment	1				0	1	0						0
			Expenses at $1K/a x 266 yrs = $266K	Other	1					266	1	266					266
				Contingency	0.3								1083.92	0.3	325.176		325

Total	**130,747**
Check: Should = 0	**0**

Total	90,021	Total	7,980	Total	2,666	Total	30,079.8
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 — CASKS IN STORAGE BUILDINGS (CSB)

ACTIVITY SUMMARY TO DATA TRANSFER — PICKERING

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
571	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	4	4	0	0	NO DATA TO FILL	587.7
571	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	4	4	0	0		0.0
571	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	4	4	0	0		580.8
571	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	4	4	0	0		233.7

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	588	0.0	587.7
Materials and Equipment	0	0.0	0.0
Other	581	0.0	580.8
Contingency	233.7	0.0	233.7
Total	1402	0.0	1402

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 1	2	3	4	5	6	7	8	WBS Description / Detail	Cost Category	Factor	Labour A	Labour B	Labour C	Materials and other Equipment D	E	F	Other G	H	I	Contingency J	K	L	TOTAL Cost $k M
571	90							**Program Management**															
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Pickering			total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	CES	Factor	RES	
								based on 5 staff. Assume 3 x OPG01, 2 x OPG03 for 4year duration	Labour	0.24	2448.8436	0.24	587.722464										588
								no entry	Materials and Equipment	0				0	0	0							0
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							2420	0.24	580.8				581
								Contingency as CES value	Contingency	20%										20%	1.0	233.7	234

Total	**1,402**
Check: Should = 0	**0**

	Labour	Materials and other Equipment	Other	Contingency
Total	588	0	581	233.7
Check: Should = 0	0	0	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.

RES ALTERNATIVE
WBS No 571
CASKS IN STORAGE BUILDINGS (CSB)
PICKERING

Cost Category	Total K$
Labour	1,078,599
Materials and Equipment	1,062,493
Other	704,756
Contingency	787,027
Total Cost	**3,632,875**

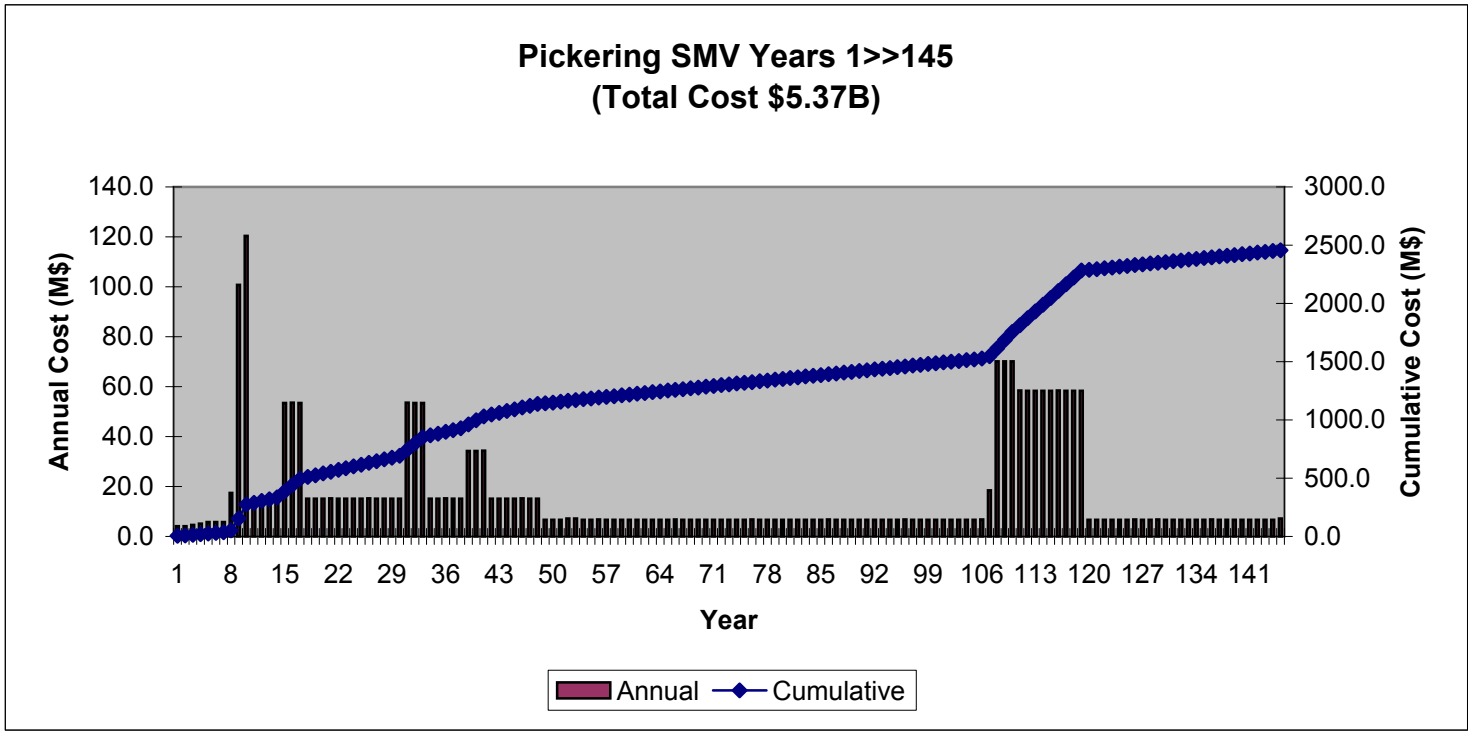
3,632,875

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$
571	15	0	0	0	0	0	0	RJH	Labour	0	1	87	7	0	452
571	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	87	7	0	0
571	15	0	0	0	0	0	0	RJH	Other	0	1	87	7	0	97
571	15	0	0	0	0	0	0	RJH	Contingency	0	1	87	7	0	275
571	20	0	0	0	0	0	0	AM	Labour	0	83	89	7	0	5,137
571	20	0	0	0	0	0	0	AM	Materials and Equipment	0	83	89	7	0	452
571	20	0	0	0	0	0	0	AM	Other	0	83	89	7	0	203
571	20	0	0	0	0	0	0	AM	Contingency	0	83	89	7	0	2,239
571	25	0	0	0	0	0	0	RJH	Labour	0	1	299	269	0	3,628
571	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	299	269	0	0
571	25	0	0	0	0	0	0	RJH	Other	0	1	299	269	0	444
571	25	0	0	0	0	0	0	RJH	Contingency	0	1	299	269	0	1,629
571	30	0	0	0	0	0	0	RJH	Labour	0	34	299	266	0	9,076
571	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	34	299	266	0	0
571	30	0	0	0	0	0	0	RJH	Other	0	34	299	266	0	20,593
571	30	0	0	0	0	0	0	RJH	Contingency	0	34	299	266	0	7,417
571	35	0	0	0	0	0	0	RJH	Labour	0	1	90	10	0	1,368
571	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	90	10	0	0
571	35	0	0	0	0	0	0	RJH	Other	0	1	90	10	0	820
571	35	0	0	0	0	0	0	RJH	Contingency	0	1	90	10	0	1,094
571	40	0	0	0	0	0	0	AM	Labour	0		51	90	5	0	5344.18
571	40	0	0	0	0	0	0	AM	Materials and Equipment	0		51	90	5	0	7810.98333
571	40	0	0	0	0	0	0	AM	Other	0		51	90	5	0	36.63
571	40	0	0	0	0	0	0	AM	Contingency	0		51	90	5	0	5950.76367
571	45	0	0	0	0	0	0	AM	Labour	0	34	299	266	0	962,985
571	45	0	0	0	0	0	0	AM	Materials and Equipment	0	34	299	266	0	1,046,251
571	45	0	0	0	0	0	0	AM	Other	0	34	299	266	0	679,316
571	45	0	0	0	0	0	0	AM	Contingency	0	34	299	266	0	738,110
571	55	0	0	0	0	0	0	RJH	Labour	0	34	299	266	0	90,021
571	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	34	299	266	0	7,980
571	55	0	0	0	0	0	0	RJH	Other	0	34	299	266	0	2,666
571	55	0	0	0	0	0	0	RJH	Contingency	0	34	299	266	0	30,080
571	90	0	0	0	0	0	0	AM	Labour	0	1	4	4	0	588
571	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	4	4	0	0
571	90	0	0	0	0	0	0	AM	Other	0	1	4	4	0	581
571	90	0	0	0	0	0	0	AM	Contingency	0	1	4	4	0	234

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 572
PICKERING
SURFACE MODULAR VAULTS **(SMV)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	22,974
25	Safety Assessment	5,875
30	Licensing & Approvals	42,469
35	Public Affairs	3,281
40	Facility Design & Construction	236,423
45	Facility Operation	4,905,313
55	Environmental Assessment and Monitoring	152,559
90	Program Management	4,474
	Total Cost ($k)	**5,374,192**

Pickering SMV Alternative	**5,374,192**
Siting Phase	**40,423**
Siting	824
EA	3,752
System Development	22,974
SA	1,365
L&A	3,753
Public Affairs	3,281
Program Mgmt	4,474
Construction Phase	**236,423**
Intial construction	232,959
Transition to Standalone	3,464
Operations Phase	**5,097,345**
Repeat & Repackaging	*3,257,429*
Initial Fuel receipts	838,675
SMV - 100 yrs	532,819
SMV - 200 yrs	537,703
SMV - 300 yrs	532,819
Repackaging M to M - 300 yrs	558,098
PM for Repeats & Repackaging	257,316
Extended Monitoring	*1,839,916*
Program Mgmt	945,131
Monitoring Survelliance	14,944
Operation Indirects	569,602
Common Ancillary Services Ops	109,169
Fuel Integrity Monitoring	9,037
SA - Ops & Decommissioning	4,510
L&A - Ops Licence Renewal	38,716
Environmental Monitoring	148,807


Pickering SMV Years 1>>145
(Total Cost $5.37B)
Annual Cost (M$)
Cumulative Cost (M$)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
PICKERING

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
572	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	7	7	0	0	NO DATA TO FILL	452.2
572	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	7	7	0	0		0.0
572	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	7	7	0	0		97.0
572	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	7	7	0	0		274.6

INSTRUCTIONS

Check: Total minus budget Should = 0		Budget costs to Years by %
Check total	**Total Cost $k**	
0%		

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
Total	824	*0.0*	824

INSTRUCTIONS

					A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
572	15				**Siting**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
572	15	10			SITING MANAGEMENT																
					RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites or a factor of 0.08. Overall scope of the siting program much smaller than CES	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	
572	15	70			PREFERRED SITE																
572	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	
572	15	70	30		PREFERRED SITE - CHARACTERISATION																
					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	

Total	**824**
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

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV) PICKERING

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
572	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	1	7	7	0	0	NO DATA TO FILL	15086.6
572	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	1	7	7	0	0		1053.5
572	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	1	7	7	0	0		336.9
572	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	1	7	7	0	0		6497.1

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	14548			0.0	15086.6
Materials and Equipment	1054			0.0	1053.5
Other	876			0.0	336.9
Contingency	6497.1			0.0	6497.1
Total	22974			0.0	22974

INSTRUCTIONS

								A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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															
572	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
572																								
572	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technolog but with existing processing facilities an additional 30% is deducted. Assume additional documentatio required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Labour	0.25	7980.70	0.25	1955.27											1,955
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technolog but with existing processing facilities an additional 30% is deducted. Assume additional documentatio required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Other	0.25							300.00	0.25	73.50						74
								Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	608.6	609
572	20	5						SYSTEM OPTIMIZATION																
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technolog but with existing processing facilities an additional 30% is deducted. Assume additional documentatio required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Labour	0.25	5011.20	0.25	1227.74											1,228
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0

			Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technolog but with existing processing facilities an additional 30% is deducted. Assume additional documentatio required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Other	0.25					120.00	0.25	29.40				29
			Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.00	377.14	377
572	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)													
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, but not developed in SMV engineering an additional 30% is deducted	Labour	0.25	30642.60	0.25	7507.44								7,507
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.25				4300.00	0.25	1053.50					1,054
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, but not developed in SMV engineering an additional 30% is deducted	Other	0.25					895.00	0.25	219.28				219
			Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.00	4390.11	4,390
572	20	30	STORAGE SYSTEM ENG'NG													
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for new technology storage option the factor = 100% with a deduction of 30% to allow for any existing storage engineering common to SMV.	Labour	0.25	14295.80	0.25	3502.47								3,502
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00					0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for new technology storage option the factor = 100% with a deduction of 30% to allow for any existing storage engineering common to SMV.	Labour	0.25					2200.00	0.25	539.00				539
			Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.00	1010.37	1,010
572	20	40	SECURITY & SAFEGUARD ENG'NG													
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69								355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00					0

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25	60.00	0.25	14.70				15
Percentage for contingency assumed same as for CES	Contingency	30%				30%	1.0	110.8	111

Total	**22,974**
Check: Should = 0	**0**

Total	14,548	Total	1,054	Total	876	Total	6,497.1
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	25	0	0	0	0	0	0	Safety Assessment	Labour		OPG	RJH	1	319	47	0	0	NO DATA TO FILL	3721.1
572	25	0	0	0	0	0	0	Safety Assessment	Materials and Equipment		OPG	RJH	1	319	47	0	0		0.0
572	25	0	0	0	0	0	0	Safety Assessment	Other		OPG	RJH	1	319	47	0	0		475.0
572	25	0	0	0	0	0	0	Safety Assessment	Contingency		OPG	RJH	1	319	47	0	0		1678.4

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0		Budget costs to Years by %
		Check total	Total Cost $k	
		0%		
Labour	3721	0.0	3721.1	
Materials and Equipment	0	0.0	0.0	
Other	475	0.0	475.0	
Contingency	1678.4	0.0	1678.4	
Total	5875	0.0	5875	

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency			TOTAL	
																							Cost $k	
572	25							**Safety Assessment**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
572	25	10						SAFETY ASSESMENT MANAGEMENT																
								RES = 10 yrs vs CES = 17 yrs. Share costs over 7 sites. Thus factor is 0.08. However due to inefficencies of multiple sites increase to 0.1	Labour	0.1	5218.2	0.1	521.82									522	
									Materials and Equipment	0.1				0	0.1	0							0	1
									Other	0.1							850	0.1	85				85	
									Contingency	40%										40%	1.0	242.7	243	
572	25	30						SA - SITING																
								Very limited siting program and thus no requirement for SA work	Labour	0	2287.5	0	0									0	2
									Materials and Equipment	0				0	0	0							0	
									Other	0							3,850	0	0				0	
									Contingency	40%										40%	1.0	0.0	0	
572	25	40						SA - OPERATING LICENSE																
									Labour	0.2	1540.5	0.2	308.1										308	3
									Materials and Equipment	0.2				0	0.2	0							0	
									Other	0.2							300	0.2	60				60	
									Contingency	40%										40%	1.0	147.2	147	
572	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between 5 sites with same technoilogy; thus reduce factor to 0.5	Labour	0.25	9604.8	0.25	2401.2									2,401	
									Materials and Equipment	1				0	1	0							0	

			Expenses at $1k/a x 270 yrs	Other	1							270	1	270					270
				Contingency	40%										40%	1.0	1,068.5		1,068
572	25	70	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 0.2	Labour	0.2	2449.9	0.2	489.98											490
				Materials and Equipment	0.2				0	0.2	0								0
				Other	0.2							300	0.2	60					60
				Contingency	40%										40%	1.0	220.0		220
																		Total	**5,875**
																		Check: Should = 0	**0**
						Total		3,721	Total		0	Total		475	Total		1,678.4		
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0		

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour		OPG	RJH	1	319	319	0	0	NO DATA TO FILL	8597.6
572	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment		OPG	RJH	1	319	319	0	0		0.0
572	30	0	0	0	0	0	0	0 Licensing & Approvals	Other		OPG	RJH	1	319	319	0	0		24047.5
572	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency		OPG	RJH	1	319	319	0	0		9823.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
			0%		
Labour	8598		0.0	8597.6	
Materials and Equipment	0		0.0	0.0	
Other	24048		0.0	24047.5	
Contingency	9823.6		0.0	9823.6	
Total	42469		0.0	42469	

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																	
572								In general the L&A costs are assumed to be lower than CES facility due to implementation on an existing dry storage site. In addition experience and costs can be shared between several reactor sites.																	
572	30							**Licensing & Approvals**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
572	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	
572	30	50						CNSC CONSTRUCTION LICENCE																
									Labour	0.25	2631	0.25	657.75										658	2
								Inefficiencies gained due to multiple sites	Materials and Equipment	0.25				0	0.25	0							0	
								Y5 to Y7	Other	0.25							6,264	0.25	1566				1,566	
									Contingency	0.3										30%	1.0	667.1	667	
572	30	60						OTHER GOVN'MT APPROVALS																
572	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	
								Y1 to Y4	Materials and Equipment	0.2				0	0.2	0							0	
									Other	0.2							0	0.2	0				0	

					Contingency	0.5														50%	1.0	33.7	34
572	30	60	30	FEDERAL APPROVALS																			
				Y1 to Y4	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	0.5														50%	1.0	16.6	17
572	30	60	40	PROVINCIAL APPROVALS																			
				Y1 to Y4	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	0.4														40%	1.0	13.3	13
572	30	60	50	MUNICIPAL APPROVALS																			
				Y1 to Y4	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	0.5														50%	1.0	16.6	17
572	30	65		CNSC OPERATING LICENCE (Initial Application)																			
				Y9 & Y10	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	0.3														30%	1.0	106.1	106
572	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																			
				CES duration is 330 years. Costs incurred in RES during period Y11 to Y319 or 309 years. 309/330 x 0.25/1 = 0.23	Labour	0.23	32754	0.23	7533.42															7,533
					Materials and Equipment	1				0	1	0											0
				Expenses at $72K/a x 309 yrs	Other	1							22,248	1	22248								22,248
					Contingency	0.3														30%	1.0	8,934.4	8,934

Total	**42,469**
Check: Should = 0	**0**

Total	8,598	Total	0	Total	24,048	Total	9,823.6
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	35	0	0	0	0	0	0	Public Affairs	Labour		OPG	RJH	1	10	10	0	0	NO DATA TO FILL	1367.5
572	35	0	0	0	0	0	0	Public Affairs	Materials and Equipment		OPG	RJH	1	10	10	0	0		0.0
572	35	0	0	0	0	0	0	Public Affairs	Other		OPG	RJH	1	10	10	0	0		820.0
572	35	0	0	0	0	0	0	Public Affairs	Contingency		OPG	RJH	1	10	10	0	0		1093.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
			0%		
Labour	1368		*0.0*	1367.5	
Materials and Equipment	0		*0.0*	0.0	
Other	820		*0.0*	820.0	
Contingency	1093.8		*0.0*	1093.8	
Total	3281		*0.0*	3281	

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

ACTIVITY DETAIL ESTIMATE

								A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL																				TOTAL	
								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			Cost $k	
1	2	3	4	5	6	7	8				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
572	35							**Public Affairs**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
572	35	45						PUBLIC AFFAIRS - APPROVED SITE																
									Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
572	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
572	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
572	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							170	0.1	17				17	
									Contingency	50%										50%	1.0	185.0	185	

572 35 120 Community Offsets & Benefits

Labour	0.25	0	0.25	0										0
Materials and Equipment	0.25				0	0.25	0							0
Other	0.25							2,072	0.25	518				518
Contingency	50%										50%	1.0	259.0	259
												Check: Should = 0		0
	Total			1,368	Total		0	Total		820	Total		1,093.8	
	Check: Should = 0			0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	6	53	48	0	0	NO DATA TO FILL	61118.3
572	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	1	347	347	0	0		96504.3
572	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	1	347	347	0	0		31619.8
572	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	1	347	347	0	0		47180.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	61118		*0.0*	61118.3	
Materials and Equipment	96504		*0.0*	96504.3	
Other	31620		*0.0*	31619.8	
Contingency	47180.8		*0.0*	47180.8	
Total	236423		*0.0*	236423	

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																	
572	40							**Facility Design & Construction**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
572	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 additional land acquisition costs neccesary	Other	0.0							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
572	40	20	20	10				RECEIPT & TRANSFER (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	120.3	1.0	120.3										120
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				2,406.6	1.0	2,406.6							2,407
								Operations as CES. Facility based on CES figures.	Other	1.0							126.3	1.0	126.3				126
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	796.0	796
572	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	1,464.4	1.0	1,464.4										1,464
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				9,762.4	1.0	9,762.4							9,762
								Operations as CES. Facility based on CES figures.	Other	1.0							561.3	1.0	561.3				561
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,536.4	3,536
572	40	20	20	40				COMMON CRANE MAINTENANCE AREA																
								Operations as CES. Facility based on CES figures.	Labour	1.0	338.7	1.0	338.7										339

				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0			2,258.3	1.0	2,258.3									2,258
				Operations as CES. Facility based on CES figures.	Other	1.0						129.9	1.0	129.9						130
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	818.1			818
572	40	20	30	PROCESSING BUILDING DESIGN & CONST'N																
				Operations as CES. Facility based on CES figures.	Labour	1.0	4,800.0	1.0	4,800.0											4,800
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0			4,599.1	1.0	4,599.1									4,599
				Operations as CES. Facility based on CES figures.	Other	1.0						960.0	1.0	960.0						960
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	3,107.7			3,108
572	40	20	60	PB BUILDING SERVICES DESIGN AND																
				Operations as CES. Facility based on CES figures.	Labour	1.0	6,630.7	1.0	6,630.7											6,631
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0			5,506.5	1.0	5,506.5									5,507
				Operations as CES. Facility based on CES figures.	Other	1.0						1,933.0	1.0	1,933.0						1,933
				Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	3,517.6			3,518
572	40	20	70	COMMISSIONING (PB)																
				Operations as CES. Facility based on CES figures.	Labour	1.0	835.2	1.0	835.2											835
				Operations as CES. Facility based on CES figures.	Materials and Equipment	0.0			0.0	0.0	0.0									0
				Operations as CES. Facility based on CES figures.	Other	1.0						167.0	1.0	167.0						167
				Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	501.1			501
572	40	20	80	CONST'N INDIRECTS (PB)																
				Processing Buildings similar to CES. Facility based on CES figures.	Labour	1.0	9,365.4	1.0	9,365.4											9,365
				Processing Buildings similar to CES. Facility based on CES figures.	Materials and Equipment	0.0			0.0	0.0	0.0									0
				Processing Buildings similar to CES. Facility based on CES figures.	Other	1.0						388.0	1.0	388.0						388
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	2,926.0			2,926
572	40	30		COMMON ANCILLARY FACILITIES																
572	40	30	10	ADMIN AND SUPPORT FACILITIES																
572	40	30	10	1	ADMIN AND VISITOR RECEPTION BLDG															
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0								comment 7			0
					Materials and Equipment	0.00			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
572	40	30	10	2	OPS SUPPT & HEALTH PHYSICS BLDG															
				housed in process bldg	Labour	0.00	1,294.8	0.0	0.0								comment 7			0
					Materials and Equipment	0.00			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
572	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																			
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0											comment 7			0
						Materials and Equipment	0.00				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
572	40	30	10	4	NEW' MODULE CANISTER STORE																			
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0											comment 7			0
						Materials and Equipment	0.00				1,892.0	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
572	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
572	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
572	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
572	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
572	40	30	10	9	WAREHOUSE BLDG																			
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0											comment 7			0
						Materials and Equipment	0.00				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
572	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																			

					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0											comment 7		0
						Materials and Equipment	0.00				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%	1.25	0.0	0
572	40	30	10	11	TRUCK INSP'N / WASH STATION																				
					not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0											comment 7		0
						Materials and Equipment	0.00				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
572	40	30	10	12	UTILITY BLDG																				
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0											comment 7		0
						Materials and Equipment	0.00				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
572	40	30	10	13	TEST FACILITY CONSTRUCTION																				
					Taken as being independent of fuel inventory stored. Same size bldg as CES, facility will be constructed at Bruce but will be shared by OPG sites, therefore Bruce cost is 1/3 of CES total.	Labour	0.3	766.8	0.3	255.6													256
						Materials and Equipment	0.3				1,675.0	0.3	558.3												558
					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	20.0%										20%	1.0	162.8	163
572	40	30	20		OTHER SITE SYSTEMS																				
572	40	30	20	1	FIRE PROTECTION SYSTEMS																				
					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
572	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																				
					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
572	40	30	20	3	ELECTRICAL AND EMERGENCY POWER																				
					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

572	40	30	20	4	SANITARY SEWER SYSTEM																	
					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
572	40	30	20	5	POTABLE WATER SYSTEM																	
					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
572	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
572	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
572	40	30	20	8	CONST'N 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
572	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
572	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
572	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
572	40	40		STORAGE CONSTRUCTION (Stage 1)																	
572	40	40	10	5 CONSTRUCTIION FACILITIES																	
				Construction of RES SMV facility,stage 1 capacity 320 tubes CES capacity 800 tubes. Using 6/10 rule for estimating	Labour	0.58	469.5	0.58	270.9												271
					Materials and Equipment	0.58				312.0	0.58	180.0									180
					Other	0.58							112.0	0.58	64.6						65
				Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	154.7	155
572	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 figure used in CES	Contingency	30%												30%	1.0	2,052.5	2,053
572	40	40	10	20 STORES EQUIPMENT DESIGN, SUPPLY AND INSTALL'N																	
				factor for equipment taken as same as CES	Labour	1.00	5,476.2	1.00	5,476.2												5,476
				factor for equipment taken as same as CES	Materials and Equipment	1.00				12,131.7	1.00	12,131.7									12,132
				factor for equipment taken as same as CES	Other	1.00							0.0	1.00	0.0						0
				Percentage for contingency averaged from figures used in CES	Contingency	13%												13%	1.0	2,201.0	2,201
572	40	40	10	30 SURFACE MODULAR VAULT DESIGN AND CONSTRUCTION																	
				Factor for services taken as same as for construction	Labour	0.58	2,940.3	0.58	1,696.8												1,697
				Factor for services taken as same as for construction	Materials and Equipment	0.58				89,285.0	0.58	51,524.6									51,525
				Factor for services taken as same as for construction	Other	0.58							47,112.2	0.58	27,187.5						27,188
				Percentage for contingency averaged from figures used in CES	Contingency	20%												20%	1.0	16,081.8	16,082
572	40	40	10	40 COMMISSIONING																	
				Same allowance applied as CES	Labour	1.00	164.7	1.00	164.7												165
				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
				Percentage for contingency averaged from figure used in CES	Contingency	40%												40%	1.0	65.9	66
572	40	40	10	50 CONST'N INDIRECTS																	
				Same allowance applied as CES	Labour	1.00	17,624.6	1.0	17,624.6												17,625
				Same allowance applied as CES	Materials and Equipment	1.00				110.0	1.0	110.0									110
				Same allowance applied as CES	Other	1.00							0.0	1.0	0.0						0
				Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	5,320.4	5,320
572	40	500		COMMISSIONING MANAGEMENT																	
				Same allowance applied as CES	Labour	1.0	144.5	1.0	144.5												145

			Same allowance applied as CES	Materials and Equipment	0.0				0.0	0.0	0.0								0
			Same allowance applied as CES	Other	1.00							28.9	1.0	28.9					29
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	86.7		87
572	40	600	EQUIPMENT, SPARES and CONSUMABLES.																
			No entry into cost category	Labour	0.0	0.0	0.0	0.0											0
			No entry into cost category	Materials and Equipment	1.0				214.1	1.0	214.1								214
			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	64.2		64
572	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
			allowance for consumption for construction of ancillary buildings	Other	0.20							366.3	0.2	73.3					73
			Contingency included in cost (built into power consumption calculation)	Contingency	0%										0%	1.0	0.0		0

Total	**236,423**
Check: Should = 0	**0**

Total	61,118	Total	96,504	Total	31,620	Total	47,180.8
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
2
3
4

REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	45							Facility Operation	Labour		CTECH	AM	11	322	312			NO DATA TO FILL	1039765.5
572	45							Facility Operation	Materials and Equipment		CTECH	AM	11	322	312				1292373.4
572	45							Facility Operation	Other		CTECH	AM	11	322	312				1622748.7
572	45							Facility Operation	Contingency		CTECH	AM	11	322	312				950425.3

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	1039765	*0.0*	1039765.5
Materials and Equipment	1292373		1292373.4
Other	1622749		1622748.7
Contingency	950425		950425.3
Total	4905313		4905313

INSTRUCTIONS

											A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
572	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
572	45	10						OPERATIONS - INITIAL FUEL RECEIPT																
572	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
								slightly longer duration to CES. Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.5	118,334.0	0.5	59,955.9										59,956	
								No entry in CES alternative cost category	Materials and Equipment															
								Annual cost = $3358/a x 38 yrs	Other	1.00							127,604	1.0	127,604				127,604	3
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	37,512.0	37,512	
572	45	10	10					PROCESS BUILDING OPERATIONS																
								Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.37	78,324.0	0.37	28,861.2										28,861	
								Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.37				255,840.0	0.37	94,273.2							94,273	
								No provision in CES	Other								131,349.0							
								Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	61,567.2	61,567	
572	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPT)																
								Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.37	32,676.3	0.37	12,040.7										12,041	
								No entry in CES alternative cost category	Materials and Equipment															
								No entry in CES alternative cost category	Other								131,349.0							
								Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	3,010.2	3,010	

572	45	10	25		MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPT)																	
					Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.37	3,900.0	0.37	1,437.1											1,437
					Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.37				53.0	0.37	19.5										20
					No entry in CES alternative cost category	Other																	
					Percentage for contingency assumed same as for CES	Contingency	50%												50%	1.0	728.3		728
572	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 38 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.63	115,547.0	0.63	73,179.8											73,180
						Materials and Equipment	0.63				1,284.0	0.63	813.2										813
						Other	0.63								16,380.0	0.63	10,374.0						10,374
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	25,310.1		25,310
572	45	10	40		STORAGE OPERATIONS																	
					Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.37	30,696.0	0.37	11,311.0											11,311
					Fuel inventory 1280 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.37				200.0	0.4	73.7										74
					No entry in CES alternative cost category	Other																	
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	3,415.4		3,415
572	45	10	50		ADDITIONAL STORAGE CONSTRUCTION																	
572	45	10	50	10	STORAGE CONSTRUCTION STAGE 2																	
					factor for storage const'n stage 2 taken pro rata from stage 1	Labour	0.58	14,792.5	0.58	8,536.5											8,536
					factor for storage const'n stage 2 taken pro rata from stage 1	Materials and Equipment	0.58				91,538.7	0.58	52,825.1										52,825
					factor for storage const'n stage 2 taken pro rata from stage 1	Other	0.58								46,846.7	0.58	27,034.3						27,034
					Percentage for contingency averaged from CES	Contingency	30%												30%	1.0	26,518.8		26,519
572	45	10	50	20	STORAGE CONSTRUCTION STAGE 3																	
					factor for storage const'n stage 3 taken as same as stage 1	Labour	0.58	14,792.5	0.58	8,536.5											8,536
					factor for storage const'n stage 3 taken as same as stage 1	Materials and Equipment	0.58				91,538.7	0.58	52,825.1										52,825
					factor for storage const'n stage 3 taken as same as stage 1	Other	0.58								46,846.7	0.58	27,034.3						27,034
					Percentage for contingency averaged from CES	Contingency	30%												30%	1.0	26,518.8		26,519
572	45	10	50	30	STORAGE CONSTRUCTION STAGE 4																	
					factor for storage const'n stage 4 taken as same as stage 1	Labour	0.58	14,792.5	0.58	8,536.5											8,536
					factor for storage const'n stage 4 taken as same as stage 1	Materials and Equipment	0.58				14,819.0	0.58	8,551.7										8,552
					factor for storage const'n stage 4 taken as same as stage 1	Other	0.58								46,846.7	0.58	27,034.3						27,034
					Percentage for contingency averaged from CES	Contingency	30%												30%	1.0	13,236.7		13,237
572	45	20			OPERATIONS - EXTENDED MONITORING																	
572	45	20	5		PROGRAM MANAGEMENT																	

				Entries in CES DET applicable to RES but duration 270 years RES & 300 years CES therefore 270/300 of labour costs. Pickering assumed to have 2.6 staff vs 9 in CES. Thus factor is 26%.	Labour	0.26	312,652.0	0.26	81,289.5													81,290	
				No entry in CES alternative cost category	Materials and Equipment																				
				Annual cost = $2,616/a x 270 yrs	Other	1.00						706,320.0		1.0	706,320.0							706,320	1
				Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	157,521.9				157,522	
572	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING																					
				Reduced duration to CES (270/300). One staff for RES vs 5 in CES. Combined factor = (270/300) x (1/5) = 0.18	Labour	0.18	53,849.0	0.18	9,692.8													9,693	
				Annual costs = $1K/a x 270 yrs	Materials and Equipment	1.00					270.0											270	
				No entry in CES alternative cost category	Other																				
				Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	4,981.4				4,981	
572	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)																					
					Labour	0.34	907,516.0	0.34	308,555.4													308,555	
				Entries in CES DET applicable to RES but duration 270 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 270/300 x 13/34 = 0.34. Annual M&E costs are $150K/a x 270 yrs = $40500K	Materials and Equipment	1.00					40,500.0											40,500	
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 270 years = $89100K	Other								89,100.0									89,100	
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	131,446.6				131,447	
572	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																					
					Labour	0.54	148,529.0	0.54	87,334.9													87,335	
				RES has duration 270 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 270/300 x 3/5 = 0.54																				
				No entry in CES alternative cost category	Materials and Equipment																				
				No entry in CES alternative cost category	Other																				
				Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	21,833.7				21,834	
572	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																					
				RES duration is 270 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES factor is 0.2 Annual M&E costs is $3.3K/a x 270 yrs = $891K. Other costs is $0.7K/a x 270 yrs = $189K.	Labour	0.20	24,724.0	0.20	4,944.8													4,945	
					Materials and Equipment	1.0					891.0											891	
					Other	1.0							189.0									189	
				Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	3,012.4				3,012	
572	45	30		OPERATIONS - FACILITY REPEATS																					
572	45	30	20	STORAGE VAULT 100 YEAR REPLACEMENT																					
				labour for demolition of previous vaults = and construction of new = factor 1280/4400 tube qty) labour for fuel transfer = 9/30 (years for transfer) therefore common factor =0 .3	Labour	0.29	154,896.8	0.3	45,060.9													45,061	
				const'n materials = building to house 1280 tubes RES, 4400 tubes CES factor =0.3	Materials and Equipment	0.48					563,645.8	0.5	268,695.7									268,696	

	waste disposal =vaults for 1280 tubes RES, 4400 tubes CES factor =0.3	Other	0.29							447,765.3	0.3	130,259.0				130,259	
	Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	88,803.1	88,803	
572 45 30 30	STORAGE VAULTS 200 YEAR REPLACEMENT																
	assumed same as 100 yr replacement	Labour	0.29	154,896.8	0.3	45,060.9										45,061	
	assumed same as 100 yr replacement	Materials and Equipment	0.48				563,645.8	0.5	268,695.7							268,696	
	assumed same as 100 yr replacement	Other	0.3							447,765.3	0.3	134,329.6				134,330	
	Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	89,617.2	89,617	
572 45 30 40	STORAGE VAULTS 300 YEAR REPLACEMENT																
	assumed same as 100 yr replacement	Labour	0.29	154,896.8	0.3	45,060.9										45,061	
	assumed same as 100 yr replacement	Materials and Equipment	0.48				563,645.8	0.5	268,695.7							268,696	
	assumed same as 100 yr replacement	Other	0.29							447,765.3	0.3	130,259.0				130,259	
	Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	88,803.1	88,803	
572 45 40	OPERATIONS - REPACKAGING																
572 45 40 5	PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																
	duration 36 years RES & 114 years CES therefore36/114 = 0.316 Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.13	360,064.0	0.1	45,481.8										45,482	
	No entry in CES alternative cost category	Materials and Equipment															
	Annual cost = $k4693/a x36 yrs	Other	1.00							168,948	1.0	168,948				168,948	2
	Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	42,886.0	42,886	
572 45 40 10	MODULE TO MODULE 300 YEAR REPACKAGING																
572 45 40 10 10	DECOMMISSIONING OF EXISTING FACILITIES																
	assume decommissioning of existing module to canister process building same costs as CES process building	Labour	1.0	2,357.4	1.0	2,357.4										2,357	
	No entry in CES alternative cost category	Materials and Equipment															
		Other	1.0							3,462.3	1.0	3,462.3				3,462	
	Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,745.9	1,746	
572 45 40 10 20	CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																
	RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.0	476.1										476	
	RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6							355	
	RPM Repackaging plant same as CES facility therefore factor = 1	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	
572 45 40 10 30	PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																
572 45 40 10 30 20	RPM EQUIP. DESIGN, SUPPLY & INSTALL																
572 45 40 10 30 20 10	RECEIPT & TRANSFER (EQUIP)																
	RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	106.6	1.0	106.6										107	

							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0			2,132.0	1.0	2,132.0						2,132
							RPM Repackaging plant same as CES facility therefore factor = 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
572	45	40	10	30	20	20	CANISTER TO CANISTER FUEL TRANSFER (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	3,721.1	1.0	3,721.1								3,721
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			18,605.6	1.0	18,605.6						18,606
							Equipment same as CES facility therefore factor = 1	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
572	45	40	10	30	20	30	CANISTER DECONTAMINATION (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	961.0	1.0	961.0								961
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			4,805.0	1.0	4,805.0						4,805
							Equipment same as CES facility therefore factor = 1	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
572	45	40	10	30	20	40	MODULE DECONTAMINATION (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	761.0	1.0	761.0								761
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			3,805.0	1.0	3,805.0						3,805
							Equipment same as CES facility therefore factor = 1	Other	1.0						228.5	1.0	228.5			229
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,438.4	1,438
572	45	40	10	30	20	50	CANISTER DISMANTLING/BREAKDOWN (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	1,066.6	1.0	1,066.6								1,067
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			5,332.8	1.0	5,332.8						5,333
							Equipment same as CES facility therefore factor = 1	Other	1.0						320.0	1.0	320.0			320
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	2,015.8	2,016
572	45	40	10	30	20	60	CASK OPENING AND CASK DECONTAM AREA (EQUIP. LABOUR and DISPOSAL)														
							Cask decontam equip info from CES CVSB (561-45-40-10-30-20-30), + labour and disposal from CES CVSB (561-45-40-10-600, (with replacement casks removed).	Labour	1.0	18,348.3	1.0	18,348.3						18,348
							Cask decontam info from CES CVSB	Materials and Equipment	1.0			13,716.4	1.0	13,716.4						13,716
							Cask decontam and disposal info from CES CVSB	Other	1.0						15,383.0	1.0	15,383.0			15,383
							Cask decontam info from CES CVSB	Contingency	30%									30%	1.0	14,234.3	14,234
572	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N														
							RPM Repackaging plant same as CES facility bu has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Labour	1.22	8,000.0	1.2	9,760.0						9,760

						RPM Repackaging plant same as CES facility bu has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Materials and Equipment	1.22			7,768.3	1.2	9,477.3								9,477
						RPM Repackaging plant same as CES facility bu has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Other	1.22						1,600.0	1.2	1,952.0					1,952
						Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	6,356.8	6,357
572	45	40	10	30	60	BUILDING SERVICES (RPM)															
						RPM Repackaging plant same as CES facility bu includes cask area therefore factor = 1.22	Labour	1.22	9,120.0	1.2	11,126.4									11,126
						RPM Repackaging plant same as CES facility bu includes cask area therefore factor = 1.22	Materials and Equipment	1.22			7,199.9	1.2	8,783.9								8,784
						RPM Repackaging plant same as CES facility bu includes cask area therefore factor = 1.22	Other	1.22						2,527.2	1.2	3,083.2					3,083
						Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	5,748.4	5,748
572	45	40	10	30	70	COMMISSIONING (RPM)															
						RPM Repackaging plant same as CES facility bu includes cask area therefore factor = 1.22	Labour	1.22	1,169.3	1.2	1,426.5									1,427
						No entry in CES alternative cost category	Materials and Equipment														
						RPM Repackaging plant same as CES facility bu includes cask area therefore factor = 1.22	Other	1.22						218.3	1.2	266.3					266
						Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	846.4	846
572	45	40	10	30	80	CONST'N INDIRECTS (RPM)															
						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	12,695.0	1.2	15,487.9									15,488
						No entry in CES alternative cost category	Materials and Equipment														
						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22						481.1	1.2	586.9					587
						Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	4,822.5	4,822
572	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)			comment 7												
						Reduced facilities support stand-alone RES facility from CES, every 100 years but 'full' facilities required at 300 year event, therefore factor = (8/13+8/13 +1)	Labour	2.2	21,056.2	2.2	46,971.5									46,972
							Materials and Equipment	2.2			29,785.1	2.2	66,443.7								66,444
						No entry in CES alternative cost category	Other														
						Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	28,353.8	28,354
572	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)															
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	219.0	1.0	219.0									219
						No entry in CES alternative cost category	Materials and Equipment														
						No entry in CES alternative cost category	Other														
						Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	109.5	110
572	45	40	10	600		REPACKAGING OPERATIONS (RPM)															
						repackaging of 2421 RES module canisters compared to 8528 CES = 2421/8528	Labour	0.28	118,823.0	0.28	33,732.5									33,732

						procurement of 2421 RES module canisters compared to 8528 CES factor = 2421/8528	Materials and Equipment	0.28				358,176.0	0.28	101,682.0								101,682
						Disposal of 2421 RES module canisters compared to 8528 CES factor = 2421/8528	Other	0.28							43,594.8	0.28	12,376.1					12,376
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	44,337.2		44,337
572	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	11,882.0	0.3	3,564.6											3,565
						No entry in CES alternative cost category	Materials and Equipment															
						No entry in CES alternative cost category	Other															
						Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	891.2		891
572	45	40	10	700		OPERATION INDIRECTS (RPM)																
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	13,976.2	0.3	4,192.9											4,193
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				351.6	0.3	105.5								105
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0					4,860
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,747.5		2,748
572	45	40	10	800		STORAGE OPERATIONS (RPM)																
						transfer of 2560 canisters RES compared to 8800 canisters CES	Labour	0.29	2,093.9	0.29	609.1											609
						No entry in CES alternative cost category	Materials and Equipment															

No entry in CES alternative cost category	Other								
Percentage for contingency assumed same as for CES	Contingency	30%				30%	1.0	182.7	183

								Total	**4,905,313**
								Check: Should = 0	
	Total	1,039,765	Total	1,292,373	Total	1,622,749	Total	950,425.3	
	Check: Should = 0		Check: Should = 0		Check: Should = 0		Check: Should = 0		

BASIS OF ESTIMATE NOTES - Insert references and notes

1	2,616k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (387,144k$) at rate 2.87%)
2	4693k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (387,144k$) at rate 2.87%). this tax runs for 3X12 years = 36 years. A portion of this tax over 36 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)
3	3,358k$/a made up of expenses from table 18 (605$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (383,680k$) at rate 2.87% = 5505, this is then halved as the storage buildings are built on a rolling program)
4	

REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour		OPG	RJH	4	319	316	0	0	NO DATA TO FILL	105203.0
572	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	4	319	316	0	0		9012.0
572	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other		OPG	RJH	4	319	316	0	0		3138.0
572	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency		OPG	RJH	4	319	316	0	0		35205.9

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
			0%		
Labour	105203		*0.0*	105203.0	
Materials and Equipment	9012		*0.0*	9012.0	
Other	3138		*0.0*	3138.0	
Contingency	35205.9		*0.0*	35205.9	
Total	152559		*0.0*	152559	

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																	
572	55							**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
572	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y4 to Y319 (when repackaging ends) or 316 yrs vs 347 in CES. RES has 0.5 staff vs 2 in CES. Factor is	Labour	0.23	70306	0.23	16170.38											16,170
									Materials and Equipment	1				0	1	0								0
								Expenses at $3k/a x 316 yrs	Other	1							948	1	948					948
									Contingency	0.3										17118.38	0.3	5135.514		5,136
572	55	20						CNSC 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	0.3	7471	0.3	2241.3											2,241
									Materials and Equipment	0.3				0	0.3	0								0
									Other	0.3							2,150	0.3	645					645
									Contingency	0.3										2886.3	0.3	865.89		866

572	55	40	GROUNDWATER MONITORING														
			Costs span the period Y11 to Y319 or 309 yrs vs 330 in CES. RES staff = 0.2 vs 0.6 in CES. Factor is 309/330 x 0.2/0.6 = 0.29	Labour	0.312	37158	0.312	11593.296								11,593
			M&E @ $6K/a x 309 yrs	Materials and Equipment	1			1854	1	1854						1,854
			Expenses @ $4K/a x 309 yrs	Other	1						1,236	1	1236			1,236
				Contingency	0.3									14683.296	0.3	4404.9888	4,405
572	55	50	RADIOLOGICAL BIOSPHERE MONITORING														
			Costs span the period Y11 to Y319 or 309 yrs vs 330 in CES. Factor is 309/330 x 1/3.3 = 0.28	Labour	0.284	217280	0.284	61707.52								61,708
			M&E costs at $18K/a x 309 yrs	Materials and Equipment	1			5562	1	5562						5,562
				Other	1						0	1	0			0
				Contingency	0.3									67269.52	0.3	20180.856	20,181
572	55	60	NON-RAD BIOSPHERE MONITORING														
			Costs span the period Y11 to Y319 or 309 yrs vs 330 in CES. Factor is 309/330 x 0.2/0.8 = 0.23	Labour	0.234	53590	0.234	12540.06								12,540
			M&E costs at $6K/a x 266 yrs	Materials and Equipment	1			1596	1	1596						1,596
				Other	1						0	1	0			0
				Contingency	0.3									14136.06	0.3	4240.818	4,241
572	55	80	HUMAN HEALTH MONITORING														
			Costs span the period Y11 to Y319 or 309 yrs vs 330 yrs in CES. Factor is 309/330 x 0.03/0.17 = 0.17	Labour	0.165	5760	0.165	950.4								950
				Materials and Equipment	1			0	1	0						0
			Expenses at 1K/a x 309 yrs	Other	1						309	1	309			309
				Contingency	0.3									1259.4	0.3	377.82	378
						Total		105,203	Total		9,012	Total		3,138	Total		35,205.9
						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

REACTOR EXTENDED STORE

ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)

PICKERING

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
572	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	10	10	0	0	NO DATA TO FILL	2276.7
572	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	10	10	0	0		0.0
572	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	10	10	0	0		1452.0
572	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	10	10	0	0		745.7

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	2277
Materials and Equipment	0
Other	1452
Contingency	745.7
Total	4474

Check: Total minus budget Should = 0		Budget costs to Years by %
Check total	**Total Cost $k**	
0%		
0.0	2276.7	
0.0	0.0	
0.0	1452.0	
0.0	745.7	
0.0	4474	

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																	
572	90							**Program Management**																
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Pickering			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**	
572								based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 10year duration	Labour	0.24	9486.204	0.24	2276.68896										2,277	
								no entry	Materials and Equipment	0				0	0	0							0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							6050	0.24	1452				1,452	
								Contingency as CES value	Contingency	20%										20%	1.0	745.7	746	
																							Total	**4,474**
																							Check: Should = 0	**0**
											Total		2,277	Total		0	Total		1,452	Total		745.7		
											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

RES ALTERNATIVE
WBS No 572
SURFACE MODULAR VAULTS (SMV)
PICKERING

Cost Category	Total K$
Labour	1,237,588
Materials and Equipment	1,398,943
Other	1,684,735
Contingency	1,052,925
Total Cost	**5,374,192**

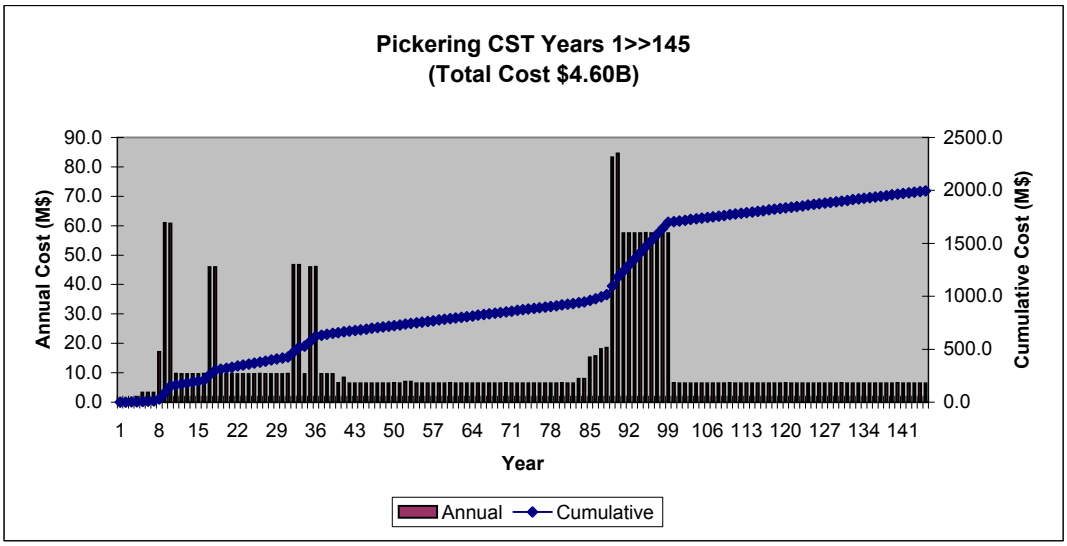
5,374,191.65

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$
572	15	0	0	0	0	0	0	RJH	Labour	0	1	7	7	0	452
572	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	7	7	0	0
572	15	0	0	0	0	0	0	RJH	Other	0	1	7	7	0	97
572	15	0	0	0	0	0	0	RJH	Contingency	0	1	7	7	0	275
572	20	0	0	0	0	0	0	AM	Labour	0	1	7	7	0	15,087
572	20	0	0	0	0	0	0	AM	Materials and Equipment	0	1	7	7	0	1,054
572	20	0	0	0	0	0	0	AM	Other	0	1	7	7	0	337
572	20	0	0	0	0	0	0	AM	Contingency	0	1	7	7	0	6,497
572	25	0	0	0	0	0	0	RJH	Labour	0	1	319	47	0	3,721
572	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	319	47	0	0
572	25	0	0	0	0	0	0	RJH	Other	0	1	319	47	0	475
572	25	0	0	0	0	0	0	RJH	Contingency	0	1	319	47	0	1,678
572	30	0	0	0	0	0	0	RJH	Labour	0	1	319	319	0	8,598
572	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	319	319	0	0
572	30	0	0	0	0	0	0	RJH	Other	0	1	319	319	0	24,048
572	30	0	0	0	0	0	0	RJH	Contingency	0	1	319	319	0	9,824
572	35	0	0	0	0	0	0	RJH	Labour	0	1	10	10	0	1,368
572	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	10	10	0	0
572	35	0	0	0	0	0	0	RJH	Other	0	1	10	10	0	820
572	35	0	0	0	0	0	0	RJH	Contingency	0	1	10	10	0	1,094
572	40	0	0	0	0	0	0	AM	Labour	0	6	53	48	0	61,118
572	40	0	0	0	0	0	0	AM	Materials and Equipment	0	1	347	347	0	96,504
572	40	0	0	0	0	0	0	AM	Other	0	1	347	347	0	31,620
572	40	0	0	0	0	0	0	AM	Contingency	0	1	347	347	0	47,181
572	45	0	0	0	0	0	0	AM	Labour	0	11	322	312	0	1,039,765.46
572	45	0	0	0	0	0	0	AM	Materials and Equipment	0	11	322	312	0	1,292,373
572	45	0	0	0	0	0	0	AM	Other	0	11	322	312	0	1,622,749
572	45	0	0	0	0	0	0	AM	Contingency	0	11	322	312	0	950,425
572	55	0	0	0	0	0	0	RJH	Labour	0	4	319	316	0	105,203
572	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	4	319	316	0	9,012
572	55	0	0	0	0	0	0	RJH	Other	0	4	319	316	0	3,138
572	55	0	0	0	0	0	0	RJH	Contingency	0	4	319	316	0	35,206
572	90	0	0	0	0	0	0	AM	Labour	0	1	10	10	0	2,277
572	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	10	10	0	0
572	90	0	0	0	0	0	0	AM	Other	0	1	10	10	0	1,452
572	90	0	0	0	0	0	0	AM	Contingency	0	1	10	10	0	746

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 573
PICKERING
CASKS IN SHALLOW TRENCH **(CST)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	1,003
20	System Development	10,675
25	Safety Assessment	6,671
30	Licensing & Approvals	38,597
35	Public Affairs	3,281
40	Facility Design & Construction	137,872
45	Facility Operation	4,250,505
55	Environmental Assessment and Monitoring	142,803
90	Program Management	4,474
	Total Cost ($k)	**4,595,882**

Pickering CST Alternative	**4,595,882**
Siting Phase	**28,130**
Siting	1,003
EA	3,752
System Development	10,675
SA	1,365
L&A	3,580
Public Affairs	3,281
Program Mgmt	4,474
Construction Phase	**137,872**
New Storage Chamber Construction	134,371
Transition to Standalone	3,500
Operations Phase	**4,429,880**
Repeat & Repackaging	*2,727,389*
Initial Fuel Transfer	479,514
Storage Chamber Replacement - 200 yrs	61,183
Repackaging - 100 yrs	602,993
Repackaging - 200 yrs	601,621
Repackaging M to M - 300 yrs	671,275
PM for Repeats & Repackaging	310,802
Extended Monitoring	*1,702,491*
Program Mgmt	845,314
Monitoring Surveliance	38,724
Operation Indirects	537,636
Common Ancillary Services Ops	96,544
Fuel Integrity Monitoring	4,899
SA - Ops & Decommissioning	5,306
L&A - Ops Licence Renewal	35,017
Environmental Monitoring	139,051


Pickering CST Years 1>>145
(Total Cost $4.60B)
Annual Cost (M$)
Cumulative Cost (M$)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	7	7	0	0	NO DATA TO FILL	555.9
573	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	7	7	0	0		0.0
573	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	7	7	0	0		113.0
573	15	0	0	0	0	0	0	Siting	Contingency		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
		0%	
Labour	556	0.0	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

ACTIVITY DETAIL ESTIMATE

										A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
573	15							**Siting**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	Cost $k	
573	15	10						SITING MANAGEMENT																
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites or a factor of 0.08. Overall scope of siting program much smaller relative to CES	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	
573	15	70						PREFERRED SITE																
573	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 15% 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%										50%	1.0	53.1	53	
573	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 15% 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										50%	1.0	126.4	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

BASIS OF ESTIMATE NOTES - Insert references and notes

1	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc. Where are particular part of the RES cost estimate has to be developed, because it doesn't have a directly comparable CES stock, then develop estimate below the notes line, then paste into the appropriate entries in format developed above.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	83	89	7	0	0	NO DATA TO FILL	7114.4
573	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	83	89	7	0	0		451.5
573	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	83	89	7	0	0		182.2
573	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	83	89	7	0	0		2926.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	7079		*0.0*	7114.4	
Materials and Equipment	452		*0.0*	451.5	
Other	217		*0.0*	182.2	
Contingency	2926.6		*0.0*	2926.6	
Total	10675		*0.0*	10675	

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																	
573	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								OPG has 3 sites Pickering, Bruce and Darlington. CST (Casks in Shallow Trenches) is a storage alternative applicable to each site. The system development for the CST alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CST workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.																
573	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Labour	0.18	6690.40	0.18	1170.82											1,171
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Other	0.18							300.00	0.18	52.50					53
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	367.0		367
573	20	5						SYSTEM OPTIMIZATION																

			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18	3303.70	0.18	578.15											578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Other	0.18							120.00	0.18	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.00	179.74		180
573	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Labour	0.11	28327.20	0.11	2974.36											2,974
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.11				4300.00	0.11	451.50								452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Other	0.11							895.00	0.11	93.98					94
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.00	1759.92		1,760
573	20	30	STORAGE SYSTEM ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18	11436.70	0.18	2001.42											2,001
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18							200.00	0.18	35.00					35
			Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.00	509.11		509
573	20	40	SECURITY & SAFEGUARD ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69											355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25				60.00	0.25	14.70					15
Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	110.8		111
												Total	**10,675**
												Check: Should = 0	**0**
			Total	7,079	Total	452	Total	217	Total		2,926.6		
			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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	25	0	0	0	0	0	0	Safety Assessment	Labour		OPG	RJH	1	299	51	0	0	NO DATA TO FILL	4211.1
573	25	0	0	0	0	0	0	Safety Assessment	Materials and Equipment		OPG	RJH	1	299	51	0	0		0.0
573	25	0	0	0	0	0	0	Safety Assessment	Other		OPG	RJH	1	299	51	0	0		554.0
573	25	0	0	0	0	0	0	Safety Assessment	Contingency		OPG	RJH	1	299	51	0	0		1906.0

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
Labour	4211			*0.0*	4211.1
Materials and Equipment	0			*0.0*	0.0
Other	554			*0.0*	554.0
Contingency	1906.0			*0.0*	1906.0
Total	6671			*0.0*	6671

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency			TOTAL Cost $k	
573	25							**Safety Assessment**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
573	25	10						SAFETY ASSESSMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	Labour	0.1	5218.2	0.1	521.82									522	
									Materials and Equipment	0.1				0	0.1	0							0	1
									Other	0.1							850	0.1	85				85	
									Contingency	40%										40%	1.0	242.7	243	
573	25	30						SA - SITING																
								Very limited siting activities leads no SA costs	Labour	0	2287.5	0	0										0	2
									Materials and Equipment	0				0	0	0							0	
									Other	0							3,850	0	0				0	
									Contingency	40%										40%	1.0	0.0	0	
573	25	40						SA - OPERATING LICENSE																
									Labour	0.2	1540.5	0.2	308.1										308	3
									Materials and Equipment	0.2				0	0.2	0							0	
									Other	0.2							300	0.2	60				60	
									Contingency	40%										40%	1.0	147.2	147	
573	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between 5 sites with same technoilogy; thus reduce factor to 0.5	Labour	0.25	9604.8	0.25	2401.2									2,401	
									Materials and Equipment	1				0	1	0							0	
								Expenses at $1K/a x 289	Other	1							289	1	289				289	

				Contingency	40%								40%	1.0	1,076.1	1,076
573	25	70	SA - DECOMMISSIONING (Processing Facilities)														
			RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technoilogy; thus factor to 0.4	Labour	0.4	2449.9	0.4	979.96								980
				Materials and Equipment	0.4				0	0.4	0					0
				Other	0.4							300	0.4	120		120
				Contingency	40%								40%	1.0	440.0	440
						Total		4,211	Total		0	Total		554	Total	1,906.0	
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0	0	6671
															Total		**6,671**
															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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	30	0	0	0	0	0	0	Licensing & Approvals	Labour		OPG	RJH	6	299	294	0	0	NO DATA TO FILL	8270.0
573	30	0	0	0	0	0	0	Licensing & Approvals	Materials and Equipment		OPG	RJH	6	299	294	0	0		0.0
573	30	0	0	0	0	0	0	Licensing & Approvals	Other		OPG	RJH	6	299	294	0	0		22607.5
573	30	0	0	0	0	0	0	Licensing & Approvals	Contingency		OPG	RJH	6	299	294	0	0		7719.4

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	8270			0.0	8270.0
Materials and Equipment	0			0.0	0.0
Other	22608			0.0	22607.5
Contingency	7719.4			0.0	7719.4
Total	38597			0.0	38597

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																	
								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																
573	30							**Licensing & Approvals**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
573	30	30						LIAISON WITH CNSC																
								Duration 4 yrs (Y1 to Y4) 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	
573	30	50						CNSC CONSTRUCTION LICENCE																
								Can share knowledge between sites Efficiencies gained through sharing of knowledge bewteen sites. Licensing process shorter than CES at 7yrs with RES being 3 years. CES involves comprehensive with Panel and RES would likely be a comprehensive with no Panel.	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	
573	30	60						OTHER GOVN'MT APPROVALS																
573	30	60	10					APPROVAL REQUIREMENTS																

				Duration 4 yrs (Y1 to Y4) 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
573	30	60	30	FEDERAL APPROVALS															
				Y5 to Y10 or 6 yrs	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
573	30	60	40	PROVINCIAL APPROVALS															
				Y5 to Y10 or 6 yrs	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
573	30	60	50	MUNICIPAL APPROVALS															
				Y5 to Y10 or 6 yrs	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
573	30	65		CNSC OPERATING LICENCE (Initial Application)															
				Y9 to Y10 or 2 yrs	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	88
573	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)															
				CES duration is 330 years. Costs incurred in RES during period Y11 to Y299 or 289 years. RES has 0.25 staff vs 1 staff in CES. Factor is 289/330 x 0.25/1 = 0.22	Labour	0.22	32754	0.22	7205.88										7,206
					Materials and Equipment	1				0	1	0							0
				Expenses at $72K/a x 289 yrs	Other	1							20,808	1	20808				20,808
					Contingency	0.25										25%	1.0	7,003.5	7,003
																		Total	**38,597**
																		Check: Should = 0	**0**
							Total		8,270	Total		0	Total		22,608	Total		7,719.4	
							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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	35							Public Affairs	Labour		OPG	RJH	1	10	10			1367.5
573	35							Public Affairs	Materials and Equipment		OPG	RJH	1	10	10			
573	35							Public Affairs	Other		OPG	RJH	1	10	10			820.0
573	35							Public Affairs	Contingency		OPG	RJH	1	10	10			1093.8

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	1368		1367.5
Materials and Equipment			
Other	820		820.0
Contingency	1093.8		1093.8
Total	3281		3281

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
573	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
573	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
									Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0.1										
									Other	0.1						600	0.1	60					60	
									Contingency	50%									50%	1.0	182.3		182	
573	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0.1										
									Other	0.1						1,450	0.1	145					145	
									Contingency	50%									50%	1.0	301.0		301	
573	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0.1										
									Other	0.1						800	0.1	80					80	
									Contingency	50%									50%	1.0	166.4		166	
573	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0.1										

				Other	0.1					170	0.1	17						17
				Contingency	50%								50%	1.0	185.0			185
573	35	120	Community Offsets & Benefits															
				Labour	0.25	0.25												
				Materials and Equipment	0.25				0.25									
				Other	0.25					2,072	0.25	518						518
				Contingency	50%								50%	1.0	259.0			259

																	Total	**3,281**
																	Check: Should = 0	
						Total	1,368	Total		Total	820	Total			1,093.8			
						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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	8	90	5	0	0	NO DATA TO FILL	67414.3
573	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	8	90	5	0	0		33898.0
573	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	8	90	5	0	0		3209.8
573	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	8	90	5	0	0		33349.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
Labour	67414			*0.0*	67414.3
Materials and Equipment	33898			*0.0*	33898.0
Other	3210			*0.0*	3209.8
Contingency	33349.8			*0.0*	33349.8
Total	137872			*0.0*	137872

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	2	3	4	5	6	7	8				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 $k is calculated	Add Basis of estimate Note Ref Number
												Labour			Materials and other Equipment			Other			Contingency				
573	40							**Facility Design & Construction**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
573	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 additional land acquisition costs neccesary	Other	0.0							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
573	40	30						COMMON ANCILLARY FACILITIES																
573	40	30	10					ADMIN AND SUPPORT FACILITIES																
573	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0								comment 7		0
									Materials and Equipment	0.00				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
573	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0								comment 7		0
									Materials and Equipment	0.00				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
573	40	30	10	3				EQUIP STORAGE AND MAINT'CE BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0								comment 7		0

				/45/20/50	Materials and Equipment	0.00				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
573	40	30	10	4	STORAGE CASK STORE															
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0									comment 7		0
					Materials and Equipment	0.00				1,892.0	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
573	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	0.30	459.9	0.3	138.0											138
					Materials and Equipment	0.30				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	Contingency	30%										30%	1.0	143.5		144
573	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	0.30	458.8	0.3	137.6											138
					Materials and Equipment	0.30				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
573	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	0.30	359.4	0.3	107.8											108
					Materials and Equipment	0.30				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
573	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	0.30	373.7	0.3	112.1											112
					Materials and Equipment	0.30				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
573	40	30	10	9	WAREHOUSE BLDG															
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0									comment 7		0
					Materials and Equipment	0.00				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
573	40	30	10	10	GUARDHOUSE AND SECURITY FENCE															
				building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0									comment 7		0
					Materials and Equipment	0.00				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%	1.25	0.0		0
573	40	30	10	11	TRUCK INSP'N / WASH STATION															
				not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0									comment 7		0

						Materials and Equipment	0.00				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
573	40	30	10	12	UTILITY BLDG																	
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0										comment 7		0
						Materials and Equipment	0.00				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
573	40	30	10	13	TEST FACILITY CONSTRUCTION																	
					Facility will be constructed at Bruce, taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3	Labour	0.3	766.8	0.3	255.6												256
						Materials and Equipment	0.3				1,675.0	0.3	558.3									558
					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	20.0%										20%	1.0	162.8			163
573	40	30	20		OTHER SITE SYSTEMS																	
573	40	30	20	1	FIRE PROTECTION SYSTEMS																	
					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
573	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																	
					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
573	40	30	20	3	ELECTRICAL AND EMERGENCY POWER																	
					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
573	40	30	20	4	SANITARY SEWER SYSTEM																	
					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
573	40	30	20	5	POTABLE WATER SYSTEM																	
					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
573	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
573 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	Contingency	30%										30%	1.0	0.0				0
573 40	30	20	8	CONST'N 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
573 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
573 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
573 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
573 40	40			STORAGE CONSTRUCTION STAGE 1																			
				Construction of stage 1 of the shallow trench storage chambers. 1 chamber capacity 660 casks for RES as opposed to 4 CES chambers. Therefore factor by 1/4 and use 6/10 rule.	Labour	0.44	142,599.6	0.44	62,070.1													62,070
					Materials and Equipment	0.44				59,932.2	0.44	26,087.0										26,087
				expenses factor taken same as labour	Other	0.44							7,290.0	0.44	3,173.2							3,173
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	27,399.1				27,399
573 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
				allowance for consumption for construction of 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		137,872

							Check: Should = 0	**0**
	Total	67,414	Total	33,898	Total	3,210	Total	33,349.8
	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	11	299	289	0	0	NO DATA TO FILL	1101221.8
573	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	11	299	289	0	0		1105402.7
573	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	11	299	289	0	0		1161510.1
573	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	11	299	289	0	0		882370.7

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	1101222	*0.0*	1101221.8
Materials and Equipment	1105403	*0.0*	1105402.7
Other	1161510	*0.0*	1161510.1
Contingency	882371	*0.0*	882370.7
Total	4250505	*0.0*	4250505

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																	
573	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
573	45	10						OPERATIONS FUEL TRANSFER																
573	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
								Shorter duration to CES (29/30)and labour cost s shared equally between OPG sites (33%) this factor is increased to includes inefficiency of single site based program management team (use 40).	Labour	0.39	110,251.0	0.39	42,630.4								42,630	
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0	
								Annual cost = $3034/a x 29 yrs	Other	1.00							87,986	1.0	87,986				87,986	3
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	26,123.3	26,123	
573	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)																
								Shorter duration to CES but reduced fuel inventory 2421/8528 x 29/30yrs = 0.27	Labour	0.27	19,456.0	0.27	5,253.1										5,253	
								allow slight reduction in costs for monitoring equipment	Materials and Equipment	0.75				53.0	0.8	39.8							40	
								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	2,646.4	2,646	

573	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 38 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.48	115,547.0	0.48	55,847.7								55,848
						Materials and Equipment	0.48				1,284.0	0.48	620.6						621
						Other	0.48							16,380.0	0.48	7,917.0			7,917
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	19,316
573	45	10	40		STORAGE OPERATIONS														
						Labour	0.28	29,706.0	0.28	8,433.2									8,433
					shorter duration, equal operator disciplines, reduced crew size and crew usage due to lower fuel inventory 2421/8528														
					cask transporter overhaul costs same as CES	Materials and Equipment	1.0				300.0	1.0	300.0						300
					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	2,620
573	45	10	50		ADDITIONAL STORAGE CONSTRUCTION														
573	45	10	50	10	STORAGE CONSTRUCTION STAGE 2														
					factor for istorage const'n stage 2 taken as same as stage 1	Labour	0.44	37,467.3	0.44	16,308.6									16,309
					factor for istorage const'n stage 2 taken as same as stage 1	Materials and Equipment	0.44				81,361.5	0.4	35,414.6						35,415
					factor for istorage const'n stage 2 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4			4,295
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,806
573	45	10	50	20	STORAGE CONSTRUCTION STAGE 3														
					factor for istorage const'n stage 3 taken as same as stage 1. The cost for const'n labour for vaults is omitted from CES costs	Labour	0.44	50,001.9	0.44	21,764.6									21,765
					factor for istorage const'n stage 3 taken as same as stage 1. The cost for const'n materials for basket vaults is omitted from CES costs	Materials and Equipment	0.44				71,382.0	0.4	31,070.8						31,071
					factor for istorage const'n stage 3 taken as same as stage 1	Other	0.44							9,804.0	0.4	4,267.4			4,267
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	17,131
573	45	10	50	30	STORAGE CONSTRUCTION STAGE 4														
					factor for istorage const'n stage 3 taken as same as stage 1	Labour	0.44	49,193.7	0.44	21,412.8									21,413
					factor for istorage const'n stage 3 taken as same as stage 1	Materials and Equipment	0.44				69,457.0	0.4	30,232.9						30,233
					factor for istorage const'n stage 3 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4			4,295
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,782
573	45	20			OPERATIONS - EXTENDED MONITORING														
573	45	20	5		PROGRAM MANAGEMENT														

					Labour	0.25	312,354.0	0.25	78,088.5												78,089	
				Entries in CES DET applicable to RES but duration 260 years RES & 300 years CES therefore 260/300 of labour costs. Pickering assumed to have 2.6 staff vs 9 in CES. Thus factor is 25%.																		
				No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0	
				Annual cost = $2,409/a x 260 yrs	Other	1.00							626,340.0	1.0	626,340.0						626,340	1
				Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	140,885.7		140,886	
573	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING																		
				Reduced duration to CES (260/300). One staff for RES vs 5 in CES. Combined factor = (260/300) x (1/5) = 0.17	Labour	0.17	150,328.0	0.17	25,555.8												25,556	
				Annual costs = $1K/a x 260 yrs	Materials and Equipment	1.00						260.0									260	
				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	12,907.9		12,908	
573	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)																		
					Labour	0.33	875,048.0	0.33	288,765.8												288,766	
				Entries in CES DET applicable to RES but duration 260 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 266/300 x 13/34 = 0.33. Annual M&E costs are $150K/a x 260 yrs = $39000K	Materials and Equipment	1.00						39,000.0									39,000	
					Other										85,800.0						85,800	
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 260 years = $85,800K																		
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	124,069.8		124,070	
573	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																		
					Labour	0.52	148,529.0	0.52	77,235.1												77,235	
				RES has duration 260 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 260/300 x 3/5 = 0.52																		
				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	19,308.8		19,309	
573	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																		
				RES duration is 260 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 260	Labour	0.2	4,631.0	0.20	926.2												926	
					Materials and Equipment	1.0						858.0									858	

				yrs = $858K. Other costs is $0.7K/a x 260 yrs = $182K.	Other	1.0								182.0							182
				Percentage for contingency assumed same as for CES	Contingency	50%												50%	1.0	983.1	983
573	45	20	80	RECEIPT & TRANSFER (EQUIP)																	
				No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0												0
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5				3,000.0	0.5	1,500.0									1,500
				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	450.0	450
573	45	30		OPERATIONS - FACILITY REPEATS																	
573	45	30	50	STORAGE CHAMBER 200 YEAR REPLACEMENT																	
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2421 casks. Therefore a factor of 1/4 using 6/10 rule is used	Labour	0.44	110,400.0	0.44	48,054.4												48,054
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2421 casks. Therefore a factor of 1/4 using 6/10 rule is used	Materials and Equipment	0.44				0.0	0.4	0.0									0
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2421 casks. Therefore a factor of 1/4 using 6/10 rule is used	Other	0.44							2,048.4	0.4	891.6						892
				Percentage for contingency assumed same as for CES	Contingency	25%												25%	1.0	12,236.5	12,237
573	45	40		OPERATIONS - REPACKAGING																	
573	45	40	5	PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																	
					Labour	0.16	440,778.0	0.16	69,596.5												69,597
				Entries in CES DET applicable to RES but duration 45 years RES 4x(2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 9yr operations) & 114 years CES therefore45/114 of labour cost s. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).																
				No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0
				Annual cost = $k4209/a x45 yrs	Other	1.00							189,405	1.0	189,405					189,405	2
				Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	51,800.3	51,800
573	45	40	10	MODULE TO CASK 100 YEAR REPACKAGING																	
573	45	40	10	10 DECOMMISSIONING OF EXISTING FACILITIES																	

							assume decommissioning of existing process building (from interim period) at 100year point same costs as CES	Labour	1.0	2,357.4	1.00	2,357.4											2,357
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0								0
								Other	1.0							2,216.9	1.0	2,216.9					2,217
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,372.3		1,372
573	45	40	10	20			CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1											476
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6								355
							RPM Repackaging plant same as CES facility therefore factor = 1	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
573	45	40	10	30			PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																
573	45	40	10	30	20		RPM EQUIP. DESIGN, SUPPLY & INSTALL																
573	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)																
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2											276
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0								5,523
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							290.0	1.0	290.0					290
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,826.8		1,827
573	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)																
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6											2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1								11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							685.4	1.0	685.4					685
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,317.9		4,318
573	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)																
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3											2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4								13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							823.0	1.0	823.0					823
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	5,184.8		5,185
573	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)																
							No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0											0
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0								5,055
							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	1,516.5	1,517
573	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0								233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0					2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							128.0	1.0	128.0		128
							Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	538.6	539
573	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2								8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7					8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							1,624.3	1.0	1,624.3		1,624
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	5,593.3	5,593
573	45	40	10	30	60		BUILDING SERVICES (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2								11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4					9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							3,486.7	1.0	3,486.7		3,487
							Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	5,994.6	5,995
573	45	40	10	30	70		COMMISSIONING (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8								1,253
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							232.1	1.0	232.1		232
							Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	742.5	742
573	45	40	10	30	80		CONST'N INDIRECTS (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3								14,668
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							518.6	1.0	518.6		519
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	4,556.1	4,556
573	45	40	10	40			COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7										
							replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2								21,056
								Materials and Equipment	1.00				29,785.1	1.0	29,785.1					29,785
							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	22%								22%	1.0	11,185.1	11,185

573	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8											274
						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	136.9				137
573	45	40	10	600		REPACKAGING OPERATIONS (RPM)																	
						repackaging of 2421 RES casks compared to 8528 CES factor = 2421/8528	Labour	0.28	112,881.9	0.28	32,045.9											32,046
						procurement of 2421 RES casks compared to 8528 CES factor = 2421/8528	Materials and Equipment	0.28				788,840.0	0.3	223,942.5										223,943
						disposal of 2421 RES casks compared to 8528 CES factor = 2412/8528	Other	0.28							110,864.0	0.3	31,473.0							31,473
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	86,238.4				86,238
573	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																	
						duration 12 years RES (1 demolish prev, 2const'n, 9 transfer ops) compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.4	11,882.0	0.40	4,752.8											4,753
						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	1,188.2				1,188
573	45	40	10	700		OPERATION INDIRECTS (RPM)																	
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	17,186.8	0.30	5,156.0											5,156
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				404.8	0.3	121.4										121
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0							4,860
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,041.2				3,041
573	45	40	10	800		STORAGE OPERATIONS (RPM)																	
						transfer of 2421 casks RES compared to 8528 casks CES	Labour	0.28	14,657.1	0.28	4,104.0											4,104
						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	30%										30%	1.0	1,231.2				1,231
573	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING																	
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Labour				111,489.8													111,490
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Materials and Equipment							309,955.3										309,955
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Other										46,566.4							46,566

						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Contingency													133,609.7	133,610
573	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING															
573	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING															
						Costs taken as same as 200 year repackaging	Labour				111,489.8										111,490
						Costs taken as same as 200 year repackaging	Materials and Equipment						309,955.3								309,955
						Costs taken as same as 200 year repackaging	Other									46,566.4					46,566
						Costs taken as same as 200 year repackaging	Contingency													133,609.7	133,610
573	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS															
573	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL															
						No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5							6,472
						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	1,941.5	1,941
573	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1										372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1							372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							74.4	1.0	74.4				74
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	245.6	246
573	45	40	30	30	60	BUILDING SERVICES (MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9										384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5							311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							97.9	1.0	97.9				98
						Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	198.1	198
573	45	40	30	30	70	COMMISSIONING(MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1										334
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							53.2	1.0	53.2				53
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	193.7	194
573	45	40	30	30	80	CONST'N INDIRECTS (MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8										724
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							25.4	1.0	25.4				25

					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	224.8	225
573	45	40	30	600	REPACKAGING OPERATIONS (Module to Module)													
					MM repackaging operations factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Labour	0.28	17,823.5	0.28	5,065.8								5,066
					Module procurement factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.28			102,336.0	0.3	29,086.1						29,086
					module waste disposal factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Other	0.28					35,817.6	0.3	10,180.1				10,180
					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	13,299.6	13,300

Total	**4,250,505**
Check: Should = 0	**0**

	Total	1,101,222	Total	1,105,403	Total	1,161,510	Total	882,370.7
	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	2409k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (341,974k$) at rate 2.87%)
2	4209k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (341,974k$) at rate 2.87%). this tax runs for 3X15 years = 45 years. A portion of this tax over 45 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)
3	3034k$/a made up of expenses from table 18 (605k$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (338,510k$) at rate 2.87% = 4857, this is then halved as the storage buildings are built on a rolling program)
4	

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
PICKERING

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
573	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Labour		OPG	RJH	4	299	296	0	0	NO DATA TO FILL	98200.5
573	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	4	299	296	0	0		8670.0
573	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Other		OPG	RJH	4	299	296	0	0		2978.0
573	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Contingency		OPG	RJH	4	299	296	0	0		32954.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	196401		*0.0*	98200.5	
Materials and Equipment	17340		*0.0*	8670.0	
Other	5956		*0.0*	2978.0	
Contingency	65909.1		*0.0*	32954.6	
Total	285606		*0.0*	142803	

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																	
573	55							**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
573	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y4 to Y299 (when repackaging ends) or 296 yrs vs CES at 347 yrs. RES has 0.5 staff vs 2 staff for CES. Factor is 296/347 x 0.5/2 = 0.213	Labour	0.213	70306	0.213	14975.178											14,975
									Materials and Equipment	1				0	1	0								0
								Expenses at $3K/a x 296 yrs	Other	1							888	1	888					888
									Contingency	0.3										15863.178	0.3	4758.9534		4,759
573	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years with with some preparation work in Y4; ie total of 4 years. Due to multiple sites with same technology can share costs	Labour	0.3	7471	0.3	2241.3											2,241
									Materials and Equipment	0.3				0	0.3	0								0
									Other	0.3							2,150	0.3	645					645

				Contingency	0.3								2886.3	0.3	865.89	866
573	55	40	GROUNDWATER MONITORING													
			RES = 289 yrs vs CES = 330 yrs. Factor is 289/330 x 0.2/0.6 = 0.29 (Y11 to Y299)	Labour	0.29	37158	0.29	10775.82								10,776
			M&E @ $6K/a x 289 yrs	Materials and Equipment	1				1734	1	1734					1,734
			Expenses @ $4K/a x 289 yrs	Other	1							1,156	1	1156		1,156
				Contingency	0.3								13665.82	0.3	4099.746	4,100
573	55	50	RADIOLOGICAL BIOSPHERE MONITORING													
			RES = 289 yrs vs CES = 330 yrs. Factor is 289/330 x 1/3.3 = 0.265 (Y11 to Y299)	Labour	0.265	217280	0.265	57579.2								57,579
			M&E costs at $18K/a x 289 yrs	Materials and Equipment	1				5202	1	5202					5,202
				Other	1							0	1	0		0
				Contingency	0.3								62781.2	0.3	18834.36	18,834
573	55	60	NON-RAD BIOSPHERE MONITORING													
			RES = 289 yrs vs CES = 330 yrs. Factor is 289/330 x 0.2/0.8 = 0.202 (Y11 to Y299)	Labour	0.219	53590	0.219	11736.21								11,736
			M&E costs at $6K/a x 289 yrs	Materials and Equipment	1				1734	1	1734					1,734
				Other	1							0	1	0		0
				Contingency	0.3								13470.21	0.3	4041.063	4,041
573	55	80	HUMAN HEALTH MONITORING													
			RES = 289 yrs vs CES = 330 yrs. Factor is 289/330 x 0.03/0.17 =	Labour	0.155	5760	0.155	892.8								893
				Materials and Equipment	1				0	1	0					0
			Expenses at $1K/a x 289 yrs	Other	1							289	1	289		289
				Contingency	0.3								1181.8	0.3	354.54	355

Total	**142,803**
Check: Should = 0	**0**

Total	98,201	Total	8,670	Total	2,978	Total	32,954.6
Check: Should = 0	98,201	Check: Should = 0	-187,731	Check: Should = 0	-14,362	Check: Should = 0	26,999

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 — CASKS IN SHALLOW TRENCH (CST)

ACTIVITY SUMMARY TO DATA TRANSFER — PICKERING

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
573	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	10	10	0	0	NO DATA TO FILL	2276.7
573	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	4	10	0	0		0.0
573	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	10	10	0	0		1452.0
573	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	10	10	0	0		745.7

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	2277	0.0	2276.7
Materials and Equipment	0	0.0	0.0
Other	1452	0.0	1452.0
Contingency	745.7	0.0	745.7
Total	4474	0.0	4474

INSTRUCTIONS

	WBS Description / Detail	Cost Category	Factor	A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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 1	2	3	4	5	6	7	8	WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL Cost $k
573	90							**Program Management**															
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Pickering			total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	total for 7 sites	Factor	RES	CES	Factor	RES	
								based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 10year duration	Labour	0.24	9486.204	0.24	2276.68896										2,277
								no entry	Materials and Equipment	0				0	0	0							0
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							6050	0.24	1452				1,452
								Contingency as CES value	Contingency	20%										20%	1.0	745.7	746

Total	4,474
Check: Should = 0	0

Labour		Materials and other Equipment		Other		Contingency	
Total	2,277	Total	0	Total	1,452	Total	745.7
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.

RES ALTERNATIVE
WBS No 573
CASKS IN SHALLOW TRENCH (CST)
PICKERING

Cost Category	Total K$
Labour	1,290,632
Materials and Equipment	1,148,422
Other	1,193,427
Contingency	963,401
Total Cost	**4,595,882**

4,595,882

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$
573	15	0	0	0	0	0	0	RJH	Labour	0	1	7	7	0	556
573	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	7	7	0	0
573	15	0	0	0	0	0	0	RJH	Other	0	1	7	7	0	113
573	15	0	0	0	0	0	0	RJH	Contingency	0	1	7	7	0	334
573	20	0	0	0	0	0	0	AM	Labour	0	83	89	7	0	7,114
573	20	0	0	0	0	0	0	AM	Materials and Equipment	0	83	89	7	0	452
573	20	0	0	0	0	0	0	AM	Other	0	83	89	7	0	182
573	20	0	0	0	0	0	0	AM	Contingency	0	83	89	7	0	2,927
573	25	0	0	0	0	0	0	RJH	Labour	0	1	299	51	0	4,211
573	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	299	51	0	0
573	25	0	0	0	0	0	0	RJH	Other	0	1	299	51	0	554
573	25	0	0	0	0	0	0	RJH	Contingency	0	1	299	51	0	1,906
573	30	0	0	0	0	0	0	RJH	Labour	0	6	299	294	0	8,270
573	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	6	299	294	0	0
573	30	0	0	0	0	0	0	RJH	Other	0	6	299	294	0	22,608
573	30	0	0	0	0	0	0	RJH	Contingency	0	6	299	294	0	7,719
573	35	0	0	0	0	0	0	RJH	Labour	0	1	10	10	0	1,368
573	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	10	10	0	0
573	35	0	0	0	0	0	0	RJH	Other	0	1	10	10	0	820
573	35	0	0	0	0	0	0	RJH	Contingency	0	1	10	10	0	1,094
573	40	0	0	0	0	0	0	AM	Labour	0	8	90	5	0	67414.2611
573	40	0	0	0	0	0	0	AM	Materials and Equipment	0	8	90	5	0	33897.9886
573	40	0	0	0	0	0	0	AM	Other	0	8	90	5	0	3209.7868
573	40	0	0	0	0	0	0	AM	Contingency	0	8	90	5	0	33349.8366
573	45	0	0	0	0	0	0	AM	Labour	0	11	299	289	0	1,101,222
573	45	0	0	0	0	0	0	AM	Materials and Equipment	0	11	299	289	0	1,105,403
573	45	0	0	0	0	0	0	AM	Other	0	11	299	289	0	1,161,510
573	45	0	0	0	0	0	0	AM	Contingency	0	11	299	289	0	882,371
573	55	0	0	0	0	0	0	RJH	Labour	0	4	299	296	0	98,201
573	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	4	299	296	0	8,670
573	55	0	0	0	0	0	0	RJH	Other	0	4	299	296	0	2,978
573	55	0	0	0	0	0	0	RJH	Contingency	0	4	299	296	0	32,955
573	90	0	0	0	0	0	0	AM	Labour	0	1	10	10	0	2,277
573	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	4	10	0	0
573	90	0	0	0	0	0	0	AM	Other	0	1	10	10	0	1,452
573	90	0	0	0	0	0	0	AM	Contingency	0	1	10	10	0	746

B2 Cost Estimate Schedules for Pickering Site

WBS No 571 – CSB
WBS No 572 – SMV
WBS No 573 - CST

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

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment
1																					
2	1	571								**CASKS IN STORAGE BUILDINGS (CSB) OPG - PICKERING**											
3	2	571	15							**SITING**	Db Sm										
4	3	571	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	87	7		
5	3	571	15	70						PREFERRED SITE	Db Sm										
6	4	571	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			84	84	1		
7	4	571	15	70	30					PREFERRED SITE - CHARACTERIZATION	Db Act	FIXED	OPG	RJH			84	84	1		
8																					
9	2	571	20							**SYSTEM DEVELOPMENT**	Db Sm										
10	3	571	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			83	89	7		
11	3	571	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			83	86	4		
12	3	571	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			83	89	7		
13	3	571	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			83	89	7		
14	3	571	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			86	86	1		
15																					
16	2	571	25							**SAFETY ASSESSMENT**	Db Sm										
17	3	571	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	90	11		
18	3	571	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			83	84	1		
19	3	571	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			88	89	2		
20	3	571	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			34	299	30		
21	3	571	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			85	286	6		
22																					
23	2	571	30							**LICENSING & APPROVALS**	Db Sm										
24	3	571	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG			81	84	4		
25	3	571	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG			85	87	3		
26	3	571	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG							
27	4	571	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG			85	90	6		
28	4	571	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG			85	90	6		
29	4	571	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG			85	90	6		
30	4	571	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG			85	90	6		
31	3	571	30	65						CNSC OPERATING LICENCE	Db Act	FIXED	CTECH	MG			89	90	2		
32	3	571	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG			34	299	266		
33																					
34	2	571	35							**PUBLIC AFFAIRS**	Db Sm										
35	3	571	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			84	84	1		
36	3	571	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			85	87	3		

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment
37	3	571	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			88	90	3		
38	3	571	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	90	10		
39	3	571	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH			88	90	3		
40																					
41	2	571	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm										
42	3	571	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	GA			55	55	1		
43	3	571	40	30						COMMON ANCILLARY FACILITIES	Db Sm										
44	4	571	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm										
45	5	571	40	30	10	01				ADMIN AND VISITOR RECEPTION BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
46	5	571	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
47	5	571	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
48	5	571	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	GA			*	*	*		
49	5	571	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2		
50	5	571	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			89	90	2		
51	5	571	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2		
52	5	571	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2		
53	5	571	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
54	5	571	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA			*	*	*		
55	5	571	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	GA	Not required for RES						
56	5	571	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
57	5	571	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA	At Bruce		52	53	2		
58	4	571	40	30	20					OTHER SITE SYSTEMS	Db Sm										
59	5	571	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
60	5	571	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
61	5	571	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA			*	*	*		
62	5	571	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
63	5	571	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
64	5	571	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
65	5	571	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
66	5	571	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
67	5	571	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
68	5	571	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
69	4	571	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA			52	53	2		
70	3	571	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM			53	53	1		
71										*** Existing buildings and services adopted by RES facility.**												
72	2	571	45							**FACILITY OPERATION**	Db Sm										
73	3	571	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm										
74	4	571	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			34	299	266		

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment
75	4	571	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING	Db Act	STEP FIXED	CTECH	AM			34	299	266		
76	4	571	45	20	50					OPERATION INDIRECTS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM			34	299	266		
77	4	571	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA			34	299	266		
78	4	571	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM			34	299	266		
79	4	571	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			41	41	1		
80	3	571	45	30						OPERATIONS - FACILITY REPEATS	Db Sm										
81	4	571	45	30	20					STORAGE BUILDINGS 100 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			88	99	12		
82	4	571	45	30	50					STORAGE BUILDINGS 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			188	199	12		
83	4	571	45	30	70					STORAGE BUILDINGS 300 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			288	299	12		
84	3	571	45	40						OPERATIONS - REPACKAGING	Db Sm										
85	4	571	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM			85	299	45		
86	4	571	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm										
87	5	571	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM			87	88	2		
88	5	571	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM			87	90	4		
89	5	571	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm										
90	6	571	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm										
91	7	571	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
92	7	571	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
93	7	571	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
94	7	571	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
95	7	571	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
96	6	571	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM			89	90	2		
97	6	571	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
98	6	571	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM			90	90	1		
99	6	571	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			89	90	2		
100	5	571	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	GA			151	153	3		

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment
101	5	571	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM			90	90	1		
102	5	571	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9		
103	6	571	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	GA			88	99	12		
104	5	571	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9		
105	5	571	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9		
106	4	571	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			187	199	13		
107	4	571	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm										
108	5	571	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			287	299	13		
109	5	571	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm										
110	6	571	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM			289	290	2		
111	6	571	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM			287	290	4		
112	6	571	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM			289	290	2		
113	6	571	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM			290	290	1		
114	6	571	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM			287	290	4		
115	5	571	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM			291	299	9		
116																					
117	2	571	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm										
118	3	571	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			34	299	266		
119	3	571	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT	Db Act	FIXED	OPG	RJH			84	87	4		
120	3	571	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH			34	299	266		
121	3	571	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			34	299	266		
122	3	571	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			34	299	266		
123	3	571	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH			34	299	59		
124																					
125	2	571	90							**PROGRAM MANAGEMENT (Yrs 1 to 4)**	Db Act	STEP FIXED	CTECH	AM			1	4	4		

LINE No	Level sp sht	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule
1	1	572								**SURFACE MODULAR VAULT (SMV) - OPG PICKERING**											
2	2	572	15							**SITING**	Db Sm										
3	3	572	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	7	7		
4	3	572	15	70						PREFERRED SITE	Db Sm										
5	4	572	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			4	4	1		
6	4	572	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH			4	4	1		
7		572																			
8	2	572	20							**SYSTEM DEVELOPMENT**	Db Sm										
9	3	572	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			1	7	7		
10	3	572	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			1	4	4		
11	3	572	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			1	7	7		
12	3	572	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			1	7	7		
13	3	572	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			3	3	1		
14		572																			
15	2	572	25							**SAFETY ASSESSMENT**	Db Sm										
16	3	572	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	10	10		
17	3	572	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			3	4	2		
18	3	572	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			8	9	2		
19	3	572	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			11	319	35		
20	3	572	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			309	310	2		
21		572																			
22	2	572	30							**LICENSING & APPROVALS**	Db Sm										
23	3	572	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG			1	4	4		
24	3	572	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG			5	10	6		
25	3	572	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG							
26	4	572	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG			1	4	4		
27	4	572	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG			1	4	6		
28	4	572	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG			1	4	6		
29	4	572	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG			1	4	6		
30	3	572	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	CTECH	MG			9	10	2		
31	3	572	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG			11	319	309		
32		572																			
33	2	572	35							**PUBLIC AFFAIRS**	Db Sm										
34	3	572	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			4	4	1		
35	3	572	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			5	7	3		
36	3	572	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			8	10	3		
37	3	572	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	10	10		
38	3	572	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH			8	10	3		
39																					
40	2	572	40							**SMV FACILITY DESIGN AND CONSTRUCTION**											
41	3	572	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	GA			8	8	1		
42	3	572	40	20						PROCESSING BUILDING (PB)											
43	4	572	40	20	20					PROCESSING BUILDING EQUIP. DESIGN, SUPPLY & INSTALL											
44	5	572	40	20	20	10				RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			9	10	2		
45	5	572	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)	Db Act	STEP FIXED	CTECH	AM			9	10	2		

LINE No sp sht	Level	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
46	5	572	40	20	20	40				COMMON CRANE MAINTENANCE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM			9	10	2		
47	4	572	40	20	30					PROCESSING BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM			9	10	2		
48	4	572	40	20	60					PB BUILDING SERVICES DESIGN AND INSTALL'N	Db Act	STEP FIXED	CTECH	AM			10	10	1		
49	4	572	40	20	70					COMMISSIONING (PB)	Db Act	STEP FIXED	CTECH	AM			10	10	1		
50	4	572	40	20	80					CONST'N INDIRECTS (PB)	Db Act	STEP FIXED	CTECH	AM			9	10	2		
51	3	572	40	30						COMMON ANCILLARY FACILITIES											
52	4	572	40	30	10					ADMIN AND SUPPORT FACILITIES											
53	5	572	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
54	5	572	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BDLG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
55	5	572	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
56	5	572	40	30	10	04				MODULE CANISTER STORE	Db Act	STEP FIXED	CTECH	GA			*	*	*		
57	5	572	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	GA			309	310	2		
58	5	572	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			309	310	2		
59	5	572	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	GA			309	310	2		
60	5	572	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	GA			309	310	2		
61	5	572	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
62	5	572	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA			*	*	*		
63	5	572	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	GA	Not required for RES						
64	5	572	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*		
65	5	572	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA	At Bruce		52	53	2		
66	4	572	40	30	20					OTHER SITE SYSTEMS											
67	5	572	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
68	5	572	40	30	20	02				SECURITY AND COMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
69	5	572	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA			*	*	*		
70	5	572	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
71	5	572	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*		
72	5	572	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
73	5	572	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*		
74	5	572	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
75	5	572	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*		
76	5	572	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA			*	*	*		
77	4	572	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA			52	53	2		
78	3	572	40	40						STORAGE CONSTRUCTION (STAGE 1)											
79	5	572	40	40	10	05				CONSTRUCTION FACILITIES	Db Act	STEP FIXED	ALSTEC	CC			9	10	2		
80	5	572	40	40	10	10				STORES ENGINEERING	Db Act	STEP FIXED	ALSTEC	CC			9	10	2		
81	4	572	40	40	10	20				STORES EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	ALSTEC	CC			9	10	2		
82	4	572	40	40	10	30				SURFACE MODULAR VAULT DESIGN AND CONST'N	Db Act	STEP FIXED	ALSTEC	CC			9	10	2		
83	4	572	40	40	10	40				COMMISSIONING	Db Act	STEP FIXED	ALSTEC	CC			10	10	1		
84	4	572	40	40	10	50				CONST'N INDIRECTS	Db Act	STEP FIXED	ALSTEC	CC			9	10	2		
85	3	572	40	500						COMMISSIONING MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			10	10	1		
86	3	572	40	600						EQUIPMENT, SPARES AND CONSUMABLES	Db Act	STEP FIXED	CTECH	AM			10	10	1		
87	3	572	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM			10	10	1		
88		572								*** Existing buildings and services adopted by RES facility.**												
89	2	572	45							**FACILITY OPERATION**											

LINE No sp sht	Level	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
90	3	572	45	10						OPERATIONS INITIAL FUEL RECEIPT											
91	4	572	45	10	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			11	48	38		
92	4	572	45	10	10					PROCESSING BUILDING OPERATIONS	Db Act	STEP FIXED	CTECH	AM			11	48	38		
93	4	572	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPTS)	Db Act	STEP FIXED	CTECH	GA			11	48	38		
94	4	572	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPTS)	Db Act	STEP FIXED	CTECH	AM			11	48	38		
95	4	572	45	10	30					OPERATION INDIRECTS (INITIAL FUEL RECEIPTS)	Db Act	STEP FIXED	CTECH	AM			11	48	38		
96	4	572	45	10	40					STORAGE OPERATIONS	Db Act	STEP FIXED	CTECH	AM			11	48	38		
97	4	572	45	10	50					ADDITIONAL STORAGE CONSTRUCTION											
98	5	572	45	10	50	10				STORAGE CONSTRUCTION (STAGE 2)	Db Act	STEP FIXED	CTECH	AM			15	17	3		
99	5	572	45	10	50	20				STORAGE CONSTRUCTION (STAGE 3)	Db Act	STEP FIXED	CTECH	AM			31	33	3		
100	5	572	45	10	50	30				STORAGE CONSTRUCTION (STAGE 4)	Db Act	STEP FIXED	CTECH	AM			39	41	3		
101	3	572	45	20						OPERATIONS - EXTENDED MONITORING											
102	4	572	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			49	319	271		
103	4	572	45	20	40					MONITORING AND SURVEILLANCE (EXTENDED)	Db Act	STEP FIXED	CTECH	AM			49	319	271		
104	4	572	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM			49	319	271		
105	4	572	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA			49	319	271		
106	4	572	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM			49	319	271		
107	3	572	45	30						OPERATIONS - FACILITY REPEATS											
108	4	572	45	30	20					VAULT 100 YEAR REPLACEMENT	Db Act	STEP FIXED	ALSTEC	CC			108	119	12		
109	4	572	45	30	30					VAULT 200 YEAR REPLACEMENT	Db Act	STEP FIXED	ALSTEC	CC			208	219	12		
110	4	572	45	30	40					VAULT 300 YEAR REPLACEMENT	Db Act	STEP FIXED	ALSTEC	CC			308	319	12		
111	3	572	45	40						OPERATIONS - REPACKAGING											
112	4	572	45	40	05					PROGRAM MANAGEMENT FACILITY REPEATS & REPACKAGING	Db Act	STEP FIXED	CTECH	AM			108	319	36		
113	4	572	45	40	10					MODULE TO MODULE (M to M) 300 YEAR REPACKAGING											
114	5	572	45	40	10	10				DECOMMISSSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM			307	308	2		
115	5	572	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT M TO M	Db Act	STEP FIXED	CTECH	AM			309	310	2		
116	5	572	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT M to M (RPMM)											
117	6	572	45	40	10	30	20			RPMM EQUIP. DESIGN, SUPPLY & INSTALL											
118	7	572	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
119	7	572	45	40	10	30	20	20		CANISTER TO CANISTER FUEL TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
120	7	572	45	40	10	30	20	30		CANISTER DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
121	7	572	45	40	10	30	20	40		MODULE DECONTAMINATION(EQUIP)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
122	7	572	45	40	10	30	20	50		CANISTER DISMANTLING / BREAKDOWN(EQUIP)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
123		572	45	40	10	30	20	60		CASK OPENING AND CASK DECONTAMINATION (EQUIP,	Db Act	STEP FIXED	CTECH	AM			310	310	1		
124	6	572	45	40	10	30	30			RPMM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM			309	310	2		
125	6	572	45	40	10	30	60			BUILDING SERVICES (RPMM)	Db Act	STEP FIXED	CTECH	AM			309	310	2		
126	6	572	45	40	10	30	70			COMMISSIONING (RPMM)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
127	6	572	45	40	10	30	80			CONST'N INDIRECTS (RPMM)	Db Act	STEP FIXED	CTECH	AM			309	310	2		
128	5	572	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)	Db Act	STEP FIXED	CTECH	GA			152	291	12		
129	5	572	45	40	10	500				COMMISSIONING MANAGEMENT (RPMM)	Db Act	STEP FIXED	CTECH	AM			310	310	1		
130	5	572	45	40	10	600				REPACKAGING OPERATIONS (RPMM)	Db Act	STEP FIXED	CTECH	AM			311	319	9		

LINE No sp sht	Level	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
131	6	572	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	VARIABLE	CTECH	GA			108	319	36		
132	5	572	45	40	10	700				OPERATION INDIRECTS (RPMM)	Db Act	STEP FIXED	CTECH	AM			311	319	9		
133	5	572	45	40	10	800				STORAGE OPERATIONS (RPMM)	Db Act	STEP FIXED	CTECH	AM			311	319	9		
134		572																			
135	2	572	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**											
136	3	572	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	STEP FIXED	OPG	RJH			4	319	316		
137	3	572	55	20						CNSC CONSTRUCTION LICENCE - EA	Db Act	STEP FIXED	OPG	RJH			5	7	3		
138	3	572	55	40						GROUNDWATER MONITORING	Db Act	STEP FIXED	OPG	RJH			11	319	309		
139	3	572	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	STEP FIXED	OPG	RJH			11	319	309		
140	3	572	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	STEP FIXED	OPG	RJH			11	319	309		
141	3	572	55	80						HUMAN HEALTH MONITORING	Db Act	STEP FIXED	OPG	RJH			11	319	60		
142		572																			
143	2	572	90							**PROGRAM MANAGEMENT (Yrs 01 to 10)**	Db Act	STEP FIXED	CTECH	AM			1	10	10		

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt
1	1	573								**CASKS IN SHALLOW TRENCHES (CST) - OPG PICKERING**												
2	2	573	15							**SITING**	Db Sm											
3	3	573	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	7	7			
4	3	573	15	70						PREFERRED SITE	Db Sm											
5	4	573	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			4	4	1			
6	4	573	15	70	30					PREFERRED SITE - CHARACTERIZATION	Db Act	FIXED	OPG	RJH			4	4	1			
7																						
8	2	573	20							**SYSTEM DEVELOPMENT**	Db Sm											
9	3	573	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			83	89	7			
10	3	573	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			83	86	4			
11	3	573	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			83	89	7			
12	3	573	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			83	89	7			
13	3	573	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			86	86	1			
14																						
15	2	573	25							**SAFETY ASSESSMENT**	Db Sm											
16	3	573	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	10	10			
17	3	573	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			3	4	2			
18	3	573	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			8	9	2			
19	3	573	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			11	299	35			
20	3	573	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			85	286	6			
21																						
22	2	573	30							**LICENSING & APPROVALS**	Db Sm											
23	3	573	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG			1	4	4			
24	3	573	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG			5	7	3			
25	3	573	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG								
26	4	573	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG			1	4	4			
27	4	573	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG			5	10	6			
28	4	573	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG			5	10	6			
29	4	573	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG			5	10	6			
30	3	573	30	65						CNSC OPERATING LICENCE	Db Act	FIXED	CTECH	MG			9	10	2			
31	3	573	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG			11	299	289			
32																						
33	2	573	35							**PUBLIC AFFAIRS**	Db Sm											
34	3	573	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			4	4	1			
35	3	573	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			5	7	3			
36	3	573	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			8	10	3			
37	3	573	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	10	10			
38	3	573	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH			8	10	3			
39																						
40	2	573	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm											
41	3	573	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	GA			8	8	1			
42	3	573	40	30						COMMON ANCILLARY FACILITIES	Db Sm											
43	4	573	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm											
44	5	573	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt
45	5	573	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*			
46	5	573	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*			
47	5	573	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	GA			*	*	*			
48	5	573	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2			
49	5	573	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			89	90	2			
50	5	573	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2			
51	5	573	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	GA			89	90	2			
52	5	573	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*			
53	5	573	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA			*	*	*			
54	5	573	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	GA	Not required for RES							
55	5	573	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA			*	*	*			
56	5	573	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA	At Bruce		52	53	2			
57	4	573	40	30	20					OTHER SITE SYSTEMS	Db Sm											
58	5	573	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA			*	*	*			
59	5	573	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*			
60	5	573	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA			*	*	*			
61	5	573	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*			
62	5	573	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA			*	*	*			
63	5	573	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*			
64	5	573	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA			*	*	*			
65	5	573	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*			
66	5	573	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA			*	*	*			
67	5	573	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA			*	*	*			
68	4	573	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA			52	53	2			
69	3	573	40	40						STORAGE DESIGN & CONSTRUCTION (STAGE 1)	Db Act	STEP FIXED	CTECH	GA			9	10	2			
70	3	573	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM			53	53	1			
71																						
72	2	573	45							**FACILITY OPERATION**	Db Sm											
73	3	573	45	10						OPERATIONS FUEL TRANSFER	Db Sm											
74	4	573	45	10	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			11	39	29			
75	4	573	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM			11	39	29			
76	4	573	45	10	30					OPERATION INDIRECTS (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM			11	39	29			
77	4	573	45	10	40					STORAGE OPERATIONS	Db Act	STEP FIXED	CTECH	AM			11	39	29			
78	4	573	45	10	50					ADDITIONAL STORAGE CONSTRUCTION	Db Sm											
79	5	573	45	10	50	10				STORAGE DESIGN & CONSTRUCTION STAGE 2	Db Act	STEP FIXED	CTECH	GA			17	18	2			
80	5	573	45	10	50	20				STORAGE DESIGN & CONSTRUCTION STAGE 3	Db Act	STEP FIXED	CTECH	GA			32	33	2			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt
81	5	573	45	10	50	30				STORAGE DESIGN & CONSTRUCTION STAGE 4	Db Act	STEP FIXED	CTECH	GA			35	36	2			
82	3	573	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm											
83	4	573	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			40	299	260			
84	4	573	45	20	40					MONITORING AND SURVEILLANCE	Db Act	STEP FIXED	CTECH	AM			40	299	260			
85	4	573	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM			40	299	260			
86	4	573	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA			40	299	260			
87	4	573	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM			40	299	260			
88	4	571	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			41	41	1			
89	3	573	45	30						OPERATIONS - FACILITY REPEATS	Db Sm											
90	4	573	45	30	50					STORAGE CHAMBER 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	GA			187	199	13			
91	3	573	45	40						OPERATIONS - REPACKAGING	Db Sm											
92	4	573	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM			85	299	45			
93	4	573	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm											
94	5	573	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM			87	88	2			
95	5	573	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM			87	90	4			
96	5	573	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm											
97	6	573	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm											
98	7	573	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
99	7	573	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER	Db Act	STEP FIXED	CTECH	AM			89	90	2			
100	7	573	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
101	7	573	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
102	7	573	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
103	6	573	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM			89	90	2			
104	6	573	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
105	6	573	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM			90	90	1			
106	6	573	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			89	90	2			
107	5	573	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	GA			151	153	3			
108	5	573	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM			90	90	1			
109	5	573	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9			
110	6	573	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	GA			88	99	12			
111	5	573	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Amendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt
112	5	573	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			91	99	9			
113	4	573	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			187	199	13			
114	4	573	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm											
115	5	573	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			287	299	13			
116	5	573	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm											
117	5	573	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM			289	290	2			
118	6	573	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM			287	290	4			
119	6	573	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM			289	290	2			
120	6	573	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM			290	290	1			
121	6	573	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM			287	290	4			
122	5	573	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM	AM		291	299	9			
123																						
124	2	573	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm											
125	3	573	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			4	299	296			
126	3	573	55	20						CNSC CONSTRUCTION LICENCE - EA	Db Act	FIXED	OPG	RJH			5	7	3			
127	3	573	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH			11	299	289			
128	3	573	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			11	299	289			
129	3	573	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			11	299	289			
130	3	573	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH			11	299	58			
131																						
132																						
133	2	573	90							**PROGRAM MANAGEMENT (Yrs 01 to 10)**	Db Act	STEP FIXED	CTECH	AM			1	10	10			

APPENDIX C

C1 Estimating Workbooks for Bruce Site

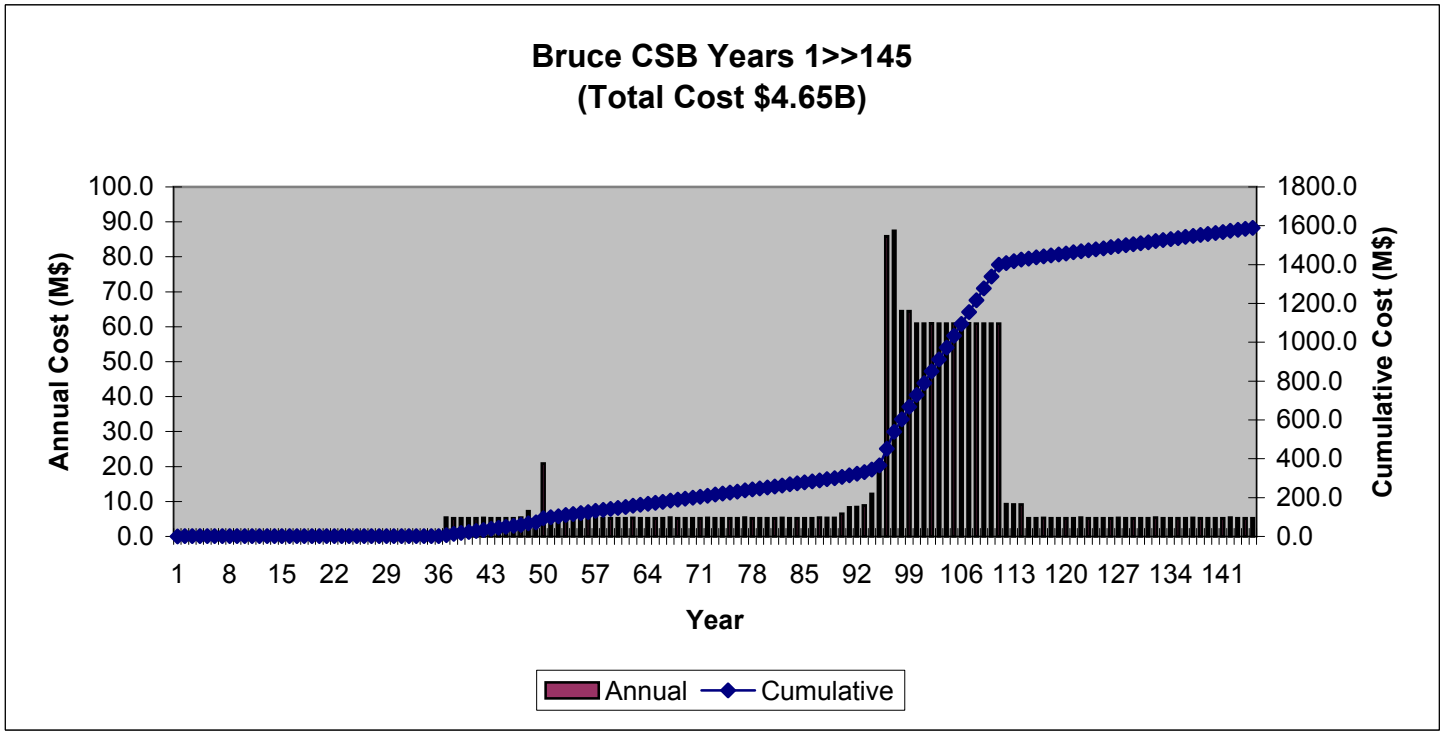
WBS No 574 – CSB
WBS No 575 – SMV
WBS No 576 - CST

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

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 574
BRUCE
CASKS IN STORAGE BUILDINGS **(CSB)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	8,031
25	Safety Assessment	5,714
30	Licensing & Approvals	37,986
35	Public Affairs	3,281
40	Facility Design & Construction	19,143
45	Facility Operation	4,434,253
55	Environmental Assessment and Monitoring	135,599
90	Program Management	1,402
	Total Cost ($k)	**4,646,233**

Bruce CSB Alternative	**4,646,233**
Siting Phase	**20,266**
Siting	824
EA	3,007
System Development	8,031
SA	811
L&A	2,910
Public Affairs	3281
Program Mgmt	1402
Construction Phase	**19,143**
Transition to Standalone	16,655
Before 100-yr Repackaging	2,487
Operations Phase	**4,606,824**
Repeat & Repackaging	*3,149,563*
SB - 100 yrs	105,022
SB - 200 yrs	102,729
SB - 300 yrs	102,729
Repackaging - 100 yrs	845,635
Repackaging - 200 yrs	845,635
Repackaging M to M - 300 yrs	915,289
PM for Repeats & Repackaging	232,525
Extended Monitoring	*1,457,261*
Program Mgmt	566,207
Monitoring Surveliance	41,003
Operation Indirects	570,371
Common Ancillary Services Ops	102,114
Fuel Integrity Monitoring	4,995
SA - Ops & Decommissioning	4,903
L&A - Ops Licence Renewal	35,076
Environmental Monitoring	132,593


Bruce CSB Years 1>>145
(Total Cost $4.65B)
Annual Cost (M$)
Cumulative Cost (M$)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1800.0
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	94	7	0	0	NO DATA TO FILL	452.2
574	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	94	7	0	0		0.0
574	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	94	7	0	0		97.0
574	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	94	7	0	0		274.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
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	
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	
											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																	
574	15							**Siting**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
574	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 inefficiencies of multiple sites assume a factor of 0.05. Costs in Y1 to Y3 & Y91 to Y94.	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	
574	15	70						PREFERRED SITE																
574	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 10% of a CES greenfield site (Y91)	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	
574	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 10% of a CES greenfield site (Y91)	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	

Total	**824**
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

BASIS OF ESTIMATE NOTES - Insert references and notes

1	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc. Where are particular part of the RES cost estimate has to be developed, because it doesn't have a directly comparable CES stock, then develop estimate below the notes line, then paste into the appropriate entries in format developed above.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	90	96	7	0	0	NO DATA TO FILL	5137.5
574	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	90	96	7	0	0		451.5
574	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	90	96	7	0	0		203.2
574	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	90	96	7	0	0		2238.7

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	5137	*0.0*	5137.5
Materials and Equipment	452	*0.0*	451.5
Other	203	*0.0*	203.2
Contingency	2238.7	*0.0*	2238.7
Total	8031	*0.0*	8031

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																	
574	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								OPG has 3 sites Pickering, Bruce and Darlington. CSB (Casks in Storage Buildings) is a storage alternative applicable to each site. The system development for the CSB alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CSB workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.															
574	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and additional 50% is deducted. Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Labour	0.18	6690.40	0.18	1170.82										1,171
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and additional 50% is deducted. Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Other	0.18							300.00	0.18	52.50				53

			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	367.0	367
574	20	5	SYSTEM OPTIMIZATION																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Labour	0.18	3303.70	0.18	578.15											578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Other	0.18							120.00	0.18	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.00	179.74	180
574	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Labour	0.11	20750.10	0.11	2178.76											2,179
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.11				4300.00	0.11	451.50								452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Other	0.11							895.00	0.11	93.98					94
			Percentage for contingency assumed same as for CES	Contingency	50%											50%	1.00	1362.12	1,362
574	20	30	STORAGE SYSTEM ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Labour	0.11	8143.20	0.11	855.04											855
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Other	0.11							200.00	0.11	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.00	219.01	219
574	20	40	SECURITY & SAFEGUARD ENG'NG																

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69												355
No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00									0
Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25							60.00	0.25	14.70						15
Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8			111

Total	**8,031**
Check: Should = 0	**0**

Total	5,137	Total	452	Total	203	Total	2,238.7		
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

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	25	0	0	0	0	0	0	Safety Assessment	Labour		OPG	RJH	1	312	279	0	0	NO DATA TO FILL	3628.2
574	25	0	0	0	0	0	0	Safety Assessment	Materials and Equipment		OPG	RJH	1	312	279	0	0		0.0
574	25	0	0	0	0	0	0	Safety Assessment	Other		OPG	RJH	1	312	279	0	0		453.5
574	25	0	0	0	0	0	0	Safety Assessment	Contingency		OPG	RJH	1	312	279	0	0		1632.7

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
			0%		% >>>
Labour	3628		0.0	3628.2	
Materials and Equipment	0		0.0	0.0	
Other	454		0.0	453.5	
Contingency	1632.7		0.0	1632.7	
Total	5714		0.0	5714	

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

ACTIVITY DETAIL ESTIMATE

								A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency			TOTAL	
																							Cost $k	
574	25							**Safety Assessment**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
574	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 (Y1 to [illegible] Y1 to Y3 & Y90 to Y97	Labour	0.05	5218.2	0.05	260.91											261	
									Materials and Equipment	0.05				0	0.05	0								0	1
									Other	0.05							850	0.05	42.5				43	
									Contingency	40%										40%	1.0	121.4	121	
574	25	30						SA - SITING																
								No work required	Labour		2287.5	0	0										0	2
									Materials and Equipment					0	0	0							0	
									Other								3,850	0	0				0	
									Contingency	40%										40%	1.0	0.0	0	
574	25	40						SA - OPERATING LICENSE																
								Y95 to Y96	Labour	0.15	1540.5	0.15	231.075										231	3
									Materials and Equipment	0.15				0	0.15	0							0	
									Other	0.15							300	0.15	45				45	
									Contingency	40%										40%	1.0	110.4	110	
574	25	50						SA - FACILITY OPERATIONS																
								RES has 32 renewal events vs 45 in CES giving a factor of 0.71. However renewal costs can be shared between with same technology; thus reduce factor to 0.25 (Y37 to Y312)	Labour	0.25	9604.8	0.25	2401.2											2,401	
									Materials and Equipment	1				0	1	0							0	
								Expenses at $1K/a x 276 yrs = $276K	Other	1							276	1	276				276	
									Contingency	40%										40%	1.0	1,070.9	1,071	
574	25	70						SA - DECOMMISSIONING (Processing Facilities)																
								RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technology; thus factor to 0.3	Labour	0.3	2449.9	0.3	734.97											735	
									Materials and Equipment	0.3				0	0.3	0							0	
									Other	0.3							300	0.3	90				90	
									Contingency	40%										40%	1.0	330.0	330	

							Total	**5,714**
							Check: Should = 0	**0**
Total	3,628	Total	0	Total	454	Total	1,632.7	
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	5714

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

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour		OPG	RJH	37	312	276	0	0	NO DATA TO FILL	9075.5
574	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment		OPG	RJH	37	312	276	0	0		0.0
574	30	0	0	0	0	0	0	0 Licensing & Approvals	Other		OPG	RJH	37	312	276	0	0		21313.2
574	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency		OPG	RJH	37	312	276	0	0		7597.2

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Total Cost $k	% >>>
Labour	9076	*0.0*		9075.5	
Materials and Equipment	0	*0.0*		0.0	
Other	21313	*0.0*		21313.2	
Contingency	7597.2	*0.0*		7597.2	
Total	37986	*0.0*		37986	

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																	
								In general L&A costs are assumed to be less than for a CES facility since dealing with well developed technology on an existing site. In some cases the costs are shared between the seven sites which further reduces costs.																
574	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
574	30	30						LIAISON WITH CNSC																
								Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.058. However due to inefficiencies of multiple sites increase to 0.2 (Y88 to Y91)	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	
574	30	50						CNSC CONSTRUCTION LICENCE																
								Can share knowledge between sites Some efficiencies gained through sharing of knowledge (Y92 to Y94). Licensing process is shorther than in CES. CES involves a comprehensive EA with a Panel and RES comphrensive with no Panel.	Labour	0.2	2631	0.2	526.2											526	
									Materials and Equipment	0.2				0	0.2	0								0	2
									Other	0.2							6,264	0.2	1252.8					1,253	
									Contingency	0.25										25%	1.0	444.8		445	
574	30	60						OTHER GOVN'MT APPROVALS																
574	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 (Y92 to Y95)	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
574	30	60	30	FEDERAL APPROVALS																				
				Y92 to Y97	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
574	30	60	40	PROVINCIAL APPROVALS																				
				Y92 to Y97	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
574	30	60	50	MUNICIPAL APPROVALS																				
				Y92 to Y97	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
574	30	65		CNSC OPERATING LICENCE (Initial Application)																				
				Y96 & Y97	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
574	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																				
				CES duration is 330 years. Costs incurred in RES during period Y37 to Y312 or 276 years. Thus assume a factor of 84%. Significant effeciencies gained because of renewal at 3 sites.	Labour	0.25	32754	0.25	8188.5															8,189
					Materials and Equipment	1				0	1	0												0
				Expenses at $72K/a x 276 yrs = $19,872K	Other	1							19,872	1	19872									19,872
					Contingency	0.25										25%	1.0	7,015.1						7,015

Total	**37,986**
Check: Should = 0	**0**

					Total		9,076				Total		0				Total		21,313				Total	7,597.2
					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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	35	0	0	0	0	0	0	0 Public Affairs	Labour		OPG	RJH	1	97	10	0	0	NO DATA TO FILL	1367.5
574	35	0	0	0	0	0	0	0 Public Affairs	Materials and Equipment		OPG	RJH	1	97	10	0	0		0.0
574	35	0	0	0	0	0	0	0 Public Affairs	Other		OPG	RJH	1	97	10	0	0		820.0
574	35	0	0	0	0	0	0	0 Public Affairs	Contingency		OPG	RJH	1	97	10	0	0		1093.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
Labour	1368		*0.0*	1367.5	
Materials and Equipment	0		*0.0*	0.0	
Other	820		*0.0*	820.0	
Contingency	1093.8		*0.0*	1093.8	
Total	3281		*0.0*	3281	

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

ACTIVITY DETAIL ESTIMATE

								A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								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
1	2	3	4	5	6	7	8	WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency				TOTAL	
																				Cost $k	
574	35							**Public Affairs**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
574	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
								Y91	Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
574	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
								Y92 to Y94	Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
574	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
								Y95 to Y97	Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
574	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
								Y1 to Y3 & Y91 to Y97	Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							170	0.1	17				17	
									Contingency	50%										50%	1.0	185.0	185	

574	35	120	Community Offsets & Benefits															
			Y95 to Y97	Labour	0.25	0	0.25	0										0
				Materials and Equipment	0.25				0	0.25	0							0
				Other	0.25							2,072	0.25	518				518
				Contingency	50%										50%	1.0	259.0	259
															Total			**3,281**
															Check: Should = 0			**0**
					Total			1,368	Total		0	Total		820	Total		1,093.8	
					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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	8	50	5	0	0	NO DATA TO FILL	5344.2
574	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	8	50	5	0	0		7811.0
574	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	8	50	5	0	0		36.6
574	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	8	50	5	0	0		5950.8

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	5344	*0.0*	5344.2
Materials and Equipment	7811	*0.0*	7811.0
Other	37	*0.0*	36.6
Contingency	5950.8	*0.0*	5950.8
Total	19143	*0.0*	19143

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8																TOTAL	
											Labour			Materials and other Equipment			Other			Contingency			Cost $k	
574	40							**Facility Design & Construction**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
574	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 additional land acquisition costs neccesary	Other	0.0							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
574	40	30						COMMON ANCILLARY FACILITIES																
574	40	30	10					ADMIN AND SUPPORT FACILITIES																
574	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0								comment 7		0
									Materials and Equipment	0.00				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
574	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0								comment 7		0
									Materials and Equipment	0.00				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
574 40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0							comment 7		0
					Materials and Equipment	0.00				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
574 40	30	10	4	STORAGE CASK STORE														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0							comment 7		0
					Materials and Equipment	0.00				1,892.0	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
574 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
574 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
574 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
574 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
574 40	30	10	9	WAREHOUSE BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0							comment 7		0
					Materials and Equipment	0.00				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
574	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																			
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0												comment 7		0
						Materials and Equipment	0.00				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%	1.25	0.0		0
574	40	30	10	11	TRUCK INSP'N / WASH STATION																			
					not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0												comment 7		0
						Materials and Equipment	0.00				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
574	40	30	10	12	UTILITY BLDG																			
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0												comment 7		0
						Materials and Equipment	0.00				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
574	40	30	10	13	TEST FACILITY CONSTRUCTION																			
					Taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3 OPG sites therefore factor 0.33.	Labour	0.33	766.8	0.3	255.6														256
						Materials and Equipment	0.33				1,675.0	0.3	558.3											558
					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	20.0%													20%	1.0	162.8		163
574	40	30	20		OTHER SITE SYSTEMS																			
574	40	30	20	1	FIRE PROTECTION SYSTEMS																			
					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
574	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																			
					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
574	40	30	20	3	ELECTRICAL AND EMERGENCY POWER																			
					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
574 40	30	20	4	SANITARY SEWER SYSTEM																
				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
574 40	30	20	5	POTABLE WATER SYSTEM																
				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
574 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
574 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
574 40	30	20	8	CONST'N 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
574 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
574 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

574 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
574 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
			allowance for consumption for construction of 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	**19,143**
																		Check: Should = 0	**0**
						Total	5,344		Total	7,811		Total	37		Total	5,950.8			
						Check: Should = 0	0		Check: Should = 0	0		Check: Should = 0	0		Check: Should = 0	0			

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	4	299	296	0	0	NO DATA TO FILL	1116601.2
574	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	4	299	296	0	0		1486125.9
574	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	4	299	296	0	0		870772.0
574	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	4	299	296	0	0		960753.7

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	1116601	*-2357.4*	1116601.2
Materials and Equipment	1486126	*0.0*	1486125.9
Other	889161	*-3207.7*	870772.0
Contingency	960754	*-1669.5*	960753.7
Total	4452642	*-7234.6*	4,434,253

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																	
574	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
574	45	20						OPERATIONS - EXTENDED MONITORING																
574	45	20	5					PROGRAM MANAGEMENT																
									Labour	0.27	312,354.0	0.27	84,335.6										84,336	
								Entries in CES DET applicable to RES but duration 276 years RES & 300 years CES therefore 276/300 of labour costs. Bruce assumed to have 2.6 staff vs 9 in CES. Thus factor is 27%.															
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0	
								Annual cost is $1,404K/a x 276 yrs	Other	1.00							387,504.0	1.0	387,504.0				387,504	1
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	94,367.9	94,368	
574	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING																
								Reduced duration to CES (276/300). One staff for RES vs 5 in CES. Combined factor = (276/300) x (1/5) = 0.18	Labour	0.18	150,328.0	0.18	27,059.0											27,059	
								Annual costs = $1K/a x 276 yrs	Materials and Equipment	1.00				276.0	1.0	276.0							276	
								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	13,667.5	13,668	

574	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)																	
					Labour	0.35	875,048.0	0.35	306,266.8												306,267
				Entries in CES DET applicable to RES but duration 276 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 276/300 x 13/34 = 0.35. Annual M&E costs are $150K/a x 276 yrs = $41400K	Materials and Equipment	1.00				41,400.0	1.0	41,400.0								41,400
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 276 years = $91080K	Other									91,080.0							91,080
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	131,624.0			131,624
574	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																	
				RES has duration 276 years & 300 years for CES. RES staff is 3 vs 5 in CES. Factor is 276/300 x 3/5 = 0.55	Labour	0.55	148,529.0	0.55	81,691.0												81,691
				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
				Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	20,422.7			20,423
574	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																	
				RES duration is 276 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 276 yrs = $910.8K. Other costs is $0.7K/a x 276 yrs = $193.2K.	Labour	0.20	4,631.0	0.20	926.2												926
					Materials and Equipment	1.0				910.8	1.0	910.8									911
					Other	1.0							193.2	1.0	193.2						193
				Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	1,015.1			1,015
574	45	20	80	RECEIPT & TRANSFER (EQUIP)																	
				No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0												0
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5				3,000.0	0.5	1,500.0									1,500
				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	450.0			450
574	45	30		OPERATIONS - FACILITY REPEATS																	
574	45	30	20	STORAGE BUILDINGS 100 YEAR REPLACEMENT																	
				labour for demolition of previous stores and construction of new = factor 5/17 (0.29) (stores qty) labour for fuel transfer = 17/30 (years for transfer) factor = 17/30= use factor (0.45)	Labour	0.45	89,923.0	0.45	40,465.4												40,465
				const'n materials = 8 bldgs RES, 17 bldgs CES factor =8/17	Materials and Equipment	0.47				41,803.0	0.5	19,672.0									19,672
				waste disposal = 8 bldgs RES, 17 bldgs CES factor =8/17	Other	0.47							43,879.0	0.5	20,648.9						20,649
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	24,235.9			24,236
574	45	30	50	STORAGE BUILDINGS 200 YEAR REPLACEMENT																	
				assumed same as 100 yr replacement	Labour	0.45	89,923.0	0.45	40,465.4												40,465
				assumed same as 100 yr replacement	Materials and Equipment	0.45				41,803.0	0.5	18,811.4									18,811
				assumed same as 100 yr replacement	Other	0.45							43,879.0	0.5	19,745.6						19,746
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	23,706.7			23,707

574	45	30	70			STORAGE BUILDINGS 300 YEAR REPLACEMENT																	
						assumed same as 100 yr replacement	Labour	0.45	89,923.0	0.45	40,465.4											40,465	
						assumed same as 100 yr replacement	Materials and Equipment	0.45				41,803.0	0.5	18,811.4									18,811	
						assumed same as 100 yr replacement	Other	0.45							43,879.0	0.5	19,745.6						19,746	
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	23,706.7		23,707	
574	45	40				OPERATIONS - REPACKAGING																	
574	45	40	5			PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																	
							Labour	0.21	389,170.0	0.21	81,930.5											81,931	
						Entries in CES DET applicable to RES but duration 60 years RES 3x(2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 14yr operations) & 114 years CES therefore 60/114 of labour cost s. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).															
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0	
						property tax based on 60 year duration (3x20 year periods)	Other	1.00							111,840.0	1.0	111,840.0						111,840	2
						Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	38,754.1		38,754	
574	45	40	10			MODULE TO CASK 100 YEAR REPACKAGING																	
574	45	40	10	10		DECOMMISSIONING OF EXISTING FACILITIES																	
						assume decommissioning of existing process building (from interim period) same costs as CES process building	Labour	1.0	2,357.4	1.00	2,357.4											2,357	
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0	
							Other	1.0							3,207.7	1.0	3,207.7						3,208	
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,669.5		1,670	
574	45	40	10	20		CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1											476	
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6									355	
						RPM Repackaging plant same as CES facility therefore factor = 1	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	
574	45	40	10	30		PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																	
574	45	40	10	30	20	RPM EQUIP. DESIGN, SUPPLY & INSTALL																	
574	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)																
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2											276	
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0									5,523	
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							290.0	1.0	290.0						290	

							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,826.8	1,827
574	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)														
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6									2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1						11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							685.4	1.0	685.4			685
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	4,317.9	4,318
574	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)														
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3									2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4						13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							823.0	1.0	823.0			823
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,184.8	5,185
574	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)														
							No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0									0
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0						5,055
							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	1,516.5	1,517
574	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0									233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0						2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							128.0	1.0	128.0			128
							Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	538.6	539
574	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N														
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2									8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7						8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							1,624.3	1.0	1,624.3			1,624
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,593.3	5,593
574	45	40	10	30	60		BUILDING SERVICES (RPM)														
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2									11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4						9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							3,486.7	1.0	3,486.7			3,487
							Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	5,994.6	5,995
574	45	40	10	30	70		COMMISSIONING (RPM)														

						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8												1,253
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							232.1	1.0	232.1						232
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	742.5			742
574	45	40	10	30	80	CONST'N INDIRECTS (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3												14,668
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							518.6	1.0	518.6						519
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,556.1			4,556
574	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7														
						replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2												21,056
							Materials and Equipment	1.00				29,785.1	1.0	29,785.1									29,785
						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	22%										22%	1.0	11,185.1			11,185
574	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8												274
						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	136.9			137
574	45	40	10	600		REPACKAGING OPERATIONS (RPM)																	
						repackaging of 3929 RES casks compared to 8528 CES factor = 3929/8528	Labour	0.46	118,823.0	0.46	54,743.9												54,744
						procurement of 3929 RES casks compared to 8528 CES factor = 3929/8528	Materials and Equipment	0.46				788,840.0	0.5	363,432.5									363,433
						disposal of 3929 RES casks compared to 8528 CES factor = 3929/8529	Other	0.46							110,864.0	0.5	51,077.0						51,077
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	140,776.0			140,776
574	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																	
						duration 17 years RES (1 demolish prev, 2const'n, 14 transfer ops) compared to 30 years CES. Factor =17/30 = 0.566	Labour	0.6	11,882.0	0.57	6,733.1												6,733
						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	1,683.3			1,683
574	45	40	10	700		OPERATION INDIRECTS (RPM)																	

						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.47	Labour	0.47	16,070.0	0.47	7,499.3											7,499
						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.4	Materials and Equipment	0.47				380.5	0.5	177.6										178
						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.5	Other	0.47							16,200.0	0.5	7,560.0							7,560
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,571.1		4,571
574	45	40	10	800		STORAGE OPERATIONS (RPM)																
						transfer of 3929 casks RES compared to 8528 casks CES	Labour	0.46	2,093.9	0.46	964.7											965
						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	30%										30%	1.0	289.4		289
574	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING																
						Costs taken by addition of individual entries in 574-45-40-10 (100 year repackaging)	Labour				135,372.1											135,372
						Costs taken by addition of individual entries in 574-45-40-10 (100 year repackaging)	Materials and Equipment							449,501.4										449,501
						Costs taken by addition of individual entries in 574-45-40-10 (100 year repackaging)	Other										69,861.2							69,861
						Costs taken by addition of individual entries in 574-45-40-10 (100 year repackaging)	Contingency														190,900.0			190,900
574	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING																
574	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING																
						Costs taken as same as 200 year repackaging	Labour				135,372.1											135,372
						Costs taken as same as 200 year repackaging	Materials and Equipment							449,501.4										449,501
						Costs taken as same as 200 year repackaging	Other										69,861.2							69,861
						Costs taken as same as 200 year repackaging	Contingency														190,900.0			190,900
574	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS																
574	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL																
						No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0											0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5										6,472
						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	1,941.5		1,941
574	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)																
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1											372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1										372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							74.4	1.0	74.4							74

						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	245.6	246
574	45	40	30	30	60	BUILDING SERVICES (MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9								384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5					311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							97.9	1.0	97.9				98
						Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	198.1	198
574	45	40	30	30	70	COMMISSIONING(MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1								334
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							53.2	1.0	53.2				53
						Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	193.7	194
574	45	40	30	30	80	CONST'N INDIRECTS (MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8								724
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							25.5	1.0	25.5				26
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	224.8	225
574	45	40	30	600		REPACKAGING OPERATIONS (Module to Module)													
						MM repackaging operations factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Labour	0.28	17,823.5	0.28	5,065.8								5,066
						Module procurement factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.28				102,336.0	0.3	29,086.1					29,086
						module waste disposal factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Other	0.28							35,817.6	0.3	10,180.1				10,180
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	13,299.6	13,300

Total	**4,434,253**
Check: Should = 0	**0**

Total	1,116,601	Total	1,486,126	Total	889,161	Total	960,753.7
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 1404k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (105,022k$) at rate 2.87%)

2 1864k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (105022k$) at rate 2.87%). this tax runs for 3X20 years = 60 years. A portion of this tax over 60 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)

3

4

5

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Labour		OPG	RJH	37	312	276	0	0	NO DATA TO FILL	93374.3
574	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	37	312	276	0	0		8280.0
574	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Other		OPG	RJH	37	312	276	0	0		2745.5
574	55	0	0	0	0	0	0	0 Environmental Assessment and Monitoring	Contingency		OPG	RJH	37	312	276	0	0		31199.7

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
Labour	93374		0.0	93374.3	
Materials and Equipment	8280		0.0	8280.0	
Other	2746		0.0	2745.5	
Contingency	31199.7		0.0	31199.7	
Total	135599		0.0	135599	

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																	

Total OPG fuel inventory on 3 sites is 93% of CES inventory. Therefore it is assumed that the total cost of EA & Monitoring program is same as total cost for CES. Therefore have assumed that the annual costs would be same as for CES and that there would be reduction due to shorter duration of program. Exceptions are noted below.

											CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
574	55							**Environmental Assessment and Monitoring**																
574	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over 276 yrs vs CES at 347 yrs. RES has 0.5 staff vs 2 staff in CES. Factor is 276/347 x 0.5/2 = 0.2	Labour	0.2	70306	0.2	14061.2											14,061
									Materials and Equipment	1				0	1	0								0
								Expenses at $3k/a x 276 = $828K	Other	1							828	1	828					828
									Contingency	0.3										14889.2	0.3	4466.76		4,467
574	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years (Y92 to Y94) with with some preparation work in Y91; ie total of 4 years. Due to multiple sites with same technology can share costs. EA process is simplier since repeating technology at 3 sites.	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	0.25										2405.25	0.25	601.3125	601
574	55	40	GROUNDWATER MONITORING														
			RES = 276 yrs vs CES = 330 yrs. Factor is 276/330 x 0.2/0.6 = 0.279 (Y37 to Y312)	Labour	0.279	37158	0.279	10367.082									10,367
			M&E @ $6K/a x 276 yrs = $1,656K	Materials and Equipment	1				1656	1	1656						1,656
			Other @ $4K x 276 yrs = $1,104K	Other	1							1,104	1	1104			1,104
				Contingency	0.3										13127.082	0.3	3938.1246	3,938
574	55	50	RADIOLOGICAL BIOSPHERE MONITORING														
			RES = 276 yrs vs CES = 330 yrs. Factor is 276/330 x 1/3.3 = 0.253 (Y37 to Y312)	Labour	0.253	217280	0.253	54971.84									54,972
			M&E costs at $18K/a x 276 yrs = $4,968K	Materials and Equipment	1				4968	1	4968						4,968
				Other	1							0	1	0			0
				Contingency	0.3										59939.84	0.3	17981.952	17,982
574	55	60	NON-RAD BIOSPHERE MONITORING														
			RES = 276 yrs vs CES = 330 yrs. Factor is 276/330 x 0.2/0.8 = 0.21 (Y37 to Y312)	Labour	0.21	53590	0.21	11253.9									11,254
			M&E costs at $6K/a x 276 yrs = $1,656K	Materials and Equipment	1				1656	1	1656						1,656
				Other	1							0	1	0			0
				Contingency	0.3										12909.9	0.3	3872.97	3,873
574	55	80	HUMAN HEALTH MONITORING														
			RES = 276 yrs vs CES = 330 yrs. Factor is 276/330 x 0.03/0.17= 0.148	Labour	0.148	5760	0.148	852.48									852
				Materials and Equipment	1				0	1	0						0
			Expenses at $1K/a x 276 yrs = $276K	Other	1							276	1	276			276
				Contingency	0.3										1128.48	0.3	338.544	339

																Total	**135,599**
																Check: Should = 0	**0**
				Total		93,374			Total		8,280	Total		2,746	Total		31,199.7
				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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

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
574	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	4	4	0	0	NO DATA TO FILL	587.7
574	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	4	4	0	0		0.0
574	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	4	4	0	0		580.8
574	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	4	4	0	0		233.7

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Budget costs to Years by %	Total Cost $k
			0%		
Labour	588		*0.0*		587.7
Materials and Equipment	0		*0.0*		0.0
Other	581		*0.0*		580.8
Contingency	233.7		*0.0*		233.7
Total	1402		*0.0*		1402

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																	
574	90							**Program Management**																
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Bruce			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								based on 5 staff. Assume 3 x OPG01, 2 x OPG03 for 4 year duration	Labour	0.24	2448.8436	0.24	587.722464										588	
								no entry	Materials and Equipment	0				0	0	0							0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							2420	0.24	580.8				581	
								Contingency as CES value	Contingency	20%										20%	1.0	233.7	234	

Total	588	Total	0	Total	581	Total	233.7	
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	

Total	**1,402**
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.

RES ALTERNATIVE
WBS No 574
CASKS IN STORAGE BUILDINGS (CSB)
BRUCE

Cost Category	Total K$
Labour	1,235,568
Materials and Equipment	1,502,668
Other	897,022
Contingency	1,010,975
Total Cost	**4,646,233**

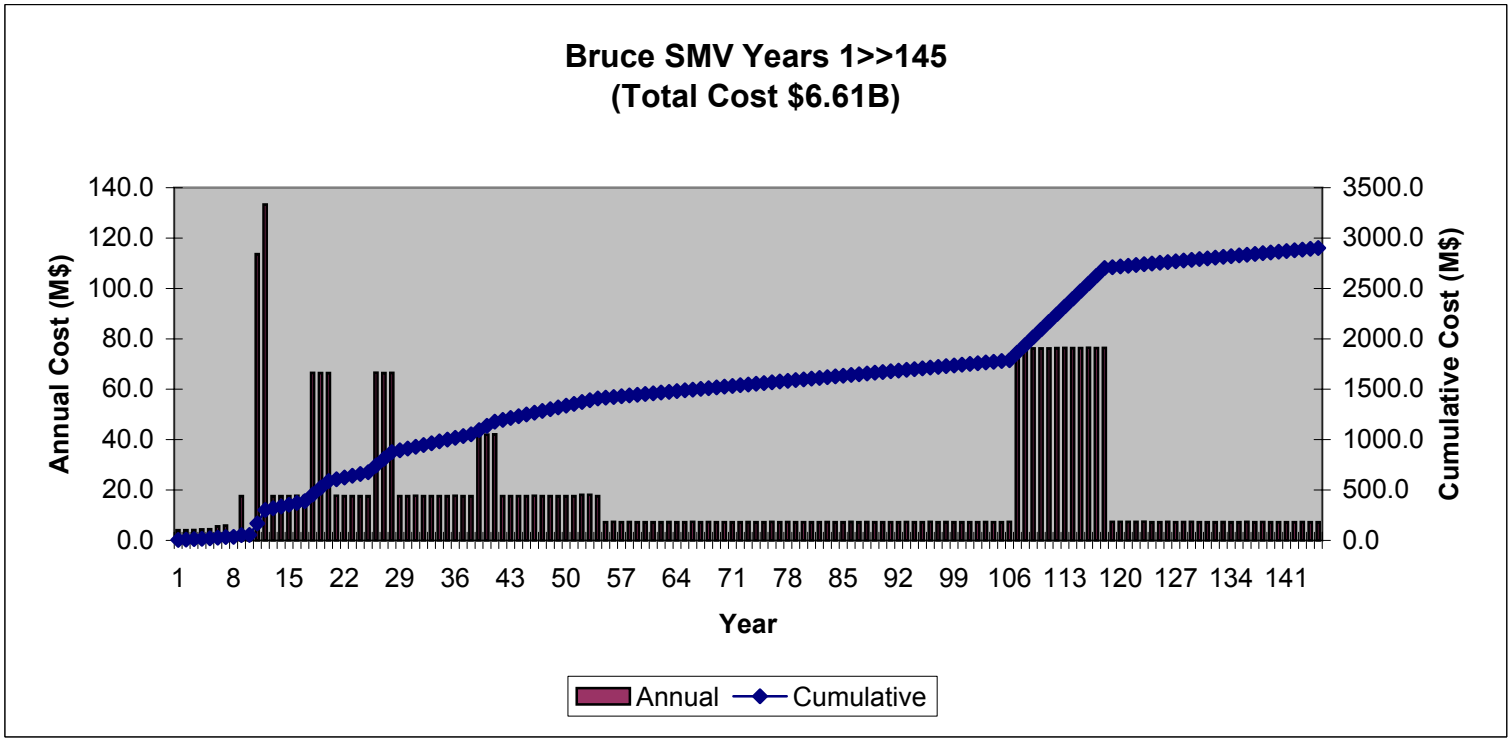
4,646,233

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$
574	15	0	0	0	0	0	0	RJH	Labour	0	1	94	7	0	452
574	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	94	7	0	0
574	15	0	0	0	0	0	0	RJH	Other	0	1	94	7	0	97
574	15	0	0	0	0	0	0	RJH	Contingency	0	1	94	7	0	275
574	20	0	0	0	0	0	0	AM	Labour	0	90	96	7	0	5,137
574	20	0	0	0	0	0	0	AM	Materials and Equipment	0	90	96	7	0	452
574	20	0	0	0	0	0	0	AM	Other	0	90	96	7	0	203
574	20	0	0	0	0	0	0	AM	Contingency	0	90	96	7	0	2,239
574	25	0	0	0	0	0	0	RJH	Labour	0	1	312	279	0	3,628
574	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	312	279	0	0
574	25	0	0	0	0	0	0	RJH	Other	0	1	312	279	0	454
574	25	0	0	0	0	0	0	RJH	Contingency	0	1	312	279	0	1,633
574	30	0	0	0	0	0	0	RJH	Labour	0	37	312	276	0	9,076
574	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	37	312	276	0	0
574	30	0	0	0	0	0	0	RJH	Other	0	37	312	276	0	21,313
574	30	0	0	0	0	0	0	RJH	Contingency	0	37	312	276	0	7,597
574	35	0	0	0	0	0	0	RJH	Labour	0	1	97	10	0	1,368
574	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	97	10	0	0
574	35	0	0	0	0	0	0	RJH	Other	0	1	97	10	0	820
574	35	0	0	0	0	0	0	RJH	Contingency	0	1	97	10	0	1,094
574	40	0	0	0	0	0	0	AM	Labour	0	8	50	5	0	5344.18
574	40	0	0	0	0	0	0	AM	Materials and Equipment	0	8	50	5	0	7810.98333
574	40	0	0	0	0	0	0	AM	Other	0	8	50	5	0	36.63
574	40	0	0	0	0	0	0	AM	Contingency	0	8	50	5	0	5950.76367
574	45	0	0	0	0	0	0	AM	Labour	0	4	299	296	0	1,116,601
574	45	0	0	0	0	0	0	AM	Materials and Equipment	0	4	299	296	0	1,486,126
574	45	0	0	0	0	0	0	AM	Other	0	4	299	296	0	870,772
574	45	0	0	0	0	0	0	AM	Contingency	0	4	299	296	0	960,754
574	55	0	0	0	0	0	0	RJH	Labour	0	37	312	276	0	93,374
574	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	37	312	276	0	8,280
574	55	0	0	0	0	0	0	RJH	Other	0	37	312	276	0	2,746
574	55	0	0	0	0	0	0	RJH	Contingency	0	37	312	276	0	31,200
574	90	0	0	0	0	0	0	AM	Labour	0	1	4	4	0	588
574	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	4	4	0	0
574	90	0	0	0	0	0	0	AM	Other	0	1	4	4	0	581
574	90	0	0	0	0	0	0	AM	Contingency	0	1	4	4	0	234

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 575
BRUCE
SURFACE MODULAR VAULTS **(SMV)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	22,974
25	Safety Assessment	5,931
30	Licensing & Approvals	41,715
35	Public Affairs	3,281
40	Facility Design & Construction	263,184
45	Facility Operation	6,115,291
55	Environmental Assessment and Monitoring	151,426
90	Program Management	5,369
	Total Cost ($k)	**6,609,995**

Bruce SMV Alternative	**6,609,995**
Siting Phase	**41,145**
Siting	824
EA	3,752
System Development	22,974
SA	1,365
L&A	3,580
Public Affairs	3,281
Program Mgmt	5369
Construction Phase	**263,184**
Intial construction	259,720
Transition to Standalone	3,464
Operations Phase	**6,305,666**
Repeat & Repackaging	*4,334,065*
Initial Fuel receipts	1,080,464
SMV - 100 yrs	726,817
SMV - 200 yrs	726,817
SMV - 300 yrs	819,045
Repackaging M to M - 300 yrs	677,771
PM for Repeats & Repackaging	303,151
Extended Monitoring	*1,971,602*
Program Mgmt	1,081,496
Monitoring Survelliance	14,940
Operation Indirects	567,717
Common Ancillary Services Ops	108,055
Fuel Integrity Monitoring	9,019
SA - Ops & Decommissioning	4,566
L&A - Ops Licence Renewal	38,136
Environmental Monitoring	147,674


Bruce SMV Years 1>>145
(Total Cost $6.61B)
Annual Cost (M$)
Cumulative Cost (M$)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
1
8
15
22
29
36
43
50
57
64
71
78
85
92
99
106
113
120
127
134
141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	9	7	0	0	NO DATA TO FILL	452.2
575	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	9	7	0	0		0.0
575	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	9	7	0	0		97.0
575	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	9	7	0	0		274.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Budget costs to Years by %	Total Cost $k
			0%		
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
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	
											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																	
575	15							**Siting**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575	15	10						SITING MANAGEMENT																
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites	Labour	0.05	4897.7	0.05	244.885										245
									Materials and Equipment	0.05				0	0.05	0								0
									Other	0.05							1,300	0.05	65					65
									Contingency	50%										50%	1.0	154.9		155
575	15	70						PREFERRED SITE																
575	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
									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
575	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 10% of a CES greenfield site	Labour	0.1	1484.8	0.1	148.48										148
									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
																							Total	824
																							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		

BASIS OF ESTIMATE NOTES - Insert references and notes

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	1	7	7	0	0	NO DATA TO FILL	15086.6
575	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	1	7	7	0	0		1053.5
575	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	1	7	7	0	0		336.9
575	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	1	7	7	0	0		6497.1

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	14548	*0.0*	15086.6
Materials and Equipment	1054	*0.0*	1053.5
Other	876	*0.0*	336.9
Contingency	6497.1	*0.0*	6497.1
Total	22974	*0.0*	22974

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
575	20							**System Development**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
575								**OPG has 3 sites Pickering, Bruce and Darlington. SMV (Surface Modular Vaults) is a storage alternative applicable to each site. The system development for the SMV alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites SMV workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.**																
575	20	2						SYSTEM DEVELOPMENT MANAGEMENT																	
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Labour	0.25	7980.70	0.25	1955.27										1,955
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Other	0.25							300.00	0.25	73.50				74
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	608.6	609
575	20	5						SYSTEM OPTIMIZATION																	
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technology but with existing processing facilities an additional 30% is deducted. Assume additional	Labour	0.25	5011.20	0.25	1227.74										1,228
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Other	0.25							120.00	0.25	29.40				29
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.00	377.14	377
575	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																	

			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, but not developed in SMV	Labour	0.25	30642.60	0.25	7507.44											7,507
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is	Materials and Equipment	0.25				4300.00	0.25	1053.50								1,054
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is	Other	0.25							895.00	0.25	219.28					219
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.00	4390.11		4,390
575	20	30	STORAGE SYSTEM ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for new technology storage option the factor = 100% with a deduction	Labour	0.25	14295.80	0.25	3502.47											3,502
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is	Labour	0.25							2200.00	0.25	539.00					539
			Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.00	1010.37		1,010
575	20	40	SECURITY & SAFEGUARD ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and	Labour	0.25	1447.70	0.25	354.69											355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and	Other	0.25							60.00	0.25	14.70					15
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8		111
																		Total	**22,974**
																		Check: Should = 0	**0**
						Total		14,548	Total		1,054	Total		876	Total		6,497.1		
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0		

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	25							Safety Assessment	Labour		OPG	RJH	1	322	46			3721.1
575	25							Safety Assessment	Materials and Equipment		OPG	RJH	1	322	46			
575	25							Safety Assessment	Other		OPG	RJH	1	322	46			515.0
575	25							Safety Assessment	Contingency		OPG	RJH	1	322	46			1694.4

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	3721		3721.1
Materials and Equipment			
Other	515		515.0
Contingency	1694.4		1694.4
Total	5931		5931

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

ACTIVITY DETAIL ESTIMATE

											A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
575	25							**Safety Assessment**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	Cost $k	
575	25	10						SAFETY ASSESMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	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	
575	25	30						SA - SITING																
								Very limited siting work leads to no SA costs	Labour		2287.5													2
									Materials and Equipment															
									Other								3,850							
									Contingency	40%										40%	1.0			
575	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	
575	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between 5 sites with same technoilogy; thus reduce factor to 0.25	Labour	0.25	9604.8	0.25	2401.2										2,401	
									Materials and Equipment	1					1									
								Expenses at $1K/a x 310 yrs	Other	1							310	1	310				310	
									Contingency	40%										40%	1.0	1,084.5	1,084	
575	25	70						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 0.2	Labour	0.2	2449.9	0.2	489.98												490
	Materials and Equipment	0.2				0.2											
	Other	0.2						300	0.2	60							60
	Contingency	40%									40%	1.0	220.0				220
																Total	**5,931**
																Check: Should = 0	
			Total		3,721	Total		Total		515	Total		1,694.4				
			Check: Should = 0			Check: Should = 0		Check: Should = 0			Check: Should = 0						

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	30							Licensing & Approvals	Labour		OPG	RJH	1	322	322			9252.7
575	30							Licensing & Approvals	Materials and Equipment		OPG	RJH	1	322	322			
575	30							Licensing & Approvals	Other		OPG	RJH	1	322	322			24119.5
575	30							Licensing & Approvals	Contingency		OPG	RJH	1	322	322			8343.0

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	9253		9252.7
Materials and Equipment			
Other	24120		24119.5
Contingency	8343.0	*0.0*	8343.0
Total	41715		41715

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																
575																							
575	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575	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				0.2										1
									Other	0.2						40	0.2	8				8	
									Contingency	0.25									25%	1.0	29.8	30	
575	30	50						CNSC CONSTRUCTION LICENCE																
								Can share knowledge between sites Efficiencies gained through sharing of knowledge bewteen sites. Licensing process shorter than CES at 7yrs with RES being 3 years. CES involves comprehensive with Panel and RES would likely be a comprehensive with no Panel.	Labour	0.25	2631	0.25	657.75										658	2
									Materials and Equipment	0.25				0.25										
									Other	0.25						6,264	0.25	1566				1,566	
									Contingency	0.25									25%	1.0	555.9	556	
575	30	60						OTHER GOVN'MT APPROVALS																
575	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				0.2							
					Other	0.2						0.2					
					Contingency	0.25								25%	1.0	16.9	17
575	30	60	30	FEDERAL APPROVALS													
					Labour	0.25	133	0.25	33.25								33
					Materials and Equipment	0.25				0.25							
					Other	0.25						0.25					
					Contingency	0.25								25%	1.0	8.3	8
575	30	60	40	PROVINCIAL APPROVALS													
					Labour	0.25	133	0.25	33.25								33
					Materials and Equipment	0.25				0.25							
					Other	0.25						0.25					
					Contingency	0.25								25%	1.0	8.3	8
575	30	60	50	MUNICIPAL APPROVALS													
					Labour	0.25	133	0.25	33.25								33
					Materials and Equipment	0.25				0.25							
					Other	0.25						0.25					
					Contingency	0.25								25%	1.0	8.3	8
575	30	65		CNSC OPERATING LICENCE (Initial Application)													
					Labour	0.25	513	0.25	128.25								128
					Materials and Equipment	0.25				0.25							
					Other	0.25					902	0.25	225.5				226
					Contingency	0.25								25%	1.0	88.4	88
575	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)													
				CES duration is 330 years. Costs incurred in RES during period Y13 to Y322 or 310 years. Some effeciencies gained because of renewal on three sites. Thus assume a factor of 25%	Labour	0.25	32754	0.25	8188.5								8,189
					Materials and Equipment	1				1							
				Expenses at $72K/a x 310 yrs	Other	1					22,320	1	22320				22,320
					Contingency	0.25								25%	1.0	7,627.1	7,627
															Total		**41,715**
															Check: Should = 0		
							Total		9,253	Total	Total		24,120	Total		8,343.0	
							Check: Should = 0			Check: Should = 0	Check: Should = 0			Check: Should = 0			

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	35	0	0	0	0	0	0	Public Affairs	Labour		OPG	RJH	1	12	10	0	0	NO DATA TO FILL	1367.5
575	35	0	0	0	0	0	0	Public Affairs	Materials and Equipment		OPG	RJH	1	12	10	0	0		0.0
575	35	0	0	0	0	0	0	Public Affairs	Other		OPG	RJH	1	12	10	0	0		820.0
575	35	0	0	0	0	0	0	Public Affairs	Contingency		OPG	RJH	1	12	10	0	0		1093.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Budget costs to Years by %	Total Cost $k
			0%		
Labour	1368		*0.0*		1367.5
Materials and Equipment	0		*0.0*		0.0
Other	820		*0.0*		820.0
Contingency	1093.8		*0.0*		1093.8
Total	3281		*0.0*		3281

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																	
575	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575	35	45						PUBLIC AFFAIRS - APPROVED SITE																
									Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
575	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
575	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
575	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							170	0.1	17				17	
									Contingency	50%										50%	1.0	185.0	185	

575 35 120 Community Offsets & Benefits

Labour	0.25	0	0.25	0											0
Materials and Equipment	0.25				0	0.25	0								0
Other	0.25							2,072	0.25	518					518
Contingency	50%										50%	1.0	259.0		259
													Check: Should = 0		0
		Total		1,368	Total		0	Total		820	Total			1,093.8	
		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

2

3

4

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	40	0	0	0	0	0		0 Facility Design & Construction	Labour		CTECH	AM	6	53	48	0	0	NO DATA TO FILL	61660.3
575	40	0	0	0	0	0		0 Facility Design & Construction	Materials and Equipment		CTECH	AM	1	347	347	0	0		110745.0
575	40	0	0	0	0	0		0 Facility Design & Construction	Other		CTECH	AM	1	347	347	0	0		39125.7
575	40	0	0	0	0	0		0 Facility Design & Construction	Contingency		CTECH	AM	1	347	347	0	0		51652.7

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	61660	*0.0*	61660.3
Materials and Equipment	110745	*0.0*	110745.0
Other	39126	*0.0*	39125.7
Contingency	51652.7	*0.0*	51652.7
Total	263184	*0.0*	263184

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
575	40							**Facility Design & Construction**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575	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 additional land acquisition costs neccesary	Other	0.0							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	
575	40	20	20	10				RECEIPT & TRANSFER (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	120.3	1.0	120.3										120	
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				2,406.6	1.0	2,406.6							2,407	
								Operations as CES. Facility based on CES figures.	Other	1.0							126.3	1.0	126.3				126	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	796.0	796	
575	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	1,464.4	1.0	1,464.4										1,464	
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				9,762.4	1.0	9,762.4							9,762	
								Operations as CES. Facility based on CES figures.	Other	1.0							561.3	1.0	561.3				561	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,536.4	3,536	
575	40	20	20	40				COMMON CRANE MAINTENANCE AREA (EQUIP)																

				Operations as CES. Facility based on CES figures.	Labour	1.0	338.7	1.0	338.7										339
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				2,258.3	1.0	2,258.3							2,258
				Operations as CES. Facility based on CES figures.	Other	1.0							129.9	1.0	129.9				130
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	818.1	818
575	40	20	30	PROCESSING BUILDING DESIGN & CONST'N															
				Operations as CES. Facility based on CES figures.	Labour	1.0	4,800.0	1.0	4,800.0										4,800
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				4,599.1	1.0	4,599.1							4,599
				Operations as CES. Facility based on CES figures.	Other	1.0							960.0	1.0	960.0				960
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,107.7	3,108
575	40	20	60	PB BUILDING SERVICES DESIGN AND INSTALL'N															
				Operations as CES. Facility based on CES figures.	Labour	1.0	6,630.7	1.0	6,630.7										6,631
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				5,506.5	1.0	5,506.5							5,507
				Operations as CES. Facility based on CES figures.	Other	1.0							1,933.0	1.0	1,933.0				1,933
				Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	3,517.6	3,518
575	40	20	70	COMMISSIONING (PB)															
				Operations as CES. Facility based on CES figures.	Labour	1.0	835.2	1.0	835.2										835
				Operations as CES. Facility based on CES figures.	Materials and Equipment	0.0				0.0	0.0	0.0							0
				Operations as CES. Facility based on CES figures.	Other	1.0							167.0	1.0	167.0				167
				Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	501.1	501
575	40	20	80	CONST'N INDIRECTS (PB)															
				Processing Buildings similar to CES. Facility based on CES figures.	Labour	1.0	9,365.4	1.0	9,365.4										9,365
				Processing Buildings similar to CES. Facility based on CES figures.	Materials and Equipment	0.0				0.0	0.0	0.0							0
				Processing Buildings similar to CES. Facility based on CES figures.	Other	1.0							388.0	1.0	388.0				388
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,926.0	2,926
575	40	30		COMMON ANCILLARY FACILITIES															
575	40	30	10	ADMIN AND SUPPORT FACILITIES															
575	40	30	10	1	ADMIN AND VISITOR RECEPTION BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0									comment 7	0
					Materials and Equipment	0.00				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
575	40	30	10	2	OPS SUPPT & HEALTH PHYSICS BLDG														
				housed in process bldg	Labour	0.00	1,294.8	0.0	0.0									comment 7	0

						Materials and Equipment	0.00			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
575	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0								comment 7		0
						Materials and Equipment	0.00			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
575	40	30	10	4	NEW' MODULE CANISTER STORE															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0								comment 7		0
						Materials and Equipment	0.00			1,892.0	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
575	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
575	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
575	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
575	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
575	40	30	10	9	WAREHOUSE BLDG															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0								comment 7		0

					/45/20/50	Materials and Equipment	0.00				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
575	40	30	10	10	GUARDHOUSE AND SECURITY FENCE														
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0								comment 7	0
						Materials and Equipment	0.00				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	Contingency	20%										20%	1.25	0.0	0
575	40	30	10	11	TRUCK INSP'N / WASH STATION														
					not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0								comment 7	0
						Materials and Equipment	0.00				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
575	40	30	10	12	UTILITY BLDG														
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0								comment 7	0
						Materials and Equipment	0.00				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
575	40	30	10	13	TEST FACILITY CONSTRUCTION														
					Taken as being independent of fuel inventory stored. Same size bldg as CES, facility will be constructed at Bruce but will be shared by OPG sites, therefore Bruce cost is 1/3 of CES total.	Labour	0.3	766.8	0.3	255.6									256
						Materials and Equipment	0.3				1,675.0	0.3	558.3						558
					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	20.0%										20%	1.0	162.8	163
575	40	30	20		OTHER SITE SYSTEMS														
575	40	30	20	1	FIRE PROTECTION SYSTEMS														
					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
575	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM														
					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
575	40	30	20	3	ELECTRICAL AND EMERGENCY POWER														
					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
575	40	30	20	4	SANITARY SEWER SYSTEM														
					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
575	40	30	20	5	POTABLE WATER SYSTEM														
					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
575	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
575	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
575	40	30	20	8	CONST'N 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
575	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
575	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

575	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
575	40	40			STORAGE CONSTRUCTION (Stage 1)																
575	40	40	10	5	CONSTRUCTIION FACILITIES																
					Construction of RES SMV facility, total capacity 1280 tubes (1280/4 per stage) CES capacity 800 tubes, stage 1. Using 6/10 rule for estimating	Labour	0.74	469.5	0.74	345.6											346
						Materials and Equipment	0.74				312.0	0.74	229.6								230
						Other	0.74							112.0	0.74	82.4					82
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	197.3		197
575	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
575	40	40	10	20	STORES EQUIPMENT DESIGN, SUPPLY AND INSTALL'N																
					factor for equipment taken as same as CES	Labour	1.00	5,476.2	1.00	5,476.2											5,476
					factor for equipment taken as same as CES	Materials and Equipment	1.00				12,131.7	1.00	12,131.7								12,132
					factor for equipment taken as same as CES	Other	1.00							0.0	1.00	0.0					0
					Percentage for contingency averaged from figures	Contingency	13%										13%	1.0	2,201.0		2,201
575	40	40	10	30	SURFACE MODULAR VAULT DESIGN AND CONSTRUCTION																
					Factor for services taken as same as for construction	Labour	0.74	2,940.3	0.74	2,164.1											2,164
					Factor for services taken as same as for construction	Materials and Equipment	0.74				89,285.0	0.74	65,715.7								65,716
					Factor for services taken as same as for construction	Other	0.74							47,112.2	0.74	34,675.6					34,676
					Percentage for contingency averaged from figures used in CES	Contingency	20%										20%	1.0	20,511.1		20,511
575	40	40	10	40	COMMISSIONING																
					Same allowance applied as CES	Labour	1.00	164.7	1.00	164.7											165
					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
					Percentage for contingency averaged from figures used in CES	Contingency	40%										40%	1.0	65.9		66
575	40	40	10	50	CONST'N INDIRECTS																
					Same allowance applied as CES	Labour	1.00	17,624.6	1.0	17,624.6											17,625
					Same allowance applied as CES	Materials and Equipment	1.00				110.0	1.0	110.0								110

			Same allowance applied as CES	Other	1.00						0.0	1.0	0.0						0
			Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,320.4	5,320		
575	40	500	COMMISSIONING MANAGEMENT																
			Same allowance applied as CES	Labour	1.0	144.5	1.0	144.5									145		
			Same allowance applied as CES	Materials and Equipment	0.0				0.0	0.0	0.0						0		
			Same allowance applied as CES	Other	1.00						28.9	1.0	28.9				29		
			Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	86.7	87		
575	40	600	EQUIPMENT, SPARES and CONSUMABLES.																
			No entry into cost category	Labour	0.0	0.0	0.0	0.0									0		
			No entry into cost category	Materials and Equipment	1.0				214.1	1.0	214.1						214		
			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	64.2	64		
575	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		
			allowance for consumption for construction of ancillary buildings	Other	0.20						366.3	0.2	73.3				73		
			Contingency included in cost (built into power consumption calculation)	Contingency	0%									0%	1.0	0.0	0		

Total	**263,184**
Check: Should = 0	**0**

Total	61,660	Total	110,745	Total	39,126	Total	51,652.7
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
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	11	322	312	0	0	NO DATA TO FILL	1161355.5
575	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	11	322	312	0	0		1655899.9
575	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	11	322	312	0	0		2117068.3
575	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	11	322	312	0	0		1180967.5

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	1161355	0.0	1161355.5
Materials and Equipment	1655900	0.0	1655899.9
Other	2117068	0.0	2117068.3
Contingency	1180967	0.0	1180967.5
Total	6115291	0.0	6115291

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
575	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575	45	10						OPERATIONS FUEL TRANSFER																
575	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
								Similar duration to CES. Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.5	118,334.0	0.5	59,955.9										59,956	
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0	
								Annual cost = $4,116/a x 42 yrs	Other	1.00							172,872	1.0	172,872				172,872	3
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	46,565.6	46,566	
575	45	10	10					PROCESS BUILDING OPERATIONS																
								Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.55	78,324.0	0.55	43,291.8										43,292	
								Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.55				255,840.0	0.55	141,409.7							141,410	
								No provision in CES	Other	0.00							131,349.0	0.0	0.0				0	
								Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	92,350.8	92,351	
575	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPT)																
								Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.55	32,676.3	0.55	18,061.1										18,061	
								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	0.00							131,349.0	0.0	0.0				0	
								Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	4,515.3	4,515	
575	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPT)																

					Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.55	3,900.0	0.55	2,155.6											2,156
					Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.55				53.0	0.55	29.3										29
					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	1,092.5				1,092
575	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 38 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.63	115,547.0	0.63	73,179.8													73,180
						Materials and Equipment	0.63				1,284.0	0.63	813.2										813
						Other	0.63							16,380.0	0.63	10,374.0							10,374
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	25,310.1				25,310
575	45	10	40		STORAGE OPERATIONS																		
					Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Labour	0.55	30,696.0	0.55	16,966.5													16,967
					Fuel inventory 1920 tubes, (CES 4400). RES duration 38 years compared to 30 year CES.	Materials and Equipment	0.55				200.0	0.6	110.5										111
					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	5,123.1				5,123
575	45	10	50		ADDITIONAL STORAGE CONSTRUCTION																		
575	45	10	50	10	STORAGE CONSTRUCTION STAGE 2																		
					factor for storage const'n stage 2 taken pro rata from stage 1	Labour	0.74	14,792.5	0.74	10,887.6													10,888
					factor for storage const'n stage 2 taken pro rata from stage 1	Materials and Equipment	0.74				91,538.7	0.74	67,374.5										67,374
					factor for storage const'n stage 2 taken pro rata from stage 1	Other	0.74							46,846.7	0.74	34,480.2							34,480
					Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	33,822.7				33,823
575	45	10	50	20	STORAGE CONSTRUCTION STAGE 3																		
					factor for storage const'n stage 3 taken as same as stage 1	Labour	0.74	14,792.5	0.74	10,887.6													10,888
					factor for storage const'n stage 3 taken as same as stage 1	Materials and Equipment	0.74				91,538.7	0.74	67,374.5										67,374
					factor for storage const'n stage 3 taken as same as stage 1	Other	0.74							46,846.7	0.74	34,480.2							34,480
					Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	33,822.7				33,823
575	45	10	50	30	STORAGE CONSTRUCTION STAGE 4																		
					factor for storage const'n stage 4 taken as same as stage 1	Labour	0.74	14,792.5	0.74	10,887.6													10,888
					factor for storage const'n stage 4 taken as same as stage 1	Materials and Equipment	0.74				14,819.0	0.74	10,907.1										10,907
					factor for storage const'n stage 4 taken as same as stage 1	Other	0.74							46,846.7	0.74	34,480.2							34,480
					Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	16,882.5				16,882
575	45	20			OPERATIONS - EXTENDED MONITORING																		
575	45	20	5		PROGRAM MANAGEMENT																		
					Entries in CES DET applicable to RES but duration 267 years RES & 300 years CES therefore 267/300 of labour costs. Bruce assumed to have 2.6 staff vs 9 in CES. Thus factor is 26%.	Labour	0.26	312,652.0	0.26	81,289.5													81,290
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0										0

				Annual cost = $3,071/a x 267 yrs	Other	1.00						819,957.0	1.0	819,957.0				819,957	1
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	180,249.3	180,249	
575	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING															
				Reduced duration to CES (267/300). One staff for RES vs 5 in CES. Combined factor = (267/300) x (1/5) = 0.2	Labour	0.18	53,849.0	0.18	9,692.8									9,693	
				Annual costs = $1K/a x 267 yrs	Materials and Equipment	1.00				267.0	1.00	267.0						267	
				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	4,979.9	4,980	
575	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)															
					Labour	0.34	907,516.0	0.34	308,555.4									308,555	
				Entries in CES DET applicable to RES but duration 267 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 267/300 x 13/34 = 0.34. Annual M&E costs are $150K/a x 267 yrs = $40050K	Materials and Equipment	1.00				40,050.0	1.00	40,050.0						40,050	
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 267 years = $88,100K	Other							88,100.0	1.0	88,100.0				88,100	
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	131,011.6	131,012	
575	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)															
					Labour	0.53	148,529.0	0.53	86,443.7									86,444	
				RES has duration 267 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 267/300 x 3/5 = 0.534															
				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	21,610.9	21,611	
575	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)															
				RES duration is 267 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.534. Annual M&E costs is $3.3K/a x 267 yrs = $881.1K. Other costs is $0.7K/a x 267 yrs = $186.9K.	Labour	0.2	24,724.0	0.2	4,944.8									4,945	
					Materials and Equipment	1.0				881.1	1.0	881.1						881	
					Other	1.0						186.9	1.0	186.9				187	
				Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	3,006.4	3,006	
575	45	30		OPERATIONS - FACILITY REPEATS															
575	45	30	20	STORAGE VAULT 100 YEAR REPLACEMENT															
				labour for demolition of previous vaults = and construction of new = factor 1920/4400 tube qty) labour for fuel transfer = 9/30 (years for transfer) therefore common factor =0 .3	Labour	0.44	154,896.8	0.4	67,591.3									67,591	
				const'n materials = building to house 1920 tubes RES, 4400 tubes CES factor =0.436	Materials and Equipment	0.61				563,645.8	0.6	342,701.0						342,701	
				waste disposal =vaults for 1920 tubes RES, 4400 tubes CES factor =0.3	Other	0.44						447,765.3	0.4	195,388.5				195,388	
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	121,136.2	121,136	
575	45	30	30	STORAGE VAULTS 200 YEAR REPLACEMENT															

						assumed same as 100 yr replacement	Labour	0.44	154,896.8	0.4	67,591.3													67,591	
						assumed same as 100 yr replacement	Materials and Equipment	0.61				563,645.8	0.6	342,701.0										342,701	
						assumed same as 100 yr replacement	Other	0.44							447,765.3	0.4	195,388.5							195,388	
						Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	121,136.2	121,136	
575	45	30	40			STORAGE VAULTS 300 YEAR REPLACEMENT																			
						assumed same as 100 yr replacement	Labour	0.44	154,896.8	0.4	67,591.3													67,591	
						assumed same as 100 yr replacement	Materials and Equipment	0.61				563,645.8	0.6	342,701.0										342,701	
						assumed same as 100 yr replacement	Other	0.61							447,765.3	0.6	272,244.8							272,245	
						Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	136,507.4	136,507	
575	45	40				OPERATIONS - REPACKAGING																			
575	45	40	5			PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																			
						duration 36 years RES & 114 years CES therefore36/114 = 0.316 Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.13	360,064.0	0.1	45,481.8													45,482	
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0										0	
						Annual cost = $k5754/a x36 yrs	Other	1.00							207,144	1.0	207,144							207,144	2
						Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	50,525.2	50,525	
575	45	40	10			MODULE TO MODULE 300 YEAR REPACKAGING																			
575	45	40	10	10		DECOMMISSIONING OF EXISTING FACILITIES																			
						assume decommissioning of existing module to canister process building same costs as CES process building	Labour	1.0	2,357.4	1.0	2,357.4													2,357	
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0										0	
							Other	1.0							3,462.3	1.0	3,462.3							3,462	
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,745.9	1,746	
575	45	40	10	20		CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																			
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.0	476.1													476	
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6										355	
						RPM Repackaging plant same as CES facility therefore factor = 1	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	
575	45	40	10	30		PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																			
575	45	40	10	30	20	RPM EQUIP. DESIGN, SUPPLY & INSTALL																			
575	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)																		
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	106.6	1.0	106.6													107	
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,132.0	1.0	2,132.0										2,132	
						RPM Repackaging plant same as CES facility therefore factor = 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	
575	45	40	10	30	20	20	CANISTER TO CANISTER FUEL TRANSFER (EQUIP)																		
						Equipment same as CES facility therefore factor = 1	Labour	1.0	3,721.1	1.0	3,721.1													3,721	

							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			18,605.6	1.0	18,605.6					18,606
							Equipment same as CES facility therefore factor = 1	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
575	45	40	10	30	20	30	CANISTER DECONTAMINATION (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	961.0	1.0	961.0							961
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			4,805.0	1.0	4,805.0					4,805
							Equipment same as CES facility therefore factor = 1	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
575	45	40	10	30	20	40	MODULE DECONTAMINATION (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	761.0	1.0	761.0							761
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			3,805.0	1.0	3,805.0					3,805
							Equipment same as CES facility therefore factor = 1	Other	1.0						228.5	1.0	228.5		229
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,438.4	1,438
575	45	40	10	30	20	50	CANISTER DISMANTLING/BREAKDOWN (EQUIP)														
							Equipment same as CES facility therefore factor = 1	Labour	1.0	1,066.6	1.0	1,066.6							1,067
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0			5,332.8	1.0	5,332.8					5,333
							Equipment same as CES facility therefore factor = 1	Other	1.0						320.0	1.0	320.0		320
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	2,015.8	2,016
575	45	40	10	30	20	60	CASK OPENING AND CASK DECONTAM AREA (EQUIP. LABOUR and DISPOSAL)														
							Cask decontam equip info from CES CVSB (561-45-40-10-30-20-30), + labour and disposal from CES CVSB (561-45-40-10-600, (with replacement casks removed).	Labour	1.0	18,348.3	1.0	18,348.3					18,348
							Cask decontam info from CES CVSB	Materials and Equipment	1.0			13,716.4	1.0	13,716.4					13,716
							Cask decontam and disposal info from CES CVSB	Other	1.0						15,383.0	1.0	15,383.0		15,383
							Cask decontam info from CES CVSB	Contingency	30%									30%	1.0	14,234.3	14,234
575	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N														
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Labour	1.22	8,000.0	1.2	9,760.0					9,760
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Materials and Equipment	1.22			7,768.3	1.2	9,477.3					9,477
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Other	1.22						1,600.0	1.2	1,952.0		1,952
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	6,356.8	6,357
575	45	40	10	30	60		BUILDING SERVICES (RPM)														
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	9,120.0	1.2	11,126.4					11,126
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Materials and Equipment	1.22			7,199.9	1.2	8,783.9					8,784

						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22				2,527.2	1.2	3,083.2			3,083
						Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	5,748.4	5,748
575	45	40	10	30	70	COMMISSIONING (RPM)												
						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	1,169.3	1.2	1,426.5						1,427
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0
						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22				218.3	1.2	266.3				266
						Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	846.4	846
575	45	40	10	30	80	CONST'N INDIRECTS (RPM)												
						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	12,695.0	1.2	15,487.9						15,488
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0

						RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22					481.1	1.2	586.9					587
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	4,822.5		4,822
575	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)			comment 7												
						Reduced facilities support stand-alone RES facility from CES, every 100 years but 'full' facilities required at 300 year event, therefore factor = (8/13+8/13 +1)	Labour	2.2	21,056.2	2.2	46,971.5									46,972
							Materials and Equipment	2.2				29,785.1	2.2	66,443.7						66,444
						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	28,353.8		28,354
575	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)															
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	219.0	1.0	219.0									219
						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	109.5		110
575	45	40	10	600		REPACKAGING OPERATIONS (RPM)															
						repackaging of 3929 RES module canisters compared to 8528 CES = 3029/8528	Labour	0.46	118,823.0	0.46	54,743.9									54,744
						procurement of 3929 RES module canisters compared to 8528 CES factor = 3929/8528	Materials and Equipment	0.46				358,176.0	0.46	165,018.0						165,018
						procurement of 3929 RES module canisters compared to 8528 CES factor = 3929/8529	Other	0.46					43,594.8	0.46	20,084.9					20,085
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	71,954.0		71,954
575	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)															
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	11,882.0	0.3	3,564.6									3,565
						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	891.2		891
575	45	40	10	700		OPERATION INDIRECTS (RPM)															
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	13,976.2	0.3	4,192.9									4,193
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				351.6	0.3	105.5						105
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3					16,200.0	0.3	4,860.0					4,860
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	2,747.5		2,748
575	45	40	10	800		STORAGE OPERATIONS (RPM)															
						transfer of 2560 canisters RES compared to 8800 canisters CES	Labour	0.29	2,093.9	0.29	609.1									609
						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	30%								30%	1.0	182.7		183

Total	**6,115,291**
Check: Should = 0	**0**

	Total	1,161,355	Total	1,655,900	Total	2,117,068	Total	1,180,967.5
	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	3,071k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (492,818k$) at rate 2.87%)
2	5754k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (492,818k$) at rate 2.87%). this tax runs for 3X12 years = 36 years. A portion of this tax over 36 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)
3	4,116k$/a made up of expenses from table 18 (605k$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (489,354k$) at rate 2.87% = 7022, this is then halved as the storage buildings are built on a rolling program)
4	

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
55								Environmental Assessment and Monitoring	Labour		OPG	RJH	7	322	319			104056.7
55								Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	7	322	319			9300.0
55								Environmental Assessment and Monitoring	Other		OPG	RJH	7	322	319			3125.0
55								Environmental Assessment and Monitoring	Contingency		OPG	RJH	7	322	319			34944.5

NO DATA TO FILL

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	104057			104056.7	
Materials and Equipment	9300			9300.0	
Other	3125			3125.0	
Contingency	34944.5			34944.5	
Total	151426			151426	

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																								**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																		
55								**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
55	10							EA & MONITORING PROGRAM MANAGEMENT																	
								Costs are incurred over the period Y4 to Y322 (when repackaging ends) or 319 yrs vs CES at 347 yrs. RES has 0.5 staff vs 2 staff in CES. Factor is 319/347x 0.5/2 = 0.23	Labour	0.23	70306	0.23	16170.38										16,170
									Materials and Equipment	1.00				1.00											
									Other	1.00						930	1.00	930						930
								Expenses at $3K x 319 yrs	Contingency	0.30									17100.38	0.3	5130.114		5,130
55	20							CNSC 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 and thus reduce costs relative to CES. EA process is simplier since repeat of same technolgy at several sites.	Labour	0.3	7471	0.3	2241.3										2,241
									Materials and Equipment	0.3				0.3											
									Other	0.3						2,150	0.3	645						645
									Contingency	0.3									2886.3	0.3	865.89		866

55	40	GROUNDWATER MONITORING																	
		Costs span the period Y13 to Y322 or 310 yrs vs 330 yrs in CES. Factor is 310/330 x 0.2/0.6 = 0.31	Labour	0.31	37158	0.31	11518.98											11,519
		M&E @ $6K/a x 310 yrs	Materials and Equipment	1				1860	1	1860								1,860
		Expenses @ $4K/a x 310 yrs	Other	1							1,240	1	1240					1,240
			Contingency	0.3										14618.98	0.3	4385.694		4,386
55	50	RADIOLOGICAL BIOSPHERE MONITORING																	
		Costs span the period Y13 to Y322 or 310 yrs. Factor is 310/330 x 1/3.3 = 0.28	Labour	0.28	217280	0.28	60838.4											60,838
		M&E costs at $18K/a x 310 yrs	Materials and Equipment	1				5580	1	5580								5,580
			Other	1								1						
			Contingency	0.3										66418.4	0.3	19925.52		19,926
55	60	NON-RAD BIOSPHERE MONITORING																	
		Costs span the period Y13 to Y322 or 310 yrs. Factor is 310/330 x 0.2/0.8 = 0.23	Labour	0.23	53590	0.23	12325.7											12,326
		M&E costs at $6K/a x 310 yrs	Materials and Equipment	1				1860	1	1860								1,860
			Other	1								1						
			Contingency	0.3										14185.7	0.3	4255.71		4,256
55	80	HUMAN HEALTH MONITORING																	
		RES = 310 yrs vs CES = 330 yrs. Factor is 310/330 x 0.03/0.17= 0.167	Labour	0.167	5760	0.167	961.92											962
			Materials and Equipment	1					1									
		Expenses at $1K/a x 310 yrs	Other	1							310	1	310					310
			Contingency	0.3										1271.92	0.3	381.576		382
					Total		104,057	Total		9,300	Total		3,125	Total		34,944.5		
					Check: Should = 0			Check: Should = 0			Check: Should = 0			Check: Should = 0				

BASIS OF ESTIMATE NOTES - Insert references and notes

1

2

3

4

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
BRUCE

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
575	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	12	12	0	0	NO DATA TO FILL	2732.0
575	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	12	12	0	0		0.0
575	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	12	12	0	0		1742.4
575	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	12	12	0	0		894.9

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check total	Total Cost $k
		0%	
Labour	2732	*0.0*	2732.0
Materials and Equipment	0	*0.0*	0.0
Other	1742	*0.0*	1742.4
Contingency	894.9	*0.0*	894.9
Total	5369	*0.0*	5369

Check: Total minus budget Should = 0

Budget costs to Years by %

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																	
575	90							**Program Management**																
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Bruce			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
575								based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 12year duration	Labour	0.24	11383.445	0.24	2732.026752											2,732	
								no entry	Materials and Equipment	0				0	0	0								0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							7260	0.24	1742.4					1,742	
								Contingency as CES value	Contingency	20%										20%	1.0	894.9		895	

Total	2,732	Total	0	Total	1,742	Total	894.9	**Total**	**5,369**
Check: Should = 0	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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc.

RES ALTERNATIVE
WBS No 575
SURFACE MODULAR VAULTS (SMV)
BRUCE

Cost Category	Total K$
Labour	1,359,685
Materials and Equipment	1,776,998
Other	2,186,950
Contingency	1,286,362
Total Cost	**6,609,995**

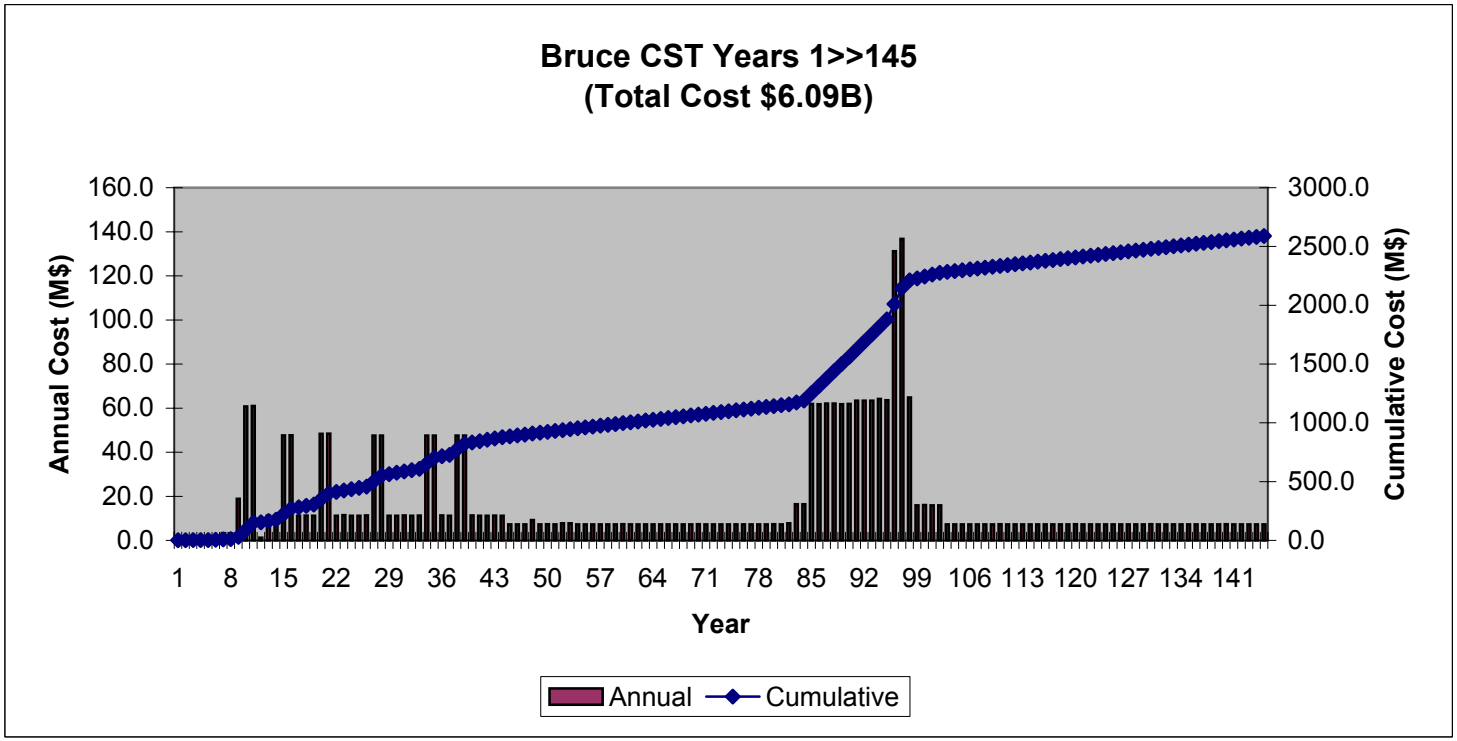
6,609,995

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$
575	15	0	0	0	0	0	0	RJH	Labour	0	1	9	7	0	452
575	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	9	7	0	0
575	15	0	0	0	0	0	0	RJH	Other	0	1	9	7	0	97
575	15	0	0	0	0	0	0	RJH	Contingency	0	1	9	7	0	275
575	20	0	0	0	0	0	0	AM	Labour	0	1	7	7	0	15,087
575	20	0	0	0	0	0	0	AM	Materials and Equipment	0	1	7	7	0	1,054
575	20	0	0	0	0	0	0	AM	Other	0	1	7	7	0	337
575	20	0	0	0	0	0	0	AM	Contingency	0	1	7	7	0	6,497
575	25	0	0	0	0	0	0	RJH	Labour	0	1	322	46	0	3,721
575	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	322	46	0	0
575	25	0	0	0	0	0	0	RJH	Other	0	1	322	46	0	515
575	25	0	0	0	0	0	0	RJH	Contingency	0	1	322	46	0	1,694
575	30	0	0	0	0	0	0	RJH	Labour	0	1	322	322	0	9,253
575	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	322	322	0	0
575	30	0	0	0	0	0	0	RJH	Other	0	1	322	322	0	24,120
575	30	0	0	0	0	0	0	RJH	Contingency	0	1	322	322	0	8,343
575	35	0	0	0	0	0	0	RJH	Labour	0	1	12	10	0	1,368
575	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	12	10	0	0
575	35	0	0	0	0	0	0	RJH	Other	0	1	12	10	0	820
575	35	0	0	0	0	0	0	RJH	Contingency	0	1	12	10	0	1,094
575	40	0	0	0	0	0	0	AM	Labour	0		6	53	48	0 61660.2676
575	40	0	0	0	0	0	0	AM	Materials and Equipment	0		1	347	347	0 110745.04
575	40	0	0	0	0	0	0	AM	Other	0		1	347	347	0 39125.7065
575	40	0	0	0	0	0	0	AM	Contingency	0		1	347	347	0 51652.6928
575	45	0	0	0	0	0	0	AM	Labour	0	11	322	312	0	1,161,355
575	45	0	0	0	0	0	0	AM	Materials and Equipment	0	11	322	312	0	1,655,900
575	45	0	0	0	0	0	0	AM	Other	0	11	322	312	0	2,117,068
575	45	0	0	0	0	0	0	AM	Contingency	0	11	322	312	0	1,180,967
0	55	0	0	0	0	0	0	RJH	Labour	0	7	322	319	0	104,057
0	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	7	322	319	0	9,300
0	55	0	0	0	0	0	0	RJH	Other	0	7	322	319	0	3,125
0	55	0	0	0	0	0	0	RJH	Contingency	0	7	322	319	0	34,945
575	90	0	0	0	0	0	0	AM	Labour	0	1	12	12	0	2,732
575	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	12	12	0	0
575	90	0	0	0	0	0	0	AM	Other	0	1	12	12	0	1,742
575	90	0	0	0	0	0	0	AM	Contingency	0	1	12	12	0	895

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 576
BRUCE
CASKS IN SHALLOW TRENCH **(CST)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	1,003
20	System Development	10,675
25	Safety Assessment	6,685
30	Licensing & Approvals	39,906
35	Public Affairs	3,281
40	Facility Design & Construction	137,872
45	Facility Operation	5,724,265
55	Environmental Assessment and Monitoring	164,404
90	Program Management	5,369
	Total Cost ($k)	**6,093,460**

Bruce CST Alternative	**6,093,460**
Siting Phase	**29,025**
Siting	1003
EA	3,752
System Development	10,675
SA	1,365
L&A	3,580
Public Affairs	3281
Program Mgmt	5369
Construction Phase	**137,872**
New Storage Chamber Construction	134,371
Transition to Standalone	3,500
Operations Phase	**5,926,563**
Repeat & Repackaging	*3,950,556*
Initial Fuel Transfer	703,215
Storage Chamber Replacement - 200 yrs	78,034
Repackaging - 100 yrs	849,005
Repackaging - 200 yrs	847,633
Repackaging M to M - 300 yrs	953,075
PM for Repeats & Repackaging	519,594
Extended Monitoring	*1,976,007*
Program Mgmt	1,073,510
Monitoring Survelliance	40,991
Operation Indirects	554,003
Common Ancillary Services Ops	100,257
Fuel Integrity Monitoring	4,947
SA - Ops & Decommissioning	5,320
L&A - Ops Licence Renewal	36,327
Environmental Monitoring	160,651


Bruce CST Years 1>>145
(Total Cost $6.09B)
Annual Cost (M$)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Cumulative Cost (M$)
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	15	0	0	0	0	0	0	Siting	Labour		CTECH	AM	1	9	7	0	0	NO DATA TO FILL	555.9
576	15	0	0	0	0	0	0	Siting	Materials and Equipment		CTECH	AM	1	9	7	0	0		0.0
576	15	0	0	0	0	0	0	Siting	Other		CTECH	AM	1	9	7	0	0		113.0
576	15	0	0	0	0	0	0	Siting	Contingency		CTECH	AM	1	9	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
		0%	
Labour	556	0.0	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

ACTIVITY DETAIL ESTIMATE

											A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
											Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8																Cost $k	
576	15							**Siting**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
576	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 inefficiencies of multiple sites assume a factor of 0.2	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	
576	15	70						PREFERRED SITE																
576	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 1/4 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%										50%	1.0	53.1	53	
576	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 1/4 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										50%	1.0	126.4	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

BASIS OF ESTIMATE NOTES - Insert references and notes

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	91	97	7	0	0	NO DATA TO FILL	7114.4
576	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	91	97	7	0	0		451.5
576	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	91	97	7	0	0		182.2
576	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	91	97	7	0	0		2926.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Budget costs to Years by %	Total Cost $k
			0%		
Labour	7079		*0.0*		7114.4
Materials and Equipment	452		*0.0*		451.5
Other	217		*0.0*		182.2
Contingency	2926.6		*0.0*		2926.6
Total	10675		*0.0*		10675

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																	
576	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								OPG has 3 sites Pickering, Bruce and Darlington. CST (Casks in Shallow Trenches) is a storage alternative applicable to each site. The system development for the CST alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CST workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.															
576	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Labour	0.18	6690.40	0.18	1170.82											1,171	
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0	
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Other	0.18							300.00	0.18	52.50					53	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	367.0	367	
576	20	5						SYSTEM OPTIMIZATION																

			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18	3303.70	0.18	578.15													578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00										0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Other	0.18							120.00	0.18	21.00							21
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.00	179.74				180
576	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																		
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Labour	0.11	28327.20	0.11	2974.36													2,974
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.11				4300.00	0.11	451.50										452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Other	0.11							895.00	0.11	93.98							94
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.00	1759.92				1,760
576	20	30	STORAGE SYSTEM ENG'NG																		
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18	11436.70	0.18	2001.42													2,001
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00										0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18							200.00	0.18	35.00							35
			Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.00	509.11				509
576	20	40	SECURITY & SAFEGUARD ENG'NG																		
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69													355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00										0

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25		60.00	0.25	14.70			15
Percentage for contingency assumed same as for CES	Contingency	30%					30%	1.0 110.8	111

Total	**10,675**
Check: Should = 0	**0**

Total	7,079	Total	452	Total	217	Total	2,926.6
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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	25							Safety Assessment	Labour		OPG	RJH	1	311	45			4211.1
576	25							Safety Assessment	Materials and Equipment		OPG	RJH	1	311	45			
576	25							Safety Assessment	Other		OPG	RJH	1	311	45			564.0
576	25							Safety Assessment	Contingency		OPG	RJH	1	311	45			1910.0

NO DATA TO FILL

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	4211
Materials and Equipment	
Other	564
Contingency	1910.0
Total	6685

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k
-0.3	4211.1
0.0	564.0
-0.1	1910.0
-0.5	6685

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8																TOTAL	
											Labour			Materials and other Equipment			Other			Contingency			Cost $k	
576	25							**Safety Assessment**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
576	25	10						SAFETY ASSESSMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	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	
576	25	30						SA - SITING																
								Very limited siting activities leads no SA costs	Labour		2287.5													2
									Materials and Equipment															
									Other								3,850							
									Contingency	40%										40%	1.0			
576	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	
576	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between sites with same technoilogy; thus reduce factor to 0.25	Labour	0.25	9604.8	0.25	2401.2									2,401	
									Materials and Equipment	1					1									
								Expenses at $1K/a x 299 yrs	Other	1							299	1	299				299	

				Contingency	40%								40%	1.0	1,080.1	1,080	
576	25	70	SA - DECOMMISSIONING (Processing Facilities)														
			RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technoilogy; thus factor to 0.4	Labour	0.4	2449.9	0.4	979.96								980	
				Materials and Equipment	0.4				0.4								
				Other	0.4					300	0.4	120				120	
				Contingency	40%								40%	1.0	440.0	440	
						Total		4,211	Total		Total		564	Total		1,910.0	
						Check: Should = 0			Check: Should = 0		Check: Should = 0			Check: Should = 0			6685
																Total	**6,685**
																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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour		OPG	RJH	1	299	299	0	0	NO DATA TO FILL	8597.6
576	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment		OPG	RJH	1	299	299	0	0		0.0
576	30	0	0	0	0	0	0	0 Licensing & Approvals	Other		OPG	RJH	1	299	299	0	0		23327.5
576	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency		OPG	RJH	1	299	299	0	0		7981.3

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	8598			*0.0*	8597.6
Materials and Equipment	0			*0.0*	0.0
Other	23328			*0.0*	23327.5
Contingency	7981.3			*0.0*	7981.3
Total	39906			*0.0*	39906

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																	
								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																
576	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
576	30	30						LIAISON WITH CNSC																
								Duration 4 yrs (Y1 to Y4) 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	
576	30	50						CNSC CONSTRUCTION LICENCE																
								Costs incurred Y7 to Y9	Labour	0.25	2631	0.25	657.75										658	2
								Some effeciencies gained due to multiple sites	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	
576	30	60						OTHER GOVN'MT APPROVALS																
576	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	

576	30	60	30	FEDERAL APPROVALS																		
				Y7 to Y12 or 6 yrs	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
576	30	60	40	PROVINCIAL APPROVALS																		
				Y7 to Y12 or 6 yrs	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
576	30	60	50	MUNICIPAL APPROVALS																		
				Y7 to Y12 or 6 yrs	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
576	30	65		CNSC OPERATING LICENCE (Initial Application)																		
				Y11 to Y12 or 2 yrs	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				88
576	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																		
				CES duration is 330 years. Costs incurred in RES during period Y13 to Y311 or 299 years. RES has 0.25 staff vs CES with 1 staff. Factor is 299/330 x 0.25/1 = 0.23	Labour	0.23	32754	0.23	7533.42													7,533
					Materials and Equipment	1				0	1	0										0
				Expenses at $72K/a x 299 yrs	Other	1							21,528	1	21528							21,528
					Contingency	0.25										25%	1.0	7,265.4				7,265

Total	**39,906**
Check: Should = 0	**0**

Total 8,598 Total 0 Total 23,328 Total 7,981.3

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

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	35							Public Affairs	Labour		OPG	RJH	1	12	10			1367.5
576	35							Public Affairs	Materials and Equipment		OPG	RJH	1	12	10			
576	35							Public Affairs	Other		OPG	RJH	1	12	10			820.0
576	35							Public Affairs	Contingency		OPG	RJH	1	12	10			1093.8

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	1368		1367.5
Materials and Equipment			
Other	820		820.0
Contingency	1093.8		1093.8
Total	3281		3281

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

ACTIVITY DETAIL ESTIMATE

											A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
576	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	Cost $k	
576	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
									Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1					0.1									
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
576	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1					0.1									
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
576	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1					0.1									
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
576	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1					0.1									
									Other	0.1							170	0.1	17				17	

				Contingency	50%					50%	1.0	185.0	185
576	35	120	Community Offsets & Benefits										
				Labour	0.25	0.25							
				Materials and Equipment	0.25		0.25						
				Other	0.25			2,072	0.25	518			518
				Contingency	50%					50%	1.0	259.0	259

Total	**3,281**
Check: Should = 0	

Total	1,368	Total		Total	820	Total	1,093.8
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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	8	50	5	0	0	NO DATA TO FILL	67414.3
576	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	8	50	5	0	0		33898.0
576	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	8	50	5	0	0		3209.8
576	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	8	50	5	0	0		33349.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	67414		*0.0*	67414.3	
Materials and Equipment	33898		*0.0*	33898.0	
Other	3210		*0.0*	3209.8	
Contingency	33349.8		*0.0*	33349.8	
Total	137872		*0.0*	137872	

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																	
576	40							**Facility Design & Construction**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
576	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 additional land acquisition costs neccesary	Other	0.0							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	
576	40	30						COMMON ANCILLARY FACILITIES																
576	40	30	10					ADMIN AND SUPPORT FACILITIES																
576	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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	
576	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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	

576 40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0								comment 7		0
					Materials and Equipment	0.00				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
576 40	30	10	4	STORAGE CASK STORE																
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0								comment 7		0
					Materials and Equipment	0.00				1,892.0	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
576 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	0.30	459.9	0.3	138.0											138
					Materials and Equipment	0.30				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
576 40	30	10	6	SOLID WASTE STORAGE AREA																
				ACTIVE SOLID WASTE HDLG BLDG	Labour	0.30	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	0.30				437.5	0.3	131.3								131
					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
576 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	0.30	359.4	0.3	107.8											108
					Materials and Equipment	0.30				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
576 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	0.30	373.7	0.3	112.1											112
					Materials and Equipment	0.30				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
576 40	30	10	9	WAREHOUSE BLDG																

				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0										comment 7	0
					Materials and Equipment	0.00				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
576 40	30	10	10	GUARDHOUSE AND SECURITY FENCE																
				building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0										comment 7	0
					Materials and Equipment	0.00				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%	1.25	0.0		0
576 40	30	10	11	TRUCK INSP'N / WASH STATION																
				not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0										comment 7	0
					Materials and Equipment	0.00				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
576 40	30	10	12	UTILITY BLDG																
				building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0										comment 7	0
					Materials and Equipment	0.00				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
576 40	30	10	13	TEST FACILITY CONSTRUCTION																
				Facility will be constructed at Bruce, taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3 OPG sites therefore factor 0.33.	Labour	0.3	766.8	0.3	255.6											256
					Materials and Equipment	0.3				1,675.0	0.3	558.3								558
				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	20.0%										20%	1.0	162.8		163
576 40	30	20		OTHER SITE SYSTEMS																
576 40	30	20	1	FIRE PROTECTION SYSTEMS																
				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
576 40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																

				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
576	40	30	20	3	ELECTRICAL AND EMERGENCY POWER																	
				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
576	40	30	20	4	SANITARY SEWER SYSTEM																	
				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
576	40	30	20	5	POTABLE WATER SYSTEM																	
				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
576	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
576	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
576	40	30	20	8	CONST'N 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
576 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
576 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
576 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
576 40	40			STORAGE CONSTRUCTION STAGE 1																
				Construction of stage 1 of the shallow trench storage chambers. 1 chamber capacity 660 casks for RES as opposed to 4 CES chambers. Therefore factor by 1/4 and use 6/10 rule.	Labour	0.44	142,599.6	0.44	62,070.1											62,070
					Materials and Equipment	0.44			59,932.2	0.44	26,087.0									26,087
				expenses factor taken same as labour	Other	0.44						7,290.0	0.44	3,173.2						3,173
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	27,399.1			27,399
576 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
				allowance for consumption for construction of 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	**137,872**
Check: Should = 0	**0**

Total	67,414	Total	33,898	Total	3,210	Total	33,349.8
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

otes

1
2
3

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	4	299	296	0	0	NO DATA TO FILL	1302087.0
576	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	4	299	296	0	0		1603901.4
576	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	4	299	296	0	0		1627389.8
576	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	4	299	296	0	0		1190886.7

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	1302087	*-77.2*	1302087.0
Materials and Equipment	1603901	*-73.7*	1603901.4
Other	1627390	*-15.6*	1627389.8
Contingency	1190887	*-83.3*	1190886.7
Total	5724265	*-249.8*	5724265

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
576	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
576	45	10						OPERATIONS FUEL TRANSFER																
576	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
								Longer duration than CES (32/30) and labour costs shared equally between OPG sites (33%) this factor is increased to includes inefficiency of single site based program management team (use 40).	Labour	0.43	110,251.0	0.43	47,040.4											47,040	
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0								0	
								Annual cost = $4078/a x 32yrs	Other	1.00							130,496	1.0	130,496					130,496	3
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	35,507.3		35,507	
576	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)																
								Longer duration than CES but reduced fuel inventory 3929/8528 x 32/30yrs = 0.27	Labour	0.49	19,456.0	0.49	9,561.3											9,561	
								allow slight reduction in costs for monitoring equipment	Materials and Equipment	0.75				53.0	0.8	39.8								40	
								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	4,800.5		4,801	
576	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 32 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.53	115,547.0	0.53	61,625.1											61,625
						Materials and Equipment	0.53				1,284.0	0.53	684.8									685
						Other	0.53							16,380.0	0.53	8,736.0						8,736
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	21,313.8			21,314
576	45	10	40		STORAGE OPERATIONS																	
						Labour	0.46	29,706.0	0.46	13,686.1												13,686
					Longer duration, equal operator disciplines, reduced crew size and crew usage due to lower fuel inventory 3929/8528																	
					cask transporter overhaul costs same as CES	Materials and Equipment	1.0				300.0	1.0	300.0									300
					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	4,195.8			4,196
576	45	10	50		ADDITIONAL STORAGE CONSTRUCTION																	
576	45	10	50	10	STORAGE CONSTRUCTION STAGE 2																	
					factor for storage const'n stage 2 taken as same as stage 1	Labour	0.44	37,467.3	0.44	16,308.6												16,309
					factor for storage const'n stage 2 taken as same as stage 1	Materials and Equipment	0.44				81,361.5	0.4	35,414.6									35,415
					factor for storage const'n stage 2 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4						4,295
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,805.6			16,806
576	45	10	50	20	STORAGE CONSTRUCTION STAGE 3																	
					factor for storage const'n stage 3 taken as same as stage 1. The cost for const'n labour for vaults is omitted from CES costs	Labour	0.44	50,001.9	0.44	21,764.6												21,765
					factor for storage const'n stage 3 taken as same as stage 1. The cost for const'n materials for basket vaults is omitted from CES costs	Materials and Equipment	0.44				71,382.0	0.4	31,070.8									31,071
					factor for storage const'n stage 3 taken as same as stage 1	Other	0.44							9,804.0	0.4	4,267.4						4,267
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	17,130.9			17,131
576	45	10	50	30	STORAGE CONSTRUCTION STAGE 4																	
					factor for storage const'n stage 4 taken as same as stage 1	Labour	0.44	49,193.7	0.44	21,412.8												21,413
					factor for storage const'n stage 4 taken as same as stage 1	Materials and Equipment	0.44				69,457.0	0.4	30,232.9									30,233
					factor for storage const'n stage 4 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4						4,295
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,782.3			16,782
576	45	10	50	40	STORAGE CONSTRUCTION STAGE 5																	
					factor for storage const'n stage 5 taken as same as stage 1	Labour	0.44	49,193.7	0.44	21,412.8												21,413
					factor for storage const'n stage 5 taken as same as stage 1	Materials and Equipment	0.44				69,457.0	0.4	30,232.9									30,233
					factor for storage const'n stage 5 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4						4,295
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,782.3			16,782

576	45	10	50	50	STORAGE CONSTRUCTION STAGE 6																	
					factor for storage const'n stage 6 taken as same as stage 1	Labour	0.44	49,193.7	0.44	21,412.8											21,413	
					factor for storage const'n stage 6 taken as same as stage 1	Materials and Equipment	0.44				69,457.0	0.4	30,232.9								30,233	
					factor for storage const'n stage 6 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4					4,295	
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,782.3		16,782	
576	45	20			OPERATIONS - EXTENDED MONITORING																	
576	45	20	5		PROGRAM MANAGEMENT																	
						Labour	0.26	312,354.0	0.26	81,212.0											81,212	
					Entries in CES DET applicable to RES but duration 268 years RES & 300 years CES therefore 268/300 of labour costs. Bruce assumed to have 2.6 staff vs 9 in CES. Thus factor is 26%.																	
					No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0								0	
					Annual cost = $3,035/a x 268 yrs	Other	1.00							813,380.0	1.0	813,380.0					813,380	1
					Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	178,918.4		178,918	
576	45	20	40		MONITORING AND SURVEILLANCE -EXTENDED MONITORING																	
					Reduced duration to CES (268/300). One staff for RES vs 5 in CES. Combined factor = (268/300) x (1/5) = 0.18	Labour	0.18	150,328.0	0.18	27,059.0											27,059	
					Annual costs = $1K/a x 268 yrs	Materials and Equipment	1.00						268.0								268	
					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	13,663.5		13,664	
576	45	20	50		OPERATION INDIRECTS (EXTENDED MONITORING)																	
						Labour	0.34	875,048.0	0.34	297,516.3											297,516	
					Entries in CES DET applicable to RES but duration 268 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 268/300 x 13/34 = 0.34. Annual M&E costs are $150K/a x 268 yrs = $40200K	Materials and Equipment	1.00						40,200.0								40,200	
					Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 268 years = $88,440K	Other										88,440.0					88,440	
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	127,846.9		127,847	
576	45	20	60		COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																	
						Labour	0.54	148,529.0	0.54	80,205.7											80,206	
					RES has duration 268 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 268/300 x 3/5 = 0.54																	
					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	20,051.4	20,051	
576	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																	
				RES duration is 268 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 268 yrs = $884.4K. Other costs is $0.7K/a x 268 yrs = $187.6K.	Labour	0.2	4,631.0	0.20	926.2										926	
					Materials and Equipment	1.0						884.4									884	
					Other	1.0								187.6							188	
				Percentage for contingency assumed same as for CES	Contingency	50%											50%	1.0	999.1	999	
576	45	20	80																		
				No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0												0	
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5					3,000.0	0.5	1,500.0								1,500	
				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	450.0	450	
576	45	30		OPERATIONS - FACILITY REPEATS																	
576	45	30	50	STORAGE CHAMBER 200 YEAR REPLACEMENT																	
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 6 chamber trench to house its inventory of 3929 casks. Therefore a factor of 6/16 using 6/10 rule is used	Labour	0.56	110,400.0	0.56	61,289.7												61,290	
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 6 chamber trench to house its inventory of 3929 casks. Therefore a factor of 6/16 using 6/10 rule is used	Materials and Equipment	0.56					0.0	0.6	0.0								0	
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 6 chamber trench to house its inventory of 3929 casks. Therefore a factor of 6/16 using 6/10 rule is used	Other	0.56								2,048.4	0.6	1,137.2					1,137	
				Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.0	15,606.7	15,607	
576	45	40		OPERATIONS - REPACKAGING																	
576	45	40	5	PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																	
				Entries in CES DET applicable to RES but duration 60 years RES 4x(2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 14yr operations) & 114 years CES therefore60/114 of labour cost s. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).	Labour	0.21	440,778.0	0.21	92,795.4										92,795	
				No entry in CES alternative cost category	Materials and Equipment	0.0					0.0	0.0	0.0								0	
				Annual cost = $k5670/a x60 yrs	Other	1.00								340,200	1.0	340,200				340,200	2
				Percentage for contingency assumed same as for CES	Contingency	20%											20%	1.0	86,599.1	86,599	
576	45	40	10	MODULE TO CASK 100 YEAR REPACKAGING																	
576	45	40	10	10 DECOMMISSIONING OF EXISTING FACILITIES																	

							assume decommissioning of existing process building (from interim period) at 100 year period same costs as CES	Labour	1.0	2,357.4	1.00	2,357.4										2,357
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
								Other	1.0							2,216.9	1.0	2,216.9				2,217
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,372.3	1,372
576	45	40	10	20			CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1										476
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6							355
							RPM Repackaging plant same as CES facility therefore factor = 1	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
576	45	40	10	30			PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)															
576	45	40	10	30	20		RPM EQUIP. DESIGN, SUPPLY & INSTALL															
576	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2										276
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0							5,523
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							290.0	1.0	290.0				290
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,826.8	1,827
576	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6										2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1							11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							685.4	1.0	685.4				685
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,317.9	4,318
576	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3										2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4							13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							823.0	1.0	823.0				823
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	5,184.8	5,185
576	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)															
							No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0							5,055
							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	1,516.5	1,517
576	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0								233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0					2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							128.0	1.0	128.0		128
							Percentage for contingency assumed same as for CES	Contingency	20%								20%	1.0	538.6	539
576	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2								8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7					8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							1,624.3	1.0	1,624.3		1,624
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	5,593.3	5,593
576	45	40	10	30	60		BUILDING SERVICES (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2								11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4					9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							3,486.7	1.0	3,486.7		3,487
							Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	5,994.6	5,995
576	45	40	10	30	70		COMMISSIONING (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8								1,253
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							232.1	1.0	232.1		232
							Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	742.5	742
576	45	40	10	30	80		CONST'N INDIRECTS (RPM)													
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3								14,668
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							518.6	1.0	518.6		519
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	4,556.1	4,556
576	45	40	10	40			COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7										
							replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2								21,056
								Materials and Equipment	1.00				29,785.1	1.0	29,785.1					29,785
							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	22%								22%	1.0	11,185.1	11,185
576	45	40	10	500			COMMISSIONING MANAGEMENT (RPM)													

						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8															274
						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	136.9						137
576	45	40	10	600		REPACKAGING OPERATIONS (RPM)																				
						repackaging of 3929 RES casks compared to 8528 CES factor = 3929/8528	Labour	0.46	112,881.9	0.46	52,006.7															52,007
						procurement of 3929 RES casks compared to 8528 CES factor = 3929/8528	Materials and Equipment	0.46				788,840.0	0.5	363,432.5												363,433
						disposal of 3929 RES casks compared to 8528 CES factor = 3929/8528	Other	0.46							110,864.0	0.5	51,077.0									51,077
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	139,954.9						139,955
576	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																				
						duration 17 years RES (1 demolish prev, 2const'n, 14 transfer ops) compared to 30 years CES. Factor =17/30 = 0.566	Labour	0.6	11,882.0	0.57	6,733.1															6,733
						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	1,683.3						1,683
576	45	40	10	700		OPERATION INDIRECTS (RPM)																				
						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.466	Labour	0.47	17,186.8	0.47	8,020.5															8,021
						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.467	Materials and Equipment	0.47				404.8	0.5	188.9												189
						duration 14 years RES compared to 30 years CES. Factor =14/30 = 0.468	Other	0.47							16,200.0	0.5	7,560.0									7,560
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,730.8						4,731
576	45	40	10	800		STORAGE OPERATIONS (RPM)																				
						transfer of 3929 casks RES compared to 8528 casks CES	Labour	0.46	14,657.1	0.46	6,752.8															6,753
						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	30%										30%	1.0	2,025.8						2,026
576	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING																				
						Costs taken by addition of individual entries in 576-45-40-10 (100 year repackaging)	Labour				138,944.2															138,944
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Materials and Equipment							449,512.7												449,513
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Other										68,870.4									68,870
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Contingency													190,305.5						190,305

576	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING															
576	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING															
						Costs taken as same as 200 year repackaging	Labour				138,944.2										138,944
						Costs taken as same as 200 year repackaging	Materials and Equipment						449,512.7								449,513
						Costs taken as same as 200 year repackaging	Other								68,870.4						68,870
						Costs taken as same as 200 year repackaging	Contingency										190,305.5				190,305
576	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS															
576	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL															
						No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5							6,472
						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	1,941.5	1,941
576	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1										372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1							372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							74.4	1.0	74.4				74
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	245.6	246
576	45	40	30	30	60	BUILDING SERVICES (MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9										384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5							311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							97.9	1.0	97.9				98
						Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	198.1	198
576	45	40	30	30	70	COMMISSIONING(MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1										334
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							53.2	1.0	53.2				53
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	193.7	194
576	45	40	30	30	80	CONST'N INDIRECTS (MM)															
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8										724
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							25.4	1.0	25.4				25
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	224.8	225
576	45	40	30	600		REPACKAGING OPERATIONS (Module to Module)															

MM repackaging operations factor 3929/8528 = 0.46 (ratio for casks = ratio for modules)	Labour	0.46	17,823.5	0.46	8,211.6											8,212
Module procurement factor 3929/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.46				102,336.0	0.5	47,148.0								47,148
module waste disposal factor 3929/8528 = 0.46 (ratio for casks = ratio for modules)	Other	0.46							35,817.6	0.5	16,501.8					16,502
Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	21,558.4		21,558

Total	**5,724,265**
Check: Should = 0	**0**

	Total	1,302,087	Total	1,603,901	Total	1,627,390	Total	1,190,886.7
	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	3035k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (487,420k$) at rate 2.87%)
2	5670k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (487,420k$) at rate 2.87%). this tax runs for 3X20 years = 60years. A portion of this tax over 60 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)
3	4078k$/a made up of expenses from table 18 (605k$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (483,956k$) at rate 2.87% = 6945, this is then halved as the storage buildings are built on a rolling program)
4	
5	

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
BRUCE

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
576	55							Environmental Assessment and Monitoring	Labour		OPG	RJH	4	311	308			114436.3
576	55							Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	4	311	308			8970.0
576	55							Environmental Assessment and Monitoring	Other		OPG	RJH	4	311	308			3058.0
576	55							Environmental Assessment and Monitoring	Contingency		OPG	RJH	4	311	308			37939.3

NO DATA TO FILL

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	228873			114436.3	
Materials and Equipment	17940		*0.0*	8970.0	
Other	6116		*0.0*	3058.0	
Contingency	75878.6			37939.3	
Total	328807			164404	

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

ACTIVITY DETAIL ESTIMATE

								A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
											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
1	2	3	4	5	6	7	8																Cost $k	
576	55							**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
576	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y6 to Y311 (when repackaging ends) or 306 yrs vs CES at 347 yrs. RES has 0.5 staff vs CES 2 staff in CES. Factor is 306/347 x 0.5/2 = 0.22	Labour	0.22	70306	0.22	15467.32											15,467
									Materials and Equipment	1				1										
								Expenses at $3K/a x 306 years	Other	1							918	1	918					918
									Contingency	0.3										16385.32	0.3	4915.596		4,916
576	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years with with some preparation work in previous year; ie total of 4 years. Due to multiple sites with same technology can share costs	Labour	0.3	7471	0.3	2241.3											2,241
									Materials and Equipment	0.3				0.3										
									Other	0.3							2,150	0.3	645					645

				Contingency	0.3							2886.3	0.3	865.89	866
576	55	40	GROUNDWATER MONITORING												
			RES = 299 yrs vs CES = 330 yrs. Factor is 299/330 x 0.2/0.6 = 0.302 (Y13 to Y311)	Labour	0.302	37158	0.302	11221.716							11,222
			M&E @ $6K/a x 299 yrs	Materials and Equipment	1				1794	1	1794				1,794
			Expenses @ $4K/a x 299 yrs	Other	1						1,196	1	1196		1,196
				Contingency	0.3								14211.716	0.3 4263.5148	4,264
576	55	50	RADIOLOGICAL BIOSPHERE MONITORING												
			RES = 299 yrs vs CES = 330 yrs. Factor is 299/330 x 1/3.3 = 0.275 (Y13 to Y311)	Labour	0.3333	217280	0.3333	72419.424							72,419
			M&E costs at $18K/a x 299 yrs	Materials and Equipment	1				5382	1	5382				5,382
				Other	1							1			
				Contingency	0.3								77801.424	0.3 23340.427	23,340
576	55	60	NON-RAD BIOSPHERE MONITORING												
			RES = 299 yrs vs CES = 330 yrs. Factor is 299/330 x 0.2/0.8 = 0.227 (Y13 to Y311)	Labour	0.227	53590	0.227	12164.93							12,165
			M&E costs at $6K/a x 299 yrs	Materials and Equipment	1				1794	1	1794				1,794
				Other	1							1			
				Contingency	0.3								13958.93	0.3 4187.679	4,188
576	55	80	HUMAN HEALTH MONITORING												
			RES = 299 yrs vs CES = 330 yrs. Factor is 299/330 x 0.03/0.17= 0.16	Labour	0.16	5760	0.16	921.6							922
				Materials and Equipment	1					1					
			Expenses at $1K/a x 299 yrs	Other	1						299	1	299		299
				Contingency	0.3								1220.6	0.3 366.18	366

Total	**164,404**
Check: Should = 0	

Total	114,436	Total	8,970	Total	3,058	Total	37,939.3
Check: Should = 0	114,436	Check: Should = 0	-219,903	Check: Should = 0	-14,882	Check: Should = 0	31,823

BASIS OF ESTIMATE NOTES - Insert references and notes

1	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner

REACTOR EXTENDED STORE — CASKS IN SHALLOW TRENCH (CST)
ACTIVITY SUMMARY TO DATA TRANSFER — BRUCE

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
576	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	12	12	0	0	NO DATA TO FILL	2732.0
576	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	12	12	0	0		0.0
576	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	12	12	0	0		1742.4
576	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	12	12	0	0		894.9

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0 — Check total	Total Cost $k	Budget costs to Years by %
		0%		
Labour	2732	0.0	2732.0	
Materials and Equipment	0	0.0	0.0	
Other	1742	0.0	1742.4	
Contingency	894.9	0.0	894.9	
Total	5369	0.0	5369	

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 1	2	3	4	5	6	7	8	WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL Cost $k	
576	90							**Program Management**																
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Bruce			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 12year duration	Labour	0.24	11383.445	0.24	2732.026752										2,732	
								no entry	Materials and Equipment	0				0	0	0							0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							7260	0.24	1742.4				1,742	
								Contingency as CES value	Contingency	20%										20%	1.0	894.9	895	

Total	**5,369**
Check: Should = 0	**0**

	Labour	Materials and other Equipment	Other	Contingency
Total	2,732	0	1,742	894.9
Check: Should = 0	0	0	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.

RES ALTERNATIVE
WBS No 576
CASKS IN SHALLOW TRENCH (CST)
BRUCE

Cost Category	Total K$
Labour	1,508,516
Materials and Equipment	1,647,221
Other	1,660,407
Contingency	1,277,317
Total Cost	**6,093,460**

6,093,460

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$
576	15							AM	Labour		1	9	7		556
576	15							AM	Materials and Equipment		1	9	7		
576	15							AM	Other		1	9	7		113
576	15							AM	Contingency		1	9	7		334
576	20							AM	Labour		91	97	7		7,114
576	20							AM	Materials and Equipment		91	97	7		452
576	20							AM	Other		91	97	7		182
576	20							AM	Contingency		91	97	7		2,927
576	25							RJH	Labour		1	311	45		4,211
576	25							RJH	Materials and Equipment		1	311	45		
576	25							RJH	Other		1	311	45		564
576	25							RJH	Contingency		1	311	45		1,910
576	30							RJH	Labour		1	299	299		8,598
576	30							RJH	Materials and Equipment		1	299	299		
576	30							RJH	Other		1	299	299		23,328
576	30							RJH	Contingency		1	299	299		7,981
576	35							RJH	Labour		1	12	10		1,368
576	35							RJH	Materials and Equipment		1	12	10		
576	35							RJH	Other		1	12	10		820
576	35							RJH	Contingency		1	12	10		1,094
576	40							AM	Labour		8	50	5		67414.2611
576	40							AM	Materials and Equipment		8	50	5		33897.9886
576	40							AM	Other		8	50	5		3209.7868
576	40							AM	Contingency		8	50	5		33349.8366
576	45							AM	Labour		4	299	296		1,302,087
576	45							AM	Materials and Equipment		4	299	296		1,603,901
576	45							AM	Other		4	299	296		1,627,390
576	45							AM	Contingency		4	299	296		1,190,887
576	55							RJH	Labour		4	311	308		114,436
576	55							RJH	Materials and Equipment		4	311	308		8,970
576	55							RJH	Other		4	311	308		3,058
576	55							RJH	Contingency		4	311	308		37,939
576	90							AM	Labour		1	12	12		2,732
576	90							AM	Materials and Equipment		1	12	12		
576	90							AM	Other		1	12	12		1,742
576	90							AM	Contingency		1	12	12		895

C2 Cost Estimate Schedules for Bruce Site

WBS No 574 – CSB
WBS No 575 – SMV
WBS No 576 - CST

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

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment	Schedule Amndmnt No
1																					
2																					
3	1	574								**CASKS IN STORAGE BUILDINGS (CSB) - OPG BRUCE**											
4	2	574	15							**SITING**	Db Sm										
5	3	574	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH		1	94	7			
6	3	574	15	70						PREFERRED SITE	Db Sm										
7	4	574	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH		91	91	1			
8	4	574	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH		91	91	1			
9																					
10	2	574	20							**SYSTEM DEVELOPMENT**	Db Sm										
11	3	574	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM		90	96	7			
12	3	574	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM		90	93	4			
13	3	574	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM		90	96	7			
14	3	574	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM		90	96	7			
15	3	574	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM		93	93	1			
16																					
17	2	574	25							**SAFETY ASSESSMENT**	Db Sm										
18	3	574	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH		1	97	11			
19	3	574	25	30						SA - SITING	Db Act	FIXED	OPG	RJH		90	91	2			
20	3	574	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH		95	96	2			
21	3	574	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH		37	312	32			
22	3	574	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH		95	297	6			
23																					
24	2	574	30							**LICENSING & APPROVALS**	Db Sm										
25	3	574	30	30						LIAISON WITH CNSC	Db Act	FIXED	OPG	RJH		88	91	4			
26	3	574	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	OPG	RJH		92	94	3			
27	3	574	30	60						OTHER GOVN'MT APPROVALS	Db Sm										
28	4	574	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	OPG	RJH		88	91	4			
29	4	574	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	OPG	RJH		92	97	6			
30	4	574	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	OPG	RJH		92	97	6			
31	4	574	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	OPG	RJH		92	97	6			
32	3	574	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	OPG	RJH		96	97	2			
33	3	574	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	OPG	RJH		37	312	276			
34																					
35	2	574	35							**PUBLIC AFFAIRS**	Db Sm										
36	3	574	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH		91	91	1			
37	3	574	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH		92	94	3			
38	3	574	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH		95	97	3			
39	3	574	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH		1	97	10			
40	3	574	35	120						HOST COMMUNITY COMPENSATION	Db Act	FIXED	OPG	RJH		95	97	3			
41																					
42	2	574	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm										
43	3	574	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	GA		50	50	1			
44	3	574	40	30						COMMON ANCILLARY FACILITIES	Db Sm										
45	4	574	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm										
46	5	574	40	30	10	01				ADMIN AND VISITOR RECEPTION BLDG	Db Act	STEP FIXED	CTECH	GA		*	*	*			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment	Schedule Amndmnt No
47	5	574	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	GA		*	*	*			
48	5	574	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	GA		*	*	*			
49	5	574	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	GA		*	*	*			
50	5	574	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	GA		96	97	2			
51	5	574	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	GA		96	97	2			
52	5	574	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	GA		96	97	2			
53	5	574	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	GA		96	97	2			
54	5	574	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	GA		*	*	*			
55	5	574	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	GA		*	*	*			
56	5	574	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	GA	Not required for RES						
57	5	574	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	GA		*	*	*			
58	5	574	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	GA		52	53	2			
59	4	574	40	30	20					OTHER SITE SYSTEMS	Db Sm										
60	5	574	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	GA		*	*	*			
61	5	574	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	GA		*	*	*			
62	5	574	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	GA		*	*	*			
63	5	574	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	GA		*	*	*			
64	5	574	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	GA		*	*	*			
65	5	574	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	GA		*	*	*			
66	5	574	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	GA		*	*	*			
67	5	574	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	GA		*	*	*			
68	5	574	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	GA		*	*	*			
69	5	574	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	GA		*	*	*			
70	4	574	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	GA		52	53	2			
71	3	574	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM		53	53	1			
72										*** Existing buildings and services adopted by RES facility**												
73	2	574	45							**FACILITY OPERATION**	Db Sm										
74	3	574	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm										
75	4	574	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM		37	312	276			
76	4	574	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING	Db Act	STEP FIXED	CTECH	AM		37	312	276			
77	4	574	45	20	50					OPERATION INDIRECTS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM		37	312	276			
78	4	574	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	GA		37	312	276			
79	4	574	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM		37	312	276			
80	4	574	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM		48	48	1			
81	3	574	45	30						OPERATIONS - FACILITY REPEATS	Db Sm										
82	4	574	45	30	20					STORAGE BUILDINGS 100 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM		95	111	17			
83	4	574	45	30	50					STORAGE BUILDINGS 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM		195	211	17			
84	4	574	45	30	70					STORAGE BUILDINGS 300 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM		295	311	17			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment	Schedule Amndmnt No
85	3	574	45	40						OPERATIONS - REPACKAGING	Db Sm										
86	4	574	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM		95	312	60			
87	4	574	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm										
88	5	574	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM		94	95	2			
89	5	574	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM		94	97	4			
90	5	574	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm										
91	6	574	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm										
92	7	574	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
93	7	574	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
94	7	574	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
95	7	574	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
96	7	574	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
97	6	574	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM		96	97	2			
98	6	574	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
99	6	574	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM		97	97	1			
100	6	574	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM		96	97	2			
101	5	574	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	GA		151	153	3			
102	5	574	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM		97	97	1			
103	5	574	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM		98	111	14			
104	6	574	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	GA		95	111	17			
105	5	574	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM		98	111	14			
106	5	574	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM		98	111	14			
107	4	574	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM		194	211	18			
108	4	574	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm										
109	5	574	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM		295	312	18			
110	5	574	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm										
111	6	574	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM		297	298	2			
112	6	574	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM		295	298	4			
113	6	574	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM		297	298	2			
114	6	574	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM		298	298	1			
115	6	574	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM		295	298	4			
116	5	574	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM		299	312	14			
117																					
118	2	574	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm										
119	3	574	55	10						EA & Monitoring Program Management	Db Act	FIXED	OPG	RJH		37	312	276			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Comment	Schedule Amndmnt No
120	3	574	55	20						CNSC Construction Licence – Environmental Assessment	Db Act	FIXED	OPG	RJH		92	94	3			
121	3	574	55	40						Groundwater Monitoring	Db Act	FIXED	OPG	RJH		37	312	276			
122	3	574	55	50						Radiological Biosphere Monitoring	Db Act	FIXED	OPG	RJH		37	312	276			
123	3	574	55	60						Non-Rad Biosphere Monitoring	Db Act	FIXED	OPG	RJH		37	312	276			
124	3	574	55	80						Human Health Monitoring	Db Act	FIXED	OPG	RJH		37	312	62			
125																					
126	2	574	90							**PROGRAM MANAGEMENT (Yrs 01 to 4)**	Db Act	STEP FIXED	CTECH	AM		1	4	4			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	WBS Comments	Ammendment No	Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule	Schedule Amn
1	1	575								**SURFACE MODULAR VAULT (SMV) - OPG BRUCE**												
2	2	575	15							**SITING**	Db Sm											
3	3	575	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	9	7			
4	3	575	15	70						PREFERRED SITE	Db Sm											
5	4	575	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			6	6	1			
6	4	575	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH			6	6	1			
7																						
8	2	575	20							**SYSTEM DEVELOPMENT**	Db Sm											
9	3	575	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			1	7	7			
10	3	575	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			1	4	4			
11	3	575	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			1	7	7			
12	3	575	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			1	7	7			
13	3	575	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			4	4	1			
14																						
15	2	575	25							**SAFETY ASSESSMENT**	Db Sm											
16	3	575	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	12	10			
17	3	575	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			5	6	2			
18	3	575	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			10	11	2			
19	3	575	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			16	322	35			
20	3	575	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			311	312	2			
21																						
22	2	575	30							**LICENSING & APPROVALS**	Db Sm											
23	3	575	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG			1	6	4			
24	3	575	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG			7	9	3			
25	3	575	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG								
26	4	575	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG			3	6	4			
27	4	575	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG			7	12	6			
28	4	575	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG			7	12	6			
29	4	575	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG			7	12	6			
30	3	575	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	CTECH	MG			11	12	2			
31	3	575	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG			13	322	310			
32																						
33	2	575	35							**PUBLIC AFFAIRS**	Db Sm											
34	3	575	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			6	6	1			
35	3	575	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			7	9	3			
36	3	575	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			10	12	3			
37	3	575	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	12	10			
38	3	575	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH			10	12	3			
39																						
40	2	575	40							**SMV FACILITY DESIGN AND CONSTRUCTION**												
41	3	575	40	10						SITE & IMPROVEMENTS		STEP FIXED	CTECH	AM			9	9	1			
42	3	575	40	20						PROCESSING BUILDING (PB)												
43	4	575	40	20	20					PROCESSING BUILDING EQUIP. DESIGN, SUPPLY & INSTALL												
44	5	575	40	20	20	10				RECEIPT & TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			11	12	2			
45	5	575	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)		STEP FIXED	CTECH	AM			11	12	2			
46	5	575	40	20	20	40				COMMON CRANE MAINTENANCE AREA (EQUIP)		STEP FIXED	CTECH	AM			11	12	2			
47	4	575	40	20	30					PROCESSING BUILDING DESIGN & CONST'N		STEP FIXED	CTECH	AM			11	12	2			
48	4	575	40	20	60					PB BUILDING SERVICES DESIGN AND INSTALL'N		STEP FIXED	CTECH	AM			12	12	1			
49	4	575	40	20	70					COMMISSIONING (PB)		STEP FIXED	CTECH	AM			12	12	1			
50	4	575	40	20	80					CONST'N INDIRECTS (PB)		STEP FIXED	CTECH	AM			11	12	2			
51	3	575	40	30						COMMON ANCILLARY FACILITIES												

LINE No sp sht	Level	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 edul e Amn
52	4	575	40	30	10					ADMIN AND SUPPORT FACILITIES												
53	5	575	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG		STEP FIXED	CTECH	AM			*	*	*			
54	5	575	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BDLG		STEP FIXED	CTECH	AM			*	*	*			
55	5	575	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG		STEP FIXED	CTECH	AM			*	*	*			
56	5	575	40	30	10	04				STORAGE CASK/MODULE CANISTER STORE		STEP FIXED	CTECH	AM			*	*	*			
57	5	575	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG		STEP FIXED	CTECH	AM			310	311	2			
58	5	575	40	30	10	06				SOLID WASTE STORAGE AREA		STEP FIXED	CTECH	AM			310	311	2			
59	5	575	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG		STEP FIXED	CTECH	AM			310	311	2			
60	5	575	40	30	10	08				LOW LVL LIQ/W STRG BLDG		STEP FIXED	CTECH	AM			310	311	2			
61	5	575	40	30	10	09				WAREHOUSE BLDG		STEP FIXED	CTECH	AM			*	*	*			
62	5	575	40	30	10	10				GUARDHOUSE AND SECURITY FENCE		STEP FIXED	CTECH	AM			*	*	*			
63	5	575	40	30	10	11				TRUCK INSP'N / WASH STATION		STEP FIXED	CTECH	AM	Not required for RES							
64	5	575	40	30	10	12				UTILITY BLDG		STEP FIXED	CTECH	AM			52	53	2			
65	5	575	40	30	10	13				TEST FACILITY		STEP FIXED	CTECH	AM			52	53	2			
66	4	575	40	30	20					OTHER SITE SYSTEMS												
67	5	575	40	30	20	01				FIRE PROTECTION SYSTEMS		STEP FIXED	CTECH	AM			52	53	2			
68	5	575	40	30	20	02				SECURITY AND COMUNICATION SYSTEM		STEP FIXED	CTECH	AM			52	53	2			
69	5	575	40	30	20	03				ELECTRICAL AND EMERGENCY POWER		STEP FIXED	CTECH	AM			52	53	2			
70	5	575	40	30	20	04				SANITARY SEWER SYSTEM		STEP FIXED	CTECH	AM			52	53	2			
71	5	575	40	30	20	05				POTABLE WATER SYSTEM		STEP FIXED	CTECH	AM			52	53	2			
72	5	575	40	30	20	06				RETENTION/SEDIMENTATION POND		STEP FIXED	CTECH	AM			53	53	1			
73	5	575	40	30	20	07				STORM WATER DETENTION POND		STEP FIXED	CTECH	AM			53	53	1			
74	5	575	40	30	20	08				CONST'N MAT'L STOCKPILE AREA		STEP FIXED	CTECH	AM			51	51	1			
75	5	575	40	30	20	09				SITE MATERIALS STORAGE AREA		STEP FIXED	CTECH	AM			51	51	1			
76	5	575	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS		STEP FIXED	CTECH	AM			51	51	1			
77	4	575	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES		STEP FIXED	CTECH	AM			52	53	2			
78	3	575	40	40						STORAGE CONSTRUCTION (STAGE 1)												
79	5	575	40	40	10	05				CONSTRUCTION FACILITIES		STEP FIXED	ALSTEC	AM			11	12	2			
80	5	575	40	40	10	10				STORES ENGINEERING		STEP FIXED	ALSTEC	AM			11	12	2			
81	4	575	40	40	10	20				STORES EQUIP. DESIGN, SUPPLY & INSTALL		STEP FIXED	ALSTEC	AM			11	12	2			
82	4	575	40	40	10	30				SURFACE MODULAR VAULT DESIGN AND CONST'N		STEP FIXED	ALSTEC	AM			11	12	2			
83	4	575	40	40	10	40				COMMISSIONING		STEP FIXED	ALSTEC	AM			12	12	1			
84	4	575	40	40	10	50				CONST'N INDIRECTS		STEP FIXED	ALSTEC	AM			11	12	2			
85	3	575	40	500						COMMISSIONING MANAGEMENT		STEP FIXED	CTECH	AM			12	12	1			
86	3	575	40	600						EQUIPMENT, SPARES AND CONSUMABLES		STEP FIXED	CTECH	AM			12	12	1			
87	3	575	40	650						ENERGY CONSUMPTION		STEP FIXED	CTECH	AM			12	12	1			
88		575								*** Existing buildings and services adopted by RES facility**													
89	2	575	45							**FACILITY OPERATION**												
90	3	575	45	10						OPERATIONS INITIAL FUEL RECEIPT												
91	4	575	45	10	05					PROGRAM MANAGEMENT		STEP FIXED	CTECH	AM			13	54	42			
92	4	575	45	10	10					PROCESSING BUILDING OPERATIONS		STEP FIXED	CTECH	AM			13	54	42			
93	4	575	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	AM			13	54	42			
94	4	575	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	AM			13	54	42			
95	4	575	45	10	30					OPERATION INDIRECTS (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	AM			13	54	42			
96	4	575	45	10	40					STORAGE OPERATIONS		STEP FIXED	CTECH	AM			13	54	42			
97	4	575	45	10	50					ADDITIONAL STORAGE CONSTRUCTION												
98	5	575	45	10	50	10				STORAGE CONSTRUCTION (STAGE 2)		STEP FIXED	CTECH	AM			18	20	3			
99	5	575	45	10	50	20				STORAGE CONSTRUCTION (STAGE 3)		STEP FIXED	CTECH	AM			26	28	3			
100	5	575	45	10	50	30				STORAGE CONSTRUCTION (STAGE 4)		STEP FIXED	CTECH	AM			39	41	3			
101	3	575	45	20						OPERATIONS - EXTENDED MONITORING												
102	4	575	45	20	05					PROGRAM MANAGEMENT		STEP FIXED	CTECH	AM			55	321	267			
103	4	575	45	20	40					MONITORING AND SURVEILLANCE (EXTENDED)		STEP FIXED	CTECH	AM			55	321	267			

LINE No sp sht	Level	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 edul e Amn
104	4	575	45	20	50					OPERATION INDIRECTS (MONITORING)		STEP FIXED	CTECH	AM			55	321	267			
105	4	575	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)		STEP FIXED	CTECH	AM			55	321	267			
106	4	575	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)		STEP FIXED	CTECH	AM			55	321	267			
107	3	575	45	30						OPERATIONS - FACILITY REPEATS												
108	4	575	45	30	20					VAULT 100 YEAR REPLACEMENT		STEP FIXED	ALSTEC	AM			112	123	12			
109	4	575	45	30	30					VAULT 200 YEAR REPLACEMENT		STEP FIXED	ALSTEC	AM			212	223	12			
110	4	575	45	30	40					VAULT 300 YEAR REPLACEMENT		STEP FIXED	ALSTEC	AM			312	322	11			
111	3	575	45	40						OPERATIONS - REPACKAGING												
112	4	575	45	40	05					PROGRAM MANAGEMENT FACILITY REPEATS & REPACKAGING		STEP FIXED	CTECH	AM			112	322	36			
113	4	575	45	40	10					MODULE TO MODULE (M to M) 300 YEAR REPACKAGING												
	5	575	45	40	10	10				DECOMMISSSIONING OF EXISTING FACILITIES		STEP FIXED	CTECH	AM			309	310	2			
114	5	575	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT		STEP FIXED	CTECH	AM			311	312	2			
115	5	575	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT												
116	6	575	45	40	10	30	20			RP EQUIP. DESIGN, SUPPLY & INSTALL												
117	7	575	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			312	312	1			
118	7	575	45	40	10	30	20	20		CANISTER TO CANISTER FUEL TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			312	312	1			
119	7	575	45	40	10	30	20	30		CANISTER DECONTAMINATION (EQUIP)		STEP FIXED	CTECH	AM			312	312	1			
120	7	575	45	40	10	30	20	40		MODULE DECONTAMINATION(EQUIP)		STEP FIXED	CTECH	AM			312	312	1			
121	7	575	45	40	10	30	20	50		CANISTER DISMANTLING / BREAKDOWN(EQUIP)		STEP FIXED	CTECH	AM			312	312	1			
122		575	45	40	10	30	20	60		CASK OPENING AND CASK DECONTAMINATION (EQUIP,		STEP FIXED	CTECH	AM			312	312	1			
123	6	575	45	40	10	30	30			RP BUILDING DESIGN & CONST'N		STEP FIXED	CTECH	AM			311	312	2			
124	6	575	45	40	10	30	60			BUILDING SERVICES (RP)		STEP FIXED	CTECH	AM			311	312	2			
125	6	575	45	40	10	30	70			COMMISSIONING (RP)		STEP FIXED	CTECH	AM			311	312	2			
126	6	575	45	40	10	30	80			CONST'N INDIRECTS (RP)		STEP FIXED	CTECH	AM			311	312	2			
127	5	575	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)		STEP FIXED	CTECH	AM			152	320	12			
128	5	575	45	40	10	500				COMMISSIONING MANAGEMENT (RP)		STEP FIXED	CTECH	AM			312	312	1			
129	5	575	45	40	10	600				REPACKAGING OPERATIONS (RPMM)		STEP FIXED	CTECH	AM			313	321	9			
130	6	575	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)		VARIABLE	CTECH	AM			112	321	36			
131	5	575	45	40	10	700				OPERATION INDIRECTS (RPMM)		STEP FIXED	CTECH	AM			313	321	9			
132	5	575	45	40	10	800				STORAGE OPERATIONS (RPMM)		STEP FIXED	CTECH	AM			313	321	9			
133	5	575	45	40	40	600				REPACKAGING OPERATIONS (RPBB)		STEP FIXED	CTECH	AM			320	321	2			
134		575																				
135	2	575	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**												
136	3	575	55	10						EA & MONITORING PROGRAM MANAGEMENT		STEP FIXED	OPG	RJH			4	322	319			
137	3	575	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL		STEP FIXED	OPG	RJH			5	7	3			
138	3	575	55	40						GROUNDWATER MONITORING		STEP FIXED	OPG	RJH			13	322	310			
139	3	575	55	50						RADIOLOGICAL BIOSPHERE MONITORING		STEP FIXED	OPG	RJH			13	322	310			
140	3	575	55	60						NON-RAD BIOSPHERE MONITORING		STEP FIXED	OPG	RJH			13	322	310			
141	3	575	55	80						HUMAN HEALTH MONITORING		STEP FIXED	OPG	RJH			13	322	310			
142		575																				
143	2	575	90							**PROGRAM MANAGEMENT**		STEP FIXED	CTECH	AM			1	12	12			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt
1	1	576								**CASKS IN SHALLOW TRENCHES (CST) - OPG BRUCE**										
2	2	576	15							**SITING**	Db Sm									
3	3	576	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH	1	9	7			
4	3	576	15	70						PREFERRED SITE	Db Sm									
5	4	576	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH	6	6	1			
6	4	576	15	70	30					PREFERRED SITE - CHARACTERIZATION	Db Act	FIXED	OPG	RJH	6	6	1			
7																				
8	2	576	20							**SYSTEM DEVELOPMENT**	Db Sm									
9	3	576	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM	91	97	7			
10	3	576	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM	91	94	4			
11	3	576	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM	91	97	7			
12	3	576	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM	91	97	7			
13	3	576	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM	94	94	1			
14																				
15	2	576	25							**SAFETY ASSESSMENT**	Db Sm									
16	3	576	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH	1	10	10			
17	3	576	25	30						SA - SITING	Db Act	FIXED	OPG	RJH	6	7	2			
18	3	576	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH	10	11	2			
19	3	576	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH	11	311	35			
20	3	576	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH	87	288	6			
21																				
22	2	576	30							**LICENSING & APPROVALS**	Db Sm									
23	3	576	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG	1	4	4			
24	3	576	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG	7	9	3			
25	3	576	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG						
26	4	576	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG	4	7	4			
27	4	576	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG	6	10	5			
28	4	576	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG	7	12	6			
29	4	576	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG	7	12	6			
30	3	576	30	65						CNSC OPERATING LICENCE	Db Act	FIXED	CTECH	MG	11	12	2			
31	3	576	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG	13	311	299			
32																				
33	2	576	35							**PUBLIC AFFAIRS**	Db Sm									
34	3	576	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH	6	6	1			
35	3	576	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH	7	9	3			
36	3	576	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH	10	12	3			
37	3	576	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH	1	12	10			
38	3	576	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH	10	12	3			
39																				
40	2	576	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm									
41	3	576	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	AM	9	9	1			
42	3	576	40	30						COMMON ANCILLARY FACILITIES	Db Sm									
43	4	576	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm									
44	5	576	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG	Db Act	STEP FIXED	CTECH	AM	*	*	*			
45	5	576	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	AM	*	*	*			
46	5	576	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	AM	*	*	*			
47	5	576	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	AM	*	*	*			
48	5	576	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	AM	96	97	2			
49	5	576	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	AM	96	97	2			
50	5	576	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	AM	96	97	2			
51	5	576	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	AM	96	97	2			
52	5	576	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	AM	*	*	*			
53	5	576	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	AM	*	*	*			
54	5	576	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	AM	*	*	*			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt
55	5	576	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	AM	*	*	*			
56	5	576	40	30	10	13				TEST FACILITY	Db Sm	STEP FIXED	CTECH	AM	52	53	2			
57	4	576	40	30	20					OTHER SITE SYSTEMS										
58	5	576	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	AM	*	*	*			
59	5	576	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	AM	*	*	*			
60	5	576	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	AM	*	*	*			
61	5	576	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	AM	*	*	*			
62	5	576	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	AM	*	*	*			
63	5	576	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	AM	*	*	*			
64	5	576	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	AM	*	*	*			
65	5	576	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	AM	*	*	*			
66	5	576	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	AM	*	*	*			
67	5	576	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	AM	*	*	*			
68	4	576	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	AM	*	*	*			
69	3	576	40	40						STORAGE DESIGN & CONSTRUCTION (STAGE 1)	Db Act	STEP FIXED	CTECH	AM	10	11	2			
70	3	576	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM	53	53	1			
71										*** Existing buildings and services adopted by RES facility**											
72	2	576	45							**FACILITY OPERATION**	Db Sm									
73	3	576	45	10						OPERATIONS FUEL TRANSFER	Db Sm									
74	4	576	45	10	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM	13	44	32			
75	4	576	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM	13	44	32			
76	4	576	45	10	30					OPERATION INDIRECTS (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM	13	44	32			
77	4	576	45	10	40					STORAGE OPERATIONS	Db Act	STEP FIXED	CTECH	AM	13	44	32			
78	4	576	45	10	50					ADDITIONAL STORAGE CONSTRUCTION	Db Sm									
79	5	576	45	10	50	10				STORAGE DESIGN & CONSTRUCTION STAGE 2	Db Act	STEP FIXED	CTECH	AM	15	16	2			
80	5	576	45	10	50	20				STORAGE DESIGN & CONSTRUCTION STAGE 3	Db Act	STEP FIXED	CTECH	AM	20	21	2			
81	5	576	45	10	50	30				STORAGE DESIGN & CONSTRUCTION STAGE 4	Db Act	STEP FIXED	CTECH	AM	27	28	2			
82	5	576	45	10	50	40				STORAGE DESIGN & CONSTRUCTION STAGE 5	Db Act	STEP FIXED	CTECH	AM	34	35	2			
83	5	576	45	10	50	50				STORAGE DESIGN & CONSTRUCTION STAGE 6	Db Act	STEP FIXED	CTECH	AM	38	39	2			
84	3	576	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm									
85	4	576	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM	45	311	268			
86	4	576	45	20	40					MONITORING AND SURVEILLANCE	Db Act	STEP FIXED	CTECH	AM	45	311	268			
87	4	576	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM	45	311	268			
88	4	576	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM	45	311	268			
89	4	576	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM	45	311	268			
90	4	576	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM	48	48	1			
91	3	576	45	30						OPERATIONS - FACILITY REPEATS	Db Sm									
92	4	576	45	30	50					STORAGE CHAMBER 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM	186	202	17			
93	3	576	45	40						OPERATIONS - REPACKAGING	Db Sm									

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt
94	4	576	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM	94	311	60			
95	4	576	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm									
96	5	576	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM	97	98	2			
97	5	576	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM	94	97	4			
98	5	576	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm									
99	6	576	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm									
100	7	576	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
101	7	576	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER	Db Act	STEP FIXED	CTECH	AM	96	97	2			
102	7	576	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
103	7	576	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
104	7	576	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
105	6	576	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM	96	97	2			
106	6	576	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
107	6	576	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM	97	97	1			
108	6	576	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM	96	97	2			
109	5	576	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	AM	151	153	3			
110	5	576	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM	97	97	1			
111	5	576	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM	98	111	14			
112	6	576	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	AM	95	111	17			
113	5	576	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM	98	111	14			
114	5	576	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM	98	111	14			
115	4	576	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM	194	211	18			
116	4	576	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm									
117	5	576	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM	294	311	18			
118	5	576	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm									
119	5	576	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM	296	297	2			
120	6	576	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM	294	297	4			
121	6	576	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM	296	297	2			
122	6	576	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM	297	297	1			
123	6	576	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM	294	297	4			
124	5	576	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM	298	311	14			
125																				
126	2	576	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm									
127	3	576	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH	7	9	3			
128	3	576	55	20						CNSC CONSTRUCTION LICENCE - EA	Db Act	FIXED	OPG	RJH	5	7	3			
129	3	576	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH	13	311	299			
130	3	576	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH	13	311	299			
131	3	576	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH	13	311	299			
132	3	576	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH	13	311	60			
133																				
134	2	576	90							**PROGRAM MANAGEMENT (Yrs 01 to 12)**	Db Act	STEP FIXED	CTECH	AM	1	12	12			
135																				

APPENDIX D

D1 Estimating Workbooks for Darlington Site

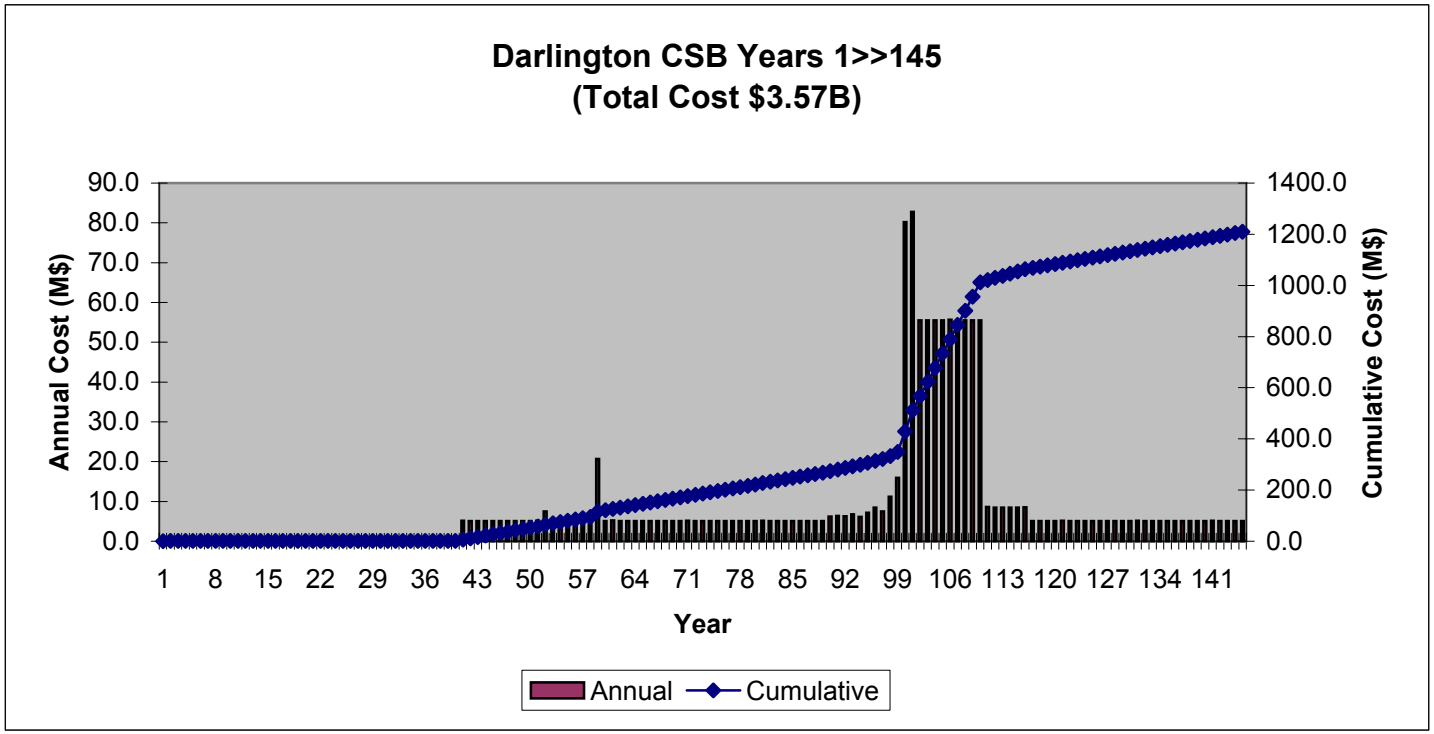
WBS No 577 – CSB
WBS No 578 – SMV
WBS No 579 - CST

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

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 577
DARLINGTON
CASKS IN STORAGE BUILDINGS **(CSB)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	8,031
25	Safety Assessment	5,706
30	Licensing & Approvals	37,446
35	Public Affairs	3,281
40	Facility Design & Construction	19,143
45	Facility Operation	3,359,146
55	Environmental Assessment and Monitoring	132,615
90	Program Management	1,402
	Total Cost ($k)	**3,567,594**

Darlington CSB Alternative	**3,567,594**
Siting Phase	**20,266**
Siting	824
EA	3007
System Development	8031
SA	811
L&A	2910
Public Affairs	3281
Program Mgmt	1402
Construction Phase	**19,143**
Transition to Standalone	16,655
Before 100-yr Repackaging	2,487
Operations Phase	**3,528,185**
Repeat & Repackaging	*2,162,508*
SB - 100 yrs	68,486
SB - 200 yrs	68,486
SB - 300 yrs	68,486
Repackaging - 100 yrs	579,841
Repackaging - 200 yrs	578,171
Repackaging M to M - 300 yrs	644,516
PM for Repeats & Repackaging	154,521
Extended Monitoring	*1,365,678*
Program Mgmt	495,178
Monitoring Surveliance	40,994
Operation Indirects	555,251
Common Ancillary Services Ops	100,257
Fuel Integrity Monitoring	4,959
SA - Ops & Decommissioning	4,895
L&A - Ops Licence Renewal	34,536
Environmental Monitoring	129,609


Darlington CSB Years 1>>145
(Total Cost $3.57B)
Annual Cost (M$)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
Cumulative Cost (M$)
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB) DARLINGTON

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
577	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	98	7	0	0	NO DATA TO FILL	452.2
577	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	98	7	0	0		0.0
577	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	98	7	0	0		97.0
577	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	98	7	0	0		274.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
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	
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	
											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																	
577	15							**Siting**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	15	10						SITING MANAGEMENT																
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites. Assume a factor of 0.05. Costs in Y1 to Y3 & Y95 to Y98.	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	
577	15	70						PREFERRED SITE																
577	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 10% of a CES greenfield site (Y95)	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	
577	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 10% of a CES greenfield site (Y95)	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	

Total	**824**
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		0

BASIS OF ESTIMATE NOTES - Insert references and notes

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	90	97	8	0	0	NO DATA TO FILL	5137.5
577	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	90	97	8	0	0		451.5
577	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	90	97	8	0	0		203.2
577	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	90	97	8	0	0		2238.7

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	5137	0.0	5137.5
Materials and Equipment	452	0.0	451.5
Other	203	0.0	203.2
Contingency	2238.7	0.0	2238.7
Total	8031	0.0	8031

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
577	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577								**OPG has 3 sites Pickering, Bruce and Darlington. CSB (Casks in Storage Buildings) is a storage alternative applicable to each site. The system development for the CSB alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CSB workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.**															
577	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and additional 50% is deducted. Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Labour	0.18	6690.40	0.18	1170.82										1,171
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0
								Assume same size management team as for CES. Therefore factor = 1/3. Also for resident storage option selected as future storage method and additional 50% is deducted. Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor	Other	0.18							300.00	0.18	52.50				53

			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	367.0	367
577	20	5	SYSTEM OPTIMIZATION																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Labour	0.18	3303.70	0.18	578.15											578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 50% is deducted	Other	0.18							120.00	0.18	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.00	179.74	180
577	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Labour	0.11	20750.10	0.11	2178.76											2,179
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is deducted	Materials and Equipment	0.11				4300.00	0.11	451.50								452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is deducted	Other	0.11							895.00	0.11	93.98					94
			Percentage for contingency assumed same as for CES	Contingency	50%											50%	1.00	1362.12	1,362
577	20	30	STORAGE SYSTEM ENG'NG																
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Labour	0.11	8143.20	0.11	855.04											855
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00								0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 70% is deducted	Other	0.11							200.00	0.11	21.00					21
			Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.00	219.01	219
577	20	40	SECURITY & SAFEGUARD ENG'NG																

Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Labour	0.25	1447.70	0.25	354.69												355
No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00									0
Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and additional 30% is deducted	Other	0.25							60.00	0.25	14.70						15
Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8			111

Total	**8,031**
Check: Should = 0	**0**

Total	5,137	Total	452	Total	203	Total	2,238.7				
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

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	25	0	0	0	0	0	0	Safety Assessment	Labour		OPG	RJH	1	310	273	0	0	NO DATA TO FILL	3628.2
577	25	0	0	0	0	0	0	Safety Assessment	Materials and Equipment		OPG	RJH	1	310	273	0	0		0.0
577	25	0	0	0	0	0	0	Safety Assessment	Other		OPG	RJH	1	310	273	0	0		447.5
577	25	0	0	0	0	0	0	Safety Assessment	Contingency		OPG	RJH	1	310	273	0	0		1630.3

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	3628
Materials and Equipment	0
Other	448
Contingency	1630.3
Total	5706

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k	% >>>>
Should = 100% --->	*0%*	
0.0	3628.2	
0.0	0.0	
0.0	447.5	
0.0	1630.3	
0.0	5706	

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
577	25							**Safety Assessment**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
577	25	10						SAFETY ASSESSMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	Labour	0.05	5218.2	0.05	260.91										261	
								Y1 to Y3 & Y94 to Y101	Materials and Equipment	0.05				0	0.05	0							0	1
									Other	0.05							850	0.05	42.5				43	
									Contingency	40%										40%	1.0	121.4	121	
577	25	30						SA - SITING																
								Y94 & Y95	Labour	0	2287.5	0	0										0	2
								Very limited siting activities leads no SA costs	Materials and Equipment	0				0	0	0							0	
									Other	0							3,850	0	0				0	
									Contingency	40%										40%	1.0	0.0	0	
577	25	40						SA - OPERATING LICENSE																
								Y99 to Y100	Labour	0.15	1540.5	0.15	231.075										231	3
									Materials and Equipment	0.15				0	0.15	0							0	
									Other	0.15							300	0.15	45				45	
									Contingency	40%										40%	1.0	110.4	110	
577	25	50						SA - FACILITY OPERATIONS																

			RES has 30 renewal events vs 45 in CES giving a factor of 0.66. However renewal costs can be shared between sites with same technoilogy; thus reduce factor to 0.25 (Y41 to Y310)	Labour	0.25	9604.8	0.25	2401.2													2,401
				Materials and Equipment	1				0	1	0										0
			Expenses at $1K/a x 270 yrs = $270K	Other	1							270	1	270							270
				Contingency	40%										40%	1.0	1,068.5				1,068
577	25	70	SA - DECOMMISSIONING (Processing Facilities)																		
			RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technoilogy; thus factor to 0.3	Labour	0.3	2449.9	0.3	734.97													735
				Materials and Equipment	0.3				0	0.3	0										0
				Other	0.3							300	0.3	90							90
				Contingency	40%										40%	1.0	330.0				330
																				Total	**5,706**
																				Check: Should = 0	**0**
						Total		3,628	Total		0	Total		448	Total		1,630.3				
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0				5706

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

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour		OPG	RJH	41	310	270	0	0	NO DATA TO FILL	9075.5
577	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment		OPG	RJH	41	310	270	0	0		0.0
577	30	0	0	0	0	0	0	0 Licensing & Approvals	Other		OPG	RJH	41	310	270	0	0		20881.2
577	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency		OPG	RJH	41	310	270	0	0		7489.2

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Total Cost $k	% >>>
Labour	9076	*0.0*		9075.5	
Materials and Equipment	0	*0.0*		0.0	
Other	20881	*0.0*		20881.2	
Contingency	7489.2	*0.0*		7489.2	
Total	37446	*0.0*		37446	

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																	
								In general L&A costs are assumed to be less than for a CES facility since dealing with well developed technology on an existing site. In some cases the costs are shared between the seven sites which further reduces costs.																	
577	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	30	30						LIAISON WITH CNSC																
								Duration 4 yrs vs 10 yrs in CES and cost shared between 7 sites. Thus factor is 0.058. However due to inefficiencies of multiple sites increase to 0.2 (Y92 to Y95)	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	
577	30	50						CNSC CONSTRUCTION LICENCE																
								Can share knowledge between sites Efficiencies gained through sharing of knowledge bewteen sites. Licensing process shorter than CES at 7yrs with RES being 3 years (Y96 to Y98). CES involves comprehensive with Panel and RES would likely be a comprehensive with no Panel.	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	
577	30	60						OTHER GOVN'MT APPROVALS																
577	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 (Y92 to Y95)	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
577	30	60	30	FEDERAL APPROVALS															
				Y96 to Y101	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
577	30	60	40	PROVINCIAL APPROVALS															
				Y96 to Y101	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
577	30	60	50	MUNICIPAL APPROVALS															
				Y96 to Y101	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
577	30	65		CNSC OPERATING LICENCE (Initial Application)															
				Y100 to Y101	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
577	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)															
				CES duration is 330 years. Costs incurred in RES during period Y41 to Y310 or 270 years. Thus assume a factor of 82%. Some effeciencies gained because of renewal on three sites. Thus assume 25% factor.	Labour	0.25	32754	0.25	8188.5										8,189
					Materials and Equipment	1				0	1	0							0
				Expenses at $72K/a x 270 yrs = $19,440K	Other	1							19,440	1	19440				19,440
					Contingency	0.25										25%	1.0	6,907.1	6,907
																Total			**37,446**
																Check: Should = 0			**0**
							Total		9,076	Total		0	Total		20,881	Total		7,489.2	
							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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	35	0	0	0	0	0	0	0 Public Affairs	Labour		OPG	RJH	1	101	10	0	0	NO DATA TO FILL	1367.5
577	35	0	0	0	0	0	0	0 Public Affairs	Materials and Equipment		OPG	RJH	1	101	10	0	0		0.0
577	35	0	0	0	0	0	0	0 Public Affairs	Other		OPG	RJH	1	101	10	0	0		820.0
577	35	0	0	0	0	0	0	0 Public Affairs	Contingency		OPG	RJH	1	101	10	0	0		1093.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
Labour	1368		*0.0*	1367.5	
Materials and Equipment	0		*0.0*	0.0	
Other	820		*0.0*	820.0	
Contingency	1093.8		*0.0*	1093.8	
Total	3281		*0.0*	3281	

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
577	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
								Y95	Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
577	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
								Y96 to Y98	Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
577	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
								Y99 to Y101	Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
577	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
								Y1 to Y3 & Y95 to Y101	Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0	0.1	0							0	
									Other	0.1							170	0.1	17				17	
									Contingency	50%										50%	1.0	185.0	185	

577	35	120	Community Offsets & Benefits																		
			Y99 to Y101	Labour	0.25	0	0.25	0													0
				Materials and Equipment	0.25				0	0.25	0										0
				Other	0.25							2,072	0.25	518							518
				Contingency	50%										50%	1.0	259.0				259
															Total						**3,281**
															Check: Should = 0						**0**
					Total		1,368	Total		0	Total		820	Total		1,093.8					
					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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	8	50	5	0	0	NO DATA TO FILL	5344.2
577	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	8	50	5	0	0		7811.0
577	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	8	50	5	0	0		36.6
577	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	8	50	5	0	0		5950.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	5344		*0.0*	5344.2	
Materials and Equipment	7811		*0.0*	7811.0	
Other	37		*0.0*	36.6	
Contingency	5950.8		*0.0*	5950.8	
Total	19143		*0.0*	19143	

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																	
577	40							**Facility Design & Construction**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	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 additional land acquisition costs neccesary	Other	0.0							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	
577	40	30						COMMON ANCILLARY FACILITIES																
577	40	30	10					ADMIN AND SUPPORT FACILITIES																
577	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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	
577	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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
577	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0								comment 7		0
					Materials and Equipment	0.00				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
577	40	30	10	4	STORAGE CASK STORE														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0								comment 7		0
					Materials and Equipment	0.00				1,892.0	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
577	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	0.30	459.9	0.3	138.0										138
					Materials and Equipment	0.30				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
577	40	30	10	6	SOLID WASTE STORAGE AREA														
				ACTIVE SOLID WASTE HDLG BLDG	Labour	0.30	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	0.30				437.5	0.3	131.3							131
					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
577	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	0.30	359.4	0.3	107.8										108
					Materials and Equipment	0.30				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
577	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	0.30	373.7	0.3	112.1										112
					Materials and Equipment	0.30				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
577	40	30	10	9	WAREHOUSE BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0								comment 7		0
					Materials and Equipment	0.00				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
577	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																	
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0										comment 7		0
						Materials and Equipment	0.00				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%	1.25	0.0		0
577	40	30	10	11	TRUCK INSP'N / WASH STATION																	
					not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0										comment 7		0
						Materials and Equipment	0.00				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
577	40	30	10	12	UTILITY BLDG																	
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0										comment 7		0
						Materials and Equipment	0.00				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
577	40	30	10	13	TEST FACILITY CONSTRUCTION																	
					Facility will be constructed at Bruce, taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3 OPG sites therefore factor 0.33.	Labour	0.3	766.8	0.3	255.6												256
						Materials and Equipment	0.3				1,675.0	0.3	558.3									558
					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	20.0%											20%	1.0	162.8		163
577	40	30	20		OTHER SITE SYSTEMS																	
577	40	30	20	1	FIRE PROTECTION SYSTEMS																	
					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
577	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																	
					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
577	40	30	20	3	ELECTRICAL AND EMERGENCY POWER																	
					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
577	40	30	20	4	SANITARY SEWER SYSTEM															
				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
577	40	30	20	5	POTABLE WATER SYSTEM															
				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
577	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
577	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
577	40	30	20	8	CONST'N 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
577	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
577	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

577 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
577 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
			allowance for consumption for construction of 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	**19,143**
																		Check: Should = 0	**0**
						Total		5,344	Total		7,811	Total		37	Total		5,950.8		
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0		

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	41	310	270	0	0	NO DATA TO FILL	957969.6
577	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	41	310	270	0	0		1006625.3
577	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	41	310	270	0	0		674633.3
577	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	41	310	270	0	0		719918.1

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	957970	*0.0*	957969.6
Materials and Equipment	1006625	*0.0*	1006625.3
Other	674633	*0.0*	674633.3
Contingency	719918	*0.0*	719918.1
Total	3359146	*0.0*	3359146

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
577	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	45	20						OPERATIONS - EXTENDED MONITORING																
577	45	20	5					PROGRAM MANAGEMENT																
									Labour	0.26	312,354.0	0.26	81,212.0										81,212	
								Entries in CES DET applicable to RES but duration 270 years RES & 300 years CES therefore 270/300 of labour costs. Darlington assumed to have 2.6 staff vs 9 in CES. Thus factor is 26%.																
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0	
								Annual cost = $1246/a x 266 yrs	Other	1.00							331,436.0	1.0	331,436.0				331,436	1
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	82,529.6	82,530	
577	45	20	40					MONITORING AND SURVEILLANCE -EXTENDED MONITORING																
								Reduced duration to CES (270/300). One staff for RES vs 5 in CES. Combined factor = (270/300) x (1/5)	Labour	0.18	150,328.0	0.18	27,059.0										27,059	
								Annual cost = $1k/a x 270 yrs	Materials and Equipment	1.00				270.0	1.0	270.0							270	
								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	13,664.5	13,665	

577	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)															
				Entries in CES DET applicable to RES but duration 270 years RES & 300 years CES therefore270/300 = 0.9, also staff for RES = 13 vs 34 in CES. Combined factor is 270/300 x 13/34 = 0.34. Annual M&E costs are $150k/a x 270 yrs = $40,500	Labour	0.34	875,048.0	0.34	297,516.3									297,516
					Materials and Equipment	1.00				40,500.0	1.0	40,500.0							40,500
					Other								89,100.0						89,100
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 270 years = $89,100K															
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	128,134.9		128,135
577	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)															
					Labour	0.54	148,529.0	0.54	80,205.7										80,206
				RES duration is 270 years RES & 300 years CES. RES staff is 3 vs 5 in CES. Factor is 270/300 x 3/5 = 0.54															
				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	20,051.4		20,051
577	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)															
				RES duration is 270 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 270 yrs = $891K. Other costs is $0.7K/a x 270 yrs = $189K.	Labour	0.2	4,631.0	0.20	926.2									926
					Materials and Equipment	1.0				891.0	1.0	891.0							891
					Other	1.0							189.0	1.0	189.0				189
				Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	1,003.1		1,003
577	45	20	80	RECEIPT & TRANSFER (EQUIP)															
				No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5				3,000.0	0.5	1,500.0							1,500
				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	450.0		450
577	45	30		OPERATIONS - FACILITY REPEATS															
577	45	30	20	STORAGE BUILDINGS 100 YEAR REPLACEMENT															
				labour for demolition of previous stores and construction of new = factor 5/17 (0.29) (stores qty) labour for fuel transfer = 9/30 (years for transfer) factor = 9/30= (0.3) use 0.3	Labour	0.30	89,923.0	0.30	26,976.9									26,977
				const'n materials = 5 bldgs RES, 17 bldgs CES factor =5/17	Materials and Equipment	0.30				41,803.0	0.3	12,540.9							12,541
				waste disposal = 5 bldgs RES, 17 bldgs CES factor =5/17	Other	0.30							43,879.0	0.3	13,163.7				13,164
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	15,804.5		15,804
577	45	30	50	STORAGE BUILDINGS 200 YEAR REPLACEMENT															
				assumed same as 100 yr replacement	Labour	0.30	89,923.0	0.30	26,976.9										26,977
				assumed same as 100 yr replacement	Materials and Equipment	0.30				41,803.0	0.3	12,540.9							12,541
				assumed same as 100 yr replacement	Other	0.30							43,879.0	0.3	13,163.7				13,164

						Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	15,804.5	15,804		
577	45	30	70			STORAGE BUILDINGS 300 YEAR REPLACEMENT																		
						assumed same as 100 yr replacement	Labour	0.30	89,923.0	0.30	26,976.9											26,977		
						assumed same as 100 yr replacement	Materials and Equipment	0.30				41,803.0	0.3	12,540.9										12,541		
						assumed same as 100 yr replacement	Other	0.30							43,879.0	0.3	13,163.7							13,164		
						Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	15,804.5	15,804		
577	45	40				OPERATIONS - REPACKAGING																		
577	45	40	5			PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																		
							Labour	0.16	389,170.0	0.16	61,447.9											61,448		
						Entries in CES DET applicable to RES but duration 45 years RES 4 x (2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 9yr operations) & 114 years CES therefore 45/114 of labour costs. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).																	
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0										0		
						property tax based on 45 year duration (3x15 year periods)	Other	1.00							67,320.0	1.0	67,320							67,320		2
						Percentage for contingency assumed same as for CES	Contingency	20%											20%	1.0	25,753.6	25,754		
577	45	40	10			MODULE TO CASK 100 YEAR REPACKAGING																		
577	45	40	10	10		DECOMMISSIONING OF EXISTING FACILITIES																		
						assume decommissioning of existing process building (from interim period) same costs as CES process building	Labour	1.0	2,357.4	1.00	2,357.4											2,357		
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0										0		
							Other	1.0							3,207.7	1.0	3,207.7							3,208		
						Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	1,669.5	1,670		
577	45	40	10	20		CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)																		
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1											476		
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6										355		
						RPM Repackaging plant same as CES facility therefore factor = 1	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		
577	45	40	10	30		PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)																		
577	45	40	10	30	20	RPM EQUIP. DESIGN, SUPPLY & INSTALL																		
577	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2											276		
						RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0										5,523		

							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						290.0	1.0	290.0					290
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,826.8	1,827
577	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6									2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1						11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						685.4	1.0	685.4				685
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	4,317.9	4,318
577	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3									2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4						13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						823.0	1.0	823.0				823
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,184.8	5,185
577	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)															
							No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0									0
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0						5,055
							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	1,516.5	1,517
577	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0									233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0						2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						128.0	1.0	128.0				128
							Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	538.6	539
577	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2									8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7						8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						1,624.3	1.0	1,624.3				1,624
							Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	5,593.3	5,593
577	45	40	10	30	60		BUILDING SERVICES (RPM)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2									11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4						9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0						3,486.7	1.0	3,486.7				3,487
							Percentage for contingency assumed same as for CES	Contingency	25%									25%	1.0	5,994.6	5,995

577	45	40	10	30	70	COMMISSIONING (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8												1,253
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0											0
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							232.1	1.0	232.1								232
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	742.5					742
577	45	40	10	30	80	CONST'N INDIRECTS (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3												14,668
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0											0
						RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							518.6	1.0	518.6								519
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,556.1					4,556
577	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7															
						replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2												21,056
							Materials and Equipment	1.00				29,785.1	1.0	29,785.1									29,785
						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	22%										22%	1.0	11,185.1					11,185
577	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																	
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8												274
						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	136.9					137
577	45	40	10	600		REPACKAGING OPERATIONS (RPM)																	
						repackaging of 2282 RES casks compared to 8528 CES factor = 2282/8528	Labour	0.27	118,823.0	0.27	31,795.7												31,796
						procurement of 2282 RES casks compared to 8528 CES factor = 2282/8528	Materials and Equipment	0.27				788,840.0	0.3	211,085.0											211,085
						disposal of 2282 RES casks compared to 8528 CES factor = 2282/8528	Other	0.27							110,864.0	0.3	29,666.0								29,666
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	81,764.0					81,764
577	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																	
						duration 12 years RES (1 demolish prev, 2const'n, 9 transfer ops) compared to 30 years CES. Factor =12/30 = 0.3	Labour	0.4	11,882.0	0.40	4,752.8												4,753
						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	1,188.2					1,188

577	45	40	10	700		OPERATION INDIRECTS (RPM)													
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	16,070.0	0.30	4,821.0								4,821
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				380.5	0.3	114.2							114
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0				4,860
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,938.5	2,939
577	45	40	10	800		STORAGE OPERATIONS (RPM)													
						transfer of 2282 casks RES compared to 8528 casks CES	Labour	0.27	2,093.9	0.27	560.3								560
						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	30%										30%	1.0	168.1	168
577	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING													
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Labour				107,360.9									107,361
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Materials and Equipment							297,090.5							297,090
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Other									45,750.2					45,750
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Contingency													127,969.5	127,970
577	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING													
577	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING													
						Costs taken as same as 200 year repackaging	Labour				107,360.9									107,361
						Costs taken as same as 200 year repackaging	Materials and Equipment							297,090.5							297,090
						Costs taken as same as 200 year repackaging	Other									45,750.2					45,750
						Costs taken as same as 200 year repackaging	Contingency													127,969.5	127,970
577	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS													
577	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL													
						No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5							6,472
						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	1,941.5	1,941
577	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1										372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1							372

						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					74.4	1.0	74.4				74
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	245.6	246
577	45	40	30	30	60	BUILDING SERVICES (MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9								384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5					311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					97.9	1.0	97.9				98
						Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	198.1	198
577	45	40	30	30	70	COMMISSIONING(MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1								334
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					53.2	1.0	53.2				53
						Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	193.7	194
577	45	40	30	30	80	CONST'N INDIRECTS (MM)													
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8								724
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0					0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0					25.4	1.0	25.4				25
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	224.8	225
577	45	40	30	600		REPACKAGING OPERATIONS (Module to Module)													
						MM repackaging operations factor 2282/8528 = 0.284 (ratio for casks = ratio for modules)	Labour	0.27	17,823.5	0.27	4,775.0								4,775
						Module procurement factor 2282/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.27				102,336.0	0.3	27,416.1					27,416
						module waste disposal factor 2282/8528 = 0.284 (ratio for casks = ratio for modules)	Other	0.27					35,817.6	0.3	9,595.7				9,596
						Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	12,536.0	12,536
																		Total	**3,359,146**
																		Check: Should = 0	**0**
								Total		957,970	Total		1,006,625	Total		674,633	Total	719,918.1	
								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 1246k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (71950k$) at rate 2.87%)

2 1496k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (71950k$) at rate 2.87%). this tax runs for 3X15 years = 45 years. A portion of this tax over 45 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)

3

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour		OPG	RJH	41	310	270	0	0	NO DATA TO FILL	91310.9
577	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	41	310	270	0	0		8100.0
577	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other		OPG	RJH	41	310	270	0	0		2693.5
577	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency		OPG	RJH	41	310	270	0	0		30511.1

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
					% >>>
Labour	91311		*0.0*	91310.9	
Materials and Equipment	8100		*0.0*	8100.0	
Other	2694		*0.0*	2693.5	
Contingency	30511.1		*0.0*	30511.1	
Total	132615		*0.0*	132615	

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																	

Total OPG fuel inventory on 3 sites is 93% of CES inventory. Therefore it is assumed that the total cost of EA & Monitoring program is same as total cost for CES. Therefore have assumed that the annual costs would be same as for CES and that there would be reduction due to shorter duration of program. Exceptions are noted below.

577	55							**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
577	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y41 (start of ex. Monitoring) to Y310 (when repackaging ends) or 270 yrs vs CES at 347 yrs. RES has 0.5 staff vs 2 staff in CES. Factor is 270/347 x 0.5/2 = 0.195	Labour	0.195	70306	0.195	13709.67											13,710
									Materials and Equipment	1				0	1	0								0
								Expenses at $3K/a x 270 years	Other	1							810	1	810					810
									Contingency	0.3										14,520	0.3	4355.901		4,356
577	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years (Y96 to Y98) with with some preparation work in Y95; ie total of 4 years. Due to multiple sites with same technology can share costs. EA process is simplier since repeat of same technolgy at existing storage sites	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	0.25								2405.25	0.25	601.3125		601
577	55	40	GROUNDWATER MONITORING														
			RES = 270 yrs vs CES = 330 yrs. Factor is 270/330 x 0.2/0.6 = 0.27 (Y41 to Y310)	Labour	0.27	37158	0.27	10032.66									10,033
			M&E @ $6K/a x 270 yrs = $1,620K	Materials and Equipment	1				1620	1	1620						1,620
			Expenses @ $4K/a x 270 yrs = $1080K	Other	1					1,080	1	1080					1,080
				Contingency	0.3								12732.66	0.3	3819.798		3,820
577	55	50	RADIOLOGICAL BIOSPHERE MONITORING														
			RES = 270 yrs vs CES = 330 yrs. Factor is 270/330 x 1/3.3 = 0.248 (Y41 to Y310)	Labour	0.248	217280	0.248	53885.44									53,885
			M&E costs at $18K/a x 270 yrs	Materials and Equipment	1				4860	1	4860						4,860
				Other	1					0	1	0					0
				Contingency	0.3								58745.44	0.3	17623.632		17,624
577	55	60	NON-RAD BIOSPHERE MONITORING														
			RES = 270 yrs vs CES = 330 yrs. Factor is 270/330 x 0.2/0.8 = 0.205 (Y41 to Y310)	Labour	0.205	53590	0.205	10985.95									10,986
			M&E costs at $6K/a x 270 yrs	Materials and Equipment	1				1620	1	1620						1,620
				Other	1					0	1	0					0
				Contingency	0.3								12605.95	0.3	3781.785		3,782
577	55	80	HUMAN HEALTH MONITORING														
			RES = 270 yrs vs CES = 330 yrs. Factor is 270/330 x 0.03/0.17= 0.144	Labour	0.144	5760	0.144	829.44									829
				Materials and Equipment	1				0	1	0						0
			Expenses at $1K/a x 266 yrs = $266K	Other	1					266	1	266					266
				Contingency	0.3								1095.44	0.3	328.632		329

Total	**132,615**
Check: Should = 0	**0**

Total	91,311	Total	8,100	Total	2,694	Total	30,511.1
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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

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
577	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	4	4	0	0	NO DATA TO FILL	587.7
577	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	4	4	0	0		0.0
577	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	4	4	0	0		580.8
577	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	4	4	0	0		233.7

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0 / Check total	Total Cost $k	Budget costs to Years by %
		0%		
Labour	588	0.0	587.7	
Materials and Equipment	0	0.0	0.0	
Other	581	0.0	580.8	
Contingency	233.7	0.0	233.7	
Total	1402	0.0	1402	

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 1	2	3	4	5	6	7	8	WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL Cost $k	
577	90							**Program Management**																
577								**Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Darlington**			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								based on 5 staff. Assume 3 x OPG01, 2 x OPG03 for 4year duration	Labour	0.24	2448.8436	0.24	587.722464										588	
								no entry	Materials and Equipment	0				0	0	0							0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							2420	0.24	580.8				581	
								Contingency as CES value	Contingency	20%										20%	1.0	233.7	234	

Total	1,402
Check: Should = 0	0

Total	588 Total	0 Total	581 Total	233.7
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.

RES ALTERNATIVE
WBS No 577
CASKS IN STORAGE BUILDINGS (CSB)
DARLINGTON

Cost Category	Total K$
Labour	1074873
Materials and Equipment	1022988
Other	700393
Contingency	769340
Total Cost	**3567594**

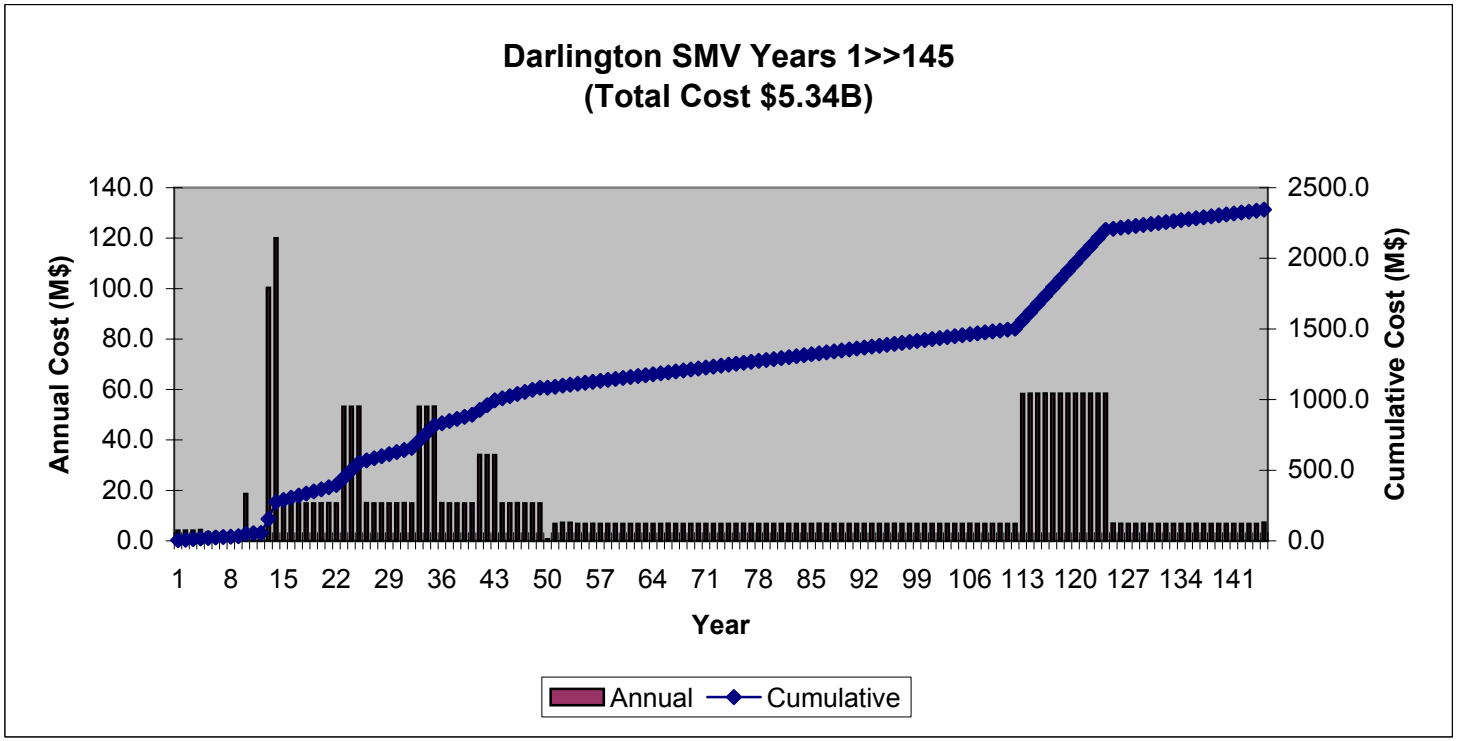
3567594

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$
577	15	0	0	0	0	0	0	RJH	Labour	0	1	98	7	0	452
577	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	98	7	0	0
577	15	0	0	0	0	0	0	RJH	Other	0	1	98	7	0	97
577	15	0	0	0	0	0	0	RJH	Contingency	0	1	98	7	0	275
577	20	0	0	0	0	0	0	AM	Labour	0	90	97	8	0	5137
577	20	0	0	0	0	0	0	AM	Materials and Equipment	0	90	97	8	0	452
577	20	0	0	0	0	0	0	AM	Other	0	90	97	8	0	203
577	20	0	0	0	0	0	0	AM	Contingency	0	90	97	8	0	2239
577	25	0	0	0	0	0	0	RJH	Labour	0	1	310	273	0	3628
577	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	310	273	0	0
577	25	0	0	0	0	0	0	RJH	Other	0	1	310	273	0	448
577	25	0	0	0	0	0	0	RJH	Contingency	0	1	310	273	0	1630
577	30	0	0	0	0	0	0	RJH	Labour	0	41	310	270	0	9076
577	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	41	310	270	0	0
577	30	0	0	0	0	0	0	RJH	Other	0	41	310	270	0	20881
577	30	0	0	0	0	0	0	RJH	Contingency	0	41	310	270	0	7489
577	35	0	0	0	0	0	0	RJH	Labour	0	1	101	10	0	1368
577	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	101	10	0	0
577	35	0	0	0	0	0	0	RJH	Other	0	1	101	10	0	820
577	35	0	0	0	0	0	0	RJH	Contingency	0	1	101	10	0	1094
577	40	0	0	0	0	0	0	AM	Labour	0		8	50	5	0	5344
577	40	0	0	0	0	0	0	AM	Materials and Equipment	0		8	50	5	0	7811
577	40	0	0	0	0	0	0	AM	Other	0		8	50	5	0	37
577	40	0	0	0	0	0	0	AM	Contingency	0		8	50	5	0	5951
577	45	0	0	0	0	0	0	AM	Labour	0	41	310	270	0	957970
577	45	0	0	0	0	0	0	AM	Materials and Equipment	0	41	310	270	0	1006625
577	45	0	0	0	0	0	0	AM	Other	0	41	310	270	0	674633
577	45	0	0	0	0	0	0	AM	Contingency	0	41	310	270	0	719918
577	55	0	0	0	0	0	0	RJH	Labour	0	41	310	270	0	91311
577	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	41	310	270	0	8100
577	55	0	0	0	0	0	0	RJH	Other	0	41	310	270	0	2694
577	55	0	0	0	0	0	0	RJH	Contingency	0	41	310	270	0	30511
577	90	0	0	0	0	0	0	AM	Labour	0	1	4	4	0	588
577	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	4	4	0	0
577	90	0	0	0	0	0	0	AM	Other	0	1	4	4	0	581
577	90	0	0	0	0	0	0	AM	Contingency	0	1	4	4	0	234

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 578
DARLINGTON
SURFACE MODULAR VAULTS **(SMV)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	824
20	System Development	22,974
25	Safety Assessment	5,929
30	Licensing & Approvals	40,923
35	Public Affairs	3,281
40	Facility Design & Construction	236,423
45	Facility Operation	4,872,794
55	Environmental Assessment and Monitoring	152,559
90	Program Management	6,264
	Total Cost ($k)	**5,341,972**

Darlington SMV Alternative	**5,341,972**
Siting Phase	**42,157**
Siting	824
EA	3,752
System Development	22,974
SA	1,365
L&A	3,697
Public Affairs	3,281
Program Mgmt	6,264
Construction Phase	**236,423**
Intial construction	232,959
Transition to Standalone	3,464
Operations Phase	**5,063,392**
Repeat & Repackaging	*3,203,946*
Initial Fuel receipts	786,574
SMV - 100 yrs	532,819
SMV - 200 yrs	537,703
SMV - 300 yrs	532,819
Repackaging M to M - 300 yrs	558,098
PM for Repeats & Repackaging	255,933
Extended Monitoring	*1,859,446*
Program Mgmt	949,963
Monitoring Survelliance	14,949
Operation Indirects	583,857
Common Ancillary Services Ops	111,025
Fuel Integrity Monitoring	9,055
SA - Ops & Decommissioning	4,564
L&A - Ops Licence Renewal	37,227
Environmental Monitoring	148,807


Darlington SMV Years 1>>145
(Total Cost $5.34B)
Annual Cost (M$)
Cumulative Cost (M$)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
1 8 15 22 29 36 43 50 57 64 71 78 85 92 99 106 113 120 127 134 141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	11	7	0	0	NO DATA TO FILL	452.2
578	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	11	7	0	0		0.0
578	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	11	7	0	0		97.0
578	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	11	7	0	0		274.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	452
Materials and Equipment	0
Other	97
Contingency	274.6
Total	824

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k
0%	
0.0	452.2
0.0	0.0
0.0	97.0
0.0	274.6
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

ACTIVITY DETAIL ESTIMATE

											A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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 $k	Add Basis of estimate Note Ref Number
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency				
578	15							**Siting**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
578	15	10						SITING MANAGEMENT																
								RES is 7 yrs vs 13 yrs for CES and shared amongst 7 sites. Limited siting program - 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	
578	15	70						PREFERRED SITE																
578	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	
578	15	70	30					PREFERRED SITE - CHARACTERISATION																
								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	

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

Total	**824**
Check: Should = 0	**0**

BASIS OF ESTIMATE NOTES - Insert references and notes

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	1	7	7	0	0	NO DATA TO FILL	15086.6
578	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	1	7	7	0	0		1053.5
578	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	1	7	7	0	0		336.9
578	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	1	7	7	0	0		6497.1

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	14548			0.0	15086.6
Materials and Equipment	1054			0.0	1053.5
Other	876			0.0	336.9
Contingency	6497.1			0.0	6497.1
Total	22974			0.0	22974

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																	
578	20							**System Development**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
578								**OPG has 3 sites Pickering, Bruce and Darlington. SMV (Surface Modular Vaults) is a storage alternative applicable to each site. The system development for the SMV alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites SMV workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.**																
578	20	2						SYSTEM DEVELOPMENT MANAGEMENT																	
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Labour	0.25	7980.70	0.25	1955.27										1,955	
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0	
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Other	0.25							300.00	0.25	73.50				74	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	608.6	609	
578	20	5						SYSTEM OPTIMIZATION																
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage technology but with existing processing facilities an additional 30% is deducted. Assume additional	Labour	0.25	5011.20	0.25	1227.74										1,228	
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00							0	
								Assume same size management team as for CES. Therefore factor = 1/3. Also new storage	Other	0.25							120.00	0.25	29.40				29	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.00	377.14	377	
578	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)																

			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, but not developed in SMV	Labour	0.25	30642.60	0.25	7507.44														7,507
			Assume same materials and equipment reguired for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing process cell engineering, an additional 70% is	Materials and Equipment	0.25				4300.00	0.25	1053.50											1,054
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is	Other	0.25							895.00	0.25	219.28								219
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.00	4390.11					4,390
578	20	30	STORAGE SYSTEM ENG'NG																			
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for new technology storage option the factor = 100% with a deduction	Labour	0.25	14295.80	0.25	3502.47														3,502
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00											0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is	Labour	0.25							2200.00	0.25	539.00								539
			Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.00	1010.37					1,010
578	20	40	SECURITY & SAFEGUARD ENG'NG																			
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and	Labour	0.25	1447.70	0.25	354.69														355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00											0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and	Other	0.25							60.00	0.25	14.70								15
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8					111

Total	**22,974**
Check: Should = 0	**0**

Total	14,548	Total	1,054	Total	876	Total	6,497.1
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
2
3
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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	25							Safety Assessment	Labour		OPG	RJH	1	323	46			3721.1
578	25							Safety Assessment	Materials and Equipment		OPG	RJH	1	323	46			
578	25							Safety Assessment	Other		OPG	RJH	1	323	46			514.0
578	25							Safety Assessment	Contingency		OPG	RJH	1	323	46			1694.0

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	3721		3721.1
Materials and Equipment			
Other	514		514.0
Contingency	1694.0		1694.0
Total	5929		5929

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL: 1 2 3 4 5 6 7 8

								WBS Description / Detail	Cost Category	Factor	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
											Labour			Materials and other Equipment			Other			Contingency			TOTAL	
											CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	Cost $k	
578	25							**Safety Assessment**																
578	25	10						SAFETY ASSESMENT MANAGEMENT																
								Overall scope of SA program is much smaller relative CES and can significanlty reduce scope of work	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	
578	25	30						SA - SITING																
								Very limited siting activities leads no SA costs	Labour		2287.5													2
									Materials and Equipment															
									Other								3,850							
									Contingency	40%										40%	1.0			
578	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	
578	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between 5 sites with same technoilogy; thus reduce factor to 0.25	Labour	0.25	9604.8	0.25	2401.2									2,401	
								Expenses at $1K/a x 309 yrs	Materials and Equipment	1					1								
									Other	1							309	1	309				309	
									Contingency	40%										40%	1.0	1,084.1	1,084	
578	25	70						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 0.2	Labour	0.2	2449.9	0.2	489.98														490
	Materials and Equipment	0.2					0.2												
	Other	0.2							300	0.2	60								60
	Contingency	40%										40%	1.0	220.0					220
																		Total	**5,929**
																		Check: Should = 0	
			Total		3,721	Total			Total		514	Total			1,694.0				
			Check: Should = 0			Check: Should = 0			Check: Should = 0			Check: Should = 0						

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV) DARLINGTON

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
578	30							Licensing & Approvals	Labour		OPG	RJH	6	323	318			NO DATA TO FILL	8597.6
578	30							Licensing & Approvals	Materials and Equipment		OPG	RJH	6	323	318				
578	30							Licensing & Approvals	Other		OPG	RJH	6	323	318				24047.5
578	30							Licensing & Approvals	Contingency		OPG	RJH	6	323	318				8278.4

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	8598		8597.6
Materials and Equipment			
Other	24048		24047.5
Contingency	8278.4		8278.4
Total	40923		40923

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																
578	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
578	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				0.2									1
									Other	0.2						40	0.2	8				8	
									Contingency	0.3										30%	1.0	35.7	36	
578	30	50						CNSC CONSTRUCTION LICENCE																
								Efficiencies gained through sharing of knowledge bewteen sites. Licensing process shorter than CES at 7yrs with RES being 3 years. CES involves comprehensive with Panel and RES would likely be a comprehensive with no Panel.	Labour	0.25	2631	0.25	657.75										658	2
									Materials and Equipment	0.25				0.25									
									Other	0.25						6,264	0.25	1566				1,566	
									Contingency	0.3										30%	1.0	667.1	667	
578	30	60						OTHER GOVN'MT APPROVALS																
578	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					0.2												
					Other	0.2							0.2										
					Contingency	0.25											25%	1.0	16.9			17
578	30	60	30	FEDERAL APPROVALS																		
					Labour	0.25	133	0.25	33.25													33
					Materials and Equipment	0.25					0.25												
					Other	0.25							0.25										
					Contingency	0.25											25%	1.0	8.3			8
578	30	60	40	PROVINCIAL APPROVALS																		
					Labour	0.25	133	0.25	33.25													33
					Materials and Equipment	0.25					0.25												
					Other	0.25							0.25										
					Contingency	0.25											25%	1.0	8.3			8
578	30	60	50	MUNICIPAL APPROVALS																		
					Labour	0.25	133	0.25	33.25													33
					Materials and Equipment	0.25					0.25												
					Other	0.25							0.25										
					Contingency	0.25											25%	1.0	8.3			8
578	30	65		CNSC OPERATING LICENCE (Initial Application)																		
					Labour	0.25	513	0.25	128.25													128
					Materials and Equipment	0.25					0.25												
					Other	0.25								902	0.25	225.5						226
					Contingency	0.25											25%	1.0	88.4			88
578	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																		
				CES duration is 330 years. Costs incurred in RES during period Y15 to Y323 or 309 years. Staff in RES is 0.25 vs 1 in CES. Factor for labour is 309/330 x 0.25/1 = 0.23	Labour	0.23	32754	0.23	7533.42													7,533
					Materials and Equipment	1					1												
				Expenses = $72K/a x 309 yrs	Other	1							22,248	1	22248							22,248
					Contingency	0.25											25%	1.0	7,445.4			7,445

																					Total	**40,923**
																					Check: Should = 0	
					Total		8,598	Total				Total		24,048	Total			8,278.4				
					Check: Should = 0			Check: Should = 0				Check: Should = 0			Check: Should = 0							

BASIS OF ESTIMATE NOTES - Insert references and notes

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	35							Public Affairs	Labour		OPG	RJH	1	14	10			1367.5
578	35							Public Affairs	Materials and Equipment		OPG	RJH	1	14	10			
578	35							Public Affairs	Other		OPG	RJH	1	14	10			820.0
578	35							Public Affairs	Contingency		OPG	RJH	1	14	10			1093.8

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	1368		1367.5
Materials and Equipment			
Other	820		820.0
Contingency	1093.8		1093.8
Total	3281		3281

INSTRUCTIONS

										A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																
578	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
578	35	45						PUBLIC AFFAIRS - APPROVED SITE																
									Labour	0.1	3046.2	0.1	304.62										305	
									Materials and Equipment	0.1				0.1										
									Other	0.1							600	0.1	60				60	
									Contingency	50%										50%	1.0	182.3	182	
578	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457	
									Materials and Equipment	0.1				0.1										
									Other	0.1							1,450	0.1	145				145	
									Contingency	50%										50%	1.0	301.0	301	
578	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253	
									Materials and Equipment	0.1				0.1										
									Other	0.1							800	0.1	80				80	
									Contingency	50%										50%	1.0	166.4	166	
578	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353	
									Materials and Equipment	0.1				0.1										
									Other	0.1							170	0.1	17				17	
									Contingency	50%										50%	1.0	185.0	185	

578	35	120	Community Offsets & Benefits												
				Labour	0.25	0.25									
				Materials and Equipment	0.25		0.25								
				Other	0.25			2,072	0.25	518					518
				Contingency	50%						50%	1.0	259.0		259
											Check: Should = 0				
					Total	1,368	Total	Total		820	Total		1,093.8		
					Check: Should = 0		Check: Should = 0	Check: Should = 0			Check: Should = 0				

BASIS OF ESTIMATE NOTES - Insert references and notes

1

2

3

4

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	40							Facility Design & Construction	Labour		CTECH	AM	10	61	52			NO DATA TO FILL	61118.3
578	40							Facility Design & Construction	Materials and Equipment		CTECH	AM	1	347	347				96504.3
578	40							Facility Design & Construction	Other		CTECH	AM	1	347	347				31619.8
578	40							Facility Design & Construction	Contingency		CTECH	AM	1	347	347				47180.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	61118
Materials and Equipment	96504
Other	31620
Contingency	47180.8
Total	236423

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k
	61118.3
	96504.3
	31619.8
	47180.8
	236423

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

ACTIVITY DETAIL ESTIMATE

WBS LEVEL								WBS Description / Detail	Cost Category	Factor	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
1	2	3	4	5	6	7	8				Labour			Materials and other Equipment			Other			Contingency			TOTAL Cost $k	
578	40							**Facility Design & Construction**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES		
578	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 additional land acquisition costs neccesary	Other								3,375.0							
								Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	5,214.0	5,214	
578	40	20	20	10				RECEIPT & TRANSFER (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	120.3	1.0	120.3										120	
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				2,406.6	1.0	2,406.6							2,407	
								Operations as CES. Facility based on CES figures.	Other	1.0							126.3	1.0	126.3				126	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	796.0	796	
578	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)																
								Operations as CES. Facility based on CES figures.	Labour	1.0	1,464.4	1.0	1,464.4										1,464	
								Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				9,762.4	1.0	9,762.4							9,762	
								Operations as CES. Facility based on CES figures.	Other	1.0							561.3	1.0	561.3				561	
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,536.4	3,536	
578	40	20	20	40				COMMON CRANE MAINTENANCE AREA (EQUIP)																

				Operations as CES. Facility based on CES figures.	Labour	1.0	338.7	1.0	338.7										339
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				2,258.3	1.0	2,258.3							2,258
				Operations as CES. Facility based on CES figures.	Other	1.0							129.9	1.0	129.9				130
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	818.1	818
578	40	20	30	PROCESSING BUILDING DESIGN & CONST'N															
				Operations as CES. Facility based on CES figures.	Labour	1.0	4,800.0	1.0	4,800.0										4,800
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				4,599.1	1.0	4,599.1							4,599
				Operations as CES. Facility based on CES figures.	Other	1.0							960.0	1.0	960.0				960
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	3,107.7	3,108
578	40	20	60	PB BUILDING SERVICES DESIGN AND INSTALL'N															
				Operations as CES. Facility based on CES figures.	Labour	1.0	6,630.7	1.0	6,630.7										6,631
				Operations as CES. Facility based on CES figures.	Materials and Equipment	1.0				5,506.5	1.0	5,506.5							5,507
				Operations as CES. Facility based on CES figures.	Other	1.0							1,933.0	1.0	1,933.0				1,933
				Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	3,517.6	3,518
578	40	20	70	COMMISSIONING (PB)															
				Operations as CES. Facility based on CES figures.	Labour	1.0	835.2	1.0	835.2										835
				Operations as CES. Facility based on CES figures.	Materials and Equipment														
				Operations as CES. Facility based on CES figures.	Other	1.0							167.0	1.0	167.0				167
				Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	501.1	501
578	40	20	80	CONST'N INDIRECTS (PB)															
				Processing Buildings similar to CES. Facility based on CES figures.	Labour	1.0	9,365.4	1.0	9,365.4										9,365
				Processing Buildings similar to CES. Facility based on CES figures.	Materials and Equipment														
				Processing Buildings similar to CES. Facility based on CES figures.	Other	1.0							388.0	1.0	388.0				388
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,926.0	2,926
578	40	30		COMMON ANCILLARY FACILITIES															
578	40	30	10	ADMIN AND SUPPORT FACILITIES															
578	40	30	10	1	ADMIN AND VISITOR RECEPTION BLDG														
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		486.3											comment 7	
					Materials and Equipment					784.2									
				No entry in CES alternative cost category	Other														
				Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0		
571	40	30	10	2	OPS SUPPT & HEALTH PHYSICS BLDG														
				housed in process bldg	Labour		1,294.8											comment 7	

						Materials and Equipment				1,612.6									
					No entry in CES alternative cost category	Other														
					Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0			
571	40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		1,262.1										comment 7		
						Materials and Equipment				1,675.0									
					No entry in CES alternative cost category	Other														
					Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0			
571	40	30	10	4	NEW' MODULE CANISTER STORE															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		1,031.0										comment 7		
						Materials and Equipment				1,892.0									
					No entry in CES alternative cost category	Other														
					Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0			
571	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														
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	143.5		144
571	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														
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	80.7		81
571	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														
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	187.8		188
571	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														
					Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	162.0		162
571	40	30	10	9	WAREHOUSE BLDG															
					building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		470.9										comment 7		

					/45/20/50	Materials and Equipment				550.0											
					No entry in CES alternative cost category	Other																
					Percentage for contingency assumed same as for CES	Contingency	20%											20%	1.0			
571	40	30	10	10	GUARDHOUSE AND SECURITY FENCE																
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		631.2												comment 7		
						Materials and Equipment				553.7											
					No entry in CES alternative cost category	Other																
					Increased contingency than CES due to RES facility footprint size not confirmed and therefore length of fence, not yet known	Contingency	20%											20%	1.25			
571	40	30	10	11	TRUCK INSP'N / WASH STATION																
					not req'd as no fuel transported off site	Labour		872.2												comment 7		
						Materials and Equipment				1,075.0											
					No entry in CES alternative cost category	Other						389.4										
					Percentage for contingency assumed same as for CES	Contingency	20%											20%	1.0			
571	40	30	10	12	UTILITY BLDG																
					building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour		1,023.2												comment 7		
						Materials and Equipment				1,257.0											
					No entry in CES alternative cost category	Other																
					Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0			
571	40	30	10	13	TEST FACILITY CONSTRUCTION																
					Taken as being independent of fuel inventory stored. Same size bldg as CES, facility will be constructed at Bruce but will be shared by OPG sites, therefore Bruce cost is 1/3 of CES total.	Labour	0.3	766.8	0.3	255.6												256
						Materials and Equipment	0.3			1,675.0	0.3	558.3									558
					No entry in CES alternative cost category	Other																
					Percentage for contingency assumed same as for CES	Contingency	20.0%											20%	1.0	162.8		163
571	40	30	20		OTHER SITE SYSTEMS																
571	40	30	20	1	FIRE PROTECTION SYSTEMS																
					assumed available and turned over to RES during transition	Labour		1,022.2												comment 7		
						Materials and Equipment				676.2											
					No entry in CES alternative cost category	Other																
					Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.0			
571	40	30	20	2	SECURITY AND COMMUNICATION SYSTEM																
					assumed available and turned over to RES during transition	Labour		607.5												comment 7		
						Materials and Equipment				600.0											
					No entry in CES alternative cost category	Other																

					Percentage for contingency assumed same as for CES	Contingency	25%				25%	1.0		
571	40	30	20	3	ELECTRICAL AND EMERGENCY POWER									
					assumed available and turned over to RES during transition	Labour		1,939.6					comment 7	
						Materials and Equipment			1,932.0					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	25%				25%	1.0		
571	40	30	20	4	SANITARY SEWER SYSTEM									
					assumed available and turned over to RES during transition	Labour		339.2					comment 7	
						Materials and Equipment			310.5					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	25%				25%	1.0		
571	40	30	20	5	POTABLE WATER SYSTEM									
					assumed available and turned over to RES during transition	Labour		371.6					comment 7	
						Materials and Equipment			148.0					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	25%				25%	1.0		
571	40	30	20	6	RETENTION/SEDIMENTATION POND									
					assumed available and turned over to RES during transition	Labour		874.4					comment 7	
						Materials and Equipment			189.6					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	30%				30%	1.0		
571	40	30	20	7	STORM WATER DETENTION POND									
					assumed available and turned over to RES during transition	Labour		387.8					comment 7	
						Materials and Equipment			93.5					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	30%				30%	1.0		
571	40	30	20	8	CONST'N MAT'L STOCKPILE AREA									
					not req'd, concrete brought in as req'd from off-site	Labour		1,039.2					comment 7	
						Materials and Equipment			625.0					
					No entry in CES alternative cost category	Other								
					Percentage for contingency assumed same as for CES	Contingency	15%				15%	1.0		
571	40	30	20	9	SITE MATERIALS STORAGE AREA									
					assumed available and turned over to RES during transition	Labour		1,169.5					comment 7	
						Materials and Equipment			655.0					
					No entry in CES alternative cost category	Other								

					Percentage for contingency assumed same as for CES	Contingency	15%											15%	1.0		
571	40	30	20	10	ACCESS ROADS AND VEHICLE COMPOUNDS																
					assumed available and turned over to RES during transition	Labour		1,319.9											comment 7		
						Materials and Equipment				1,866.9											
					No entry into cost category	Other															
					Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.0		
571	40	30	30		CONST'N INDIRECTS ANCILLARY FACILITIES																
					assumed available and turned over to RES during transition	Labour		4,406.4											comment 7		
						Materials and Equipment				6,610.9											
					No entry into cost category	Other															
					Percentage for contingency assumed same as for CES	Contingency	25%											25%	1.0		
578	40	40			STORAGE CONSTRUCTION (Stage 1)																
578	40	40	10	5	CONSTRUCTIION FACILITIES																
					Construction of RES SMV facility, stage 1 capacity 320 tubes CES capacity 800 tubes. Using 6/10 rule for estimating	Labour	0.58	469.5	0.58	270.9											271
						Materials and Equipment	0.58				312.0	0.58	180.0								180
						Other	0.58							112.0	0.58	64.6					65
					Percentage for contingency assumed same as for CES	Contingency	30%											30%	1.0	154.7	155
578	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															
					factor for services taken as same as for construction	Other															
					Percentage for contingency averaged from figures used in CES	Contingency	30%											30%	1.0	2,052.5	2,053
578	40	40	10	20	STORES EQUIPMENT DESIGN, SUPPLY AND INSTALL'N																
					factor for equipment taken as same as CES	Labour	1.00	5,476.2	1.00	5,476.2											5,476
					factor for equipment taken as same as CES	Materials and Equipment	1.00				12,131.7	1.00	12,131.7								12,132
					factor for equipment taken as same as CES	Other	1.00								1.00						
					Percentage for contingency averaged from figures u	Contingency	13%											13%	1.0	2,201.0	2,201
578	40	40	10	30	SURFACE MODULAR VAULT DESIGN AND CONSTRUCTION																
					Factor for services taken as same as for construction	Labour	0.58	2,940.3	0.58	1,696.8											1,697
					Factor for services taken as same as for construction	Materials and Equipment	0.58				89,285.0	0.58	51,524.6								51,525
					Factor for services taken as same as for construction	Other	0.58							47,112.2	0.58	27,187.5					27,188
					Percentage for contingency averaged from figures used in CES	Contingency	20%											20%	1.0	16,081.8	16,082
578	40	40	10	40	COMMISSIONING																

					Same allowance applied as CES	Labour	1.00	164.7	1.00	164.7												165
					Same allowance applied as CES	Materials and Equipment						12,131.7										
					Same allowance applied as CES	Other																
					Percentage for contingency averaged from figures used in CES	Contingency	40%												40%	1.0	65.9	66
578	40	40	10	50	CONST'N INDIRECTS																	
					Same allowance applied as CES	Labour	1.00	17,624.6	1.0	17,624.6												17,625
					Same allowance applied as CES	Materials and Equipment	1.00					110.0	1.0	110.0								110
					Same allowance applied as CES	Other	1.00									1.0						
					Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	5,320.4	5,320
571	40	500			COMMISSIONING MANAGEMENT																	
					Same allowance applied as CES	Labour	1.0	144.5	1.0	144.5												145
					Same allowance applied as CES	Materials and Equipment																
					Same allowance applied as CES	Other	1.00						28.9	1.0	28.9							29
					Percentage for contingency assumed same as for CES	Contingency	50%												50%	1.0	86.7	87
571	40	600			EQUIPMENT, SPARES and CONSUMABLES.																	
					No entry into cost category	Labour																
					No entry into cost category	Materials and Equipment	1.0					214.1	1.0	214.1								214
					consumption for construction of 1 storage bldg and ancillary buildings	Other																
					Contingency included in cost (built into power consumption calculation)	Contingency	30%												30%	1.0	64.2	64
571	40	650			ENERGY CONSUMPTION																	
					No entry into cost category	Labour																
					No entry into cost category	Materials and Equipment																
					allowance for consumption for construction of ancillary buildings	Other	0.20						366.3	0.2	73.3							73
					Contingency included in cost (built into power consumption calculation)	Contingency														1.0		

																					Total	**236,423**
																					Check: Should = 0	
						Total		61,118		Total		96,504		Total		31,620		Total		47,180.8		
						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
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	16	323	308	0	0	NO DATA TO FILL	1032590.0
578	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	16	323	308	0	0		1283288.8
578	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	16	323	308	0	0		1614916.8
578	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	16	323	308	0	0		941998.5

INSTRUCTIONS

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

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	1032590
Materials and Equipment	1283289
Other	1614917
Contingency	941998
Total	4872794

Check total	Total Cost $k
0%	
0.0	1032590.0
0.0	1283288.8
0.0	1614916.8
0.0	941998.5
0.0	4872794

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**		
578 45	**Facility Operation**																
578 45 10	OPERATIONS FUEL TRANSFER																
578 45 10 5	PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
	Similar duration to CES. Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.5	118,334.0	0.45	53,644.7										53,645	
	No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0	
	Annual cost = $3335/a x 35 yrs	Other	1.00							116,725	1.0	116,725				116,725	3
	Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	34,073.9	34,074	
578 45 10 10	PROCESS BUILDING OPERATIONS																
	Fuel inventory 1280 tubes, (CES 4400). RES duration 35 years compared to 30 year CES.	Labour	0.33	78,324.0	0.33	25,823.2										25,823	
	Fuel inventory 1280 tubes, (CES 4400). RES duration 34 years compared to 30 year CES.	Materials and Equipment	0.33				255,840.0	0.33	84,349.7							84,350	
	No provision in CES	Other	0.00							131,349.0	0.0	0.0				0	
	Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	55,086.4	55,086	
578 45 10 20	COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPT)																
	Fuel inventory 1280 tubes, (CES 4400). RES duration 35 years compared to 30 year CES.	Labour	0.33	32,676.3	0.33	10,773.3										10,773	

					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	0.00							131,349.0	0.0	0.0					0
					Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	2,693.3		2,693
578	45	10	25		MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPT)																
					Fuel inventory 1280 tubes, (CES 4400). RES duration 35 years compared to 30 year CES.	Labour	0.33	3,900.0	0.33	1,285.8											1,286
					Fuel inventory 1280 tubes, (CES 4400). RES duration 34 years compared to 30 year CES.	Materials and Equipment	0.33				53.0	0.33	17.5								17
					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	651.6		652
578	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 38 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.58	115,547.0	0.58	67,402.4											67,402
						Materials and Equipment	0.58				1,284.0	0.58	749.0								749
						Other	0.58							16,380.0	0.58	9,555.0					9,555
					Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	23,311.9		23,312
578	45	10	40		STORAGE OPERATIONS																
					Fuel inventory 1280 tubes, (CES 4400). RES duration 35 years compared to 30 year CES.	Labour	0.33	30,696.0	0.33	10,120.4											10,120
					Fuel inventory 1280 tubes, (CES 4400). RES duration 34 years compared to 30 year CES.	Materials and Equipment	0.33				200.0	0.3	65.9								66
					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	3,055.9		3,056
578	45	10	50		ADDITIONAL STORAGE CONSTRUCTION																
578	45	10	50	10	STORAGE CONSTRUCTION STAGE 2																
					factor for storage const'n stage 2 taken pro rata from CES stage 2	Labour	0.58	14,792.5	0.58	8,536.5											8,536
					factor for storage const'n stage 2 taken pro rata from CES stage 2	Materials and Equipment	0.58				91,538.7	0.58	52,825.1								52,825
					factor for storage const'n stage 2 taken pro rata from CES stage 2	Other	0.58							46,846.7	0.58	27,034.3					27,034
					Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	26,518.8		26,519
578	45	10	50	20	STORAGE CONSTRUCTION STAGE 3																
					factor for storage const'n stage 3 taken as same as stage 2	Labour	0.58	14,792.5	0.58	8,536.5											8,536
					factor for storage const'n stage 3 taken as same as stage 2	Materials and Equipment	0.58				91,538.7	0.58	52,825.1								52,825
					factor for storage const'n stage 3 taken as same as stage 2	Other	0.58							46,846.7	0.58	27,034.3					27,034
					Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	26,518.8		26,519
578	45	10	50	30	STORAGE CONSTRUCTION STAGE 4																
					factor for storage const'n stage 4 taken as same as stage 2	Labour	0.58	14,792.5	0.58	8,536.5											8,536

				factor for storage const'n stage 4 taken as same as stage 2	Materials and Equipment	0.58				14,819.0	0.58	8,551.7									8,552
				factor for storage const'n stage 4 taken as same as stage 2	Other	0.58							46,846.7	0.58	27,034.3						27,034
				Percentage for contingency averaged from CES	Contingency	30%										30%	1.0	13,236.7			13,237
578	45	20		OPERATIONS - EXTENDED MONITORING																	
578	45	20	5	PROGRAM MANAGEMENT																	
				Entries in CES DET applicable to RES but duration 273 years RES & 300 years CES therefore 273/300 of labour costs. Darlington assuemd to have 2.6 staff vs 9 in CES. Thus factor is 26%.	Labour	0.26	312,652.0	0.26	81,289.5												81,290
				No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0
				Annual cost = $2,602a x 273 yrs	Other	1.00							710,346.0	1.0	710,346.0						710,346
				Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	158,327.1			158,327
578	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING																	
				Reduced duration to CES (273/300). One staff for RES vs 5 in CES. Combined factor = (273/300) x (1/5) = 0.18	Labour	0.18	53,849.0	0.18	9,692.8												9,693
				Annual costs = $1K/a x 273 yrs	Materials and Equipment	1.00						273.0									273
				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	4,982.9			4,983
578	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)																	
					Labour	0.35	907,516.0	0.35	317,630.6												317,631
				Entries in CES DET applicable to RES but duration 273 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 273/300 x 13/34 = 0.35. Annual M&E costs are $150K/a x 276 yrs = $41400K	Materials and Equipment	1.00						41,400.0									41,400
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 273 years = $90,090K	Other										90,090.0						90,090
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	134,736.2			134,736
578	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																	
				RES has duration 273 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 273/300 x 3/5 = 0.546	Labour	0.55	148,529.0	0.55	88,820.2												88,820
				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	22,205.0			22,205
578	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																	
				RES duration is 273 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES -	Labour	0.20	24,724.0	0.20	4,944.8												4,945

				equivalent annual staff is 0.1 FTE 0.6 in CES factor is 0.2. Annual M&E costs is $3.3K/a x 273 yrs = $900.9K. Other costs is $0.7K/a x 273 yrs = $191.1K.	Materials and Equipment	1.0					900.9							901
					Other	1.0							191.1						191
				Percentage for contingency assumed same as for CES	Contingency	50%									50%	1.0	3,018.4		3,018
578	45	30		OPERATIONS - FACILITY REPEATS															
578	45	30	20	STORAGE VAULT 100 YEAR REPLACEMENT															
				labour for demolition of previous vaults = and construction of new = factor 1280/4400 tube qty) labour for fuel transfer = 9/30 (years for transfer) therefore common factor =0 .3	Labour	0.29	154,896.8	0.29	45,060.9									45,061
				const'n materials = building to house 1280 tubes RES, 4400 tubes CES factor =0.3	Materials and Equipment	0.48			563,645.8	0.5	268,695.7								268,696
				waste disposal =vaults for 1280 tubes RES, 4400 tubes CES factor =0.3	Other	0.29						447,765.3	0.3	130,259.0					130,259
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	88,803.1		88,803
578	45	30	30	STORAGE VAULTS 200 YEAR REPLACEMENT															
				assumed same as 100 yr replacement	Labour	0.29	154,896.8	0.29	45,060.9										45,061
				assumed same as 100 yr replacement	Materials and Equipment	0.48			563,645.8	0.5	268,695.7								268,696
				assumed same as 100 yr replacement	Other	0.3						447,765.3	0.3	134,329.6					134,330
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	89,617.2		89,617
578	45	30	40	STORAGE VAULTS 300 YEAR REPLACEMENT															
				assumed same as 100 yr replacement	Labour	0.29	154,896.8	0.29	45,060.9										45,061
				assumed same as 100 yr replacement	Materials and Equipment	0.48			563,645.8	0.5	268,695.7								268,696
				assumed same as 100 yr replacement	Other	0.29						447,765.3	0.3	130,259.0					130,259
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	88,803.1		88,803
578	45	40		OPERATIONS - REPACKAGING															
578	45	40	5	PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)															
				duration 36 years RES & 114 years CES therefore36/114 = 0.316 Labour to be shared between 3 OPG sites, use 40% factor to allow for inefficiencies	Labour	0.13	360,064.0	0.13	45,481.8									45,482	
				No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0								0	
				Annual cost = $k4661/a x36 yrs	Other	1.00						167,796	1.0	167,796				167,796	2
				Percentage for contingency assumed same as for CES	Contingency	20%									20%	1.0	42,655.6	42,656	
578	45	40	10	MODULE TO MODULE 300 YEAR REPACKAGING															
578	45	40	10	10 DECOMMISSIONING OF EXISTING FACILITIES															
				assume decommissioning of existing module to canister process building same costs as CES process building	Labour	1.0	2,357.4	1.00	2,357.4									2,357	
				No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0								0	
					Other	1.0						3,462.3	1.0	3,462.3				3,462	
				Percentage for contingency assumed same as for CES	Contingency	30%									30%	1.0	1,745.9	1,746	

578	45	40	10	20			CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)											
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1						476
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6			355
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							228.4	1.0	228
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	317.7	318
578	45	40	10	30			PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)											
578	45	40	10	30	20		RPM EQUIP. DESIGN, SUPPLY & INSTALL											
578	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)											
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	106.6	1.00	106.6						107
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,132.0	1.0	2,132.0			2,132
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							111.9	1.0	112
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	705.2	705
578	45	40	10	30	20	20	CANISTER TO CANISTER FUEL TRANSFER (EQUIP)											
							Equipment same as CES facility therefore factor = 1	Labour	1.0	3,721.1	1.00	3,721.1						3,721
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0				18,605.6	1.0	18,605.6			18,606
							Equipment same as CES facility therefore factor = 1	Other	1.0							1,116.3	1.0	1,116
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	7,032.9	7,033
578	45	40	10	30	20	30	CANISTER DECONTAMINATION (EQUIP)											
							Equipment same as CES facility therefore factor = 1	Labour	1.0	961.0	1.00	961.0						961
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0				4,805.0	1.0	4,805.0			4,805
							Equipment same as CES facility therefore factor = 1	Other	1.0							288.3	1.0	288
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	1,816.3	1,816
578	45	40	10	30	20	40	MODULE DECONTAMINATION (EQUIP)											
							Equipment same as CES facility therefore factor = 1	Labour	1.0	761.0	1.00	761.0						761
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0				3,805.0	1.0	3,805.0			3,805
							Equipment same as CES facility therefore factor = 1	Other	1.0							228.5	1.0	229
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	1,438.4	1,438
578	45	40	10	30	20	50	CANISTER DISMANTLING/BREAKDOWN (EQUIP)											
							Equipment same as CES facility therefore factor = 1	Labour	1.0	1,066.6	1.00	1,066.6						1,067
							Equipment same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,332.8	1.0	5,332.8			5,333

							Equipment same as CES facility therefore factor = 1	Other	1.0					320.0	1.0	320.0				320
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	2,015.8	2,016
578	45	40	10	30	20	60	CASK OPENING AND CASK DECONTAM AREA (EQUIP. LABOUR and DISPOSAL)													
							Cask decontam equip info from CES CVSB (561-45-40-10-30-20-30), + labour and disposal from CES CVSB (561-45-40-10-600, (with replacement casks removed).	Labour	1.0	18,348.3	1.00	18,348.3								18,348
							Cask decontam info from CES CVSB	Materials and Equipment	1.0			13,716.4	1.0	13,716.4						13,716
							Cask decontam and disposal info from CES CVSB	Other	1.0					15,383.0	1.0	15,383.0				15,383
							Cask decontam info from CES CVSB	Contingency	30%								30%	1.0	14,234.3	14,234
578	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N													
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Labour	1.22	8,000.0	1.22	9,760.0								9,760
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Materials and Equipment	1.22			7,768.3	1.2	9,477.3						9,477
							RPM Repackaging plant same as CES facility but has additional cask decontam facility, ratio of construction vols taken, therefore factor = 1.22	Other	1.22					1,600.0	1.2	1,952.0				1,952
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	6,356.8	6,357
578	45	40	10	30	60		BUILDING SERVICES (RPM)													
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	9,120.0	1.22	11,126.4								11,126
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Materials and Equipment	1.22			7,199.9	1.2	8,783.9						8,784
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22					2,527.2	1.2	3,083.2				3,083
							Percentage for contingency assumed same as for CES	Contingency	25%								25%	1.0	5,748.4	5,748
578	45	40	10	30	70		COMMISSIONING (RPM)													
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	1,169.3	1.22	1,426.5								1,427
							No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0						0
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22					218.3	1.2	266.3				266
							Percentage for contingency assumed same as for CES	Contingency	50%								50%	1.0	846.4	846
578	45	40	10	30	80		CONST'N INDIRECTS (RPM)													
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Labour	1.22	12,695.0	1.22	15,487.9								15,488
							No entry in CES alternative cost category	Materials and Equipment	0.0			0.0	0.0	0.0						0
							RPM Repackaging plant same as CES facility but includes cask area therefore factor = 1.22	Other	1.22					481.1	1.2	586.9				587
							Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	4,822.5	4,822

578	45	40	10	40		COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)			comment 7													
						Reduced facilities support stand-alone RES facility from CES, every 100 years but 'full' facilities required at 300 year event, therefore factor = (8/13+8/13 +1)	Labour	2.2	21,056.2	2.23	46,971.5							46,972
							Materials and Equipment	2.2				29,785.1	2.2	66,443.7								66,444
						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	28,353.8		28,354
578	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	219.0	1.00	219.0											219
						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	109.5		110
578	45	40	10	600		REPACKAGING OPERATIONS (RPM)																
						repackaging of 2421 RES module canisters compared to 8528 CES = 2421/8528	Labour	0.28	118,823.0	0.28	33,732.5											33,732
						procurement of 2421 RES module canisters compared to 8528 CES factor = 2421/8528	Materials and Equipment	0.28				358,176.0	0.28	101,682.0								101,682
						Disposal of 2421 RES module canisters compared to 8528 CES factor = 2421/8528	Other	0.28							43,594.8	0.28	12,376.1					12,376
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	44,337.2		44,337
578	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	11,882.0	0.30	3,564.6											3,565
						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	891.2		891
578	45	40	10	700		OPERATION INDIRECTS (RPM)																
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	13,976.2	0.30	4,192.9											4,193
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				351.6	0.3	105.5								105
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0					4,860
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	2,747.5		2,748
578	45	40	10	800		STORAGE OPERATIONS (RPM)																
						transfer of 2560 canisters RES compared to 8800 canisters CES	Labour	0.29	2,093.9	0.29	609.1											609
						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	30%										30%	1.0	182.7		183

									Total	**4,872,794**
									Check: Should = 0	**0**
	Total	1,032,590	Total	1,283,289	Total	1,614,917	Total	941,998.5		
	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	2,602k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (384,024k$) at rate 2.87%)
2	4661k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (56,288k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (384,024k$) at rate 2.87%). this tax runs for 3X12 years = 36 years. A portion of this tax over 36 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)
3	3,335k$/a made up of expenses from table 18 (605k$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (380,560k$) at rate 2.87% = 5461, this is then halved as the storage buildings are built on a rolling program)
4	Misc.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

SURFACE MODULAR VAULTS (SMV)
DARLINGTON

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
578	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour		OPG	RJH	8	323	316	0	0	NO DATA TO FILL	105203.0
578	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	8	323	316	0	0		9012.0
578	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other		OPG	RJH	8	323	316	0	0		3138.0
578	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency		OPG	RJH	8	323	316	0	0		35205.9

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
		0%	
Labour	105203	*0.0*	105203.0
Materials and Equipment	9012	*0.0*	9012.0
Other	3138	*0.0*	3138.0
Contingency	35205.9	*0.0*	35205.9
Total	152559	*0.0*	152559

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																	
578	55							**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
578	55	10						EA & MONITORING PROGRAM MANAGEMENT																
								Costs are incurred over the period Y8 to Y323 (when repackaging ends) or 316 yrs vs 347 yrs in CES. RES has 0.5 staff vs 2 staff in CES. Fcator is 316/347 x 0.5/2 = 0.23.	Labour	0.23	70306	0.23	16170.38									16,170
									Materials and Equipment	1				0	1	0								0
								Expenses at 3K/a x 316 yrs	Other	1							948	1	948					948
									Contingency	0.3										17118.38	0.3	5135.514		5,136
578	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
								Assume C/L & EA process spans 3 years (Y9 to Y11) with with some preparation work in Y8; ie total of 4 years. Due to multiple sites with same technology can share costs. EA process is simplier relative to CES	Labour	0.3	7471	0.3	2241.3									2,241
									Materials and Equipment	0.3				0	0.3	0								0
									Other	0.3							2,150	0.3	645					645
									Contingency	0.3										2886.3	0.3	865.89		866
578	55	40						GROUNDWATER MONITORING																

			RES = 309 yrs vs CES = 330 yrs. Factor is 309/330 x 0.2/0.6 = 0.312 (Y15 to Y323)	Labour	0.312	37158	0.312	11593.296													11,593
			M&E @ $6K/a x 309 yrs = $1854K	Materials and Equipment	1				1854	1	1854										1,854
			Expenses @ $4K/a x 309 yrs = $1236K	Other	1							1,236	1	1236							1,236
				Contingency	0.3										14683.296	0.3	4404.9888				4,405
578	55	50	RADIOLOGICAL BIOSPHERE MONITORING																		
			RES = 309 yrs vs CES = 330 yrs. Factor is 309/330 x 1/3.3 = 0.284	Labour	0.284	217280	0.284	61707.52													61,708
			M&E costs at $18K/a x 309 yrs = $5562K	Materials and Equipment	1				5562	1	5562										5,562
				Other	1							0	1	0							0
				Contingency	0.3										67269.52	0.3	20180.856				20,181
578	55	60	NON-RAD BIOSPHERE MONITORING																		
			RES = 309 yrs vs CES = 330 yrs. Factor is 309/330 x 0.2/0.8 = 0.234	Labour	0.234	53590	0.234	12540.06													12,540
			M&E costs at $6K/a x 309 yrs = $1,596K	Materials and Equipment	1				1596	1	1596										1,596
				Other	1							0	1	0							0
				Contingency	0.3										14136.06	0.3	4240.818				4,241
578	55	80	HUMAN HEALTH MONITORING																		
			RES = 309 yrs vs CES = 330 yrs. Factor is 309/330 x 0.03/0.17= 0.165	Labour	0.165	5760	0.165	950.4													950
				Materials and Equipment	1				0	1	0										0
			Expenses at $1K/a x 309 yrs = $309K	Other	1							309	1	309							309
				Contingency	0.3										1259.4	0.3	377.82				378
						Total		105,203	Total		9,012	Total		3,138	Total		35,205.9				
						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

REACTOR EXTENDED STORE — SURFACE MODULAR VAULTS (SMV)
ACTIVITY SUMMARY TO DATA TRANSFER — DARLINGTON

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
578	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	14	14	0	0	NO DATA TO FILL	3187.4
578	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	14	14	0	0		0.0
578	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	14	14	0	0		2032.8
578	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	14	14	0	0		1044.0

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0 / Check total	Total Cost $k	Budget costs to Years by %
		0%		
Labour	3187	0.0	3187.4	
Materials and Equipment	0	0.0	0.0	
Other	2033	0.0	2032.8	
Contingency	1044.0	0.0	1044.0	
Total	6264	0.0	6264	

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE

WBS LEVEL (1 2 3 4 5 6 7 8)	WBS Description / Detail	Cost Category	Factor	A Labour: Use appropriate CES cost	B Apply Factor	C Calc RES cost value	D Materials and other Equipment: Use appropriate CES cost	E Apply Factor	F Calc RES cost value	G Other: Use appropriate CES cost	H Apply Factor	I Calc RES cost value	J Contingency: Use appropriate CES cost	K Apply Factor	L Calc RES cost value	M TOTAL Cost $k: Total Cost is calculated	Add Basis of estimate Note Ref Number
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															
578 90	**Program Management**																
	Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Darlington			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
578	based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 14year duration	Labour	0.24	13280.686	0.24	3187.364544										3,187	
	no entry	Materials and Equipment	0				0	0	0							0	
	the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							8470	0.24	2032.8				2,033	
	Contingency as CES value	Contingency	20%										20%	1.0	1,044.0	1,044	

Total	6,264
Check: Should = 0	0

	Labour	Materials and other Equipment	Other	Contingency
Total	3,187	0	2,033	1,044.0
Check: Should = 0	0	0	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.

RES ALTERNATIVE
WBS No 578
SURFACE MODULAR VAULTS (SMV)
DARLINGTON

Cost Category	Total K$
Labour	1,231,324
Materials and Equipment	1,389,859
Other	1,677,523
Contingency	1,043,267
Total Cost	**5,341,972**

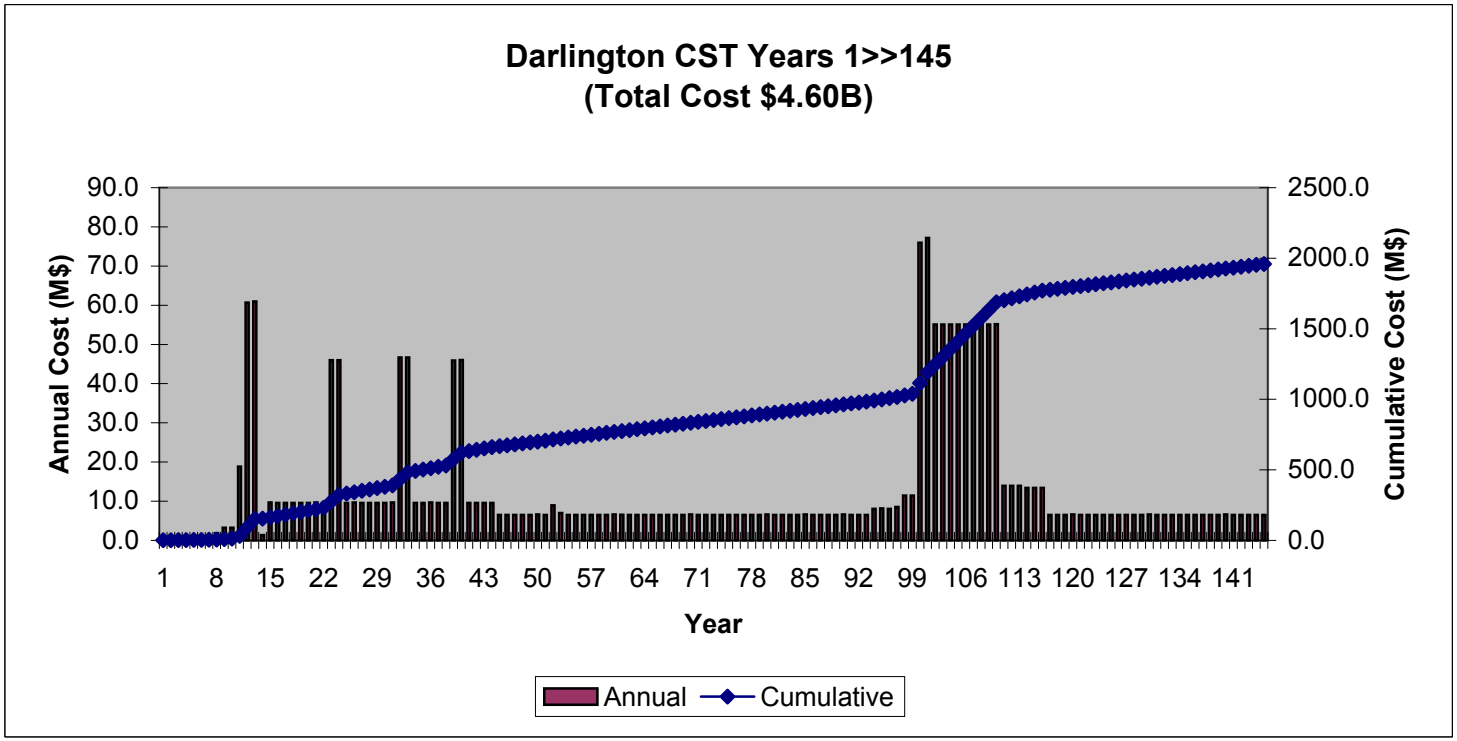
5,341,972

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$
578	15	0	0	0	0	0	0	RJH	Labour	0	1	11	7	0	452
578	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	11	7	0	0
578	15	0	0	0	0	0	0	RJH	Other	0	1	11	7	0	97
578	15	0	0	0	0	0	0	RJH	Contingency	0	1	11	7	0	275
578	20	0	0	0	0	0	0	AM	Labour	0	1	7	7	0	15,087
578	20	0	0	0	0	0	0	AM	Materials and Equipment	0	1	7	7	0	1,054
578	20	0	0	0	0	0	0	AM	Other	0	1	7	7	0	337
578	20	0	0	0	0	0	0	AM	Contingency	0	1	7	7	0	6,497
578	25	0	0	0	0	0	0	RJH	Labour	0	1	323	46	0	3,721
578	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	323	46	0	0
578	25	0	0	0	0	0	0	RJH	Other	0	1	323	46	0	514
578	25	0	0	0	0	0	0	RJH	Contingency	0	1	323	46	0	1,694
578	30	0	0	0	0	0	0	RJH	Labour	0	6	323	318	0	8,598
578	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	6	323	318	0	0
578	30	0	0	0	0	0	0	RJH	Other	0	6	323	318	0	24,048
578	30	0	0	0	0	0	0	RJH	Contingency	0	6	323	318	0	8,278
578	35	0	0	0	0	0	0	RJH	Labour	0	1	14	10	0	1,368
578	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	14	10	0	0
578	35	0	0	0	0	0	0	RJH	Other	0	1	14	10	0	820
578	35	0	0	0	0	0	0	RJH	Contingency	0	1	14	10	0	1,094
578	40	0	0	0	0	0	0	AM	Labour	0		10	61	52	0 61118.3073
578	40	0	0	0	0	0	0	AM	Materials and Equipment	0		1	347	347	0 96504.3167
578	40	0	0	0	0	0	0	AM	Other	0		1	347	347	0 31619.7996
578	40	0	0	0	0	0	0	AM	Contingency	0		1	347	347	0 47180.7733
578	45	0	0	0	0	0	0	AM	Labour	0	16	323	308	0	1,032,590
578	45	0	0	0	0	0	0	AM	Materials and Equipment	0	16	323	308	0	1,283,289
578	45	0	0	0	0	0	0	AM	Other	0	16	323	308	0	1,614,917
578	45	0	0	0	0	0	0	AM	Contingency	0	16	323	308	0	941,998
578	55	0	0	0	0	0	0	RJH	Labour	0	8	323	316	0	105,203
578	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	8	323	316	0	9,012
578	55	0	0	0	0	0	0	RJH	Other	0	8	323	316	0	3,138
578	55	0	0	0	0	0	0	RJH	Contingency	0	8	323	316	0	35,206
578	90	0	0	0	0	0	0	AM	Labour	0	1	14	14	0	3,187
578	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	14	14	0	0
578	90	0	0	0	0	0	0	AM	Other	0	1	14	14	0	2,033
578	90	0	0	0	0	0	0	AM	Contingency	0	1	14	14	0	1,044

RES ALTERNATIVE **FUEL OWNER** **OPG**
WBS No 579
DARLINGTON
CASKS IN SHALLOW TRENCH **(CST)**

Lev 2	WBS Name	Sheet Totals ($k)
15	Siting	1,003
20	System Development	10,675
25	Safety Assessment	6,681
30	Licensing & Approvals	39,397
35	Public Affairs	3,281
40	Facility Design & Construction	137,872
45	Facility Operation	4,237,284
55	Environmental Assessment and Monitoring	158,989
90	Program Management	6,264
	Total Cost ($k)	**4,601,446**

Darlington CST Alternative	**4,601,446**
Siting Phase	**29,926**
Siting	1003
EA	3,752
System Development	10,675
SA	1,365
L&A	3,586
Public Affairs	3,281
Program Mgmt	6,264
Construction Phase	**137,872**
New Storage Chamber Construction	134,371
Transition to Standalone	3,500
Operations Phase	**4,433,648**
Repeat & Repackaging	*2,669,903*
Initial Fuel Transfer	487,106
Storage Chamber Replacement - 200 yrs	61,183
Repackaging - 100 yrs	581,301
Repackaging - 200 yrs	579,929
Repackaging M to M - 300 yrs	649,583
PM for Repeats & Repackaging	310,802
Extended Monitoring	*1,763,745*
Program Mgmt	869,298
Monitoring Surveliance	40,989
Operation Indirects	553,379
Common Ancillary Services Ops	98,772
Fuel Integrity Monitoring	4,942
SA - Ops & Decommissioning	5,316
L&A - Ops Licence Renewal	35,811
Environmental Monitoring	155,237


Darlington CST Years 1>>145
(Total Cost $4.60B)
Annual Cost (M$)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Cumulative Cost (M$)
1
8
15
22
29
36
43
50
57
64
71
78
85
92
99
106
113
120
127
134
141
Year
Annual
Cumulative

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	15	0	0	0	0	0	0	Siting	Labour		OPG	RJH	1	11	7	0	0	NO DATA TO FILL	555.9
579	15	0	0	0	0	0	0	Siting	Materials and Equipment		OPG	RJH	1	11	7	0	0		0.0
579	15	0	0	0	0	0	0	Siting	Other		OPG	RJH	1	11	7	0	0		113.0
579	15	0	0	0	0	0	0	Siting	Contingency		OPG	RJH	1	11	7	0	0		334.4

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	556
Materials and Equipment	0
Other	113
Contingency	334.4
Total	1003

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k
0%	
0.0	555.9
0.0	0.0
0.0	113.0
0.0	334.4
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

ACTIVITY DETAIL ESTIMATE

											A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
579	15							**Siting**			CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	CES	Factor	RES	Cost $k	
579	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 inefficiencies of multiple sites assume a factor of 0.2	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	
579	15	70						PREFERRED SITE																
579	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING																
								Assume cost is 15% 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%										50%	1.0	53.1	53	
579	15	70	30					PREFERRED SITE - CHARACTERISATION																
								Assume cost is 15% 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										50%	1.0	126.4	126	

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

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

BASIS OF ESTIMATE NOTES - Insert references and notes

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	20	0	0	0	0	0	0	System Development	Labour		CTECH	AM	94	100	7	0	0	NO DATA TO FILL	7114.4
579	20	0	0	0	0	0	0	System Development	Materials and Equipment		CTECH	AM	94	100	7	0	0		451.5
579	20	0	0	0	0	0	0	System Development	Other		CTECH	AM	94	100	7	0	0		182.2
579	20	0	0	0	0	0	0	System Development	Contingency		CTECH	AM	94	100	7	0	0		2926.6

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Budget costs to Years by %	Total Cost $k
			0%		
Labour	7079		*0.0*		7114.4
Materials and Equipment	452		*0.0*		451.5
Other	217		*0.0*		182.2
Contingency	2926.6		*0.0*		2926.6
Total	10675		*0.0*		10675

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																	
579	20							**System Development**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								OPG has 3 sites Pickering, Bruce and Darlington. CST (Casks in Shallow Trenches) is a storage alternative applicable to each site. The system development for the CST alternative will cover all 3 sites. Therefore for estimating purposes the CES cost is brought forward into each of the 3 sites CST workbooks and divided by 3 (ie factor = 0.33). Any additional factors are then incorporated.																
579	20	2						SYSTEM DEVELOPMENT MANAGEMENT																
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Labour	0.18	6690.40	0.18	1170.82											1,171
								No entry in CES alternative cost category	Materials and Equipment	0.00				0.00	0.00	0.00								0
								Assume same size management team as for CES. Therefore factor = 1/3. Also for cask storage option selected as future storage method and 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	Other	0.18							300.00	0.18	52.50					53
								Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	367.0		367
579	20	5						SYSTEM OPTIMIZATION																

			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Labour	0.18	3303.70	0.18	578.15										578
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00							0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional 50% is deducted.	Other	0.18							120.00	0.18	21.00				21
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.00	179.74	180
579	20	20	PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)															
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for facility with existing process cell engineering, an additional 70% is	Labour	0.11	28327.20	0.11	2974.36										2,974
			Assume same materials and equipment required for RES feasibility demonstrations as CES. Therefore factor = 1/3 - Also for facility with existing	Materials and Equipment	0.11				4300.00	0.11	451.50							452
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is	Other	0.11							895.00	0.11	93.98				94
			Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.00	1759.92	1,760
579	20	30	STORAGE SYSTEM ENG'NG															
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for cask storage option selected as future storage method and additional	Labour	0.18	11436.70	0.18	2001.42										2,001
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00							0
			Assume additional documetation required to support individual sites eg technical specs, safety	Labour	0.18							200.00	0.18	35.00				35
			Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.00	509.11	509
579	20	40	SECURITY & SAFEGUARD ENG'NG															
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage	Labour	0.25	1447.70	0.25	354.69										355
			No entry in CES alternative cost category	Materials and Equipment	0				0.00	0.00	0.00							0
			Assume additional documetation required to support individual sites eg technical specs, safety documents etc. therefore an additional 5% is included onto factor. Also for resident storage option selected as future storage method and	Other	0.25							60.00	0.25	14.70				15
			Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	110.8	111

Total	**10,675**
Check: Should = 0	**0**

Total	7,079	Total	452	Total	217	Total	2,926.6
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	25	0	0	0	0	0	0	Safety Assessment	Labour		OPG	RJH	1	310	42	0	0	NO DATA TO FILL	4211.1
579	25	0	0	0	0	0	0	Safety Assessment	Materials and Equipment		OPG	RJH	1	310	42	0	0		0.0
579	25	0	0	0	0	0	0	Safety Assessment	Other		OPG	RJH	1	310	42	0	0		561.0
579	25	0	0	0	0	0	0	Safety Assessment	Contingency		OPG	RJH	1	310	42	0	0		1908.8

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	4211	*0.0*	4211.1
Materials and Equipment	0	*0.0*	0.0
Other	561	*0.0*	561.0
Contingency	1908.8	*0.0*	1908.8
Total	6681	*0.0*	6681

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																	
579	25							**Safety Assessment**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
579	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	0.1	0								0	1
									Other	0.1							850	0.1	85				85	
									Contingency	40%										40%	1.0	242.7	243	
579	25	30						SA - SITING																
									Labour	0	2287.5	0	0										0	2
									Materials and Equipment	0				0	0	0							0	
									Other	0							3,850	0	0				0	
									Contingency	40%										40%	1.0	0.0	0	
579	25	40						SA - OPERATING LICENSE																
									Labour	0.2	1540.5	0.2	308.1										308	3
									Materials and Equipment	0.2				0	0.2	0							0	
									Other	0.2							300	0.2	60				60	
									Contingency	40%										40%	1.0	147.2	147	
579	25	50						SA - FACILITY OPERATIONS																
								RES has 35 renewal events vs 45 in CES giving a factor of 0.78. However renewal costs can be shared between sites with same technoilogy; thus reduce factor to 0.25	Labour	0.25	9604.8	0.25	2401.2											2,401	
									Materials and Equipment	1				0	1	0							0	

			Expenses at $1K/a x 296 yrs	Other	1						296	1	296						296
				Contingency	40%									40%	1.0	1,078.9			1,079
579	25	70	SA - DECOMMISSIONING (Processing Facilities)																
			RES has 3 decommissioning events - same as CES. However costs can be shared between sites with same technoilogy; thus factor to 0.4	Labour	0.4	2449.9	0.4	979.96											980
				Materials and Equipment	0.4				0	0.4	0								0
				Other	0.4						300	0.4	120						120
				Contingency	40%									40%	1.0	440.0			440
						Total		4,211	Total		0	Total		561	Total		1,908.8		
						Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0	Check: Should = 0		0		6681
																		Total	**6,681**
																		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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	30	0	0	0	0	0	0	0 Licensing & Approvals	Labour		OPG	RJH	1	310	308	0	0	NO DATA TO FILL	8401.0
579	30	0	0	0	0	0	0	0 Licensing & Approvals	Materials and Equipment		OPG	RJH	1	310	308	0	0		0.0
579	30	0	0	0	0	0	0	0 Licensing & Approvals	Other		OPG	RJH	1	310	308	0	0		23111.5
579	30	0	0	0	0	0	0	0 Licensing & Approvals	Contingency		OPG	RJH	1	310	308	0	0		7884.1

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	8401			0.0	8401.0
Materials and Equipment	0			0.0	0.0
Other	23112			0.0	23111.5
Contingency	7884.1			0.0	7884.1
Total	39397			0.0	39397

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																	
								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																
579	30							**Licensing & Approvals**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
579	30	30						LIAISON WITH CNSC																
								Duration 4 yrs (Y6 to Y9) 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	
579	30	50						CNSC CONSTRUCTION LICENCE																
								Costs incurred Y9 to Y11	Labour	0.25	2631	0.25	657.75										658	2
								Some effeciencies gained due to multiple sites	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	
579	30	60						OTHER GOVN'MT APPROVALS																
579	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
579	30	60	30	FEDERAL APPROVALS																	
				Y9 to Y14 or 6 yrs	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
579	30	60	40	PROVINCIAL APPROVALS																	
				Y9 to Y14 or 6 yrs	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
579	30	60	50	MUNICIPAL APPROVALS																	
				Y9 to Y14 or 6 yrs	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
579	30	65		CNSC OPERATING LICENCE (Initial Application)																	
				Y13 to Y14 or 2 yrs	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			88
579	30	70		CNSC OPERATING LICENCE (Maintenance & Renewal)																	
				CES duration is 330 years. Costs incurred in RES during period Y15 to Y310 or 296 years. RES has 0.25 staff vs 1 staff for CES. Factor is 296/330 x 025/1 = 0.224	Labour	0.224	32754	0.224	7336.896												7,337
					Materials and Equipment	1				0	1	0									0
				Expenses at $72K/a x 296 yrs	Other	1							21,312	1	21312						21,312
					Contingency	0.25										25%	1.0	7,162.2			7,162

Total	**39,397**
Check: Should = 0	**0**

						Total			8,401	Total		0	Total		23,112	Total			7,884.1		
						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	Note if appropriate,
2	Correspondence description
3	Special request from fuel owner
4	Misc.

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	35	0	0	0	0	0	0	Public Affairs	Labour		OPG	RJH	1	14	10	0	0	NO DATA TO FILL	1367.5
579	35	0	0	0	0	0	0	Public Affairs	Materials and Equipment		OPG	RJH	1	14	10	0	0		0.0
579	35	0	0	0	0	0	0	Public Affairs	Other		OPG	RJH	1	14	10	0	0		820.0
579	35	0	0	0	0	0	0	Public Affairs	Contingency		OPG	RJH	1	14	10	0	0		1093.8

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	1368	*0.0*	1367.5
Materials and Equipment	0	*0.0*	0.0
Other	820	*0.0*	820.0
Contingency	1093.8	*0.0*	1093.8
Total	3281	*0.0*	3281

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

ACTIVITY DETAIL ESTIMATE

										A	B	C	D	E	F	G	H	I	J	K	L	M	
WBS LEVEL								WBS Description / Detail	Cost Category	Factor	Labour			Materials and other Equipment			Other			Contingency			TOTAL	
1	2	3	4	5	6	7	8				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
579	35							**Public Affairs**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	Cost $k	
579	35	45						PUBLIC AFFAIRS - PREFERRED SITE																
									Labour	0.1	3046.2	0.1	304.62										305
									Materials and Equipment	0.1				0	0.1	0							0
									Other	0.1							600	0.1	60				60
									Contingency	50%										50%	1.0	182.3	182
579	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL																
									Labour	0.1	4569.3	0.1	456.93										457
									Materials and Equipment	0.1				0	0.1	0							0
									Other	0.1							1,450	0.1	145				145
									Contingency	50%										50%	1.0	301.0	301
579	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION																
									Labour	0.1	2528.9	0.1	252.89										253
									Materials and Equipment	0.1				0	0.1	0							0
									Other	0.1							800	0.1	80				80
									Contingency	50%										50%	1.0	166.4	166
579	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT																
									Labour	0.1	3530.8	0.1	353.08										353
									Materials and Equipment	0.1				0	0.1	0							0

				Other	0.1					170	0.1	17					17
				Contingency	50%								50%	1.0	185.0		185
579	35	120	Community Offsets & Benefits														
				Labour	0.25	0	0.25	0									0
				Materials and Equipment	0.25				0	0.25	0						0
				Other	0.25					2,072	0.25	518					518
				Contingency	50%								50%	1.0	259.0		259

Total	**3,281**
Check: Should = 0	**0**

Total	1,368	Total	0	Total	820	Total		1,093.8	
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
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	40	0	0	0	0	0	0	Facility Design & Construction	Labour		CTECH	AM	8	50	5	0	0	NO DATA TO FILL	67414.3
579	40	0	0	0	0	0	0	Facility Design & Construction	Materials and Equipment		CTECH	AM	8	50	5	0	0		33898.0
579	40	0	0	0	0	0	0	Facility Design & Construction	Other		CTECH	AM	8	50	5	0	0		3209.8
579	40	0	0	0	0	0	0	Facility Design & Construction	Contingency		CTECH	AM	8	50	5	0	0		33349.8

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Check total	Total Cost $k	Budget costs to Years by %
Labour	67414		*0.0*	67414.3	
Materials and Equipment	33898		*0.0*	33898.0	
Other	3210		*0.0*	3209.8	
Contingency	33349.8		*0.0*	33349.8	
Total	137872		*0.0*	137872	

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																	
579	40							**Facility Design & Construction**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
579	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 additional land acquisition costs neccesary	Other	0.0							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	
579	40	30						COMMON ANCILLARY FACILITIES																
579	40	30	10					ADMIN AND SUPPORT FACILITIES																
579	40	30	10	1				ADMIN AND VISITOR RECEPTION BLDG																
								building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	486.3	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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	
579	40	30	10	2				OPS SUPPT & HEALTH PHYSICS BLDG																
								housed in process bldg	Labour	0.00	1,294.8	0.0	0.0									comment 7	0	
									Materials and Equipment	0.00				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	

579 40	30	10	3	EQUIP STORAGE AND MAINT'CE BLDG																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,262.1	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				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
579 40	30	10	4	STORAGE CASK STORE																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,031.0	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				1,892.0	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
579 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	0.30	459.9	0.3	138.0													138
					Materials and Equipment	0.30				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
579 40	30	10	6	SOLID WASTE STORAGE AREA																		
				ACTIVE SOLID WASTE HDLG BLDG	Labour	0.30	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	0.30				437.5	0.3	131.3										131
					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
579 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	0.30	359.4	0.3	107.8													108
					Materials and Equipment	0.30				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
579 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	0.30	373.7	0.3	112.1													112
					Materials and Equipment	0.30				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
579 40	30	10	9	WAREHOUSE BLDG																		
				building s exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	470.9	0.0	0.0										comment 7		0
					Materials and Equipment	0.00				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
579 40	30	10	10	GUARDHOUSE AND SECURITY FENCE																		

	building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	631.2	0.0	0.0								comment 7		0
		Materials and Equipment	0.00				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%	1.25	0.0	0
579 40 30 10 11	TRUCK INSP'N / WASH STATION															
	not req'd as no fuel transported off site	Labour	0.00	872.2	0.0	0.0								comment 7		0
		Materials and Equipment	0.00				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
579 40 30 10 12	UTILITY BLDG															
	building and security exist therefore new bldg not req'd. allowance for refurbishment covered in ***/45/20/50	Labour	0.00	1,023.2	0.0	0.0								comment 7		0
		Materials and Equipment	0.00				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
579 40 30 10 13	TEST FACILITY CONSTRUCTION															
	Facility will be constructed at Bruce, taken as being independent of fuel inventory stored. Same size bldg as CES, but costs shared between 3 OPG sites therefore factor 0.33.	Labour	0.3	766.8	0.3	255.6										256
		Materials and Equipment	0.3				1,675.0	0.3	558.3							558
	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	20.0%										20%	1.0	162.8	163
579 40 30 20	OTHER SITE SYSTEMS															
579 40 30 20 1	FIRE PROTECTION SYSTEMS															
	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
579 40 30 20 2	SECURITY AND COMMUNICATION SYSTEM															
	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
579 40 30 20 3	ELECTRICAL AND EMERGENCY POWER															
	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
579 40 30 20 4	SANITARY SEWER SYSTEM															
	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
579	40	30	20	5	POTABLE WATER SYSTEM															
				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
579	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
579	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
579	40	30	20	8	CONST'N 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
579	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
579	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
579	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
579	40	40	STORAGE CONSTRUCTION STAGE 1																
		Construction of stage 1 of the shallow trench storage chambers. 1 chamber capacity 660 casks for RES as opposed to 4 CES chambers. Therefore factor by 1/4 and use 6/10 rule.	Labour	0.44	142,599.6	0.44	62,070.1												62,070
			Materials and Equipment	0.44				59,932.2	0.44	26,087.0									26,087
		expenses factor taken same as labour	Other	0.44							7,290.0	0.44	3,173.2						3,173
		Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	27,399.1			27,399
579	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
		allowance for consumption for construction of 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	**137,872**
						Check: Should = 0	**0**
Total	67,414	Total	33,898	Total	3,210	Total	33,349.8
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
2
3
4

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	45	0	0	0	0	0	0	Facility Operation	Labour		CTECH	AM	4	299	296	0	0	NO DATA TO FILL	1113180.7
579	45	0	0	0	0	0	0	Facility Operation	Materials and Equipment		CTECH	AM	4	299	296	0	0		1067932.4
579	45	0	0	0	0	0	0	Facility Operation	Other		CTECH	AM	4	299	296	0	0		1178573.8
579	45	0	0	0	0	0	0	Facility Operation	Contingency		CTECH	AM	4	299	296	0	0		877596.6

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	1113181	*0.0*	1113180.7
Materials and Equipment	1067932	*0.0*	1067932.4
Other	1178574	*0.0*	1178573.8
Contingency	877597	*0.0*	877596.6
Total	4237284	*0.0*	4237284

INSTRUCTIONS

											A	B	C	D	E	F	G	H	I	J	K	L	M	
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		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																	
579	45							**Facility Operation**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
579	45	10						OPERATIONS FUEL TRANSFER																
579	45	10	5					PROGRAM MANAGEMENT - INITIAL FUEL TRANSFER																
								Same duration to CES (30/30)and labour cost s shared equally between OPG sites (33%) this factor is increased to includes inefficiency of single site based program management team (use 40).	Labour	0.40	110,251.0	0.40	44,100.4											44,100	
								No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0								0	
								Annual cost = $3034/a x 30 yrs	Other	1.00							91,020	1.0	91,020					91,020	3
								Percentage for contingency assumed same as for CES	Contingency	20%										20%	1.0	27,024.1	27,024	
579	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)																
								Same duration as CES but reduced fuel inventory 2282/8528 = 0.27	Labour	0.27	19,456.0	0.27	5,206.2											5,206	
								allow slight reduction in costs for monitoring equipment	Materials and Equipment	0.75				53.0	0.8	39.8								40	
								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	2,623.0	2,623	
579	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 30 years (CES 30), but using 50% utilisation. Other category is for energy consumption only.	Labour	0.50	115,547.0	0.50	57,773.5										57,774
					Materials and Equipment	0.50				1,284.0	0.50	642.0								642
					Other	0.50							16,380.0	0.50	8,190.0					8,190
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	19,981.7		19,982
579	45	10	40	STORAGE OPERATIONS																
				same duration, equal operator disciplines, reduced crew size and crew usage due to lower fuel inventory 2282/8528	Labour	0.27	29,706.0	0.27	7,949.0											7,949
				cask transporter overhaul costs same as CES	Materials and Equipment	1.0				300.0	1.0	300.0								300
				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	2,474.7		2,475
579	45	10	50	ADDITIONAL STORAGE CONSTRUCTION																
579	45	10	50	10 STORAGE CONSTRUCTION STAGE 2																
				factor for istorage const'n stage 2 taken as same as stage 1	Labour	0.44	37,467.3	0.44	16,308.6											16,309
				factor for istorage const'n stage 2 taken as same as stage 1	Materials and Equipment	0.44				81,361.5	0.4	35,414.6								35,415
				factor for istorage const'n stage 2 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4					4,295
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,805.6		16,806
579	45	10	50	20 STORAGE CONSTRUCTION STAGE 3																
				factor for istorage const'n stage 3 taken as same as stage 1. The cost for const'n labour for vaults is omitted from CES costs	Labour	0.44	50,001.9	0.44	21,764.6											21,765
				factor for istorage const'n stage 3 taken as same as stage 1. The cost for const'n materials for basket vaults is omitted from CES costs	Materials and Equipment	0.44				71,382.0	0.4	31,070.8								31,071
				factor for istorage const'n stage 3 taken as same as stage 1	Other	0.44							9,804.0	0.4	4,267.4					4,267
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	17,130.9		17,131
579	45	10	50	30 STORAGE CONSTRUCTION STAGE 4																
				factor for istorage const'n stage 3 taken as same as stage 1	Labour	0.44	49,193.7	0.44	21,412.8											21,413
				factor for istorage const'n stage 3 taken as same as stage 1	Materials and Equipment	0.44				69,457.0	0.4	30,232.9								30,233
				factor for istorage const'n stage 3 taken as same as stage 1	Other	0.44							9,868.3	0.4	4,295.4					4,295
				Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	16,782.3		16,782
579	45	20		OPERATIONS - EXTENDED MONITORING																
579	45	20	5	PROGRAM MANAGEMENT																

					Labour	0.26	312,354.0	0.26	81,212.0														81,212	
				Entries in CES DET applicable to RES but duration 267 years RES & 300 years CES therefore 267/300 of labour costs. Darlington assumed to have 2.6 staff vs 9 in CES. Thus factor is 26%.																				
				No entry in CES alternative cost category	Materials and Equipment	0.0						0.0	0.0	0.0										0	
				Annual cost = $2409/a x 267 yrs	Other	1.00									643,203.0	1.0	643,203.0							643,203	1
				Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	144,883.0				144,883	
579	45	20	40	MONITORING AND SURVEILLANCE -EXTENDED MONITORING																					
				Reduced duration to CES (267/300). One staff for RES vs 5 in CES. Combined factor = (267/300) x (1/5) = 0.18	Labour	0.18	150,328.0	0.18	27,059.0															27,059	
				Annual costs = $1K/a x 267 yrs	Materials and Equipment	1.00								267.0										267	
				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	13,663.0				13,663	
579	45	20	50	OPERATION INDIRECTS (EXTENDED MONITORING)																					
					Labour	0.34	875,048.0	0.34	297,516.3														297,516	
				Entries in CES DET applicable to RES but duration 267 years RES & 300 years CES. Staff for RES = 13 vs 34 in CES. Combined factor is 267/300 x 13/34 = 0.34. Annual M&E costs are $150K/a x 267 yrs = $40050K	Materials and Equipment	1.00								40,050.0										40,050	
					Other												88,110.0							88,110	
				Armed Response = $300K/a + energy costs at $30K/a. Total cost = $330K/a x 267 years = $88,110K																				
				Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	127,702.9				127,703	
579	45	20	60	COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)																					
					Labour	0.53	148,529.0	0.53	79,017.4														79,017	
				RES has duration 267 years & 300 years. RES staff is 3 vs 5 in CES. Factor is 267/300 x 3/5 = 0.534																				
				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	19,754.4				19,754	
579	45	20	70	FUEL INTEGRITY MONITORING (25 YEARLY)																					
				RES duration is 267 yrs vs 300 yrs in CES & RES equivalent annual staff is 0.1 vs 0.5 in CES - factor is 0.2. Annual M&E costs is $3.3K/a x 267	Labour	0.20	4,631.0	0.20	926.2																926	
					Materials and Equipment	1.0								881.8										882	

				yrs = $881.1K. Other costs is $0.7K/a x 267 yrs = $186.7K.	Other	1.0								186.7							187
				Percentage for contingency assumed same as for CES	Contingency	50%												50%	1.0	997.4	997
579	45	20	80	RECEIPT & TRANSFER (EQUIP)																	
				No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0												0
				Allowance for additional 1 cask transporters (factor 0.5 as CES has qty = 2)	Materials and Equipment	0.5				3,000.0	0.5	1,500.0									1,500
				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	450.0	450
579	45	30		OPERATIONS - FACILITY REPEATS																	
579	45	30	50	STORAGE CHAMBER 200 YEAR REPLACEMENT																	
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2282 casks. Therefore a factor of 1/4 using 6/10 rule is used	Labour	0.44	110,400.0	0.44	48,054.4												48,054
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2282 casks. Therefore a factor of 1/4 using 6/10 rule is used	Materials and Equipment	0.44				0.0	0.4	0.0									0
				CES utilises a 16 chambers trench layout for fuel storage. RES requires a 4 chamber trench to house its inventory of 2282 casks. Therefore a factor of 1/4 using 6/10 rule is used	Other	0.44							2,048.4	0.4	891.6						892
				Percentage for contingency assumed same as for CES	Contingency	25%												25%	1.0	12,236.5	12,237
579	45	40		OPERATIONS - REPACKAGING																	
579	45	40	5	PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)																	
					Labour	0.16	440,778.0	0.16	69,596.5												69,597
				Entries in CES DET applicable to RES but duration 45 years RES 4 x (2 yr licensing 2yr demolish prev. bldg, 2 yr const'n, 9yr operations) & 114 years CES therefore 45/114 of labour costs. A further factor included due to program management shared equally between OPG sites this factor is increased to include inefficiency of single site based program management team (use 40%).																
				No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0									0
				Annual cost = $k4209/a x45 yrs	Other	1.00							189,405	1.0	189,405					189,405	2
				Percentage for contingency assumed same as for CES	Contingency	20%												20%	1.0	51,800.3	51,800
579	45	40	10	MODULE TO CASK 100 YEAR REPACKAGING																	
579	45	40	10	10 DECOMMISSIONING OF EXISTING FACILITIES																	

							assume decommissioning of existing process building (from interim period) same costs as CES process building	Labour	1.0	2,357.4	1.00	2,357.4										2,357
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0							0
								Other	1.0							2,216.9	1.0	2,216.9				2,217
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,372.3	1,372
579	45	40	10	20			CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	476.1	1.00	476.1										476
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				354.6	1.0	354.6							355
							RPM Repackaging plant same as CES facility therefore factor = 1	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
579	45	40	10	30			PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)															
579	45	40	10	30	20		RPM EQUIP. DESIGN, SUPPLY & INSTALL															
579	45	40	10	30	20	10	RECEIPT & TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	276.2	1.00	276.2										276
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				5,523.0	1.0	5,523.0							5,523
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							290.0	1.0	290.0				290
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	1,826.8	1,827
579	45	40	10	30	20	20	CASK TO CASK FUEL TRANSFER (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,284.6	1.00	2,284.6										2,285
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				11,423.1	1.0	11,423.1							11,423
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							685.4	1.0	685.4				685
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	4,317.9	4,318
579	45	40	10	30	20	30	CASK DECONTAMINATION (EQUIP)															
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	2,743.3	1.00	2,743.3										2,743
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				13,716.4	1.0	13,716.4							13,716
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							823.0	1.0	823.0				823
							Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	5,184.8	5,185
579	45	40	10	30	20	50	DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)															
							No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0										0
							assume same size bldg and same equip needed as CES therefore factor = 1	Materials and Equipment	1.0				5,055.0	1.0	5,055.0							5,055
							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	1,516.5	1,517
579	45	40	10	30	20	70	CASK PROCESS AREA (RP EQUIP)	Labour	1.0	233.0	1.00	233.0							233
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				2,332.0	1.0	2,332.0				2,332
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							128.0	1.0	128.0	128
							Percentage for contingency assumed same as for CES	Contingency	20%							20%	1.0	538.6	539
579	45	40	10	30	30		RPM BUILDING DESIGN & CONST'N												
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	8,435.2	1.00	8,435.2							8,435
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				8,584.7	1.0	8,584.7				8,585
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							1,624.3	1.0	1,624.3	1,624
							Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	5,593.3	5,593
579	45	40	10	30	60		BUILDING SERVICES (RPM)												
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	11,374.2	1.00	11,374.2							11,374
							RPM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				9,117.4	1.0	9,117.4				9,117
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							3,486.7	1.0	3,486.7	3,487
							Percentage for contingency assumed same as for CES	Contingency	25%							25%	1.0	5,994.6	5,995
579	45	40	10	30	70		COMMISSIONING (RPM)												
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	1,252.8	1.00	1,252.8							1,253
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							232.1	1.0	232.1	232
							Percentage for contingency assumed same as for CES	Contingency	50%							50%	1.0	742.5	742
579	45	40	10	30	80		CONST'N INDIRECTS (RPM)												
							RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	14,668.3	1.00	14,668.3							14,668
							No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0				0
							RPM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							518.6	1.0	518.6	519
							Percentage for contingency assumed same as for CES	Contingency	30%							30%	1.0	4,556.1	4,556
579	45	40	10	40			COMMON ANCILLARY FACILITIES (REPLACEMENT)			comment 7									
							replacement of common ancillary buildings from first 100 years. (excludes truck inspection/wash facility and construction materials stockpile area)	Labour	1.00	21,056.2	1.00	21,056.2							21,056
								Materials and Equipment	1.00				29,785.1	1.0	29,785.1				29,785
							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	22%							22%	1.0	11,185.1	11,185

579	45	40	10	500		COMMISSIONING MANAGEMENT (RPM)																		
						RPM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	273.8	1.00	273.8												274
						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	136.9			137
579	45	40	10	600		REPACKAGING OPERATIONS (RPM)																		
						repackaging of 2282 RES casks compared to 8528 CES factor = 2282/8528	Labour	0.27	112,881.9	0.27	30,206.0												30,206
						procurement of 2282 RES casks compared to 8528 CES factor = 2282/8528	Materials and Equipment	0.27				788,840.0	0.3	211,085.0											211,085
						disposal of 2282 RES casks compared to 8528 CES factor = 2282/8528	Other	0.27							110,864.0	0.3	29,666.0								29,666
						Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	81,287.1			81,287
579	45	40	10	600	30	ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)																		
						duration 12 years RES (1 demolish prev, 2const'n, 9 transfer ops) compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.4	11,882.0	0.40	4,752.8												4,753
						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	1,188.2			1,188
579	45	40	10	700		OPERATION INDIRECTS (RPM)																		
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Labour	0.3	17,186.8	0.30	5,156.0												5,156
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Materials and Equipment	0.3				404.8	0.3	121.4											121
						duration 9 years RES compared to 30 years CES. Factor =9/30 = 0.3	Other	0.3							16,200.0	0.3	4,860.0								4,860
						Percentage for contingency assumed same as for CES	Contingency	30%												30%	1.0	3,041.2			3,041
579	45	40	10	800		STORAGE OPERATIONS (RPM)																		
						transfer of 2282 casks RES compared to 8528 casks CES	Labour	0.27	14,657.1	0.27	3,922.1												3,922
						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	30%												30%	1.0	1,176.6			1,177
579	45	40	20			MODULE TO CASK 200 YEAR REPACKAGING																		
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Labour				109,468.0														109,468
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Materials and Equipment							297,097.8											297,098
						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Other										44,759.4								44,759

						Costs taken by addition of individual entries in 571-45-40-10 (100 year repackaging)	Contingency											128,603.8		128,604
579	45	40	30			MODULE TO MODULE 300 YEAR REPACKAGING														
579	45	40	30	10		MODULE TO CASK 300 YEAR REPACKAGING														
						Costs taken as same as 200 year repackaging	Labour				109,468.0									109,468
						Costs taken as same as 200 year repackaging	Materials and Equipment						297,097.8							297,098
						Costs taken as same as 200 year repackaging	Other								44,759.4					44,759
						Costs taken as same as 200 year repackaging	Contingency											128,603.8		128,604
579	45	40	30	20		MODULE TO MODULE ADDITIONAL REQUIREMENTS														
579	45	40	30	20	10	MM EQUIP. DESIGN, SUPPLY & INSTALL														
						No entry in CES alternative cost category	Labour	0.0	0.0	0.00	0.0									0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				6,471.5	1.0	6,471.5						6,472
						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	1,941.5	1,941
579	45	40	30	30	30	BUILDING DESIGN & CONST'N (Module to Module)														
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	372.1	1.00	372.1									372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				372.1	1.0	372.1						372
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							74.4	1.0	74.4			74
						Percentage for contingency assumed same as for CES	Contingency	30%										30%	1.0	245.6	246
579	45	40	30	30	60	BUILDING SERVICES (MM)														
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	383.9	1.00	383.9									384
						RPMM Repackaging plant same as CES facility therefore factor = 1	Materials and Equipment	1.0				310.5	1.0	310.5						311
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							97.9	1.0	97.9			98
						Percentage for contingency assumed same as for CES	Contingency	25%										25%	1.0	198.1	198
579	45	40	30	30	70	COMMISSIONING(MM)														
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	334.1	1.00	334.1									334
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							53.2	1.0	53.2			53
						Percentage for contingency assumed same as for CES	Contingency	50%										50%	1.0	193.7	194
579	45	40	30	30	80	CONST'N INDIRECTS (MM)														
						RPMM Repackaging plant same as CES facility therefore factor = 1	Labour	1.0	723.8	1.00	723.8									724
						No entry in CES alternative cost category	Materials and Equipment	0.0				0.0	0.0	0.0						0
						RPMM Repackaging plant same as CES facility therefore factor = 1	Other	1.0							25.4	1.0	25.4			25

					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	224.8		225
579	45	40	30	600	REPACKAGING OPERATIONS (Module to Module)														
					MM repackaging operations factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Labour	0.28	17,823.5	0.28	5,065.8									5,066
					Module procurement factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Materials and Equipment	0.28				102,336.0	0.3	29,086.1						29,086
					module waste disposal factor 2421/8528 = 0.284 (ratio for casks = ratio for modules)	Other	0.28							35,817.6	0.3	10,180.1			10,180
					Percentage for contingency assumed same as for CES	Contingency	30%								30%	1.0	13,299.6		13,300

Total	**4,237,284**
Check: Should = 0	**0**

Total	1,113,181	Total	1,067,932	Total	1,178,574	Total	877,596.6		
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 2409k$/a made up of expenses from table 18 + property tax for repackaging bldg (based on assessed value of 15% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 15% of building costs (341,974k$) at rate 2.87%)

2 4209k$/a made up from property tax for repackaging building (based on assessed value of 50% of building costs (54,210k$) at rate 4.08%) + property tax for stores and ancillary bldgs (based on assessed value of 50% of building costs (341,974k$) at rate 2.87%). this tax runs for 3X15 years = 45 years. A portion of this tax over 45 years is covered in the ext monitoring entry (at 15%) therefore use rate of 35% (35+15 = 50)

3 3034k$/a made up of expenses from table 18 (605k$/a) + property tax for stores (no ancillarys - based on assessed value of 50% of stores building costs (338,510k$) at rate 2.87% = 4857, this is then halved as the storage buildings are built on a rolling program)

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REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Labour		OPG	RJH	8	310	303	0	0	NO DATA TO FILL	107824.6
579	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Materials and Equipment		OPG	RJH	8	310	303	0	0		8880.0
579	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Other		OPG	RJH	8	310	303	0	0		5595.0
579	55	0	0	0	0	0	0	Environmental Assessment and Monitoring	Contingency		OPG	RJH	8	310	303	0	0		36689.9

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost
Labour	215649
Materials and Equipment	17760
Other	11190
Contingency	73379.7
Total	317979

Check: Total minus budget Should = 0

Budget costs to Years by %

Check total	Total Cost $k
0.0	107824.6
0.0	8880.0
0.0	5595.0
0.0	36689.9
0.0	158989

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															
579 55	**Environmental Assessment and Monitoring**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
579 55 10	EA & MONITORING PROGRAM MANAGEMENT																
	Costs are incurred over the period Y8 to Y310 (when repackaging ends) or 303 yrs vs 347 yrs in CES. RES has 0.5 staff and CES has 2 staff. Factor is 303/347 x 0.5/2 = 0.218	Labour	0.218	70306	0.218	15326.708											15,327
		Materials and Equipment	1				0	1	0								0
		Other	1							3,470	1	3470					3,470
		Contingency	0.3										18796.708	0.3	5639.0124		5,639
579 55 20	CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT																
	Assume C/L & EA process spans 3 years (Y9 to Y11) with with some preparation work in Y4; ie total of 4 years. Due to multiple sites with same technology can share costs	Labour	0.3	7471	0.3	2241.3											2,241
		Materials and Equipment	0.3				0	0.3	0								0
		Other	0.3							2,150	0.3	645					645
		Contingency	0.3										2886.3	0.3	865.89		866

579	55	40	GROUNDWATER MONITORING																
			RES = 296 yrs vs CES = 330 yrs. Factor is 296/330 x 0.2/0.6 = 0.318 (Y15 to Y310)	Labour	0.3333	37158	0.3333	12384.7614										12,385
			M&E @ $6K/a x 296 yrs	Materials and Equipment	1				1776	1	1776							1,776
			Expenses @ $4K/a x 296 yrs	Other	1							1,184	1	1184				1,184
				Contingency	0.3										15344.761	0.3	4603.4284	4,603
579	55	50	RADIOLOGICAL BIOSPHERE MONITORING																
			RES = 296 yrs vs CES = 330 yrs. Factor is 296/330 x 1/3.3 = 0.272	Labour	0.272	217280	0.272	59100.16										59,100
			M&E costs at $18K/a x 296 yrs	Materials and Equipment	1				5328	1	5328							5,328
				Other	1							0	1	0				0
				Contingency	0.3										64428.16	0.3	19328.448	19,328
579	55	60	NON-RAD BIOSPHERE MONITORING																
			RES = 296 yrs vs CES = 330 yrs. Factor is 296/330 x 0.2/0.8 = 0.224	Labour	0.3333	53590	0.3333	17861.547										17,862
			M&E costs at $6K/a x 296 yrs	Materials and Equipment	1				1776	1	1776							1,776
				Other	1							0	1	0				0
				Contingency	0.3										19637.547	0.3	5891.2641	5,891
579	55	80	HUMAN HEALTH MONITORING																
			RES = 296 yrs vs CES = 330 yrs. Factor is 296/330 x 0.03/0.17= 0.158	Labour	0.158	5760	0.158	910.08										910
				Materials and Equipment	1				0	1	0							0
			Expenses at $1K/a x 296 yrs = $296K	Other	1							296	1	296				296
				Contingency	0.3										1206.08	0.3	361.824	362

Total	**158,989**
Check: Should = 0	**0**

Total	107,825	Total	8,880	Total	5,595	Total	36,689.9
Check: Should = 0	107,825	Check: Should = 0	-206,769	Check: Should = 0	-12,165	Check: Should = 0	25,500

BASIS OF ESTIMATE NOTES - Insert references and notes

1

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3

REACTOR EXTENDED STORE
ACTIVITY SUMMARY TO DATA TRANSFER

CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

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
579	90	0	0	0	0	0	0	Program Management	Labour		CTECH	AM	1	14	14	0	0	NO DATA TO FILL	3187.4
579	90	0	0	0	0	0	0	Program Management	Materials and Equipment		CTECH	AM	1	14	14	0	0		0.0
579	90	0	0	0	0	0	0	Program Management	Other		CTECH	AM	1	14	14	0	0		2032.8
579	90	0	0	0	0	0	0	Program Management	Contingency		CTECH	AM	1	14	14	0	0		1044.0

INSTRUCTIONS

ACTIVITY DETAIL ESTIMATE SUMMARY

Cost Category	Total Cost	Check: Total minus budget Should = 0	Budget costs to Years by %	Check total	Total Cost $k
				0%	
Labour	3187			0.0	3187.4
Materials and Equipment	0			0.0	0.0
Other	2033			0.0	2032.8
Contingency	1044.0			0.0	1044.0
Total	6264			0.0	6264

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																	
579	90							**Program Management**			**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								Program management shared between 7 reactor sites at percentages based on table 18 in cost estimate report. 24% for Darlington			**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**total for 7 sites**	**Factor**	**RES**	**CES**	**Factor**	**RES**		
								based on 8 staff. Assume 4 x OPG01, 4 x OPG03 for 14year duration	Labour	0.24	13280.686	0.24	3187.364544										3,187	
								no entry	Materials and Equipment	0				0	0	0							0	
								the following expenses: Public affairs, overheads, insurance, community compensation, legal fees	Other	0.24							8470	0.24	2032.8				2,033	
								Contingency as CES value	Contingency	20%										20%	1.0	1,044.0	1,044	

Total	3,187	Total	0	Total	2,033	Total	1,044.0
Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0	Check: Should = 0	0

Total	**6,264**
Check: Should = 0	**0**

RES ALTERNATIVE
WBS No 579
CASKS IN SHALLOW TRENCH (CST)
DARLINGTON

Cost Category	Total K$
Labour	1,313,257
Materials and Equipment	1,111,162
Other	1,214,199
Contingency	962,828
Total Cost	**4,601,446**

4,601,446

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$
579	15	0	0	0	0	0	0	RJH	Labour	0	1	11	7	0	556
579	15	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	11	7	0	0
579	15	0	0	0	0	0	0	RJH	Other	0	1	11	7	0	113
579	15	0	0	0	0	0	0	RJH	Contingency	0	1	11	7	0	334
579	20	0	0	0	0	0	0	AM	Labour	0	94	100	7	0	7,114
579	20	0	0	0	0	0	0	AM	Materials and Equipment	0	94	100	7	0	452
579	20	0	0	0	0	0	0	AM	Other	0	94	100	7	0	182
579	20	0	0	0	0	0	0	AM	Contingency	0	94	100	7	0	2,927
579	25	0	0	0	0	0	0	RJH	Labour	0	1	310	42	0	4,211
579	25	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	310	42	0	0
579	25	0	0	0	0	0	0	RJH	Other	0	1	310	42	0	561
579	25	0	0	0	0	0	0	RJH	Contingency	0	1	310	42	0	1,909
579	30	0	0	0	0	0	0	RJH	Labour	0	1	310	308	0	8,401
579	30	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	310	308	0	0
579	30	0	0	0	0	0	0	RJH	Other	0	1	310	308	0	23,112
579	30	0	0	0	0	0	0	RJH	Contingency	0	1	310	308	0	7,884
579	35	0	0	0	0	0	0	RJH	Labour	0	1	14	10	0	1,368
579	35	0	0	0	0	0	0	RJH	Materials and Equipment	0	1	14	10	0	0
579	35	0	0	0	0	0	0	RJH	Other	0	1	14	10	0	820
579	35	0	0	0	0	0	0	RJH	Contingency	0	1	14	10	0	1,094
579	40	0	0	0	0	0	0	AM	Labour	0		8	50	5	0 67414.2611
579	40	0	0	0	0	0	0	AM	Materials and Equipment	0		8	50	5	0 33897.9886
579	40	0	0	0	0	0	0	AM	Other	0		8	50	5	0 3209.7868
579	40	0	0	0	0	0	0	AM	Contingency	0		8	50	5	0 33349.8366
579	45	0	0	0	0	0	0	AM	Labour	0	4	299	296	0	1,113,181
579	45	0	0	0	0	0	0	AM	Materials and Equipment	0	4	299	296	0	1,067,932
579	45	0	0	0	0	0	0	AM	Other	0	4	299	296	0	1,178,574
579	45	0	0	0	0	0	0	AM	Contingency	0	4	299	296	0	877,597
579	55	0	0	0	0	0	0	RJH	Labour	0	8	310	303	0	107,825
579	55	0	0	0	0	0	0	RJH	Materials and Equipment	0	8	310	303	0	8,880
579	55	0	0	0	0	0	0	RJH	Other	0	8	310	303	0	5,595
579	55	0	0	0	0	0	0	RJH	Contingency	0	8	310	303	0	36,690
579	90	0	0	0	0	0	0	AM	Labour	0	1	14	14	0	3,187
579	90	0	0	0	0	0	0	AM	Materials and Equipment	0	1	14	14	0	0
579	90	0	0	0	0	0	0	AM	Other	0	1	14	14	0	2,033
579	90	0	0	0	0	0	0	AM	Contingency	0	1	14	14	0	1,044

D2 Cost Estimate Schedules for Darlington Site

WBS No 577 – CSB
WBS No 578 – SMV
WBS No 579 - CST

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

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Respon sible	WBS Comments	Ammen dment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt
1	1	577								**CASKS IN STORAGE BUILDINGS (CSB) - OPG DARLINGTON**												
2	2	577	15							**SITING**	Db Sm											
3	3	577	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	98	7			
4	3	577	15	70						PREFERRED SITE	Db Sm											
5	4	577	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			95	95	1			
6	4	577	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH			95	95	1			
7																						
8	2	577	20							**SYSTEM DEVELOPMENT**	Db Sm											
9	3	577	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			90	96	7			
10	3	577	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			90	93	4			
11	3	577	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			90	97	8			
12	3	577	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			90	97	8			
13	3	577	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			93	93	1			
14																						
15	2	577	25							**SAFETY ASSESSMENT**	Db Sm											
16	3	577	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	101	11			
17	3	577	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			94	95	2			
18	3	577	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			99	100	2			
19	3	577	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			41	310	32			
20	3	577	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			96	299	6			
21																						
22	2	577	30							**LICENSING & APPROVALS**	Db Sm											
23	3	577	30	30						LIAISON WITH CNSC	Db Act	FIXED	OPG	RJH			92	95	4			
24	3	577	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	OPG	RJH			96	98	3			
25	3	577	30	60						OTHER GOVN'MT APPROVALS	Db Sm											
26	4	577	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	OPG	RJH			92	95	4			
27	4	577	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	OPG	RJH			96	101	6			
28	4	577	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	OPG	RJH			96	101	6			
29	4	577	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	OPG	RJH			96	101	6			
30	3	577	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	OPG	RJH			100	101	2			
31	3	577	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	OPG	RJH			41	310	270			
32																						
33	2	577	35							**PUBLIC AFFAIRS**	Db Sm											
34	3	577	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			95	95	1			
35	3	577	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			96	98	3			
36	3	577	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			99	101	3			
37	3	577	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	101	101			
38	3	577	35	120						HOST COMMUNITY COMPENSATION	Db Act	FIXED	OPG	RJH			99	101	3			
39																						
40	2	577	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm											
41	3	577	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	AM			59	59	1			
42	3	577	40	30						COMMON ANCILLARY FACILITIES	Db Sm											
43	4	577	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm											
44	5	577	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG	Db Act	STEP FIXED	CTECH	AM			*	*	*			
45	5	577	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	AM			*	*	*			
46	5	577	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	AM			*	*	*			
47	5	577	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	AM			*	*	*			
48	5	577	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	AM			100	101	2			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Respon sible	WBS Comments	Ammen dment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt
49	5	577	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	AM			100	101	2			
50	5	577	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	AM			100	101	2			
51	5	577	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	AM			100	101	2			
52	5	577	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	AM			*	*	*			
53	5	577	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	AM			*	*	*			
54	5	577	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	AM	Not required for RES							
55	5	577	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	AM			*	*	*			
56	5	577	40	30	10	13				TEST FACILITY					At Bruce		52	53	2			
57	4	577	40	30	20					OTHER SITE SYSTEMS	Db Sm											
58	5	577	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	AM			*	*	*			
59	5	577	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	AM			*	*	*			
60	5	577	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	AM			*	*	*			
61	5	577	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	AM			*	*	*			
62	5	577	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	AM			*	*	*			
63	5	577	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	AM			*	*	*			
64	5	577	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	AM			*	*	*			
65	5	577	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	AM			*	*	*			
66	5	577	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	AM			*	*	*			
67	5	577	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	AM			*	*	*			
68	4	577	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	AM			60	60	1			
69	3	577	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM			61	61	1			
70										*** Existing buildings and services adopted by RES facility**													
71	2	577	45							**FACILITY OPERATION**	Db Sm											
72	3	577	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm											
73	4	577	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM			41	310	270			
74	4	577	45	20	40					MONITORING AND SURVEILLANCE	Db Act	STEP FIXED	CTECH	AM			41	310	270			
75	4	577	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM			41	310	270			
76	4	577	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM			41	310	270			
77	4	577	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM			41	302	270			
78	4	571	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			52	52	1			
79	3	577	45	30						OPERATIONS - FACILITY REPEATS	Db Sm											
80	4	577	45	30	20					STORAGE BUILDINGS 100 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			99	110	12			
81	4	577	45	30	50					STORAGE BUILDINGS 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			199	210	12			
82	4	577	45	30	70					STORAGE BUILDINGS 300 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM			299	310	12			
83	3	577	45	40						OPERATIONS - REPACKAGING	Db Sm											
84	4	577	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM			102	310	45			
85	4	577	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm											
86	5	577	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM			98	99	2			
87	5	577	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM			98	101	4			
88	5	577	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm											
89	6	577	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm											
90	7	577	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM			100	101	2			
91	7	577	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER	Db Act	STEP FIXED	CTECH	AM			100	101	2			

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Respon sible	WBS Comments	Ammen dment No	Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt	
92	7	577	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM			100	101	2				
93	7	577	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM			100	101	2				
94	7	577	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM			100	101	2				
95	6	577	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM			100	101	2				
96	6	577	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM			100	101	2				
97	6	577	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM			101	101	1				
98	6	577	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			100	101	2				
99	5	577	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	AM			159	161	3				
100	5	577	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM			101	101	1				
101	5	577	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			102	110	9				
102	6	577	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	AM			99	110	12				
103	5	577	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM			102	110	9				
104	5	577	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM			102	110	9				
105	4	577	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			198	210	13				
106	4	577	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm												
107	5	577	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM			298	310	13				
108	5	577	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm												
109	5	577	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM			300	301	2				
110	6	577	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM			298	301	4				
111	6	577	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM			300	301	2				
112	6	577	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM			301	301	1				
113	6	577	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM			298	301	4				
114	5	577	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM	AM		302	310	9				
115																							
116	2	577	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm												
117	3	577	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			41	310	270				
118	3	577	55	20						CNSC CONSTRUCTION LICENCE - ENVIRONMENTAL ASSESSMENT	Db Act	FIXED	OPG	RJH			95	98	4				
119	3	577	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH			41	310	270				
120	3	577	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			41	310	270				
121	3	577	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH			41	310	270				
122	3	577	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH			41	310	62				
123																							
124	2	577	90							**PROGRAM MANAGEMENT (Yrs 01 to 4)**	Db Act	STEP FIXED	CTECH	AM			1	4	4				

LINE No sp sht	Level	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 edul e Amn
1	1	578								**SURFACE MODULAR VAULT (SMV) - OPG DARLINGTON**												
2	2	578	15							**SITING**	Db Sm											
3	3	578	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH			1	11	7			
4	3	578	15	70						PREFERRED SITE	Db Sm											
5	4	578	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH			8	8	1			
6	4	578	15	70	30					PREFERRED SITE - CHARACTERISATION	Db Act	FIXED	OPG	RJH			8	8	1			
7		578																				
8	2	578	20							**SYSTEM DEVELOPMENT**	Db Sm											
9	3	578	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM			1	7	7			
10	3	578	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM			1	4	4			
11	3	578	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM			1	7	7			
12	3	578	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM			1	7	7			
13	3	578	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM			4	4	1			
14		578																				
15	2	578	25							**SAFETY ASSESSMENT**	Db Sm											
16	3	578	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH			1	14	10			
17	3	578	25	30						SA - SITING	Db Act	FIXED	OPG	RJH			7	8	2			
18	3	578	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH			12	13	2			
19	3	578	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH			16	323	35			
20	3	578	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH			313	314	2			
21		578																				
22	2	578	30							**LICENSING & APPROVALS**	Db Sm											
23	3	578	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG			6	9	4			
24	3	578	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG			9	11	3			
25	3	578	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG								
26	4	578	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG			6	9	4			
27	4	578	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG			9	14	6			
28	4	578	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG			9	14	6			
29	4	578	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG			9	14	6			
30	3	578	30	65						CNSC OPERATING LICENCE (Initial Application)	Db Act	FIXED	CTECH	MG			13	14	2			
31	3	578	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG			15	323	309			
32																						
33	2	578	35							**PUBLIC AFFAIRS**	Db Sm											
34	3	578	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH			8	8	1			
35	3	578	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH			9	11	3			
36	3	578	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH			12	14	3			
37	3	578	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH			1	14	10			
38	3	578	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH			12	14	3			
39																						
40	2	578	40							**SMV FACILITY DESIGN AND CONSTRUCTION**												
41	3	578	40	10						SITE & IMPROVEMENTS		STEP FIXED	CTECH	GA			12	12	1			
42	3	578	40	20						PROCESSING BUILDING (PB)												
43	4	578	40	20	20					PROCESSING BUILDING EQUIP. DESIGN, SUPPLY & INSTALL												
44	5	578	40	20	20	10				RECEIPT & TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			13	14	2			
45	5	578	40	20	20	20				MODULE TRANSFER CELLS (EQUIP)		STEP FIXED	CTECH	AM			13	14	2			
46	5	578	40	20	20	40				COMMON CRANE MAINTENANCE AREA (EQUIP)		STEP FIXED	CTECH	AM			13	14	2			
47	4	578	40	20	30					PROCESSING BUILDING DESIGN & CONST'N		STEP FIXED	CTECH	AM			13	14	2			
48	4	578	40	20	60					PB BUILDING SERVICES DESIGN AND INSTALL'N		STEP FIXED	CTECH	AM			14	14	1			
49	4	578	40	20	70					COMMISSIONING (PB)		STEP FIXED	CTECH	AM			14	14	1			

LINE No sp sht	Level	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 edul e Amn	
50	4	578	40	20	80					CONST'N INDIRECTS (PB)		STEP FIXED	CTECH	AM			13	14	2				
51	3	578	40	30						COMMON ANCILLARY FACILITIES													
52	4	578	40	30	10					ADMIN AND SUPPORT FACILITIES													
53	5	578	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG		STEP FIXED	CTECH	GA			*	*	*				
54	5	578	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BDLG		STEP FIXED	CTECH	GA			*	*	*				
55	5	578	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG		STEP FIXED	CTECH	GA			*	*	*				
56	5	578	40	30	10	04				STORAGE CASK/MODULE CANISTER STORE		STEP FIXED	CTECH	GA			*	*	*				
57	5	578	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG		STEP FIXED	CTECH	GA			313	314	2				
58	5	578	40	30	10	06				SOLID WASTE STORAGE AREA		STEP FIXED	CTECH	GA			313	314	2				
59	5	578	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG		STEP FIXED	CTECH	GA			313	314	2				
60	5	578	40	30	10	08				LOW LVL LIQ/W STRG BLDG		STEP FIXED	CTECH	GA			313	314	2				
61	5	578	40	30	10	09				WAREHOUSE BLDG		STEP FIXED	CTECH	GA			*	*	*				
62	5	578	40	30	10	10				GUARDHOUSE AND SECURITY FENCE		STEP FIXED	CTECH	GA			*	*	*				
63	5	578	40	30	10	11				TRUCK INSP'N / WASH STATION		STEP FIXED	CTECH	GA	Not required at RES								
64	5	578	40	30	10	12				UTILITY BLDG		STEP FIXED	CTECH	GA			*	*	*				
65	5	578	40	30	10	13				TEST FACILITY					At Bruce		52	53	2				
66	4	578	40	30	20					OTHER SITE SYSTEMS													
67	5	578	40	30	20	01				FIRE PROTECTION SYSTEMS		STEP FIXED	CTECH	GA			*	*	*				
68	5	578	40	30	20	02				SECURITY AND COMUNICATION SYSTEM		STEP FIXED	CTECH	GA			*	*	*				
69	5	578	40	30	20	03				ELECTRICAL AND EMERGENCY POWER		STEP FIXED	CTECH	GA			*	*	*				
70	5	578	40	30	20	04				SANITARY SEWER SYSTEM		STEP FIXED	CTECH	GA			*	*	*				
71	5	578	40	30	20	05				POTABLE WATER SYSTEM		STEP FIXED	CTECH	GA			*	*	*				
72	5	578	40	30	20	06				RETENTION/SEDIMENTATION POND		STEP FIXED	CTECH	GA			*	*	*				
73	5	578	40	30	20	07				STORM WATER DETENTION POND		STEP FIXED	CTECH	GA			*	*	*				
74	5	578	40	30	20	08				CONST'N MAT'L STOCKPILE AREA		STEP FIXED	CTECH	GA			*	*	*				
75	5	578	40	30	20	09				SITE MATERIALS STORAGE AREA		STEP FIXED	CTECH	GA			*	*	*				
76	5	578	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS		STEP FIXED	CTECH	GA			*	*	*				
77	4	578	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES		STEP FIXED	CTECH	GA			60	61	2				
78	3	578	40	40						STORAGE CONSTRUCTION (STAGE 1)													
79	5	578	40	40	10	05				CONSTRUCTION FACILITIES		STEP FIXED	ALSTEC	CC			13	14	2				
80	5	578	40	40	10	10				STORES ENGINEERING		STEP FIXED	ALSTEC	CC			13	14	2				
81	4	578	40	40	10	20				STORES EQUIP. DESIGN, SUPPLY & INSTALL		STEP FIXED	ALSTEC	CC			13	14	2				
82	4	578	40	40	10	30				SURFACE MODULAR VAULT DESIGN AND CONST'N		STEP FIXED	ALSTEC	CC			13	14	2				
83	4	578	40	40	10	40				COMMISSIONING		STEP FIXED	ALSTEC	CC			14	14	1				
84	4	578	40	40	10	50				CONST'N INDIRECTS		STEP FIXED	ALSTEC	CC			13	14	2				
85	3	578	40	500						COMMISSIONING MANAGEMENT		STEP FIXED	CTECH	AM			14	14	1				
86	3	578	40	600						EQUIPMENT, SPARES AND CONSUMABLES		STEP FIXED	CTECH	AM			14	14	1				
87	3	578	40	650						ENERGY CONSUMPTION		STEP FIXED	CTECH	AM			14	14	1				
88		578																					
89	2	578	45							**FACILITY OPERATION**													
90	3	578	45	10						OPERATIONS INITIAL FUEL RECEIPT													
91	4	578	45	10	05					PROGRAM MANAGEMENT		STEP FIXED	CTECH	AM			15	49	35				
92	4	578	45	10	10					PROCESSING BUILDING OPERATIONS		STEP FIXED	CTECH	AM			15	49	35				
93	4	578	45	10	20					COMMON ANCILLARY FACILITIES OPERATIONS (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	GA			15	49	35				
94	4	578	45	10	25					MONITORING AND SURVEILLANCE (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	AM			15	49	35				
95	4	578	45	10	30					OPERATION INDIRECTS (INITIAL FUEL RECEIPTS)		STEP FIXED	CTECH	AM			15	49	35				
96	4	578	45	10	40					STORAGE OPERATIONS		STEP FIXED	CTECH	AM			15	49	35				
97	4	578	45	10	50					ADDITIONAL STORAGE CONSTRUCTION													
98	5	578	45	10	50	10				STORAGE CONSTRUCTION (STAGE 2)		STEP FIXED	CTECH	AM			23	25	3				
99	5	578	45	10	50	20				STORAGE CONSTRUCTION (STAGE 3)		STEP FIXED	CTECH	AM			33	35	3				

LINE No sp sht	Level	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 edul e Amn	
100	5	578	45	10	50	30				STORAGE CONSTRUCTION (STAGE 4)		STEP FIXED	CTECH	AM			41	43	3				
101	3	578	45	20						OPERATIONS - EXTENDED MONITORING													
102	4	578	45	20	05					PROGRAM MANAGEMENT		STEP FIXED	CTECH	AM			51	323	273				
103	4	578	45	20	40					MONITORING AND SURVEILLANCE (EXTENDED)		STEP FIXED	CTECH	AM			51	323	273				
104	4	578	45	20	50					OPERATION INDIRECTS (MONITORING)		STEP FIXED	CTECH	AM			51	323	273				
105	4	578	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)		STEP FIXED	CTECH	GA			51	323	273				
106	4	578	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)		STEP FIXED	CTECH	AM			51	323	273				
107	3	578	45	30						OPERATIONS - FACILITY REPEATS													
108	4	578	45	30	20					VAULT 100 YEAR REPLACEMENT		STEP FIXED	ALSTEC	CC			113	124	12				
109	4	578	45	30	30					VAULT 200 YEAR REPLACEMENT		STEP FIXED	ALSTEC	CC			212	223	12				
110	4	578	45	30	40					VAULT 300 YEAR REPLACEMENT		STEP FIXED	ALSTEC	CC			310	321	12				
111	3	578	45	40						OPERATIONS - REPACKAGING													
112	4	578	45	40	05					PROGRAM MANAGEMENT FACILITY REPEATS & REPACKAGING		STEP FIXED	CTECH	AM			113	324	36				
113	4	578	45	40	10					MODULE TO MODULE (M to M) 300 YEAR REPACKAGING													
114	5	578	45	40	10	10				DECOMMISSSIONING OF EXISTING FACILITIES		STEP FIXED	CTECH	AM			307	308	2				
115	5	578	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT M TO M		STEP FIXED	CTECH	AM			309	310	2				
116	5	578	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT M to M (RPMM)													
117	6	578	45	40	10	30	20			RPMM EQUIP. DESIGN, SUPPLY & INSTALL													
118	7	578	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			314	314	1				
119	7	578	45	40	10	30	20	20		CANISTER TO CANISTER FUEL TRANSFER (EQUIP)		STEP FIXED	CTECH	AM			314	314	1				
120	7	578	45	40	10	30	20	30		CANISTER DECONTAMINATION (EQUIP)		STEP FIXED	CTECH	AM			314	314	1				
121	7	578	45	40	10	30	20	40		MODULE DECONTAMINATION(EQUIP)		STEP FIXED	CTECH	AM			314	314	1				
122	7	578	45	40	10	30	20	50		CANISTER DISMANTLING / BREAKDOWN(EQUIP)		STEP FIXED	CTECH	AM			314	314	1				
123		578	45	40	10	30	20	60		CASK OPENING AND CASK DECONTAMINATION (EQUIP,		STEP FIXED	CTECH	AM			314	314	1				
124	6	578	45	40	10	30	30			RPMM BUILDING DESIGN & CONST'N		STEP FIXED	CTECH	AM			313	314	2				
125	6	578	45	40	10	30	60			BUILDING SERVICES (RPMM)		STEP FIXED	CTECH	AM			313	314	2				
126	6	578	45	40	10	30	70			COMMISSIONING (RPMM)		STEP FIXED	CTECH	AM			314	314	1				
127	6	578	45	40	10	30	80			CONST'N INDIRECTS (RPMM)		STEP FIXED	CTECH	AM			313	314	2				
128	5	578	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT EVERY 100 YEARS)		STEP FIXED	CTECH	GA			160	324	12				
129	5	578	45	40	10	500				COMMISSIONING MANAGEMENT (RPMM)		STEP FIXED	CTECH	AM			314	314	1				
130	5	578	45	40	10	600				REPACKAGING OPERATIONS (RPMM)		STEP FIXED	CTECH	AM			315	323	9				
131	6	578	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)		VARIABLE	CTECH	GA			114	322	36				
132	5	578	45	40	10	700				OPERATION INDIRECTS (RPMM)		STEP FIXED	CTECH	AM			315	323	9				
133	5	578	45	40	10	800				STORAGE OPERATIONS (RPMM)		STEP FIXED	CTECH	AM			315	323	9				
134		578																					
135	2	578	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**													
136	3	578	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	STEP FIXED	OPG	RJH			8	323	316				
137	3	578	55	20						CNSC CONSTRUCTION LICENCE - EA	Db Act	STEP FIXED	OPG	RJH			8	11	4				
138	3	578	55	40						GROUNDWATER MONITORING	Db Act	STEP FIXED	OPG	RJH			15	323	309				
139	3	578	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	STEP FIXED	OPG	RJH			15	323	309				
140	3	578	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	STEP FIXED	OPG	RJH			15	323	309				
141	3	578	55	80						HUMAN HEALTH MONITORING	Db Act	STEP FIXED	OPG	RJH			15	323	62				
142																							
143	2	578	90							**PROGRAM MANAGEMENT**		STEP FIXED	CTECH	AM			1	14	14				

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible		Start Yr	Finish Yr	DUR - Yrs	PR ED	Sc hed ule Co	Sche dule Amn dmnt		11
1	1	579								**CASKS IN SHALLOW TRENCHES (CST) - OPG DARLINGTON**													
2	2	579	15							**SITING**	Db Sm												
3	3	579	15	10						SITING MANAGEMENT	Db Act	FIXED	OPG	RJH		1	11	7					
4	3	579	15	70						PREFERRED SITE	Db Sm												
5	4	579	15	70	10					PREFERRED SITE - SUPPORT AND REPORTING	Db Act	FIXED	OPG	RJH		8	8	1					
6	4	579	15	70	30					PREFERRED SITE - CHARACTERIZATION	Db Act	FIXED	OPG	RJH		8	8	1					
7																							
8	2	579	20							**SYSTEM DEVELOPMENT**	Db Sm												
9	3	579	20	02						SYSTEM DEVELOPMENT MANAGEMENT	Db Act	FIXED	CTECH	AM		94	100	7					
10	3	579	20	05						SYSTEM OPTIMIZATION	Db Act	FIXED	CTECH	AM		94	97	4					
11	3	579	20	20						PROCESS SYSTEM ENG'NG (PACK'G, REPACK'G & DEC'NT'M)	Db Act	FIXED	CTECH	AM		94	100	7					
12	3	579	20	30						STORAGE SYSTEM ENG'NG	Db Act	FIXED	CTECH	AM		94	100	7					
13	3	579	20	40						SECURITY & SAFEGUARD ENG'NG	Db Act	FIXED	CTECH	AM		97	97	1					
14																							
15	2	579	25							**SAFETY ASSESSMENT**	Db Sm												
16	3	579	25	10						SAFETY ASSESSMENT MANAGEMENT	Db Act	FIXED	OPG	RJH		1	14	10					
17	3	579	25	30						SA - SITING	Db Act	FIXED	OPG	RJH		7	8	2					
18	3	579	25	40						SA - OPERATING LICENSE	Db Act	FIXED	OPG	RJH		12	13	2					
19	3	579	25	50						SA - FACILITY OPERATIONS	Db Act	FIXED	OPG	RJH		15	310	35					
20	3	579	25	70						SA - DECOMMISSIONING (Processing Facilities)	Db Act	FIXED	OPG	RJH		98	299	6					
21																							
22	2	579	30							**LICENSING & APPROVALS**	Db Sm												
23	3	579	30	30						LIAISON WITH CNSC	Db Act	FIXED	CTECH	MG		6	9	4					
24	3	579	30	50						CNSC CONSTRUCTION LICENCE	Db Act	FIXED	CTECH	MG		9	11	3					
25	3	579	30	60						OTHER GOVN'MT APPROVALS	Db Act	FIXED	CTECH	MG									
26	4	579	30	60	10					APPROVAL REQUIREMENTS	Db Act	FIXED	CTECH	MG		6	9	4					
27	4	579	30	60	30					FEDERAL APPROVALS	Db Act	FIXED	CTECH	MG		9	14	6					
28	4	579	30	60	40					PROVINCIAL APPROVALS	Db Act	FIXED	CTECH	MG		9	14	6					
29	4	579	30	60	50					MUNICIPAL APPROVALS	Db Act	FIXED	CTECH	MG		9	14	6					
30	3	579	30	65						CNSC OPERATING LICENCE	Db Act	FIXED	CTECH	MG		13	14	2					
31	3	579	30	70						CNSC OPERATING LICENCE (Maintenance & Renewal)	Db Act	FIXED	CTECH	MG		15	310	296					
32																							
33	2	579	35							**PUBLIC AFFAIRS**	Db Sm												
34	3	579	35	45						PUBLIC AFFAIRS - PREFERRED SITE	Db Act	FIXED	OPG	RJH		4	4	1					
35	3	579	35	50						PUBLIC AFFAIRS - PUBLIC REVIEW & EA APPROVAL	Db Act	FIXED	OPG	RJH		5	7	3					
36	3	579	35	70						PUBLIC AFFAIRS - DESIGN & CONSTRUCTION	Db Act	FIXED	OPG	RJH		8	10	3					
37	3	579	35	110						PUBLIC AFFAIRS - PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH		1	10	10					
38	3	579	35	120						COMMUNITY OFFSETS AND BENEFITS	Db Act	FIXED	OPG	RJH		8	10	3					
39																							
40																							
41	2	579	40							**FACILITY DESIGN AND CONSTRUCTION**	Db Sm												
42	3	579	40	10						SITE & IMPROVEMENTS	Db Act	STEP FIXED	CTECH	AM		11	11	1					
43	3	579	40	30						COMMON ANCILLARY FACILITIES	Db Sm												
44	4	579	40	30	10					ADMIN AND SUPPORT FACILITIES	Db Sm												
45	5	579	40	30	10	01				ADMIN AND VISITOR RECEPT'N BLDG	Db Act	STEP FIXED	CTECH	AM		*	*	*					
46	5	579	40	30	10	02				OPS SUPPT & HEALTH PHYSICS BLDG	Db Act	STEP FIXED	CTECH	AM		*	*	*					
47	5	579	40	30	10	03				EQUIP STORAGE AND MAINT'CE BLDG	Db Act	STEP FIXED	CTECH	AM		*	*	*					
48	5	579	40	30	10	04				STORAGE CASK STORE	Db Act	STEP FIXED	CTECH	AM		*	*	*					
49	5	579	40	30	10	05				ACTIVE SOLID WASTE HDLG BLDG	Db Act	STEP FIXED	CTECH	AM		100	101	2					
50	5	579	40	30	10	06				SOLID WASTE STORAGE AREA	Db Act	STEP FIXED	CTECH	AM		100	101	2					

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible		Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt		11
51	5	579	40	30	10	07				ACTIVE LIQ/W TRT'MT BLDG	Db Act	STEP FIXED	CTECH	AM		100	101	2					
52	5	579	40	30	10	08				LOW LVL LIQ/W STRG BLDG	Db Act	STEP FIXED	CTECH	AM		100	101	2					
53	5	579	40	30	10	09				WAREHOUSE BLDG	Db Act	STEP FIXED	CTECH	AM		*	*	*					
54	5	579	40	30	10	10				GUARDHOUSE AND SECURITY FENCE	Db Act	STEP FIXED	CTECH	AM		*	*	*					
55	5	579	40	30	10	11				TRUCK INSP'N / WASH STATION	Db Act	STEP FIXED	CTECH	AM		Not required by RES							
56	5	579	40	30	10	12				UTILITY BLDG	Db Act	STEP FIXED	CTECH	AM		*	*	*					
57	5	579	40	30	10	13				TEST FACILITY CONSTRUCTION	Db Act	STEP FIXED	CTECH	AM	At Bruce	52	53	2					
58	4	579	40	30	20					OTHER SITE SYSTEMS	Db Sm												
59	5	579	40	30	20	01				FIRE PROTECTION SYSTEMS	Db Act	STEP FIXED	CTECH	AM		*	*	*					
60	5	579	40	30	20	02				SECURITY AND COMMUNICATION SYSTEM	Db Act	STEP FIXED	CTECH	AM		*	*	*					
61	5	579	40	30	20	03				ELECTRICAL AND EMERGENCY POWER	Db Act	STEP FIXED	CTECH	AM		*	*	*					
62	5	579	40	30	20	04				SANITARY SEWER SYSTEM	Db Act	STEP FIXED	CTECH	AM		*	*	*					
63	5	579	40	30	20	05				POTABLE WATER SYSTEM	Db Act	STEP FIXED	CTECH	AM		*	*	*					
64	5	579	40	30	20	06				RETENTION/SEDIMENTATION POND	Db Act	STEP FIXED	CTECH	AM		*	*	*					
65	5	579	40	30	20	07				STORM WATER DETENTION POND	Db Act	STEP FIXED	CTECH	AM		*	*	*					
66	5	579	40	30	20	08				CONST'N MAT'L STOCKPILE AREA	Db Act	STEP FIXED	CTECH	AM		*	*	*					
67	5	579	40	30	20	09				SITE MATERIALS STORAGE AREA	Db Act	STEP FIXED	CTECH	AM		*	*	*					
68	5	579	40	30	20	10				ACCESS ROADS AND VEHICLE COMPOUNDS	Db Act	STEP FIXED	CTECH	AM		*	*	*					
69	4	579	40	30	30					CONST'N INDIRECTS ANCILLARY FACILITIES	Db Act	STEP FIXED	CTECH	AM		*	*	*					
70	3	579	40	40						STORAGE DESIGN & CONSTRUCTION (STAGE 1)	Db Act	STEP FIXED	CTECH	AM		12	13	2					
71	3	579	40	650						ENERGY CONSUMPTION	Db Act	STEP FIXED	CTECH	AM		61	61	1					
72										*** Existing buildings and services adopted by RES facility**														
73	2	579	45							**FACILITY OPERATION**	Db Sm												
74	3	579	45	10						OPERATIONS FUEL TRANSFER	Db Sm												
75	4	579	45	10	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM		15	44	30					
76	4	579	45	10	25					MONITORING AND SURVEILLANCE (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM		15	44	30					
77	4	579	45	10	30					OPERATION INDIRECTS (FUEL TRANSFER)	Db Act	STEP FIXED	CTECH	AM		15	44	30					
78	4	579	45	10	40					STORAGE OPERATIONS	Db Act	STEP FIXED	CTECH	AM		15	44	30					
79	4	579	45	10	50					ADDITIONAL STORAGE CONSTRUCTION	Db Sm												
80	5	579	45	10	50	10				STORAGE DESIGN & CONSTRUCTION STAGE 2	Db Act	STEP FIXED	CTECH	AM		23	24	2					
81	5	579	45	10	50	20				STORAGE DESIGN & CONSTRUCTION STAGE 3	Db Act	STEP FIXED	CTECH	AM		32	33	2					
82	5	579	45	10	50	30				STORAGE DESIGN & CONSTRUCTION STAGE 4	Db Act	STEP FIXED	CTECH	AM		39	40	2					
83	3	579	45	20						OPERATIONS - EXTENDED MONITORING	Db Sm												
84	4	579	45	20	05					PROGRAM MANAGEMENT	Db Act	STEP FIXED	CTECH	AM		45	310	266					
85	4	579	45	20	40					MONITORING AND SURVEILLANCE	Db Act	STEP FIXED	CTECH	AM		45	310	266					
86	4	579	45	20	50					OPERATION INDIRECTS (MONITORING)	Db Act	STEP FIXED	CTECH	AM		45	310	266					
87	4	579	45	20	60					COMMON ANCILLARY FACILITIES OPERATIONS (EXTENDED MONITORING)	Db Act	STEP FIXED	CTECH	AM		45	310	266					
88	4	579	45	20	70					FUEL INTEGRITY MONITORING (25 YEARLY)	Db Act	STEP FIXED	CTECH	AM		45	310	266					
89	4	571	45	20	80					RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM		52	52	1					

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible		Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt		11
90	3	579	45	30						OPERATIONS - FACILITY REPEATS	Db Sm												
91	4	579	45	30	50					STORAGE CHAMBER 200 YEAR REPLACEMENT	Db Act	STEP FIXED	CTECH	AM		200	211	12					
92	3	579	45	40						OPERATIONS - REPACKAGING	Db Sm												
93	4	579	45	40	05					PROGRAM MANAGEMENT (FACILITY REPEATS & REPACKAGING)	Db Act	STEP FIXED	CTECH	AM		102	310	45					
94	4	579	45	40	10					MODULE TO CASK 100 YEAR REPACKAGING	Db Sm												
95	5	579	45	40	10	10				DECOMMISSIONING OF EXISTING FACILITIES	Db Act	STEP FIXED	CTECH	AM		98	99	2					
96	5	579	45	40	10	20				CONSTRUCTION FACILITIES - REPACK'NG PLANT Module (RPM)	Db Act	STEP FIXED	CTECH	AM		98	101	4					
97	5	579	45	40	10	30				PROCESSING BUILDING - REPACK'NG PLANT Module (RPM)	Db Sm												
98	6	579	45	40	10	30	20			RPM EQUIP. DESIGN, SUPPLY & INSTALL	Db Sm												
99	7	579	45	40	10	30	20	10		RECEIPT & TRANSFER (EQUIP)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
100	7	579	45	40	10	30	20	20		CASK TO CASK FUEL TRANSFER	Db Act	STEP FIXED	CTECH	AM		100	101	2					
101	7	579	45	40	10	30	20	30		CASK DECONTAMINATION (EQUIP)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
102	7	579	45	40	10	30	20	50		DECONTAMINATED CASK BUFFER STORAGE AREA (EQUIP)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
103	7	579	45	40	10	30	20	70		CASK PROCESS AREA (RP EQUIP)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
104	6	579	45	40	10	30	30			RPM BUILDING DESIGN & CONST'N	Db Act	STEP FIXED	CTECH	AM		100	101	2					
105	6	579	45	40	10	30	60			BUILDING SERVICES (RPM)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
106	6	579	45	40	10	30	70			COMMISSIONING (RPM)	Db Act	STEP FIXED	CTECH	AM		101	101	1					
107	6	579	45	40	10	30	80			CONST'N INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM		100	101	2					
108	5	579	45	40	10	40				COMMON ANCILLARY FACILITIES (REPLACEMENT)	Db Act	STEP FIXED	CTECH	AM		159	161	3					
109	5	579	45	40	10	500				COMMISSIONING MANAGEMENT (RPM)	Db Act	STEP FIXED	CTECH	AM		101	101	1					
110	5	579	45	40	10	600				REPACKAGING OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM		102	110	9					
111	6	579	45	40	10	600	30			ANCILLARY FACILITIES OPERATIONS (FACILITY REPEATS AND REPACKAGING)	Db Act	STEP FIXED	CTECH	AM		102	110	12					
112	5	579	45	40	10	700				OPERATION INDIRECTS (RPM)	Db Act	STEP FIXED	CTECH	AM		102	110	9					
113	5	579	45	40	10	800				STORAGE OPERATIONS (RPM)	Db Act	STEP FIXED	CTECH	AM		102	110	9					
114	4	579	45	40	20					MODULE TO CASK 200 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM		198	210	13					
115	4	579	45	40	30					MODULE TO MODULE 300 YEAR REPACKAGING	Db Sm												
116	5	579	45	40	30	10				MODULE TO CASK 300 YEAR REPACKAGING	Db Act	STEP FIXED	CTECH	AM		298	310	13					
117	5	579	45	40	30	20				MODULE TO MODULE ADDITIONAL REQUIREMENTS	Db Sm												
118	5	579	45	40	30	20	10			MM EQUIP. DESIGN, SUPPLY & INSTALL	Db Act	STEP FIXED	CTECH	AM		300	301	2					
119	6	579	45	40	30	30	30			BUILDING DESIGN & CONST'N (Module to Module)	Db Act	STEP FIXED	CTECH	AM		298	301	4					
120	6	579	45	40	30	30	60			BUILDING SERVICES (MM)	Db Act	STEP FIXED	CTECH	AM		300	301	2					
121	6	579	45	40	30	30	70			COMMISSIONING(MM)	Db Act	STEP FIXED	CTECH	AM		301	301	1					
122	6	579	45	40	30	30	80			CONST'N INDIRECTS (MM)	Db Act	STEP FIXED	CTECH	AM		298	301	4					
123	5	579	45	40	30	600				REPACKAGING OPERATIONS (Module to Module)	Db Act	STEP FIXED	CTECH	AM		302	310	9					
124		579																					
125	2	579	55							**ENVIRONMENTAL MANAGEMENT SYSTEM**	Db Sm												
126	3	579	55	10						EA & MONITORING PROGRAM MANAGEMENT	Db Act	FIXED	OPG	RJH		8	310	303					
127	3	579	55	20						CNSC CONSTRUCTION LICENCE - EA	Db Act	FIXED	OPG	RJH		9	11	3					
128	3	579	55	40						GROUNDWATER MONITORING	Db Act	FIXED	OPG	RJH		15	310	296					
129	3	579	55	50						RADIOLOGICAL BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH		15	310	296					

LINE No sp sht	Level	01	02	03	04	05	06	07	08	WBS Desc	Output	Type	Owner	Responsible		Start Yr	Finish Yr	DUR - Yrs	PRED	Schedule Co	Schedule Amndmnt		11
130	3	579	55	60						NON-RAD BIOSPHERE MONITORING	Db Act	FIXED	OPG	RJH		15	310	296					
131	3	579	55	80						HUMAN HEALTH MONITORING	Db Act	FIXED	OPG	RJH		15	310	59					
132																							
133	2	579	90							**PROGRAM MANAGEMENT (Yrs 01 to 14)**	Db Act	STEP FIXED	CTECH	AM		1	14	14					
134																							

APPENDIX E

E1 COST ESTIMATE DATABASE CD

The contents of the attached CD comprise nine 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.

Folder No.	Alternative	Site
571	CSB	Pickering
572	SMV	Pickering
573	CST	Pickering
574	CSB	Bruce
575	SMV	Bruce
576	CST	Bruce
577	CSB	Darlington
578	SMV	Darlington
579	CST	Darlington