APPENDIX D: Conceptual design and description for all the UFTS components in the case of "All road" mode for each Current Storage Site

1. INTERFACES FOR EACH CURRENT STORAGE SITE

Tables N°4, 5, 6, 7 and 8 of Appendix B.

2. WHITESHELL

Baskets in Silo (See appendix B, Table N° 4)
From Douglas Point Facility to the Centralised Facility
Quantity of bundles to transport from 2035 to 2064: see Appendix B, Table N° 1.
.

2.1. MODE AND ROUTE DEVELOPMENT

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

« Whiteshell includes a single facility: Whiteshell Laboratories. While the Whiteshell facility was not visited as part of this review, the facility's location, paired with the very small number of used fuel bundles to be transported, suggests that road transport would be the most efficient means of completing the deliveries to either the northern or southern Ontario regions. Accordingly, a specific investigation of rail and/or water links was not conducted.

***Recommendation*:** On the above basis, it is recommended that the small volume of used fuel originating at the Whiteshell facility be transported by road.

The hypothesised routing would involve transport on the Trans Canada Highway to provincial roadways [**<52>**, **<53>**, **<27>** and **<54>**]. »

2.2. NUCLEAR FACILITY LOADING

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 2.9 of the present document.

2.3. TRANSPORTER (VEHICLE)

Conceptual design of trailer and tractors (phase 6 of table paragraph 2.9)

2.3.1. Trolley with tractor

In order to transfer:

- The baskets from the silo to the packaging (phase 2 of table paragraph 2.9),

- The full packaging from loading area of the packaging to the transportation area of the transportation cask (phase 5 of table paragraph 2.9).

2.3.2. Trailer for the road transportation (phase 6 of table paragraph 2.9)

- Modified 48 foot flatbed trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

2.3.3. Tractor for the road transportation (phase 6 of table paragraph 2.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

2.3.4. Weather cover for the road transportation (phase 7 of table paragraph 2.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

2.3.5. Frame of the Transportation cask for the road transportation

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

2.3.6. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask
-

2.4. TRANSPORTATION SYSTEM MAINTENANCE FACILITY

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

2.5. CASKS

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2.4, section 2.4.7.1.3, Figure N° 6 of Appendix A, Appendix C.

2.6. UFTS AUXILIARY EQUIPMENT

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment :
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 2.9)

- Gantry Crane:
  One for loading the baskets from the Transfer flask to the packaging (see phase 3 of table paragraph 2.9)
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 2.9)

- Lifting beam:
  One for the lid of the packaging (see phase 3 of table paragraph 2.9)
  One for the Transfer flask (see phase 3 of table paragraph 2.9)
  One for the Transportation cask (see phases 5 and 6 of table paragraph 2.9)
  One for the impact limiter of the packaging (see phase 5 of table paragraph 2.9)

- Decontamination equipment (see paragraph 3.2 of Chapter 3).

2.7. UFTS TRANSPORTATION SYSTEM OPERATION

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of Transportation cask onto the trailers, security, transportation as described in phase 6 of table paragraph 2.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

2.8. DECOMMISSIONING

Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

2.9. TABLE : ANALYSIS OF THE OPERATIONAL PHASES OF TRANSPORT

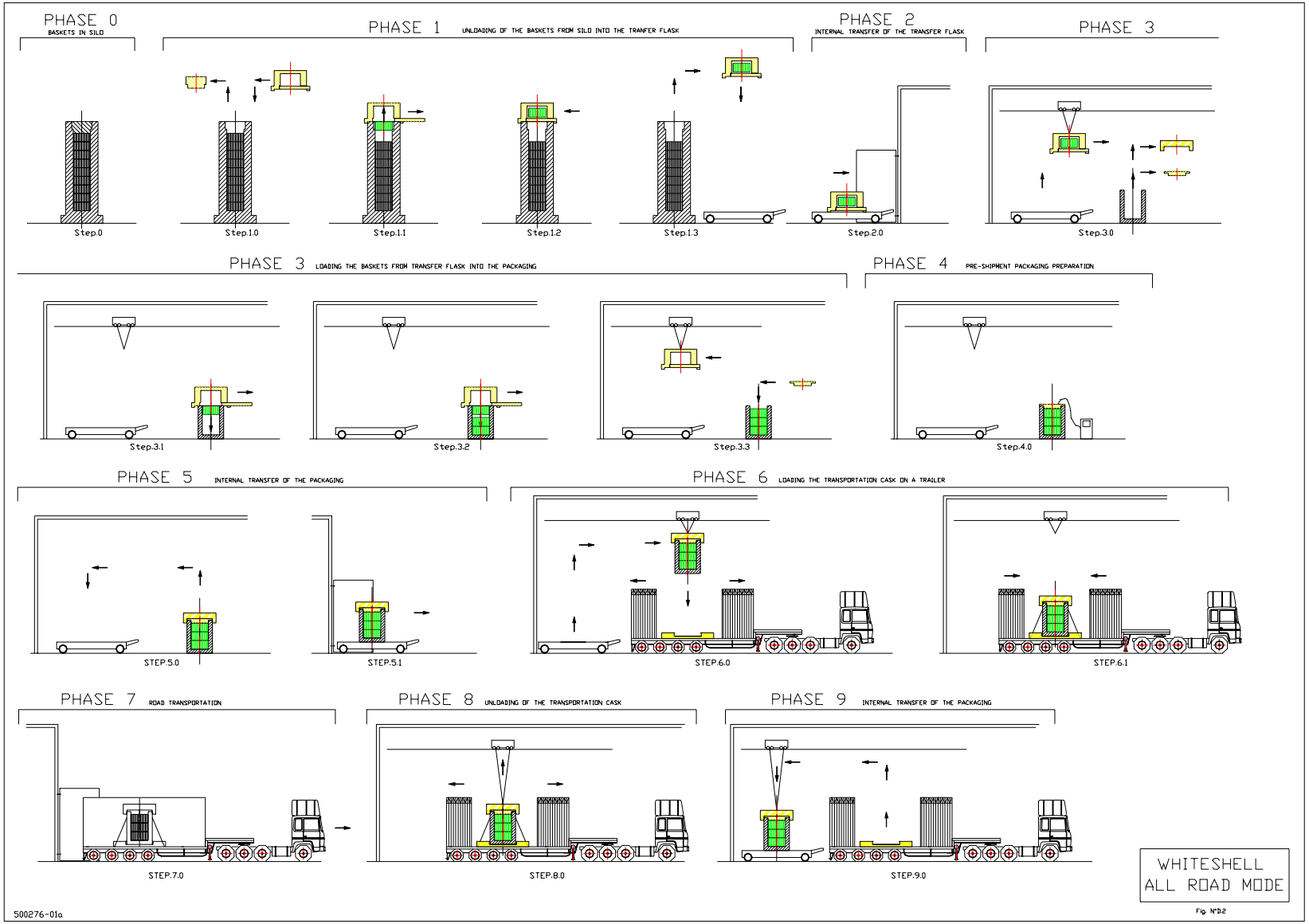
PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.2
Phase 0	Baskets in Silo	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2, 1.3
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packa-ging. Note (1)	UFTS	With the gantry, take the impact limiter handling tool of the packaging.	Packaging	IFTC/BM : See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
				Impact limiter handling tool of the packaging		3.0
				Gantry crane	With 1 hoist (of 60 tons for the IFTC/BM)	3.0
			Raise the impact limiter and store it in a place			3.0
			With the gantry, take the lid handling tool of the packaging.	Lid handling tool of the Transportation cask		3.0
			Raise the lid and store it in a place			3.0
			With the gantry, take the transfer flask	Transfer flask	Similar to Gentilly 2: Appendix A, Figure N°10 - Shielded fuel transfer cask, - 26 tons with 60 bundles basket and with irradiated fuel - “Sliding” gate - Electric hoist for lifting or lowering a basket into the IFTC/ BM - Chain - Basket lifting grapple - Shielding	3.0
				Lifting Beam for the Transfer flask		3.0
			Mate the transfer flask with the flask lid of the packaging.		Appendix A, Figure N°9	3.1
			Load the baskets.			3.1, 3.2
			With the gantry, take off the transfer flask			3.3
			With the gantry, close the packaging with the lid. Bolting of the lid with the associated platform			3.3

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.2
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
Phase 5	Internal transfer of the packaging	UFTS	Radiological control of the packaging	Non contamination, Dose Rate	“Smear test”, Radiameter	5.0
			Approach of the trolley	Trolley	Trolley with tractor	5.0
			Radiological control of the trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	5.0
			Installing the impact limiter			5.0
			Loading of the full Transportation cask on the trolley			5.0
			Radiological control of the Transportation cask and the trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	5.0
			Internal transfer	Tie down		5.1
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, **<3>**)	6.0
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N°15,**<3>**)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamination, Dose Rate	“Smear test”, Radiameter	6.1

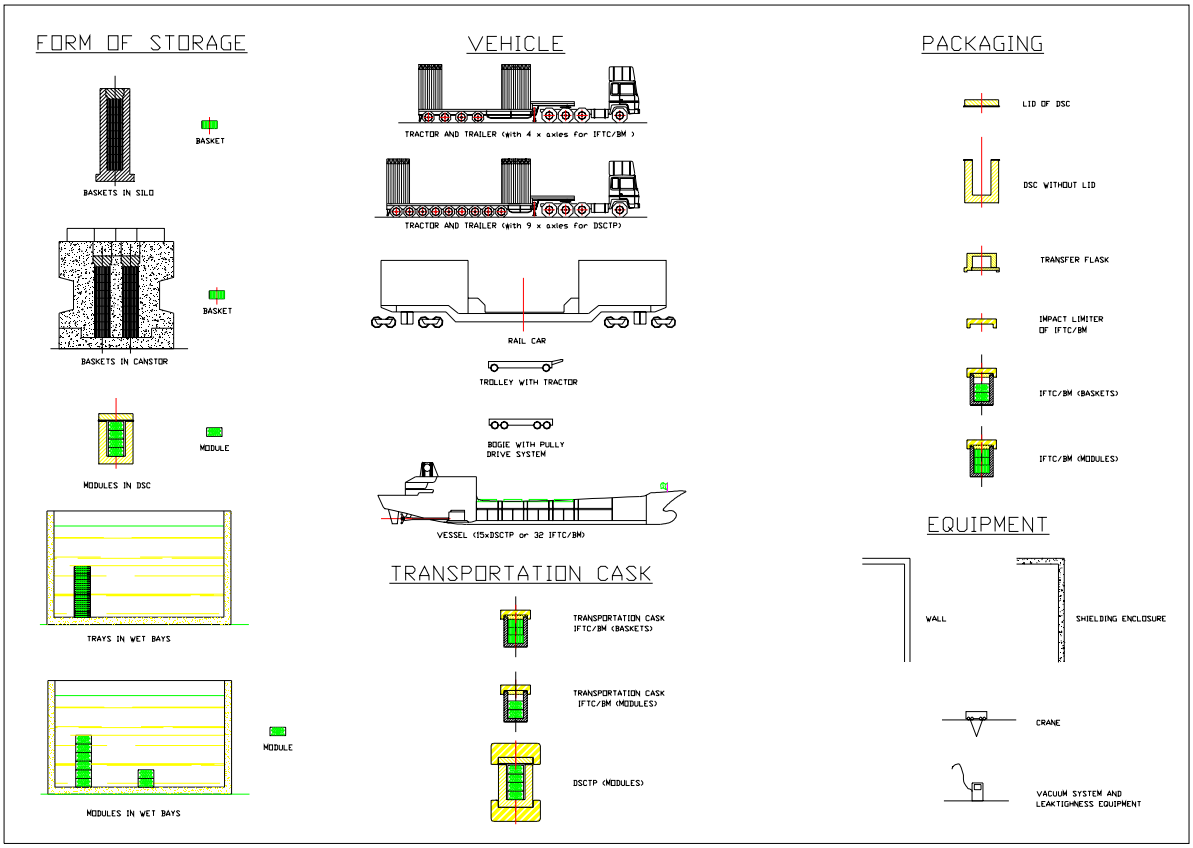
PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.2
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
			Real time tracking		Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				

Note (1): The removal of the flask and the replacement of the lid have to be co-ordinated, as it done at present (throughout). The IFTC/BM lid could be designed to be suitable for this operation.

This operation has to be repeated three times.


PHASE 0
BASKETS IN SILO
PHASE 1
UNLOADING OF THE BASKETS FROM SILO INTO THE TRANFER FLASK
PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
PHASE 3
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
Step.3.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
Step.3.1
Step.3.2
Step.3.3
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE PACKAGING
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.5.1
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
WHITESHELL
ALL ROAD MODE
500276-01a
Fig. N°D.2

Key:


FORM OF STORAGE
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
BASKET
MODULES IN DSC
MODULE
TRAYS IN WET BAYS
MODULES IN WET BAYS
MODULE
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

3. BRUCE

3.1. MODULES IN DSC (SEE APPENDIX B, TABLE N°8)

From WUFDSF to the Centralised Facility

Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N° 1.

3.1.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this Site [**<52>**, **<53>**, **<27>** and **<54>**]. Public roadways are adequate to support transport from the site. Some strengthening of on-site roadways may be required to support the high volume of transports necessary for this portion of the shipping campaign. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program. The term “consolidated” refers to the physical consolidation of cargo into larger consignments as well as to the coordination of shipments between sites, according to the context.

3.1.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 3.1.9 of the present document.

3.1.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 3.1.9)

3.1.3.1. Trolley with tractor

In order to transfer:

- The DSC from the storage to the hot cell (phase 1 of table paragraph 3.1.9),

3.1.3.2. Bogie pulley drive system

In order to transfer:

- The DSC in the hot cell (phase 2 of table paragraph 3.1.9),
- The IFTC/BM in the hot cell (phase 3 of table paragraph 3.1.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 3.1.9),
- The IFTC/BM to the shipment area (phase 5 of table paragraph 3.1.9).

3.1.3.3. Trailer for the road transportation (phase 6 of table paragraph 3.1.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

3.1.3.4. Tractor for the road transportation (phase 6 of table paragraph 3.1.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

3.1.3.5. Weather cover for the road transportation (phases 6 and 7 of table paragraph 3.1.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

3.1.3.6. Frame of the Transportation cask for the road transportation (phase 6 of table paragraph 3.1.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

3.1.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

3.1.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

3.1.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

3.1.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment :
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 3.1.9)

- Gantry Crane:
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 3.1.9)
  One for loading the impact limiter on the packaging (see phase 4 of table paragraph 3.1.9)

- Lifting beam :
  One for the Transportation cask (see phase 6 of table paragraph 3.1.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 3.1.9)

- Decontamination equipment (see paragraph 3.2 of Chapter 3).

3.1.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 3.1.9.

- Emergency response plan: see paragraph 9 of Appendix 9.

- Real time tracking: see paragraph 9 of Appendix 9.

3.1.8. Decommissioning

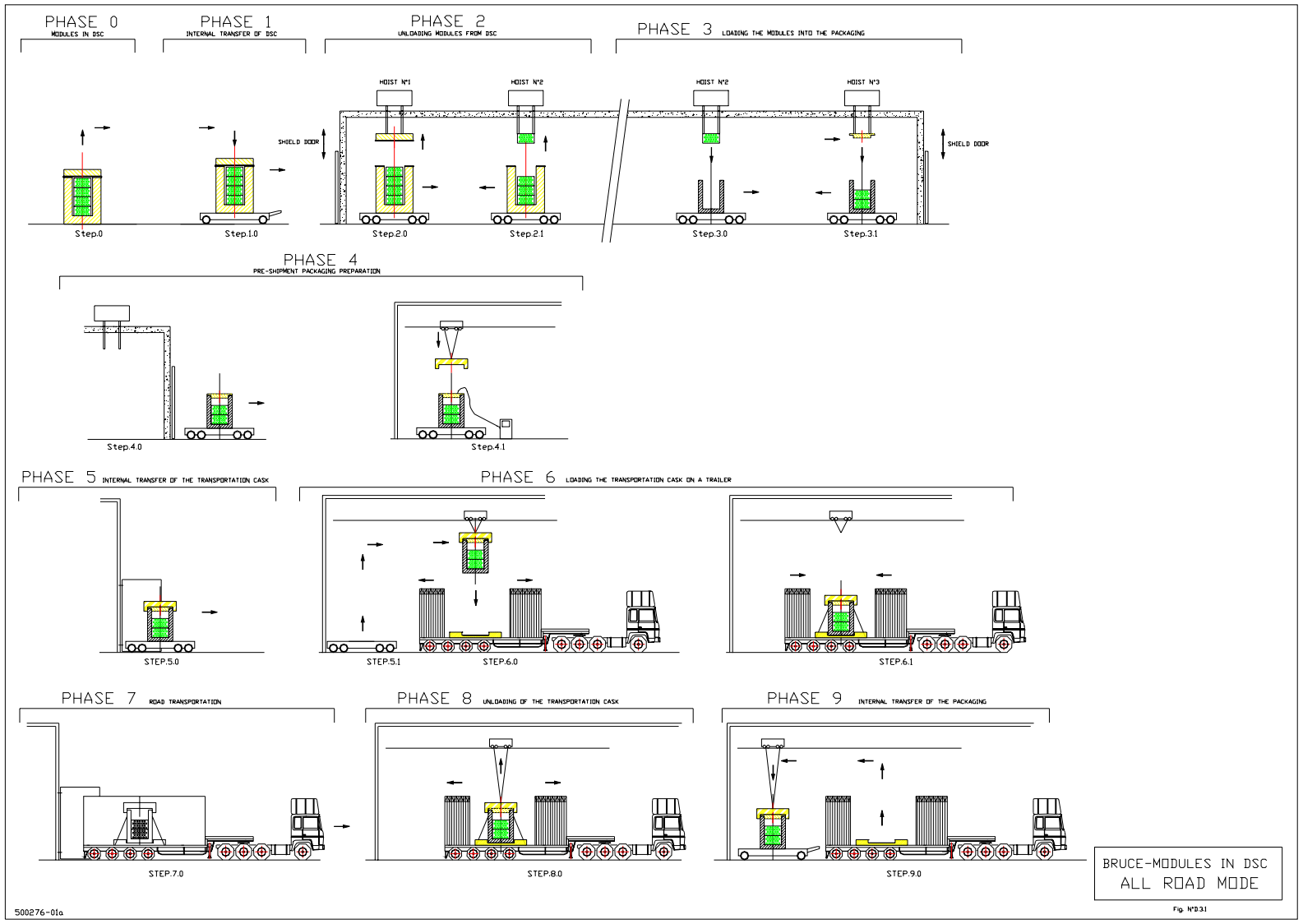
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

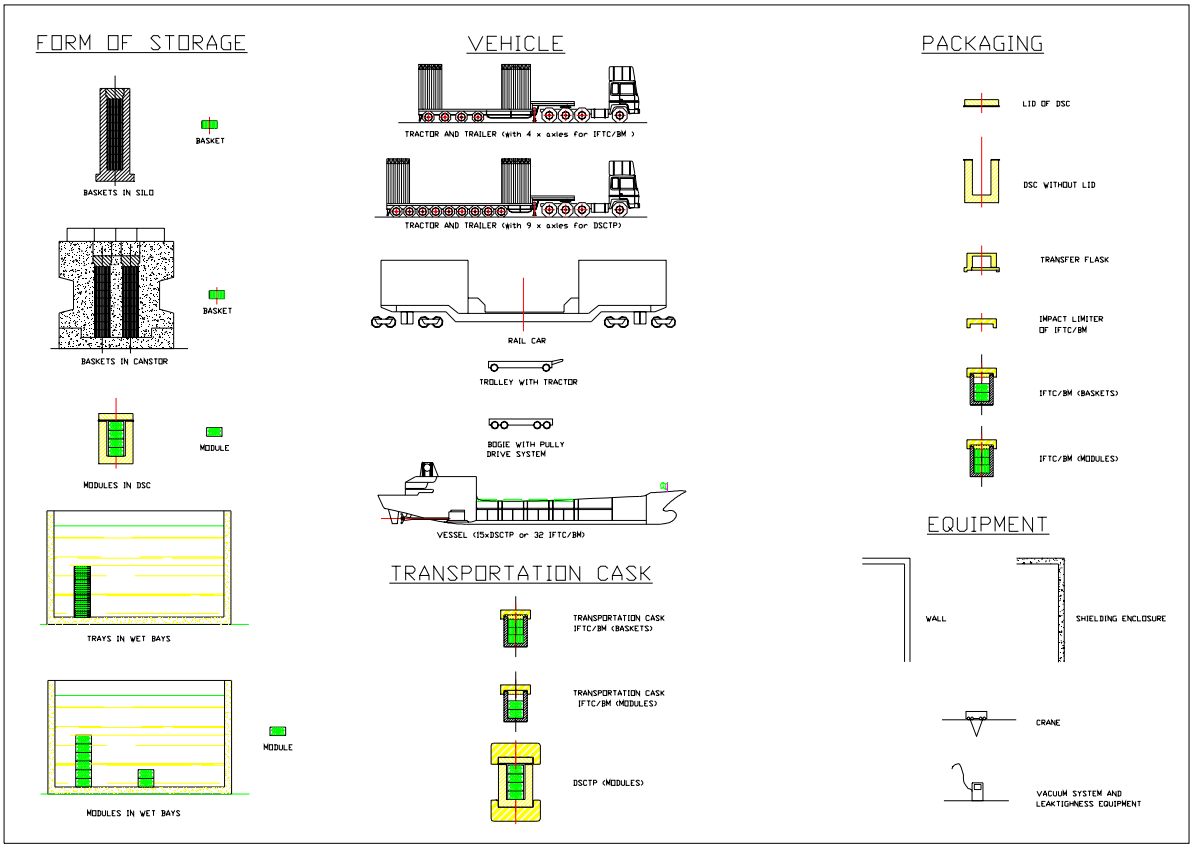
3.1.9. Table : Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.3.1
Phase 0	Modules in DSC	Interim storage	Initial phase			0
Phase 1	Internal transfer of the DSC	Interim storage				1.0
Phase 2	Unloading modules from DSC	Interim storage				2.0, 2, 1
Phase 3	Loading the modules into the packaging	UFTS	With the hoist N°3, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Figures N°4 **<3>**, N°5 in Appendix A	3.1
			With hoist N°2 Load the modules into the packaging			3.0
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	4.0, 4.1
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter	Gantry crane	For the impact limiter (10 tons)	
Phase 5	Internal transfer of the packaging	UFTS	Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Transportation cask and the Bogie	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down		
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	6.0, 6.1
			Open the weather cover	Weather cover		
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	
				Lifting Beam for the Transportation cask	To carry of the IFTC/BM similar to the IFTC, **<3>**)	
				Trailer (Appendix A, Figures N°12, 13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.3.1
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N°15, **<3>**)	
			Check the condition of the Transportation cask, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	“Smear test”, Radiameter	
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	
Phase 8	Unloading of the Trans-portation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				9.0
Phase 10	Unloading the baskets from the Trans-portation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
MODULES IN DSC
PHASE 1
INTERNAL TRANSFER OF DSC
PHASE 2
UNLOADING MODULES FROM DSC
PHASE 3
LOADING THE MODULES INTO THE PACKAGING
HOIST N°1
HOIST N°2
HOIST N°2
HOIST N°3
SHIELD DOOR
SHIELD DOOR
Step.0
Step.1.0
Step.2.0
Step.2.1
Step.3.0
Step.3.1
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
Step.4.0
Step.4.1
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.5.1
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
BRUCE-MODULES IN DSC
ALL ROAD MODE
500276-01a
Fig. N°D.3.1

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

3.2. TRAYS IN WET BAYS (SEE APPENDIX B, TABLE N° 6)

From Bruce B to the Centralised Facility
Quantity of bundles *to be transported* from 2035 to 2064: see Appendix B, Table N° 1 .

Mode and route development
Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this Facility [**<52>**, **<53>**, **<27>** and **<54>**]. Public roadways are adequate to support transport from the site. Some strengthening of on-site roadways may be required to support the high volume of transports necessary for this portion of the shipping campaign. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program. The term “consolidated” refers to the physical consolidation of cargo into larger consignments as well as to the coordination of shipments between sites, according to the context.

3.2.1. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, of paragraph 3.2.9 of the present document.

3.2.2. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 5 of table paragraph 3.2.9).

3.2.2.1. Trolley with tractor

In order to transfer:

- The packaging from the pool to the pre-shipment packaging area (phase 3 of table paragraph 3.2.9),
- The packaging from the pre-shipment packaging area to the loading area (phase 4 of table paragraph 3.2.9).

3.2.2.2. Trailer for the road transportation (phase 5 of table paragraph 3.2.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

3.2.2.3. Tractor for the road transportation (phase 5 of table paragraph 3.2.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

3.2.2.4. Weather cover for the road transportation (phases 5, 6 of table paragraph 3.2.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

3.2.2.5. Frame of the Transportation cask for the road transportation (phase 5 of table paragraph 3.2.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

3.2.2.6. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

3.2.3. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

3.2.4. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

3.2.5. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Drainage (see phase 4 of table paragraph 3.2.9)

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 3.2.9)

- Gantry Crane:
  One for the extraction of the packaging from the pool (see phase 2 of table paragraph 3.2.9)
  One for the preparation of the packaging (see phases 3, 4 of table paragraph 3.2.9)
  One for loading the Transportation cask on the trailer (see phase 5 of table paragraph 3.2.9)

- Lifting beam :
  One for the packaging transportation cask (see phase 2 of table paragraph 3.2.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 3.2.9)
  One for the transportation cask (see phase 5 of table paragraph 3.2.9)

- Decontamination equipment: (see paragraph 3.2 of Chapter 3).

3.2.6. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phases 5 and 6 of table paragraph 3.2.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

3.2.7. Decommissioning

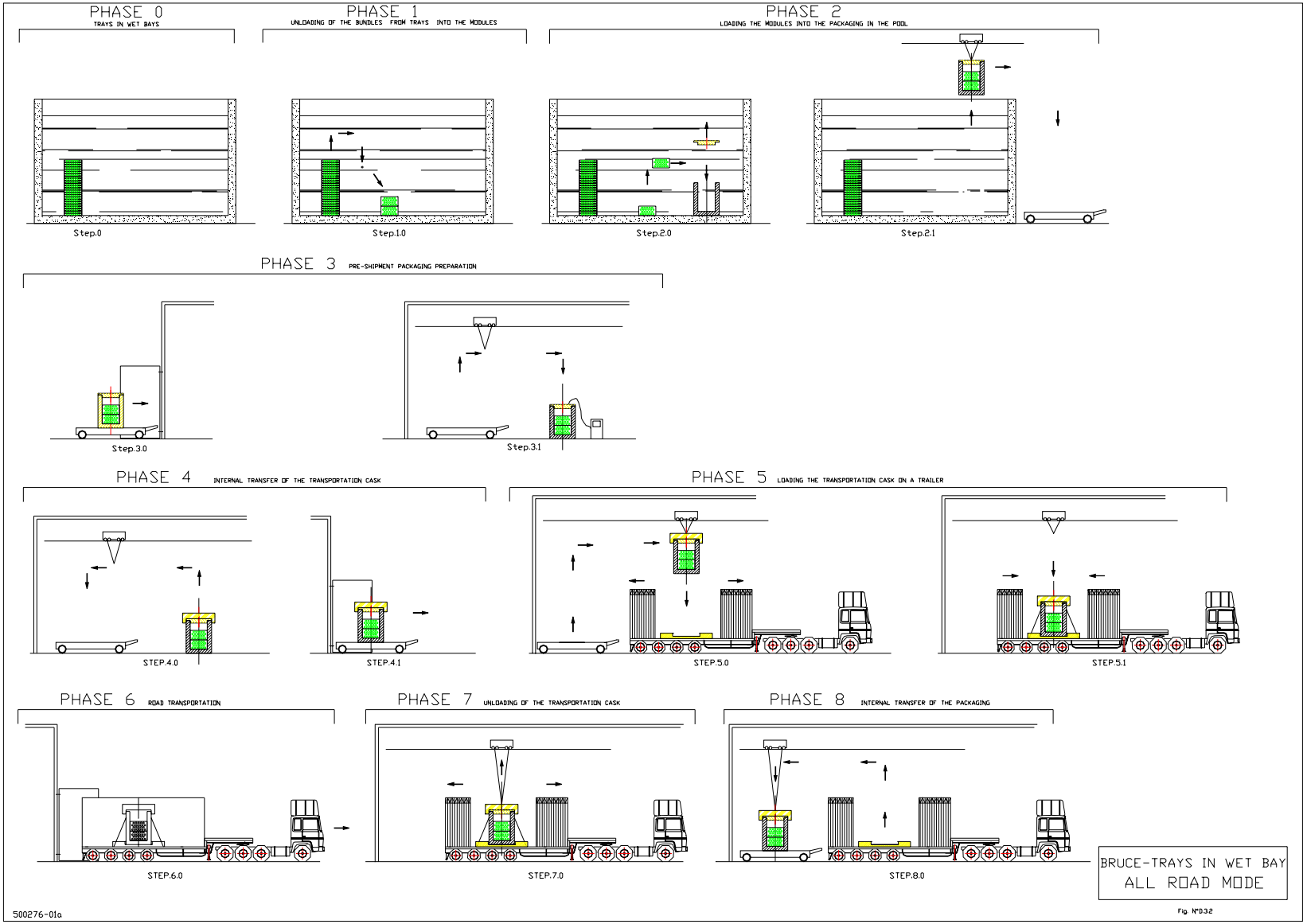
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

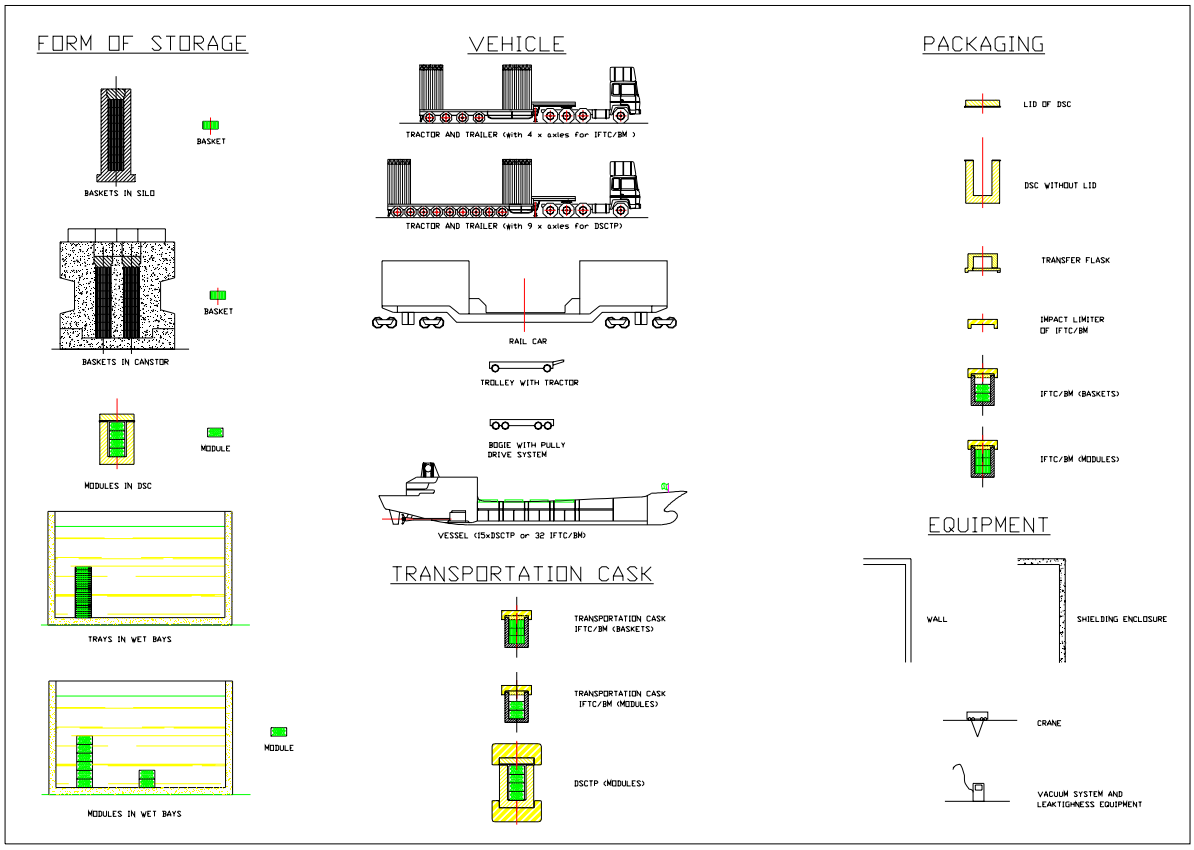
3.2.8. Table : Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.3.2
Phase 0	Trays in wet bays	Interim storage	Initial phase			0
Phase 1	Unloading of the bundles from the trays into the modules	Interim storage				1.0
Phase 2	Loading the modules into the packaging in the pool	UFTS	Loading the modules into the packaging in the pool	Gantry crane	Identical than the IFCT in the pool Decontamination of the IFTC/BM: identical as IFTC **<3>**	2.0, 2.1
				Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Figure N°5 in Appendix A	
Phase 3	Pre-shipment packaging preparation	UFTS	Unloading of the packaging from the trolley	Gantry crane	60 tons	
			Drainage			3.0, 3.1
			Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
Phase 4	Internal transfer of the packaging	UFTS	Radiological control of the packaging	Non contamination, Dose Rate	“Smear test”, Radiameter	4.0, 4.1
			Approach of the Trolley	Trolley	Trolley with tractor	
			Radiological control of the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Loading of the full packaging on the Trolley			
			Installing the impact limiter			
			Radiological control of the Transportation cask and the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	
Phase 5	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	5.0, 5.1
			Open the weather cover	Weather cover		
			Loading the Transportation cask on a trailer	Gantry Crane	With hoist (of 60 tons for the IFTC/BM)	
				Lifting Beam for Transportation cask	To carry of the IFTC/BM similar to the IFTC, **<3>**)	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.3.2
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N°15, **<3>**)	
			Check the condition of the Transportation cask, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	“Smear test”, Radiameter	
Phase 6	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			6.0
				Real time tracking	Appendix H	
Phase 7	Unloading of the Trans-portation cask	DGR/CES	Unloading of the Transportation cask from the trailer			7.0
Phase 8	Internal transfer of loaded Transportation cask	DGR/CES				8.0
Phase 9	Unloading the baskets from the Trans-portation cask	DGR/CES				
Phase 10	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 11	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
TRAYS IN WET BAYS
PHASE 1
UNLOADING OF THE BUNDLES FROM TRAYS INTO THE MODULES
PHASE 2
LOADING THE MODULES INTO THE PACKAGING IN THE POOL
Step.0
Step.1.0
Step.2.0
Step.2.1
PHASE 3
PRE-SHIPMENT PACKAGING PREPARATION
Step.3.0
Step.3.1
PHASE 4
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 5
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.4.0
STEP.4.1
STEP.5.0
STEP.5.1
PHASE 6
ROAD TRANSPORTATION
PHASE 7
UNLOADING OF THE TRANSPORTATION CASK
PHASE 8
INTERNAL TRANSFER OF THE PACKAGING
STEP.6.0
STEP.7.0
STEP.8.0
BRUCE-TRAYS IN WET BAY
ALL ROAD MODE
500276-01a
Fig. N°D.32

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

3.3. BASKETS IN SILO

Baskets in Silo (See Appendix B, Table N° 4)
From Douglas Point Facility to the Centralised Facility
Quantity of bundles to transport from 2035 to 2064: see Appendix B, Table N° 1.

3.3.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this Facility [**<52>**, **<53>**, **<27>** and **<55>**]. Public roadways are adequate to support transport from the site. Some strengthening of on-site roadways may be required to support the high volume of transports necessary for this portion of the shipping campaign. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program. The term “consolidated” refers to the physical consolidation of cargo into larger consignments as well as to the coordination of shipments between sites, according to the context.

3.3.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 3.3.9 of the present document.

3.3.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 3.3.9)

3.3.3.1. Trolley with tractor

In order to transfer:

- The baskets from the silo to the packaging (phases 2 and 3 of table paragraph 3.3.9).

3.3.3.2. Bogie pulley drive system

In order to transfer:

- The IFTC/BM in the hot cell (phase 3 of table paragraph 3.3.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 3.3.9),
- The IFTC/BM to the shipment area (phases 5 and 6 of table paragraph 3.3.9).

3.3.3.3. Trailer for the road transportation (phase 6 of table paragraph 3.3.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

3.3.3.4. Tractor for the road transportation (phase 6 of table paragraph 3.3.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

3.3.3.5. Weather cover for the road transportation (phase 7 of table paragraph 3.3.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

3.3.3.6. Frame of the Transportation cask for the road transportation (phase 6 of table paragraph 3.3.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

3.3.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

3.3.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

3.3.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 6 of Appendix A, Appendix C.

3.3.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment :
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 3.3.9)

- Gantry Crane :
  One for installing the Transfer flask on the top of the hot cell (see phase 3 of table paragraph 3.3.9)
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 3.3.9)
  One for installing the impact limiter (see phase 4 of table paragraph 3.3.9)

- Lifting beam :
  One for the Transfer flask (see phase 3 of table paragraph 3.3.9)
  One for the Transportation cask (see phase 6 of table paragraph 3.3.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 3.3.9)

- Decontamination equipment (see paragraph 3.2 of Chapter 3).

3.3.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 3.3.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

3.3.8. Decommissioning

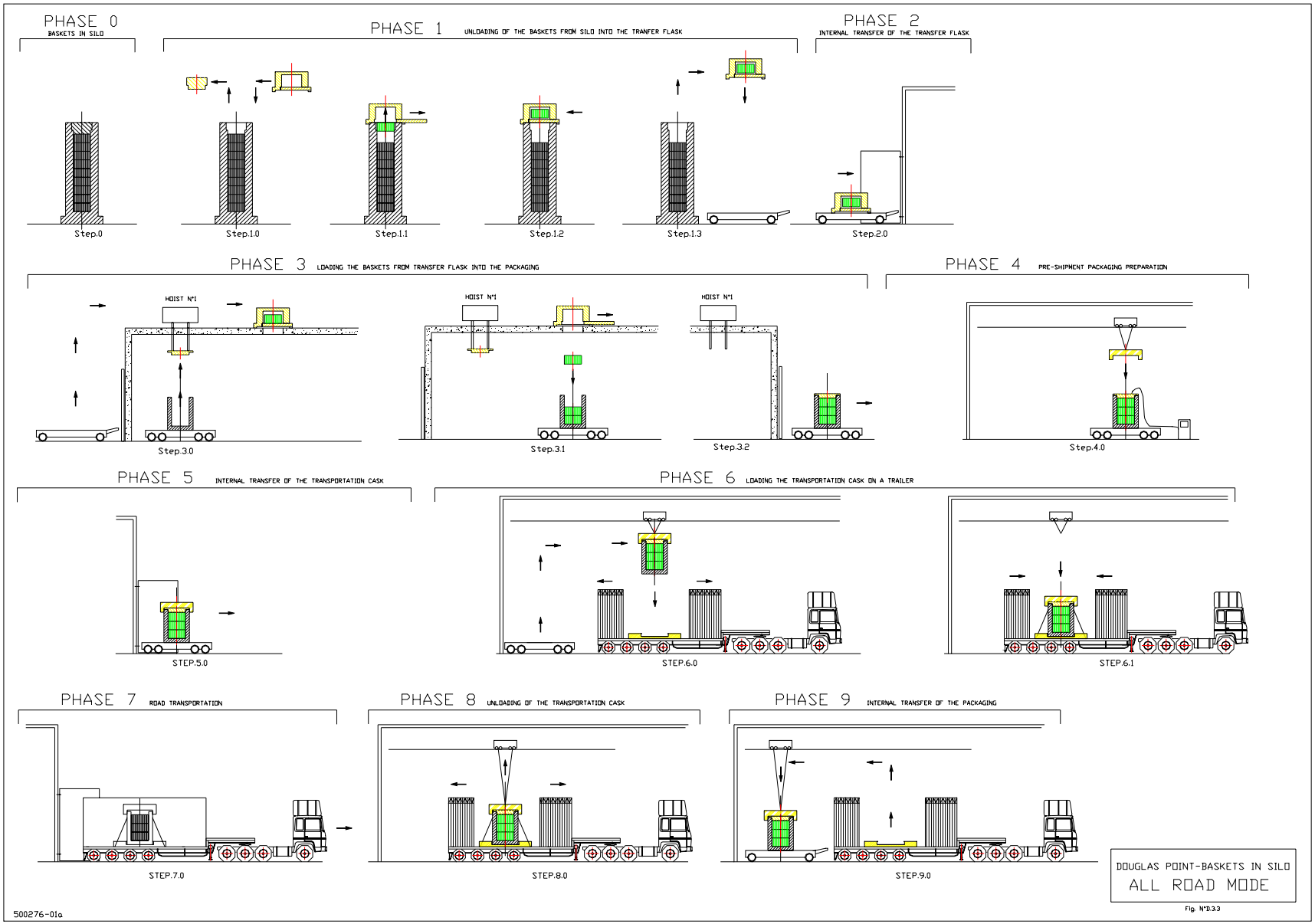
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

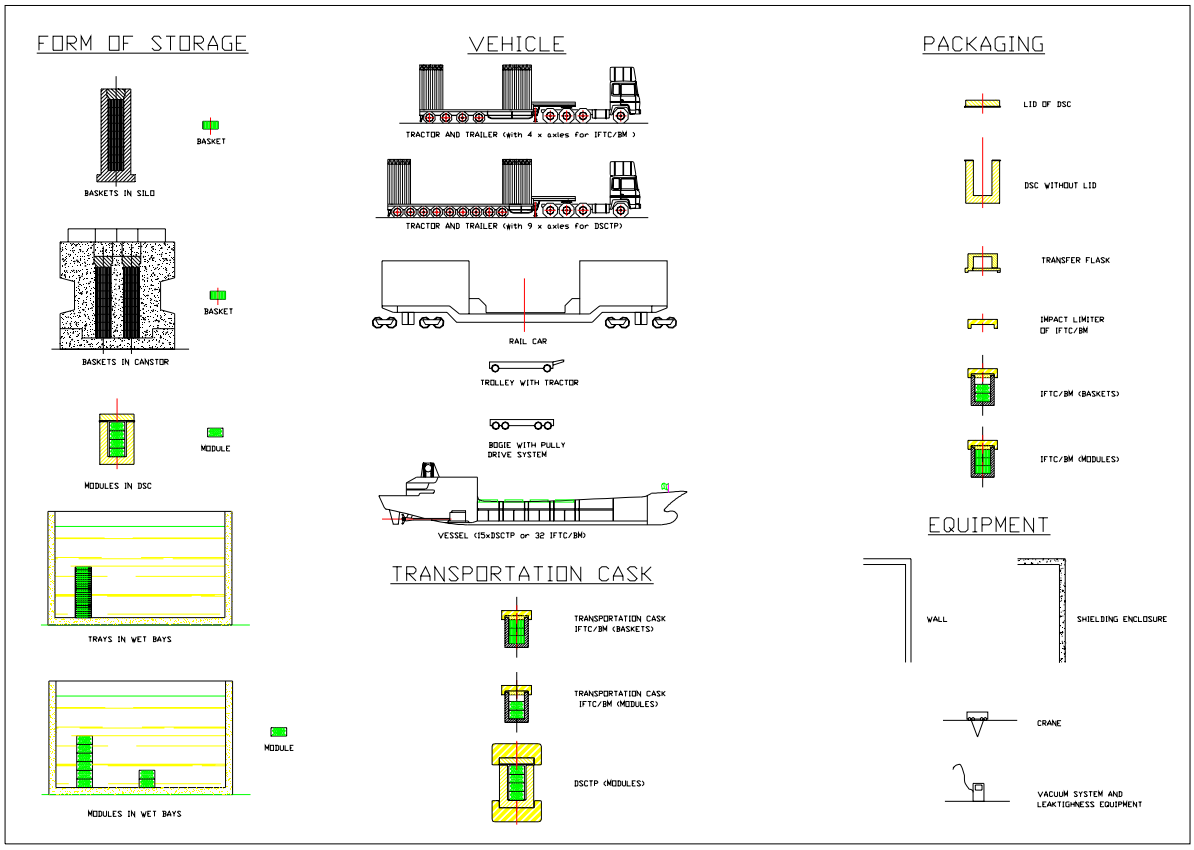
3.3.9. Table : Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.3.3
Phase 0	Baskets in Silo	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packaging	UFTS	With a gantry crane , place the transfer flask on the hot cell	Transfer flask	Similar to Gentilly 2 : Appendix A, Figure N°10 - Shielded fuel transfer cask - 26 tons with 60 bundles basket and with irradiated fuel - "Sliding" gate - Electric hoist for lifting or lowering a basket into the IFTC/BM - Chain - Basket lifting grapple - Shielding	3.0
				Gantry crane	For the Transfer flask	
				Lifting Beam for the Transfer flask		
			With the hoist N°1, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
			Load the baskets into the packaging			3.1
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, work plate-form for bolt the lid	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter	Gantry crane	For the impact limiter	
Phase 5	Internal transfer of the Transportation cask	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Bogie	Non contamina-tion, Dose Rate	"Smear test", Radiameter	5.0
			Loading of the Transportation cask on the Bogie			5.0
			Radiological control of the Transportation cask and the bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	5.1

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. D.3.3
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, **<3>**)	6.0
				Trailer (Appendix A, Figures N° 13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure 14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, **<3>**)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamina-tion, Dose Rate	"Smear test", Radiameter	6.1
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
BASKETS IN SILO
PHASE 1
UNLOADING OF THE BASKETS FROM SILO INTO THE TRANFER FLASK
PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
HOIST N°1
HOIST N°1
HOIST N°1
Step.3.0
Step.3.1
Step.3.2
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
DOUGLAS POINT-BASKETS IN SILO
ALL ROAD MODE
Fig. N°D.3.3
500276-01a

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

4. PICKERING

4.1. MODULES IN DSC (SEE APPENDIX B, TABLE N°8)

From PUFDSF to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

4.1.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this site [**<52>**, **<53>**, **<27>** and **<54>**]. The public road system is adequate to support transport from the site. On-site roadways would likely require strengthening and re-grading (especially noting the grade leaving the dry cask storage area). Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program.

4.1.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 4.1.9 of the present document.

4.1.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 4.1.9)

4.1.3.1. Trolley with tractor

In order to transfer:
- The DSC from the storage to the hot cell (phase 1 of table paragraph 4.1.9)

4.1.3.2. Bogie pulley drive system

In order to transfer:
- The DSC in the hot cell (phase 2 of table paragraph 4.1.9),
- The IFTC/BM in the hot cell (phase 3 of table paragraph 4.1.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 4.1.9),
- The IFTC/BM to the shipment area (phase 5 of table paragraph 4.1.9).

4.1.3.3. Trailer for the road transportation (phase 6 of table paragraph 4.1.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

4.1.3.4. Tractor for the road transportation (phase 6 of table paragraph 4.1.9)

- Standard commercial tractor sufficient for the loaded weight

- The weight for the fuelled reference tractor is roughly 9,075 kg.

4.1.3.5. Weather cover for the road transportation (phases 6 and 7 of table paragraph 4.1.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

4.1.3.6. Frame of the Transportation cask for the road transportation (phase 6 of table paragraph 4.1.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

4.1.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

4.1.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

4.1.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.
- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

4.1.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 4.1.9)

- Gantry Crane:
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 4.1.9)
  One for loading the impact limiter on the packaging (see phase 4 of table paragraph 4.1.9)

- Lifting beam:
  One for the Transportation cask (see phase 6 of table paragraph 4.1.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 4.1.9)

- Decontamination equipment (see paragraph 3.2 of Chapter 3).

4.1.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 4.1.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

4.1.8. Decommissioning

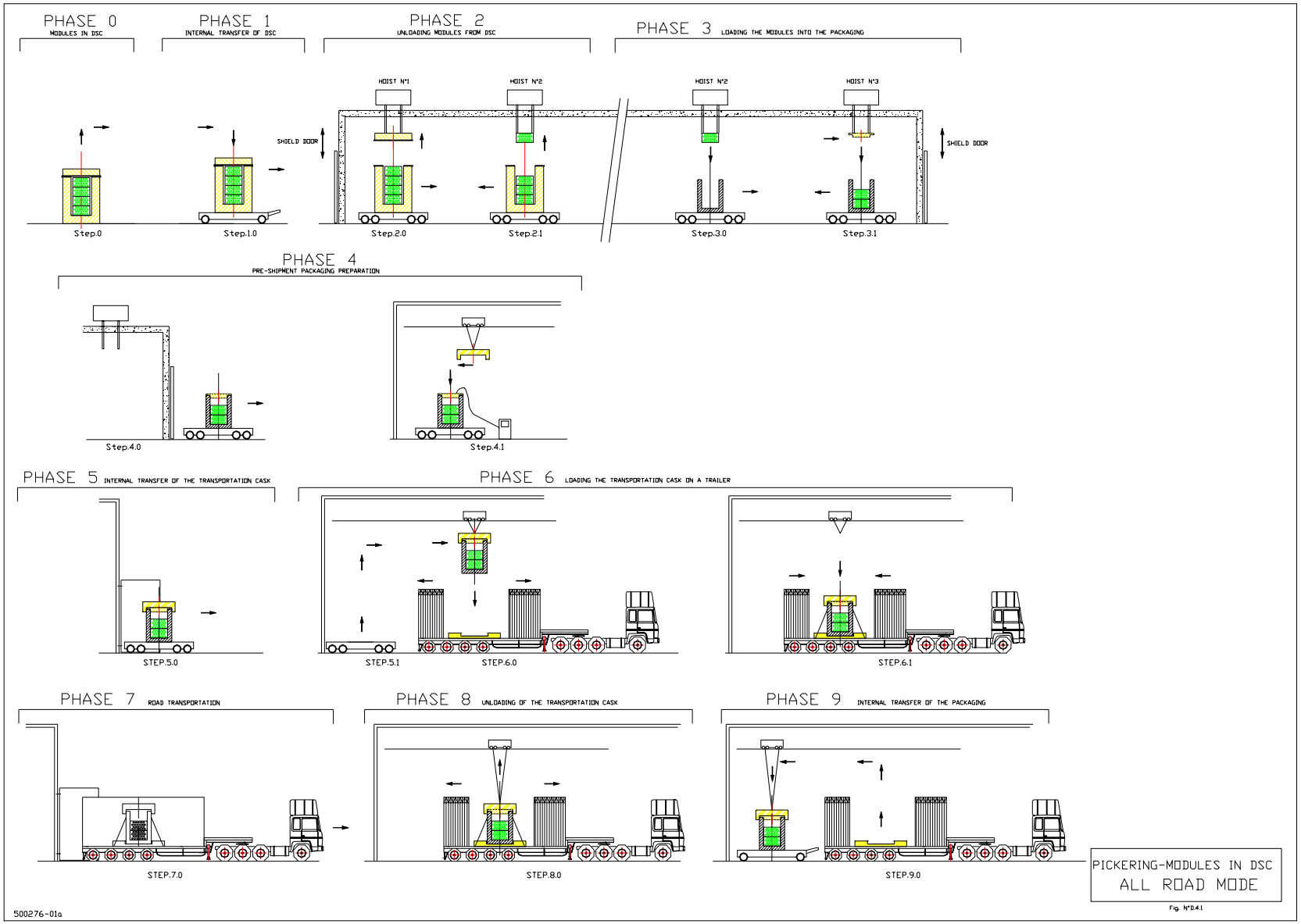
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

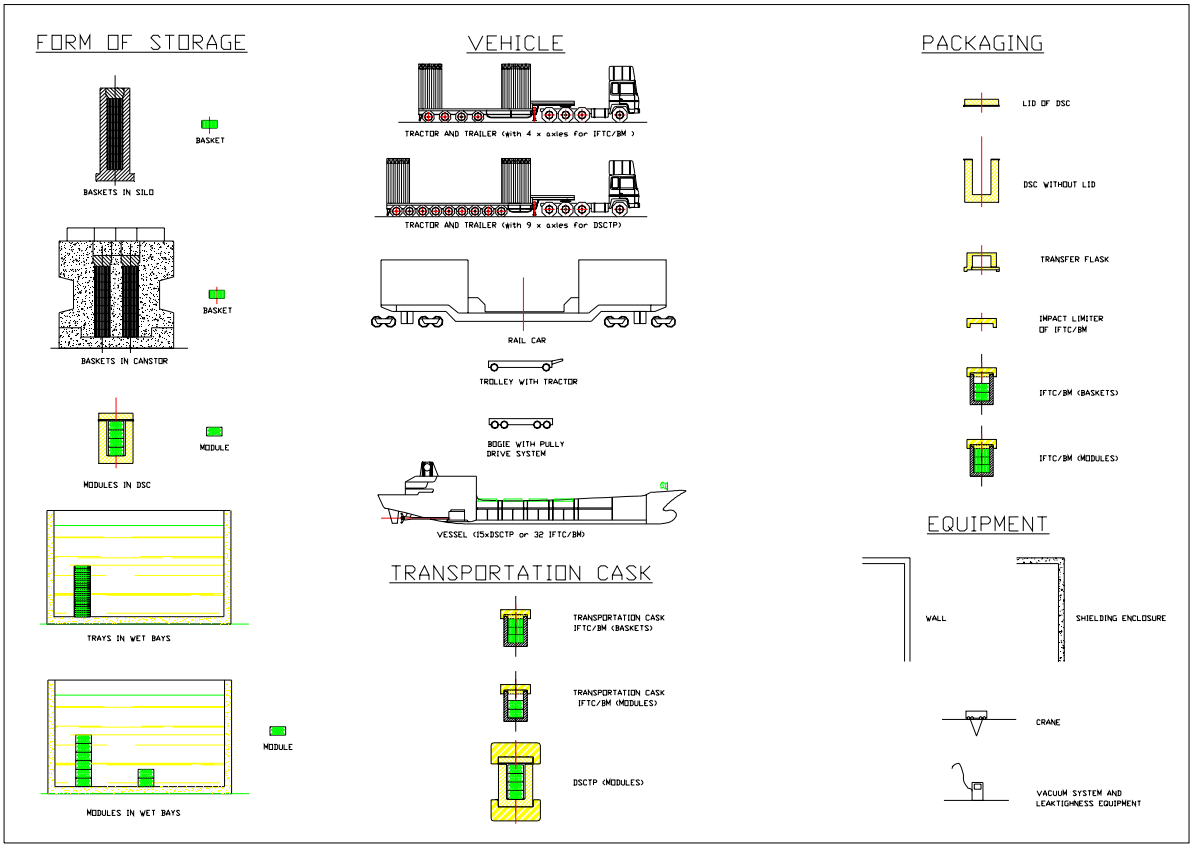
4.1.9. Table: Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. D.4.1
Phase 0	Modules in DSC	Interim storage	Initial phase			0
Phase 1	Internal transfer of the DSC	Interim storage				1.0
Phase 2	Unloading modules from DSC	Interim storage				2.0, 2, 1
Phase 3	Loading the modules into the packaging	UFTS	With the hoist N°3, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Appendix A, Figures N°4 <3>, N° 5	3.1
			With hoist N°2 Load the modules into the packaging			3.0
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	4.0, 4.1
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Installing the impact limiter	Gantry crane	For the impact limiter (10 tons)	
			Depressurising the cavity	Vacuum circuit		
Phase 5	Internal transfer of the Transportation cask	UFTS	Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Transportation cask and the Bogie	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down		
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	6.0, 6.1
			Open the weather cover	Weather cover		
			Loading the packaging on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	
				Lifting Beam for packaging	To carry of the IFTC/BM similar to the IFTC, <3>)	
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. D.4.1
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, **<3>**)	
			Check the condition of the Transportation cask, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				9.0
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
MODULES IN DSC
PHASE 1
INTERNAL TRANSFER OF DSC
PHASE 2
UNLOADING MODULES FROM DSC
PHASE 3
LOADING THE MODULES INTO THE PACKAGING
HOIST N°1
HOIST N°2
HOIST N°2
HOIST N°3
SHIELD DOOR
SHIELD DOOR
Step.0
Step.1.0
Step.2.0
Step.2.1
Step.3.0
Step.3.1
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
Step.4.0
Step.4.1
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.5.1
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
PICKERING-MODULES IN DSC
ALL ROAD MODE
500276-01a
Fig. N°D4.1

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

4.2. MODULES IN WET BAYS (SEE APPENDIX B, TABLE N° 7)

From Pickering A and Pickering B to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N° 1.

4.2.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this site [**<52>**, **<53>**, **<27>** and **<54>**]. The public road system is adequate to support transport from the site. On-site roadways would likely require strengthening. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program.

4.2.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 2, 3 of paragraph 4.2.9 of the present document.

4.2.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 4 of table paragraph 4.2.9)

4.2.3.1. Trolley with tractor

In order to transfer:

- The packaging from the pool to the pre-shipment packaging area (phase 2 of table paragraph 4.2.9),
- The Transportation cask from the pre-shipment packaging area to the loading area (phase 3 of table paragraph 4.2.9).

4.2.3.2. Trailer for the road transportation (phase 4 of table paragraph 4.2.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and non escort

4.2.3.3. Tractor for the road transportation (phase 4 of table paragraph 4.2.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

4.2.3.4. Weather cover for the road transportation (phases 4, 5 of table paragraph 4.2.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

4.2.3.5. Frame of the Transportation cask for the road transportation (phase 4 of table paragraph 4.2.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

4.2.3.6. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

4.2.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

4.2.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

4.2.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Drainage (see phase 2 of table paragraph 4.2.9)

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 2 of table paragraph 4.2.9)

- Gantry Crane:
  One for the extraction of the packaging from the pool (see phase 1 of table paragraph 4.2.9)
  One for the preparation of the packaging (see phases 2, 3 of table paragraph 4.2.9)
  One for loading the Transportation cask on the trailer (see phase 4 of table paragraph 4.2.9)

- Lifting beam:
  One for the packaging and Transportation cask (see phases 1 to 4 of table paragraph 4.2.9)
  One for the impact limiter of the packaging (see phase 3 of table paragraph 4.2.9)

- Decontamination equipment: (see paragraph 3.2 of Chapter 3).

4.2.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phases 4 and 5 of table paragraph 4.2.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

4.2.8. Decommissioning

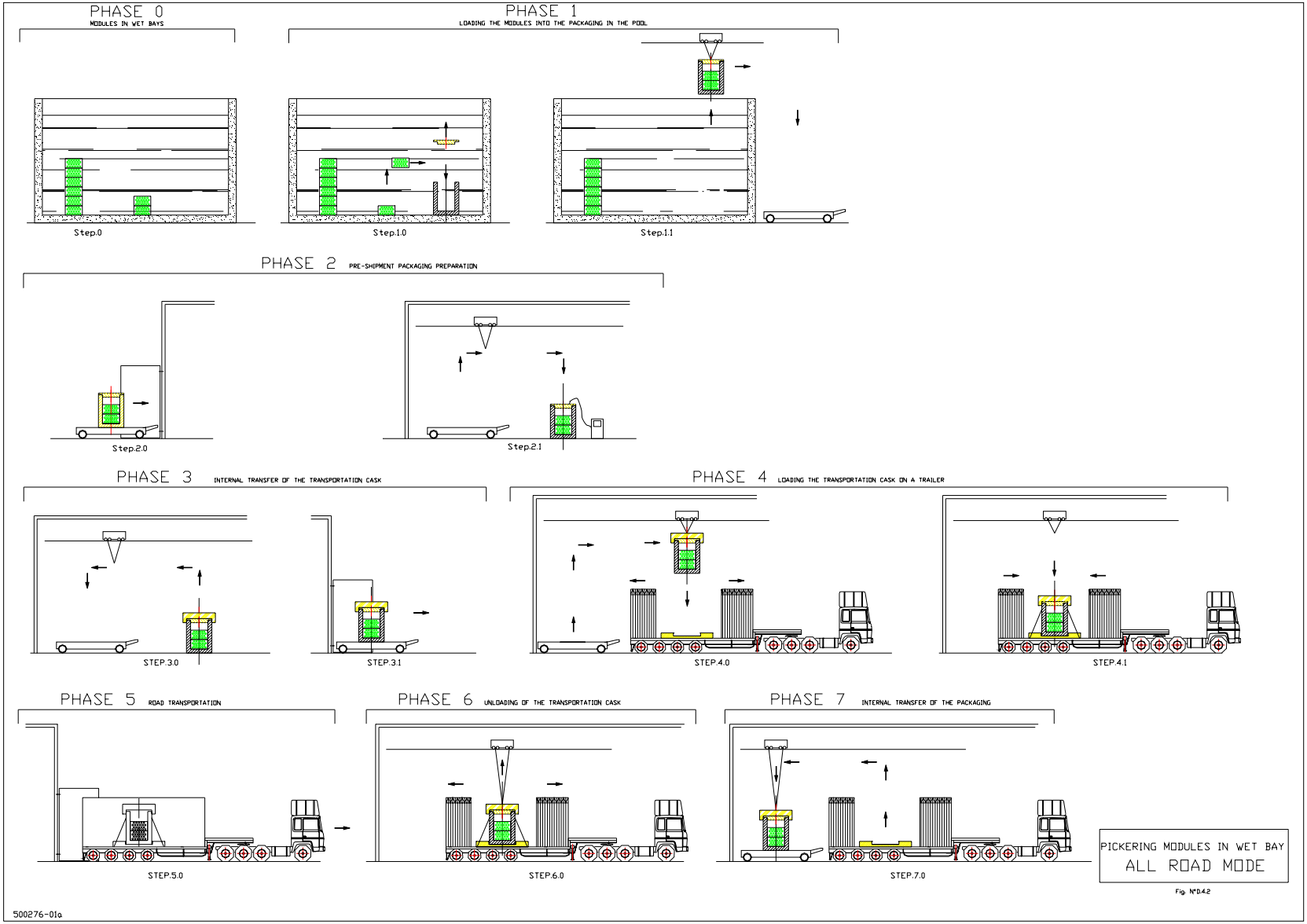
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

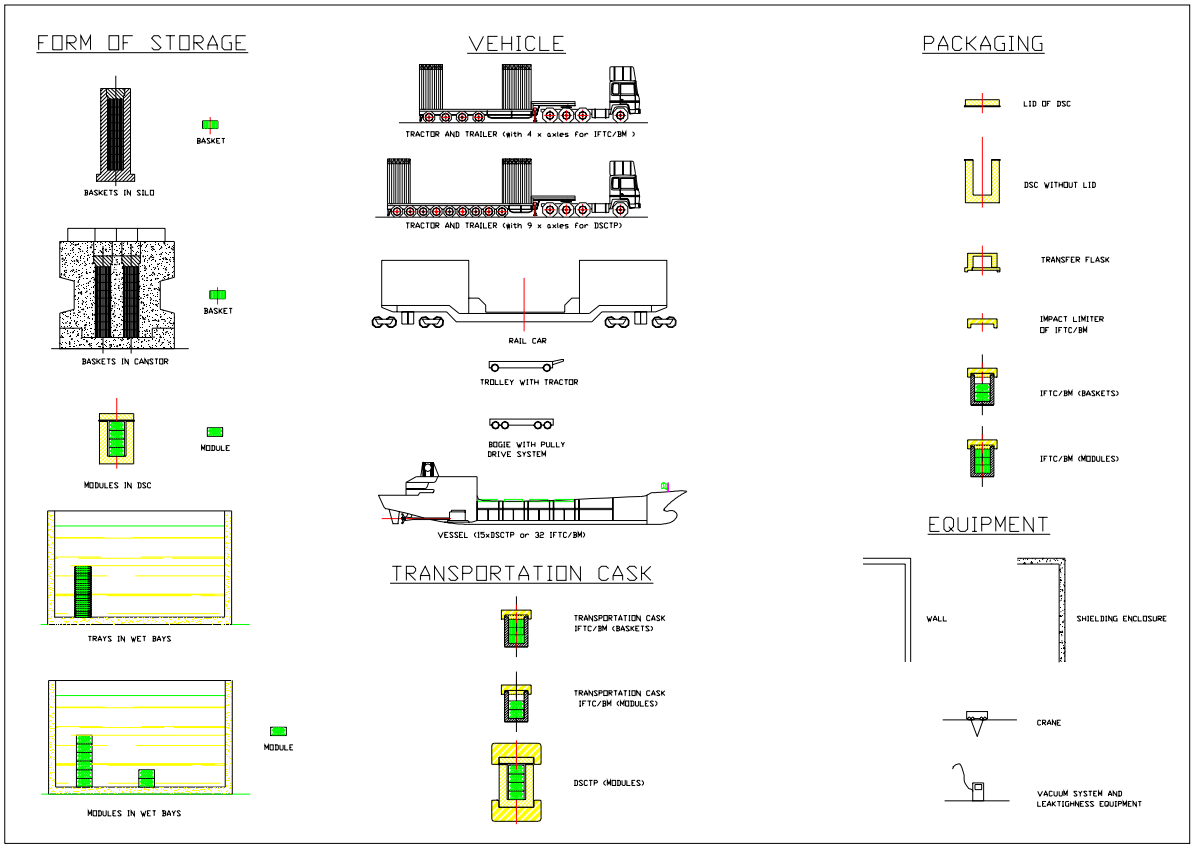
4.2.9. Table: Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.4.2
Phase 0	Modules in wet bays	Interim storage	Initial phase			0
Phase 1	Loading the modules into the packaging in the pool	UFTS	Loading the modules into the packaging in the pool		Identical than the IFTC in the pool **<3>** Decontamination of the IFTC/BM: identical as IFTC **<3>**	1.0, 1.1
				Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Figure N°5 in Appendix A	
Phase 2	Pre-shipment packaging preparation	UFTS	Drainage			2.0, 2.1
			Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
Phase 3	Internal transfer of the packaging	UFTS	Unloading of the packaging from the trolley	Gantry crane	60 tons	
			Radiological control of the packaging	Non contamination, Dose Rate	“Smear test”, Radiameter	3.0, 3.1
			Approach of the Trolley	Trolley	Trolley with tractor	
			Radiological control of the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Installing the impact limiter	Gantry crane	For the impact limiter (10 tons)	
			Loading of the Transportation cask on the Trolley			
			Radiological control of the Transportation cask and the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down		
Phase 4	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	4.0, 4.1
			Open the weather cover	Weather cover		
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	
				Lifting Beam for Transportation cask	To carry of the IFTC/BM similar to the IFTC, **<3>**)	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.4.2
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N° 15, **<3>**)	
			Check the condition of the Transportation cask, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	
Phase 5	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			5.0
				Real time tracking	Appendix H	
Phase 6	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			6.0
Phase 7	Internal transfer of loaded Transportation cask	DGR/CES				7.0
Phase 8	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 9	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 10	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
MODULES IN WET BAYS
PHASE 1
LOADING THE MODULES INTO THE PACKAGING IN THE POOL
Step.0
Step.1.0
Step.1.1
PHASE 2
PRE-SHIPMENT PACKAGING PREPARATION
Step.2.0
Step.2.1
PHASE 3
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 4
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.3.0
STEP.3.1
STEP.4.0
STEP.4.1
PHASE 5
ROAD TRANSPORTATION
PHASE 6
UNLOADING OF THE TRANSPORTATION CASK
PHASE 7
INTERNAL TRANSFER OF THE PACKAGING
STEP.5.0
STEP.6.0
STEP.7.0
PICKERING MODULES IN WET BAY
ALL ROAD MODE
Fig. N°D.4.2
500276-01a

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

5. DARLINGTON

5.1. MODULES IN DSCS (SEE APPENDIX B, TABLE N° 8)

From BUFDSF to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

5.1.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this site [**<52>**, **<53>**, **<27>** and **<54>**]. The public road system is adequate to support transport from the site. On-site roadways are also deemed adequate based on present condition. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program.

5.1.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 5.1.9 of the present document.

5.1.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 5.1.9)

5.1.3.1. Trolley with tractor

In order to transfer:

- The DSC from the storage to the hot cell (phase 1 of table paragraph 5.1.9).

5.1.3.2. Bogie pulley drive system

In order to transfer:

- The DSC in the hot cell (phase 2 of table paragraph 5.1.9),
- The IFTC/BM in the hot cell (phase 3 of table paragraph 5.1.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 5.1.9),
- The IFTC/BM to the shipment area (phase 5 of table paragraph 5.1.9).

5.1.3.3. Trailer for the road transportation (phase 6 of table paragraph 5.1.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

5.1.3.4. Tractor for the road transportation (phase 6 of table paragraph 5.1.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

5.1.3.5. Weather cover for the road transportation (phases 6 and 7 of table paragraph 5.1.9)

Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.
Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

5.1.3.6. Frame of the Transportation cask for the road transportation (phase 6 of table paragraph 5.1.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

5.1.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

5.1.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

5.1.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.
- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

5.1.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 5.1.9)
- Gantry Crane:
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 5.1.9)
  One for loading the impact limiter on the packaging (see phase 4 of table paragraph 5.1.9)
- Lifting beam:
  One for the Transportation cask (see phase 6 of table paragraph 5.1.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 5.1.9)
- Decontamination equipment (see paragraph 3.2 of Chapter 3).

5.1.7. Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 5.1.9.
- Emergency response plan: see paragraph 9 of Appendix D.
- Real time tracking: see paragraph 9 of Appendix D.

5.1.8. Decommissioning

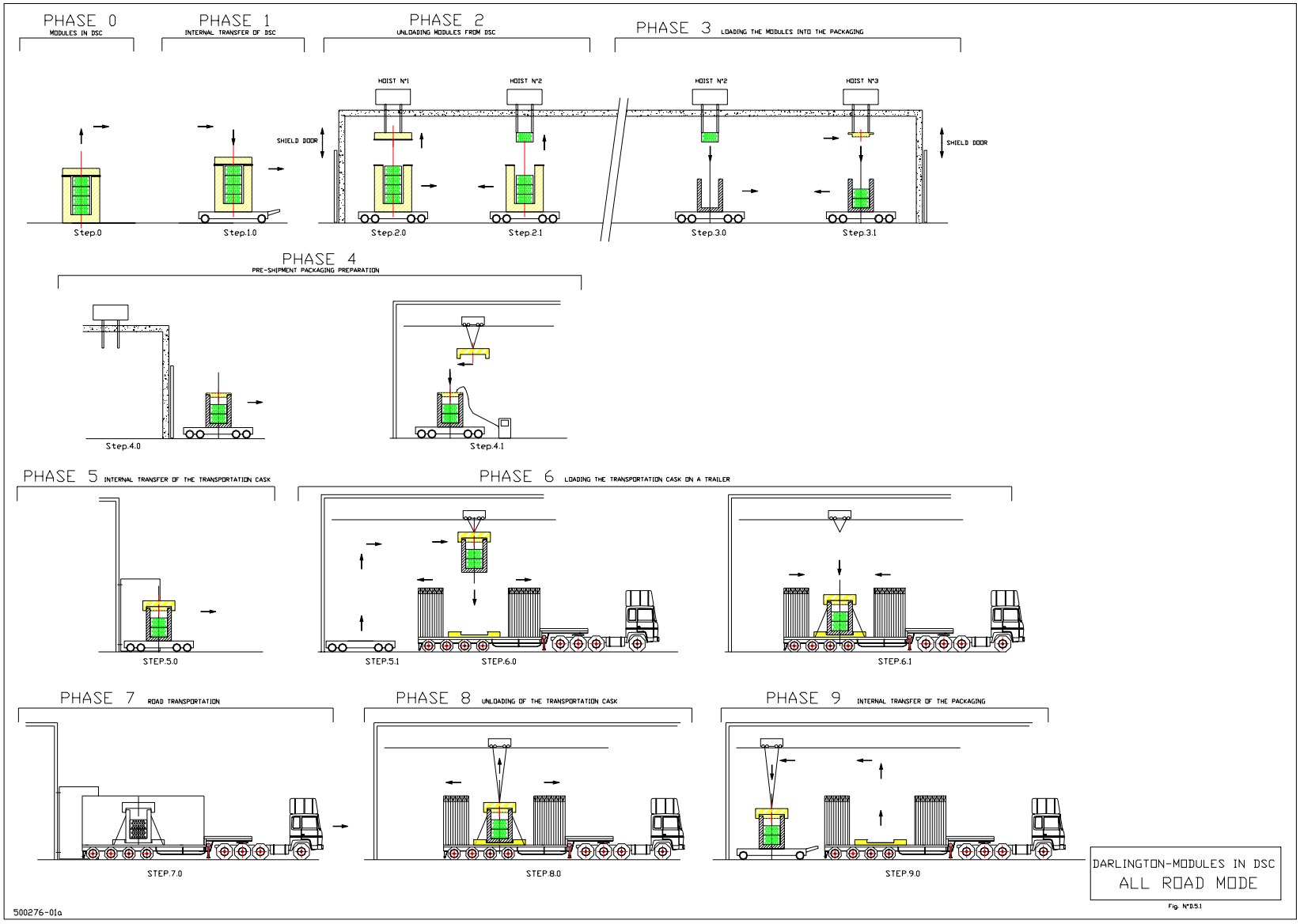
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

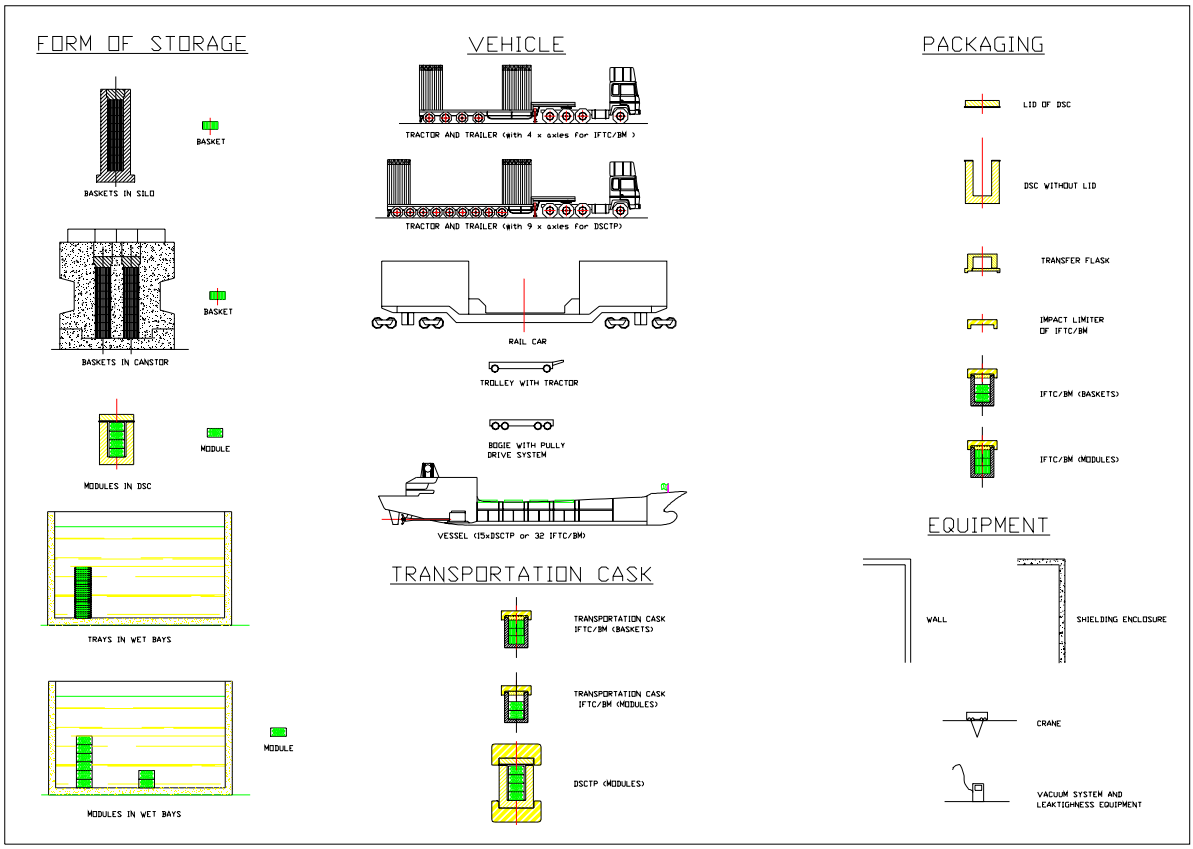
5.1.9. Table: Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.5.1
Phase 0	Modules in DSC	Interim storage	Initial phase			0
Phase 1	Internal transfer of the DSC	Interim storage				1.0
Phase 2	Unloading modules from DSC	Interim storage				2.0, 2, 1
Phase 3	Loading the modules into the packaging	UFTS	With the hoist N°3, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Figures N°4 **<3>**, N°5 in Appendix A	3.1
			With hoist N°2 Load the modules into the packaging			3.0
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	4.0, 4.1
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Installing the impact limiter	Gantry crane	For the impact limiter (10 tons)	
			Depressurising the cavity	Vacuum circuit		
Phase 5	Internal transfer of the packaging	UFTS	Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Transportation cask and the Bogie vehicle	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down		
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	6.0, 6.1
			Open the weather cover	Weather cover		
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM))	
				Lifting Beam for Transportation cask	To carry of the IFTC/BM similar to the IFTC, **<3>**)	
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.5.1
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N°15, <3>)	
			Check the condition of the packaging, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				9.0
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
MODULES IN DSC
PHASE 1
INTERNAL TRANSFER OF DSC
PHASE 2
UNLOADING MODULES FROM DSC
PHASE 3
LOADING THE MODULES INTO THE PACKAGING
HOIST N°1
HOIST N°2
HOIST N°2
HOIST N°3
SHIELD DOOR
SHIELD DOOR
Step.0
Step.1.0
Step.2.0
Step.2.1
Step.3.0
Step.3.1
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
Step.4.0
Step.4.1
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.5.1
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
DARLINGTON-MODULES IN DSC
ALL ROAD MODE
500276-01a
Fig. N°B.5.1

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

5.2. MODULES IN WET BAYS (SEE APPENDIX B, TABLE N°7)

From Darlington to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N° 1.

5.2.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from this site [**<52>**, **<53>**, **<27>** and **<54>**]. The public road system is adequate to support transport from the site. On-site roadways are also deemed adequate based on present condition. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Given the volume of used fuel to be transported to the site, use of the road mode would result in a larger number of individual shipments and offers the least potential for a consolidated transport program.

5.2.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 2, 3 of paragraph 5.2.9 of the present document.

5.2.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 4 of table paragraph 5.2.9)

5.2.3.1. Trolley with tractor

In order to transfer:

- The packaging from the pool to the pre-shipment packaging area (phase 2 of table paragraph 5.2.9),
- The packaging and Transportation cask from the pre-shipment packaging area to the loading area (phase 3 of table paragraph 5.2.9).

5.2.3.2. Trailer for the road transportation (phase 4 of table paragraph 5.2.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

5.2.3.3. Tractor for the road transportation (phase 4 of table paragraph 5.2.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

5.2.3.4. Weather cover for the road transportation (phases 4, 5 of table paragraph 5.2.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

5.2.3.5. Frame of the Transportation cask for the road transportation (phase 4 of table paragraph 5.2.9)

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

5.2.3.6. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

5.2.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

5.2.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

5.2.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Drainage (see phase 2 of table paragraph 5.2.9)

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 2 of table paragraph 5.2.9)

- Gantry Crane:
  One for the extraction of the packaging from the pool (see phase 1 of table paragraph 5.2.9)
  One for the preparation of the packaging (see phases 2, 3 of table paragraph 5.2.9)
  One for loading the Transportation cask on the trailer (see phase 4 of table paragraph 5.2.9)

- Lifting beam:

  One for the packaging and Transportation cask (see phases 1 to 4 of table paragraph 5.2.9)
  One for the impact limiter of the packaging (see phase 3 of table paragraph 5.2.9)

- Decontamination equipment: (see paragraph 3.2 of Chapter 3).

5.2.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phases 4 and 5 of table paragraph 5.2.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

5.2.8. Decommissioning

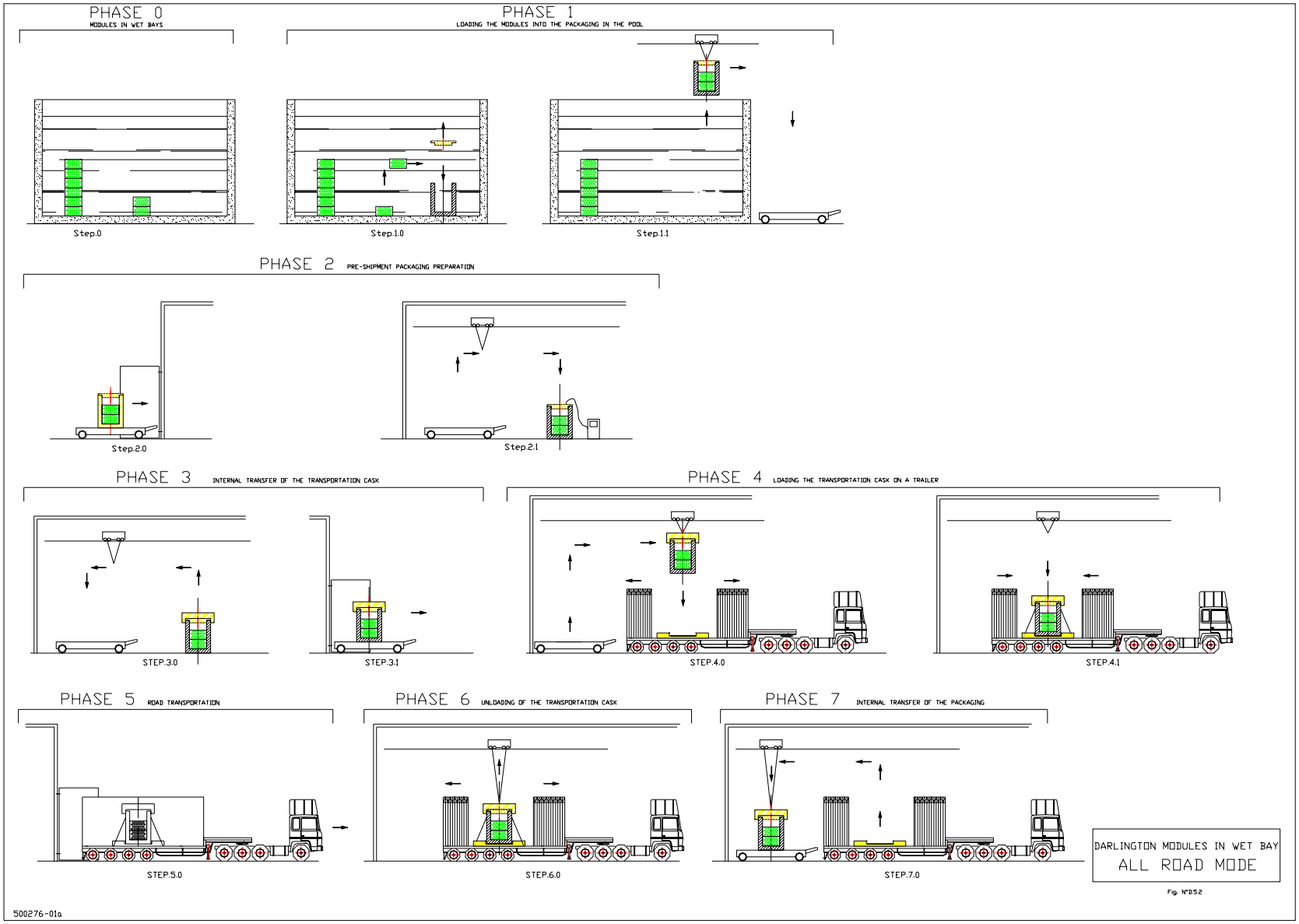
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

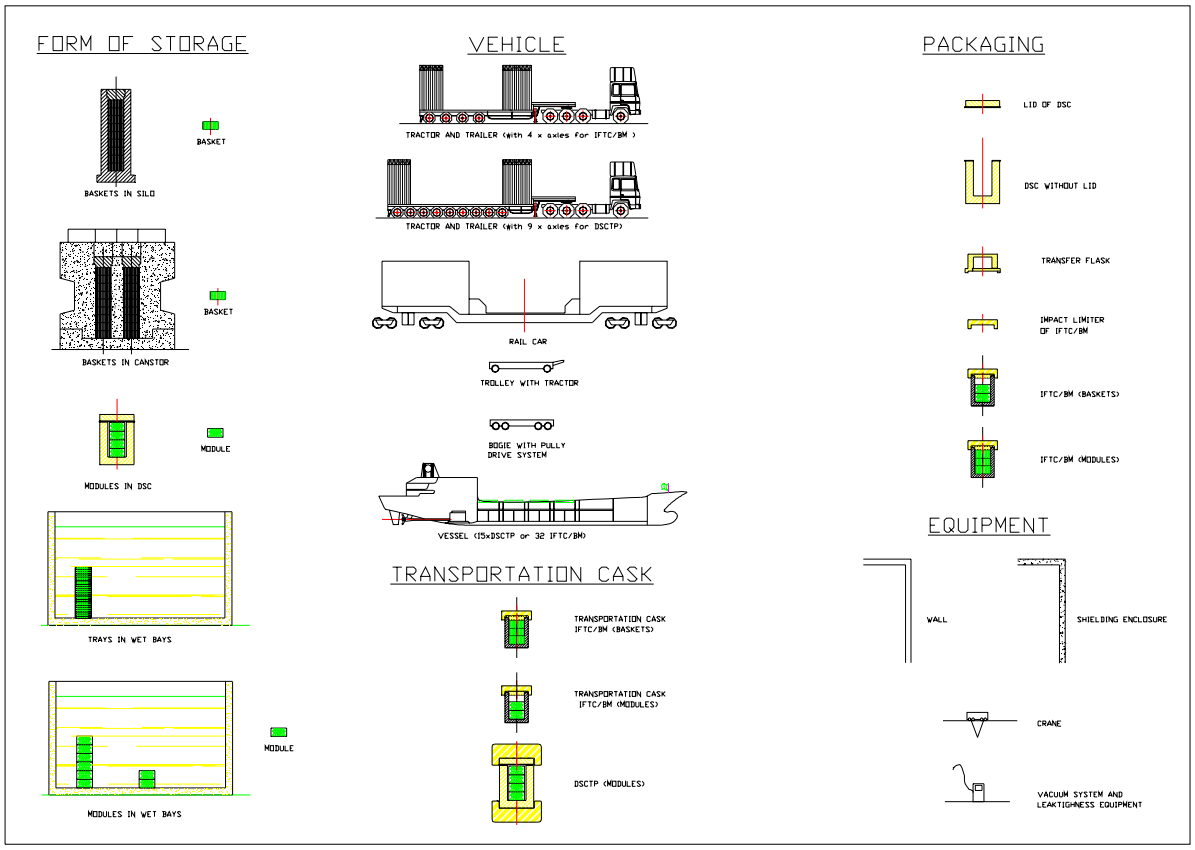
5.2.9. Table: Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.5.2
Phase 0	Modules in wet bays	Interim storage	Initial phase			0
Phase 1	Loading the modules into the packaging in the pool	UFTS	Loading the modules into the packaging in the pool		Identical than the IFTC in the pool **<3>** Decontamination of the IFTC/BM: identical as IFTC **<3>**	1.0, 1.1
Phase 2	Pre-shipment packaging preparation	UFTS	Drainage			2.0, 2.1
				Packaging	IFTC/BM : See section 2.4.7.1.3 of D#5 Figure N°5 in Appendix A	
			Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves,	
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
Phase 3	Internal transfer of the packaging	UFTS	Unloading the packaging from the trolley	Gantry crane	60 tons	
			Installing the impact limiter	Gantry crane	For the impact limiter	
			Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	3.0, 3.1
			Approach of the Trolley	Trolley	Trolley with tractor	
			Radiological control of the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Loading of the Transportation cask on the Trolley			
			Radiological control of the Transportation cask and the Trolley	Non contamination, Dose Rate	“Smear test”, Radiameter	
			Internal transfer	Tie down		
Phase 4	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	“Smear test”, Radiameter	4.0, 4.1
			Open the weather cover	Weather cover		
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	
				Lifting Beam for packaging	To carry of the IFTC/BM similar to the IFTC, **<3>**)	
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.5.2
				Tractor (Appendix A, Figure N°14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC (Appendix A, Figure N° 15, **<3>**)	
			Check the condition of the packaging, trailer			
			Fit the transport seals			
			Close the weather cover	Weather cover		
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	
Phase 5	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			5.0
				Real time tracking	Appendix H	
Phase 6	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			6.0
Phase 7	Internal transfer of loaded Transportation cask	DGR/CES				7.0
Phase 8	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 9	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 10	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
MODULES IN WET BAYS
PHASE 1
LOADING THE MODULES INTO THE PACKAGING IN THE POOL
Step.0
Step.1.0
Step.1.1
PHASE 2
PRE-SHIPMENT PACKAGING PREPARATION
Step.2.0
Step.2.1
PHASE 3
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 4
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.3.0
STEP.3.1
STEP.4.0
STEP.4.1
PHASE 5
ROAD TRANSPORTATION
PHASE 6
UNLOADING OF THE TRANSPORTATION CASK
PHASE 7
INTERNAL TRANSFER OF THE PACKAGING
STEP.5.0
STEP.6.0
STEP.7.0
DARLINGTON MODULES IN WET BAY
ALL ROAD MODE
Fig. N°D.5.2
500276-01a

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

6. POINT LEPREAU

Baskets in Silo (See Appendix B, Table N° 4)
From Point Lepreau Facility to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

6.1. MODE AND ROUTE DEVELOPMENT

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from Point Lepreau [**<52>**, **<55>**, **<53>**, **<56>**, **<27>** and **<54>**]. The public road system is adequate to support the transport, taking into account use of legal weight and size loads. Given the distance from either of the hypothesised northern or southern Ontario storage facilities, road transport from Point Lepreau would represent the longest shipment distances and durations for the entire program.

Based on a site evaluation, it is predicted that strengthening and re-grading of facility roadways would be necessary to support on-site transport. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

Additionally, given the distances involved, keyed to availability of a finite number of transport vehicles, removal of the used fuel from Point Lepreau would be a lengthy process. It would also be difficult to obtain savings in shipment times and costs that could be obtained through economies of scale available through rail or water transport.

6.2. NUCLEAR FACILITY LOADING

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 6.9 of the present document.

6.3. TRANSPORTER (VEHICLE)

Conceptual design of trailer and tractors (phase 6 of table paragraph 6.9)

6.3.1. Trolley with tractor

In order to transfer:

- The baskets from the silo to the packaging (phases 2 and 3 of table paragraph 6.9),

6.3.1.1. Bogie pulley drive system

In order to transfer:

- The IFTC/BM in the hot cell (phase 3 of table paragraph 6.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 6.9),
- The IFTC/BM to the shipment area (phases 5 and 6 of table paragraph 6.9),

6.3.2. Trailer for the road transportation (phase 6 of table paragraph 6.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

6.3.3. Tractor for the road transportation (phase 6 of table paragraph 6.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

6.3.4. Weather cover for the road transportation (phase 7 of table paragraph 6.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

6.3.5. Frame of the Transportation cask for the road transportation

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

6.3.6. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

6.4. TRANSPORTATION SYSTEM MAINTENANCE FACILITY

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

6.5. CASKS

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.
- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 5 of Appendix A, Appendix C.

6.6. UFTS AUXILIARY EQUIPMENT

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment :
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 6.9)
- Gantry Crane :
  One for installing the Transfer flask on the top of the hot cell (see phase 3 of table paragraph 6.9)
  One for loading the transportation cask on the trailer (see phase 6 of table paragraph 6.9)
- Lifting beam :
  One for the Transfer flask (see phase 3 of table paragraph 6.9)
  One for the Transportation cask (see phases 5 and 6 of table paragraph 6.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 6.9)
- Decontamination equipment (see paragraph 3.2 of Chapter 3).

6.7. UFTS TRANSPORTATION SYSTEM OPERATION

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 6.9
- Emergency response plan: see paragraph 9 of Appendix D.
- Real time tracking: see paragraph 9 of Appendix D.

6.8. DECOMMISSIONING

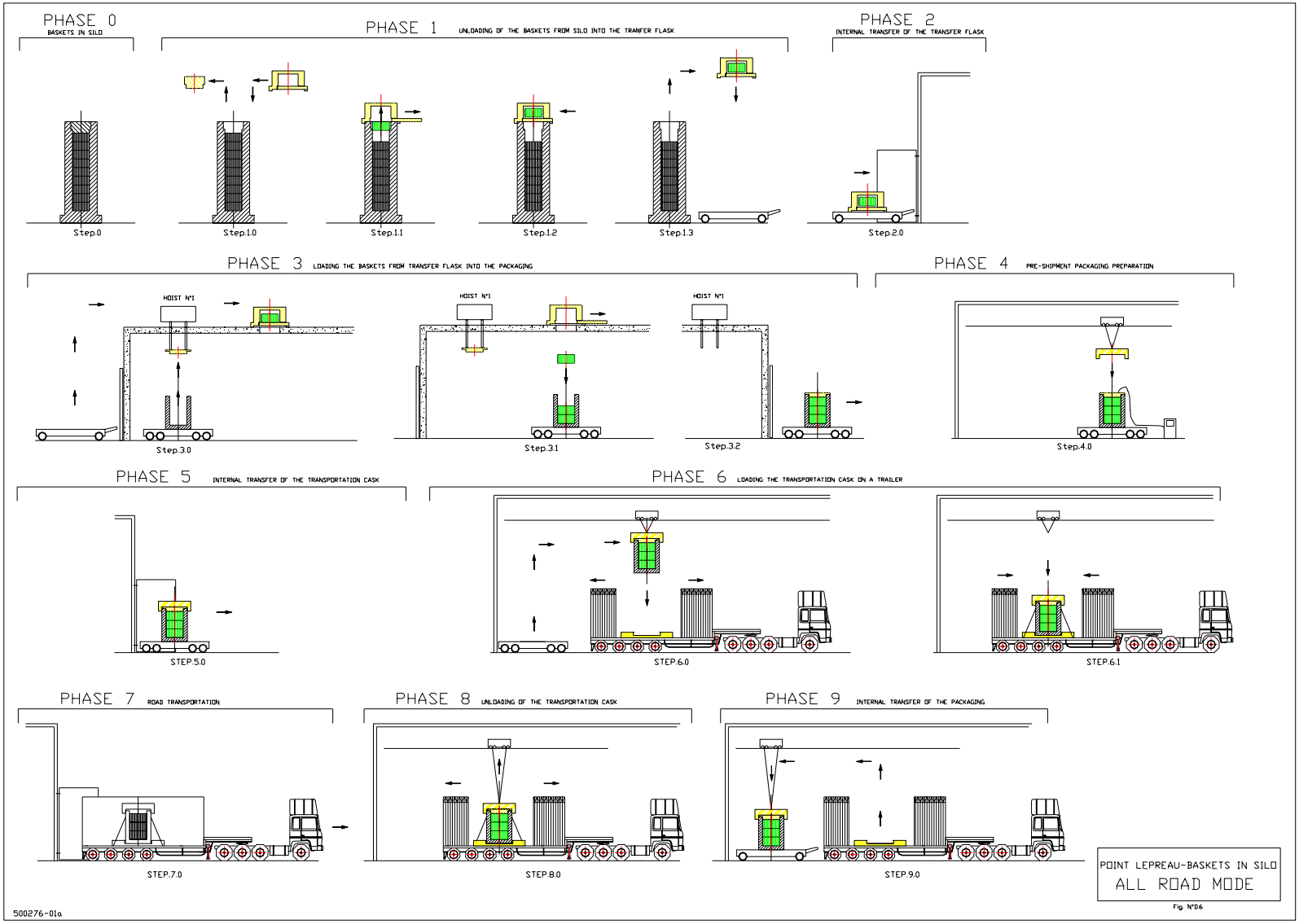
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

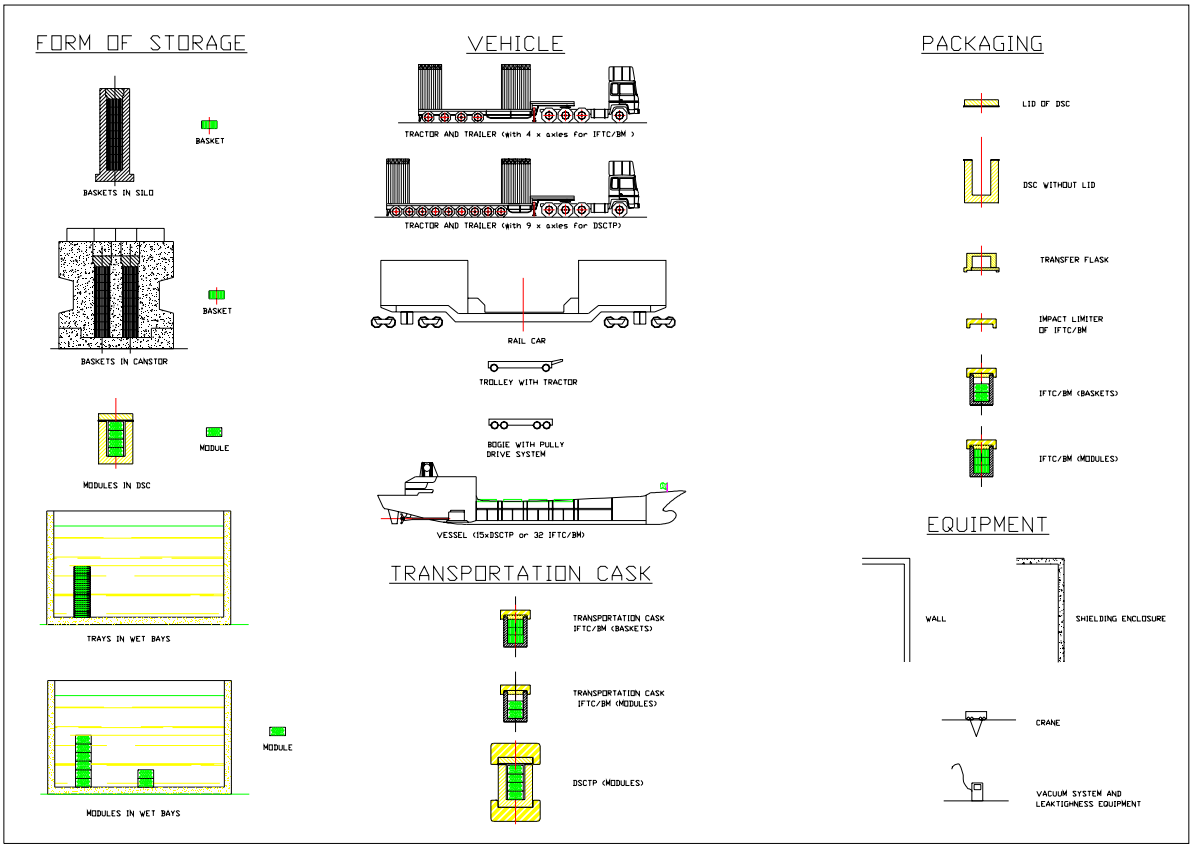
6.9. TABLE : ANALYSIS OF THE OPERATIONAL PHASES OF TRANSPORT

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.6
Phase 0	Baskets in Silo	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packaging	UFTS	With a gantry crane , place the transfer flask on the hot cell	Transfer flask	Similar to Gentilly 2: Appendix A, Figure N°10 - Shielded fuel transfer cask - 26 tons with 60 bundles basket and with irradiated fuel - "Sliding" gate - Electric hoist for lifting or lowering a basket into the IFTC/BM - Chain - Basket lifting grapple - Shielding	3.0
				Gantry crane	For the Transfer flask	
				Lifting Beam for the Transfer flask		
			With the hoist N°1, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM: See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
			With hoist N°2 Load the baskets into the packaging			3.1
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, work plate-form for bolt the lid	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter			
Phase 5	Internal transfer of the Transportation cask	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Loading of the Transportation cask on the Bogie			5.0
			Radiological control of the Transportation cask and the bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	5.1

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.6
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, <3>)	6.0
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure 14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, <3>)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	6.1
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
BASKETS IN SILO
PHASE 1
UNLOADING OF THE BASKETS FROM SILO INTO THE TRANFER FLASK
PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
HOIST N°1
HOIST N°1
HOIST N°1
Step.3.0
Step.3.1
Step.3.2
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
POINT LEPREAU-BASKETS IN SILO
ALL ROAD MODE
500276-01a
Fig N°D6

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

7. CHALK RIVER

Baskets in Silo (See Appendix B, Table N° 4)
From NPD Facility to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

7.1. MODE AND ROUTE DEVELOPMENT

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from Chalk River [**<52>**, **<53>**, **<56>**, **<27>** and **<54>**]. The public road system is generally adequate to support the lower volume shipments from this site, however some improvement may be necessary to public roadways at the time of shipment. On-site roadways would also likely require strengthening and re-grading (especially noting the grade leaving the site storage area).

Road transport would be appropriate for Chalk River used fuel being transferred to either the northern or southern Ontario repository. This transport mode is consistent with the volume of used fuel to be removed from the site.

7.2. NUCLEAR FACILITY LOADING

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 2.11 of the present document.

7.3. TRANSPORTER (VEHICLE)

Conceptual design of trailer and tractors (phase 6 of table paragraph 7.9)

7.3.1. Trolley with tractor

In order to transfer:

- The baskets from the silo to the packaging (phases 2 and 3 of table paragraph 7.9).

7.3.2. Bogie pulley drive system

In order to transfer:

- The IFTC/BM in the hot cell (phase 3 of table paragraph 7.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 7.9),
- The IFTC/BM to the shipment area (phases 5 and 6 of table paragraph 7.9).

7.3.3. Trailer for the road transportation (phase 6 of table paragraph 7.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

7.3.4. Tractor for the road transportation (phase 6 of table paragraph 7.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

7.3.5. Weather cover for the road transportation (phase 7 of table paragraph 7.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

7.3.6. Frame of the Transportation cask for the road transportation

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

7.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

7.4. TRANSPORTATION SYSTEM MAINTENANCE FACILITY

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

7.5. CASKS

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.
- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 6 of Appendix A, Appendix C.

7.6. UFTS AUXILIARY EQUIPMENT

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 7.9)
- Gantry Crane :
  One for installing the Transfer flask on the top of the hot cell (see phase 3 of table paragraph 7.9)
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 7.9)
- Lifting beam :
  One for the Transfer flask (see phase 3 of table paragraph 7.9)
  One for the Transportation cask (see phase 6 of table paragraph 7.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 7.9)
- Decontamination equipment (see paragraph 3.2 of Chapter 3).

7.7. UFTS TRANSPORTATION SYSTEM OPERATION

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 7.9
- Emergency response plan: see paragraph 9 of Appendix D.
- Real time tracking: see paragraph 9 of Appendix D.

7.8. DECOMMISSIONING

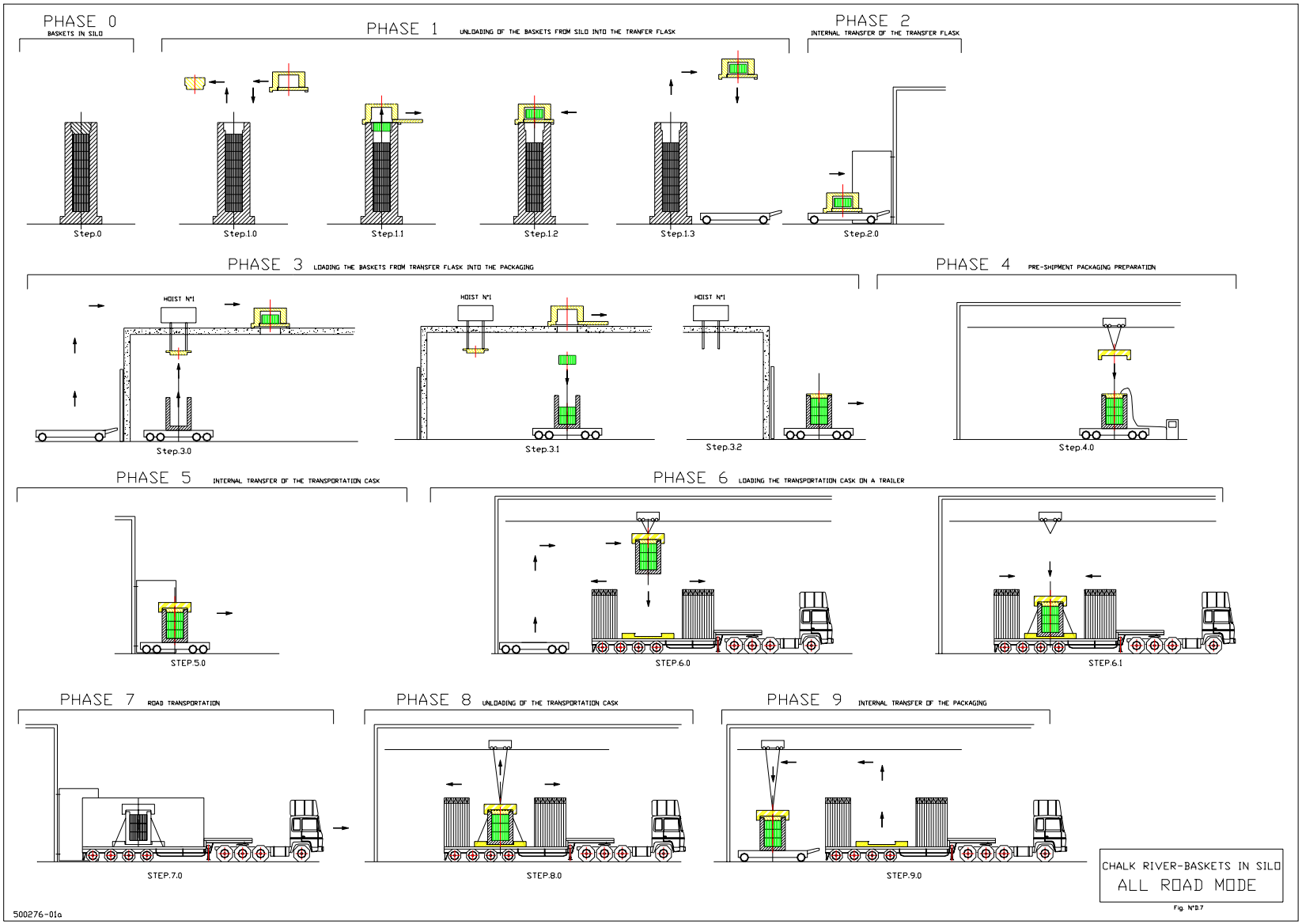
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

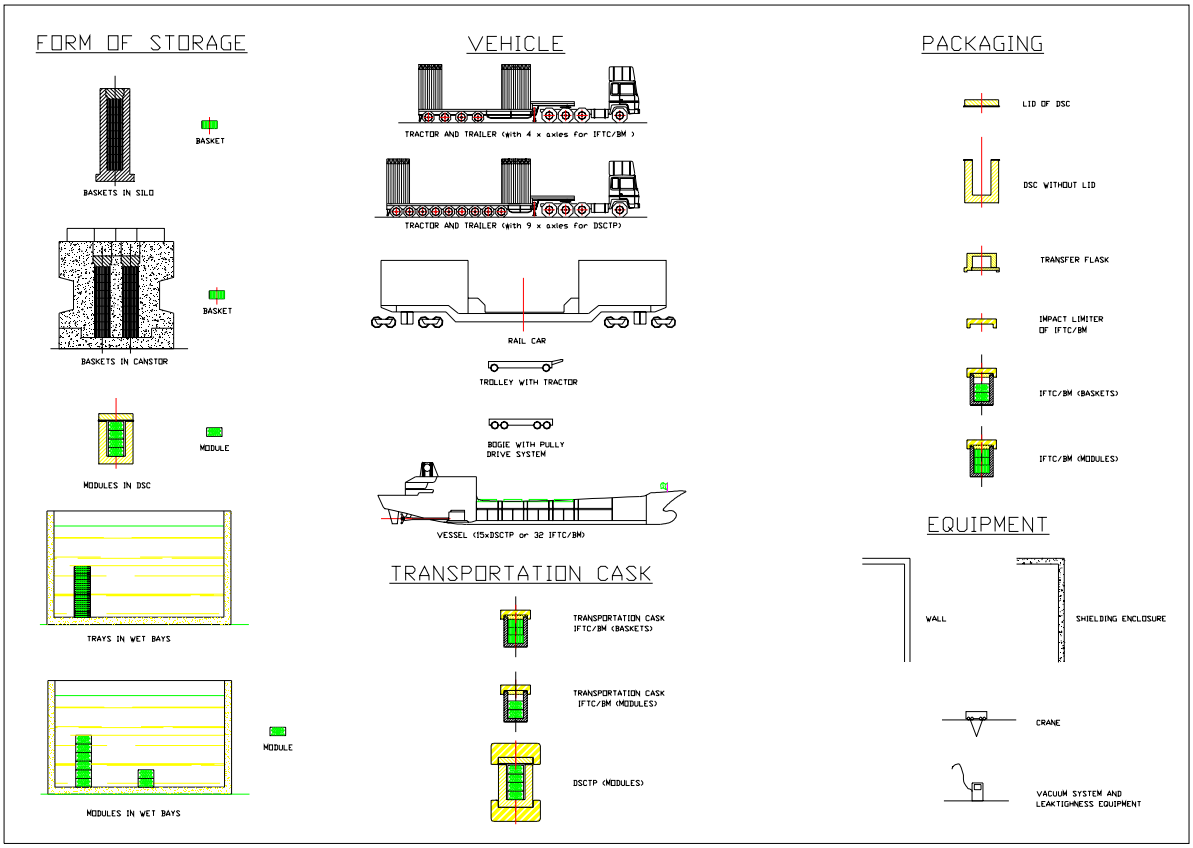
7.9. TABLE : ANALYSIS OF THE OPERATIONAL PHASES OF TRANSPORT

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.7
Phase 0	Baskets in Silo	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packaging	UFTS	With a gantry crane , place the transfer flask on the hot cell	Transfer flask	Similar to Gentilly 2 : Appendix A, Figure N°10 - Shielded fuel transfer cask - 26 tons with 60 bundles basket and with irradiated fuel - "Sliding" gate - Electric hoist for lifting or lowering a basket into the IFTC/BM - Chain - Basket lifting grapple - Shielding	3.0
				Gantry crane	For the Transfer flask	
				Lifting Beam for the Transfer flask		
			With the hoist N°1, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM: See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
			With hoist N°2 Load the baskets into the packaging			3.1
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, work plate-form for bolt the lid	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter			
Phase 5	Internal transfer of the Transportation cask	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Loading of the Transportation cask on the Bogie			5.0
			Radiological control of the Transportation cask and the bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	5.1

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.7
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, **<3>**)	6.0
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure 14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, **<3>**)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	6.1
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
BASKETS IN SILO
PHASE 1
UNLOADING OF THE BASKETS FROM SILO INTO THE TRANFER FLASK
PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
HOIST N°1
HOIST N°1
HOIST N°1
Step.3.0
Step.3.1
Step.3.2
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
CHALK RIVER-BASKETS IN SILO
ALL ROAD MODE
Fig. N°D.7
500276-01a

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

8. GENTILLY

8.1. BASKETS IN SILO (SEE APPENDIX B, TABLE N° 4)

From Gentilly 1 to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

8.1.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from the Gentilly sites [**<52>**, **<53>**, **<56>**, **<27>**, **<54>** and **<57>**]. The public road system is generally adequate to support shipments from this site, however some improvement may be necessary to public roadways at the time of shipment. (It should be noted that a review of the bridge spanning the St. Lawrence River at Trois Rivières was not specifically included herein).

On-site roadways would also likely require strengthening and re-grading. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

8.1.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 8.1.9 of the present document.

8.1.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 8.1.9)

8.1.3.1. Trolley with tractor

In order to transfer:

- The baskets from the silo to the packaging (phases 2 and 3 of table paragraph 8.1.9).

8.1.3.2. Bogie pulley drive system

In order to transfer:

- The IFTC/BM in the hot cell (phase 3 of table paragraph 8.1.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 8.1.9),
- The IFTC/BM to the shipment area (phases 5 and 6 of table paragraph 8.1.9).

8.1.3.3. Trailer for the road transportation (phase 6 of table paragraph 8.1.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

8.1.3.4. Tractor for the road transportation (phase 6 of table paragraph 8.1.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

8.1.3.5. Weather cover for the road transportation (phase 7 of table paragraph 8.1.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

8.1.3.6. Frame of the Transportation cask for the road transportation

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

8.1.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

8.1.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

8.1.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.
- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 6 of Appendix A, Appendix C.

8.1.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment:
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 8.1.9)
- Gantry Crane :
  One for installing the Transfer flask on the top of the hot cell (see phase 3 of table paragraph 8.1.9)
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 8.1.9)
- Lifting beam :
  One for the Transfer flask (see phase 3 of table paragraph 8.1.9)
  One for the transportation cask (see phase 6 of table paragraph 8.1.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 8.1.9)
- Decontamination equipment (see paragraph 3.2 of Chapter 3).

8.1.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 8.1.9
- Emergency response plan: see paragraph 9 of Appendix D.
- Real time tracking: see paragraph 9 of Appendix D.

8.1.8. Decommissioning

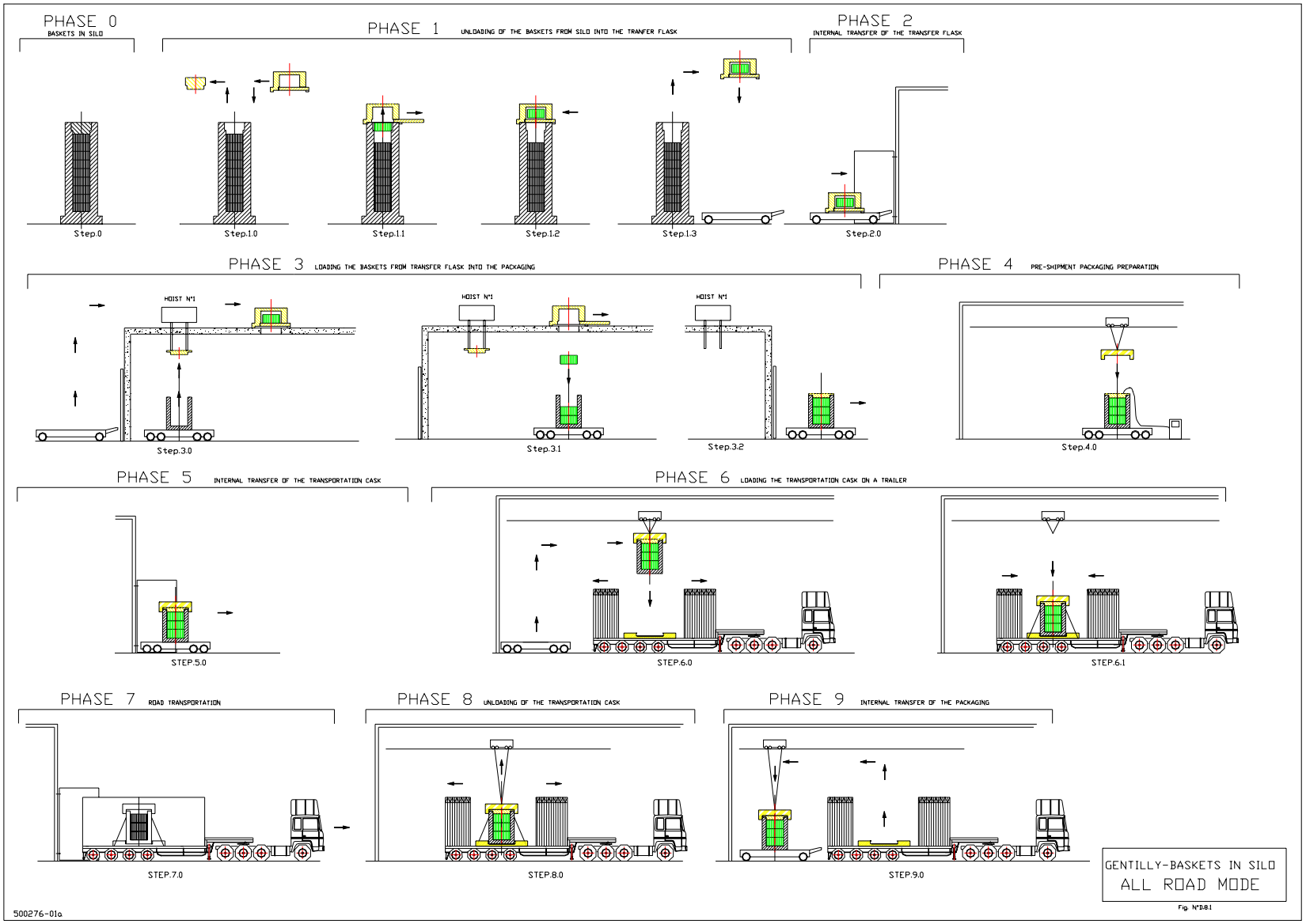
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

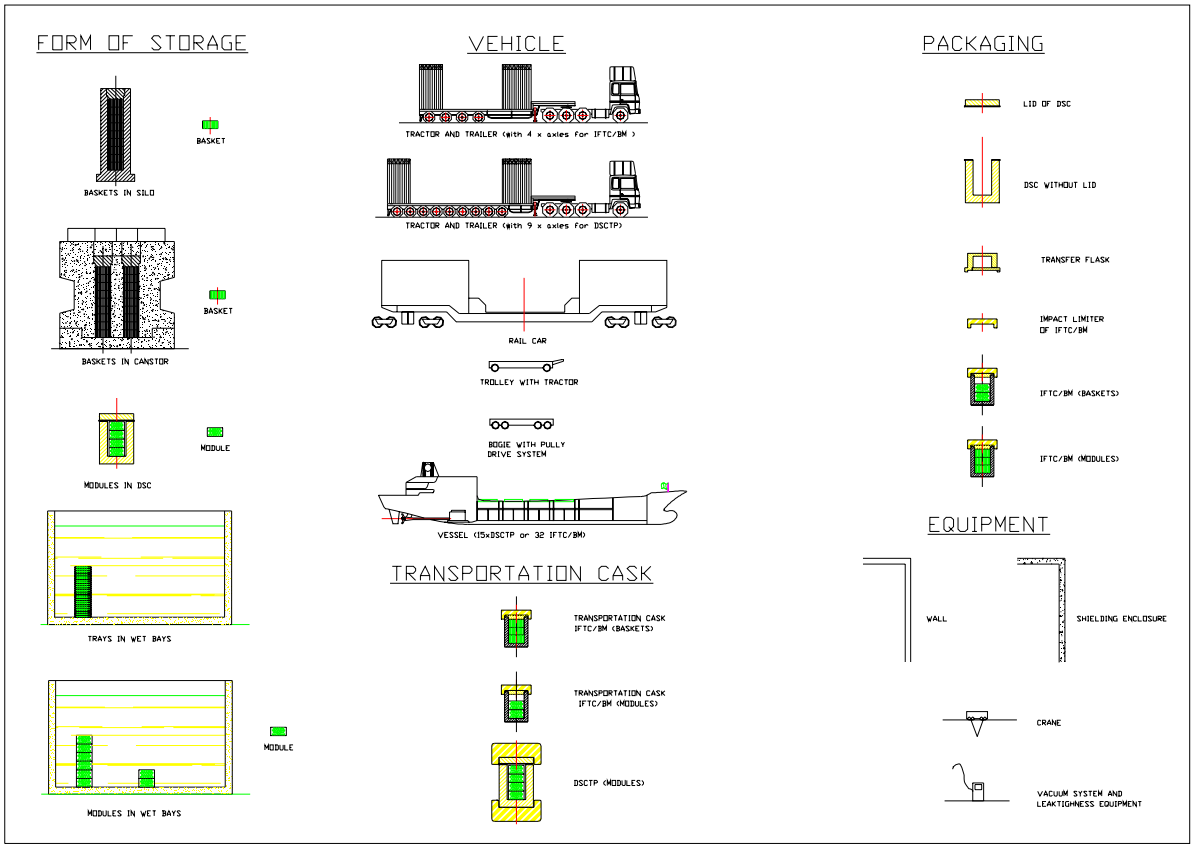
8.1.9. Table : Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.8.1
Phase 0	Baskets in Silo	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packaging	UFTS	With a gantry crane , place the transfer flask on the hot cell	Transfer flask	Similar to Gentilly 2 : Appendix A, Figure N°10 - Shielded fuel transfer cask - 26 tons with 60 bundles basket and with irradiated fuel - "Sliding" gate - Electric hoist for lifting or lowering a basket into the IFTC/BM - Chain - Basket lifting grapple - Shielding	3.0
				Gantry crane	For the Transfer flask	
				Lifting Beam for the Transfer flask		
			With the hoist N°1, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
			Load the baskets into the packaging			3.1
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, work plate-form for bolt the lid	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter			
Phase 5	Internal transfer of the Transpor-tation cask	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Loading of the Transportation cask on the Bogie			5.0
			Radiological control of the Transportation cask and the bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	5.1

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.8.1
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, **<3>**)	6.0
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure 14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, **<3>**)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	6.1
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
BASKETS IN SILO
PHASE 1
UNLOADING OF THE BASKETS FROM SILO INTO THE TRANFER FLASK
PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
HOIST N°1
HOIST N°1
HOIST N°1
Step.3.0
Step.3.1
Step.3.2
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
GENTILLY-BASKETS IN SILO
ALL ROAD MODE
Fig N°D-8.1
500276-01a

Key:


FORM OF STORAGE
BASKET
BASKETS IN SILO
BASKET
BASKETS IN CANSTOR
MODULE
MODULES IN DSC
TRAYS IN WET BAYS
MODULE
MODULES IN WET BAYS
VEHICLE
TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
RAIL CAR
TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

8.2. BASKETS IN CANSTOR (SEE APPENDIX B, TABLE N° 5)

From Gentilly 2 to the Centralised Facility
Quantity of bundles to be transported from 2035 to 2064: see Appendix B, Table N°1.

8.2.1. Mode and route development

Feasibility of transporting used fuel from the different current storage site to the centralised facility.
Viability of shipping by road and the identification of a preferred shipping route.

Road transport is clearly feasible from the Gentilly sites [**<52>**, **<53>**, **<56>**, **<27>, <54>** and **<57>**]. The public road system is generally adequate to support shipments from this site, however some improvement may be necessary to public roadways at the time of shipment. (It should be noted that a review of the bridge spanning the St. Lawrence River at Trois Rivières was not specifically included herein).

On-site roadways would also likely require strengthening and re-grading. Such infrastructure improvements would be necessary for road transport, as well as to support transport to a railway or a waterway. Accordingly, such improvements are deemed necessary for the program.

8.2.2. Nuclear facility loading

Receive and prepare the used fuel and packages for loading, prepare packages for loading into transportation packages, pre-shipment tests, and prepare transportation package for transfer to a trailer.

See phases 3, 4, 5 of paragraph 8.2.9 of the present document.

8.2.3. Transporter (vehicle)

Conceptual design of trailer and tractors (phase 6 of table paragraph 8.2.9)

8.2.3.1. Trolley with tractor

In order to transfer:
- The baskets from the silo to the packaging (phases 2 and 3 of table paragraph 8.2.9),

8.2.3.2. Bogie pulley drive system

In order to transfer:

- The IFTC/BM in the hot cell (phase 3 of table paragraph 8.2.9),
- The IFTC/BM to the pre-shipment packaging area (phase 4 of table paragraph 8.2.9),
- The IFTC/BM to the shipment area (phases 5 and 6 of table paragraph 8.2.9).

8.2.3.3. Trailer for the road transportation (phase 6 of table paragraph 8.2.9)

- Modified 48 foot flatted trailer with integrated tie-down
- Trailer equipped with hydraulic or air ride suspension to cushion the load
- Trailer equipped with four axles
- One loaded cask per trailer
- 2 drivers and no escort

8.2.3.4. for the road transportation (phase 6 of table paragraph 8.2.9)

- Standard commercial tractor sufficient for the loaded weight
- The weight for the fuelled reference tractor is roughly 9,075 kg.

8.2.3.5. Weather cover for the road transportation (phase 7 of table paragraph 8.2.9)

- Rolling removable plastic weather cover in order to protect the Transportation cask from rain and to not have a publicly Transportation cask. Two men (one on each side of the trailer) can manually open or close the weather cover which can rolls on a rail fixed on the frame of the Transportation cask.

- Holes and a ventilation shaft on the top of the cover are calculated to create an adequate draught around the Transportation cask during the transport. The weather cover is composed with two parts: one with a fixed metallic panel at the rear side, one with a fixed metallic panel at the front side. The weather cover can be taken off from the trailer with a specific frame fixed at the rear side of the frame for the Transportation cask.

8.2.3.6. Frame of the Transportation cask for the road transportation

Specific frame to fix the Transportation cask and to have an evenly distributed load on the axles. This frame is fitted to the vehicle with twistlock devices plus a metal fitting designed for the appropriate accelerations. The numbers of attachments for the frame means it is still better to remove the cask from the frame, rather than taking than cask and the frame as unit during intermodal transfers.
The weather cover can rolls on a rail fixed on the frame of the Transportation cask. A drip pan is installed under the frame in order to collect the drain of water coming from the condensation of the Transportation cask. A manual valve with a padlock is installed at the lower level of the drip pan in order to collect the water.

8.2.3.7. Specific equipment

- GPS antenna (tracking) on the tractor
- Turning light (“Girophare”) on the tractor
- Tools box adapted to the Transportation cask

8.2.4. Transportation system maintenance facility

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

8.2.5. Casks

Conceptual design for the Transportation package and tie-down systems for UFTS:

- Tie-down: similar to the IFTC.

- IFTC/BM: See chapter 2, section 2.4.7.1.3, Figure N° 6 of Appendix A, Appendix C.

8.2.6. UFTS Auxiliary equipment

Conceptual design for Auxiliary equipment work:

- Leakage and purging equipment :
  One complete equipment with vacuum pumps and gauges (see phase 4 of table paragraph 8.2.9)

- Gantry Crane:
  One for installing the Transfer flask on the top of the hot cell (see phase 3 of table paragraph 8.2.9)
  One for loading the Transportation cask on the trailer (see phase 6 of table paragraph 8.2.9)

- Lifting beam :
  One for the Transfer flask (see phase 3 of table paragraph 8.2.9)
  One for the transportation cask (see phase 6 of table paragraph 8.2.9)
  One for the impact limiter of the packaging (see phase 4 of table paragraph 8.2.9)

- Decontamination equipment (see paragraph 3.2 of Chapter 3).

8.2.7. UFTS Transportation system operation

Loading of packages onto the trailers, security, transportation, emergency response:

- Loading of packages onto the trailers, security, transportation as described in phase 6 of table paragraph 8.2.9.

- Emergency response plan: see paragraph 9 of Appendix D.

- Real time tracking: see paragraph 9 of Appendix D.

8.2.8. Decommissioning

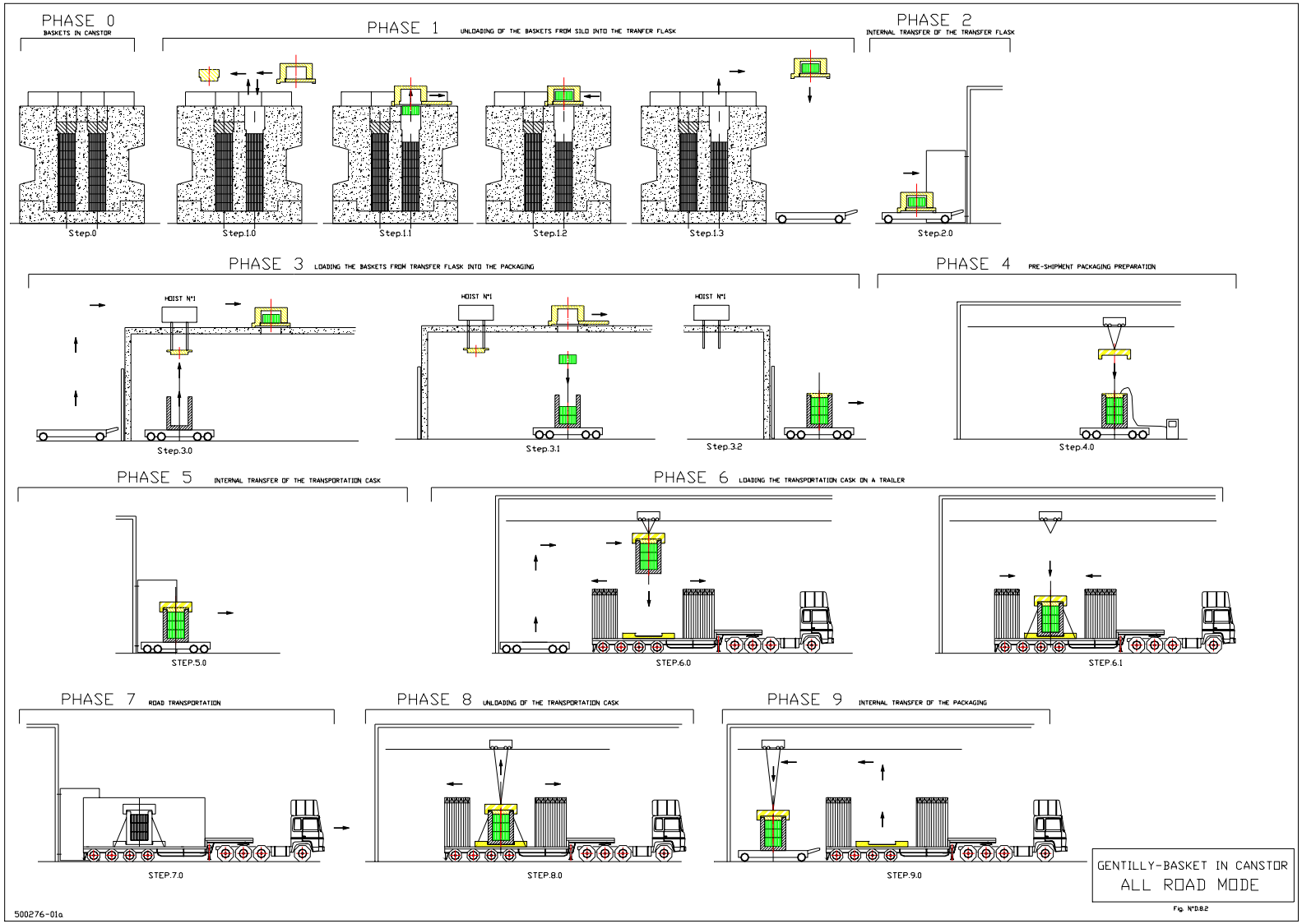
Where possible the equipment would be salvaged and decontaminated for sale and the remainder would be sent to a disposal facility.

Some of the decontaminated equipment can be decontaminated on the current storage site and some of them can be decontaminated at the Centralised Facility in order to avoid the transportation of contaminated equipment (see paragraph 3.2 of Chapter 3).

8.2.9. Table: Analysis of the operational phases of transport

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.8.2
Phase 0	Baskets in Canstor	Interim storage	Initial phase			0
Phase 1	Unloading of the baskets from the Silo into the transfer flask	Interim storage				1.0, 1.1, 1.2
Phase 2	Internal transfer of the transfer flask	Interim storage				2.0
Phase 3	Loading the baskets from the transfer flask into the packaging	UFTS	With a gantry crane , place the transfer flask on the hot cell	Transfer flask	Similar to Gentilly 2: Appendix A, Figure N°10 - Shielded fuel transfer cask - 26 tons with 60 bundles basket and with irradiated fuel - "Sliding" gate - Electric hoist for lifting or lowering a basket into the IFTC/BM - Chain - Basket lifting grapple - Shielding	3.0
				Gantry crane	For the Transfer flask	
				Lifting Beam for the Transfer flask		
			With the hoist N°1, open the lid of the packaging in a hot cell.	Packaging	IFTC/BM : See chapter 2., section 2.4.7.1.3 of D#5 Appendix A, Figure N° 6	3.0
			Load the baskets into the packaging			3.1
Phase 4	Pre-shipment packaging preparation	UFTS	Drying the cavity	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, work plate-form for bolt the lid	4.0
			Filling the cavity with helium	Vacuum circuit	Air/water separator , pump, vacuum gauges, valves, compressed air line	
			Leaktightness check	Leaktightness equipment		
			Depressurising the cavity	Vacuum circuit		
			Installing the impact limiter			
Phase 5	Internal transfer of the Transportation cask	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Approach of the Bogie	Bogie	Bogie with pulley drive system	5.0
			Radiological control of the Bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0
			Loading of the Transportation cask on the Bogie			5.0
			Radiological control of the Transportation cask and the bogie	Non contamination, Dose Rate	"Smear test", Radiameter	5.0

PHASE	DESIGNATION	STUDIED IN	DESCRIPTION OF PHASE	COMPONENTS	DESCRIPTION OF COMPONENTS	N° STEP IN SEQUENCE DIAGRAM FIG. N° D.8.2
			Internal transfer	Tie down	Similar to the Tie down of the IFTC	5.1
Phase 6	Loading the Transportation cask on a trailer	UFTS	Radiological control of the Transportation cask	Non contamination, Dose Rate	"Smear test", Radiameter	6.0
			Open the weather cover	Weather cover		6.0
			Loading the Transportation cask on a trailer	Gantry Crane	With 1 hoist (of 60 tons for the IFTC/BM)	6.0
				Lifting Beam for packaging	To carry of the IFTC/BM (similar to the IFTC, <3>)	6.0
				Trailer (Appendix A, Figures N°13, 14)	- Modified 48 foot flatted trailer with integrated tie-down - Trailer equipped with hydraulic or air ride suspension to cushion the load - Trailer equipped with four axles - One loaded cask per trailer	6.0
				Tractor (Appendix A, Figure 14)	- Standard commercial tractor sufficient for the loaded weight - The weight for the fuelled reference tractor is roughly 9,075 kg.	6.0
			Packaging tie-down on the trailer	Tie down	Similar to the Tie down of the IFTC. (Appendix A, Figure N°15, <3>)	6.1
			Check the condition of the packaging, trailer			6.1
			Fit the transport seals			6.1
			Close the weather cover	Weather cover		6.1
			Radiological control of the trailer	Non contamination, Dose Rate	"Smear test", Radiameter	6.1
Phase 7	Road transportation	UFTS	Road transportation of the Transportation cask from the Facility to the Centralised Facility			7.0
				Real time tracking	Appendix H	7.0
Phase 8	Unloading of the Transportation cask	DGR/CES	Unloading of the Transportation cask from the trailer			8.0
Phase 9	Internal transfer of loaded Transportation cask	DGR/CES				
Phase 10	Unloading the baskets from the Transportation cask	DGR/CES				
Phase 11	Storage of the baskets on the Centralised Facility	DGR/CES				
Phase 12	Road transportation of the empty Transportation cask from the Centralised Facility	DGR/CES				


PHASE 0
BASKETS IN CANISTOR
PHASE 1
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PHASE 2
INTERNAL TRANSFER OF THE TRANSFER FLASK
Step.0
Step.1.0
Step.1.1
Step.1.2
Step.1.3
Step.2.0
PHASE 3
LOADING THE BASKETS FROM TRANSFER FLASK INTO THE PACKAGING
PHASE 4
PRE-SHIPMENT PACKAGING PREPARATION
HOIST N°1
Step.3.0
Step.3.1
Step.3.2
Step.4.0
PHASE 5
INTERNAL TRANSFER OF THE TRANSPORTATION CASK
PHASE 6
LOADING THE TRANSPORTATION CASK ON A TRAILER
STEP.5.0
STEP.6.0
STEP.6.1
PHASE 7
ROAD TRANSPORTATION
PHASE 8
UNLOADING OF THE TRANSPORTATION CASK
PHASE 9
INTERNAL TRANSFER OF THE PACKAGING
STEP.7.0
STEP.8.0
STEP.9.0
GENTILLY-BASKET IN CANSTOR
ALL ROAD MODE
Fig. N°D.8.2
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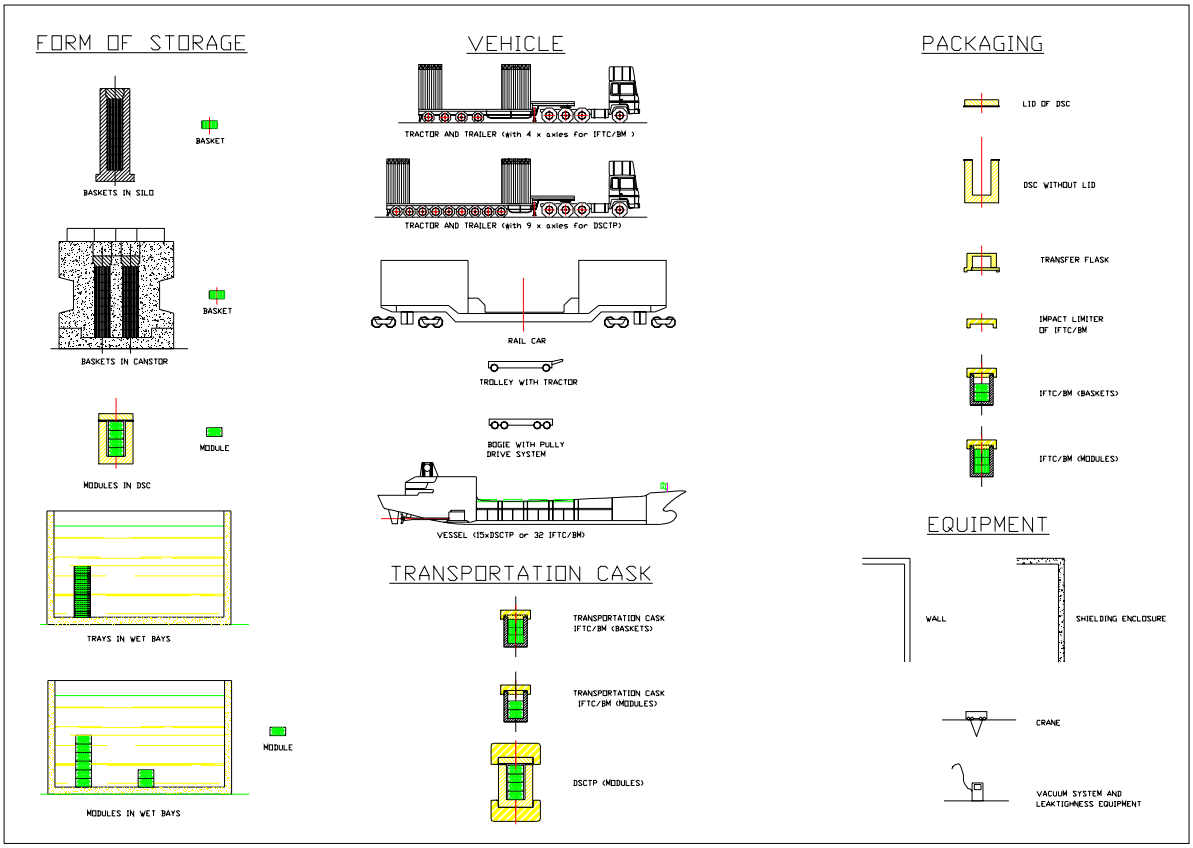
Key:


FORM OF STORAGE
BASKET
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TRACTOR AND TRAILER (with 4 x axles for IFTC/BM)
TRACTOR AND TRAILER (with 9 x axles for DSCTP)
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TROLLEY WITH TRACTOR
BOGIE WITH PULLY DRIVE SYSTEM
VESSEL (15xDSCTP or 32 IFTC/BM)
TRANSPORTATION CASK
TRANSPORTATION CASK IFTC/BM (BASKETS)
TRANSPORTATION CASK IFTC/BM (MODULES)
DSCTP (MODULES)
PACKAGING
LID OF DSC
DSC WITHOUT LID
TRANSFER FLASK
IMPACT LIMITER OF IFTC/BM
IFTC/BM (BASKETS)
IFTC/BM (MODULES)
EQUIPMENT
WALL
SHIELDING ENCLOSURE
CRANE
VACUUM SYSTEM AND LEAKTIGHNESS EQUIPMENT

9. CENTRALISED SITE

Quantity of bundles to be transported from 2035 to 2064: see Appendix A, Table N° 1.

9.1. MODE AND ROUTE DEVELOPMENT

In accordance with the shipment rate:

- Creation of an area to unload the Transportation cask from the trailer (scope of DGR/CES site).

9.2. TRANSPORTATION SYSTEM MAINTENANCE FACILITY

Design, procurement and construction of maintenance equipment, and the commissioning of the maintenance facility for UFTS:

- Maintenance equipment for IFTC/BM: shared facility at the centralised site as developed in paragraph 3.2 of Chapter 3.

- Maintenance equipment for Trailer: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

- Maintenance equipment for Tractor: shared facility at the centralised site (see paragraph 3.3 of Chapter 3).

9.3. UFTS TRANSPORTATION SYSTEM OPERATION

- Emergency response plan:

As described in chapter 4 of the present document an Emergency response plan for transportation, is needed.

The crisis cell will be located in a specially built crisis room at the Centralised Facility fully equipped with communication means (Vehicles tracking system, telephones, telefax, teleconference system,…) and all the necessary documentation (regulations, maps, safety files, TERP (Transport Emergency Response Plan) and specific plans,…).

The crisis room is operated permanently during our transports using the real Time tracking system:

- Location of the vehicle (trucks, wagons, ship) with the GPS system

- Transmission of information with the Inmarsat system

In addition, we are thinking that OPG, as COGEMA LOGISTICS needs to own a **recovery system for heavy casks**. It may be needed if the casks are placed accidentally in a location where no classical means of recovery can be efficiently used.

- Real time tracking:

As described in chapter 5 of the present document, dedicated sea and ground transports for UFTS can be real time tracked from an OPG headquarters to be located at the Centralised Facility. Road vehicles, railway wagons as well as dedicated vessels involved in the logistic network for UFTS can be equipped with specific tracking systems.