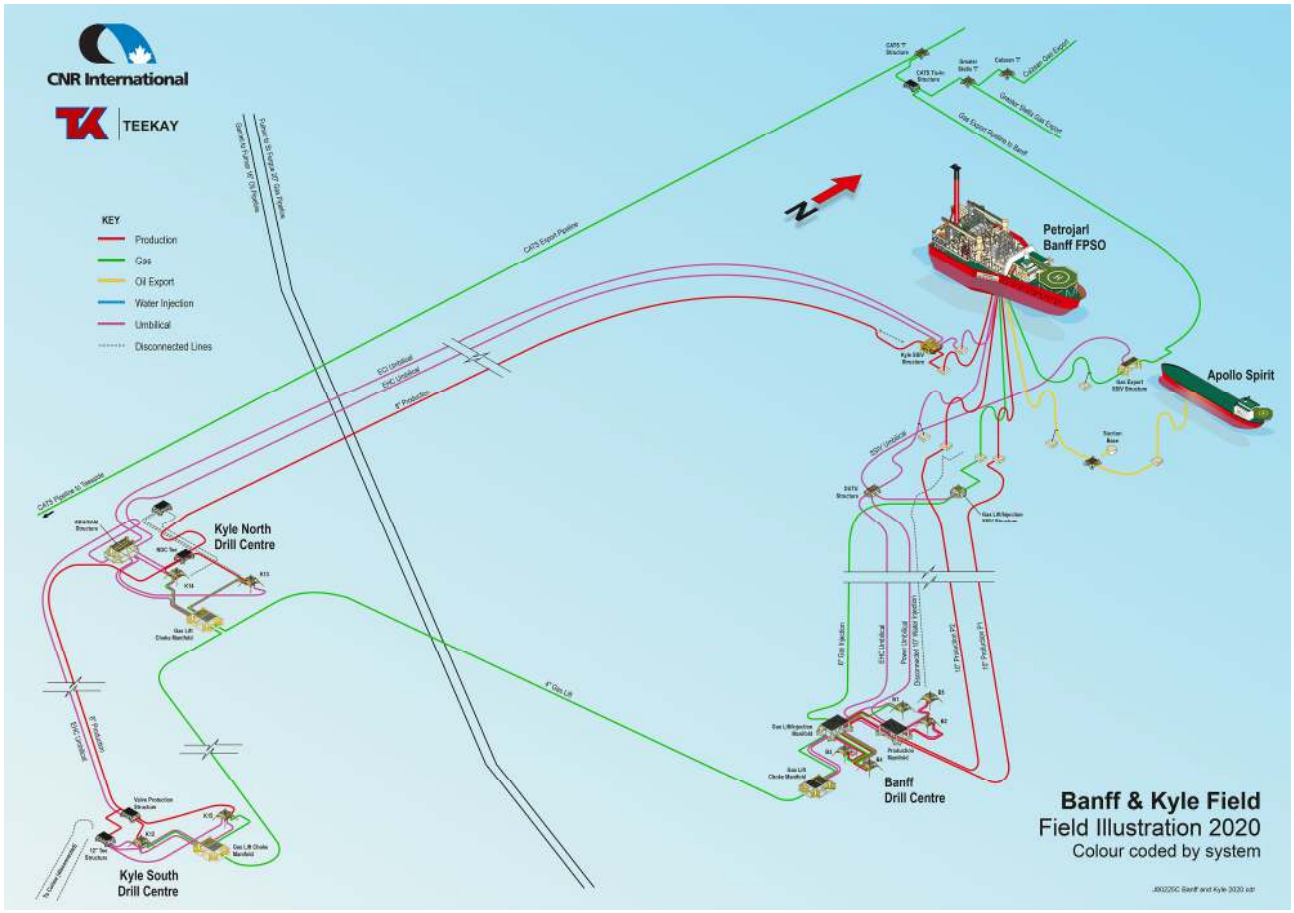

BANFF AND KYLE FIELDS DECOMMISSIONING PROGRAMMES FOR FPSO AND FSO FLOAT OFF

P0009-CNR-EN-REP-00007

Draft Decommissioning Programmes

APPROVALS

	Name	Signature	Date
Compiled By	CMP	CMP	12/03/2020
Reviewed by (CNRI)	PR	PR	12/03/2020
Reviewed by (Teekay)	TG	TG	12/03/2020
Approved by (CNRI)	SB	SB	12/03/2020
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A1	13/02/2020	First Draft
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8	Teekay Petrojarl Floating Production UK LTD
9	Teekay Petrojarl Production AS
10	Premier Oil Plc
11	Premier Oil UK Ltd
12	Ugland Stena Storage AS

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TERMS AND ABBREVIATIONS

Abbrev.	Definition
AHTV	Anchor Handler Tug vessel
bbl	Barrels
CATS	Central Area Transmission System
CNRI	CNR International (U.K.) Limited on behalf of Banff and Kyle co-veturers
CSV	Construction Support Vessel
DPN	Disused Pipeline Notification
DUTU	Dynamic Umbilical Termination Unit
EA	Environmental Appraisal
FPSO	Floating Production, Storage and Offloading vessel
FSO	Floating Storage and Offloading vessel
Km	Kilometre
M	Metre
N/A	Not Applicable
NCMPA	Nature Conservation Marine Protected Area
OGA	Oil and Gas Authority
OGUK	Oil and Gas UK
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PLANC	Permits, Licences, Authorisations, Notifications and Consents
PWA	Pipeline Works Authorisation
TUTU	Topsides Umbilical Termination Unit
Te	Tonne
UKCS	UK Continental Shelf
USS	Ugland Stena Storage

1. EXECUTIVE SUMMARY

1.1 DECOMMISSIONING PROGRAMMES

This document contains the decommissioning programmes for the removal of the Petrojarl Banff Floating Production, Storage and Offloading vessel (FPSO) and the Apollo Spirit Floating Storage and Offloading vessel (FSO) and the associated risers and mooring systems from the Banff and Kyle Fields.

The remaining Banff and Kyle field infrastructure, which is detailed on the relevant Section 29 Notices, will be subject to separate Decommissioning Programmes to be submitted following the removal of the FPSO and FSO.

The Petrojarl Banff FPSO and Apollo Spirit FSO will be utilised for the initial decommissioning activities, namely the flushing / deoiling of the subsea infrastructure i.e. manifolds, risers, subsea pipelines and umbilicals, and to support with the implementation of isolations for the subsea wells. The FPSO and FSO will then not be required to perform any further decommissioning related activities and it is proposed that the vessels are removed from their current locations. Activities associated with the subsequent decommissioning stages of the subsea pipelines, umbilicals, risers and other subsea infrastructure will require the services provided by other specialist vessels.

The early removal of the FPSO and FSO will not prejudice any further decommissioning work in the Banff and Kyle fields.

1.2 REQUIREMENT FOR DECOMMISSIONING PROGRAMMES

Installations:

In accordance with the Petroleum Act 1998, the Section 29 notice holders of the Petrojarl Banff FPSO and Apollo Spirit FSO (see Table 1.2) are applying to The Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for the removal of the FPSO and FSO from the field following completion of contract at the Banff field.

Pipelines:

In accordance with the Petroleum Act 1998, the Section 29 notice holders of the relevant Banff and Kyle pipelines (see Table 1.4) are applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2.3 of this document.

1.3 INTRODUCTION

The Banff field is located in blocks 29/2a and 22/27a in the UK Sector of the Central North Sea some 200km due east of Aberdeen in approximately 95m water depth. The Kyle field is located in block 29/2c and 29/2h in the UK Sector of the Central North Sea some 200km due east of Aberdeen in approximately 90m water depth.

There is one drill centre for the Banff and two drill centres for the Kyle field – North Kyle and South Kyle. The Banff wells and manifolds are located approximately 1.6km southeast of the Petrojarl Banff FPSO. The Kyle wells and manifolds are located between 13km and 16km south of the Petrojarl Banff FPSO. There is approximately 3km between the North and South Kyle drill centres.

The Banff and Kyle fields are tied back to the Petrojarl Banff FPSO. The Petrojarl Banff is a FPSO vessel developed from the Tentech Ramform B-380 design. The FPSO is turret-moored by a 10 leg mooring system with all risers hung off from the turret which is located at approximately mid-ship. The Banff flexible riser system comprises of one 12” oil export riser, two 10” production risers, one 8” gas injection riser, one 8” gas export riser and one control umbilical. The Kyle field was reconfigured as a tieback to the Banff FPSO in the period 2004 – 2005. The Kyle flexible riser system comprises of one 8” production riser and one control umbilical.

Produced gas is exported from the Petrojarl Banff via the Central Area Transmission System (CATS) pipeline to the CATS Terminal in Seal Sands, Teesmouth.

The Apollo Spirit is an FSO vessel, which is moored via a Submerged Turret Loading (STL) system. The vessel receives processed oil from the Petrojarl Banff via a 12" flexible riser. Oil is stored in the vessel's cargo tanks, and periodically offloaded to shuttle tankers. The Apollo Spirit has nine cargo tanks, with a total capacity of 910,000 bbl.

The previous oil export route for the FPSO was a Submerged Anchor Loading (SAL) system. The components of this system within the water column were removed during 2019 under a decommissioning programme approved in November 2019.

As production rates from both fields decline, continued production from both fields will become uneconomical during 2020. The field partners have investigated various alternative production strategies to further extend the life of the Banff and Kyle fields, but no viable alternative to decommissioning has been identified. Options considered by the Banff and Kyle partners to extend the life of both fields included:

- Near-field tie back opportunities
- De-bottlenecking of the Kyle field
- Development drilling

Currently, alternative production strategies have been found to be uneconomic. A Cessation of Production application for the field was submitted to the Oil and Gas Authority (OGA), with approval granted on 2rd March 2020.

These decommissioning programmes are submitted in compliance with national and international regulations and OPRED guidelines.

The removal of the FPSO and FSO is part of the wider Banff and Kyle field decommissioning. This will be carried out in three distinct phases executed over a five-year period:

Phase 1 - Removal of the FPSO and FSO vessels from the field

Phase 2 - Decommissioning of subsea installations and pipelines

Phase 3 - Well plug and abandonment

These decommissioning programmes address Phase 1 only, which is currently planned for summer 2020 and will involve:

- Flushing and cleaning of the subsea production system and FPSO and FSO
- Implementation of required isolations
- Removal of the FPSO and FSO vessels from the field
- Removal of buoyant flexible pipelines, and vessel mooring infrastructure.

Prior to FPSO and FSO removal, a risk-based assessment will be undertaken to determine suitable marking of the subsea infrastructure around the FPSO and FSO locations. Consideration will be given to providing a guard vessel and/or cardinal buoy system to warn of the presence of subsea infrastructure.

The remaining phases associated with the Banff and Kyle fields decommissioning will be covered by their own decommissioning programmes. Section 1.8 describes the boundaries of the Phase 1 decommissioning programmes in detail.

1.4 OVERVIEW OF THE INSTALLATIONS BEING DECOMMISSIONED

1.4.1 INSTALLATIONS

Table 1.1: Installations Being Decommissioned			
Fields:	Banff and Kyle	**Production Type (Oil/Gas/Condensate)**	Oil and Gas
Water Depth (m)	Approx. 90 m	**UKCS block**	29/2c & 22/27a
Surface Installations			
Number	**Type**	**Vessel Weight (Te)**	**Jacket Weight (Te)**
1	Petrojarl Banff FPSO	Lightship weight 16,069 Te	N/A
2	Apollo Spirit FSO	Lightship weight 34,144 Te	N/A
Distance to median		**Distance from nearest UK coastline**	
km		**km**	
63 km (Norway)		191 km (Peterhead)	

Table 1.2 Installation Section 29 Notice Holders Details *			
Installation	**Section 29 Notice Holders**	**Registration Number**	**Equity Interest (%)**
Petrojarl Banff FPSO	Banff L.L.C.	962000	100% (FPSO)**
	Teekay Petrojarl Floating Production UK LTD	02436350	
	CNR International (U.K.) Developments Limited	01021629	0%
	CNR International (U.K.) Limited	00813187	0%
	Chrysaor Production (U.K.) Limited	00524868	0%
	Dana Petroleum (E&P) Limited	02294746	0%
	Teekay Petrojarl Production AS	939 545 832	0%
Apollo Spirit FSO	Ugland Stena Storage AS	882 048 152	100% (FSO)
	Chrysaor Production (U.K.) Limited	00524868	0%
	CNR International (U.K.) Limited	00813187	0%
	CNR International (U.K.) Developments Limited	01021629	0%
	Dana Petroleum (E&P) Limited	02294746	0%

* Equity in this table is for vessels only and does not include the field equity split.
** Teekay Petrojarl Floating Production UK LTD owns the Petrojarl Banff FPSO hull and subsea equipment. Banff LLC owns the topsides and turret mooring system.

1.4.2 PIPELINES

Table 1.3: Pipelines Being Decommissioned	
Number of Pipeline(s) Details given in Table 2.3	8

Table 1.4: Pipeline Section 29 Notice Holders Details			
Field	**Section 29 Notice Holders**	**Registration Number**	**Equity Interest (%)**
Banff Pipelines	Teekay Petrojarl Floating Production UK LTD	02436350	100%
Kyle Pipelines	CNR International (UK) Developments Ltd	01021629	20%
	CNR International (UK) Ltd	00813187	25.714286%
	Dana Petroleum (BVUK) Ltd	03337437	14.285714%
	Premier Oil Plc	SC234781	0%
	Premier Oil UK Ltd	SC048705	40%

1.5 SUMMARY OF PROPOSED DECOMMISSIONING PROGRAMMES

Table 1.5: Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
1. Petrojarl Banff FPSO		
Removal from field for redeployment or sale.	Redeployment or sale opportunities are being actively sought for the Petrojarl Banff following completion of contract at the Banff field.	Following disconnection from risers and mooring lines, vessel will be towed from field.
2. Apollo Spirit FSO		
Removal from field for redeployment or sale.	Redeployment or sale opportunities are being actively sought for the Apollo Spirit following completion of contract at the Banff field.	Following disconnection from STL buoy, vessel will be towed from field.
3. Moorings & Anchors		
Removal of mooring lines and anchors. Removal of STL Buoy.	To allow removal of FPSO and FSO.	FPSO Mooring lines will be removed by an Anchor Handler Tug Vessel (AHTV) and transported to shore for recycling. Mooring anchors will be removed from the seabed. Anchor(s) that cannot be removed during Phase 1 will be captured as part of the wider Banff and Kyle fields decommissioning program. The STL Buoy will be towed from the field by an AHTV for recycling onshore. STL Buoy mooring lines will be removed by AHTV and transported to shore for recycling. STL pile anchors will be left in place and captured as part of the wider Banff and Kyle fields decommissioning program.
4. Pipelines, Flowlines & Umbilicals		
Removal of risers and umbilicals within water column.	To allow removal of FPSO and FSO.	Risers and dynamic umbilicals will be recovered from the seabed by an AHTV or CSV. They will then be transported to shore for recycling.
5. Interdependencies		
FPSO mooring lines, risers and dynamic umbilicals must be disconnected from the FPSO and laid down on the seabed in order to allow the FPSO to be towed from the field. Mooring lines, risers and dynamic umbilicals will subsequently be recovered from the seabed. The STL riser must be lowered to the seabed and the STL buoy must be released from the FSO to allow the release for the FSO. The mooring lines will then be released from the STL buoy to allow it to be towed from the field. The mooring lines and the risers will subsequently be recovered from the seabed.		

1.6 FIELD LOCATION INCLUDING FIELD LAYOUT AND ADJACENT FACILITIES

Figure 1.1 Field Location on the UKCS

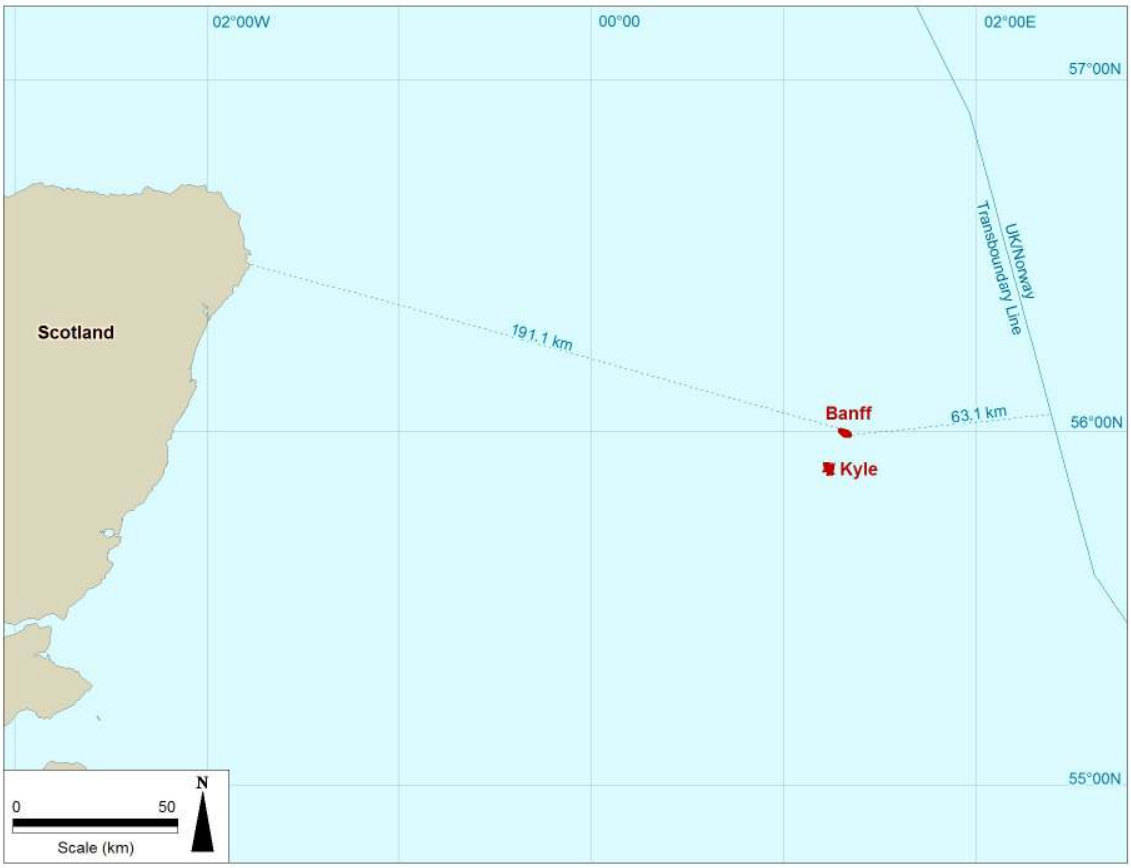


Figure 1.2: Current Field Layout

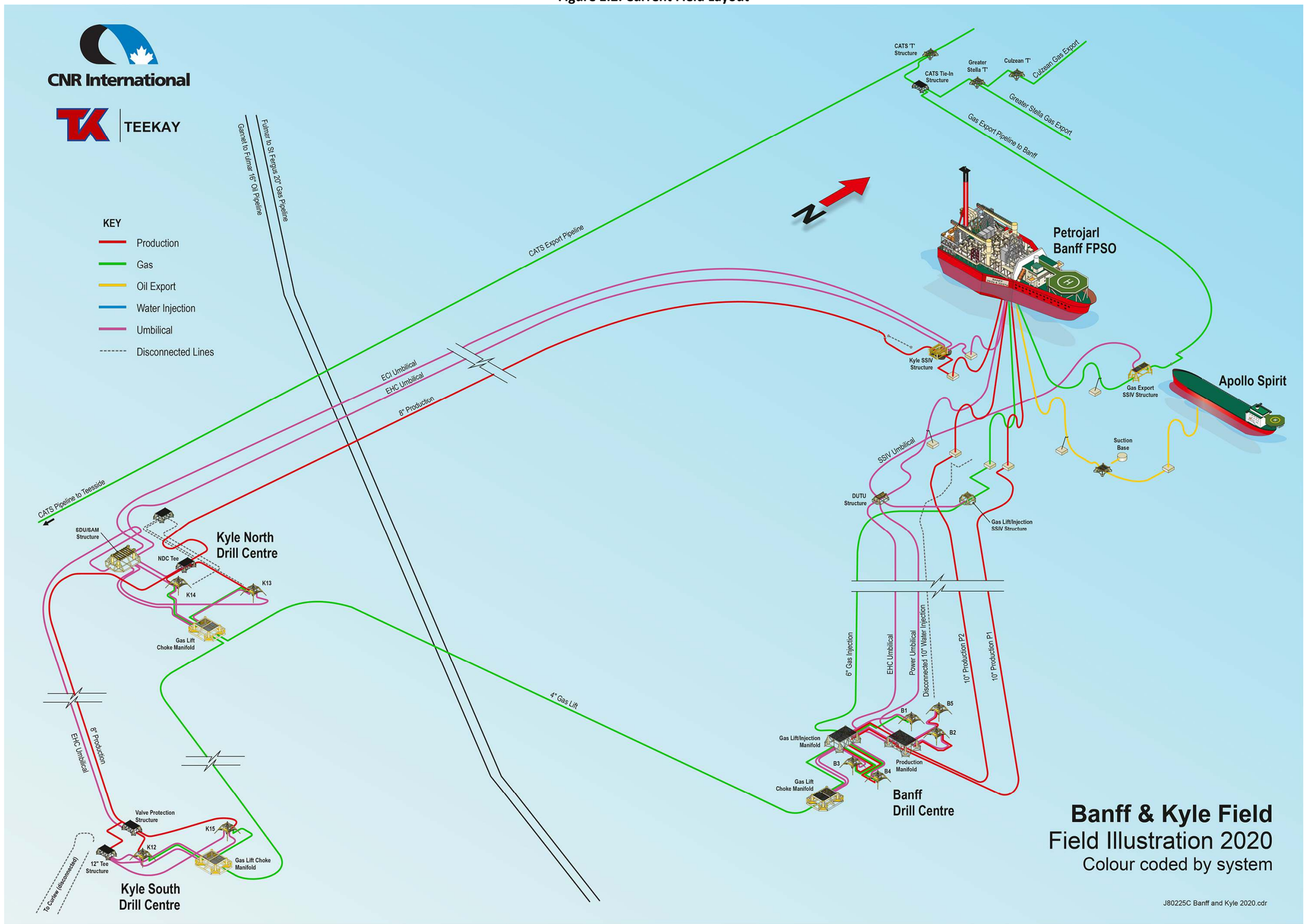


Figure 1.3 Field Layout Post FPSO & FSO Float Off Option 1 Cardinal Buoys

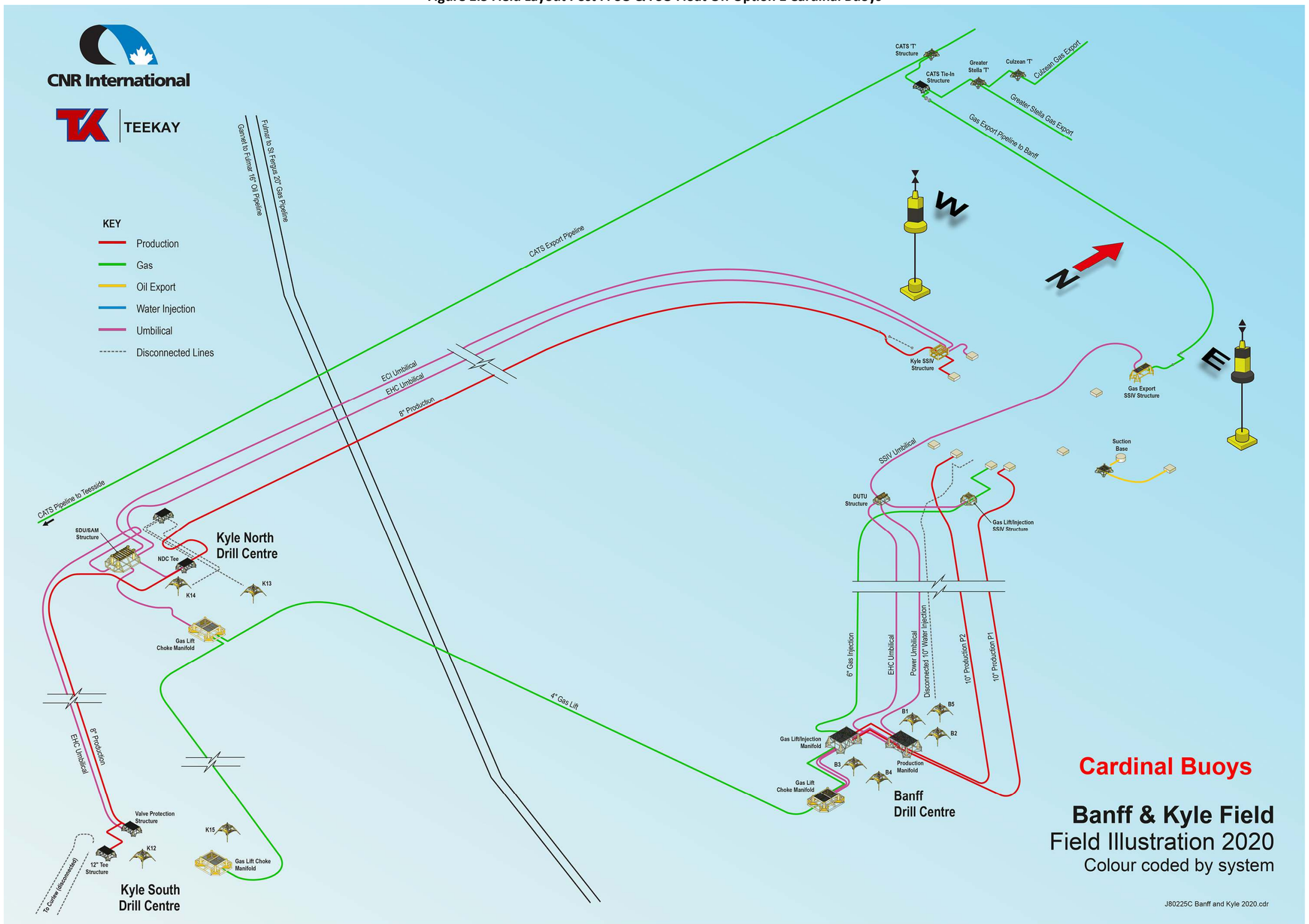
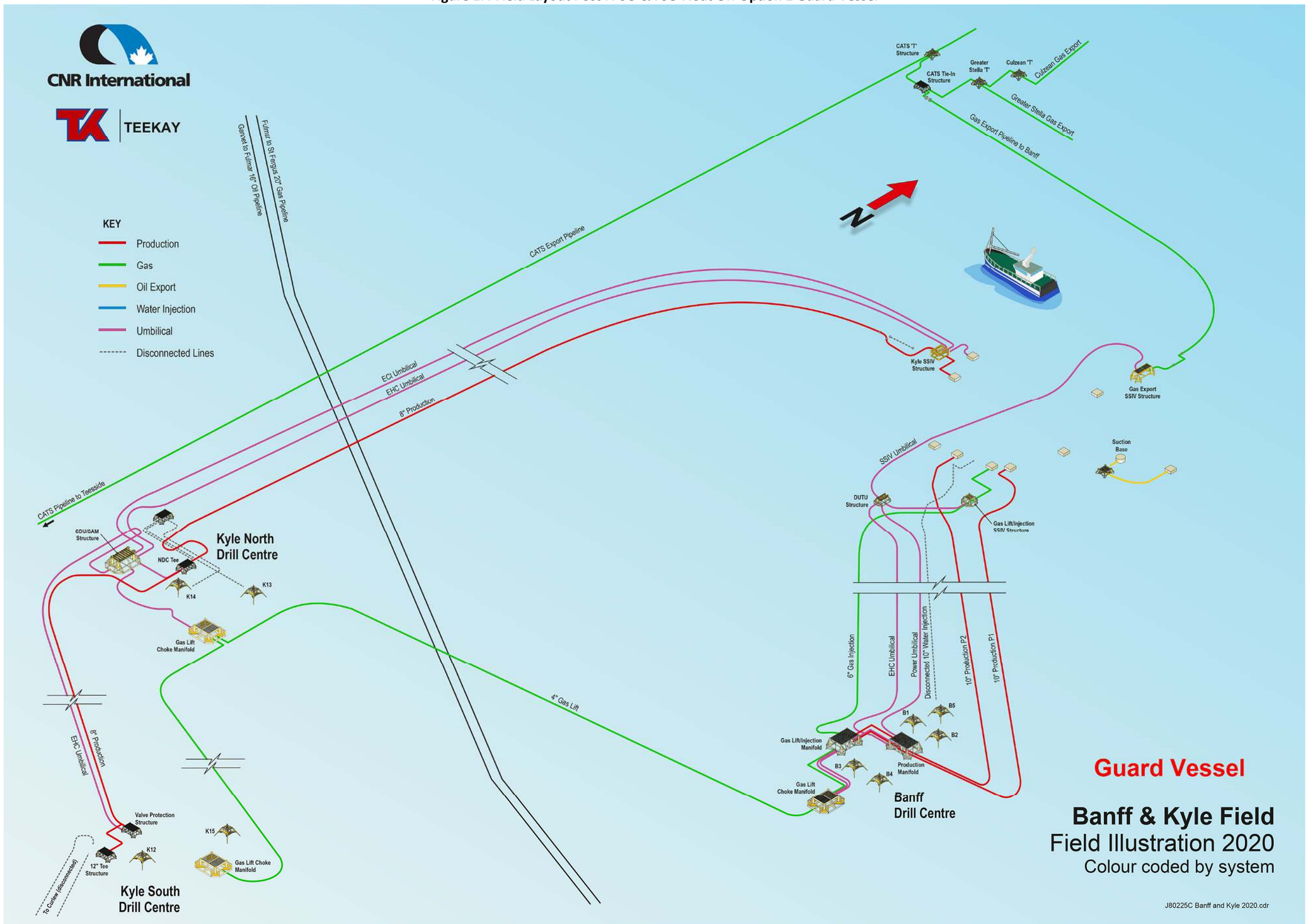


Figure 1.4 Field Layout Post FPSO & FSO Float Off Option 2 Guard Vessel



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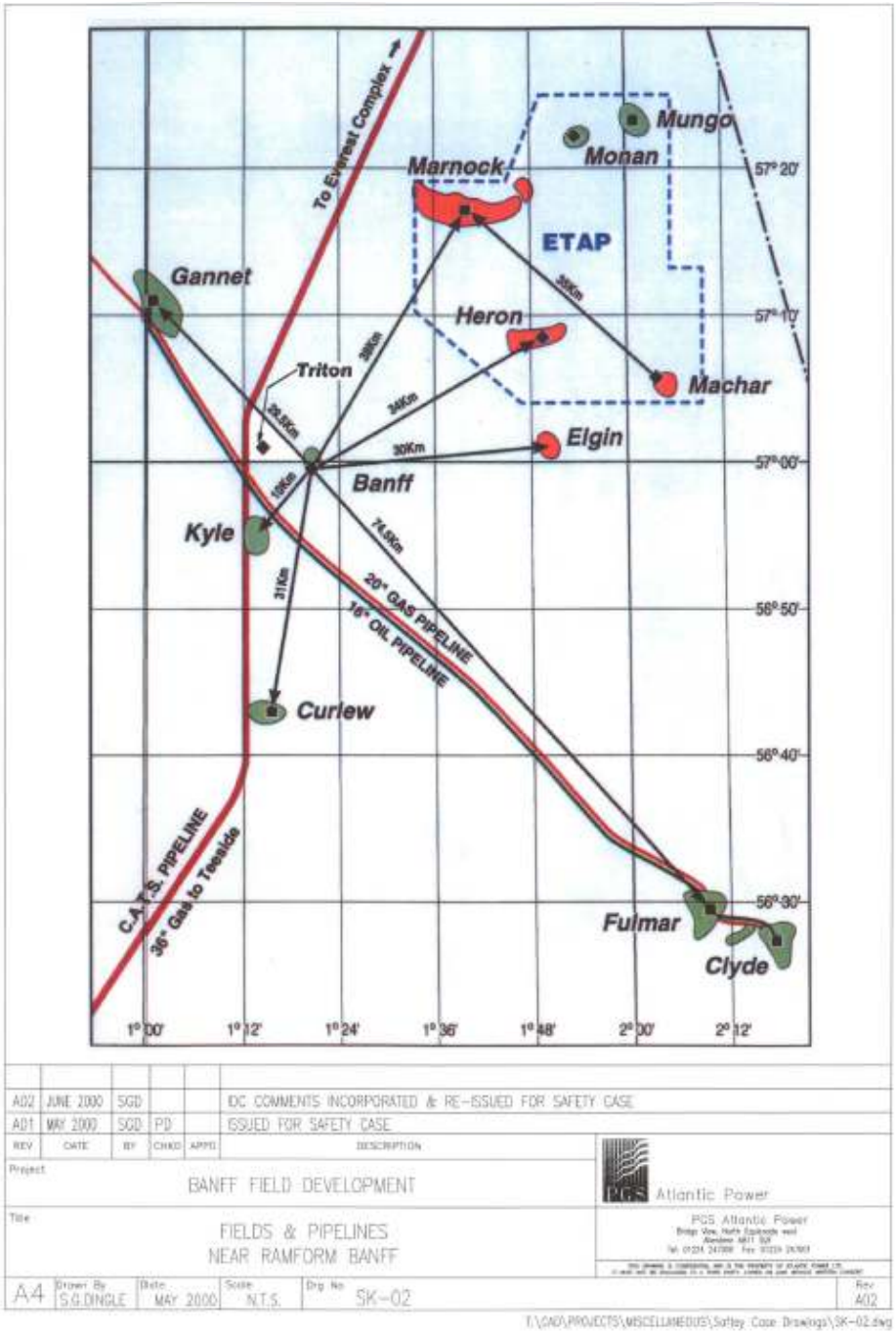
1.7 ADJACENT FACILITIES

Table 1.6 Adjacent Facilities					
Operator	**Name**	**Type**	**Distance/ Direction**	**Information**	**Status**
CATS North Sea Limited	CATS 36" Export Pipeline	Gas	8 km NW of FPSO	Gas export tie in route for Banff FPSO	Active
Ithaca Energy	Stella to CATS 10" Export Pipeline	Gas	8 km NW of FPSO	3rd party tie-in to Banff valve structure at CATS T5.	Active
Total E&P UK	Culzean to CATS 22" Export Pipeline	Gas	8 km NW of FPSO	3rd party tie-in to Stella valve structure at CATS T5.	Active
Shell U.K. Ltd	PL1800	Power and chemicals umbilical	0.5 m SW	Umbilical to ex Curlew FPSO. 0.5 m from Kyle South Tee structure.	Inactive
Shell U.K. Ltd	PL1798	Oil, gas, water pipeline	0.5 m SW	Flowline to ex Curlew FPSO 0.5 m from Kyle South Tee structure.	Inactive
Shell U.K. Ltd	Fulmar to St Fergus 20" Gas Pipeline	Gas	5km west of FPSO at closest point	Crossed by Kyle flowline, umbilicals, and the Banff to Kyle gas lift line.	Active
Shell U.K. Ltd	Gannet to Fulmar 16" Oil Pipeline	Oil	5km west of FPSO at closest point	Crossed by Kyle flowline, umbilicals, and the Banff to Kyle gas lift line.	Active
Shell U.K. Ltd	Gannet to Fulmar 16" Oil Pipeline	Oil	5km west of FPSO at closest point	Cut and disused.	Inactive
Impacts of Decommissioning Proposals					
There are no direct impacts on adjacent facilities from the decommissioning works associated with the Petrojarl Banff FPSO and Apollo Spirit FSO installations and pipelines. For the decommissioning of the Banff gas export system, CATS North Sea Limited will be informed as to the decommissioning plan.					

Figure 1.5 Adjacent fields and facilities



1.8 BOUNDARIES OF DECOMMISSIONING PLAN

The Banff and Kyle fields Decommissioning Programmes for FPSO & FSO Float Off (Phase 1) will involve:

- Flushing and cleaning of the subsea production system and FPSO and FSO
- Implementation of required isolations
- Remove the FPSO and FSO vessels from the field (as detailed in Table 2.1)
- Removal of buoyant flexible pipelines, and vessel mooring infrastructure (as detailed in Tables 2.2, and 2.3).

All other infrastructure associated with the Banff and Kyle fields will remain in place and will be subsequently decommissioned at a later stage and will be covered by separate decommissioning programmes.

2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 INSTALLATIONS: SURFACE FACILITIES – FPSO AND FSO

Table 2.1: Surface Facilities Information							
Name	Facility Type	Location		Topsides/Facilities		Mooring System	
				Weight (Te)	No. Modules	No. mooring lines	Weight (Te)
Petrojarl Banff	FPSO	WGS84 Decimal	57.001 N 1.292 E	Lightship weight 16,069 Te	1	10	Approx. 4,000 Te
		WGS84 Decimal minute	57° 00’ 01.99” N 01° 17’ 32.91” E				
Apollo Spirit	FSO	WGS84 Decimal	57.0114 N 1.3261 E	Lightship weight 34,144 Te	1	8	Approx. 1,520 Te
		WGS84 Decimal minute	57˚ 00’ 41.28” N 01˚ 19’ 34.25” E				

2.2 INSTALLATIONS: SUBSEA INCLUDING STABILISATION FEATURES

Table 2.2: Subsea Installations and Moorings					
Subsea installations	Number	Size/Weight (Te)	Location		Comments/ Status
FPSO Mooring line and Anchor #1	1	Approx. 400 Te	WGS84 Decimal	57.0204 N 1.3057 E	Weight includes anchor
			WGS84 Decimal minute	57˚ 01’ 13.456’’ N 01˚ 18’ 20.629’’ E	
FPSO Mooring line and Anchor #2	1	Approx. 400 Te	WGS84 Decimal	57.0189 N 1.3113 E	Weight includes anchor
			WGS84 Decimal minute	57˚ 01’ 8.154’’ N 01˚ 18’ 40.903’’ E	
FPSO Mooring line and Anchor #3	1	Approx. 400 Te	WGS84 Decimal	57.0014 N 1.3289 E	Weight includes anchor
			WGS84 Decimal minute	57˚ 00’ 05.118” N 01˚ 19’ 44.058” E	

Subsea installations	Number	Size/Weight (Te)	Location		Comments/ Status
FPSO Mooring line and Anchor #4	1	Approx. 400 Te	WGS84 Decimal	56.9997 N 1.3292 E	Weight includes anchor
			WGS84 Decimal minute	56˚ 59’ 58.957” N 01˚ 19’ 45.342” E	
FPSO Mooring line and Anchor #5	1	Approx. 400 Te	WGS84 Decimal	56.9807 N 1.2960 E	Weight includes anchor
			WGS84 Decimal minute	56˚ 58‘ 50.679” N 01˚ 17’ 45.772” E	
FPSO Mooring line and Anchor #6	1	Approx. 400 Te	WGS84 Decimal	56.9806 N 1.2929 E	Weight includes anchor
			WGS84 Decimal minute	56˚ 58’ 50.493” N 01˚ 17’ 34.466” E	
FPSO Mooring line and Anchor #7	1	Approx. 400 Te	WGS84 Decimal	56.9898 N 1.2629 E	Weight includes anchor
			WGS84 Decimal minute	56˚ 59’ 23.520” N 01˚ 15’ 46.471” E	
FPSO Mooring line and Anchor #8	1	Approx. 400 Te	WGS84 Decimal	56.9926 N 1.2591 E	Weight includes anchor
			WGS84 Decimal minute	56˚ 59’ 33.584” N 01˚ 15’ 32.846” E	
FPSO Mooring line and Anchor #9	1	Approx. 400 Te	WGS84 Decimal	57.0135 N 1.2625 E	Weight includes anchor
			WGS84 Decimal minute	57˚ 00’ 48.795’’ N 01˚ 15’ 45.092’’ E	
FPSO Mooring line and Anchor #10	1	Approx. 400 Te	WGS84 Decimal	57.0161 N 1.2671 E	Weight includes anchor
			WGS84 Decimal minute	57˚ 00’ 58.311’’ N 01˚ 16’ 1.579’’ E	
STL Buoy Mooring Lines	8	Approx. 190 Te each	From STL buoy to mooring piles. 2 lines 1,200m long, 6 lines 1,020m long.		Mooring piles excluded from these programmes.
STL Buoy	1	Approx. 103 Te	WGS84 Decimal	57.0114 N 1.3261 E	
			WGS84 Decimal minute	57˚ 00’ 41.279” N 01˚ 19’ 34.254” E	

2.3 PIPELINE(S) INCLUDING STABILISATION FEATURES

All relevant permit and consent applications will be submitted to the OGA and Health and Safety Executive (HSE) in a timely manner to gain approval prior to the removal of the pipelines listed below. As the pipelines are taken out of use, variations to the Pipeline Work Authorisations (PWA) will be submitted to the OGA, and Disused Pipeline Notification (DPN) forms may be submitted to OPRED if deemed appropriate. Please note that PLU3106 and PLU4522 are not included in Table 2.3 as these are static umbilicals. These umbilicals are not required to be handled to allow FPSO and FSU sail away and therefore will be included in the overall Banff and Kyle fields decommissioning programmes.

Table 2.3: Pipeline/Flowline/Umbilical Information

Description	Pipeline No. (as per PWA)	Diameter (inches)	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Banff P1 Production Riser	PL1546 (Ident 8)	10”	0.236	Dynamic riser	3 Phase Well Fluid	Riser base elbow to topside tie in spool	Surface Laid	Operational	3 Phase Well Fluid
Banff P2 Production Riser	PL1547 (Ident 6)	10”	0.236	Dynamic riser	3 Phase Well Fluid	Riser base elbow to topside tie in spool	Surface Laid	Operational	3 Phase Well Fluid
Oil Export Riser	PL1550 (Ident 3)	12”	0.358	Dynamic riser	Processed Oil	Topsides tie in spool to subsea tie in spool	Surface Laid	Operational	Processed Oil
Gas Export Riser	PL1549 (Ident 3)	6” (Diameter of riser component being removed is 12”)	0.276	Dynamic riser	Processed Gas	Topsides tie in spool to API transition spool	Surface Laid	Operational	Processed Gas
Banff Dynamic Umbilical	PLU1552.1-PLU1552.2 (Ident 1) PLU1553 (Ident 1) PLU1554.1-PLU1554.7 (Ident1) (Note 1)	6”	0.365	16 Core Dynamic Umbilical	Methanol, Scale Inhibitor, Wax Inhibitor	FPSO Umbilical hang off to Dynamic Umbilical Termination Unit (DUTU)	Surface Laid	Operational	Methanol Scale Inhibitor Wax Inhibitor

Description	Pipeline No. (as per PWA)	Diameter (inches)	Length (km)	Description of Component Parts	Product Conveyed	From – To End Points	Burial Status	Pipeline Status	Current Content
Banff Gas Lift/Injection Riser	PL1548 (Ident 3)	8” (Diameter of riser component being removed is 12”)	0.276	Dynamic riser	Processed Gas	Topsides tie in spool to riser base elbow	Surface Laid	Operational	Processed Gas
Kyle Production Riser	PL1660 (Ident 10)	8” (Diameter of riser component being removed is 11.3”)	0.221	Dynamic riser	3 Phase Well Fluid	Riser base elbow to hang off spool	Surface Laid	Operational	3 Phase Well Fluid
Kyle Dynamic Umbilical	PL1661.1- PL1661.22 (Ident 2) (Note 2)	6.65”	0.303	22 Core Dynamic Umbilical	Methanol, Scale Inhibitor, Wax Inhibitor, Hydraulic Fluid	Topsides umbilical Termination Unit (TUTU) to DUTU	Surface Laid	Operational	Methanol Scale Inhibitor Wax Inhibitor Hydraulic Fluid
Apollo Spirit STL Riser	PL1550 (Ident 10)	12”	0.250	Dynamic riser	Processed Oil	12” Flexible Flowline to STL Buoy Spool	Surface Laid	Operational	Processed Oil

- Note 1 – 6” Umbilical contains multiple cores with different PWA numbers.
- Note 2 - 6.65” Umbilical contains multiple cores with different PWA numbers.

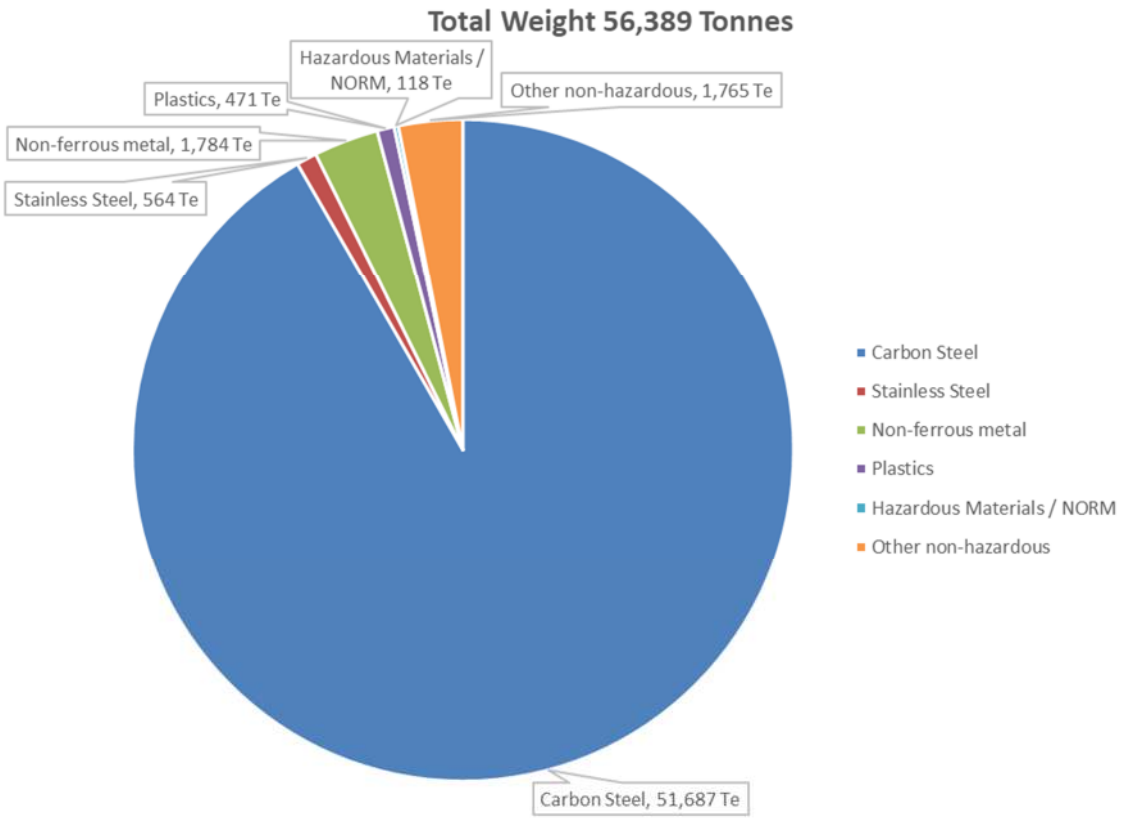
2.4 INVENTORY ESTIMATES

Table 2.4: Inventory of the material associated with surface installation decommissioning			
Petrojarl Banff FPSO		**Apollo Spirit FSO**	
Material	**Mass (tonnes)**	**Material**	**Mass (tonnes)**
Carbon Steel	13,418	Steel	32,431
Stainless Steel	562	Misc. Non Hazardous Material	1,707
Non-ferrous metal	1,768	Hazardous Materials	6
Plastics	161		
Hazardous Materials / NORM	112		
Other non-hazardous	58		
Total	**16,079**	**Total**	**34,144**

Table 2.5: Inventory of the material associated with subsea installation decommissioning	
Material	**Dry unflooded weight (tonnes)**
Mooring lines and FPSO anchors	
Carbon Steel	5,468
Plastics	52
STL Buoy	
Carbon Steel	101
Plastics	2
Total	**5,623**

Table 2.6: Inventory of the material associated with pipeline decommissioning	
Material	**Dry unflooded weight (tonnes)**
Carbon Steel	269
Stainless Steel	2
Non Ferrous Metals	16
Plastics	256
Total	**543**

Figure 2.1: Pie Chart of Estimated Inventories



3. REMOVAL AND DISPOSAL METHODS

Article 4 of the EU Waste Framework Directive (Directive 2008/98/EC) sets out the five steps to manage waste ranked according to environmental impact (also knowns as the waste hierarchy). In line with the waste hierarchy, the re-use of an installation (or parts thereof) is first in the order of preferred decommissioning options. CNRI and Teekay will follow the principles of the waste hierarchy (Figure 3.1) in order to minimise waste production resulting from the removal of the Petrojarl Banff FPSO and Apollo Spirit FSO.

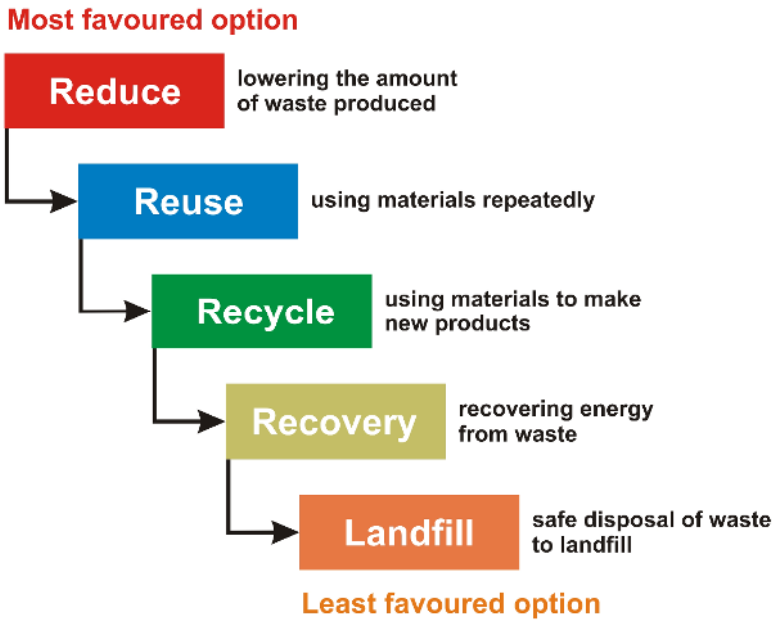
Recovered subsea infrastructure will be returned to shore and transferred to a suitably licensed waste treatment facility. Recovered infrastructure e.g. risers and mooring lines will be cleaned before being recycled.

An appropriately licensed waste management company and yard will be identified through a selection process that will ensure that the chosen facility demonstrates a proven record of waste stream management throughout the deconstruction process, the ability to deliver innovative reuse / recycling options, and ensure the aims of the waste hierarchy are achieved.

Geographic locations of potential disposal facilities may require the consideration of Trans Frontier Shipment of Waste (TFSW), including hazardous materials. Early engagement with the relevant waste regulatory authorities will ensure that any issues with TFSW are addressed before the shipment of any waste.

CNRI and Teekay will engage with other companies and industries to identify potential reuse opportunities. Both companies recognise that such opportunities are best achieved through the tendering and selection of a waste management contractor with expert knowledge and experience in this area.

Figure 3.1: Waste Hierarchy



3.1 PETROJARL BANFF FPSO

The Petrojarl Banff FPSO operates under a Lease and Operate Contract between CNRI and Teekay. After completion of operations at the Banff and Kyle fields, the FPSO unit is to be redeployed or sold.

In the event that no viable redeployment or sale opportunities are available, the vessel may be sent for recycling. Should this take place the vessel will be recycled at an EU approved ship-recycling yard, in compliance with all relevant legislation including The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

The Banff FPSO topsides process and cargo tanks will be flushed and cleaned prior to removal of the vessel from the field.

3.2 APOLLO SPIRIT FSO

The Apollo Spirit FSO operates under a Lease and Operate Contract between Teekay and Ugland Stena Storage (USS). After completion of operations at the Banff and Kyle fields, the FSO unit is to be redeployed or sold.

In the event that no viable redeployment or sale opportunities are available, the vessel may be sent for recycling. Should this take place the vessel will be recycled at an EU approved ship-recycling yard, in compliance with all relevant legislation including The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

The Apollo Spirit FSO cargo tanks will be flushed and cleaned prior to removal of the vessel from the field.

3.3 WASTE STREAMS

Table 3.1: Waste Stream Management Methods	
Waste Stream	**Removal and Disposal method**
Bulk liquids	Bulk liquid waste will be produced during the flushing of the Banff and Kyle production systems and during the cleaning of the FPSO and FSO process equipment and storage tanks. Bulk liquids will either be disposed of into a nominated disposal well, or will be processed and discharged from the FPSO under an appropriate permit, or will be offloaded and transported to shore for treatment and disposal.
Marine growth	Some marine growth may be removed offshore. Onshore disposal will be managed by the selected waste management contractor
NORM/LSA Scale	NORM contaminated material may be removed and discharged offshore under the appropriate authorisation. Some material or contaminated equipment may be recovered to shore for disposal or decontamination, selected waste management contractor will have appropriate authorisation for the disposal/decontamination of NORM contaminated waste.
Asbestos	Asbestos has been identified in surveys of the Apollo Spirit. Additional surveys will be undertaken should the vessel be sent for recycling. Recycling yard will be informed of hazard and appropriate controls and disposal methods will be in place.
Other hazardous wastes	Other hazardous wastes will be taken ashore and disposed of under an appropriate permit by the selected waste management contractor.
Onshore Dismantling sites	An appropriately licenced site will be selected. CNRI and Teekay will ensure that the selected contractor(s) have a proven record in disposal and waste stream management throughout the deconstruction process and is able to demonstrate their ability to deliver innovative recycling options. Should vessels be sent for recycling they will be recycled at an EU approved ship-recycling yard, in compliance with all relevant legislation including The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.

4. ENVIRONMENTAL APPRAISAL

All operations described in these Decommissioning Programmes will be subject to the relevant environmental permits and approvals. All permit applications and reporting will be managed through a Permits, Licences, Authorisations, Notifications and Consents (PLANC) register jointly developed by CNRI and Teekay.

An Environmental Appraisal (EA) will be submitted with the full Banff and Kyle fields Decommissioning Programmes. A summary of the main impacts and associated management expected to be included in the EA is provided in Table 4.1 below. Within the EA, CNRI and Teekay will review the environmental sensitivities in the area of the proposed operations and the significance of the potential impacts resulting from the anticipated operations in more detail.

Table 4.1: Environmental Appraisal Impacts Summary		
Activity	**Main Impacts**	**Management**
Cut and laying down of risers, dynamic pipelines and vessel mooring infrastructure listed in Tables 2.1 to 2.3 and subsequent removal from the seabed.	Seabed disturbance will be caused by the laying down and removal of the risers, dynamic pipelines and vessel mooring infrastructure. This may incur a localised, temporary disturbance of an area of seabed, within The East of Gannet and Montrose Field Nature Conservation Marine Protected Area (NCMPA).	The lifting activity will be undertaken while vessel is on dynamic positioning, thus will be undertaken through controlled, precise manoeuvring. This will minimise any lateral movement which will ensure the area of seabed temporarily disturbed will be kept a low as possible. Any potential impacts will be addressed in the EA document submitted in conjunction with the relevant permits.
Disconnection of risers, dynamic pipelines listed in Table 2.3	The potential for the discharge to sea of 200 m^3 of inhibited seawater is anticipated to have negligible environmental impact.	Any discharges to sea associated with the decommissioning of the FPSO and FSO will be subject to the relevant permitting requirements and will be applied for via PETS.
Vessel mobilisation	Localised effects on air quality. Given the location of the FPSO and FSO (191 from the Scottish coast and 63 km form the Norwegian coast) it is not anticipated that there will be a significant impact on air quality on a wider scale.	The proposed operations will be undertaken as efficiently as possible and the removal activity is expected to be complete within 4 months of the FPSO on location. The subsea construction vessel is estimated to take 25 days. Any impacts on localised air quality will be addressed in more detail in the Environmental Appraisal document submitted in conjunction with the relevant permits.
Waste	Onshore impacts including resource and energy use.	Waste streams and dismantling site selection will be managed in line with the waste hierarchy (Figure 3.1) and in line with the removal and disposal methods outlines in Table 3.1.

5. INTERESTED PARTY CONSULTATIONS

Consultations Summary:

The following key stakeholders have been identified with whom to engage regarding decommissioning activities and schedule relating to Petrojarl Banff FPSO and Apollo Spirit FSO removal:

- Banff Field Partners - CNRI, Dana Petroleum (E&P) Limited
- Kyle Field Partners - CNRI, Premier Oil UK Limited, Dana Petroleum (BVUK) Limited
- CATS system stakeholders – CATS North Sea Limited, Ithaca Energy, Total E&P UK
- Adjacent pipelines operator – Shell U.K. Limited
- OPRED Offshore Decommissioning Unit (ODU)
- OPRED Environmental Management Team (EMT)
- OPRED Offshore Environmental Inspectorate (OEI)
- Oil & Gas Authority (OGA)
- Health and Safety Executive (HSE)
- Scottish Fishermen's Federation (SFF)
- Scottish Environment Protection Agency (SEPA)
- Maritime and Coastguard Agency (MCA)
- Northern Lighthouse Board (NLB)

CNRI and Teekay have and will continue to engage with the stakeholders regarding overall decommissioning plans and in particular, the removal plans for the FPSO and FSO under the Decommissioning Programme Arrangements.

6. PROGRAMME MANAGEMENT

6.1 PROGRAMME MANAGEMENT AND VERIFICATION

A joint CNRI and Teekay project management team has been appointed to manage the operations of competent contractors selected for the FPSO and FSO removal and scopes of work. Any changes to the decommissioning programmes will be discussed and agreed with OPRED.

6.2 POST DECOMMISSIONING DEBRIS CLEARANCE AND VERIFICATION

A full-scale post decommissioning environmental seabed and pipeline survey of the Banff and Kyle fields will be carried out following full decommissioning of the fields. Results of this survey will be available once the work is complete, with a copy forwarded to OPRED.

6.3 SCHEDULE

The high-level schedule Figure 6.1 provides the overall schedule for the Petrojarl Banff FPSO and Apollo Spirit FSO removal programme of decommissioning activities.

Figure 6.1: Schedule of Project Plan*

Activity	2019		2020				2021	
	H1	H2	Q1	Q2	Q3	Q4	H1	H2
Decommissioning Planning								
COP Approval								
Anticipated DP Approval								
Cessation of Production								
Pipeline Flushing / Isolations								
FPSO Make Safe / Disconnection / Removal								
Riser removal								
Mooring system removal								
Close out reports								

*Indicative windows for activity

6.4 MANAGEMENT OF RESIDUAL LIABILITY

Prior to FPSO and FSO removal, a risk-based assessment will be undertaken to determine suitable marking of the subsea infrastructure around the FPSO and FSO locations. Consideration will be given to providing a guard vessel and/or cardinal buoy system to warn of the presence of subsea infrastructure.

Banff and Kyle production wells will be shut in and positively isolated from the production flowline systems. CNRI has carried out an assessment of the integrity status of each well and the risk associated with leaving each well in a shut in state for up to three years before final plug and abandonment and have established that there is a low risk of a release from the wells to the marine environment. Subsea Fly-by inspections will be carried out after twelve months following the disconnection to monitor the wells status. Monitoring frequency to be defined based on the outcome of initial inspection. Once this has been determined this will be discussed and agreed with OPRED.

Subsea pipework will be flushed of hydrocarbons prior to disconnection. Combined with the positive isolation of the wells from production pipework this will mitigate the risk of hydrocarbon release from the subsea pipework following the removal of the FPSO and FSO. The gas export pipeline will be positively isolated from the CATS system.

6.5 COSTS

An overall cost estimate following Oil and Gas UK (OGUK) Guidelines on Decommissioning Cost Estimates will be provided to OPRED.

6.6 CLOSE OUT

In accordance with OPRED guidelines, a close out report will be submitted to OPRED following the removal of the FPSO and FSO explaining any variance from the Decommissioning Programmes.