Appendix D1-1 - Pad Seismic Analysis Files

REFUND Soil Profile.xlsx	Spreadsheet with soil properties for each different layer in subgrade model for input to REFUND program
REFUND vpad.out REFUND hpad.out	Output listing of REFUND analysis which generates frequency dependent impedance functions - 6x6 stiffness matrices calculated at each surface node over pad model rectangular area, for a given range of frequencies - used in characterizing soil behavior in a subsequent time history dynamic analysis of a mass-stiffness model of a representative portion of a vertical storage pad.
FRIDAY vpad.out FRIDAY hpad.out	Output listing of FRIDAY time history dynamic analysis of a representative portion of a vertical storage pad. Geometry, material properties, mass properties, damping, and boundary conditions of pad input in STRUDL format. Pad dynamic model coupled to soil impedance functions generated in REFUND analysis. Time history accelerations in 3D applied at pad/soil interface. Solution yields displacement and acceleration time histories for 0.25G earthquake, from which maximum values extracted and output.
Vpad Accelerations.xlsx Hpad Accelerations.xlsx	Spreadsheet used to multiply max accelerations from 0.25G FRIDAY analysis by pad nodal masses to generate static forces to be applied to pad model for static structural integrity evaluation. Forces for 0.25G seismic evaluation are increased by factor of 3 for 0.75F analysis.
Pad Beam Properties.xlsx	Spreadsheet to calculate pad stick model beam properties and masses for input to structural integrity calculation.
V Pad Structure-0.25G.gto H Pad Structure-0.25G.gto V Pad Structure-0.75G.gto H Pad Structure-0.75G.gto	GTSTRUDL analyses of pad stick models used to evaluate pads for structural integrity. Vertical soil spring boundary conditions coded at base of pad to allow bending moments to develop. Deadweight and X, Y, and Z direction seismic loads solved individually. Seismic spatial results combined by SRSS, and absolutely summed with deadweight results to yield Extreme combination. Forces and moments in pad and at base of casks output for subsequent pad and seismic restraint sizing. Reactions at tabulated for soil bearing pressure evaluations.
Vpad Seismic Restraints.xlsx	Spreadsheet to size base restraint for vertical casks to resist turnover moments for lateral and uplift accelerations associated with 0.75G EQ. Complete inventory of Pilot ISF vertical casks considered.
Pad Seismic Results.xlsx	Spreadsheet to design vertical and horizontal pad reinforcing for bending moment demands for both 0.25G and 0.75G earthquakes. Also, verify vertical and horizontal soil bearing pressures against allowable values, and design micropiles as required.

Appendix D1-2 - Vault Seismic Analysis Files

REFUND Soil Profile.xlsx	Spreadsheet with soil properties for each different layer in subgrade model for input to REFUND program
REFUND vault.out	Output listing of REFUND analysis which generates frequency dependent impedance used in characterizing soil behavior in a subsequent time history dynamic analysis of a mass-stiffness model of a representative portion of the above grade vault.
MODEL VAULT.pdf	Simplified stick model of vault generated using FRIDAY geometry and connectivity data.
FRIDAY vault.out	Output listing of FRIDAY time history dynamic analysis of model of a representative portion of the above ground vault. Geometry, material properties, mass properties, damping, and boundary conditions of vault input in STRUDL format. Vault dynamic model coupled to soil impedance functions generated in REFUND analysis. Time history accelerations in 3D applied at vault/soil interface. Solution yields displacement and acceleration time histories for 0.25G earthquake, from which maximum values extracted and output.
Vault Accelerations.xlsx	Spreadsheet used to multiply max accelerations from 0.25G FRIDAY analysis by vault nodal masses to generate static forces to be applied to vault model for static structural integrity evaluation.
Vault Beam Properties.xlsx	Spreadsheet to calculate vault stick model beam properties and masses for input to structural integrity calculation.
Vault Structure-0.25G.gto	GTSTRUDL analyses of vault stick model used to evaluate vault for structural integrity. Vertical soil spring boundary conditions coded at base of pad to allow bending moments to develop. Deadweight and X, Y, and Z direction seismic loads solved individually. Seismic spatial results combined by SRSS, and absolutely summed with deadweight results to yield Extreme combination. Forces and moments in pad and at base of casks output for subsequent pad and seismic restraint sizing. Reactions at tabulated for soil bearing pressure evaluations.
Vault Concrete Results.xlsx	Spreadsheet to calculate max shear and bending moment demands in stack and operating floor for 0.75G EQ based on 0.25G EQ results.
Vault Op Floor Results.xls	Spreadsheet to design reinforcing for one-way slab “beams” between shield plug perforations in vault operating floor based on 0.25G and 0.75G maximum shear and bending moment demands.
Vault Stack Calcs – 0.25G.xls Vault Stack Calcs – 0.75G.xls	Hand calculations of maximum capacities of vault stack cross-section at operating floor interface.
Vault Soil Results.xls	Spreadsheet to verify soil bearing pressures in vertical and horizontal directions. Includes bearing capacity calc using Meyerhof method and comparison between MOX and vault. Also includes micropile design parameters for 0.75G AGV lateral and longitudinal directions.

HOLTEC INTERNATIONAL

DOCUMENT ISSUANCE AND REVISION STATUS[1]

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PRELIMINARY USED NUCLEAR FUEL STORAGE DESIGN CONCEPT - ABOVEGROUND VERTICAL - SCOPING THERMAL ANALYSIS

FOR

CB&I FEDERAL SERVICES

Holtec Report No: HI-2156437

Holtec Project No: 2427

Sponsoring Holtec Division: NPD

Report Class : SAFETY RELATED

TABLE OF CONTENTS

SUMMARY OF REVISION

Revision 0: Original issue.

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1.0 INTRODUCTION

On 4 April 2014, CB&I Federal Services, along with subcontractors including Holtec, submitted a proposal to the U.S. Department of Energy to provide services requested by the so-called Task Order 16. In support of Task Order 16, CB&I developed a preliminary design concept for an aboveground ventilated storage building where sealed canisters of used nuclear fuel would be stored in a vertical orientation. The preliminary design concept (see Figure 1) called for a structure with canisters of used nuclear fuel placed in a large storage "hall" in parallel rows of eight canisters per row. Air is drawn into the storage hall, via natural draft, through a missile-protected and radiation-shielded inlet at one end of the storage hall and exhausted back to the atmosphere through a tall chimney at the other end. Air flow through the storage hall removes the decay heat from the outer surfaces of the canisters of used nuclear fuel.

Working together with Holtec, the preliminary design was modified to improve its canister cooling performance and to protect the concrete structure of the storage building from excessively-high temperatures, which would complicate the design of the building's reinforced concrete. The analysis described in this report is performed as a scoping study to demonstrate the following:

1. Substantial air will be drawn into and through the storage hall via natural draft alone, to provide a completely passive heat removal mechanism.

2. Canister surface temperatures will be low enough to provide confidence that acceptable canister and contained used nuclear fuel temperatures will be likely.

3. Building structure temperatures will be low enough to provide confidence that reinforced concrete design can be accomplished without recourse to extraordinary measures.

Due to the preliminary nature of the design concept and the significant assumptions needed to enable this scoping thermal analysis to be performed, this document is not suited to support nuclear safety related activities. Thus, this document is classified as "not safety related" and has not been subject to all the controls of Holtec's nuclear quality assurance program.

2.0 ANALYSIS METHODOLOGY AND ACCEPTANCE CRITERIA

Quantification of the coupled flow and temperature fields in the storage building is accomplished through the use of a Computational Fluid Dynamics (CFD) analysis. The CFD analysis is performed utilizing the Fluent [1] fluid flow and heat transfer modeling program. Navier-Stokes equations of fluid motion, including full buoyancy effects, along with the energy conservation equation are solved to obtain the steady-state flow and temperature fields in the building.

A three-dimensional model of a section through the storage hall is made using Fluent. The width of the model encompasses one row of canisters. The sides of the model are symmetry planes. The model explicitly includes the geometry of the air inlet and the outlet chimney within the modeled section. The floor and ceiling of the storage hall are also explicitly included, including shield plugs in the ceiling above each canister), with appropriate heat transfer boundary conditions on the top of the ceiling (natural convection) and on the bottom of the floor (conduction to constant temperature soil). Radiation shields on the undersides of the shield plugs are modeled as conduction walls with the thermal conductivity of air and the emissivity of aluminum. The used fuel canisters are modeled as right-circular cylinders sitting on the storage hall floor. The canister internals are not modeled and the decay heat generated by the used fuel is modeled as constant heat fluxes out of the canister surfaces. The cylindrical side and flat top surfaces of the canisters are modeled as shell conduction walls.

Air flow within the building is in the turbulent regime, so turbulence is included and is modeled using the k-ω model in Fluent. Radiation heat transfer between canisters and between the canisters and the building structure is included and is modeled using the Discrete Ordinates model in Fluent. The temperature dependence of the density of air is modeled using the ideal gas law.

The analyses performed in this report are intended only to estimate the thermal performance of the design concept so its overall viability can be evaluated. As such, no acceptance criteria are applied and no conclusions are drawn.

3.0 INPUT DATA AND ASSUMPTIONS

The input data used to perform the analysis are presented in Table 1. Additionally, the following necessary assumptions are made in performing the analysis:

- The decay heat inside each canister is emitted from the top and sides of the canisters, with 15% being emitted from the top and 85% emitted from the sides. This distribution is based on engineering judgment from our experience designing dry storage cask systems.

- The air inlet flow straightener is modeled be restricting air flow it to be in a horizontal plane only. Given the preliminary nature of the design it is not possible to model in a more realistic manner. The pressure drop through the flow straightener is not expected to be a large portion of the total, so this assumption is expected to be negligible.

- The natural convection heat transfer coefficient on the top surface of the storage hall ceiling is set to 1 W/(m^2×K). This coefficient is based on engineering judgment from our experience designing dry storage cask systems.

- The majority of surfaces outside the storage hall (i.e., in the air inlet, air outlet and chimney) are modeled as adiabatic. The heat transfer through these surfaces is not expected to significantly affect the maximum temperatures, which will occur in the storage hall.

- The shield plugs above each canister are modeled as the same diameter as the canisters. The plugs would have to have a diameter larger than that of the canisters so the canisters could pass through the holes in the ceiling during load/unloading of the storage hall, but this geometric simplification is not expected to significantly affect the results.

- The thermal shields on the underside of the shield plugs above each canister are modeled as a thin sheet of aluminum backed by a one-inch air gap. This is consistent with mounting an aluminum sheet hanging below the underside of each plug. Similar thermal

shields have been used by us in a dry storage cask system. The emissivity of the aluminum is assumed to be 0.05. Given the preliminary nature of the design, and therefore without knowledge of the surface condition (i.e., polished, dull, anodized, etc.) it is not possible to model in a more realistic manner.

4.0 CALCULATIONS AND RESULTS

Using the input data and assumptions in Section 5.0, the CFD model is constructed with the features described in Section 2.0. Figures 2 and 3 present views of the model geometry. To ensure the granularity of the model is fine enough to properly capture both the large-scale and small-scale effects, both of which are important to the accuracy of the solution, a relatively large model with 3,163,300 hexahedral cells and 3,264,123 nodes is built. A single scenario with each of the eight canisters containing used fuel with a decay heat load of 25 kW (200 kW total for the row) is evaluated. The canister top and side heat fluxes are computed in Appendix A. The following computer files are created in the performance of the CFD analysis:

```
 Directory of G:\Projects\2427\REPORTS\Thermal Reports\HI-2156437\Rev0\cfd

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12/05/2014  10:37 AM       331,852,192 va196-a.cas
12/05/2014  10:37 AM     4,422,360,814 va196-a.dat
```

The results of the calculations are summarized in Table 2 and in Figures 4 through 13. As stated in Section 3.0, no acceptance criteria are applied to these results.

5.0 REFERENCES[1]

[1] Fluent v14.5, Ansys Inc., Copyright 2012 SAS IP Inc.

[2] "Final Safety analysis Report on the HI-STORM UMAX Canister Storage System," Holtec Report HI-2115090, Revision 2, Subsection 4.2.

[1] This revision status of Holtec documents cited above is subject to updates as the project progresses. This document will be revised if a revision to any of the above-referenced Holtec work products materially affects the instructions, results, conclusions or analyses contained in this document. Otherwise, a revision to this document will not be made and the latest revision of the referenced Holtec documents shall be assumed to supersede the revision numbers cited above. The Holtec Project Manager bears the undivided responsibility to ensure that there is no intra-document conflict with respect to the information contained in all Holtec-generated documents on a *safety-significant* project. The latest revision number of all documents produced by Holtec International in a *safety-significant* project is readily available from the company's Document Transmittal Form (DTF) database.

Table 1 – Input Data Summary		
Input Parameter	**Value**	**Source(s)**
Storage Hall Height	16’ 4” + 2’ 8”	Appendix B + Appendix C
Length from Ends of Storage Hall to Center of: First Canister from Inlet (Canister 8) Last Canister From Outlet (Canister 1)	 10’ 0” 10’ 0”	Figure 1
Canister Center-to-Center Pitch	12’ 0”	Figure 1
Storage Hall Ceiling Thickness	5’ 0”	Appendix C
Storage Hall Floor Thickness	5’ 0”	Appendix C
Shield Plug Thickness	4’ 0”	Appendix C
Air Inlet Height	12’ 0”	Appendix B
Air Inlet Flow Straightener Height	14’ 0”	Appendix B
Air Inlet Flow Straightener Length	4’ 0”	Appendix B
Air Inlet Shield Wall Height	15’ 0”	Appendix B
Air Inlet Shield Wall Thickness	3’ 0”	Appendix B
Air Inlet Flow Path Around Shield Wall Width	3’ 0”	Appendix B
Exit from Storage Hall Height	14’ 0”	Appendix B
Chimney Height	87’ 0”	Appendix B
Chimney Length	5’ 0”	Appendix B
Canister Diameter	70”	Appendix B
Canister Maximum Height	16’ 4”	Appendix B
Canister Decay Heat Load	25 kW	Appendix C
Number of Canisters per Row	8	Figure 1
Ambient Air Temperature	120°F	Appendix B
Soil Temperature Below Floor	55°F	Appendix C
(continued on next page)		

Table 1 – Input Data Summary (continued from previous page)		
Input Parameter	**Value**	**Source(s)**
Thermal Conductivity of Concrete	1.05 Btu/(hr×ft×°F)	[2]
Emissivity of Concrete	0.88	[2]
Thermal Conductivity of Stainless Steel	8.4 Btu/(hr×ft×°F)	[2]
Emissivity of Stainless Steel	0.36	[2]
Emissivity of Aluminum	0.05	Assumed
Molecular Weight of Air	28.966 g/mol	Fluent Default
Thermal Conductivity of Air at 32°F at 200°F at 450°F at 700°F at 1000°F	 0.0139 Btu/(hr×ft×°F) 0.0173 Btu/(hr×ft×°F) 0.0225 Btu/(hr×ft×°F) 0.0272 Btu/(hr×ft×°F) 0.0336 Btu/(hr×ft×°F)	[2]
Viscisity of Air at 32°F at 70.5°F at 338.4°F at 567.1°F at 701.6°F at 1078.2°F	 172.0 μP 182.4 μP 229.4 μP 246.3 μP 316.7 μP 377.6 μP	[2]
Specific Heat Capacity of Air	0.24 Btu/lb×°F	[2]

Table 2 – Numeric Results	
Result Parameter	**Value**
Air Flow Through Storage Hall	
Air Inlet Temperature	120°F
Average Air Outlet Temperature	160°F
Air Mass Flow Rate	68,175 lb/hr
Canister 1 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	517°F
Lid Average Heat Transfer Coefficient	0.994 Btu/(hr×ft^2×°F)
Side Maximum Temperature	470°F
Side Average Heat Transfer Coefficient	0.949 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	339°F
Canister 2 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	523°F
Lid Average Heat Transfer Coefficient	0.979 Btu/(hr×ft^2×°F)
Side Maximum Temperature	473°F
Side Average Heat Transfer Coefficient	0.936 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	343°F
Canister 3 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	525°F
Lid Average Heat Transfer Coefficient	0.976 Btu/(hr×ft^2×°F)
Side Maximum Temperature	474°F
Side Average Heat Transfer Coefficient	0.943 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	342°F
Canister 4 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	525°F
Lid Average Heat Transfer Coefficient	0.977 Btu/(hr×ft^2×°F)
Side Maximum Temperature	473°F
Side Average Heat Transfer Coefficient	0.959 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	339°F
(continued on next page)	

Table 2 – Numeric Results (continued from previous page)	
Result Parameter	**Value**
Canister 5 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	521°F
Lid Average Heat Transfer Coefficient	0.980 Btu/(hr×ft^2×°F)
Side Maximum Temperature	471°F
Side Average Heat Transfer Coefficient	0.982 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	334°F
Canister 6 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	519°F
Lid Average Heat Transfer Coefficient	0.985 Btu/(hr×ft^2×°F)
Side Maximum Temperature	466°F
Side Average Heat Transfer Coefficient	1.014 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	328°F
Canister 7 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	516°F
Lid Average Heat Transfer Coefficient	0.993 Btu/(hr×ft^2×°F)
Side Maximum Temperature	460°F
Side Average Heat Transfer Coefficient	1.048 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	319°F
Canister 8 Surface Temperatures and Heat Transfer Coefficients	
Lid Maximum Temperature	505°F
Lid Average Heat Transfer Coefficient	1.015 Btu/(hr×ft^2×°F)
Side Maximum Temperature	456°F
Side Average Heat Transfer Coefficient	1.118 Btu/(hr×ft^2×°F)
Whole-Surface Average Temperature	305°F
Structure Temperatures	
Ceiling Maximum Temperature	330°F
Ceiling Plugs Maximum Temperature	303°F
Floor Maximum Temperature	278°F

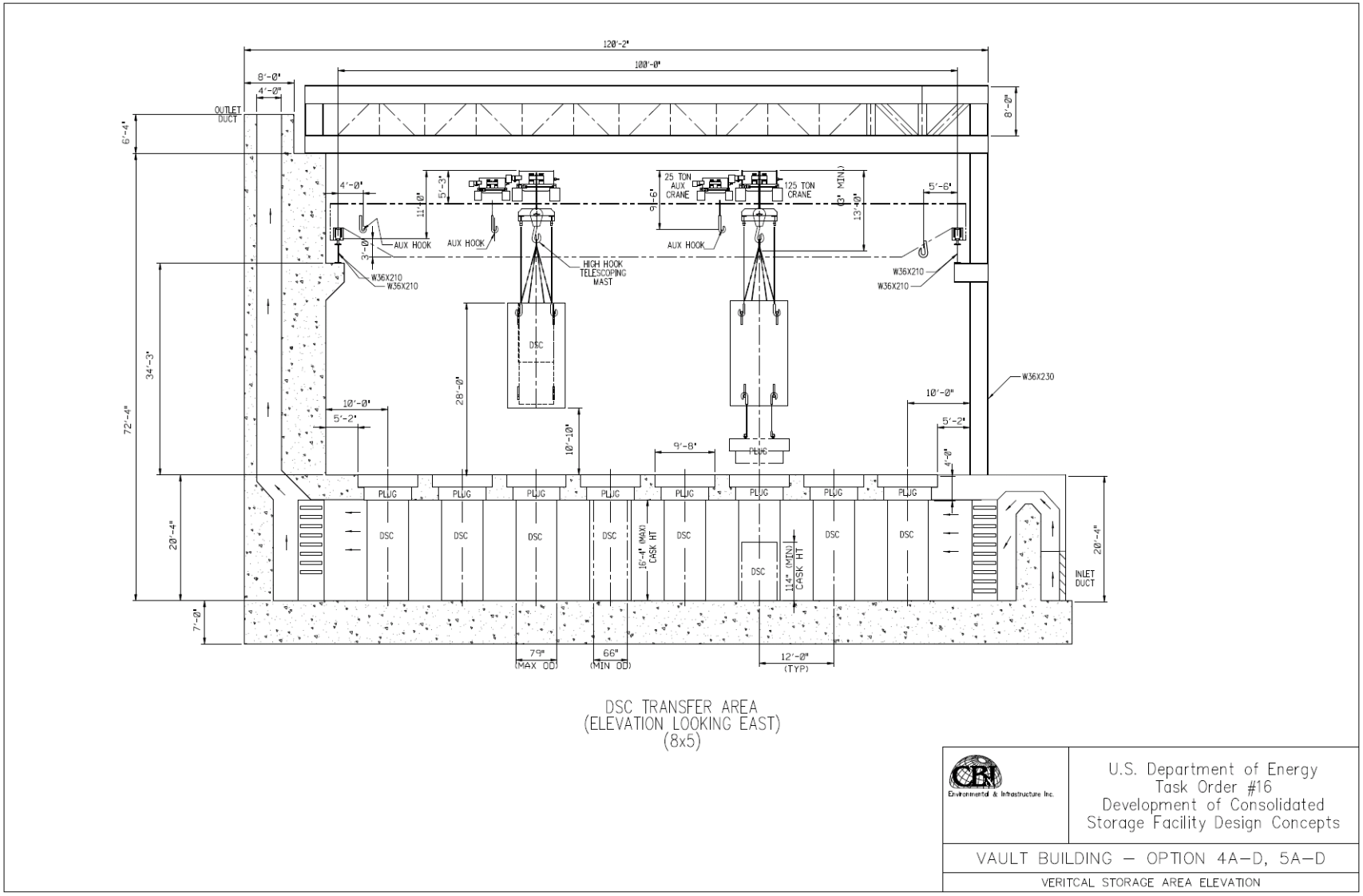


Figure 1 – Original CB&I Design Concept

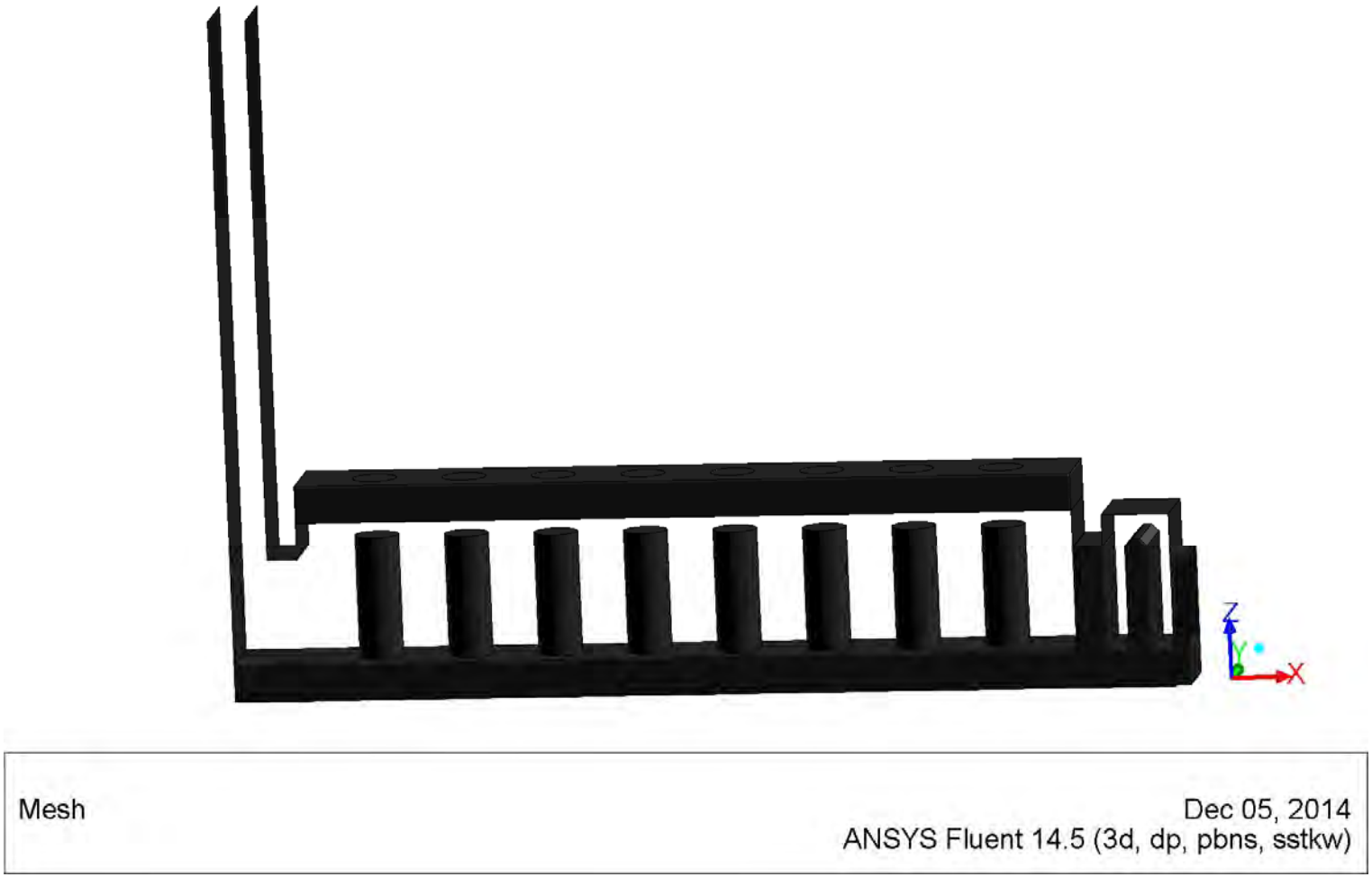


Figure 2 – Model Geometry – Symmetry Planes Hidden

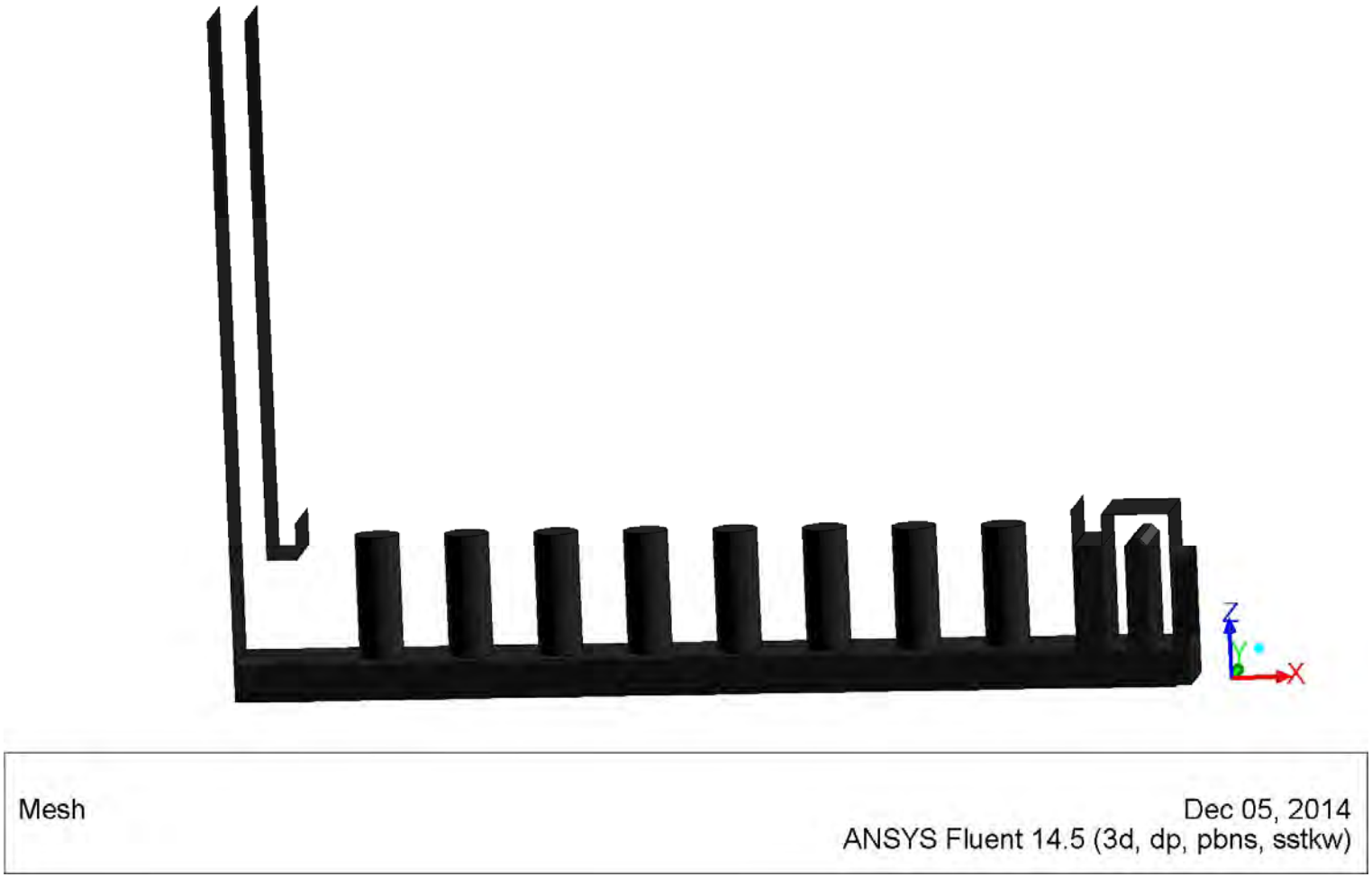


Figure 3 – Model Geometry – Symmetry Planes and Ceiling Hidden

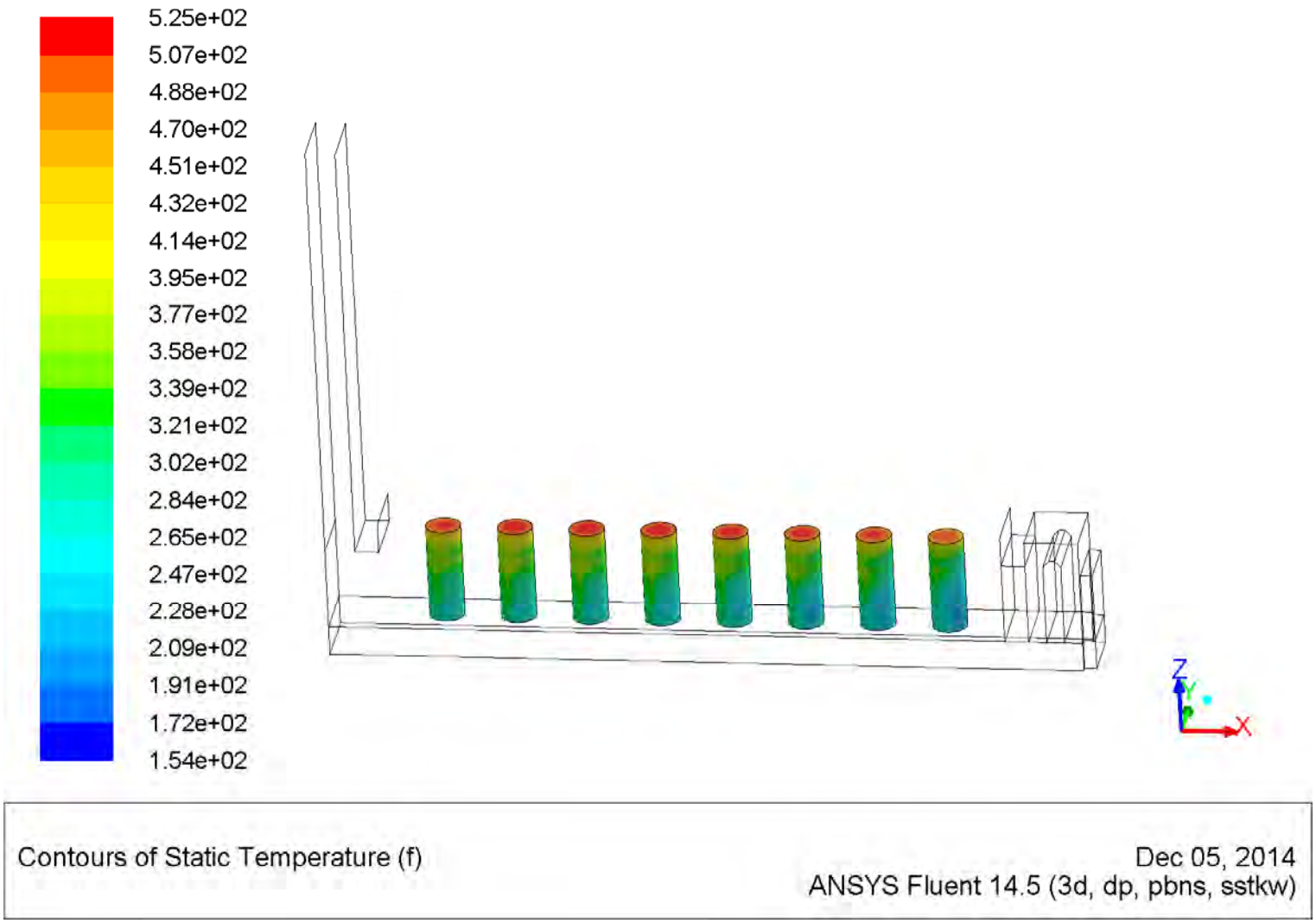


Figure 4 – Canisters Surface Temperature Contours

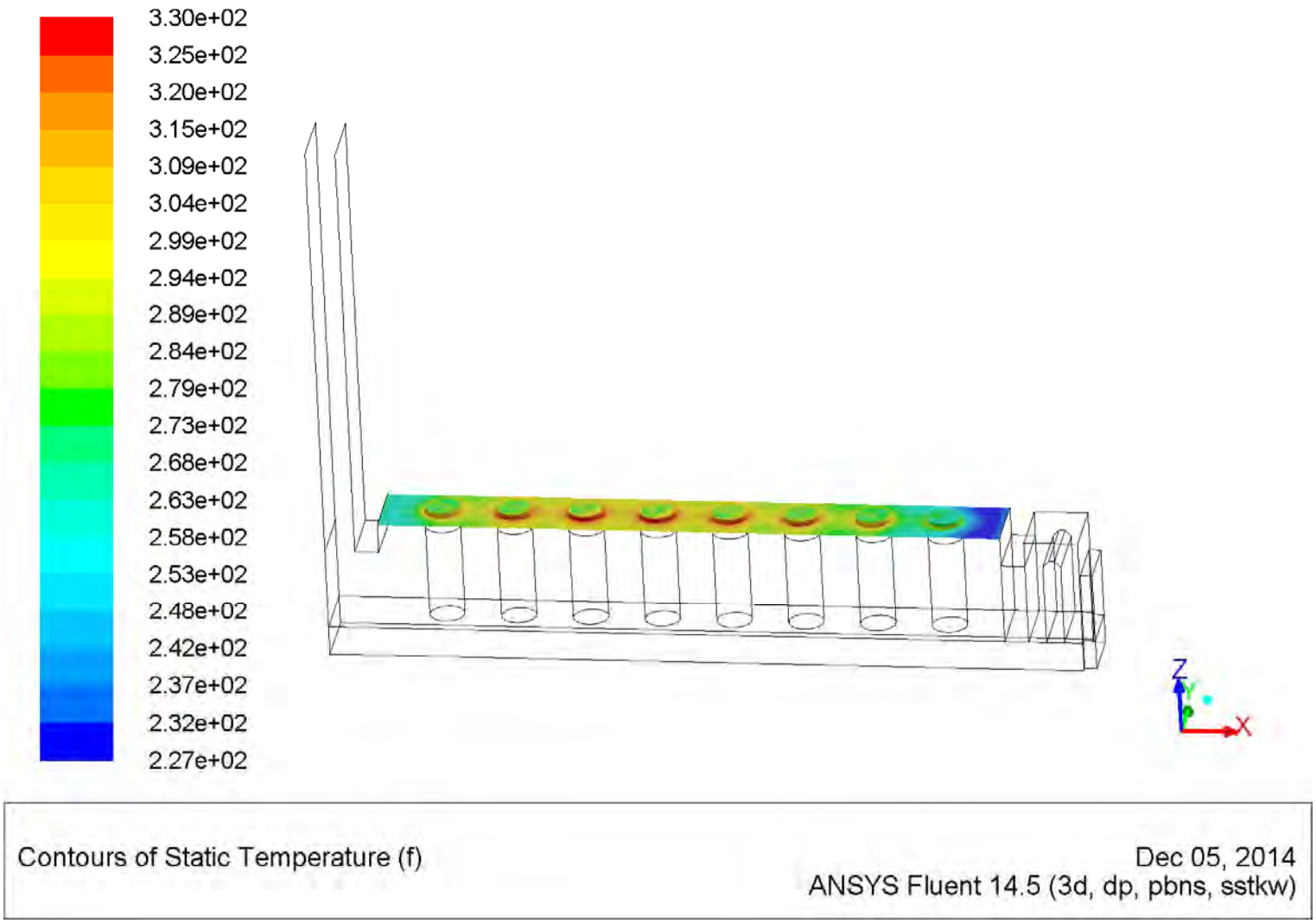


Figure 5 – Ceiling Temperature Contours

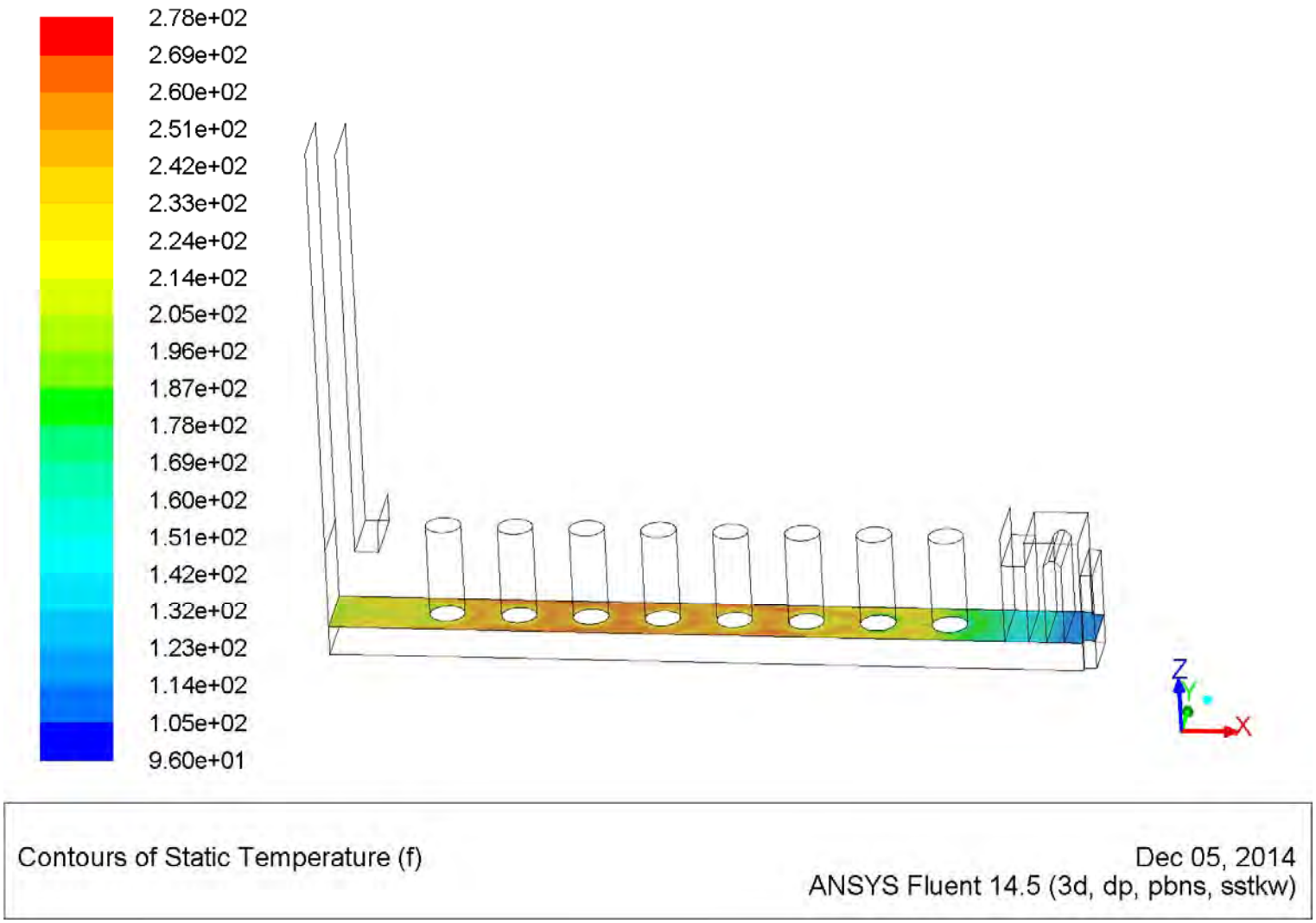


Figure 6 – Floor Temperature Contours

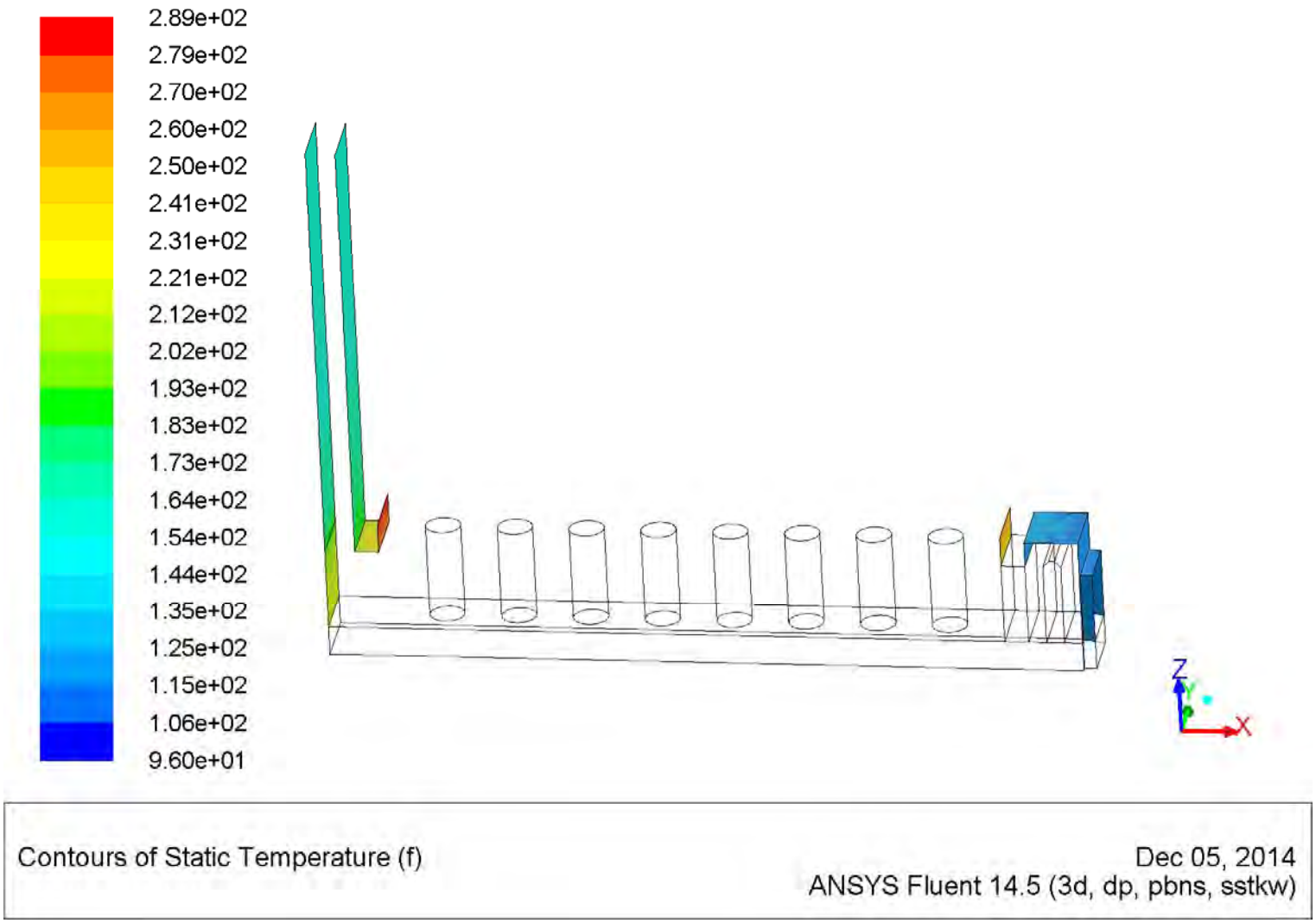


Figure 7 – Chimney Temperature Contours

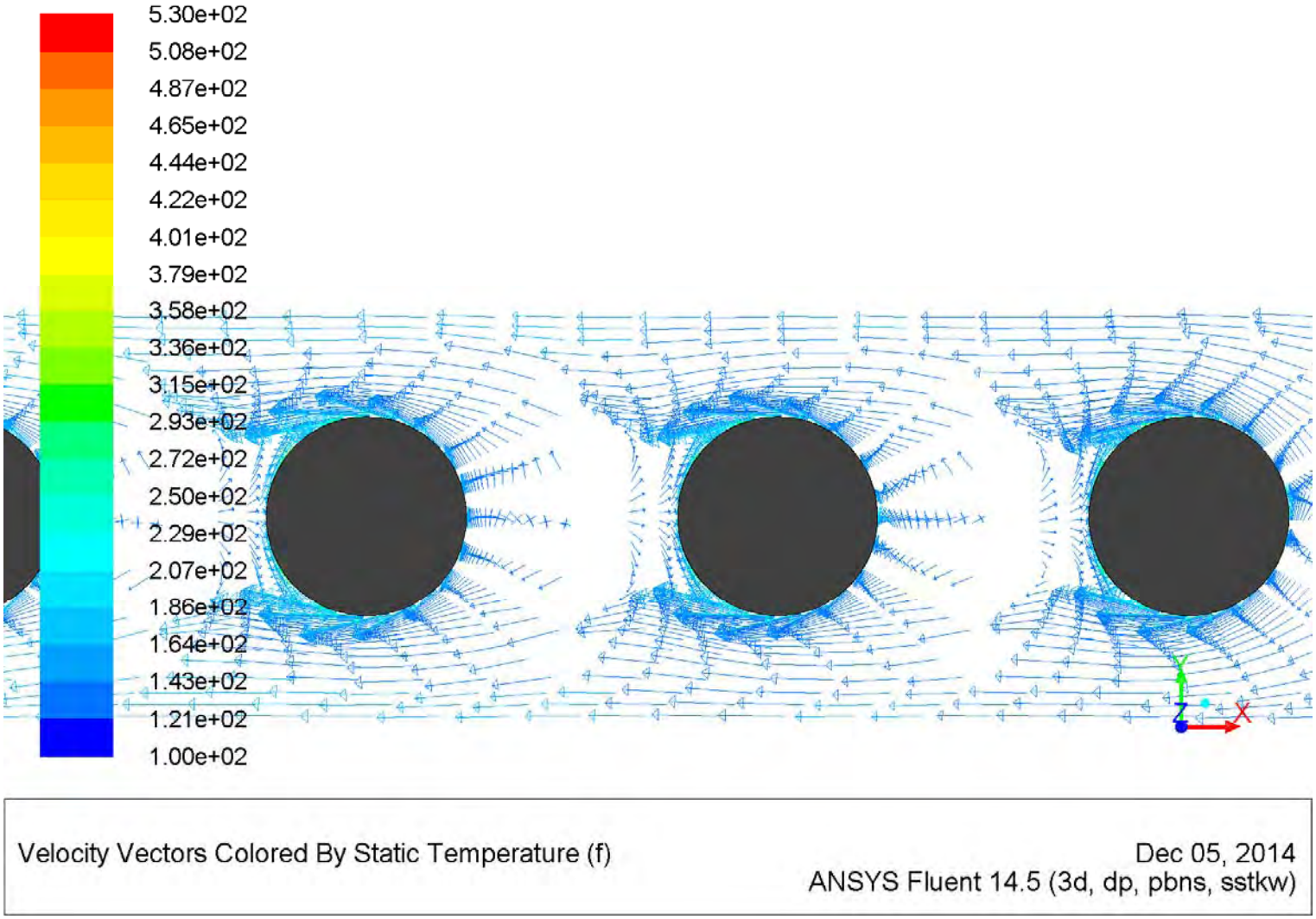


Figure 8 – Horizontal Velocity Vectors (colored by temperature) at Canisters Mid-Height

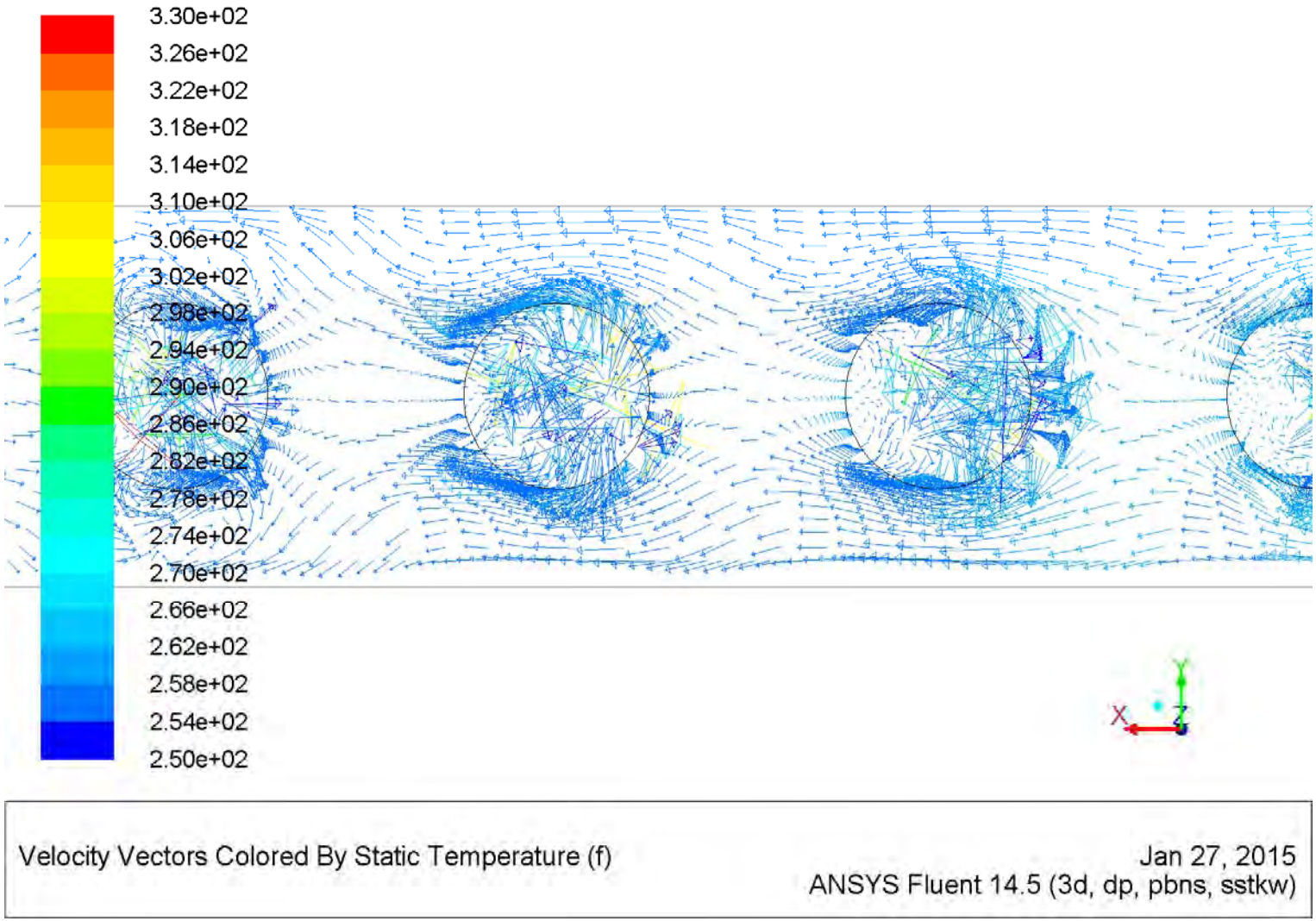


Figure 9 – Horizontal Velocity Vectors (colored by temperature) One Foot Above Canisters

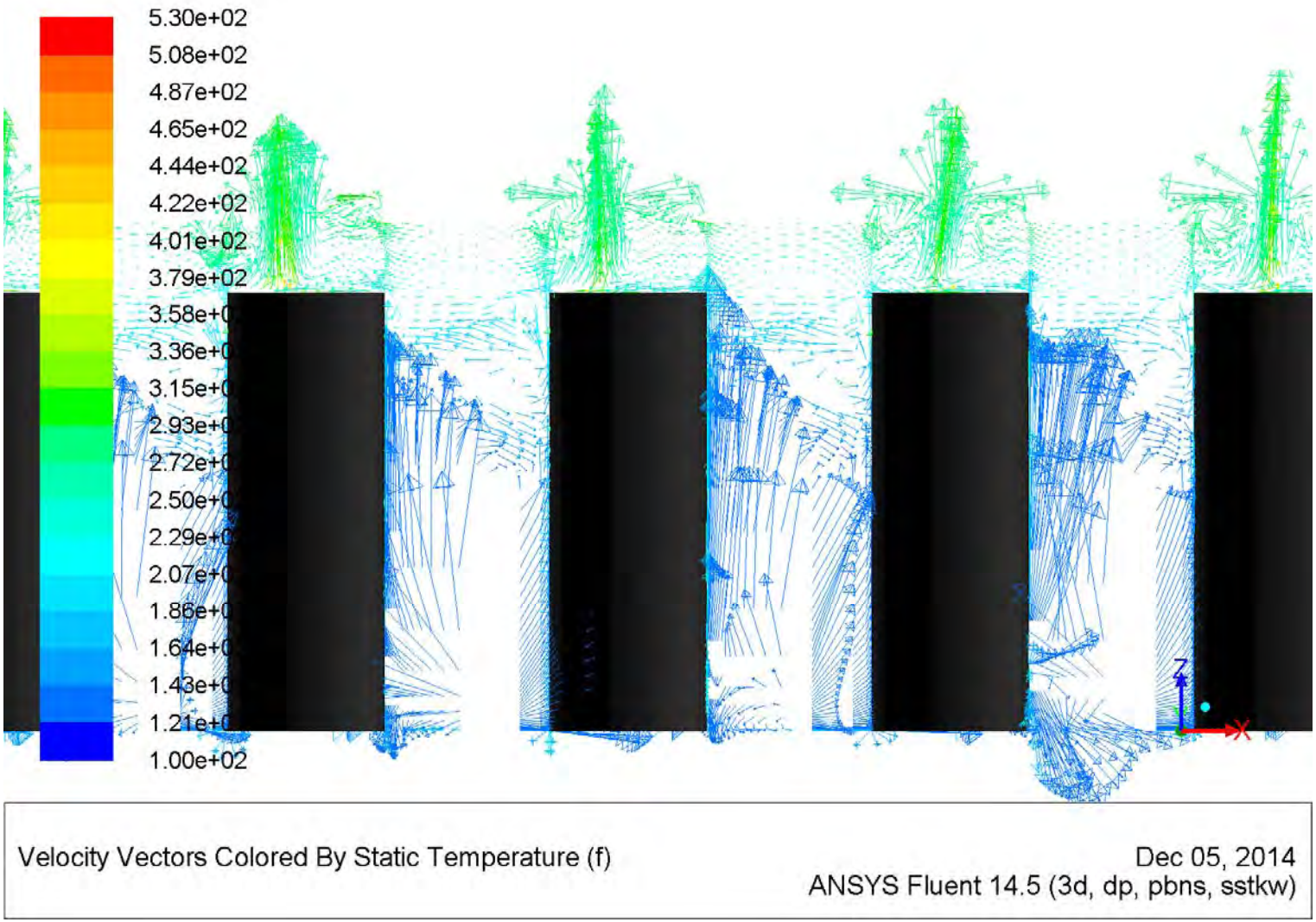


Figure 10 – Vertical Velocity Vectors (colored by temperature)

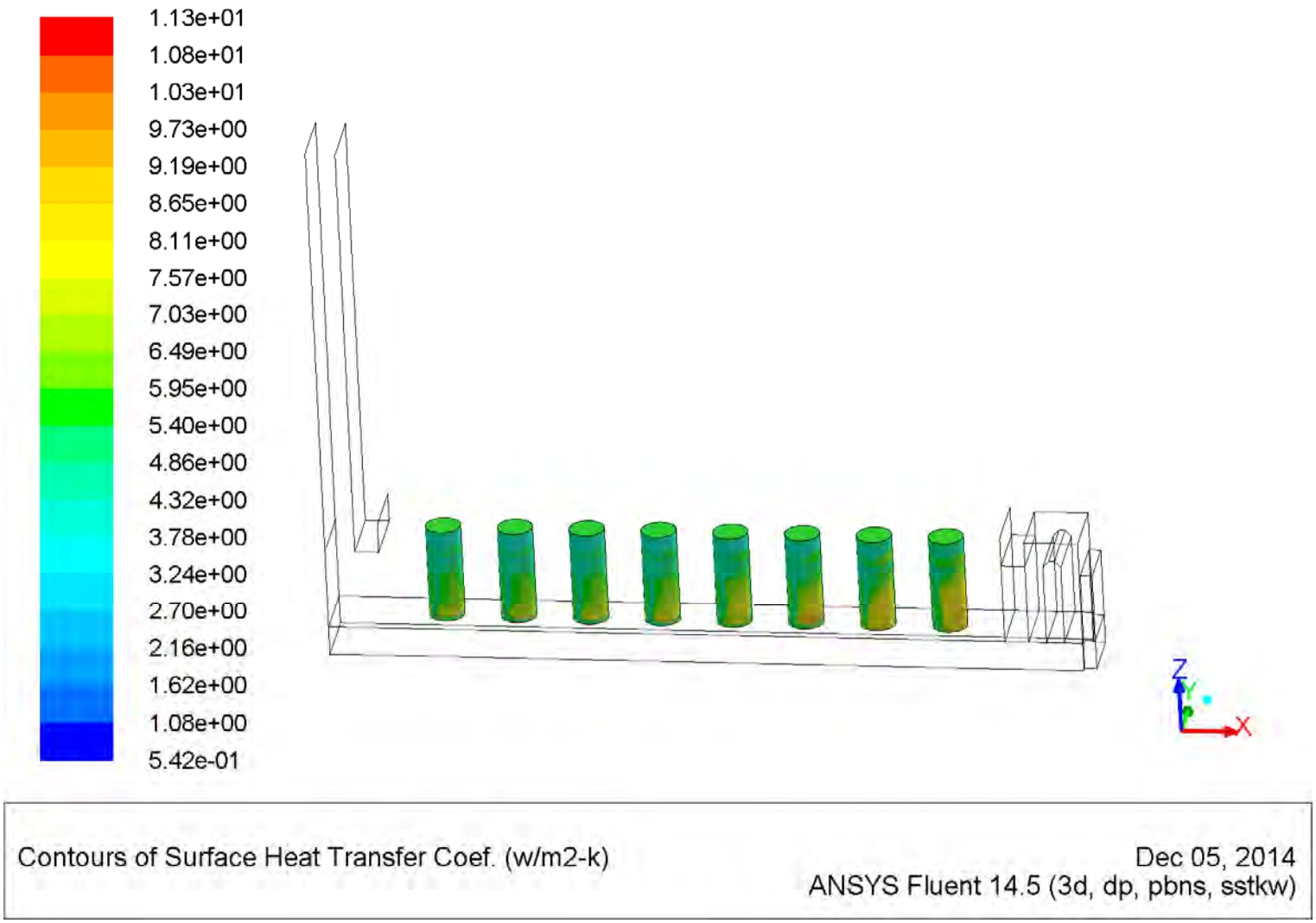


Figure 11 – Canisters Surface Heat Transfer Coefficient Contours

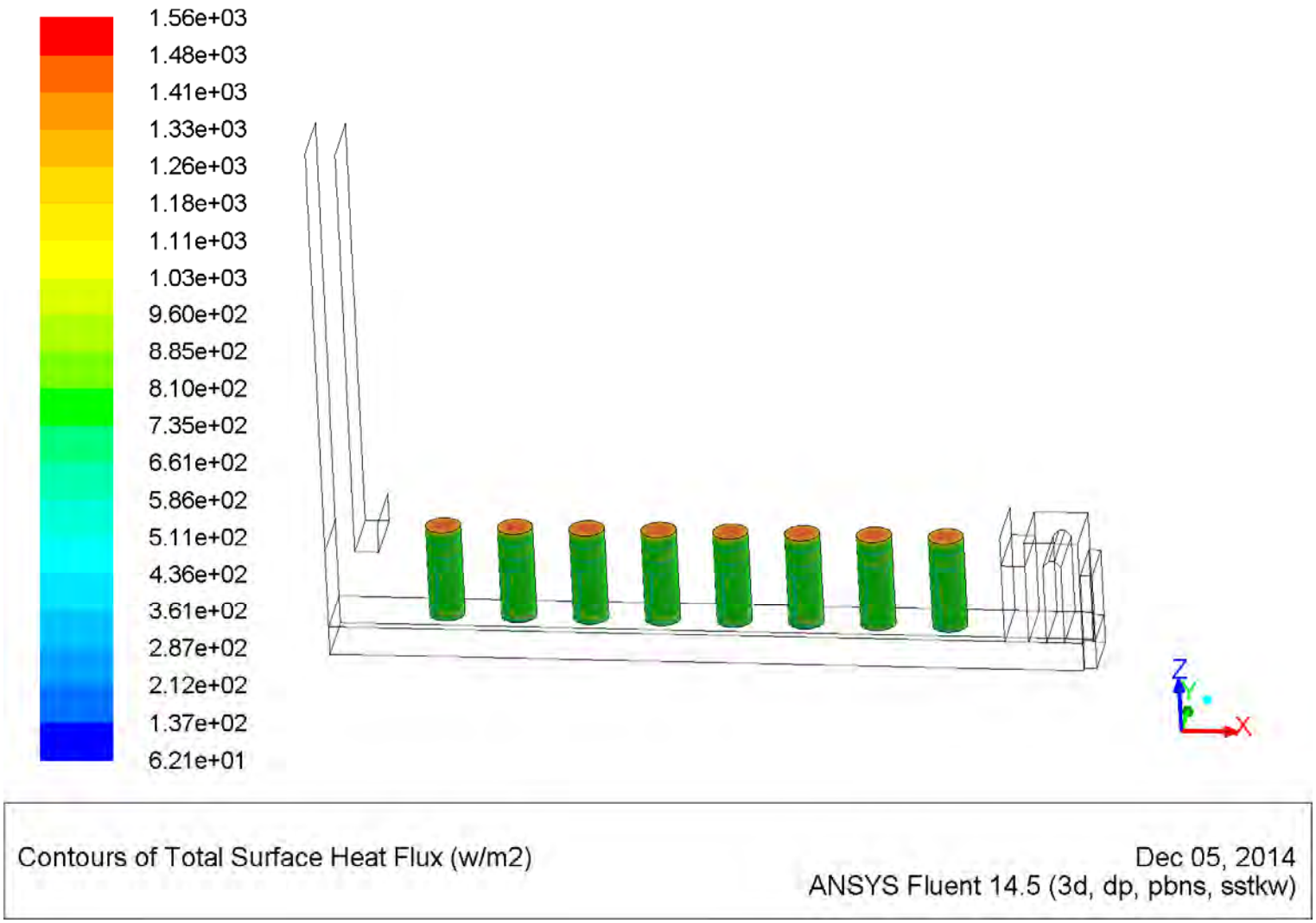


Figure 12 – Canisters Total Heat Flux Contours

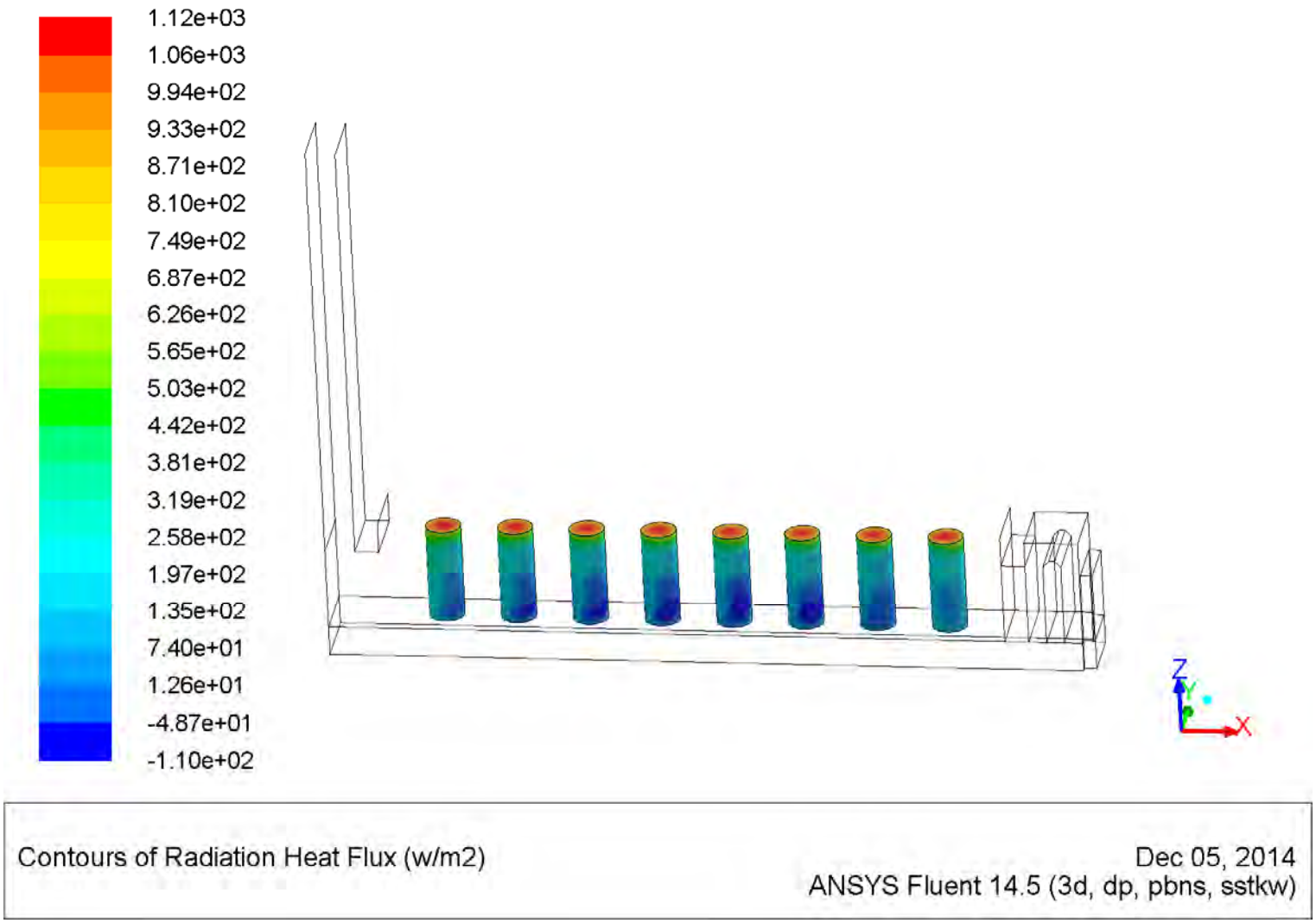


Figure 13 – Canisters Radiation Heat Flux Contours

Appendix A
Canister Surface Heat Flux Calculations

INTRODUCTION

The calculations presented in this worksheet are performed to determine heat fluxes from the top and side surfaces of the canisters of used fuel in the storage hall.

WORKSHEET-SPECIFIC INPUT DATA

$OD := 70 \cdot in$ Canister Diameter, from Table 1

$H_{can} := 196 in$ Canister Height, from Table 1

$Q_{can} := 25 \cdot kW$ Total Heat per Canister, from Table 1

$F_{side} := 85 \cdot \%$ Fraction of Heat Emitted by Side, from Section 3.0

$F_{top} := 15 \cdot \%$ Fraction of Heat Emitted by Top, from Section 3.0

CALCULATIONS

$Q_{side} := Q_{can} \cdot F_{side} = 21.25\,kW$

$Q_{top} := Q_{can} \cdot F_{top} = 3.75\,kW$

$A_{side} := \pi \cdot OD \cdot H_{can} = 299.324 \cdot ft^2$

$A_{top} := \frac{\pi}{4} \cdot OD^2 = 26.725 \cdot ft^2$

$q_{side} := \frac{Q_{side}}{A_{side}} = 764.166 \cdot \frac{W}{m^2}$

$q_{top} := \frac{Q_{top}}{A_{top}} = 1510.351 \cdot \frac{W}{m^2}$

Appendix B
Original CB&I Thermal Study Description

Vertical DSC Vault Thermal Study Description

Purpose: To validate whether or not a vault module with up to 40 vertical dry storage canisters will be able to maintain the external surface temperature(s) of the canisters below a maximum temperature limit using passive cooling.

Vault Models: For vertical DSC's, either a 2D or a 3D vault module model may be used, as follows:

2D – vertical-transverse section through the vault with a single row of up to (8) 70" diameter canisters at 12' c-c spacing. Flow area in vault (between inlet and outlet vanes) is 16.33' high x 104' long x 8.67' wide. Stack flue is 70' high (above vault ceiling) x 5' deep x 8.67' wide. Air inlet is shown in Sketch 1. Air outlet is shown in Sketch 2.

3D –vault module with up to (5) rows of up to (8) 70" diameter canisters at 12' c-c spacing, both ways. Flow area in vault (between inlet and outlet vanes) is 17.00' high x 104' long x 58' wide. Stack flue is 70' high (above vault ceiling) x 5' deep x 48' wide. Air inlet is shown in Sketch 1. Air outlet is shown in Sketch 2.

Ref Drwg: Vault Building – Option 4A-D, 5A-D – Vertical Storage Area Elevation

Thermal Boundary Conditions:
Vault floor* – conduction down through 6' of concrete with exterior temperature = 55°F
Vault walls and ceiling; stack flue surfaces – adiabatic
Ambient Air - 120°F; 14.7 psia; dry; calm (no velocity)
*trial basis. If effect minimal, use adiabatic.

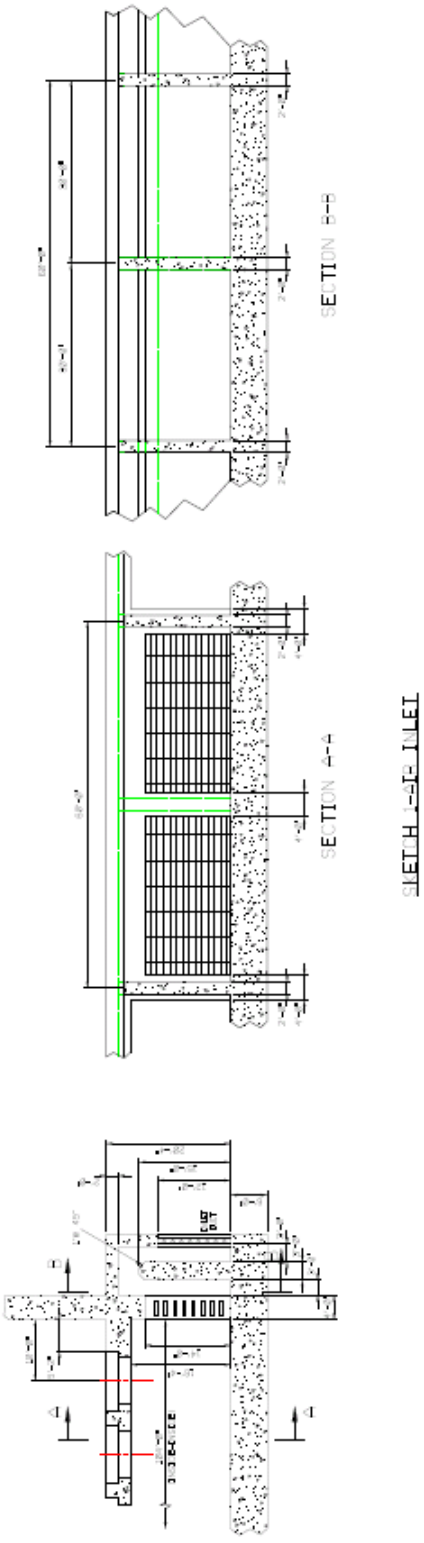
Canister Parameters:
O.D. – 70"
Height – (2) cases: 16.33' max, 9.5' min
Thermal output – (2) cases: 15 kW, 25 kW
Maximum Surface Temperature - 300°F
Film coefficients** - cylindrical surface, natural convection, $h_{CYL-NC} = 0.18\ (\Delta T)^{0.33}$
- top surface, natural convection, $h_{TOP-NC} = 0.22\ (\Delta T)^{0.33}$
- cylindrical surface, forced convection, in-line tubes,
$h_{CYL-FC} = (K/D)\ 0.26\ (\rho\ V\ D\ /\ \mu)^{0.6}\ (\mu\ C_P/\ K)^{0.33}$

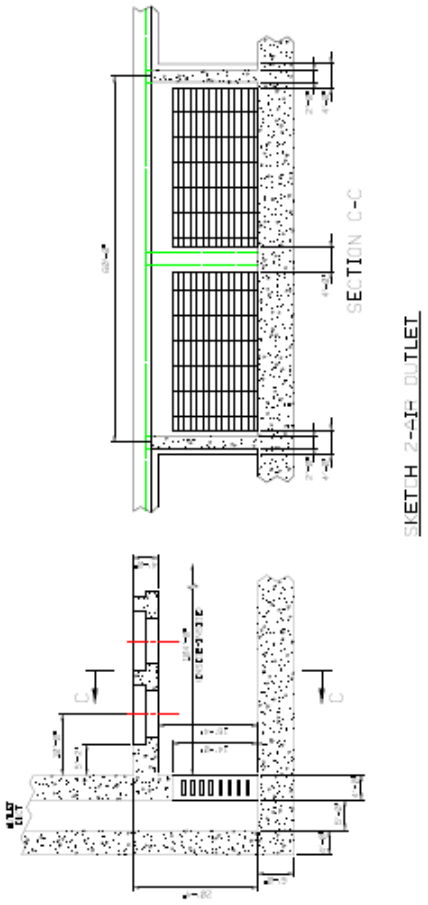
** or equivalent.

Analysis Parameters: Calculate steady-state air flow, air temperature distributions throughout vault and stack, and maximum surface temperatures of canisters (if possible)***, based on the following thermal inputs:

(1) Fully loaded vault with 25 kW canisters
(2) Fully loaded vault with 15 kW canisters
(3) Single 15 kW canister, centered on last row (adjacent to stack)

*** if not possible, calculate max air temperature adjacent to canister.


SECTION B-B
SECTION A-A
SECTION C-C


SECTION C-C

Appendix C

Modifications to Preliminary Design for Thermal Analysis

Evan Rosenbaum

From: Brunsdon, Bruce [Bruce.Brunsdon@CBIFederalServices.com]
Sent: Wednesday, November 19, 2014 12:29 PM
To: Steve Wright
Cc: Debu Majumdar; Evan Rosenbaum; Lewis, Donald Wayne (DEN); Clemmens, Jack
Subject: Holtec Thermal Study of Vault

Hi Steve:

The project has decided to proceed with modifying the CFD model of the vault as we discussed yesterday and re-running the analysis. We'd like to see the following changes incorporated:

- Increase the clearance between the top of the canisters and the underside of the operating floor from 8" to 2'-8"
- Include an insulating layer equivalent to a 2" air gap with a surface emissivity equal to a thin sheet of aluminum on the underside of the operating floor over the projected area of each canister
- Include surface conduction over the sides and top surfaces of each canister
- Delete the modeling of the flow straightener on the vault outlet

After making the changes above, please run the (8) canister, 25 kW per canister model to determine the steady state temperature distribution and produce the same table of maximum temperatures and the same temperature contour plots and velocity vector plots as were generated previously. If there is a way to have FLUENT automatically calculate effective surface film coefficients averaged over the canister lids and sides, we'd like to document those as well (suggest using a reference temperature of 120F for all canisters).

Your team is authorized to spend an additional 80 hours to make the modeling changes, re-run the (1) case, and generate the output plots. If at all possible, we'd like to have the results by December 5th, but we recognize that your computer resources are in high demand. Please contact me if you have any questions or issues.

Best Regards,

Bruce Brunsdon
PPL Mechanical Engineer III
Federal Services
MOX Offsite Support Services

Tel: +1 303 486 2566

Fax: +1 303 486 2570
bruce.brunsdon@CBIFederalServices.com
CB&I
6380 S. Fiddler's Green Circle, Suite 300
Greenwood Village, CO 80111
www.CBI.com

Evan Rosenbaum

From: Steve Wright
Sent: Tuesday, November 04, 2014 8:29 PM
To: Debu Majumdar; Evan Rosenbaum
Subject: Fw: Discuss Preliminary Results of Vault Thermal Model

Please see email below and let's talk soon.

Sent from my BlackBerry 10 smartphone on the Verizon Wireless 4G LTE network.

From: Brunsdon, Bruce <Bruce.Brunsdon@CBIFederalServices.com>
Sent: Tuesday, November 4, 2014 6:39 PM
To: Steve Wright
Subject: RE: Discuss Preliminary Results of Vault Thermal Model

Steve –

I haven't forgotten you. The seismic and thermal models both provided results at the same time, and neither one of them worked as is. We are modifying the stack geometry (increasing the flue width) to try and resist the rocking accelerations associated with 0.75G horizontal earthquake. We will let you know the final dimension when we settle on something that we can design rebar for. In the mean time, Evan can get going incorporating the following changes to the CFD model(s):

- Raise the concrete ceiling by 2 feet
- Eliminate the flow straightener at the exit
- Reduce the height of the missile shield wall in the inlet to ½ of its current value and double the thickness of the air passages at the inlet
- Stagger every other canister, ensuring that the canister nearest the stack is split
- Allow conduction heat transfer on the canister surfaces
- Code a layer of insulator/reflector in the ceiling above each canister with a diameter of 74" to knock down the radiation load on the concrete (the shield plugs are 4' thick; the ceiling is 5' thick, leaving a 1' recess for insulation)
- On the floor, code a 6' thick layer of concrete with a 55° constant temperature boundary condition on the lower surface to conduct away the radiation heat load from the upper surface (every little bit helps).

We're still working on the acceptance criteria and will forward you the results when ready. Please call Wayne to let him know about how many hours these changes will take, but don't hold up Evan waiting for a reply.

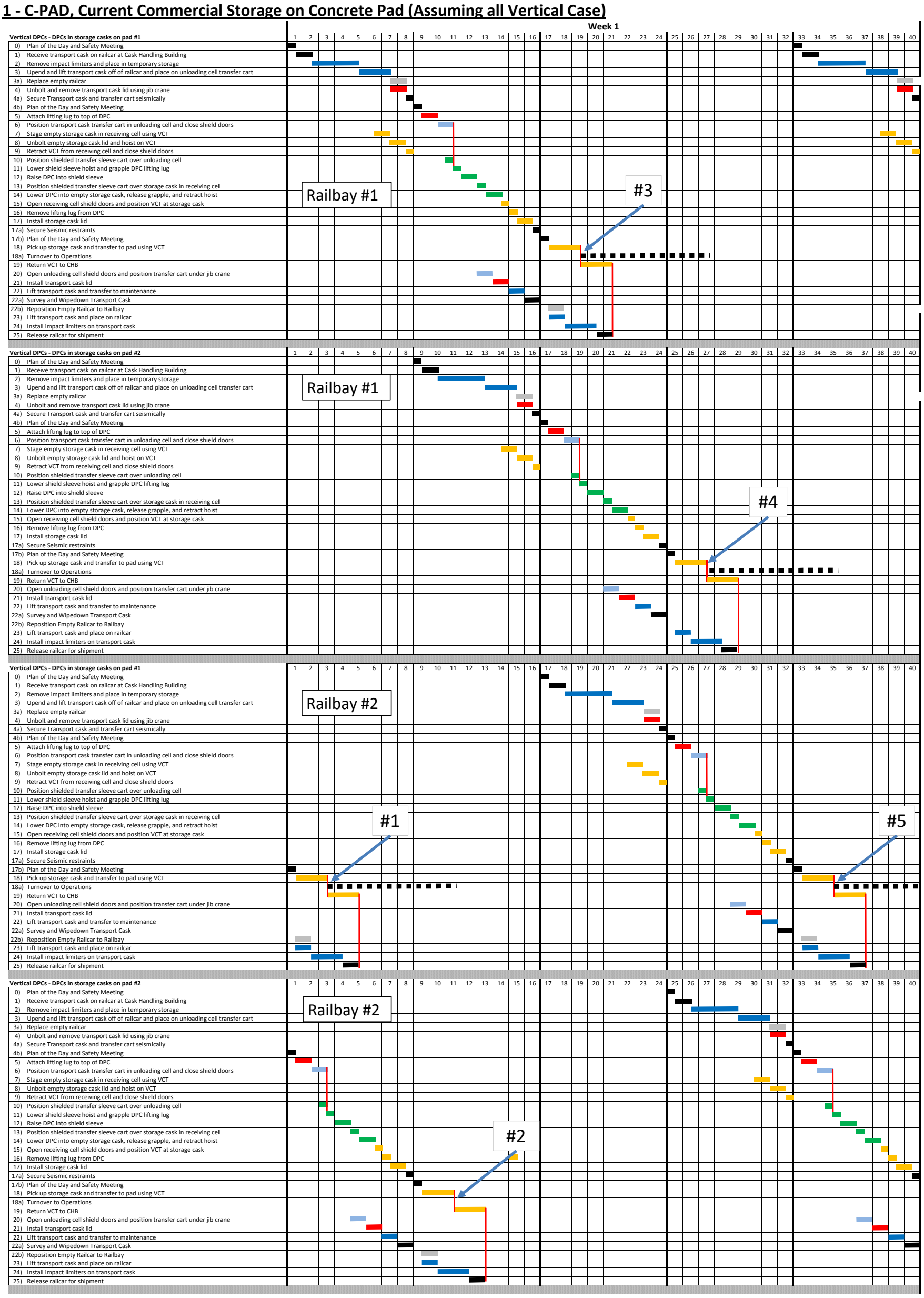
Thanks, Steve.

Bruce Brunsdon
PPL Mechanical Engineer III
Federal Services
MOX Offsite Support Services

Tel: +1 303 486 2566

Fax: +1 303 486 2570
bruce.brunsdon@CBIFederalServices.com
CB&I

1 - C-PAD, Current Commercial Storage on Concrete Pad (Assuming all Vertical Case)

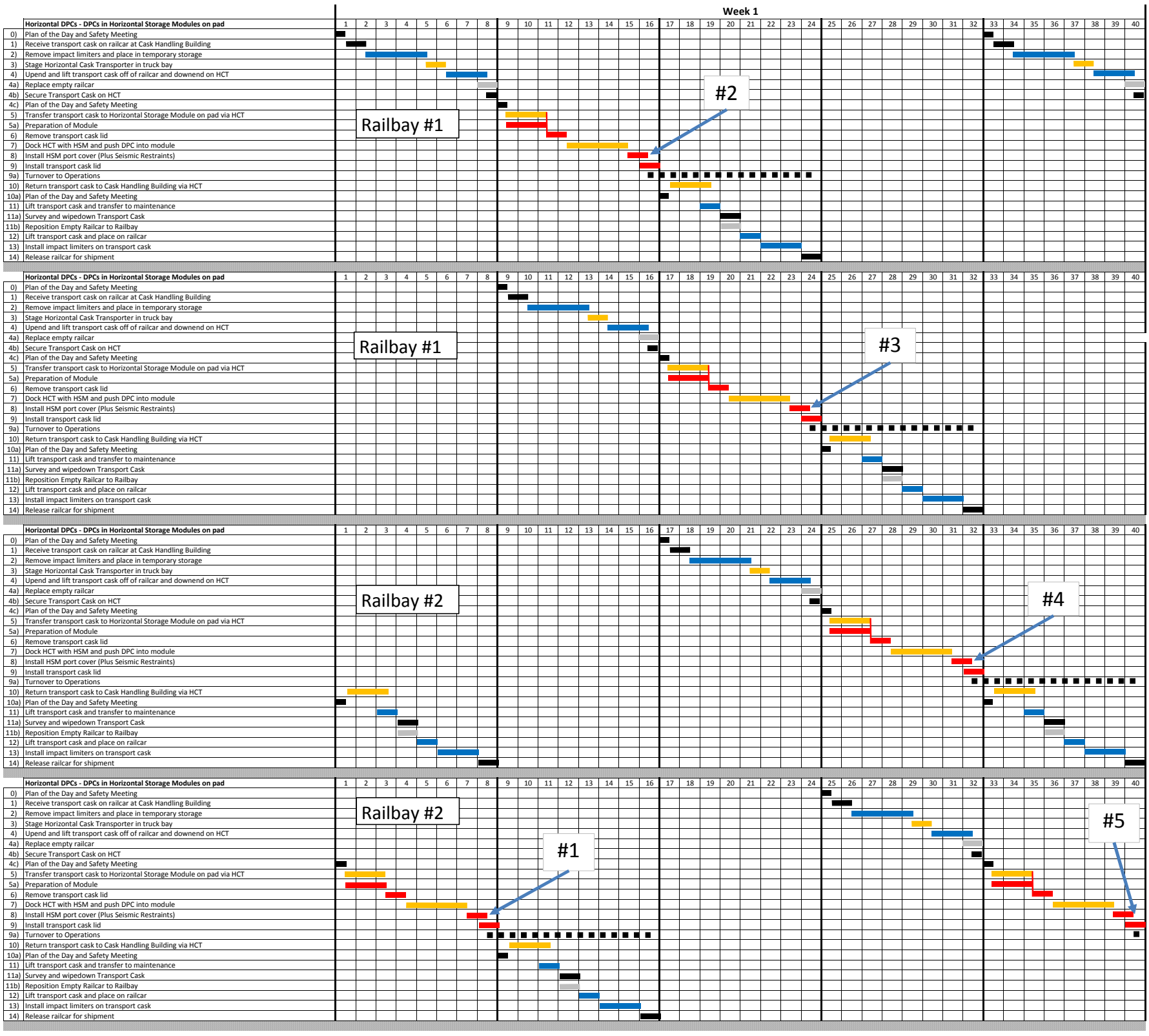


Throughput: 20 DPCs placed every four weeks, or an average of 5 DPC per week.

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Vertical Cask Transporter

1 - C-PAD, Current Commercial Storage on Concrete Pad (Assuming all Horizontal Case)

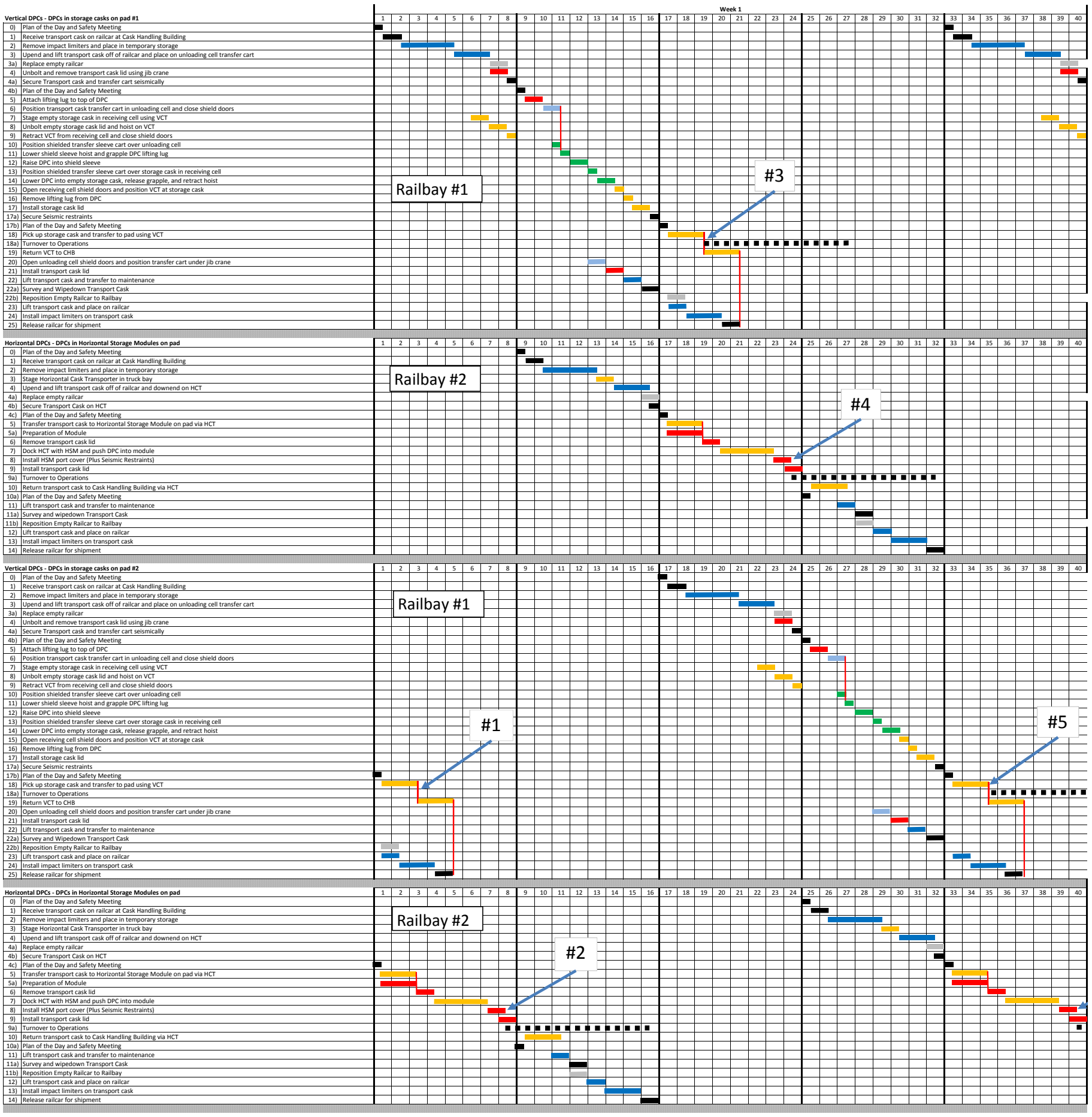


Throughput: 20 DPCs placed every four weeks, or an average of 5 DPCs per week.

Legend

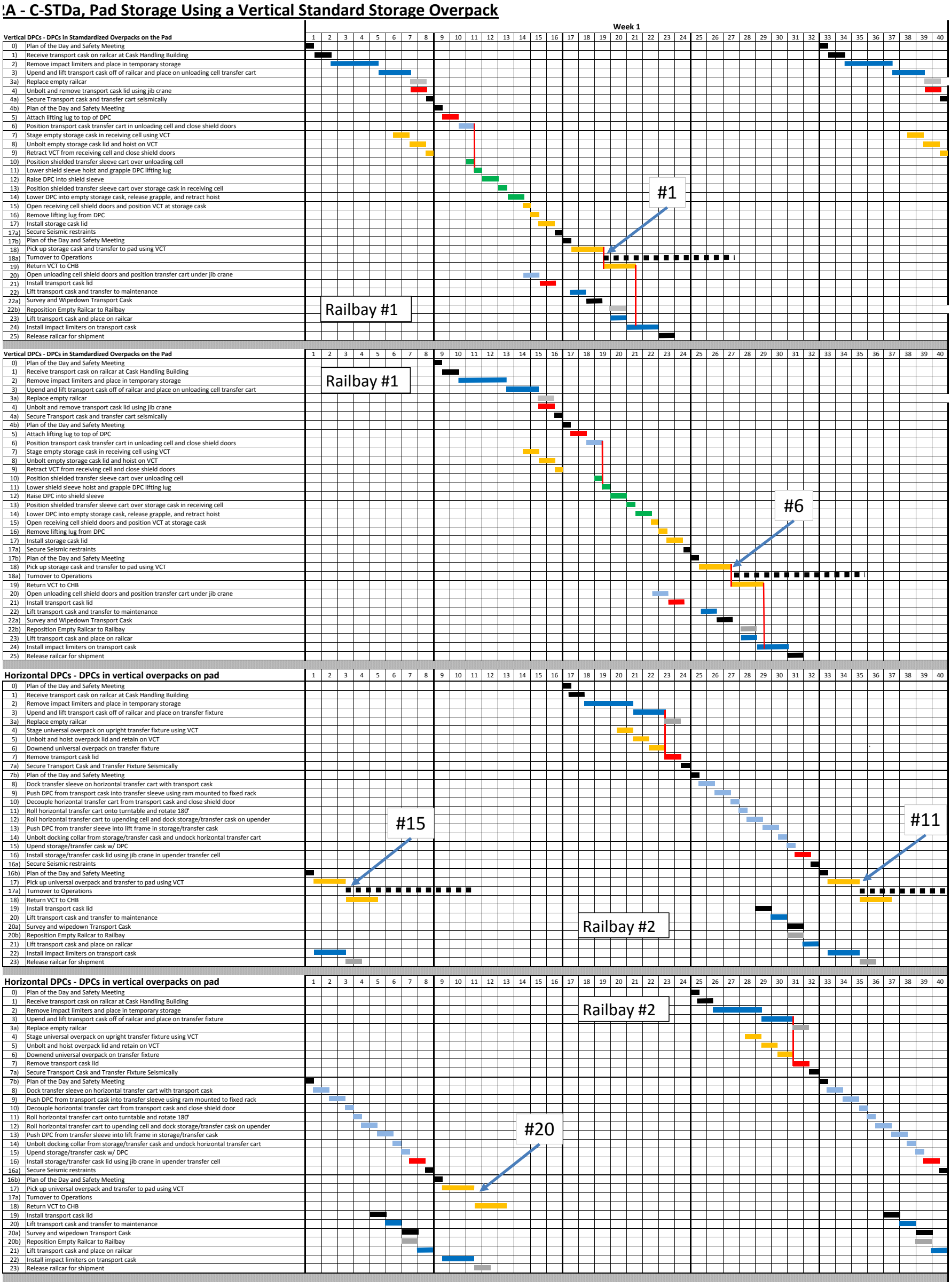
- No Heavy Equipment
- 200T OTB Crane
- Stick Crane
- Vertical Cask Transporter
- Railyard Tug

1 - C-PAD, Current Commercial Storage on Concrete Pad (Base Case)



Throughput: 20 DPCs placed every four weeks, or an average of 5 DPCs per week.

2A - C-STDa, Pad Storage Using a Vertical Standard Storage Overpack

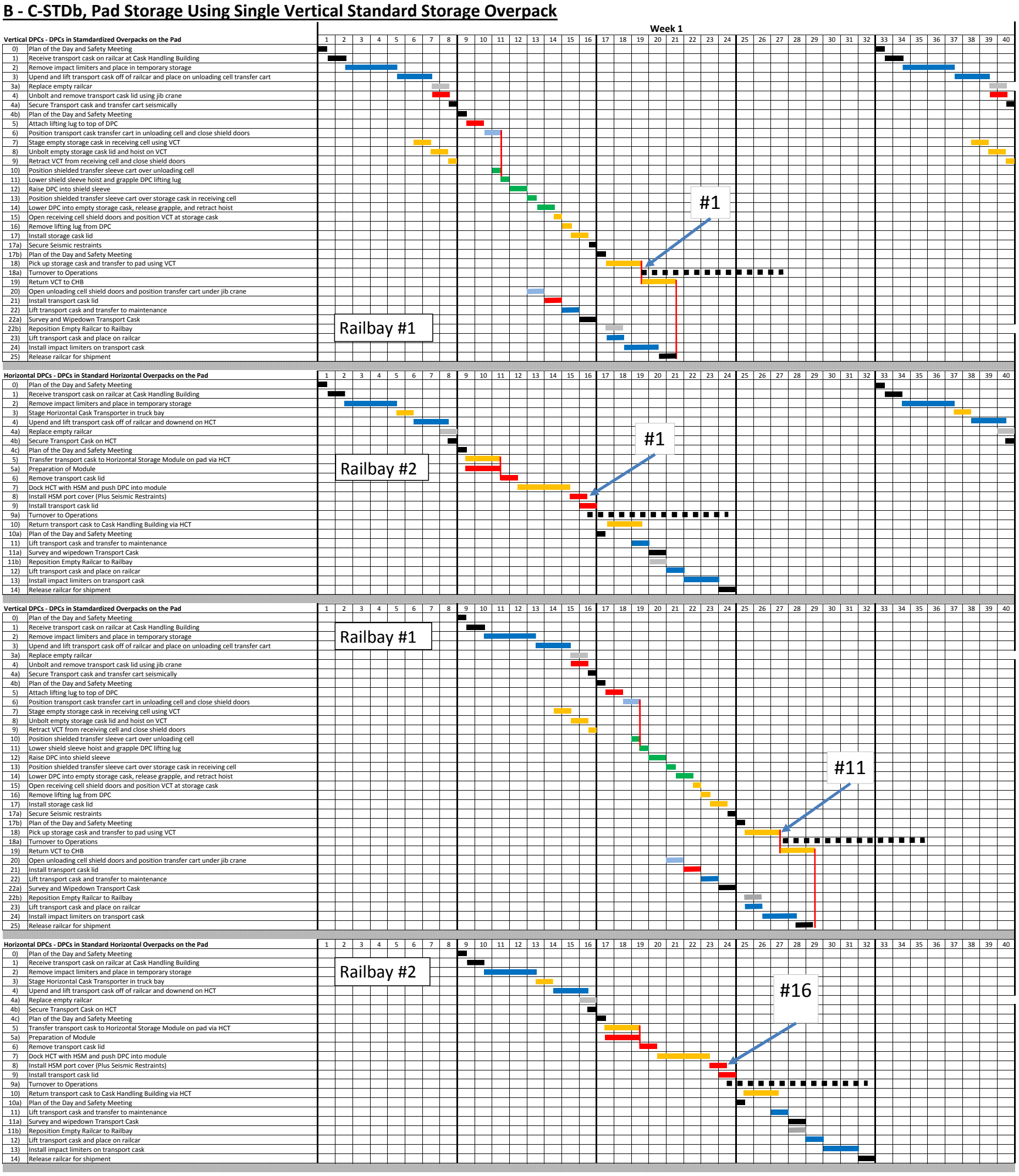


Throughput: 20 DPCs placed every four weeks, or an average of 5 per week

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Vertical Cask Transporter
- Horizontal Transfer Cart

B - C-STDb, Pad Storage Using Single Vertical Standard Storage Overpack

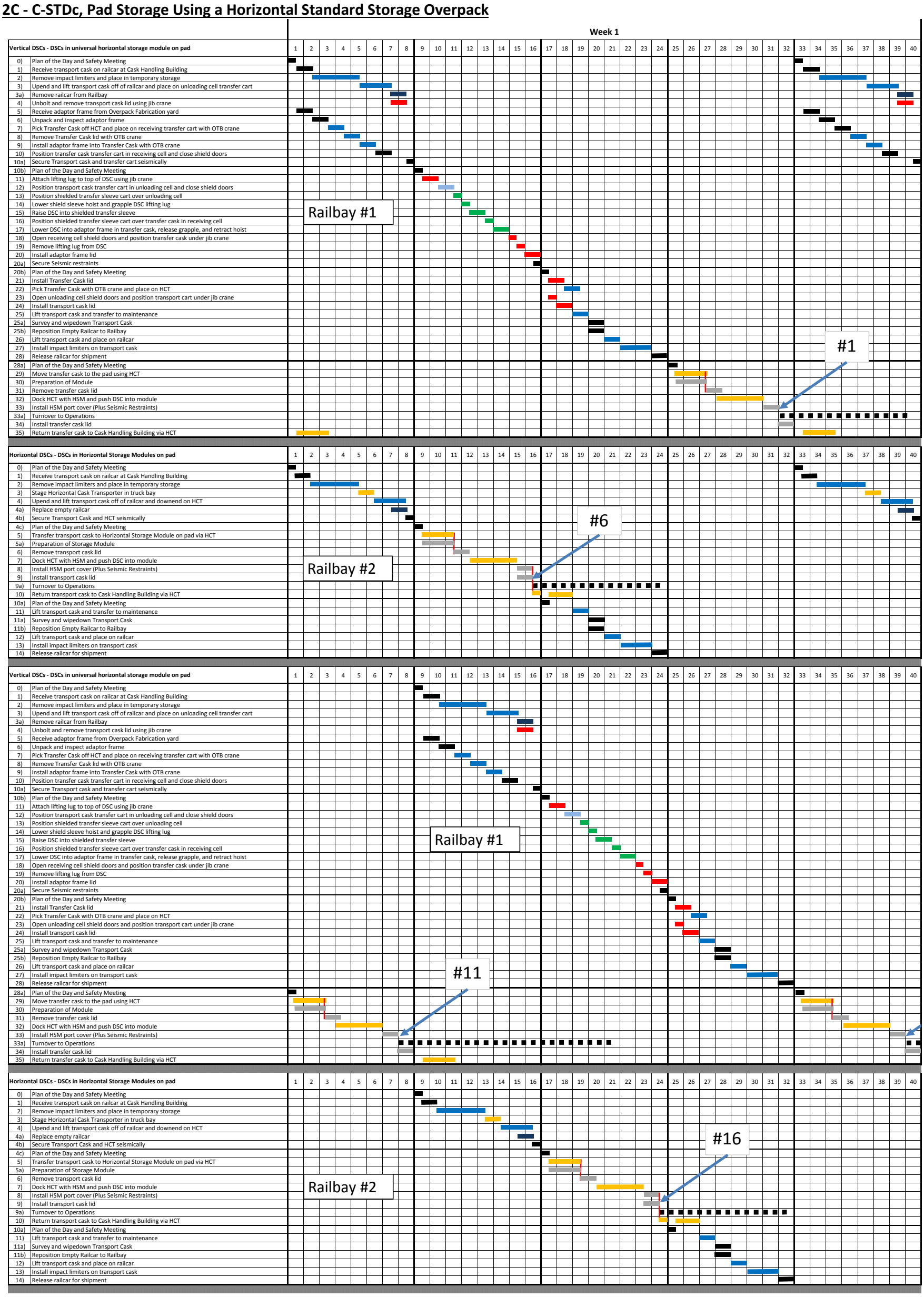


Throughput: 20 DPCs placed every four weeks, or an average of 5 DPCs per week.

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart/Transfer Cart
- Vertical Cask Transporter
- Railyard Tug

2C - C-STDc, Pad Storage Using a Horizontal Standard Storage Overpack

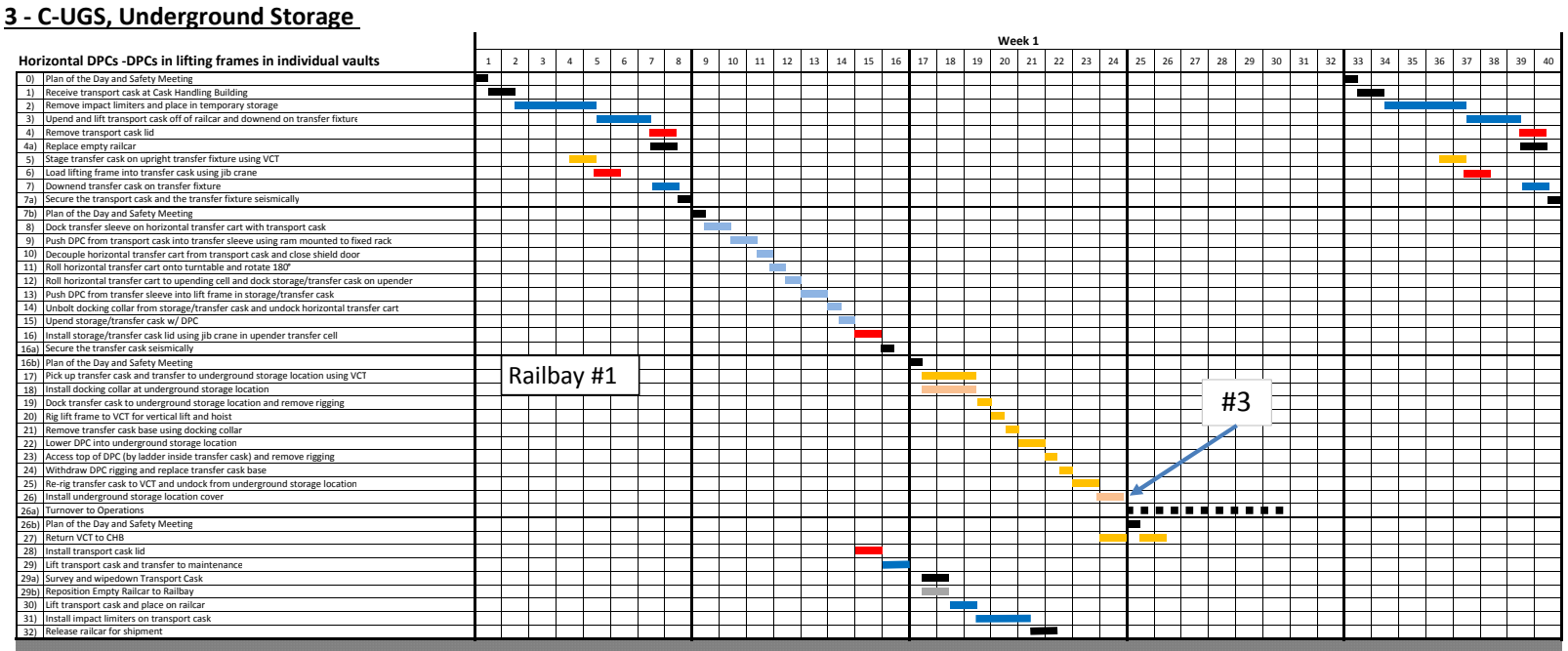


Throughput: 20 DSCs placed every four weeks, or an average of 5 per week

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Horizontal Cask Transporter
- Stick Crane

3 - C-UGS, Underground Storage

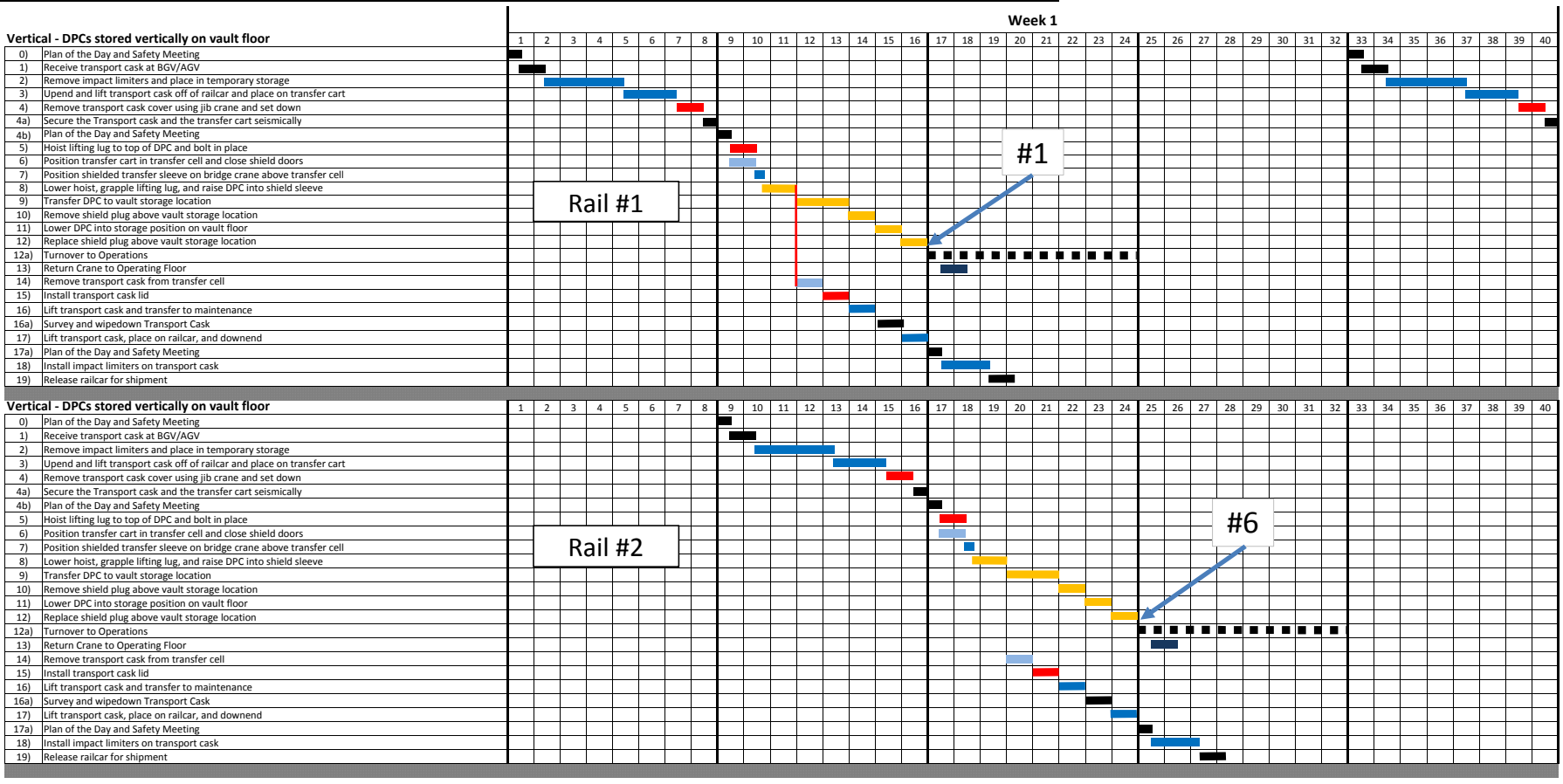


Throughput: 20 DPCs placed every four weeks, or an average of 5 DPCs per week.

Legend

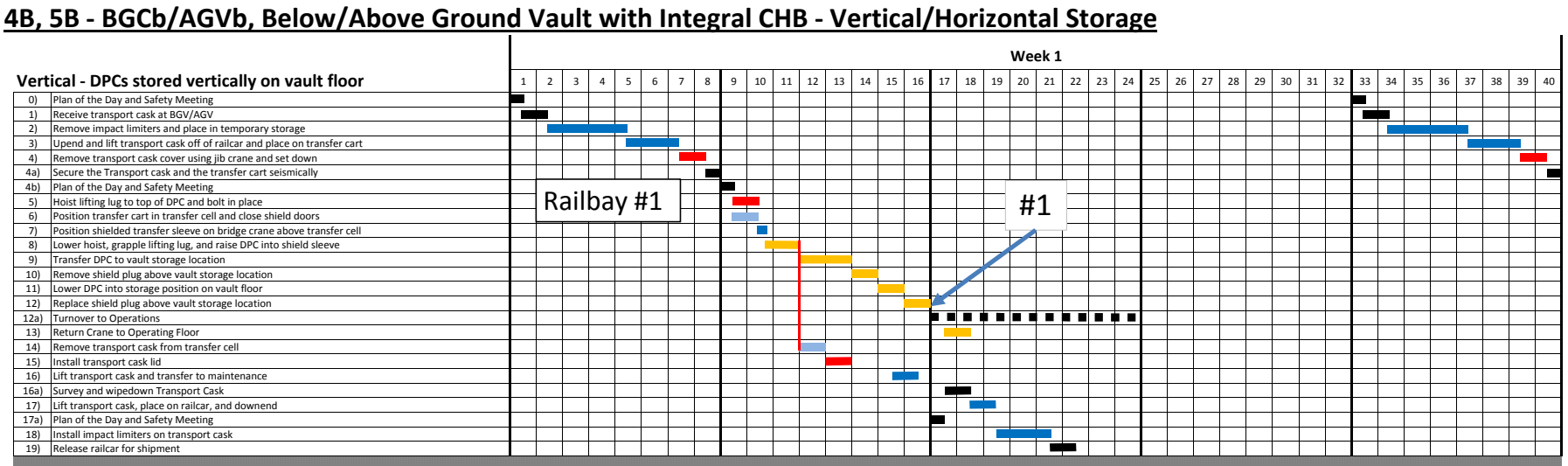
- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Gantry Crane

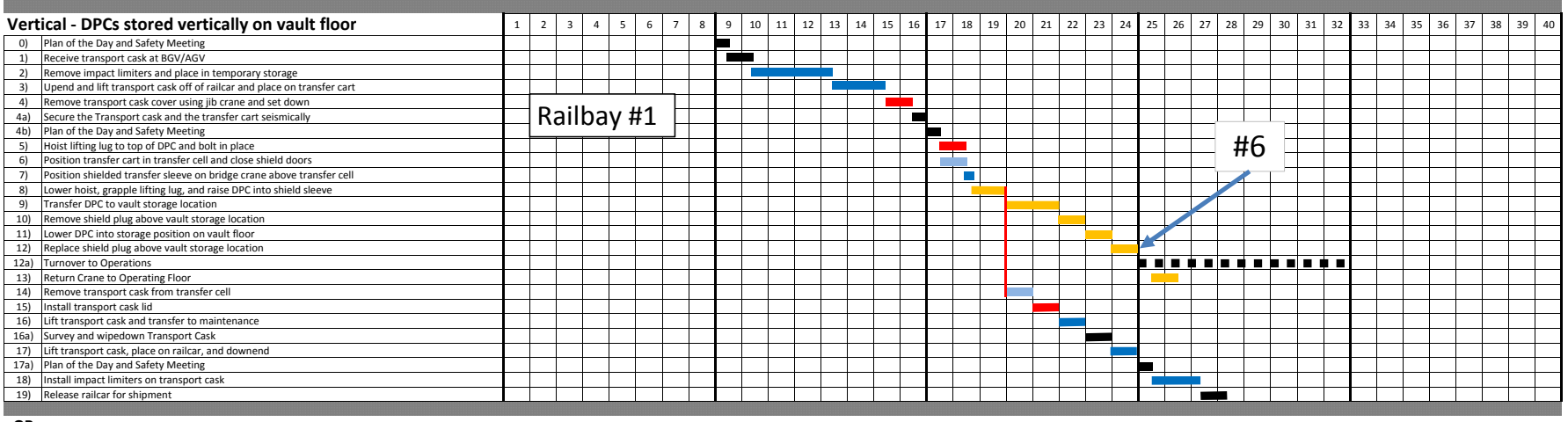
4A, 5A - BGCa/AGVa, Below/Above Ground Vault with Integral CHB - Vertical (only) Storage



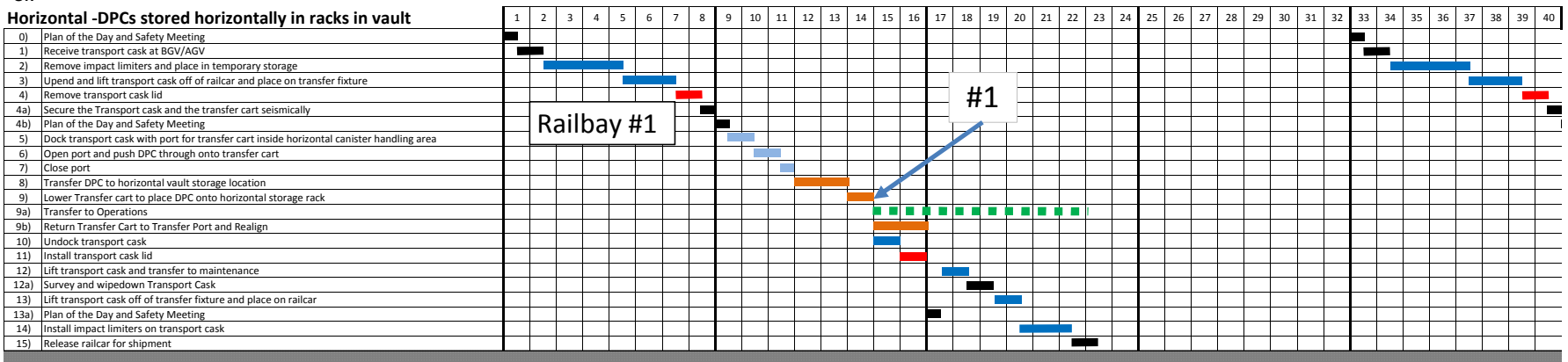
Throughput: 10 DPCs placed every four weeks, or an average of 2.5 DPCs per week.

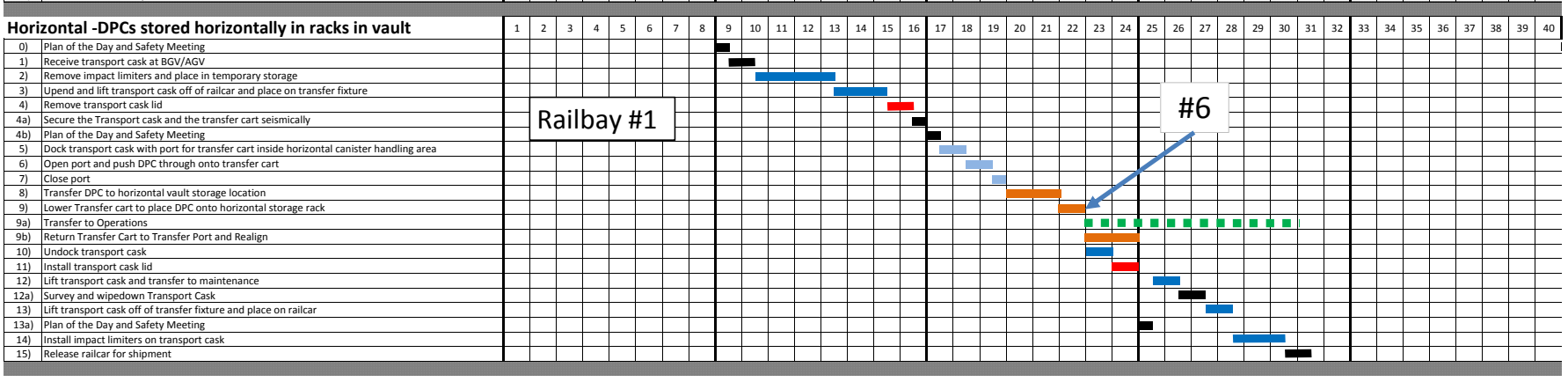
4B, 5B - BGCb/AGVb, Below/Above Ground Vault with Integral CHB - Vertical/Horizontal Storage





OR



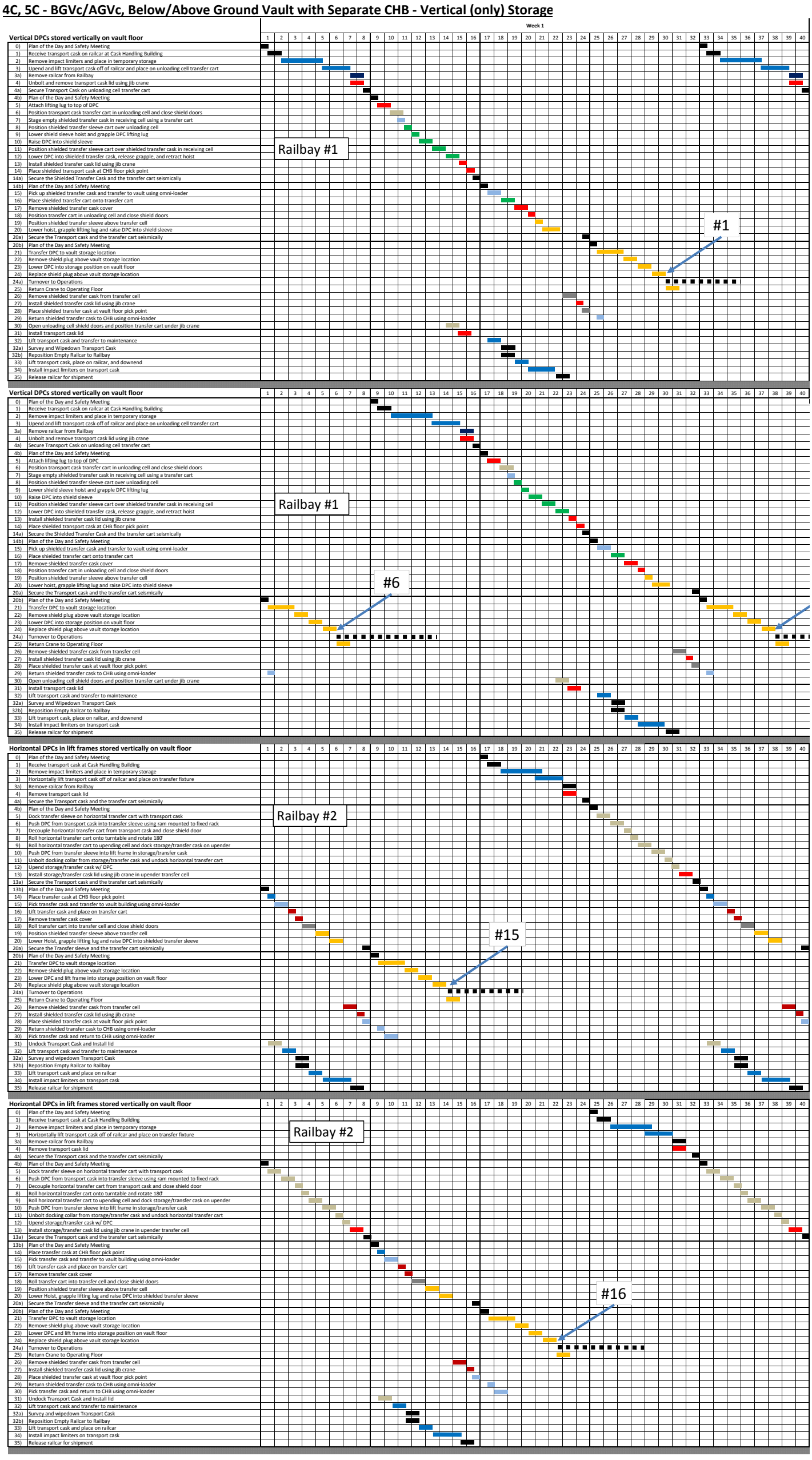


Throughput: 10 DPCs placed every four weeks, or 2 1/2 DPCs placed per week.

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Sleeve
- Vault Crane

4C, 5C - BGVc/AGVc, Below/Above Ground Vault with Separate CHB - Vertical (only) Storage

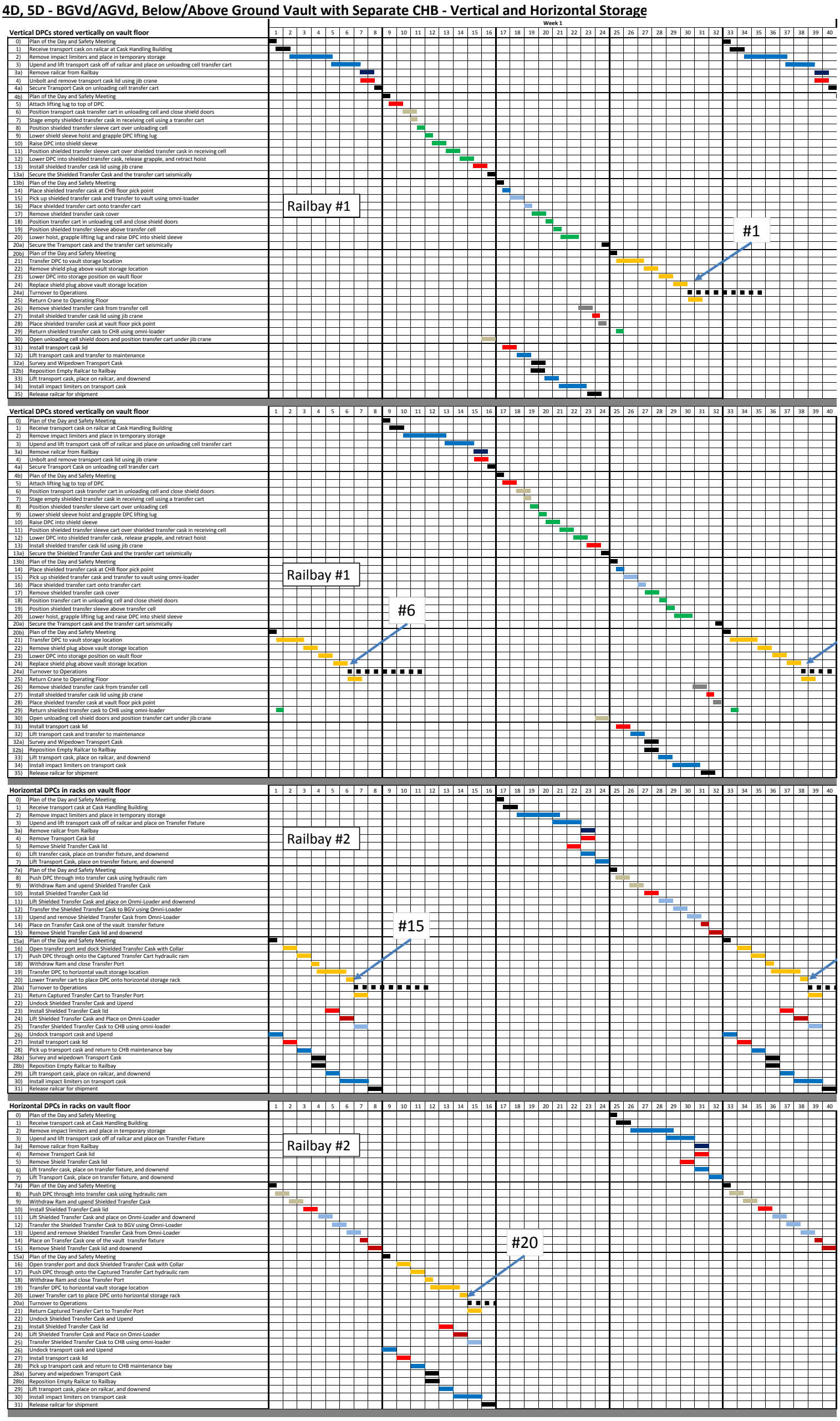


Throughput: 20 DPCs placed in four weeks, or an average of 5 per week.

Legend

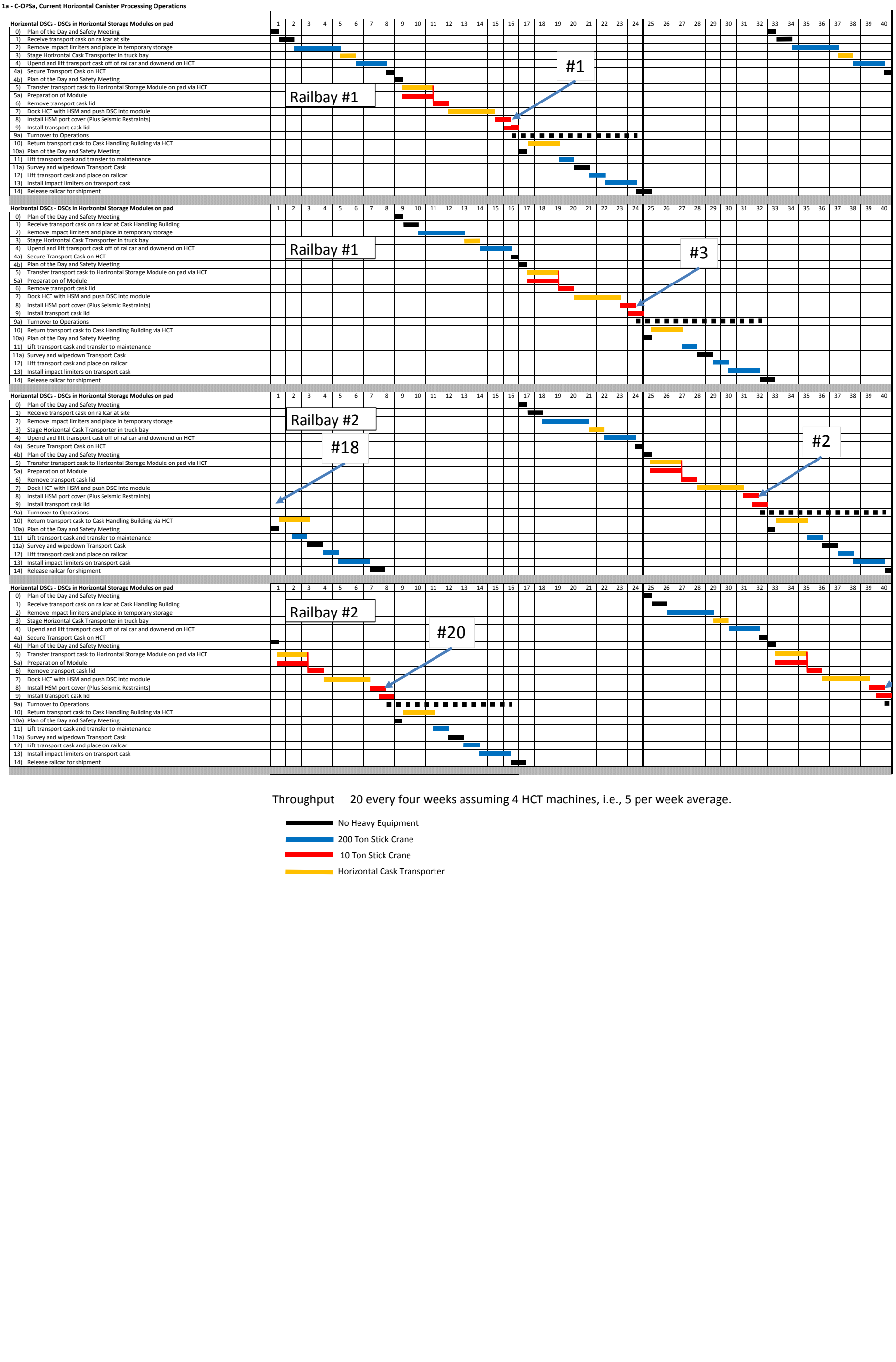
No Heavy Equipment	Omni-Loader
200T CHB Crane	Shielded Transfer Sleeve
200T Vault Crane	Vault Crane
Jib Crane	Jib Crane
Horizontal Transfer Cart	Vault Transfer Cart

4D, 5D - BGVd/AGVd, Below/Above Ground Vault with Separate CHB - Vertical and Horizontal Storage

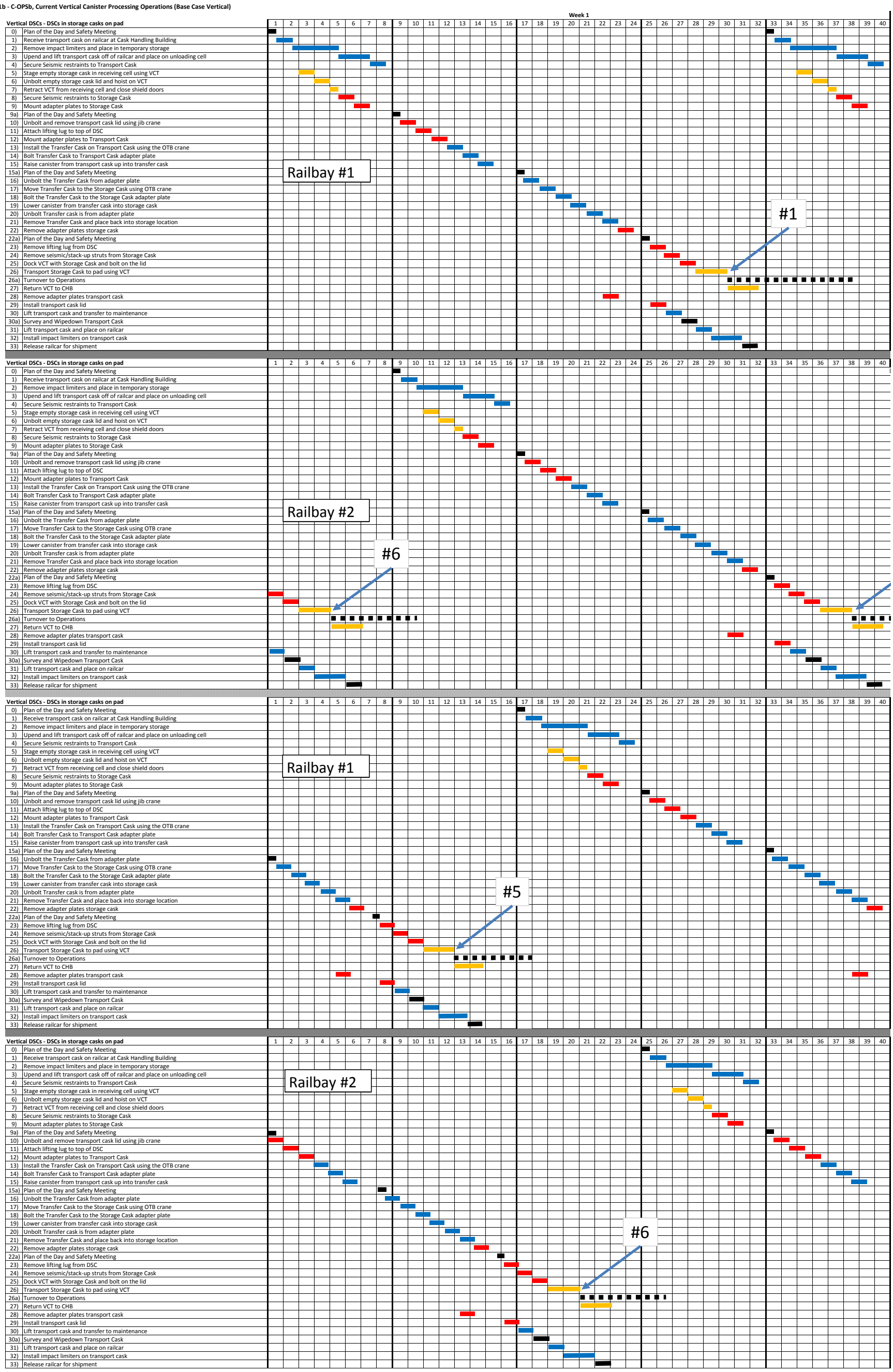


Throughput: 20 DPCs placed every four weeks, or 5 DPCs per week

1a - C-OPSa, Current Horizontal Canister Processing Operations



1b - C-OPSb, Current Vertical Canister Processing Operations (Base Case Vertical)



Throughput 20 every four weeks assuming 2 OTB cranes and 4 VCTs. (5 DPCs per week)

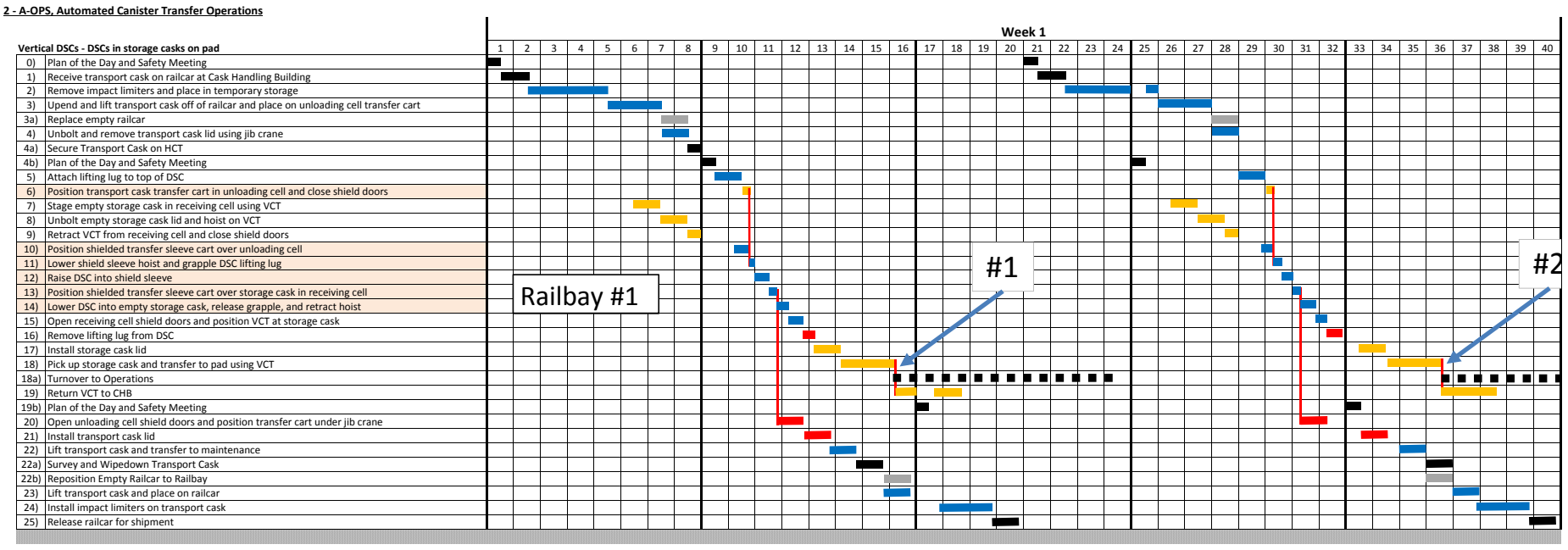
No Heavy Equipment

200 Ton OTB Crane

Jib Crane

Vertical Cask Transporter

2 - A-OPS, Automated Canister Transfer Operations



Throughput Four every week assuming only 2 VCT machines.

- No Heavy Equipment
- 200 Ton OTB Crane
- Jib Crane
- Vertical Cask Transporter

3 - R-OPS, Remote Canister Transfer Operations

Vertical DSCs - DSCs in storage casks on pad	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0) Plan of the Day and Safety Meeting																																								
1) Receive transport cask on railcar at Cask Handling Building																																								
2) Remove impact limiters and place in temporary storage																																								
3) Upend and lift transport cask off of railcar and place on unloading cell transfer cart																																								
3a) Replace empty railcar																																								
4) Unbolt and remove transport cask lid using jib crane																																								
4a) Secure Transport Cask on HCT																																								
4b) Plan of the Day and Safety Meeting																																								
5) Attach lifting lug to top of DSC																																								
6) Position transport cask transfer cart in Transfer cell and close shield doors																																								
7) Stage empty storage cask in Transfer cell using VCT																																								
8) Unbolt empty storage cask lid and hoist on VCT																																								
9) Retract VCT from Transfer cell and close shield doors																																								
11) Lower Transfer Cell hoist and grapple DSC lifting lug																																								
12) Lift the DSC out of the Transport Cask																																								
13) Reposition and lower DSC into the Storage Cask																																								
14) Release grapple, and retract hoist																																								
15) Open Transfer Cell shield doors and position VCT at storage cask																																								
16) Remove lifting lug from DSC																																								
17) Install storage cask lid																																								
18) Pick up storage cask and transfer to pad using VCT																																								
18a) Turnover to Operations																																								
19) Return VCT to CHB																																								
19a) Plan of the Day and Safety Meeting																																								
20) Open Transfer Cell shield doors and position transfer cart under jib crane																																								
21) Install transport cask lid																																								
22) Lift transport cask and transfer to maintenance																																								
22a) Survey and Wipedown Transport Cask																																								
22b) Reposition Empty Railcar to Railbay																																								
23) Lift transport cask and place on railcar																																								
24) Install impact limiters on transport cask																																								
25) Release railcar for shipment																																								

#1

#2

Vertical DSCs - DSCs in storage casks on pad	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0) Plan of the Day and Safety Meeting																																								
1) Receive transport cask on railcar at Cask Handling Building																																								
2) Remove impact limiters and place in temporary storage																																								
3) Upend and lift transport cask off of railcar and place on unloading cell transfer cart																																								
3a) Replace empty railcar																																								
4) Unbolt and remove transport cask lid using jib crane																																								
4a) Secure Transport Cask on HCT																																								
4b) Plan of the Day and Safety Meeting																																								
5) Attach lifting lug to top of DSC																																								
6) Position transport cask transfer cart in Transfer cell and close shield doors																																								
7) Stage empty storage cask in Transfer cell using VCT																																								
8) Unbolt empty storage cask lid and hoist on VCT																																								
9) Retract VCT from Transfer cell and close shield doors																																								
11) Lower Transfer Cell hoist and grapple DSC lifting lug																																								
12) Lift the DSC out of the Transport Cask																																								
13) Reposition and lower DSC into the Storage Cask																																								
14) Release grapple, and retract hoist																																								
15) Open Transfer Cell shield doors and position VCT at storage cask																																								
16) Remove lifting lug from DSC																																								
17) Install storage cask lid																																								
18) Pick up storage cask and transfer to pad using VCT																																								
18a) Turnover to Operations																																								
19) Return VCT to CHB																																								
19a) Plan of the Day and Safety Meeting																																								
20) Open Transfer Cell shield doors and position transfer cart under jib crane																																								
21) Install transport cask lid																																								
22) Lift transport cask and transfer to maintenance																																								
22a) Survey and Wipedown Transport Cask																																								
22b) Reposition Empty Railcar to Railbay																																								
23) Lift transport cask and place on railcar																																								
24) Install impact limiters on transport cask																																								
25) Release railcar for shipment																																								

#3

#4

S-OPS, Commercial Operations without CHB

Vertical DSCs - DSCs in storage casks on pad		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0)	Plan of the Day and Safety Meeting																																								
1)	Receive transport cask on railcar at siding																																								
2)	Remove impact limiters and place in temporary storage using gantry crane																																								
3)	Upend and lift transport cask off of railcar and place on pad																																								
4)	Install seismic stack-up struts on Transport Cask using stick crane																																								
5)	Transporter moves storage cask into position and removes lid																																								
6)	Mount Adapter plates to top of Storage Cask Using Stick Crane																																								
7)	Install seismic stack-up struts on Storage Cask and weather cover using stick crane																																								
7a)	Plan of the Day and Safety Meeting																																								
8)	Unbolt and remove transport cask lid																																								
9)	Attach lifting lug to top of DSC																																								
10)	Mount adapter plates to top of Transport Cask Using Stick Crane																																								
11)	Install the Transfer Cask on Transport Cask using the gantry crane																																								
12)	Bolt Transfer Cask to adapter plate																																								
13)	Raise canister from transport cask up into transfer cask																																								
13a)	Plan of the Day and Safety Meeting																																								
14)	Transfer cask is unbolted from adapter plate																																								
15)	Crane moves transfer cask from transport cask to storage cask																																								
16)	Install Weather Cover to Transport Cask																																								
17)	Transfer cask is bolted to the Storage Cask adapter plate																																								
18)	Lower canister from transfer cask into storage cask																																								
19)	Unbolt Transfer cask is from adapter plate																																								
20)	Remove Transfer Cask and place back into storage location																																								
21)	Remove adapter plates storage and transport casks																																								
21a)	Plan of the Day and Safety Meeting																																								
22)	Remove lifting lug from DSC																																								
23)	Remove seismic/stack-up struts from Storage Cask																																								
24)	Dock VCT with Storage Cask and bolt on the lid																																								
25)	Transporter takes storage cask to pad																																								
26)	Turnover to Operations																																								
27)	Return VCT to Rail Siding																																								
28)	Install transport cask lid																																								
29)	Remove seismic/stack-up struts from Transport Cask																																								
30)	Lift transport cask and transfer to maintenance																																								
30a)	Survey and Wipedown Transport Cask																																								
31)	Lift transport cask and place on railcar																																								
32)	Install impact limiters on transport cask																																								
33)	Release railcar for shipment																																								

Throughput Five every four weeks assuming one Gantry Crane and VCT.

- No Heavy Equipment
- 200 Ton Gantry Crane
- 20 Ton Stick Crane
- Vertical Cask Transporter
- Powered ManLifts

Notes

1. The rail bays need to accommodate two railcars with transportation casks on them
2. The facility needs two VCTs operational at all times.
3. The railbays are serviced by two OTB Cranes on the same rails.
4. Streamlining the unloading process improves the utilization of the VCTs but the availability of the Railbay limits throughput.

Horizontal DSCs - DSCs in Horizontal Storage Modules on pad		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0)	Plan of the Day and Safety Meeting																																								
1)	Receive transport cask on railcar at site																																								
2)	Remove impact limiters and place in temporary storage																																								
3)	Stage Horizontal Cask Transporter in truck bay																																								
4)	Upend and lift transport cask off of railcar and downend on HCT																																								
4a)	Secure Transport Cask on HCT																																								
4b)	Plan of the Day and Safety Meeting																																								
5)	Transfer transport cask to Horizontal Storage Module on pad via HCT																																								
5a)	Preparation of Module																																								
6)	Remove transport cask lid																																								
7)	Dock HCT with HSM and push DSC into module																																								
8)	Install HSM port cover (Plus Seismic Restraints)																																								
9)	Install transport cask lid																																								
9a)	Turnover to Operations																																								
10)	Return transport cask to Cask Handling Building via HCT																																								
10a)	Plan of the Day and Safety Meeting																																								
11)	Lift transport cask and transfer to maintenance																																								
11a)	Survey and wipedown Transport Cask																																								
12)	Lift transport cask and place on railcar																																								
13)	Install impact limiters on transport cask																																								
14)	Release railcar for shipment																																								

Railcar #1

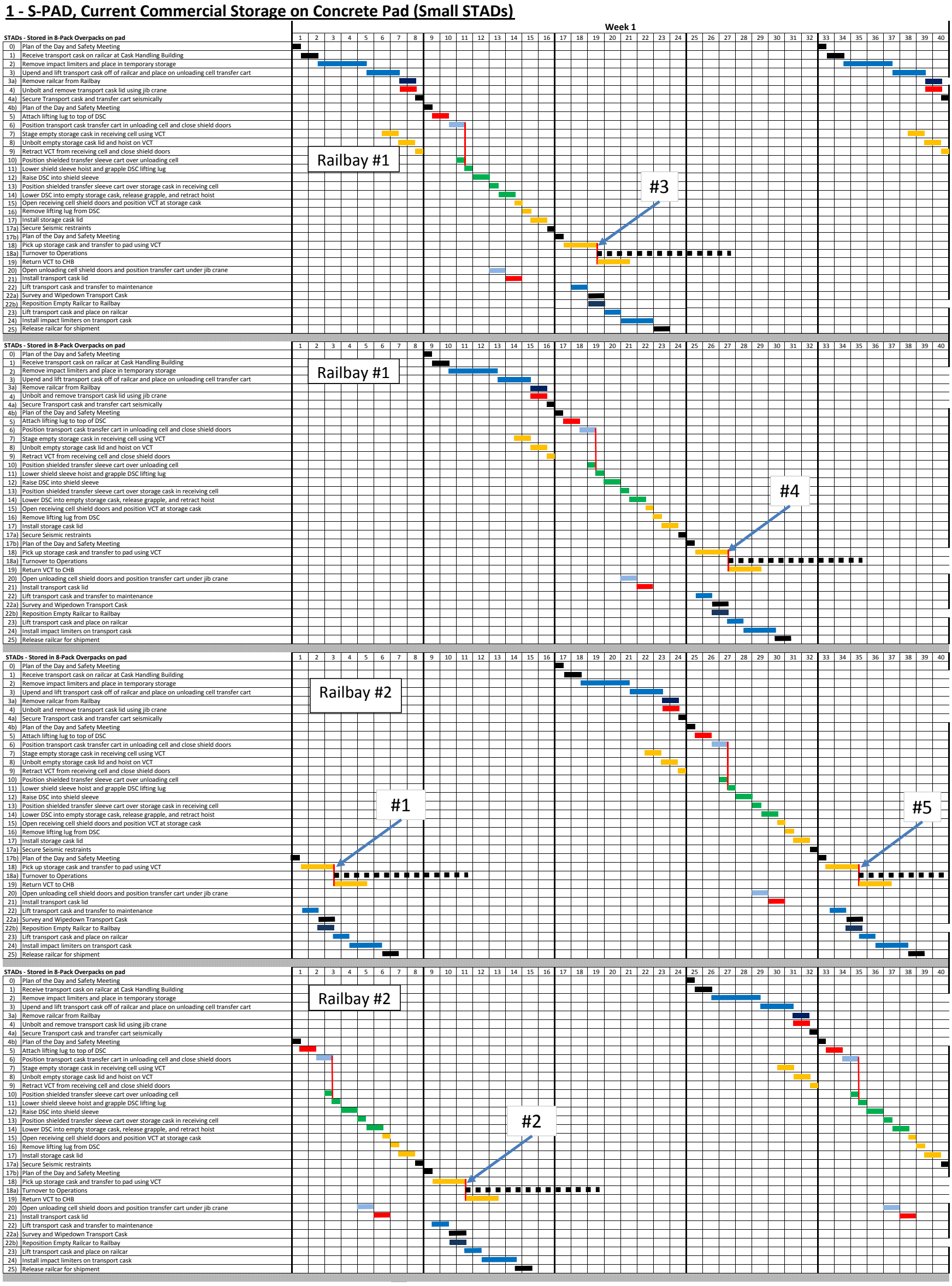
#1

Horizontal DSCs - DSCs in Horizontal Storage Modules on pad		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0)	Plan of the Day and Safety Meeting																																								
1)	Receive transport cask on railcar at Cask Handling Building																																								
2)	Remove impact limiters and place in temporary storage																																								
3)	Stage Horizontal Cask Transporter in truck bay																																								
4)	Upend and lift transport cask off of railcar and downend on HCT																																								
4a)	Secure Transport Cask on HCT																																								
4b)	Plan of the Day and Safety Meeting																																								
5)	Transfer transport cask to Horizontal Storage Module on pad via HCT																																								
5a)	Preparation of Module																																								
6)	Remove transport cask lid																																								
7)	Dock HCT with HSM and push DSC into module																																								
8)	Install HSM port cover (Plus Seismic Restraints)																																								
9)	Install transport cask lid																																								
9a)	Turnover to Operations																																								
10)	Return transport cask to Cask Handling Building via HCT																																								
10a)	Plan of the Day and Safety Meeting																																								
11)	Lift transport cask and transfer to maintenance																																								
11a)	Survey and wipedown Transport Cask																																								
12)	Lift transport cask and place on railcar																																								
13)	Install impact limiters on transport cask																																								
14)	Release railcar for shipment																																								

Railcar #2

#2

1 - S-PAD, Current Commercial Storage on Concrete Pad (Small STADs)



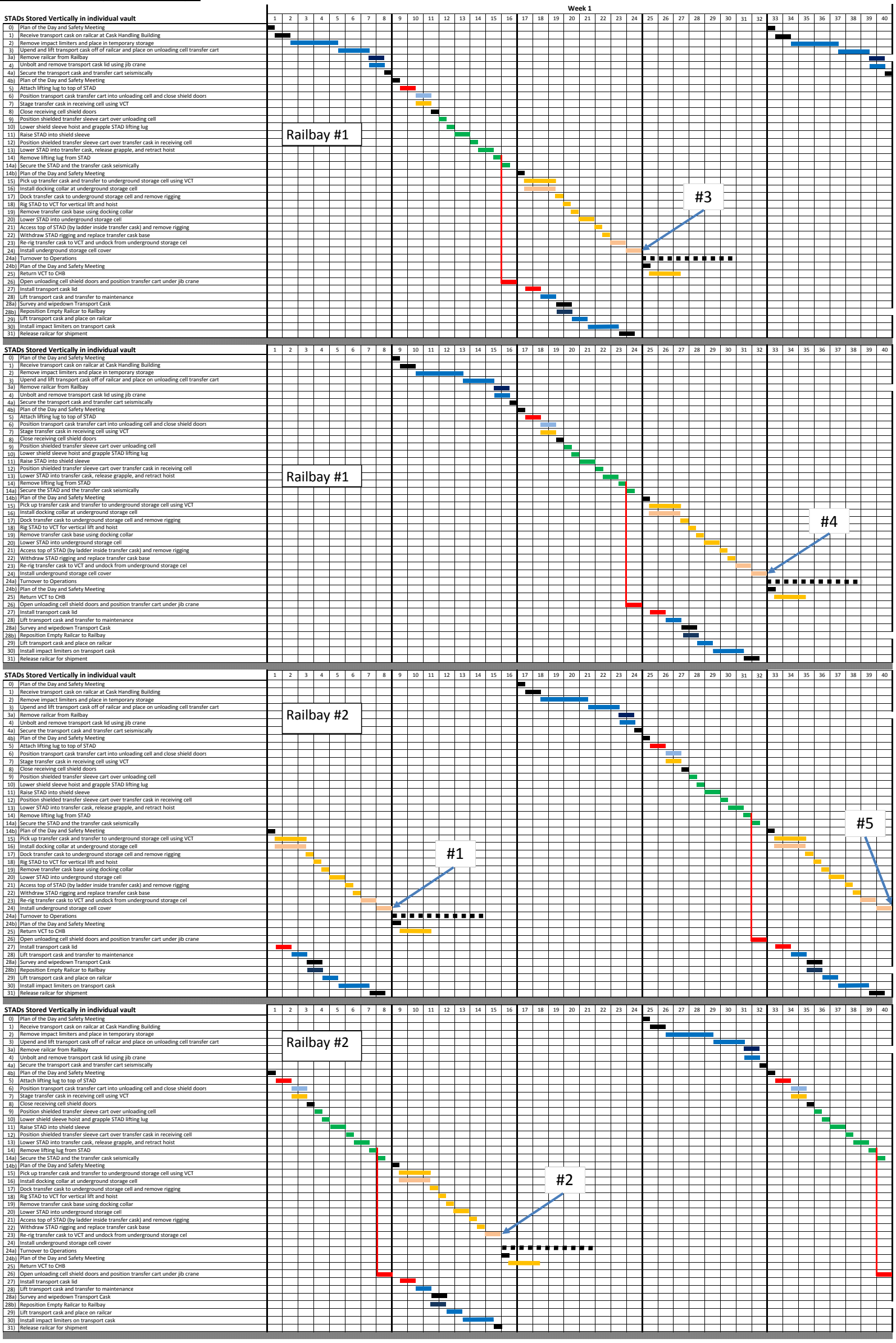
Throughput: 20 DSCs placed every four weeks, or an avaerage of 5 DSCs per week.

For small STADs, the transporter moves the overpack to the pad after every eighth STAD

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Vertical Cask Transporter

3 - S-UGS, Underground Storage

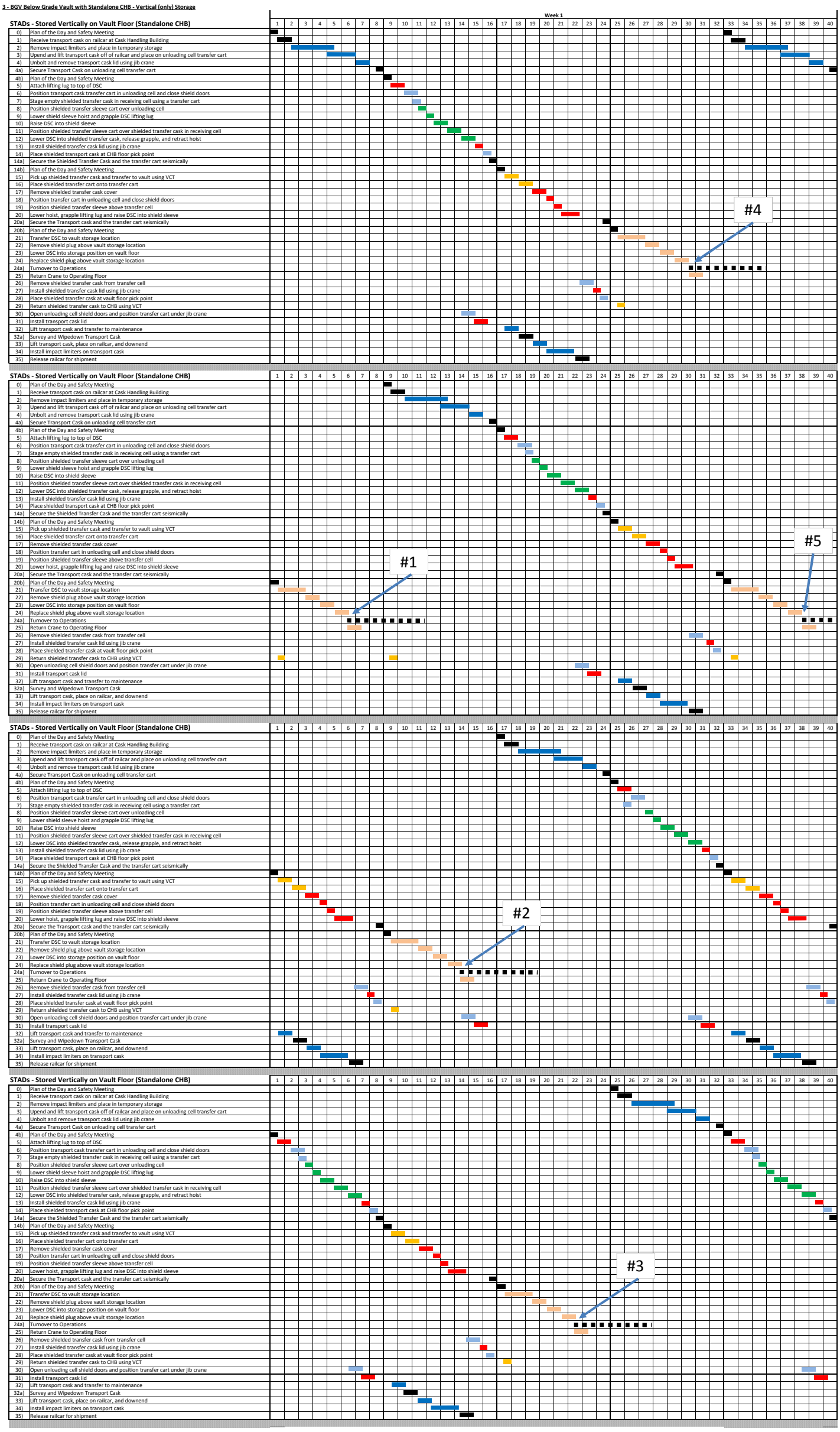


Throughput: 20 STADs placed every four weeks, or an average of 5 per week.

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Gantry Crane
- Vertical Cask Transporter

3 - BGV Below Grade Vault with Standalone CHB - Vertical (only) Storage

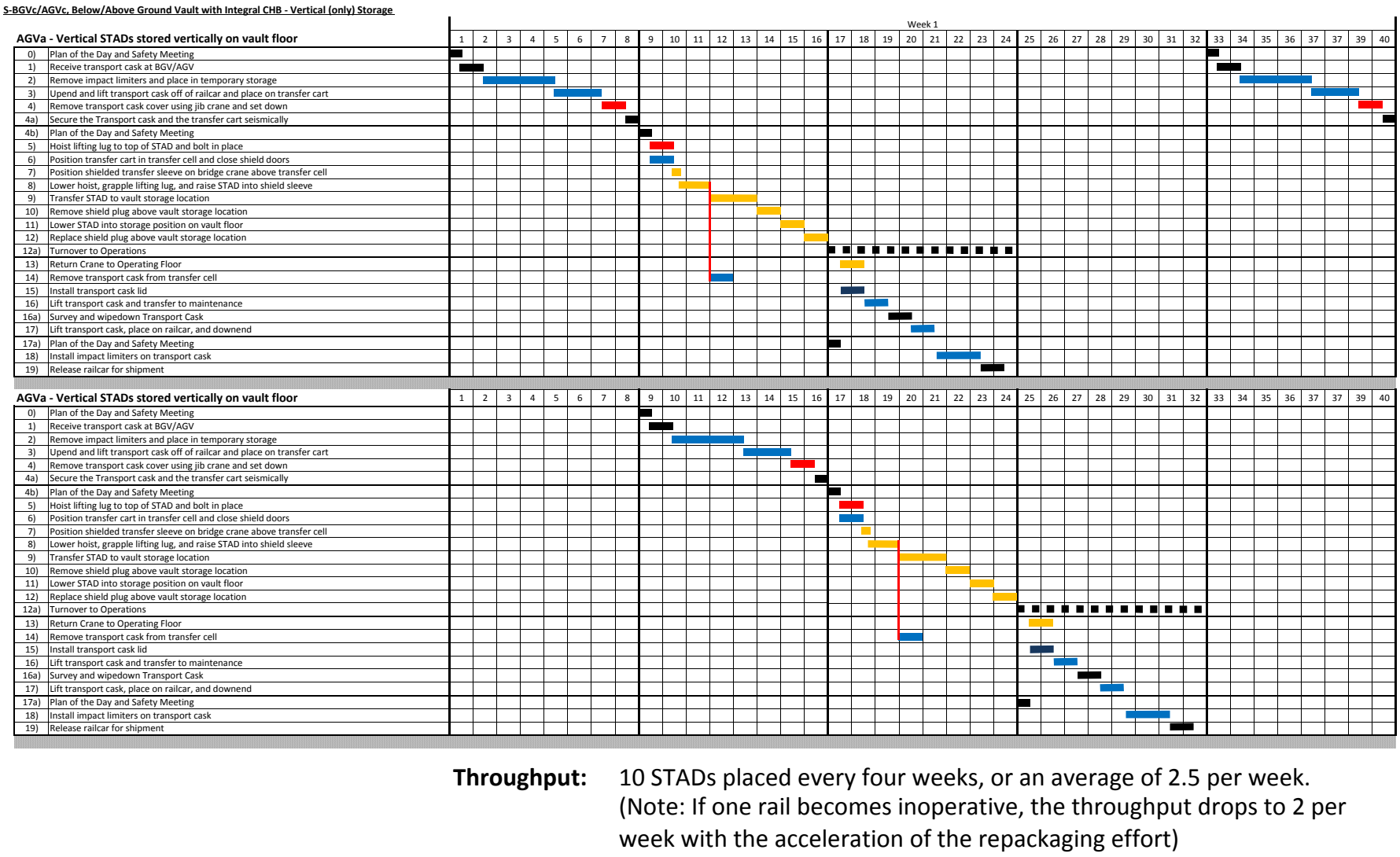


Throughput: 20 STADs placed every four weeks, or an average of 5 per week.

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Shielded Transfer Cart
- Vault OTB Crane
- Vertical Cask Transporter

S-BGVc/AGVc, Below/Above Ground Vault with Integral CHB - Vertical (only) Storage



Throughput: 10 STADs placed every four weeks, or an average of 2.5 per week. (Note: If one rail becomes inoperative, the throughput drops to 2 per week with the acceleration of the repackaging effort)

Legend

- No Heavy Equipment
- 200T OTB Crane
- Jib Crane
- Self-Powered Transfer Cart
- Vault Crane with Transfer Sleeve

NOTES AND ASSUMPTIONS:

1. The data in these spreadsheets are approximate intended to support occupational exposure estimates only. They are neither definitive nor precise enough to support detailed operational decision.
2. The occupational exposure calculations only consider the scope of activities required to place SNF shipments into storage. Ongoing site monitoring activities are not included.
3. These crew sizes and durations are based on commercial nuclear plant ISFSI operations. Durations are based on real world experience, thus include real world worker efficiencies. Work scope is consistent with C-OPS and has been extrapolated to address the other alternates.
4. Duration fractions incorporate both the number of workers of each category performing the activity and the percentage of time that each worker is occupying the radiation zone.
5. Mechanics are responsible for bolting and unbolting connections to the various SNF containers, other than rigging.
6. Riggers are responsible for attaching and removing rigging to and from the various SNF containers. They are also responsible for observing and guiding heavy lift operations.
7. Health physicists are responsible for measuring the radiation fields and contamination associated with the SNF containers. They are also responsible for decontamination activities and for certifying equipment that enters the radiation zone for release.
8. Operators have overall responsibility for the entire facility. Their activities with respect to SNF processing include opening and closing facility doors, operating the machinery used in SNF container processing, and overseeing the acceptance of the SNF container into the facility.
9. Security personnel are responsible for keeping the facility secure while the CHB railbay doors are open and for verifying that no contraband is introduced to the facility inside of SNF containers.
10. Quality Assurance/Control personnel are responsible to assure that the chain of custody paperwork is properly filled out and for observing hold points in the process to assure proper fitment and placement of SNF containers.
11. Mechanics, riggers, and health physicists (i.e. radiation protection technicians, or radiation control technicians) are assumed to work in pairs. They typically are only near the waste package when needed. If remote monitoring is utilized, the number of health physicists can be reduced in the work area.
12. Duration fractions are only assigned to workers who are in the radiation zone adjacent to the SNF container. Other people may be in the vicinity, but they will remain outside of the radiation zone in accordance with ALARA principles.
13. Although all personnel in the vicinity are accumulating dose, the dose rate for the general area is low and accumulated doses to personnel in the vicinity are insignificant when determined on an individual DPC basis.

1 - C-PAD, Current Commercial storage on Concrete pad (Base Case)

Vertical DPCs - DPCs in storage casks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use Jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty storage cask on receiving cell transfer cart**		**90**													
	a)	Prepare an empty storage cask for use	15	-							0	0	0	0	0	0
	b)	Place the empty storage cask on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the storage cask	10	-							0	0	0	0	0	0
	d)	Unbolt storage cask lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty storage cask in receiving cell using motorized cart**		**45**													
	a)	Open receiving cellshield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty storage cask into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0

10)	**Position shielded transfer sleeve cart over unloading cell**		**35**														
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
11)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**														
	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
12)	**Raise DPC into shield sleeve**		**60**														
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
13)	**Position shielded transfer sleeve cart over storage cask in receiving cell**		**70**														
	a)	Position shielded transfer sleeve cart over storage cask in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Lower DPC into empty storage cask, release grapple, and retract hoist**		**60**														
	a)	Lower DPC into empty storage cask, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
15)	**Remove lifting lug from DPC**		**35**														
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the storage cask	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
16)	**Open receiving cell shield doors and transfer storage cask out of receiving cell**		**35**														
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer storage cask out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
17)	**Install storage cask lid**		**60**														
	a)	Position VCT with storage cask lid at storage cask	15	-							0	0	0	0	0	0
	b)	Lower storage cask lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
17a)	**Secure seismic restraints**		**40**														
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
17b)	**Plan of the Day and Safety Meeting**		**30**														
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
18)	**Pick up storage cask and transfer to pad using VCT**		**120**														
	a)	Rig VCT to lift storage cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the DPC on the pad	20	-							0	0	0	0	0	0
	d)	De-rig storage cask from VCT	10	2A V T		2					0	6.7	0	0	0	0
	e)	Bolt DPC to the pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**26.2**													
18a)	**Turnover to Operations**		**1440**														
19)	**Return VCT to CHB**		**60**	-							0	0	0	0	0	0
20)	**Open unloading cell shield doors and position transfer cart under jib crane**		**120**	-							0	0	0	0	0	0
21)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
22)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
22a)	**Reposition the railcar to the railbay**		**60**	-							0	0	0	0	0	0
22b)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
23)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
24)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
25)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**61.2**								126	60	51	0	11	2.8

Horizontal DPCs - DPCs in Horizontal Storage Modules on pad			**Duration**	**Dose**	**Duration Fraction**						**Task Dose**					
			(Minutes)		**M**	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	3.7	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	1.8	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0

	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Stage Horizontal Cask Transporter (HCT) in truck bay**		**60**													
	a)	Open truck bay door	15	-							0	0	0	0	0	0
	b)	Position HCT in truck bay	30	-							0	0	0	0	0	0
	c)	Close truck bay door	15	-							0	0	0	0	0	0
4)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	15	-							0	0	0	0	0	0
	e)	Move transport cask to HCT	10	-							0	0	0	0	0	0
	f)	Downend transport cask on HCT	10	-							0	0	0	0	0	0
4a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4b)	**Secure transport cask on HCT**		**40**													
	a)	Position HCT near seismic restraint tie-downs	15	-							0	0	0	0	0	0
	b)	Install seismic restraint tie-downs	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4c)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to HSM on pad via HCT**		**120**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Open the truck bay door	15	-							0	0	0	0	0	0
	c)	Transfer the transport cask to HSM on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Horizontal Storage Module (HSM)**		**120**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to HSM port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post radiation zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**70**													
	a)	Security inspection of transport cask to verify lack of contraband	10	-							0	0	0	0	0	0
	b)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	c)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	d)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**21.2**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to Cask Handling Building via HCT**		**120**	-							0	0	0	0	0	0
10a)	**Plan of the Day and Safety Meeting**		**30**	-							0	0	0	0	0	0
11)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
11a)	**survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
11b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
12)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
13)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
14)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.7**								80	47	51	0	11	8.2

2A - C-STDa, Pad Storage using Vertical Standard Storage Overpack

Vertical DPCs - DPCs in standardized overpacks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty vertical standardized overpack on receiving cell transfer cart**		**90**													
	a)	Prepare an empty standardized overpack for use	15	-							0	0	0	0	0	0
	b)	Place the empty standardized overpack on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the standardized overpack	10	-							0	0	0	0	0	0
	d)	Unbolt standardized overpack lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty standardized overpack in receiving cell using motorized cart**		**45**													
	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty standardized overpack into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
10)	**Position shielded transfer sleeve cart over unloading cell**		**35**													
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
11)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**													

	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
12)	**Raise DPC into shield sleeve**		**60**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
13)	**Position shielded transfer sleeve cart over standardized overpack in receiving cell**		**70**													
	a)	Position shielded transfer sleeve over standardized overpack in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Lower DPC into empty standardized overpack, release grapple, and retract hoist**		**60**													
	a)	Lower DPC into empty standardized overpack, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
15)	**Remove lifting lug from DPC**		**35**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the standardized overpack	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
16)	**Open receiving cell shield doors and transfer standardized overpack out of receiving cell**		**35**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer standardized overpack out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
17)	**Install standardized overpack lid**		**60**													
	a)	Position VCT with standardized overpack lid at standardized overpack	15	-							0	0	0	0	0	0
	b)	Lower standardized overpack lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
17a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
17b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
18)	**Pick up standardized overpack and transfer to pad using VCT**		**120**													
	a)	Rig VCT to lift standardized overpack	10	2A V T		2					0	6.7	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the DPC on the pad	20	-							0	0	0	0	0	0
	d)	De-rig standardized overpack from VCT	10	2A V T		2					0	6.7	0	0	0	0
	e)	Bolt DPC to the pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**26.1**													
18a)	**Turnover to Operations**		**1440**													
19)	**Return VCT to CHB**		**60**	-							0	0	0	0	0	0
20)	**Open unloading cell shield doors and position transfer cart under jib crane**		**120**	-							0	0	0	0	0	0
21)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
22)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
22a)	**Reposition the railcar to the railbay**		**60**	-							0	0	0	0	0	0
22b)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
23)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
24)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
25)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**61.1**								126	60	51	0	11	2.8

Horizontal DPCs - DPCs in vertical standardized overpacks on pad			**Duration (Minutes)**	**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													

	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	15	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	30	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**120**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Stage standardized overpack on upender using VCT**		**180**													
	a)	Move the VCT into position	5	-							0	0	0	0	0	0
	b)	Grapple the standardized overpack	5	-							0	0	0	0	0	0
	c)	Pick the standardized overpack	15	-							0	0	0	0	0	0
	d)	Reposition the VCT at the upender in the transfer cell	15	-							0	0	0	0	0	0
	e)	Place the standardized overpack on the upender	10	-							0	0	0	0	0	0
5)	**Unbolt and hoist overpack lid and retain on VCT**		**60**													
	a)	Stage tools on top of the standardized overpack	10	-							0	0	0	0	0	0
	b)	Unbolt overpack lid	30	-							0	0	0	0	0	0
	c)	Rig the overpack lid to the VCT hoist	10	-							0	0	0	0	0	0
	d)	Lift lid to the storage position of the VCT	10	-							0	0	0	0	0	0
	e)	Remove grapples and back the VCT out of the transfer cell	10	-							0	0	0	0	0	0
6)	**Downend standardized overpack on upender**		**60**													
	a)	Secure standardized overpack to upender	15	-							0	0	0	0	0	0
	b)	Hoist docking collar to top of standardized overpack and bolt in place	30	-							0	0	0	0	0	0
	c)	Downend the standardized overpack to the horizontal position	15	-							0	0	0	0	0	0
7)	**Remove transport cask lid**		**95**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Position jib crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store Nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7a)	**Secure transport cask and transfer fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
7b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
8)	**Dock transfer sleeve on horizontal transfer cart with transport cask**		**75**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move horizontal transfer cart into position	10	-							0	0	0	0	0	0
	c)	Align transport cask with transfer sleeve	15	-							0	0	0	0	0	0
	d)	Dock transfer sleeve to transport cask	15	-							0	0	0	0	0	0
	e)	Install retaining straps on transport cask trunnions	15	2A H T		1.5					0	12	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Push DPC into transfer sleeve**		**60**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Engage ram and push DPC into the transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	5	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Decouple horizontal transfer cart from transport cask and close shield door**		**20**													
	a)	Remove retaining straps from transfer sleeve	10	2A H T		0.2					0	1.1	0	0	0	0
	b)	Undock transfer sleeve from transport cask	10	-							0	0	0	0	0	0
11)	**Roll horizontal transfer cart onto turntable and rotate 180°**		**30**													
	a)	Roll horizontal transfer cart to turntable and lock wheels	10	-							0	0	0	0	0	0
	b)	Rotate turntable 180°	20	-							0	0	0	0	0	0
12)	**Roll horizontal transfer cart to upending cell and dock with standardized overpack**		**45**													
	a)	Unlock wheels and roll horizontal transfer cart to upending cell	10	-							0	0	0	0	0	0
	b)	Dock transfer sleeve to standardized overpack on upender	20	-							0	0	0	0	0	0
	c)	Attach retaining straps to transfer sleeve trunnions	15	2A H T		0.5					0	4	0	0	0	0
13)	**Push DPC from transfer sleeve into standardized overpack**		**65**													
	a)	Plug in hydraulic power pack on horizontal transfer cart	15	-							0	0	0	0	0	0
	b)	Engage ram and push DPC into the standardized overpack	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Undock horizontal transfer cart**		**50**													
	a)	Remove retaining straps from standardized overpack	15	2A H T		0.2					0	1.6	0	0	0	0
	b)	Unplug hydraulic power pack on horizontal transfer cart	15	-							0	0	0	0	0	0
	c)	Undock transfer sleeve from standardized overpack	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15)	**Upend standardized overpack**		**30**													
	a)	Close shield door to upender cell	10	-							0	0	0	0	0	0
	b)	Upend the standardized overpack	15	-							0	0	0	0	0	0
	c)	Set locking mechanism on upender	5	-							0	0	0	0	0	0
16)	**Install lid on standardized overpack**		**60**													
	a)	Open outer shield doors to upender cell	10	-							0	0	0	0	0	0
	b)	Position VCT at standardized overpack on upender	15	-							0	0	0	0	0	0
	c)	Lower standardized overpack lid into place using the VCT	15	-							0	0	0	0	0	0
	d)	Stage tools on manlift	10	-							0	0	0	0	0	0
	e)	Install bolts and torque	20	2A H T	1.5						16	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	g)	Move manlift away	5	-							0	0	0	0	0	0
16a)	**Secure transport cask and transfer fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0

	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
17)	**Pick up standardized overpack and transfer to pad using VCT**		**130**													
	a)	Rig VCT to lift standardized overpack	10	-							0	0	0	0	0	0
	b)	Open CHB Doors	10	-							0	0	0	0	0	0
	c)	Back the VCT out of the receiving cell	10	-							0	0	0	0	0	0
	d)	Drive to storage pad location	80	-							0	0	0	0	0	0
	e)	Position the DPC on the pad	20	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**30.7**													
17a)	**Turnover to Operations**		**1440**													
18)	**Return VCT to CHB**		**120**	-							0	0	0	0	0	0
19)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
20)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
20a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
20b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
21)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
22)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
23)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.5**								69	60	50	0	13	0

2B - C-STDb, Pad Storage Using Standard Storage Overpacks

Vertical DPCs - DPCs in standardized overpacks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty vertical standardized overpack on receiving cell transfer cart**		**90**													
	a)	Prepare an empty standardized overpack for use	15	-							0	0	0	0	0	0
	b)	Place the empty standardized overpack on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the standardized overpack	10	-							0	0	0	0	0	0
	d)	Unbolt standardized overpack lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty standardized overpack in receiving cell using motorized cart**		**45**													
	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty standardized overpack into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
10)	**Position shielded transfer sleeve cart over unloading cell**		**35**													
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
11)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**													

	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
12)	**Raise DPC into shield sleeve**		**60**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
13)	**Position shielded transfer sleeve cart over standardized overpack in receiving cell**		**70**													
	a)	Position shielded transfer sleeve over standardized overpack in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Lower DPC into empty standardized overpack, release grapple, and retract hoist**		**60**													
	a)	Lower DPC into empty standardized overpack, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
15)	**Remove lifting lug from DPC**		**35**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the standardized overpack	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
16)	**Open receiving cell shield doors and transfer standardized overpack out of receiving cell**		**35**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer standardized overpack out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
17)	**Install standardized overpack lid**		**60**													
	a)	Position VCT with standardized overpack lid at standardized overpack	15	-							0	0	0	0	0	0
	b)	Lower standardized overpack lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
17a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
17b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
18)	**Pick up standardized overpack and transfer to pad using VCT**		**120**													
	a)	Rig VCT to lift standardized overpack	10	2A V T		2					0	6.7	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the DPC on the pad	20	-							0	0	0	0	0	0
	d)	De-rig standardized overpack from VCT	10	2A V T		2					0	6.7	0	0	0	0
	e)	Bolt DPC to the pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**26.1**													
18a)	**Turnover to Operations**		**1440**													
19)	**Return VCT to CHB**		**60**	-							0	0	0	0	0	0
20)	**Open unloading cell shield doors and position transfer cart under jib crane**		**120**	-							0	0	0	0	0	0
21)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
22)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
22a)	**Reposition the railcar to the railbay**		**60**	-							0	0	0	0	0	0
22b)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
23)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
24)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
25)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**61.1**								126	60	51	0	11	2.8

Horizontal DPCs - DPCs in Horizontal Standardized Overpacks on pad			**Duration (Minutes)**	**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	3.7	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	1.8	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Stage Horizontal Cask Transporter (HCT) in truck bay**		**60**													

	a)	Open truck bay door	15	-							0	0	0	0	0	0
	b)	Position HCT in truck bay	30	-							0	0	0	0	0	0
	c)	Close truck bay door	15	-							0	0	0	0	0	0
4)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	15	-							0	0	0	0	0	0
	e)	Move transport cask to HCT	10	-							0	0	0	0	0	0
	f)	Downend transport cask on HCT	10	-							0	0	0	0	0	0
4a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4b)	**Secure transport cask on HCT**		**40**													
	a)	Position HCT near seismic restraint tie-downs	15	-							0	0	0	0	0	0
	b)	Install seismic restraint tie-downs	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4c)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to HSM on pad via HCT**		**120**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Open the truck bay door	15	-							0	0	0	0	0	0
	c)	Transfer the transport cask to HSM on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Horizontal Storage Module (HSM)**		**120**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to HSM port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post radiation zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**70**													
	a)	Security inspection of transport cask to verify lack of contraband	10	-							0	0	0	0	0	0
	b)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	c)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	d)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**21.2**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to Cask Handling Building via HCT**		**120**	-							0	0	0	0	0	0
10a)	**Plan of the Day and Safety Meeting**		**30**	-							0	0	0	0	0	0
11)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
11a)	**survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
11b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
12)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
13)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
14)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.7**								80	47	51	0	11	8.2

2C - C-STDc, pad Storage using a Horizontal Standard Storage overpack

Vertical DPCs - DPCs in horizontal standardized overpacks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
4)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
5)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including leak detection	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
6)	**Receive adaptor frame from overpack fabrication yard**		**60**													
7)	**Unpack and inspect adaptor frame**		**60**	-							0	0	0	0	0	0
8)	**Pick transfer cask from HCT and stage on CHB crane bay floor near upender cell**		**60**	-							0	0	0	0	0	0
9)	**Remove transfer cask lid with jib crane**		**60**	-							0	0	0	0	0	0
10)	**Install adaptor frame into transfer cask with cask handling bridge crane**		**60**	-							0	0	0	0	0	0
11)	**Hoist transfer cask with adaptor frame and downend onto horizontal transport cart**		**30**	-							0	0	0	0	0	0
12)	**Strap docking collar to end of transfer cask**		**15**	-							0	0	0	0	0	0
12a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
12b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
13)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to DPC	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
14)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask transfer cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
15)	**Position shielded transfer sleeve cart over unloading cell**		**35**													
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**60**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
17)	**Raise DPC into shield sleeve**		**85**													
	a)	Raise DPC into shield Sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	15	-							0	0	0	0	0	0

	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
18)	**Position shielded transfer sleeve cart over intermediate transfer cask in upender cell**		**70**													
	a)	Position shielded transfer sleeve cart over intermediate transfer cask on upender	60	-							0	0	0	0	0	0
	b)	HP survey	10	-							0	0	0	0	0	0
19)	**Lower DPC into intermediate transfer cask, release grapple, and retract hoist**		**70**													
	a)	Lower DPC into intermediate transfer cask, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	10	-							0	0	0	0	0	0
20)	**Remove lifting lug from DPC and bolt grapple ring to top of DPC**		**65**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the intermediate transfer cask	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug for hoisting	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
	e)	Hoist grapple ring lug to top of DPC	10	-							0	0	0	0	0	0
	f)	Bolt grapple ring lug to top of DPC	20	2 V T	0.5						25	0	0	0	0	0
21)	**Downend intermediate transfer cask**		**5**													
	a)	Downend intermediate transfer cask	5	-							0	0	0	0	0	0
22)	**Dock upender to horizontal transfer cart**		**45**													
	a)	Align and dock horizontal transfer cart with upender	15	-							0	0	0	0	0	0
	b)	Install retaining straps	15	2A V T		1					0	5	0	0	0	0
	c)	Extend ram and engage grapple ring on canister	15	-							0	0	0	0	0	0
22)	**Transfer DPC into transfer cask on horizontal transfer cart**		**55**													
	a)	Pull DPC into transfer cask on horizontal cart	30	-							0	0	0	0	0	0
	b)	Disengage ram from grapple ring and fully retract	15	1C V C	0.2						5.9	0	0	0	0	0
	c)	Install port cover in base of transfer cask	10	1B V C	0.2						4.5	0	0	0	0	0
23)	**Undock upender from horizontal transfer cart**		**15**													
	a)	Unstrap docking collar from transfer cask on horizontal transfer cart	10	4 V X		0.5					0	15	0	0	0	0
	b)	Undock horizontal transfer cart from upender	5	-							0	0	0	0	0	0
24)	**Install transfer cask lid**		**45**													
	a)	Hoist and position transfer cask lid using the jib crane	15	-							0	0	0	0	0	0
	b)	Install bolts and torque	20	5 H H	2						5.7	0	0	0	0	0
	c)	QC Hold Point Inspection	10	5 H H						0.5	0	0	0	0	0	0.7
24a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
24b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
25)	**Hoist transfer cask from horizontal transfer cart and place on HCT**		**70**													
	a)	Rig transfer cask for lifting	10	4 H T		2					0	11	0	0	0	0
	b)	Hoist transfer cask with cask handling bridge crane and place on HCT	60	-							0	0	0	0	0	0
26)	**Move transfer cask to the pad using the HCT**		**70**													
	a)	Open CHB truck bay doors	10	-							0	0	0	0	0	0
	b)	Move transfer cask to pad using HCT	60	-							0	0	0	0	0	0
27)	**Preparation of Horizontal Storage Module (HSM)**		**135**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig stick crane to HSM port cover	20	2C H T L		2					0	1	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	20	1A H T L	2						12	0	0	0	0	0
	e)	Post radiation zone signs and barriers	15	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
28)	**Remove transfer cask lid**		**95**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid	15	1A H T L			1				0	0	4.6	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		1					0	4.6	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transfer cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transfer cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
29)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
30)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
31)	**Install transfer cask lid**		**70**													
	a)	Security inspection of transport cask to verify lack of contraband	10	-							0	0	0	0	0	0
	b)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	c)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	d)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**36.5**													
31a)	**Turnover to Operations**		**1440**													
32)	**Return transfer cask to Cask Handling Building via HCT**		**120**	-							0	0	0	0	0	0
33)	**Open unloading cell shield doors and position transport cask under jib crane**		**30**	-							0	0	0	0	0	0
34)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
35)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
36)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
37)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
38)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0

39)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**70.0**								167	91	64	0	18	11

Horizontal DPCs - DPCs in Horizontal Standardized Overpacks on pad			**Duration**	**Dose**	**Duration Fraction**						**Task Dose**					
			(Minutes)		**M**	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	3.7	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	1.8	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Stage Horizontal Cask Transporter (HCT) in truck bay**		**60**													
	a)	Open truck bay door	15	-							0	0	0	0	0	0
	b)	Position HCT in truck bay	30	-							0	0	0	0	0	0
	c)	Close truck bay door	15	-							0	0	0	0	0	0
4)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	15	-							0	0	0	0	0	0
	e)	Move transport cask to HCT	10	-							0	0	0	0	0	0
	f)	Downend transport cask on HCT	10	-							0	0	0	0	0	0
4a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4b)	**Secure transport cask on HCT**		**40**													
	a)	Position HCT near seismic restraint tie-downs	15	-							0	0	0	0	0	0
	b)	Install seismic restraint tie-downs	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4c)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to HSM on pad via HCT**		**120**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Open the truck bay door	15	-							0	0	0	0	0	0
	c)	Transfer the transport cask to HSM on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Horizontal Storage Module (HSM)**		**120**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to HSM port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post radiation zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0

	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**70**													
	a)	Security inspection of transport cask to verify lack of contraband	10	-							0	0	0	0	0	0
	b)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	c)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	d)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**21.2**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to Cask Handling Building via HCT**		**120**	-							0	0	0	0	0	0
10a)	**Plan of the Day and Safety Meeting**		**30**	-							0	0	0	0	0	0
11)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
11a)	**survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
11b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
12)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
13)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
14)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.7**								80	47	51	0	11	8.2

3 - C-UGS, underground storage

Vertical DPCs - DPCs in underground silos			Duration (Min)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty transfer cask on receiving cell transfer cart**		**90**													
	a)	Prepare an empty transfer cask for use	15	-							0	0	0	0	0	0
	b)	Place the empty transfer cask on receiving cell transfer cart	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	d)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty transfer cask in receiving cell using motorized cart**		**45**													
	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty transfer cask into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
9)	**Position shielded transfer sleeve cart over unloading cell**		**40**													
	a)	Inspect transfer sleeve cart	15	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**45**													

	a)	Lower shield sleeve hoist and grapple DPC Lifting Lug	30	-							0	0	0	0	0	0
	b)	HP survey	15	-							0	0	0	0	0	0
11)	**Raise DPC into shield sleeve**		**75**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	15	-							0	0	0	0	0	0
12)	**Position shielded transfer sleeve cart over transfer cask in receiving cell**		**35**													
	a)	Position shielded transfer sleeve cart over transfer cask in receiving cell	10	-							0	0	0	0	0	0
	b)	HP survey	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
13)	**Lower DPC into empty transfer cask, release grapple, and retract hoist**		**45**													
	a)	Lower DPC into empty transfer cask, release grapple and retract hoist	30	-							0	0	0	0	0	0
	b)	HP survey	15	1D V C			0.2				0	0	3.1	0	0	0
14)	**Remove lifting lug from DPC**		**35**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the transfer cask	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC	10	-							0	0	0	0	0	0
14a)	**Secure the DPC and the transfer cask seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
15)	**Pick up transfer cask and transfer to underground storage cell using VCT**		**30**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer transfer cask out of receiving cell using motorized cart	10	-							0	0	0	0	0	0
16)	**Install transfer cask lid**		**60**													
	a)	Position VCT with transfer cask lid at transfer cask	15	-							0	0	0	0	0	0
	b)	Lower transfer cask lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
18)	**Pick up transfer cask and transfer to pad using VCT**		**80**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	d)	Drive to storage pad location	70	-							0	0	0	0	0	0
19)	**Install mating device on Cavity Enclosure Container (CEC)**		**230**													
	a)	Position crane and rig to the underground storage cell cover	30	-							0	0	0	0	0	0
	b)	Move cover to the storage stand	15	-							0	0	0	0	0	0
	c)	Transport the docking collar and mating device to the site.	30	-							0	0	0	0	0	0
	d)	Inspect CEC	15	-							0	0	0	0	0	0
	e)	Rig the docking collar to the crane	10	-							0	0	0	0	0	0
	f)	Position the docking collar on CEC	30	-							0	0	0	0	0	0
	g)	Attach docking collar to the CEC	15	-							0	0	0	0	0	0
	h)	Rig the mating device to the crane	10	-							0	0	0	0	0	0
	i)	Position the mating device on CEC	30	-							0	0	0	0	0	0
	j)	Attach mating device to the CEC	15	-							0	0	0	0	0	0
	k)	Test mechanism	20	-							0	0	0	0	0	0
	l)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
20)	**Dock transfer cask to underground storage cell and remove rigging**		**25**													
	a)	Position VCT at vault	5	-							0	0	0	0	0	0
	b)	Dock transfer cask with underground storage cell	10	4 V S	2						37	0	0	0	0	0
	c)	Remove rigging	10	-							0	0	0	0	0	0
21)	**Rig DPC to VCT for vertical lift**		**45**													
	a)	HP survey	15	-							0	0	0	0	0	0
	b)	Bolt lifting cleats to DPC	15	1B V C	1						34	0	0	0	0	0
	c)	Attach rigging to DPC	15	1C V C		0.5					0	15	0	0	0	0
22)	**Remove transfer cask base using docking collar**		**30**													
	a)	Remove transfer cask base	30	4 V S	0.3						17	0	0	0	0	0
23)	**Lower DPC into underground storage cell**		**70**													
	a)	Lower DPC into empty storage cell	60	-							0	0	0	0	0	0
	b)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
24)	**Access top of DPC (by ladder inside transfer cask) and remove rigging**		**60**													
	a)	HP survey	15	-							0	0	0	0	0	0
	b)	Stage tools on top of the DPC inside of the transfer cask	10	-							0	0	0	0	0	0
	c)	Remove rigging from DPC	15	1B V C		0.3					0	10	0	0	0	0
	d)	Remove lifting cleats	15	1B V C	1						34	0	0	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
25)	**Withdraw DPC rigging and replace transfer cask base**		**30**													
	a)	Withdraw DPC rigging	15	-							0	0	0	0	0	0
	b)	Replace transfer cask base	15	2C H T L	2						0.8	0	0	0	0	0
26)	**Re-Rig transfer cask to VCT and undock from underground storage cell**		**45**													
	a)	Re-rig the transfer cask	15	-							0	0	0	0	0	0
	b)	Undock from underground storage cell	15	2C H T L	2						0.8	0	0	0	0	0
	c)	Back the VCT away from the underground storage cell	15	-							0	0	0	0	0	0
27)	**Install underground storage cell cover**		**85**													
	a)	Rig the storage cell cover	15	-							0	0	0	0	0	0
	b)	Pick with crane and place on underground storage cell	15	-							0	0	0	0	0	0
	c)	Bolt the cover down	15	-							0	0	0	0	0	0
	d)	Remove rigging and reposition crane	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**35.1**													
27a)	**Turnover to Operations**		**1440**													
27b)	**Plan of the Day and Safety Meeting**		**30**	-							0	0	0	0	0	0
28)	**Return VCT to CHB**		**120**	-							0	0	0	0	0	0
29)	**Open unloading cell shield doors and position transport cask under jib crane**		**60**	-							0	0	0	0	0	0
27)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
30)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
30a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
30b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
31)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
32)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0

33)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**70.6**								176	68	54	0	11	2.8

Horizontal DPCs - DPCs in lifting frames in underground silos			**Duration (Min)**	**Dose**	**Du**						**Tas**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	30	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Stage transfer cask on upender using VCT**		**50**													
	a)	Move the VCT into position	5	-							0	0	0	0	0	0
	b)	Grapple the transfer cask	5	-							0	0	0	0	0	0
	c)	Pick the transfer cask	15	-							0	0	0	0	0	0
	d)	Reposition the VCT at the upender in the transfer cell	15	-							0	0	0	0	0	0
	e)	Place the transfer cask on the upender	10	-							0	0	0	0	0	0
5)	**Unbolt and hoist transfer cask lid and retain on VCT**		**70**													
	a)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	b)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	c)	Rig lid to the VCT hoist	10	-							0	0	0	0	0	0
	d)	Lift lid to the storage position of the VCT	10	-							0	0	0	0	0	0
	e)	Remove grapples and back VCT out of the transfer cell	10	-							0	0	0	0	0	0
5a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
5b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5c)	**Load lifting frame into transfer cask using jib crane**		**85**													
	a)	Move lifting frame into position using a transfer cart	15	-							0	0	0	0	0	0
	b)	Rig the lifting frame onto the jib crane	15	-							0	0	0	0	0	0
	c)	Hoist the lifting frame and load it into the transfer cask	15	-							0	0	0	0	0	0
	d)	Lift docking collar and place on top of transfer cask	10	-							0	0	0	0	0	0
	e)	Strap docking collar to top of transfer cask	15	-							0	0	0	0	0	0
	f)	Remove the rigging and secure the jib crane	15	-							0	0	0	0	0	0
6)	**Downend transfer cask on upender**		**30**													
	a)	Secure transfer cask to upender	15	-							0	0	0	0	0	0
	b)	Downend the transfer cask to the horizontal position	15	-							0	0	0	0	0	0
7)	**Remove transport cask lid**		**100**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Position jib crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	30	1A H T L	2						18	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0

	g)	Security inspection of the interior of the transport cask	10	1A H T NL					0.2		0	0	0	0	5.4	0
7a)	**Secure transport cask and Transfer Fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
7b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
8)	**Dock transfer sleeve on horizontal transfer cart with transport cask**		**75**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move transfer sleeve into position	10	-							0	0	0	0	0	0
	c)	Align transport cask with transfer sleeve	15	-							0	0	0	0	0	0
	d)	Dock transfer sleeve to transport cask	15	-							0	0	0	0	0	0
	e)	Install retaining straps on transport cask trunnions	15	2A H T		1.5					0	12	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Push DPC into lift frame inside transfer cask**		**75**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Engage ram and push DPC into transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Undock horizontal transfer cart from transport cask**		**30**													
	a)	Remove retaining straps from transfer sleeve	10	2A H T		0.2					0	1.1	0	0	0	0
	b)	Pull horizontal transfer cart back	10	-							0	0	0	0	0	0
	c)	Close shield door on transfer sleeve	10	-							0	0	0	0	0	0
11)	**Roll horizontal transfer cart onto turntable and rotate 180°**		**30**													
	a)	Roll transfer cart to turntable lock wheels	10	-							0	0	0	0	0	0
	b)	Rotate turntable 180°	20	-							0	0	0	0	0	0
12)	**Roll horizontal transfer cart to upending cell and dock with transfer cask on upender**		**45**													
	a)	Unlock wheels and roll transfer cart to upending cell	10	-							0	0	0	0	0	0
	b)	Dock transfer sleeve to transfer cask on upender	20	-							0	0	0	0	0	0
	c)	Attach retaining straps to transfer sleeve trunnions	15	2A H T		0.5					0	4	0	0	0	0
13)	**Push DPC from transfer sleeve into lift frame in transfer cask**		**65**													
	a)	Plug in hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	b)	Engage ram and push DPC into the lift frame in the transfer cask	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Undock horizontal transfer cart**		**50**													
	a)	Remove retaining straps from transfer cask	15	2A H T		0.2					0	1.6	0	0	0	0
	b)	Unplug hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	c)	Undock transfer cart and remove	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15)	**Upend transfer cask**		**30**													
	a)	Close shield door to upender cell	10	-							0	0	0	0	0	0
	b)	Upend the transfer cask	15	-							0	0	0	0	0	0
	c)	Set locking mechanism on upender	5	-							0	0	0	0	0	0
16)	**Install lid on transfer cask**		**85**													
	a)	Open outer shield doors to upender cell	10	-							0	0	0	0	0	0
	b)	Position VCT at transfer cask on upender	15	-							0	0	0	0	0	0
	c)	Lower transfer cask lid into place using the VCT	15	-							0	0	0	0	0	0
	d)	Stage tools on manlift	10	-							0	0	0	0	0	0
	e)	Install bolts and torque	20	2A H T	1.5						16	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	g)	Move manlift away	5	-							0	0	0	0	0	0
16a)	**Secure transport cask and Transfer Fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
17)	**Pick up transfer cask and transfer to underground storage cell using VCT**		**90**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Open CHB doors	10	-							0	0	0	0	0	0
	c)	Back the VCT out of the receiving cell	10	-							0	0	0	0	0	0
	d)	Drive to storage pad location	60	-							0	0	0	0	0	0
18)	**Install mating device on Cavity Enclosure Container (CEC)**		**230**													
	a)	Position crane and rig to the underground storage cell cover	30	-							0	0	0	0	0	0
	b)	Move cover to the storage stand	15	-							0	0	0	0	0	0
	c)	Transport the docking collar and mating device to the site.	30	-							0	0	0	0	0	0
	d)	Inspect CEC	15	-							0	0	0	0	0	0
	e)	Rig the docking collar to the crane	10	-							0	0	0	0	0	0
	f)	Position the docking collar on CEC	30	-							0	0	0	0	0	0
	g)	Attach docking collar to the CEC	15	-							0	0	0	0	0	0
	h)	Rig the mating device to the crane	10	-							0	0	0	0	0	0
	i)	Position the mating device on CEC	30	-							0	0	0	0	0	0
	j)	Attach mating device to the CEC	15	-							0	0	0	0	0	0
	k)	Test mechanism	20	-							0	0	0	0	0	0
	l)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
19)	**Dock transfer cask to underground storage cell and remove rigging**		**25**													
	a)	Position VCT at underground storage cell	5	-							0	0	0	0	0	0
	b)	Dock transfer cask with underground storage cell	10	4 V S	2						37	0	0	0	0	0
	c)	Remove rigging	10	-							0	0	0	0	0	0
20)	**Rig DPC to VCT for vertical lift and hoist**		**45**													
	a)	HP survey	15	-							0	0	0	0	0	0
	b)	Bolt lifting cleats to DPC	15	1B V C	1						34	0	0	0	0	0
	c)	Attach rigging to DPC	15	1C V C		0.5					0	15	0	0	0	0
21)	**Remove transfer cask base using docking collar**		**30**													
	a)	Remove transfer cask base	30	4 V S	0.3						17	0	0	0	0	0
22)	**Lower DPC into underground storage cell**		**70**													
	a)	Lower DPC into empty storage cell	60	-							0	0	0	0	0	0
	b)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
23)	**Access top of DPC (by ladder inside transfer cask) and remove rigging**		**60**													
	a)	HP survey	15	-							0	0	0	0	0	0

	b)	Stage tools on top of the DPC inside of the transfer cask	10	-							0	0	0	0	0	0
	c)	Remove rigging from DPC	15	1B V C		0.3					0	10	0	0	0	0
	d)	Remove lifting cleats	15	1B V C	1						34	0	0	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
24)	**Withdraw DPC rigging and replace transfer cask base**		**30**													
	a)	Withdraw DPC rigging	15	-							0	0	0	0	0	0
	b)	Replace transfer cask base	15	2C H T L	2						0.8	0	0	0	0	0
25)	**Re-Rig transfer cask to VCT and undock from underground storage cell**		**45**													
	a)	Re Rig the transfer cask	15	-							0	0	0	0	0	0
	b)	Undock from underground storage cell	15	2C H T L	2						0.8	0	0	0	0	0
	c)	Back the VCT away from the underground storage cell	15	-							0	0	0	0	0	0
26)	**Install underground storage cell cover**		**80**													
	a)	Rig the storage cell cover	15	-							0	0	0	0	0	0
	b)	Pick with crane and place on underground storage cell	15	-							0	0	0	0	0	0
	c)	Bolt the cover Down	15	-							0	0	0	0	0	0
	d)	Remove rigging and reposition crane	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**38.1**													
27a)	**Turnover to Operations**		**1440**													
27b)	**Plan of the Day and Safety Meeting**		**30**	-							0	0	0	0	0	0
28)	**Return VCT to CHB**		**120**	-							0	0	0	0	0	0
29)	**Open unloading cell shield doors and position transport cask under jib crane**		**60**	-							0	0	0	0	0	0
30)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
31)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
31a)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
31b)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
32)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
33)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
34)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**73.6**								197	91	50	0	12	0

4A, 5A - C-BGVa/AGVa, Below/Above Ground Vault with Integral CHB - Vertical (only) Storage

DPCs stored vertically in vault floor			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at vault**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Position shielded transfer sleeve on bridge crane above transfer cell**		**30**													
	a)	Inspect shielded transfer sleeve	5	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
8)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**100**													
	a)	Lower shield sleeve hoist and grapple DPC lifting lug	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	c)	HP survey	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
10)	**Remove shield plug above vault storage location**		**60**													
	a)	Position crane over storage location in vault	30	-							0	0	0	0	0	0
	b)	Rig the shield plug	15	-							0	0	0	0	0	0
	c)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
11)	**Lower DPC into storage position on vault floor**		**70**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
12)	**Replace shield plug above vault storage location**		**85**													

	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the operating floor recess	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**20.7**													
12a)	**Turnover to Operations**		**1440**													
13)	**Return crane to operating floor**		**60**	-							0	0	0	0	0	0
14)	**Remove transport cask from transfer cell**		**60**	-							0	0	0	0	0	0
15)	**Install transport cask lid**		**60**													
16)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
16a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
17)	**Lift transport cask, place on railcar, and downend**		**60**	-							0	0	0	0	0	0
17a)	**Plan of the Day and Safety Meeting**		**30**													
18)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
19)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.2**								72	42	46	0	11	2.5

DPCs in lift frames stored vertically in vault floor			**Duration (Minutes)**	**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at vault**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	15	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	30	-							0	0	0	0	0	0
4)	**Remove transport cask lid**		**80**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.2		0	0	0	0	2.7	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Load lift frame into upender using jib crane**		**85**													
	a)	Move lifting frame into position using a transfer cart	15	-							0	0	0	0	0	0
	b)	Rig the lifting frame onto the jib crane	15	-							0	0	0	0	0	0
	c)	Hoist the lifting frame and load it into the transfer sleeve on the upender	15	-							0	0	0	0	0	0
	d)	Lift docking collar and place on top of transfer sleeve	10	-							0	0	0	0	0	0
	e)	Strap docking collar to top of transfer sleeve	15	-							0	0	0	0	0	0
	f)	Remove the rigging and secure the jib crane	15	-							0	0	0	0	0	0
6)	**Downend transfer sleeve with lift frame and dock with transport cask**		**45**													

	a)	Secure transfer cask to upender	15	-							0	0	0	0	0	0
	b)	Downend the transfer sleeve to the horizontal position	30	-							0	0	0	0	0	0
7)	**Dock transfer sleeve on horizontal transfer cart with transport cask**		**75**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move transfer sleeve into position	10	-							0	0	0	0	0	0
	c)	Align transport cask with transfer sleeve	15	-							0	0	0	0	0	0
	d)	Dock transfer sleeve to transport cask	15	-							0	0	0	0	0	0
	e)	Install retaining straps on transport cask trunnions	15	2A H T		1.5					0	12	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
8)	**Push DPC into transfer sleeve**		**75**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Engage ram and push DPC into transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Undock horizontal transfer cart from transport cask and close shield door**		**30**													
	a)	Remove retaining straps from transfer sleeve	10	2A H T		0.2					0	1.1	0	0	0	0
	b)	Pull horizontal transfer cart back	10	-							0	0	0	0	0	0
	c)	Close shield door on transfer sleeve	10	-							0	0	0	0	0	0
10)	**Roll horizontal transfer cart onto turntable and rotate 180°**		**30**													
	a)	Roll transfer cart to turntable Lock wheels	10	-							0	0	0	0	0	0
	b)	Rotate turntable 180°	20	-							0	0	0	0	0	0
11)	**Roll horizontal transfer cart to upending cell and dock transfer cart with upender**		**40**													
	a)	Unlock wheels and roll transfer cart to upending cell	10	-							0	0	0	0	0	0
	d)	Dock transfer cart with upender	20	-							0	0	0	0	0	0
	e)	Strap docking collar to transfer sleeve on transfer cart	10	2A H T		2					0	11	0	0	0	0
12)	**Push DPC into lift frame inside transfer cask**		**65**													
	a)	plug in hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	b)	Engage ram and push DPC into the lift frame in the upender transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
13)	**Undock transport cask**		**50**													
	a)	Remove retaining straps from transfer sleeve on upender	15	2A H T		0.2					0	1.6	0	0	0	0
	b)	Unplug hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	c)	Undock transfer cart and remove	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Upend transfer sleeve with lift frame**		**30**													
	a)	Close shield door to upender cell	10	-							0	0	0	0	0	0
	b)	Upend the transfer sleeve	15	-							0	0	0	0	0	0
	c)	Set locking mechanism on upender	5	-							0	0	0	0	0	0
15)	**Position shielded transfer sleeve above transfer cell**		**70**													
	a)	Inspect shielded transfer sleeve	15	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	30	-							0	0	0	0	0	0
	c)	Secure in position	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15a)	**Secure shielded transfer sleeve and DPC seismically**		**40**													
	a)	Reposition seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure shielded transfer sleeve	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
16)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**90**													
	a)	Lower shield sleeve hoist and grapple lift frame	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	45	-							0	0	0	0	0	0
	c)	Close shield sleeve lower doors	15	-							0	0	0	0	0	0
	d)	HP survey	15	-							0	0	0	0	0	0
17)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
18)	**Remove shield plug above vault storage location**		**105**													
	a)	Stage tools in storage vault location	15	-							0	0	0	0	0	0
	b)	Position crane in vault	30	-							0	0	0	0	0	0
	c)	Rig the shield plug	15	-							0	0	0	0	0	0
	d)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
	e)	Disconnect rigging and return crane to cask handling area	30	-							0	0	0	0	0	0
19)	**Lower DPC and lift frame into storage position on vault floor**		**85**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	d)	HP survey	15	-							0	0	0	0	0	0
20)	**Replace shield plug above vault storage location**		**85**													
	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the vault	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**29.8**													
20a)	**Turnover to Operations**		**1440**													
21)	**Return crane to Operating Floor**		**60**	-							0	0	0	0	0	0
22)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
23)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
23a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
24)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
25)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
26)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**61.8**								53	66	50	0	9	0

4B, 5B - C-BGVb/AGVb, Below/Above Ground Vault with Integral CHB - Vertical and Horizontal Storage

DPCs stored vertically in vault floor			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at vault**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Position shielded transfer sleeve on bridge crane above transfer cell**		**30**													
	a)	Inspect shielded transfer sleeve	5	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
8)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**100**													
	a)	Lower shield sleeve hoist and grapple DPC lifting lug	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	c)	HP survey	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
10)	**Remove shield plug above vault storage location**		**60**													
	a)	Position crane over storage location in vault	30	-							0	0	0	0	0	0
	b)	Rig the shield plug	15	-							0	0	0	0	0	0
	c)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
11)	**Lower DPC into storage position on vault floor**		**70**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
12)	**Replace shield plug above vault storage location**		**85**													

	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the operating floor recess	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**20.7**													
12a)	**Turnover to Operations**		**1440**													
13)	**Return crane to operating floor**		**60**	-							0	0	0	0	0	0
14)	**Remove transport cask from transfer cell**		**60**	-							0	0	0	0	0	0
15)	**Install transport cask lid**		**60**													
16)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
16a)	**survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
17)	**Lift transport cask, place on railcar, and downend**		**60**	-							0	0	0	0	0	0
17a)	**Plan of the Day and Safety Meeting**		**30**													
18)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
19)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**54.2**								72	42	46	0	11	2.5

DPCs in lift frames stored horizontal in concrete pedestals in vault			**Duration**	**Dose**	**Duration Fraction**						**Task Dose**					
			(Minutes)		**M**	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at vault**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	15	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	30	-							0	0	0	0	0	0
4)	**Remove transport cask lid**		**80**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.2		0	0	0	0	2.7	0
5)	**Dock transport cask with port for transfer cart inside horizontal canister handling area**		**70**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Check alignment	20	-							0	0	0	0	0	0
	c)	Dock transport cask with port for transfer cart inside horizontal vault	30	2A H T	0.2						3.2	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2C H T L						1	0	0	0	0	0	0.3
6)	**Open port and push DPC through onto vault horizontal transfer cart**		**80**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Open vault port door	10	-							0	0	0	0	0	0
	c)	Engage ram and push DPC onto vault horizontal transfer cart	30	-							0	0	0	0	0	0
	d)	Withdraw the ram	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	2C H T NL						1	0	0	0	0	0	1.2
7)	**Close vault port door**		**45**													
	a)	HP survey	15	-							0	0	0	0	0	0
	b)	Close vault port door	30	-							0	0	0	0	0	0
8)	**Transfer DPC to horizontal vault storage location**		**135**													
	a)	Open vault inner shield door	15	-							0	0	0	0	0	0
	b)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
9)	**Lower transfer cart carriage to place DPC onto horizontal storage rack**		**35**													

	a)	Check alignment	15	-							0	0	0	0	0	0
	b)	Lower transfer cart carriage	20	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**15.6**													
9)	**Turnover to Operations**		**1440**													
10)	**Return transfer cart to Transfer Port and Realign**		**60**	-							0	0	0	0	0	0
11)	**Undock transport cask**		**60**	-							0	0	0	0	0	0
12)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
13)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
13a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
13b)	**Reposition empty railcar**		**60**	-							0	0	0	0	0	0
14)	**Lift transport cask and place on railcar**		**30**	-							0	0	0	0	0	0
15)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
16)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**49.1**								56	38	42	0	2.7	1.4

4C, 5C - C-BGVc/AGVc, Below/Above Ground vault with Separate CHB - Vertical (only) storage

Vertical DPCs stored vertically in vault floor			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty transfer cask on receiving cell transfer cart**		**90**													
	a)	Prepare an empty transfer cask for use	15	-							0	0	0	0	0	0
	b)	Place the empty transfer cask on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	d)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty transfer cask in receiving cell using motorized cart**		**45**													
	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0

	b)	Transfer empty transfer cask into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
9)	**Position shielded transfer sleeve cart over unloading cell**		**35**													
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**													
	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
11)	**Raise DPC into shield sleeve**		**60**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
12)	**Position shielded transfer sleeve cart over transfer cask in receiving cell**		**70**													
	a)	Position shielded transfer sleeve cart over transfer cask in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
13)	**Lower DPC into empty transfer cask, release grapple, and retract hoist**		**60**													
	a)	Lower DPC into empty transfer cask, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
14)	**Open receiving cell shield doors and transfer transfer cask out of receiving cell**		**35**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer transfer cask out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
15)	**Install transfer cask lid**		**60**													
	a)	Position VCT with transfer cask lid at transfer cask	15	-							0	0	0	0	0	0
	b)	Lower transfer cask lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
15a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
16)	**Pick up transport cask and transfer to vault using VCT**		**55**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Grapple the transport cask	15	-							0	0	0	0	0	0
	c)	Move the transfer cask to the vault	30	-							0	0	0	0	0	0
17)	**Place transfer cask on transfer cart**		**15**													
	a)	Place transfer cask on unloading cell transfer cart in vault	15	-							0	0	0	0	0	0
18)	**Remove transfer cask lid**		**75**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid	15	2A V T			2				0	0	10	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		2					0	10	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
19)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
20)	**Position shielded transfer sleeve on bridge crane above transfer cell**		**30**													
	a)	Inspect shielded transfer sleeve	5	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
20a)	**Secure transfer sleeve seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
20b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
21)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**100**													
	a)	Lower shield sleeve hoist and grapple DPC lifting lug	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	c)	HP survey	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
22)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
23)	**Remove shield plug above vault storage location**		**60**													
	a)	Position crane over storage location in vault	30	-							0	0	0	0	0	0
	b)	Rig the shield plug	15	-							0	0	0	0	0	0
	c)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
24)	**Lower DPC into storage position on vault floor**		**70**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
25)	**Replace shield plug above vault storage location**		**85**													
	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the vault	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0

		Total Hours of Canister Handling Operations	**35.8**														
25a)	**Turnover to Operations**		**1440**														
26)	**Return crane to operating floor**		**120**	-							0	0	0	0	0	0	
27)	**Remove transport cask from transfer cell**		**60**	-							0	0	0	0	0	0	
28)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0	
29)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0	
29a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0	
29b)	**Reposition empty railcar to railbay**		**60**	-							0	0	0	0	0	0	
30)	**Lift transport cask, place on railcar, and downend**		**60**	-							0	0	0	0	0	0	
31)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0	
32)	**Release railcar for shipment**		**30**	-							0	0	0	0	0	0	
		Total Hours of All Cask Handling Operations	**70.3**								92	58	56	0	11	2.5	

DPCs in lift frames stored vertically in vault floor			**Duration (Minutes)**	**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	30	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Stage transfer cask on upender using VCT**		**50**													
	a)	Move the VCT into position	5	-							0	0	0	0	0	0
	b)	Grapple the transfer cask	5	-							0	0	0	0	0	0
	c)	Pick the transfer cask	15	-							0	0	0	0	0	0
	d)	Reposition the VCT at the upender in the transfer cell	15	-							0	0	0	0	0	0
	e)	Place the transfer cask on the upender	10	-							0	0	0	0	0	0
5)	**Unbolt and hoist transfer cask lid and retain on VCT**		**70**													
	a)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	b)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	c)	Rig lid to the VCT hoist	10	-							0	0	0	0	0	0
	d)	Lift lid to the storage position of the VCT	10	-							0	0	0	0	0	0
	e)	Remove grapples and back VCT out of the transfer cell	10	-							0	0	0	0	0	0
5a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
5b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0

	c)	Transportation to work site	5	-							0	0	0	0	0	0
5c)	**Load lifting frame into transfer cask using jib crane**		**85**													
	a)	Move lifting frame into position using a transfer cart	15	-							0	0	0	0	0	0
	b)	Rig the lifting frame onto the jib crane	15	-							0	0	0	0	0	0
	c)	Hoist the lifting frame and load it into the transfer cask	15	-							0	0	0	0	0	0
	d)	Lift docking collar and place on top of transfer cask	10	-							0	0	0	0	0	0
	e)	Strap docking collar to top of transfer cask	15	-							0	0	0	0	0	0
	f)	Remove the rigging and secure the jib crane	15	-							0	0	0	0	0	0
6)	**Downend transfer cask on upender**		**30**													
	a)	Secure transfer cask to upender	15	-							0	0	0	0	0	0
	b)	Downend the transfer cask to the horizontal position	15	-							0	0	0	0	0	0
7)	**Remove transport cask lid**		**100**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Position jib crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	30	1A H T L	2						18	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the transfer fixture	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	10	1A H T NL					0.2		0	0	0	0	5.4	0
7a)	**Secure transport cask and transfer fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
7b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
8)	**Dock transfer sleeve on horizontal transfer cart with transport cask**		**75**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move transfer sleeve into position	10	-							0	0	0	0	0	0
	c)	Align transport cask with transfer sleeve	15	-							0	0	0	0	0	0
	d)	Dock transfer sleeve to transport cask	15	-							0	0	0	0	0	0
	e)	Install retaining straps on transport cask trunnions	15	2A H T		1.5					0	12	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Push DPC into lift frame inside transfer cask**		**75**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Engage ram and push DPC into transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Undock horizontal transfer cart from transport cask**		**30**													
	a)	Remove retaining straps from transfer sleeve	10	2A H T		0.2					0	1.1	0	0	0	0
	b)	Pull horizontal transfer cart back	10	-							0	0	0	0	0	0
	c)	Close shield door on transfer sleeve	10	-							0	0	0	0	0	0
11)	**Roll horizontal transfer cart onto turntable and rotate 180°**		**30**													
	a)	Roll transfer cart to turntable lock wheels	10	-							0	0	0	0	0	0
	b)	Rotate turntable 180°	20	-							0	0	0	0	0	0
12)	**Roll horizontal transfer cart to upending cell and dock with transfer cask on upender**		**45**													
	a)	Unlock wheels and roll transfer cart to upending cell	10	-							0	0	0	0	0	0
	b)	Dock transfer sleeve to transfer cask on upender	20	-							0	0	0	0	0	0
	c)	Attach retaining straps to transfer sleeve trunnions	15	2A H T		0.5					0	4	0	0	0	0
13)	**Push DPC from transfer sleeve into lift frame in transfer cask**		**65**													
	a)	Plug in hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	b)	Engage ram and push DPC into the lift frame in the transfer cask	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Undock horizontal transfer cart**		**50**													
	a)	Remove retaining straps from transfer cask	15	2A H T		0.2					0	1.6	0	0	0	0
	b)	Unplug hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	c)	Undock transfer cart and remove	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15)	**Upend transfer cask**		**30**													
	a)	Close shield Door to upender cell	10	-							0	0	0	0	0	0
	b)	Upend the transfer cask	15	-							0	0	0	0	0	0
	c)	Set locking mechanism on upender	5	-							0	0	0	0	0	0
16)	**Install lid on transfer cask**		**85**													
	a)	Open outer shield doors to upender cell	10	-							0	0	0	0	0	0
	b)	Position VCT at transfer cask on upender	15	-							0	0	0	0	0	0
	c)	Lower transfer cask lid into place using the VCT	15	-							0	0	0	0	0	0
	d)	Stage tools on manlift	10	-							0	0	0	0	0	0
	e)	Install bolts and torque	20	2A H T	1.5						16	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	g)	Move manlift away	5	-							0	0	0	0	0	0
16a)	**Secure transport cask and Transfer Fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
17)	**Transfer transfer cask to vault**		**60**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Open transfer cell shield doors and back VCT out of cell	20	-							0	0	0	0	0	0
	c)	Move transfer cask to vault	30	-							0	0	0	0	0	0
12)	**Lift transfer cask and place on transfer cart**		**40**													
	a)	Lift Transfer Cask and place on Transfer cell motorized cart	30	-							0	0	0	0	0	0
	b)	QC Hold Point Inspection	10	-							0	0	0	0	0	0

13)	**Remove transfer cask cover using jib crane and set down**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Remove and store nuts	30	1A H T L	2						18	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	1A V C					0.2		0	0	0	0	8.5	0
15)	**Roll transfer cart into transfer cell and close shield doors**		**30**													
	a)	Move transfer cask cart into the unloading cell	20	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
16)	**Position shielded transfer sleeve above transfer cell**		**70**													
	a)	Inspect shielded transfer sleeve	15	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	30	-							0	0	0	0	0	0
	c)	Secure in position	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16a)	**Secure shielded transfer sleeve and DPC seismically**		**40**													
	a)	Reposition seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure shielded transfer sleeve	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
17)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**90**													
	a)	Lower shield sleeve hoist and grapple lift frame	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	45	-							0	0	0	0	0	0
	c)	Close shield sleeve lower doors	15	-							0	0	0	0	0	0
	d)	HP survey	15	-							0	0	0	0	0	0
18)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
19)	**Remove shield plug above vault storage location**		**105**													
	a)	Stage tools in storage vault location	15	-							0	0	0	0	0	0
	b)	Position crane in vault	30	-							0	0	0	0	0	0
	c)	Rig the shield plug	15	-							0	0	0	0	0	0
	d)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
	e)	Disconnect rigging and return crane to cask handling area	30	-							0	0	0	0	0	0
20)	**Lower DPC and lift frame into storage position on vault floor**		**85**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	d)	HP survey	15	-							0	0	0	0	0	0
21)	**Replace shield plug above vault storage location**		**85**													
	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the vault	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**39.1**													
21a)	**Turnover to Operations**		**1440**													
22)	**Return crane to Operating Floor**		**60**	-							0	0	0	0	0	0
23)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
24)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
24a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
25)	**Lift transport cask and place on railcar**		**60**	-							0	0	0	0	0	0
26)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
27)	**Release railcar for shipment**		**60**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**71.1**								94	75	59	0	20	0

4D, 5D - C-BGVd/AGVd, Below/Above Ground Vault with Separate CHB - Vertical and Horizontal Storage

Vertical - DSCs stored vertically in vault floor			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty transfer cask on receiving cell transfer cart**		**90**													
	a)	Prepare an empty transfer cask for use	15	-							0	0	0	0	0	0
	b)	Place the empty transfer cask on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	d)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	e)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty transfer cask in receiving cell using motorized cart**		**45**													

	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty transfer cask into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
9)	**Position shielded transfer sleeve cart over unloading cell**		**35**													
	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**													
	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
11)	**Raise DPC into shield sleeve**		**60**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
12)	**Position shielded transfer sleeve cart over transfer cask in receiving cell**		**70**													
	a)	Position shielded transfer sleeve cart over transfer cask in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
13)	**Lower DPC into empty transfer cask, release grapple, and retract hoist**		**60**													
	a)	Lower DPC into empty transfer cask, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
14)	**Open receiving cell shield doors and transfer transfer cask out of receiving cell**		**35**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer transfer cask out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
15)	**Install transfer cask lid**		**60**													
	a)	Position VCT with transfer cask lid at transfer cask	15	-							0	0	0	0	0	0
	b)	Lower transfer cask lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
15a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
16)	**Pick up transport cask and transfer to vault using VCT**		**55**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Grapple the transport cask	15	-							0	0	0	0	0	0
	c)	Move the transfer cask to the vault	30	-							0	0	0	0	0	0
17)	**Place transfer cask on transfer cart**		**15**													
	a)	Place transfer cask on unloading cell transfer cart in vault	15	-							0	0	0	0	0	0
18)	**Remove transfer cask lid**		**75**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid	15	2A V T			2				0	0	10	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		2					0	10	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
19)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
20)	**Position shielded transfer sleeve on bridge crane above transfer cell**		**30**													
	a)	Inspect shielded transfer sleeve	5	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
20a)	**Secure transfer sleeve seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
20b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
21)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**100**													
	a)	Lower shield sleeve hoist and grapple DPC lifting lug	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	c)	HP survey	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
22)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-							0	0	0	0	0	0
23)	**Remove shield plug above vault storage location**		**60**													
	a)	Position crane over storage location in vault	30	-							0	0	0	0	0	0
	b)	Rig the shield plug	15	-							0	0	0	0	0	0
	c)	Lift shield plug and place on storage stand	15	-							0	0	0	0	0	0
24)	**Lower DPC into storage position on vault floor**		**70**													
	a)	Align DPC over storage position	15	-							0	0	0	0	0	0
	b)	Lower DPC into vault	45	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
25)	**Replace shield plug above vault storage location**		**85**													
	a)	Rig the shield plug to the crane	15	-							0	0	0	0	0	0
	b)	Reposition the shield plug	15	-							0	0	0	0	0	0
	c)	Lower the shield plug into the vault	15	-							0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0

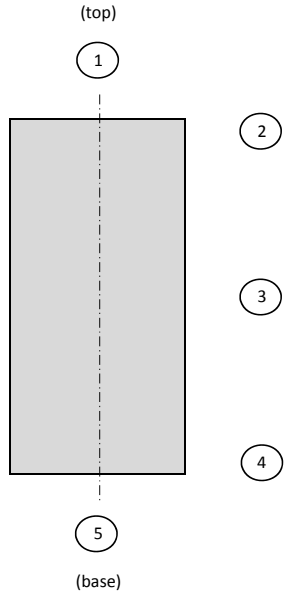
	f)	HP survey	15	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**35.8**													
25a)	**Turnover to Operations**		**1440**													
26)	**Return crane to operating floor**		**120**	-							0	0	0	0	0	0
27)	**Remove transport cask from transfer cell**		**60**	-							0	0	0	0	0	0
28)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
29)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
29a)	**Survey and wipedown transport cask**		**60**	-							0	0	0	0	0	0
29b)	**Reposition empty railcar to railbay**		**60**	-							0	0	0	0	0	0
30)	**Lift transport cask, place on railcar, and downend**		**60**	-							0	0	0	0	0	0
31)	**Install impact limiters on transport cask**		**120**	-							0	0	0	0	0	0
32)	**Release railcar for shipment**		**30**	-							0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**70.3**								92	58	56	0	11	2.5

Horizontal -DSCs stored horizontally in racks in vault			**Duration**	**Dose**	**Duration Fraction**						**Task Dose**					
			(Minutes)		**M**	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on transfer fixture**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Move transport cask to transfer fixture	30	-							0	0	0	0	0	0
	f)	Downend transport cask on transfer fixture	15	-							0	0	0	0	0	0
4)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4a)	**Secure transport cask and transfer fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Remove transport cask lid**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	d)	Remove and store nuts	30	1A H T L	2						18	0	0	0	0	0
	e)	Lift the transport cask lid and move it to the transfer fixture	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	1A H T NL					0.2		0	0	0	0	5.4	0
6)	**Dock transfer sleeve on horizontal transfer cart with transport cask**		**75**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move transfer sleeve into position	10	-							0	0	0	0	0	0

	c)	Align transport cask with transfer sleeve	15	-							0	0	0	0	0	0
	d)	Dock transfer sleeve to transport cask	15	-							0	0	0	0	0	0
	e)	Install retaining straps on transport cask trunnions	15	2A H T		1.5					0	12	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
7)	**Push DPC into transfer cask**		**75**													
	a)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	b)	Engage ram and push DPC into transfer sleeve	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
8)	**Undock horizontal transfer cart from transport cask**		**30**													
	a)	Remove retaining straps from transport cask	10	2A H T		0.2					0	1.1	0	0	0	0
	b)	Pull horizontal transfer cart back	10	-							0	0	0	0	0	0
	c)	Close shield door on transfer sleeve	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**60**	-							0	0	0	0	0	0
10)	**Lift transport cask and transfer to maintenance**		**60**	-							0	0	0	0	0	0
10a)	**Secure transport cask and transfer fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
10b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
11)	**Stage transfer cask on transfer fixture using HCT**		**35**													
	a)	Move the HCT with a transfer cask next to the transfer fixture	5	-							0	0	0	0	0	0
	b)	Rig the transfer cask for hoisting	5	-							0	0	0	0	0	0
	c)	Pick the transfer cask	15	-							0	0	0	0	0	0
	d)	Downend the transfer cask on the transfer fixture	10	-							0	0	0	0	0	0
12)	**Unbolt and hoist transfer cask lid using jib crane**		**50**													
	a)	Rig transfer cask lid to jib crane	10	-							0	0	0	0	0	0
	b)	Unbolt transfer cask lid	30	-							0	0	0	0	0	0
	c)	Hoist lid and remove	10	-							0	0	0	0	0	0
13)	**Dock horizontal transfer cart with transfer cask on transfer fixture**		**45**													
	a)	Unlock wheels and position transfer cart at transfer fixture	10	-							0	0	0	0	0	0
	b)	Dock transfer sleeve to transfer cask on transfer fixture	20	-							0	0	0	0	0	0
	c)	Attach retaining straps to transfer cask trunnions	15	2A H T		0.5					0	4	0	0	0	0
14)	**Push DPC from transfer sleeve into transfer cask**		**65**													
	a)	Plug in hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	b)	Engage ram and push DPC into the lift frame in the transfer cask	30	-							0	0	0	0	0	0
	c)	Withdraw the ram	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
15)	**Undock horizontal transfer cart**		**50**													
	a)	Remove retaining straps from transfer cask	15	2A H T		0.2					0	1.6	0	0	0	0
	b)	Unplug hydraulic power pack on transfer cart	15	-							0	0	0	0	0	0
	c)	Undock transfer cart and remove	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16)	**Install lid on transfer cask**		**70**													
	a)	Hoist transfer cask lid into place using jib crane	15	-							0	0	0	0	0	0
	b)	Stage tools on manlift	10	-							0	0	0	0	0	0
	c)	Install bolts and torque	30	2A H T	2						32	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Move manlift away	5	-							0	0	0	0	0	0
17)	**Transfer transfer cask to vault**		**60**													
	a)	Rig VCT to lift transfer cask	10	2A V T		2					0	6.7	0	0	0	0
	b)	Open transfer cell shield doors and back VCT out of cell	20	-							0	0	0	0	0	0
	c)	Move transfer cask to vault	30	-							0	0	0	0	0	0
18)	**Lift transfer cask and place on transfer cart**		**40**													
	a)	Lift Transfer Cask and place on Transfer cell motorized cart	30	-							0	0	0	0	0	0
	b)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
18a)	**Secure transport cask and Transfer Fixture seismically**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
18b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
19)	**Remove transfer cask cover using jib crane and set down**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid	15	1A H T L			2				0	0	9.2	0	0	0
	c)	Remove and store nuts	30	1A H T L	2						18	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	1C V C					0.2		0	0	0	0	3.9	0
20)	**Roll transfer cart into transfer cell and close shield doors**		**30**													
	a)	Move transfer cask cart into the unloading cell	20	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
21)	**Position shielded transfer sleeve above transfer cell**		**70**													
	a)	Inspect shielded transfer sleeve	15	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	30	-							0	0	0	0	0	0
	c)	Secure in position	15	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
22)	**Lower hoist, grapple lifting lug, and raise DPC into shield sleeve**		**90**													
	a)	Lower shield sleeve hoist and grapple lift frame	15	-							0	0	0	0	0	0
	b)	Raise DPC into shield sleeve	45	-							0	0	0	0	0	0
	c)	Close shield sleeve lower doors	15	-							0	0	0	0	0	0
	d)	HP survey	15	-							0	0	0	0	0	0

23)	**Transfer DPC to vault storage location**		**120**													
	a)	Transfer DPC to vault storage location	120	-						0	0	0	0	0	0
23a)	**Secure shielded transfer sleeve and DPC seismically**		**40**													
	a)	Reposition seismic restraint system	15	-						0	0	0	0	0	0
	b)	Secure shielded transfer sleeve	15	-						0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-						0	0	0	0	0	0
23b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-						0	0	0	0	0	0
	b)	Safety briefing	10	-						0	0	0	0	0	0
	c)	Transportation to work site	5	-						0	0	0	0	0	0
24)	**Remove shield plug above vault storage location**		**105**													
	a)	Stage tools in storage vault location	15	-						0	0	0	0	0	0
	b)	Position crane in vault	30	-						0	0	0	0	0	0
	c)	Rig the shield plug	15	-						0	0	0	0	0	0
	d)	Lift shield plug and place on storage stand	15	-						0	0	0	0	0	0
	e)	Disconnect rigging and return crane to cask handling area	30	-						0	0	0	0	0	0
25)	**Lower DPC and lift frame into storage position on vault floor**		**85**													
	a)	Align DPC over storage position	15	-						0	0	0	0	0	0
	b)	Lower DPC into vault	45	-						0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-						0	0	0	0	0	0
	d)	HP survey	15	-						0	0	0	0	0	0
26)	**Replace shield plug above vault storage location**		**85**													
	a)	Rig the shield plug to the crane	15	-						0	0	0	0	0	0
	b)	Reposition the shield plug	15	-						0	0	0	0	0	0
	c)	Lower the shield plug into the vault	15	-						0	0	0	0	0	0
	d)	Secure the shield plug and remove rigging	15	-						0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-						0	0	0	0	0	0
	f)	HP survey	15	-						0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**36.3**													
26a)	**Turnover to Operations**		**1440**													
27)	**Return crane to Operating Floor**		**60**	-						0	0	0	0	0	0
28)	**Install transport cask lid**		**60**	-						0	0	0	0	0	0
29)	**Lift transport cask and transfer to maintenance**		**60**	-						0	0	0	0	0	0
29a)	**Survey and wipedown transport cask**		**60**	-						0	0	0	0	0	0
30)	**Lift transport cask and place on railcar**		**60**	-						0	0	0	0	0	0
31)	**Install impact limiters on transport cask**		**120**	-						0	0	0	0	0	0
32)	**Release railcar for shipment**		**60**	-						0	0	0	0	0	0
		Total Hours of All Cask Handling Operations	**68.3**							110	75	59	0	16	0

Container Doses



					Notes:
1 V C	1	V	C	512	transport cask lid removed
1A H T L	1A	H	T	18.4	transport cask lid installed
1A H T NL	1A	H	T	163.2	transport cask lid removed
1A V C	1A	V	C	254	no transfer cask lid
1A V T	1A	V	T	15	impact limiters installed
1B V C	1B	V	C	134	no transfer cask lid
1C V C	1C	V	C	117	no transfer cask lid
1D V C	1D	V	C	62	no transfer cask lid
2 V T	2	V	T	150	transport cask lid removed
2A H T	2A	H	T	31.8	transport cask lid installed
2A V T	2A	V	T	20	transport cask lid installed
2B V X	2B	V	X	125	
2C H T L	2C	H	T	1.5	transport cask lid installed
2C H T NL	2C	H	T	7.1	transport cask lid removed
3 V T	3	V	T	44	
3A V T	3A	V	T	34	
3B V C	3B	V	C	146	
4 H T	4	H	T	31.8	
4 V S	4	V	S	111	
4 V X	4	V	X	177	
4A H H	4A	H	H	2.5	port cover installed
5 H H	5	H	H	8.5	port cover installed
5A H H	5A	H	H	3.2	port cover installed

Study #1 Storage Alternative	Worker Category:	Dose per DPC to Worker by Category* (person-mrem/DPC)							Annual Dose to Unit Worker by Category** (rem/yr)							Number of Workers by Category at 500 mrem/worker							Total Hours	
		Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total	Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total	Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total	Canister Transfer	Cask Handling
	No. of Workers:	2	2	2	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1			
App A1 - C-PAD	Vertical	126	60	51	0	11	3	251	15.8	7.5	6.4	0.0	2.8	0.7	33.2	32	16	13	0	6	2	69	26	61
	Horizontal	80	47	51	0	11	8	198	10.0	5.8	6.4	0.0	2.8	2.0	27.1	21	12	13	0	6	5	57	21	55
App A2 - C-STDa	Vertical	126	60	51	0	11	3	251	15.8	7.5	6.4	0.0	2.8	0.7	33.2	32	16	13	0	6	2	69	26	61
	Horizontal	69	60	50	0	13	0	192	8.6	7.4	6.3	0.0	3.3	0.0	25.6	18	15	13	0	7	0	53	31	55
App A2 - C-STDb	Vertical	126	60	51	0	11	3	251	15.8	7.5	6.4	0.0	2.8	0.7	33.2	32	16	13	0	6	2	69	26	61
	Horizontal	80	47	51	0	11	8	198	10.0	5.8	6.4	0.0	2.8	2.0	27.1	21	12	13	0	6	5	57	21	55
App A2 - C-STDc	Vertical	167	91	64	0	18	11	351	20.8	11.4	7.9	0.0	4.5	2.8	47.5	42	23	16	0	10	6	97	37	70
	Horizontal	80	47	51	0	11	8	198	10.0	5.8	6.4	0.0	2.8	2.0	27.1	21	12	13	0	6	5	57	21	55
App A3 - C-UGS	Vertical	176	68	54	0	11	3	313	22.0	8.5	6.8	0.0	2.8	0.7	40.8	45	18	14	0	6	2	85	35	71
	Horizontal	197	91	50	0	12	0	350	24.7	11.4	6.3	0.0	2.9	0.0	45.2	50	23	13	0	6	0	92	38	74
App A4 - C-BGVa, App	Vertical	72	42	46	0	11	3	173	9.0	5.2	5.8	0.0	2.8	0.6	23.4	18	11	12	0	6	2	49	21	54
A5 - C-AGVa,	Horizontal	53	66	50	0	9	0	178	6.6	8.3	6.3	0.0	2.2	0.0	23.4	14	17	13	0	5	0	49	30	62
App A4 - C-BGVb, App	Vertical	72	42	46	0	11	3	173	9.0	5.2	5.8	0.0	2.8	0.6	23.4	18	11	12	0	6	2	49	21	54
A5 - C-AGVb,	Horizontal	56	38	42	0	3	1	141	7.0	4.8	5.3	0.0	0.7	0.4	18.2	15	10	11	0	2	1	39	16	49
App A4 - C-BGVc, App	Vertical	92	58	56	0	11	3	220	11.5	7.3	7.0	0.0	2.8	0.6	29.2	23	15	14	0	6	2	60	36	70
A5 - C-AGVc,	Horizontal	94	75	59	0	20	0	249	11.7	9.4	7.4	0.0	5.0	0.0	33.6	24	19	15	0	11	0	69	39	71
App A4 - C-BGVd, App	Vertical	92	58	56	0	11	3	220	11.5	7.3	7.0	0.0	2.8	0.6	29.2	23	15	14	0	6	2	60	36	70
A5 - C-AGVd,	Horizontal	110	75	59	0	16	0	260	13.7	9.4	7.4	0.0	3.9	0.0	34.4	28	19	15	0	8	0	70	36	68

	DPC/Year
Vertical:	250
Horizontal:	250

* Dose/DPC = (time in rad zone) * (# workers in rad zone) * (dose in rad zone)

** Annual Dose = (Total dose to worker by category) * (# DPC's per year) / (# workers in rad zone)

NOTES AND ASSUMPTIONS:

1. The data in these spreadsheets are approximate intended to support occupational exposure estimates only. They are neither definitive nor precise enough to support detailed operational decision.
2. The occupational exposure calculations only consider the scope of activities required to place SNF shipments into storage. Ongoing site monitoring activities are not included.
3. These crew sizes and durations are based on commercial nuclear plant ISFSI operations. Durations are based on real world experience, thus include real world worker efficiencies. Work scope is consistent with C-OPS and has been extrapolated to address the other alternates.
4. Duration fractions incorporate both the number of workers of each category performing the activity and the percentage of time that each worker is occupying the radiation zone.
5. Mechanics are responsible for bolting and unbolting connections to the various SNF containers, other than rigging.
6. Riggers are responsible for attaching and removing rigging to and from the various SNF containers. They are also responsible for observing and guiding heavy lift operations.
7. Health physicists are responsible for measuring the radiation fields and contamination associated with the SNF containers. They are also responsible for decontamination activities and for certifying equipment that enters the radiation zone for release.
8. Operators have overall responsibility for the entire facility. Their activities with respect to SNF processing include opening and closing facility doors, operating the machinery used in SNF container processing, and overseeing the acceptance of the SNF container into the facility.
9. Security personnel are responsible for keeping the facility secure while the CHB railbay doors are open and for verifying that no contraband is introduced to the facility inside of SNF containers.
10. Quality Assurance/Control personnel are responsible to assure that the chain of custody paperwork is properly filled out and for observing hold points in the process to assure proper fitment and placement of SNF containers.
11. Mechanics, riggers, and health physicists (i.e. radiation protection technicians, or radiation control technicians) are assumed to work in pairs. They typically are only near the waste package when needed. If remote monitoring is utilized, the number of health physicists can be reduced in the work area.
12. Duration fractions are only assigned to workers who are in the radiation zone adjacent to the SNF container. Other people may be in the vicinity, but they will remain outside of the radiation zone in accordance with ALARA principles.
13. Although all personnel in the vicinity are accumulating dose, the dose rate for the general area is low and accumulated doses to personnel in the vicinity are insignificant when determined on an individual DPC basis.

1 - C-OPS, Current Canister Transfer Operations Using Cask Handling Building (Base Case)

Vertical DPCs - DPCs in storage casks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**125**													
	a)	Identify transport cask brought from yard	5	-							0	0	0	0	0	0
	b)	Operators and Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Stage work team to railbay	15	-							0	0	0	0	0	0
	d)	Open railbay door	5	-							0	0	0	0	0	0
	e)	Position transport cask in the railbay	15	-							0	0	0	0	0	0
	f)	Security inspection of the transport cask and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	g)	HP survey of transport cask	15	3 V T			0.5				0	0	5.5	0	0	0
	h)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	i)	Acceptance of transport cask	5	-							0	0	0	0	0	0
	j)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	k)	Secure the railbay doors	5	-							0	0	0	0	0	0
	l)	Operators and Security team leaves	5	-							0	0	0	0	0	0
	m)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.27	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask in canister transfer cell	15	-							0	0	0	0	0	0
4)	**Secure seismic restraints to Transport Cask**		**95**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Attach Struts to CHB	10	-							0	0	0	0	0	0
	c)	Rig and Lift Seismic Struts 1&2 into position	30	3 V T		0.2					0	4.4	0	0	0	0
	d)	Rig and lift Struts 3&4 into position	30	3 V T		0.2					0	4.4	0	0	0	0
	e)	Bolt Seismic collar together around Transport Cask.	10	3 V T	2						14.7	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
5)	**Stage empty Storage Cask into Transfer Cell using VCT**		**75**													
	a)	Transporter places storage overpack in canister transfer cell	10	-							0	0	0	0	0	0
	b)	Crews mobilize to top of storage overpack	10	-							0	0	0	0	0	0
	c)	Unbolt storage overpack lid	30	-							0	0	0	0	0	0
	d)	Rig storage overpack lid and lift	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
6)	**Retract VCT from transfer cell and close shield doors**		**30**													
	a)	Back the VCT out of the Receiving Cell	20	-							0	0	0	0	0	0
	b)	Close the canister transfer cell shield doors	10	-							0	0	0	0	0	0
7)	**Secure seismic restraints to storage overpack**		**95**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Attach Struts to CHB	10	-							0	0	0	0	0	0
	c)	Rig and Lift Seismic Struts 1&2 into position	30	-							0	0	0	0	0	0
	d)	Rig and lift Struts 3&4 into position	30	-							0	0	0	0	0	0
	e)	Bolt Seismic collar together around storage overpack	10	-							0	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
8)	**Mount adaptor plates to storage overpack**		**75**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Rig and lift adapter plate 1 to top of Storage Cask	5	-							0	0	0	0	0	0
	c)	Bolt Adapter plate 1 to top of cask	30	-							0	0	0	0	0	0
	d)	Rig and lift adapter plate 2 into position	15	-							0	0	0	0	0	0
	e)	Bolt Adapter plate 2 to top of cask	10	-												
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
9)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
10)	**Unbolt and remove transport cask lid using jib crane**		**60**													
	a)	Stage tools on top of the transfer cask	10	-							0	0	0	0	0	0
	b)	Unbolt transport cask lid	30	-							0	0	0	0	0	0
	c)	Rig the cask lid to the stick crane	10	-							0	0	0	0	0	0
	d)	Lift lid and place it on the storage stand	10	-							0	0	0	0	0	0
11)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use Jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0

12)	**Mount adapter plates to top of Transport Cask using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Rig and lift adapter plate 1 to top of Transport Cask	15	-							0	0	0	0	0	0
	c)	Bolt Adapter plate 1 to top of cask	20	2A V T	1.5						10	0	0	0	0	0
	d)	Rig and lift adapter plate 2 into position	15	-							0	0	0	0	0	0
	e)	Bolt Adapter plate 2 to top of cask	20	2A V T	1.5						10	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
13)	**Install the Transfer Cask on Transport Cask using the OTB crane**		**70**													
	a)	Rig Transfer Cask using the OTB Crane	15	-							0	0	0	0	0	0
	b)	Lift Transfer Cask to upper position	15	-							0	0	0	0	0	0
	c)	Reposition the OTB crane	15	-							0	0	0	0	0	0
	d)	Lower Transfer cask onto alignment lugs	15	2A V T		1					0	5	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Bolt Transfer Cask to Transport Cask adapter plate**		**70**													
	a)	Position Man Lifts with bolts and tools	15	-							0	0	0	0	0	0
	b)	Bolt Transfer cask to adapter plate	15	2A V T	2						10	0	0	0	0	0
	c)	Torque bolts	20	2A V T	2						13.3	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
15)	**Raise canister from transport cask up into transfer cask**		**70**													
	a)	Release Lifting block and reposition 200T hoist	5	2 V T	0.3	0.2					3.75	2.5	0	0	0	0
	b)	Position auxiliary hoist over Transfer Cask	5	-							0	0	0	0	0	0
	c)	Lower grapple and grapple DPC	15	-							0	0	0	0	0	0
	d)	Lift DPC into transfer cask	20	-							0	0	0	0	0	0
	e)	Engage locking mechanism	5	-							0	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	g)	Release grapple and withdraw hoist	10	-							0	0	0	0	0	0
15a)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
16)	**Unbolt Transfer Cask from adapter plate**		**70**													
	a)	Position Man Lifts with tools	10	-							0	0	0	0	0	0
	b)	Position OTB crane over transfer cask	15	-							0	0	0	0	0	0
	c)	Secure lifting block to Transfer Cask Trunnions	15	-							0	0	0	0	0	0
	d)	Unbolt Transfer Cask bolts and remove	20	2A V T	2						13.3	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
17)	**Move Transfer Cask from Transport Cask to Storage Overpack**		**65**													
	a)	Lift the Transfer Cask off the Transport Cask	20	-							0	0	0	0	0	0
	b)	Reposition OTB Crane	15	-							0	0	0	0	0	0
	c)	Lower Transfer Cask onto Storage overpack alignment blocks	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
18)	**Bolt Transfer Cask to Storage overpack adapter plate**		**65**													
	a)	Position Man Lifts with bolts and tools	10	-							0	0	0	0	0	0
	b)	Bolt Transfer cask to adapter plate	15	2A V T	2						10	0	0	0	0	0
	c)	Torque bolts	20	2A V T	2						13.3	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
19)	**Lower canister from Transfer Cask into Storage Cask**		**70**													
	a)	Release Lifting block and reposition 200T hoist	5	-							0	0	0	0	0	0
	b)	Position auxiliary hoist over Transfer Cask	10	-							0	0	0	0	0	0
	c)	Lower grapple and grapple DPC	10	-							0	0	0	0	0	0
	d)	Lift DPC to clear locking mechanism	5	-							0	0	0	0	0	0
	e)	Lower Canister into Storage overpack	20	-							0	0	0	0	0	0
	f)	Release grapple and withdraw hoist	10	-							0	0	0	0	0	0
	g)	HP Survey	10	-							0	0	0	0	0	0
20)	**Unbolt Transfer Cask from adapter plate**		**75**													
	a)	Position Man Lifts with tools	10	-							0	0	0	0	0	0
	b)	Reposition 200T hoist over Transfer Cask	15	-							0	0	0	0	0	0
	c)	Grapple the Transfer cask	10	-							0	0	0	0	0	0
	d)	Unbolt Transfer cask from adapter plate	30	2A V T	1						10	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
21)	**Remove Transfer Cask and place into storage**		**60**													
	a)	Lift Transfer Cask off of Storage overpack adaptor plates	15	-							0	0	0	0	0	0
	b)	Reposition overhead Crane	15	-							0	0	0	0	0	0
	c)	Lower Transfer Cask onto location	20	-							0	0	0	0	0	0
	d)	Release Lifting block and raise 200T hoist	10	-							0	0	0	0	0	0
22)	**Remove adapter plates from Storage overpack**		**95**													
	a)	Move tools to Man Lift	5	-							0	0	0	0	0	0
	b)	Attach rigging to Adapter Plate 2	10	2A V T		1					0	3.3	0	0	0	0
	c)	Unbolt Adaptor plate 2	20	2A V T	1.0						6.67	0	0	0	0	0
	d)	Lift Adaptor Plate 2 and place in storage location using stick crane	10	-							0	0	0	0	0	0
	e)	Attach rigging to Adapter Plate 1	10	2A V T		1					0	3.3	0	0	0	0
	f)	Unbolt Adaptor Plate 1	20	2A V T	1.0						6.67	0	0	0	0	0
	g)	Lift Adaptor Plate 1 and place in storage location using stick crane	10	-							0	0	0	0	0	0
	h)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
22a)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
23)	**Remove lifting lug from DPC**		**40**													
	a)	HP Survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the storage overpack	5	-							0	0	0	0	0	0
	c)	Rig the lifting lug assembly to the jib crane and remove the bolts	10	2 V T		1					0	13	0	0	0	0
	d)	Remove the lifting lug from the DPC	10	3 V T		1	1				0	7.3	7.3	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
24)	**Remove seismic/stack-up struts on Storage overpack**		**70**													
	a)	Position Tools	5	-							0	0	0	0	0	0
	b)	Rig Seismic Struts 1&2	5	3A V T		1					0	2.8	0	0	0	0
	b)	Rig seismic struts 3&4	10	3 V T		1					0	7.3	0	0	0	0

	c)	Unbolt Seismic collar around Storage overpack	15	3 V T	1						11	0	0	0	0	0
	d)	Lift the Seismic struts	10	-							0	0	0	0	0	0
	e)	Remove pins from CBH support stantions	10	-							0	0	0	0	0	0
	f)	Move Strut assemblies to storage location	10	-							0	0	0	0	0	0
	g)	Place Strut assemblies into storage	5	-							0	0	0	0	0	0
25)	**Dock VCT with Storage overpack and bolt on lid**		**65**													
	a)	Position VCT	15	-							0	0	0	0	0	0
	b)	Move forward and grapple Storage overpack	15	-							0	0	0	0	0	0
	c)	Move Storage overpack lid into position	15	-							0	0	0	0	0	0
	d)	Bolt Lid onto Storage overpack	15	2A V T	2						10	0	0	0	0	0
	e)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
26)	**Transport Storage overpack to Pad using VCT**		**120**													
	a)	Lift the Storage overpack	10	-							0	0	0	0	0	0
	b)	Drive to storage pad location	70	-							0	0	0	0	0	0
	c)	Position the storage overpack on the Pad	20	-							0	0	0	0	0	0
	d)	Bolt storage overpack to the Pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**35.8**													
26a)	**Turnover to Operations**		**1440**													
27)	**Return VCT to CHB**		**120**													
28)	**Remove adapter plates from Transport Cask**		**60**													
29)	**Install transport cask lid**		**60**													
30)	**Lift transport cask and transfer to maintenance**		**60**													
30a)	**Survey and wipedown Transport Cask**		**60**													
31)	**Lift transport cask and place on railcar**		**60**													
32)	**Install impact limiters on transport cask**		**120**													
33)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**69.8**								241	87	53	0	6.2	2.5

Horizontal DPCs - DPCs in Horizontal Storage Modules on pad				**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**125**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security and operator teams sent to railbay door	15	-							0	0	0	0	0	0
	c)	Stage work team to railbay	15	-							0	0	0	0	0	0
	d)	Open railbay door	5	-							0	0	0	0	0	0
	e)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	f)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	g)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	h)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	i)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	j)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	k)	Secure the railbay doors	5	-							0	0	0	0	0	0
	l)	Operator and Security teams leave	5	-							0	0	0	0	0	0
	m)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.27	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Stage Horizontal Cask Transporter (HCT) in truck bay**		**60**													
	a)	Open truck bay door	15	-							0	0	0	0	0	0
	b)	Position HCT in truck bay	30	-							0	0	0	0	0	0
	c)	Close truck bay door	15	-							0	0	0	0	0	0
4)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	15	-							0	0	0	0	0	0
	e)	Move transport cask to HCT	10	-							0	0	0	0	0	0
	f)	Downend transport cask on HCT	10	-							0	0	0	0	0	0
4a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4b)	**Secure transport cask on HCT**		**40**													
	a)	Position HCT near seismic restraint tie-downs	15	-							0	0	0	0	0	0
	b)	Install seismic restraint tie-downs	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4c)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0

	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to HSM on pad via HCT**		**120**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Open the truck bay door	15	-							0	0	0	0	0	0
	c)	Transfer the transport cask to HSM on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Horizontal Storage Module (HSM)**		**120**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to HSM port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post radiation zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12.3	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.25	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						13.6	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.25	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**60**													
	a)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	b)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	c)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**20.7**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to Cask Handling Building via HCT**		**120**													
10a)	**Plan of the Day and Safety Meeting**		**30**													
11)	**Lift transport cask and transfer to maintenance**		**60**													
11a)	**survey and wipedown transport cask**		**60**													
11b)	**Reposition empty railcar**		**60**													
12)	**Lift transport cask and place on railcar**		**60**													
13)	**Install impact limiters on transport cask**		**120**													
14)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**54.2**								80	47	55	0	13	8.2

2 - A-OPS, Automated Canister Transfer Operations Using Cask Handling Building

Vertical DPCs - DPCs in storage casks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the transport cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near transport cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig tie-down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on unloading cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition transport cask	30	-							0	0	0	0	0	0
	f)	Place transport cask on unloading cell transfer cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid Including gas sampling	15	2A V T			1				0	0	5	0	0	0
	c)	Remove and store nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the transport cask	10	2 V T					0.2		0	0	0	0	5	0
4a)	**Secure transport cask and transfer cart seismically**		**40**													
	a)	Reposition transfer cart near seismic restraint system	15	-							0	0	0	0	0	0
	b)	Secure transport cask and transfer cart	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use Jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in unloading cell and close shield doors**		**60**													
	a)	Move transport cask cart into the unloading cell	50	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
7)	**Stage empty storage overpack on receiving cell transfer cart**		**195**													
	a)	Prepare an empty storage overpack for use	15	-							0	0	0	0	0	0
	b)	Place the empty storage overpack on the transfer cart using VCT	15	-							0	0	0	0	0	0
	c)	Stage tools on top of the storage overpack	10	-							0	0	0	0	0	0
	d)	Unbolt storage overpack lid	30	-							0	0	0	0	0	0
	e)	Rig the overpack lid to the VCT hoist	10	-							0	0	0	0	0	0
	f)	Hoist lid and retain on VCT	10	-							0	0	0	0	0	0
8)	**Position empty storage overpack in receiving cell using motorized cart**		**60**													
	a)	Open receiving cell shield doors	15	-							0	0	0	0	0	0
	b)	Transfer empty storage overpack into receiving cell using motorized cart	15	-							0	0	0	0	0	0
	c)	Close the shield doors	10	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
10)	**Position shielded transfer sleeve cart over unloading cell**		**35**													

	a)	Inspect transfer sleeve cart	10	-							0	0	0	0	0	0
	b)	Move shielded transfer sleeve cart over unloading cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
11)	**Lower shield sleeve hoist and grapple DPC lifting lug**		**50**													
	a)	HP survey	0	-							0	0	0	0	0	0
	b)	Lower shield sleeve hoist and grapple DPC lifting lug	50	-							0	0	0	0	0	0
12)	**Raise DPC into shield sleeve**		**190**													
	a)	Raise DPC into shield sleeve	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
13)	**Position shielded transfer sleeve cart over storage overpack in receiving cell**		**60**													
	a)	Position shielded transfer sleeve cart over storage overpack in receiving cell	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
14)	**Lower DPC into empty storage overpack, release grapple, and retract hoist**		**60**													
	a)	Lower DPC into empty storage overpack, release grapple, and retract hoist	60	-							0	0	0	0	0	0
	b)	HP survey	0	-							0	0	0	0	0	0
15)	**Remove lifting lug from DPC**		**35**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the storage overpack	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
16)	**Open receiving cell shield doors and transfer storage overpack out of receiving cell**		**35**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open receiving cell shield doors	10	-							0	0	0	0	0	0
	c)	Transfer storage overpack out of receiving cell using motorized cart	15	-							0	0	0	0	0	0
17)	**Install storage overpack lid**		**60**													
	a)	Position VCT with storage cask lid at storage overpack	15	-							0	0	0	0	0	0
	b)	Lower storage overpack lid into position	10	-												
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
17a)	**Secure seismic restraints**		**40**													
	a)	Position seismic restraints	15	-							0	0	0	0	0	0
	b)	Secure seismic restraints	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
17b)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
18)	**Pick up storage overpack and transfer to pad using VCT**		**120**													
	a)	Rig VCT to lift storage overpack	10	2A V T		2					0	6.7	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the storage overpack on the pad	20	-							0	0	0	0	0	0
	d)	De-rig storage cask from VCT	10	2A V T		2					0	6.7	0	0	0	0
	e)	Bolt storage overpack to the pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**30.1**													
18a)	**Turnover to Operations**		**1440**													
19)	**Return VCT to CHB**		**60**													
20)	**Open unloading cell shield doors and position transfer cart under jib crane**		**120**													
21)	**Install transport cask lid**		**60**													
22)	**Lift transport cask and transfer to maintenance**		**60**													
22a)	**Reposition the railcar to the railbay**		**60**													
22b)	**Survey and wipedown transport cask**		**60**													
23)	**Lift transport cask and place on railcar**		**60**													
24)	**Install impact limiters on transport cask**		**120**													
25)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**65.1**								126	60	51	0	11	2.8

Horizontal DPCs - DPCs in Horizontal Storage Modules (HSMs) on pad			**Duration (Minutes)**	**Dose**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment brought from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	3.7	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	1.8	0	0	0
	i)	Inspection of tamper proof seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position manlifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first impact limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on second impact limiter	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition manlift and scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the second impact limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0

	k)	Remove and store bolts for personnel barrier	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove tie-down straps from SNF shipment	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect transport cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Stage Horizontal Cask Transporter (HCT) in truck bay**		**60**													
	a)	Open truck bay door	15	-							0	0	0	0	0	0
	b)	Position HCT in truck bay	30	-							0	0	0	0	0	0
	c)	Close truck bay door	15	-							0	0	0	0	0	0
4)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the transport cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to transport cask trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend transport cask	30	-							0	0	0	0	0	0
	d)	Lift transport cask off railcar	15	-							0	0	0	0	0	0
	e)	Move transport cask to HCT	10	-							0	0	0	0	0	0
	f)	Downend transport cask on HCT	10	-							0	0	0	0	0	0
4a)	**Remove railcar from railbay**		**60**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4b)	**Secure transport cask on HCT**		**40**													
	a)	Position HCT near seismic restraint tie-downs	15	-							0	0	0	0	0	0
	b)	Install seismic restraint tie-downs	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
4c)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to HSM on pad via HCT**		**120**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Open the truck bay door	15	-							0	0	0	0	0	0
	c)	Transfer the transport cask to HSM on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Horizontal Storage Module (HSM)**		**120**													
	a)	Stage equipment near HSM	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to HSM port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use manlift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post radiation zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP survey to verify dose rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP survey of lid including gas sampling	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position stick crane	15	-							0	0	0	0	0	0
	d)	Rig the lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the transport cask lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the transport cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DPC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0
	g)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**70**													
	a)	Security inspection of transport cask to verify lack of contraband	10	-							0	0	0	0	0	0
	b)	Pick the transport cask cover from the still attached to the lifting rig	15	-							0	0	0	0	0	0
	c)	Position the transport cask cover on the transport cask	15	-							0	0	0	0	0	0
	d)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**21.2**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to Cask Handling Building via HCT**		**120**													
10a)	**Plan of the Day and Safety Meeting**		**30**													
11)	**Lift transport cask and transfer to maintenance**		**60**													
11a)	**survey and wipedown transport cask**		**60**													
11b)	**Reposition empty railcar**		**60**													
12)	**Lift transport cask and place on railcar**		**60**													
13)	**Install impact limiters on transport cask**		**120**													
14)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**43.9**								80	47	51	0	11	8.2

3 - R-OPS, Remote Canister Transfer Operations Using Cask Handling Building

Vertical DPCs - DPCs in storage casks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at Cask Handling Building**		**145**													
	a)	Identify SNF shipment from yard	5	-							0	0	0	0	0	0
	b)	Security team sent to railbay door	15	-							0	0	0	0	0	0
	c)	Send operators to railbay door	15	-							0	0	0	0	0	0
	d)	Stage work team to railbay	15	-							0	0	0	0	0	0
	e)	Open railbay door	5	-							0	0	0	0	0	0
	f)	Position SNF shipment in the railbay	15	-							0	0	0	0	0	0
	g)	Security inspection of the SNF shipment and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	h)	HP survey of SNF shipment	15	3 V T			0.5				0	0	5.5	0	0	0
	i)	Inspection of tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	j)	Acceptance of SNF shipment	5	-							0	0	0	0	0	0
	k)	Decoupling of railcar and removal of the tug from the railbay	10	-							0	0	0	0	0	0
	l)	Secure the railbay doors	5	-							0	0	0	0	0	0
	m)	Security team leaves	5	-							0	0	0	0	0	0
	n)	Operator leaves	5	-							0	0	0	0	0	0
	o)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the SNF shipment	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near SNF shipment	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first Impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on Impact Limiter #2	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition Manlift and Scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the Second Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second Impact Limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for SNF shipment cover	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the personnel barrier	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift personnel barrier and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove Tie-Down Straps from transport cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect Transport Cask for damage and conduct HP survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on remote cell transfer cart**		**120**													
	a)	Select the appropriate lifting block for the Transport Cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to Transportation Cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend Transportation Cask	30	-							0	0	0	0	0	0
	d)	Lift Transportation Cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition Transportation Cask	30	-							0	0	0	0	0	0
	f)	Place Transportation Cask on remote cell Transfer Cart	15	-							0	0	0	0	0	0
3a)	**Remove railcar from railbay**		**120**													
	a)	Open railbay door	5	-							0	0	0	0	0	0
	b)	Railyard tug connects to railcar	10	-							0	0	0	0	0	0
	c)	Railyard tug removes railcar from railbay	10	-							0	0	0	0	0	0
	d)	Railyard tug connects to next railcar	15	-							0	0	0	0	0	0
	e)	Railyard tug repositions next railcar in railbay	10	-							0	0	0	0	0	0
	f)	Railyard tug leaves railbay and railbay door is closed	10	-							0	0	0	0	0	0
4)	**Unbolt and remove transport cask lid using jib crane**		**75**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	HP survey of lid	5	2A V T			1				0	0	1.7	0	0	0
	c)	Remove and store Nuts	30	2A V T	1						10	0	0	0	0	0
	d)	Rig the Lid for lifting using the local jib crane	15	2A V T		1.5					0	7.5	0	0	0	0
	e)	Lift the Transport Cask Lid and move it to the storage stand	10	-							0	0	0	0	0	0
	f)	Security inspection of the interior of the Transport Cask	10	2 V T					0.2		0	0	0	0	5	0
5)	**Attach lifting lug to top of DPC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use Jib crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
6)	**Position transport cask transfer cart in remote cell and close shield doors**		**15**													
	a)	Move Transport cask cart into the remote cell	10	-							0	0	0	0	0	0
	b)	Close the shield doors	5	-							0	0	0	0	0	0
7)	**Stage empty storage overpack in remote cell using a transfer cart**		**25**													
	a)	Open remote cell shield doors	5	-							0	0	0	0	0	0
	b)	Transfer empty storage overpack into remote cell	15	-							0	0	0	0	0	0
	c)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
8)	**Unbolt empty storage overpack lid and hoist on VCT**		**60**													
	a)	Stage tools on top of the storage overpack	10	-							0	0	0	0	0	0
	b)	Unbolt storage overpack lid	30	-							0	0	0	0	0	0
	c)	Rig the cask lid to the VCT hoist	10	-							0	0	0	0	0	0
	d)	Lift lid to the storage position of the VCT	10	-							0	0	0	0	0	0
9)	**Retract VCT from remote cell and close shield doors**		**15**													
	a)	Back the VCT out of the remote cell	20	-							0	0	0	0	0	0
	b)	Close the shield doors	10	-							0	0	0	0	0	0
10)	**Lower remote cell hoist and grapple DPC lifting lug**		**45**													
	a)	Position remote cell crane over transport cask in remote cell	15	-							0	0	0	0	0	0
	b)	Lower remote cell hoist and grapple DPC Lifting Lug	15	-							0	0	0	0	0	0
	c)	Verify grapple engages	15	-							0	0	0	0	0	0
11)	**Lift the DPC from the Transport Cask**		**70**													
	a)	Raise DPC out of Transport Cask as HP monitors doses outside cell	60	-							0	0	0	0	0	0
	b)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
12)	**Reposition and lower the DPC into the Storage overpack**		**120**													
	a)	Position remote cell crane over storage overpack in remote cell	60	-							0	0	0	0	0	0

	b)	Lower remote cell hoist and place DPC in storage overpack	60	-							0	0	0	0	0	0
13)	**Release grapple, and retract hoist**		**15**													
	a)	Release grapple, and retract hoist	15	-							0	0	0	0	0	0
14)	**Open remote cell shield doors and position VCT at storage overpack**		**70**													
	a)	HP survey	10	-							0	0	0	0	0	0
	b)	Open remote cell shield doors	10	-							0	0	0	0	0	0
	c)	Position the VCT at the Storage overpack	50	-							0	0	0	0	0	0
15)	**Remove lifting lug from DPC**		**40**													
	a)	HP survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Stage tools on top of the storage overpack	5	-							0	0	0	0	0	0
	c)	Remove bolts and rig lifting lug	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	d)	Remove the lifting lug from the DPC using the jib crane	10	-							0	0	0	0	0	0
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
16)	**Install storage cask lid**		**60**													
	a)	Position VCT with storage overpack lid at storage cask	15	-							0	0	0	0	0	0
	b)	Lower storage overpack lid into position	10	-							0	0	0	0	0	0
	c)	Install bolts and torque	20	2A V T	1.5						10	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2A V T						0.1	0	0	0	0	0	0.3
	e)	Clean out tools and leave the top of the DPC	5	-							0	0	0	0	0	0
17)	**Pick up storage overpack and transfer to pad using VCT**		**120**													
	a)	Rig VCT to lift storage overpack	10	2A V T		2					0	6.7	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the storage overpack on the pad	20	-							0	0	0	0	0	0
	d)	De-rig storage overpack from VCT	10	2A V T		2					0	6.7	0	0	0	0
	e)	Bolt storage overpack to the pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**23.5**													
17a)	**Turnover to Operations**		**1440**													
18)	**Return VCT to CHB**		**60**													
20)	**Open remote cell shield doors and position transfer cart under jib crane**		**120**													
20)	**Install transport cask lid**		**60**													
21)	**Lift transport cask and transfer to maintenance**		**60**													
21a)	**Survey and wipedown Transport Cask**		**60**													
21b)	**Reposition empty railcar**		**60**													
22)	**Lift transport cask and place on railcar**		**60**													
23)	**Install impact limiters on transport cask**		**120**													
24)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**58.5**								126	60	48	0	11	2.8

4 - S-OPS, Simplified Canister Transfer Operations Without Cask Handling Building

Vertical DSCs - DSCs in storage casks on pad			Duration (Minutes)	Dose	Duration Fraction						Task Dose					
					M	R	H	O	S	Q	M	R	H	O	S	Q
0)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at the siding**		**100**													
	a)	Identify Transport Cask in yard	5	-							0	0	0	0	0	0
	b)	Stage work team at siding	15	-							0	0	0	0	0	0
	c)	Position Waste Package under gantry crane	15	-							0	0	0	0	0	0
	d)	Security inspection of the Transport Cask	15	3 V T					0.5		0	0	0	0	5.5	0
	e)	HP Survey of Transport Cask	15	3 V T			0.5				0	0	5.5	0	0	0
	f)	Inspection of Tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	g)	Acceptance of Package	5	-							0	0	0	0	0	0
	h)	Decoupling of railcar and removal of the tug from the siding	10	-							0	0	0	0	0	0
	i)	Security team leaves	5	-							0	0	0	0	0	0
	j)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage using the gantry crane**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the Transport Cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near Transport Cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first Impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on Impact Limiter #2	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition Manlift and Scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the Second Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second Impact Limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for package cover	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the package cover	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift package cover and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove Tie-Down Straps from Transport Cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect Transport Cask for damage and conduct HP Survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and place on the pad**		**120**													
	a)	Select the appropriate lifting block for the Transport Cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to Transportation Cask Trunnions	10	2A V T		2					0	6.7	0	0	0	0
	c)	Upend Transportation Cask	30	-							0	0	0	0	0	0
	d)	Lift Transportation Cask off railcar	30	-							0	0	0	0	0	0
	e)	Reposition Transportation Cask	30	-							0	0	0	0	0	0
	f)	Place Transportation Cask on the "spot"	15	-							0	0	0	0	0	0
4)	**Install seismic/stack-up struts on Transport Cask using stick crane**		**95**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Attach Struts to Stantions on pad	10	-							0	0	0	0	0	0
	c)	Rig and Lift Seismic Struts 1&2 into position	30	3 V T		0.2					0	4.4	0	0	0	0
	d)	Rig and lift Struts 3&4 into position	30	3 V T		0.2					0	4.4	0	0	0	0
	e)	Bolt Seismic collar together around Transport Cask.	10	3 V T	2						15	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
5)	**Transporter moves storage overpack into position and removes lid**		**75**													
	a)	Transporter places Storage overpack on "spot"	10	-							0	0	0	0	0	0
	b)	Crews mobilize to top of Storage overpack	10	-							0	0	0	0	0	0
	c)	Unbolt storage overpack lid	30	-							0	0	0	0	0	0
	d)	Rig Storage overpack Lid and lift	15	-							0	0	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
6)	**Mount adapter plates to top of storage overpack using stick crane**		**75**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Rig and lift adapter plate 1 to top of Storage Cask	5	-							0	0	0	0	0	0
	c)	Bolt Adapter plate 1 to top of cask	30	-							0	0	0	0	0	0
	d)	Rig and lift adapter plate 2 into position	15	-							0	0	0	0	0	0
	e)	Bolt Adapter plate 2 to top of cask	10	-							0	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
7)	**Install seismic stack-up struts on storage overpack and weather cover using stick crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Attach Struts to Stantions on pad	5	-							0	0	0	0	0	0
	c)	Rig and Lift Seismic Struts 1&2 into position	30	-							0	0	0	0	0	0
	d)	Rig and lift Struts 3&4 into position	15	2A V T		0.5					0	2.5	0	0	0	0
	e)	Bolt Seismic collar together around Transport Cask.	10	2 V T	0.5						13	0	0	0	0	0
	f)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	g)	Install Weather cover	10	-							0	0	0	0	0	0
7a)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
8)	**Unbolt and remove transport cask lid**		**60**													
	a)	Stage tools on top of the transport cask	10	-							0	0	0	0	0	0
	b)	Unbolt transport cask lid	30	-							0	0	0	0	0	0
	c)	Rig the cask lid to the stick crane	10	-							0	0	0	0	0	0
	d)	Lift lid and place it on the storage stand	10	-							0	0	0	0	0	0
9)	**Attach lifting lug to top of DSC**		**70**													
	a)	Rig lifting lug on storage rack	15	-							0	0	0	0	0	0
	b)	Use stick crane to lift lifting lug into position	15	2A V T		0.5					0	2.5	0	0	0	0
	c)	Bolt Lifting lug to canister	20	2 V T	0.5						25	0	0	0	0	0
	d)	QC Hold Point Inspection	10	2 V T						0.1	0	0	0	0	0	2.5
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
10)	**Mount adapter plates to top of Transport Cask using stick crane**		**85**													
	a)	Move tools to work platform	5	-							0	0	0	0	0	0
	b)	Rig and lift adapter plate 1 to top of Transport Cask	15	-							0	0	0	0	0	0
	c)	Bolt Adapter plate 1 to top of cask	20	2A V T	1.5						10	0	0	0	0	0
	d)	Rig and lift adapter plate 2 into position	15	-							0	0	0	0	0	0
	e)	Bolt Adapter plate 2 to top of cask	20	2A V T	1.5						10	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
11)	**Install the Transfer Cask on Transport Cask using the gantry crane**		**75**													
	a)	Rig Transport Cask using the Gantry crane	15	-							0	0	0	0	0	0
	b)	Lift Transport Cask to upper position	15	-							0	0	0	0	0	0

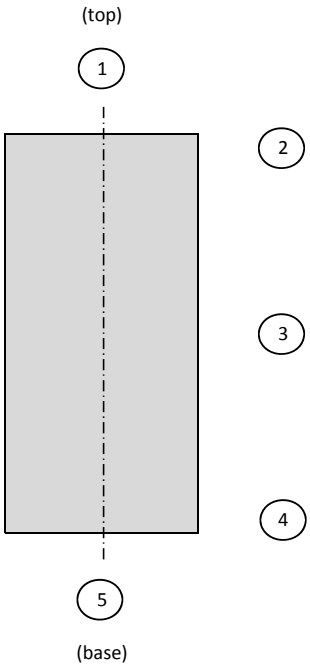
	c)	Reposition the Gantry crane	20	-							0	0	0	0	0	0
	d)	Lower Transport cask onto alignment lugs	15	2A V T		1					0	5	0	0	0	0
	e)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
12)	**Bolt Transfer Cask to adapter plate**		**70**													
	a)	Position Man Lifts with bolts and tools	15	-							0	0	0	0	0	0
	b)	Bolt Transfer cask to adapter plate	15	2A V T	2						10	0	0	0	0	0
	c)	Torque bolts	20	2A V T	2						13	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
13)	**Raise canister from transport cask up into transfer cask**		**105**													
	a)	Release Lifting block and reposition gantry crane hoist	10	2 V T	0.3	0.2					7.5	5	0	0	0	0
	b)	Position auxiliary hoist over Transfer Cask	15	-							0	0	0	0	0	0
	c)	Lower grapple and grapple DSC	20	-							0	0	0	0	0	0
	d)	Lift DSC into transfer cask	15	-							0	0	0	0	0	0
	e)	Engage locking mechanism	15	-							0	0	0	0	0	0
	f)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	g)	Release grapple and withdraw hoist	20	-							0	0	0	0	0	0
13a)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	2A V T	1.5						5	0	0	0	0	0
	c)	Transportation to work site	5	2A V T						0.1	0	0	0	0	0	0.2
14)	**Unbolt Transfer Cask from adapter plate**		**80**													
	a)	Position Man Lifts with tools	15	-							0	0	0	0	0	0
	b)	Position Gantry crane over transfer cask	15	-							0	0	0	0	0	0
	c)	Engage Lifting Block onto Transfer Cask Trunnions	20	-							0	0	0	0	0	0
	d)	Unbolt Transfer Cask bolts and remove	20	2A V T	2						13	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
15)	**Move Transfer Cask from Transport Cask to Storage Cask**		**60**													
	a)	Lift the Transfer Cask off the Transport Cask	15	-							0	0	0	0	0	0
	b)	Reposition Gantry Crane	15	-							0	0	0	0	0	0
	c)	Lower Transfer Cask onto Storage cask alignment blocks	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
16)	**Install weather cover to Transport Cask**		**105**													
	a)	Retrieve Weather Cover from Storage box	60	-							0	0	0	0	0	0
	b)	Position Man Lifts on either side of Transport Cask	15	-							0	0	0	0	0	0
	c)	Install Weather cover	20	4 V S	1						37	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
17)	**Bolt Transfer Cask to adapter plate**		**70**													
	a)	Position Man Lifts with bolts and tools	15	-							0	0	0	0	0	0
	b)	Bolt Transfer cask to adapter plate	15	2A V T	2						10	0	0	0	0	0
	c)	Torque bolts	20	2A V T	2						13	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
18)	**Lower canister from Transfer Cask into Storage overpack**		**10**													
	a)	Release Lifting block and reposition gantry crane hoist	60	-							0	0	0	0	0	0
	b)	Position auxiliary hoist over Transfer Cask	15	-							0	0	0	0	0	0
	c)	Lower grapple and grapple DSC	20	-							0	0	0	0	0	0
	d)	Lift DSC to clear locking mechanism	15	-							0	0	0	0	0	0
	e)	Lower Canister into Storage overpack	10	-							0	0	0	0	0	0
	f)	Release grapple and withdraw hoist	20	-							0	0	0	0	0	0
	g)	HP Survey	10	-							0	0	0	0	0	0
19)	**Unbolt Transfer Cask from adapter plate**		**70**													
	a)	Reposition gantry crane hoist over Transfer Cask	15	-							0	0	0	0	0	0
	b)	Grapple the Transfer cask	15	-							0	0	0	0	0	0
	a)	Position Man Lifts with tools	15	-							0	0	0	0	0	0
	b)	Unbolt Transfer cask from adapter plate	15	-							0	0	0	0	0	0
	e)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
20)	**Remove Transfer Cask and place into storage**		**60**													
	a)	Lift Transfer Cask off of Storage overpack adaptor plates	15	-							0	0	0	0	0	0
	b)	Reposition Gantry Crane	15	-							0	0	0	0	0	0
	c)	Lower Transfer Cask onto location	20	-							0	0	0	0	0	0
	d)	Release Lifting block and raise gantry crane hoist	10	3 V T					0.5		0	0	0	0	3.7	0
21)	**Remove adapter plates**		**115**													
	a)	Move tools to Man Lift	5	-							0	0	0	0	0	0
	b)	Attach rigging to Adapter Plate 2	5	-							0	0	0	0	0	0
	c)	Unbolt Adaptor plate 2	30	-							0	0	0	0	0	0
	d)	Lift Adaptor Plate 2 and place in storage location using stick crane	15	-							0	0	0	0	0	0
	e)	Attach rigging to Adapter Plate 1	10	-							0	0	0	0	0	0
	f)	Unbolt Adaptor Plate 1	10	-							0	0	0	0	0	0
	g)	Lift Adaptor Plate 1 and place in storage location using stick crane	15	-							0	0	0	0	0	0
	h)	Install Weather cover	15	-							0	0	0	0	0	0
	i)	Clear workspace and remove all tools	10	-							0	0	0	0	0	0
21a)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
22)	**Remove lifting lug from DSC**		**55**													
	a)	HP Survey	10	2 V T			0.2				0	0	5	0	0	0
	b)	Remove the Weather Cover	15	1A V T	1						3.8	0	0	0	0	0
	c)	Stage tools on top of the storage cask	5	-							0	0	0	0	0	0
	d)	Rig the lifting lug assembly to the stick crane and remove the bolts	10	2 V T		1					0	25	0	0	0	0
	e)	Remove the lifting lug from the DSC	10	3 V T		1	1				0	7.3	7.3	0	0	0
	f)	Clean out tools and leave the top of the DSC	5	-							0	0	0	0	0	0
23)	**Remove seismic/stack-up struts on Storage Cask**		**75**													
	a)	Reposition Man Lifts	5	-							0	0	0	0	0	0
	b)	Rig Seismic Struts 1&2	5	3A V T		1					0	2.8	0	0	0	0
	c)	Rig seismic struts 3&4	10	3 V T		1					0	7.3	0	0	0	0
	d)	Unbolt Seismic collar around Transport Cask	15	3 V T			2				0	0	22	0	0	0
	e)	Lift the Seismic struts	10	-							0	0	0	0	0	0
	f)	Remove pins from support stantions on the pad	10	-							0	0	0	0	0	0
	g)	Move Strut assemblies to storage location	10	-							0	0	0	0	0	0
	h)	Place Strut assemblies into storage	5	-							0	0	0	0	0	0
	i)	Reposition Man Lifts	5	-							0	0	0	0	0	0
24)	**Dock VCT with Storage Cask and bolt on lid**		**65**													
	a)	Position VCT	15	-							0	0	0	0	0	0

	b)	Move forward and grapple Storage Overpack	15	-							0	0	0	0	0	0
	c)	Move Storage Cask lid into position	15	-							0	0	0	0	0	0
	d)	Bolt Lid onto Storage Overpack	15	2A V T	2						10	0	0	0	0	0
	e)	QC Hold Point Inspection	5	-							0	0	0	0	0	0
25)	**Pick up storage overpack and transfer to pad using VCT**		**110**													
	a)	Lift the Storage overpack	10	-							0	0	0	0	0	0
	b)	Drive to storage pad location	60	-							0	0	0	0	0	0
	c)	Position the storage overpack on the Pad	20	-							0	0	0	0	0	0
	d)	Bolt storage overpack to the Pad	20	4 V S	1						37	0	0	0	0	0
		Total Hours of Canister Handling Operations	**36.8**													
26)	**Turnover to Operations**		**1440**													
27)	**Return VCT to siding**		**120**													
28)	**Install transport cask lid**		**60**													
29)	**Remove seismic/stack-up struts from Transport Cask**		**60**													
30)	**Lift Transport Cask and Transfer to Maintenance**		**60**													
30a)	**Survey and wipedown Transport Cask**		**60**													
31)	**Lift transport cask and place on railcar**		**60**													
32)	**Install impact limiters on transport cask**		**120**													
33)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**70.8**								269	98	75	0	9.9	5.2

Horizontal DSCs - DSCs in Horizontal Storage Modules on pad			**Duration (Min)**	**Top of DSC**	**Duration Fraction**						**Task Dose**					
					M	**R**	**H**	**O**	**S**	**Q**	**M**	**R**	**H**	**O**	**S**	**Q**
	Plan of the Day and Safety Meeting		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
1)	**Receive transport cask on railcar at site**		**100**													
	a)	Identify Transport Cask to bring in from yard	5	-							0	0	0	0	0	0
	b)	Stage work team to siding	15	-							0	0	0	0	0	0
	c)	Position Transport Cask under the gantry crane	15	-							0	0	0	0	0	0
	d)	Security inspection of the Transport Cask and tug	15	3 V T					0.5		0	0	0	0	5.5	0
	e)	HP Survey of Transport Cask	15	3 V T			0.5				0	0	5.5	0	0	0
	f)	Inspection of Tamper proof Seals	10	3 V T					0.1		0	0	0	0	0.7	0
	g)	Acceptance of Package Paperwork	5	-							0	0	0	0	0	0
	h)	Decoupling of railcar and removal of the tug from the siding	10	-							0	0	0	0	0	0
	i)	Security team leaves	5	-							0	0	0	0	0	0
	j)	Completes paperwork for step #1	5	-							0	0	0	0	0	0
2)	**Remove impact limiters and place in temporary storage**		**195**													
	a)	Mobilize crew (mechanics, riggers, crane operator, etc.)	5	-							0	0	0	0	0	0
	b)	Select and inspect rigging for impact limiters on the Transport Cask	5	-							0	0	0	0	0	0
	c)	Rig the lifting devices to the first impact limiter	5	1A V T		2	2				0	2.5	2.5	0	0	0
	d)	Position man lifts and temporary scaffolding near Transport Cask	5	1A V T		2					0	2.5	0	0	0	0
	e)	Remove and store bolts holding on the first Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	f)	Remove first Impact limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	g)	Remove rigging and reposition on Impact Limiter #2	5	1A V T		1					0	1.3	0	0	0	0
	h)	Reposition Manlift and Scaffolding	5	1A V T							0	0	0	0	0	0
	i)	Remove and store bolts holding on the Second Impact Limiter	30	1A V T	2						15	0	0	0	0	0
	j)	Remove second Impact Limiter and place on storage stand	10	1A V T		1					0	2.5	0	0	0	0
	k)	Remove and store bolts for package cover	30	3 V T	0.2						4.4	0	0	0	0	0
	l)	Rig the package cover	15	3 V T		1	1				0	11	11	0	0	0
	m)	Lift package cover and move to storage location	10	3 V T							0	0	0	0	0	0
	n)	Remove Tie-Down Straps from Transport Cask	10	3A V T	0.4						2.3	0	0	0	0	0
	o)	Rig Tie-Down straps and move to storage location	5	3A V T		1					0	2.8	0	0	0	0
	p)	Inspect Transport Cask for damage and conduct HP Survey	15	3 V T			2				0	0	22	0	0	0
3)	**Upend and lift transport cask off of railcar and downend on HCT**		**75**													
	a)	Select the appropriate lifting block for the Transport Cask	5	-							0	0	0	0	0	0
	b)	Secure lifting block to Transport Cask Trunnions	5	2A V T		2					0	3.3	0	0	0	0
	c)	Upend Transport Cask	30	-							0	0	0	0	0	0
	d)	Lift Transport Cask off railcar	15	-							0	0	0	0	0	0
	e)	Reposition Transport Cask	10	-							0	0	0	0	0	0
	f)	Place Transport Cask on HCT	10	-							0	0	0	0	0	0
4)	**Plan of the Day and Safety Meeting**		**30**													
	a)	Plan of the Day Meeting	15	-							0	0	0	0	0	0
	b)	Safety Briefing	10	-							0	0	0	0	0	0
	c)	Transportation to work site	5	-							0	0	0	0	0	0
5)	**Transfer transport cask to Horizontal Storage Module on pad via HCT**		**105**													
	a)	QC Hold Point Inspection	15	-							0	0	0	0	0	0
	b)	Transfer the transport cask to Horizontal Storage Module on the pad via HCT	90	-							0	0	0	0	0	0
5a)	**Preparation of Module**		**120**													
	a)	Stage equipment near Horizontal Storage Module	15	-							0	0	0	0	0	0
	b)	Place and align Theodolite heads	30	-							0	0	0	0	0	0
	c)	Rig crane to Horizontal Storage Module (HSM) port cover	15	2C H T L		2					0	0.8	0	0	0	0
	d)	Use man lift to remove nuts on mounting studs	15	1A H T L	2						9.2	0	0	0	0	0
	e)	Post Radiation Zone signs and barriers	10	-							0	0	0	0	0	0
	f)	Remove HSM Port cover and place in storage location	20	1A H T L		1					0	6.1	0	0	0	0
	g)	HP Survey to verify Dose Rates	15	1A H T L			1.5				0	0	6.9	0	0	0
6)	**Remove transport cask lid**		**90**													
	a)	Move tools to work platform	15	-							0	0	0	0	0	0
	b)	HP Survey of lid	10	1A H T L			2				0	0	6.1	0	0	0
	c)	Position Stick Crane	15	-							0	0	0	0	0	0
	d)	Rig the Lid for lifting using the local stick crane	15	1A H T L		2					0	9.2	0	0	0	0
	e)	Remove and store Nuts	20	1A H T L	2						12	0	0	0	0	0
	f)	Lift the Transport Cask Lid and move it to the storage stand	10	-							0	0	0	0	0	0
	g)	Security inspection of the interior of the Transport Cask	5	1A H T NL					0.5		0	0	0	0	6.8	0
7)	**Dock HCT with HSM and push DSC into module**		**145**													
	a)	Position spotters	10	-							0	0	0	0	0	0
	b)	Move HCT into position	15	-							0	0	0	0	0	0
	c)	Check alignment	20	-							0	0	0	0	0	0
	d)	Dock HCT to HSM	30	-							0	0	0	0	0	0
	e)	Remove pushing port in base of transport cask	15	5 H H	2						4.3	0	0	0	0	0
	f)	Engage ram and push DPC into module	20	-							0	0	0	0	0	0
	g)	Withdraw the ram	15	-							0	0	0	0	0	0
	h)	Back the HCT away from the module	10	-							0	0	0	0	0	0

	i)	QC Hold Point Inspection	10	1A H T NL						0.2	0	0	0	0	0	5.4
8)	**Install seismic restraints and HSM port cover**		**90**													
	a)	Retrieve the seismic restraints from HCT	10	-							0	0	0	0	0	0
	b)	Reach into module and install the seismic restraints	5	1A H T NL	1						14	0	0	0	0	0
	c)	QC Hold Point Inspection	5	1A H T NL						0.2	0	0	0	0	0	2.7
	d)	Pick the HSM port cover still attached to the lifting rig	15	-							0	0	0	0	0	0
	e)	Position the HSM port cover over the port in the module	15	5 H H		1					0	2.1	0	0	0	0
	f)	Install the nuts on the studs and torque to spec	15	5 H H	2						4.3	0	0	0	0	0
	g)	HP survey of area	15	5 H H			0.5				0	0	1.1	0	0	0
	h)	Remove radiation zone markers and remove all materials	10	-							0	0	0	0	0	0
9)	**Install transport cask lid**		**60**													
	a)	Pick the Transport Cask Cover from the still attached to the Lifting Rig	15	-							0	0	0	0	0	0
	b)	Position the Transport Cask Cover on the Transport Cask	15	-							0	0	0	0	0	0
	c)	Install the nuts on the studs and torque to spec	20	-							0	0	0	0	0	0
	d)	QC Hold Point Inspection	10	-							0	0	0	0	0	0
		Total Hours of Canister Handling Operations	**17.3**													
9a)	**Turnover to Operations**		**1440**													
10)	**Return transport cask to rail siding**		**120**													
10a)	**Plan of the Day and Safety Meeting**		**30**													
11)	**Lift transport cask and transfer to maintenance**		**60**													
11a)	**Survey and wipedown Transport Cask**		**60**													
11b)	**Reposition empty railcar**		**60**													
12)	**Lift transport cask and place on railcar**		**60**													
13)	**Install impact limiters on transport cask**		**120**													
14)	**Release railcar for shipment**		**60**													
		Total Hours of Cask Handling Operations	**50.8**								80	47	55	0	13	8.2

Container Doses



1 V C	1	V	C	512	transport cask lid removed
1A H T L	1A	H	T	18.4	transport cask lid installed
1A H T NL	1A	H	T	163.2	transport cask lid removed
1A V C	1A	V	C	254	no transfer cask lid
1A V T	1A	V	T	15	impact limiters installed
1B V C	1B	V	C	134	no transfer cask lid
1C V C	1C	V	C	117	no transfer cask lid
1D V C	1D	V	C	62	no transfer cask lid
2 V T	2	V	T	150	transport cask lid removed
2A H T	2A	H	T	31.8	transport cask lid installed
2A V T	2A	V	T	20	transport cask lid installed
2B V X	2B	V	X	125	
2C H T L	2C	H	T	1.5	transport cask lid installed
2C H T NL	2C	H	T	7.1	transport cask lid removed
3 V T	3	V	T	44	
3A V T	3A	V	T	34	
3B V C	3B	V	C	146	
4 H T	4	H	T	31.8	
4 V S	4	V	S	111	
4 V X	4	V	X	177	
4A H H	4A	H	H	2.5	port cover installed
5 H H	5	H	H	8.5	port cover installed
5A H H	5A	H	H	3.2	port cover installed

		Total Dose to Worker by Category*							Annual Dose to Unit Worker by Category**							Number of Workers by Category						
Storage Alternative	Worker Category:	Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total	Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total	Mechanics	Riggers	Health Physics	Operators	Security	Quality	Total
	# of Workers:	2	2	2	1	1	1		1	1	1	1	1	1		1	1	1	1	1	1	
App B1 - C-OPS	Vertical	241	87	53	0	6	3	391	30.2	10.9	6.7	0.0	1.6	0.6	49.9	61	22	14	0	4	2	103
	Horizontal	80	47	55	0	13	8	203	10.0	5.8	6.9	0.0	3.3	2.0	28.0	21	12	14	0	7	5	59
App B2 - A-OPS	Vertical	126	60	51	0	11	3	251	15.8	7.5	6.4	0.0	2.8	0.7	33.2	32	16	13	0	6	2	69
	Horizontal	80	47	51	0	11	8	198	10.0	5.8	6.4	0.0	2.8	2.0	27.1	21	12	13	0	6	5	57
App B3 - R-OPS	Vertical	126	60	48	0	11	3	248	15.8	7.5	6.0	0.0	2.8	0.7	32.8	32	16	12	0	6	2	68
	Horizontal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
App B4 - S-OPS	Vertical	269	98	75	0	10	5	458	33.6	12.3	9.4	0.0	2.5	1.3	59.1	68	25	19	0	5	3	120
	Horizontal	80	47	55	0	13	8	203	10.0	5.8	6.9	0.0	3.3	2.0	28.0	21	12	14	0	7	5	59

	DPC/Year
Vertical:	250
Horizontal:	250

* Dose/DPC = (time in rad zone) * (# workers in rad zone) * (dose in rad zone)

** Annual Dose = (Total dose to worker by category) * (# DPC's per year) / (# workers in rad zone)