E&P

TOTAL E&P UK

MCP-01

MCP-01
Decommissioning Programme

TOTAL

MCP-01

Decommissioning Programme

UK Ownership

TOTAL

Norwegian Ownership

petoro

STATOIL

HYDRO

TOTAL

ExxonMobil

Norsea Gas A/S

ConocoPhillips

Eni Norge

DONG energy

TOTAL E&P UK Limited
Crawpeel Road, Altens Industrial Estate,
Aberdeen AB12 3FG

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Foreword

In accordance with the requirements of Part IV, Section 29 of the United Kingdom Petroleum Act 1998, this document is submitted by TOTAL E&P UK Limited, on behalf of the owners who are the parties to the Decommissioning Programme, to the United Kingdom Department for Business, Enterprise & Regulatory Reform as the Decommissioning Programme in respect to the facility:

- **14/9 – MCP-01 (Manifold and Compression Platform No. 1)**

In accordance with the Norwegian Act of 29 November 1996 No. 72 relating to petroleum activities, this document is submitted by TOTAL E&P UK Limited, on behalf of the owners who are parties to the Decommissioning Programme, to the Norwegian Ministry of Petroleum and Energy and the Norwegian Ministry of Labour and Social Inclusions as the Decommissioning Programme (Avslutningsplan) in respect to the facility:

- **14/9 – MCP-01 (Manifold and Compression Platform No. 1)**

Document Control for Document No.: MCP01-00-A-00-0006, rev. 06

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Approval of the owners of MCP-01

The owners of MCP-01 are:

- TOTAL E&P UK Limited
- Gassled, consisting of the following companies:
    1. Petoro AS
    2. Statoil ASA
    3. Norsk Hydro Produksjon AS
    4. TOTAL E&P NORGE AS
    5. ExxonMobil Exploration and Production Norway AS
    6. Mobil Development Norway A/S
    7. Norske Shell Pipelines AS
    8. Norsea Gas A/S
    9. Norske ConocoPhillips AS
    10. Eni Norge AS
    11. A/S Norske Shell
    12. DONG E&P Norge AS

The owners of MCP-01 each confirm that they authorise TOTAL E&P UK Limited, as operator of MCP-01, to submit an abandonment programme relating to the installation MCP-01, as directed by the UK Secretary of State. They also each confirm that they support the proposals detailed in the Decommissioning Programme, dated 14 September 2007 submitted by TOTAL E&P UK Limited.

Letters from the owners of MCP-01 confirming these matters are attached herewith.

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petoro

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor, Atholl House
86-88 Guild Street
UK - Aberdeen AB11 6AR

Stavanger, 18 September 2007

MCP-01 Decommissioning Programme
Petroleum Act 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Petoro AS confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Best Regards

LHaga

Laurits Haga
Vice President
Petoro AS

Petoro AS Øvre Strandgate 124, P.O. Box 300 Sentrum N-4002 Stavanger
Telephone +47 51 50 20 00 Telefax +47 51 50 20 01 Email post@petoro.no **www.petoro.no** Enterprise No. NO 983 382 355 VAT

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Our date	Our reference	Statoil Internal
2007-09-26		
Your date	Your reference	

STATOIL

Statoil ASA

Department for Business, Enterprise & Regulatory Reform
Attn.: Offshore Decommissioning Unit
4th Floor, Atholl House, 86-88 Guild Street
AB11 6AR Aberdeen

Dear Sir/Madam,

MCP-01 DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Statoil ASA, confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,
Statoil ASA

AlvBS

Alv Bjørn Solheim
Senior vice president
Natural Gas Supply & Infrastructure

Company	Postal address	Visit address	Telephone	Internet
Statoil ASA		Forusbeen 50	+47 51 99 00 00	www.statoil.com
	N-4035 STAVANGER	Forus		
Register NO	Norway	4033 Stavanger	Telefax	
NO 923 609 016 VAT			+47 51 99 00 50	

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Drammensveien 264
N-0240 Oslo

HYDRO

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor Atholl House
86-88 Guild Street
Aberdeen AB11 6AR
Scotland

Our date: 2007-09-18
Our ref.: Sjur Bøyum
Our contact: Sjur Bøyum
Your date: 2007-09-07
Page: 1 of 1

MCP-01 DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998

Dear Sir or Madam

We acknowledge receipt of your letter dated 7 September 2007.
We, Norsk Hydro Produksjon AS confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,
for Norsk Hydro Produksjon AS

Sjur Bøyum

Sjur R. Bøyum
sjur.runar.boyum@hydro.com

Principal Engineer

Copy:

C:\MyDocs\Dokumenter\GASLED\2007-09-18 MCP-01 DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998.doc

Norsk Hydro Produksjon AS Drammensveien 264	Corporate@hydro.com www.hydro.com	T: +47 22 53 81 00 F: +47 22 53 27 25	Bank Account 7032 05 05419	Registration No. NO 930 187 240 MVA

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TOTAL E&P NORGE AS

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor Altholl House
86-88 Guild Street
Aberdeen AB11 6AR
Scotland

Your date:	Your ref.:	Our ref. (please quote):	Our date:
		GDOC #888681	Stavanger 19 September 2007

MCP-01 DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998

Dear Sir or Madam

We acknowledge receipt of your letter dated 7 September 2007.
TOTAL E&P Norge AS confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,
TOTAL E&P NORGE AS

Gunnar H. Olsen

Director
Gas and Commercial

Postal address:
Main Office P.O. Box 168 N-4001 Stavanger
Oslo Office P.O. Box 1361 Vika N-0113 Oslo
Harstad Office P.O. Box 476 N-9401 Harstad

Location:
Dusavik
Haakon VIIs gt. 1
Havnegata 3B

Telephone:
+47 51 50 30 00
+47 22 01 95 00
+47 77 06 55 25

Telefax:
+47 51 72 66 66
+47 22 01 95 99
+47 77 06 55 22

Enterprise Reg. No.:
NO 927 066 440 VAT

TOTAL

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ESSO NORGE AS
Grenseveien 6, N-4313 Sandnes
P.O.Box 60, N-4064 Stavanger, Norway
47 - 51 60 60 60 Telephone
47 - 51 60 66 60 Facsimile

ExxonMobil

Forus, 18. september 2007

S-29161

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen AB11 6AR
United Kingdom

Dear Sir or Madam,

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.
We, ExxonMobil confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.
We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Regards
Esso Norge AS

Jan Åge Hansen
Asset Manager
For and on behalf of ExxonMobil Production Norway Inc.
And ExxonMobil Exploration and Production Norway AS

I:\ji_norway\Assets\Gassled & other gas infrastructure\Draft Letter of Support, Gassled.doc\EoaA\21.09.2007

An ExxonMobil Subsidiary
NO 914 803 802 VAT

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ESSO NORGE AS
Grenseveien 6, N-4313 Sandnes
P.O.Box 60, N-4064 Stavanger, Norway
47 - 51 60 60 60 Telephone
47 - 51 60 66 60 Facsimile

ExxonMobil

Forus, 18. september 2007

S-29161

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen AB11 6AR
United Kingdom

Dear Sir or Madam,

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.
We, ExxonMobil confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.
We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Regards
Esso Norge AS

Jan Åge Hansen
Asset Manager
for and on behalf of Mobil Development Norway A/S

I:\ji_norway\Assets\Gassled & other gas infrastructure\Draft Letter of Support, Gassled from Mobil Dev. Norway AS.doc\EonA\25.09.2007

An ExxonMobil Subsidiary
NO 914 803 802 VAT

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A/S Norske Shell
Undersøkelse og Produksjon
(Exploration and Production)
Tankvegen 1
Postboks 40
N-4098 Tananger
Norway
Tel: +47 51 69 30 00
Fax: +47 51 69 30 30
E-mail: norske.shell@shell.com
Internett: www.shell.com

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Date: 24 September 2007

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Norske Shell Pipelines AS, confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Nina Holm Viste

Nina Holm Viste
Chairman of the Board Norske Shell Pipelines AS

Driftsavdelingen
(Operation Department)
Råket 2
Postboks 2244
N-6503 Kristiansund
Norway

Telefon: +47 71 56 40 00
Telefax: +47 71 56 40 40

A/S Norske Shell - Hovedkontor
Tankvegen 1
Postboks 40 - 4098 Tananger
Foretaksnummer NO 914807077 MVA

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Our date	Our reference	Protected
2007-09-28		
Your date	Your reference	

STATOIL

Statoil ASA

Department for Business, Enterprise & Regulatory Reform
Attn.: Offshore Decommissioning Unit
4th Floor, Atholl House, 86-88 Guild Street
AB11 6AR Aberdeen

Dear Sir/Madam,

MCP-01 DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Norsea Gas A/S, confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Terje Raae

(NN)
On behalf of Norsea GAS AS

Company
Statoil ASA

Register NO
NO 923 609 016 VAT

Postal address
N-4035 STAVANGER
Norway

Visit address
Forusbeen 50
Forus
4033 Stavanger

Telephone
+47 51 99 00 00

Telefax
+47 51 99 00 50

Internet
www.statoil.com

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ConocoPhillips

Department for Business, Enterprise & Regulatory reform
4th floor, Atholl House
86-88 Guild Street
Aberdeen

AB11 6AR
United Kingdom

Your date	Your reference	Our date	Our reference
6 & 7 September 07	J. Claxton/ J. Benstead	20.09.2007	NOT.12427746

Ref. 01.08.07.08/10C & 01.08.07/00399C

MCP01 Decommissioning Program, Petroleum Act 1998

We acknowledge receipt of your letters dated 6 & 7 September 2007.

Norske ConocoPhillips AS confirm that we authorize TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours sincerely
on behalf of ConocoPhillips Norge

Olsen, Tor-Einar,
MANAGER TRANSPORTATION AND INFRASTUCTURE
Tor-Einar.Olsen@conocophillips.com

Copy to: Ø. Rummelhoff
Myndighetskontakt

Postal address	Visiting address	Telephone	Business Enterprise No.	
P.O. Box 220	Ekofiskveien 35	+47 52 02 00 00	ConocoPhillips Norge	NO 948 138 646 VAT
N-4098 Tananger	N-4056 Tananger	**Telefax**	Norske ConocoPhillips AS	NO 921 473 052 VAT
NORWAY	NORWAY	+47 52 02 66 00	ConocoPhillips Skandinavia AS	NO 918 110 127 VAT

E-mail: contact@conocophillips.com

Page 1 of 1

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Eni Norge

Eni Norge AS
P.O.Box 101 Forus, NO-4064 STAVANGER
Vestre Svanholmen 12, NO-4313 SANDNES
Telephone: +47 52 87 48 00
Telefax: +47 52 87 49 30

Enterprise No.: NO 919 160 675 MVA / VAT

Eni

Your Ref.:
Our Ref.: ENINO/LEG/196617-1

Department for Business, Enterprise &
Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
Aberdeen AB11 6AR

SCOTLAND

Forus, September 21, 2007

Dear Sir or Madam,

Subject : MCP-01 Decommissioning Programme
Petroleum Act 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Eni Norge AS, confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully
Eni Norge AS

Agostino Maccagni
Managing Director

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A/S Norske Shell
Undersøkelse og Produksjon
(Exploration and Production)
Tankvegen 1
Postboks 40
N-4098 Tananger
Norway
Tel: +47 51 69 30 00
Fax: +47 51 69 30 30
E-mail: norske.shell@shell.com
Internett: www.shell.com

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Date: 24 September 2007

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, A/S Norske Shell, confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7 September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Eli Bøhnsdal

Eli Harriet Bøhnsdalen
Gassled Asset Lead
For and behalf of A/S Norske Shell

Driftsavdelingen
(Operation Department)
Råket 2
Postboks 2244
N-6503 Kristiansund
Norway

Telefon: +47 71 56 40 00
Telefax: +47 71 56 40 40

A/S Norske Shell - Hovedkontor
Tankvegen 1
Postboks 40 - 4098 Tananger
Foretaksnummer NO 914807077 MVA

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DONG energy

DONG E&P Norge AS
P.O. Box 450 Sentrum
4002 Stavanger
Norge

Tel +47 51 50 62 50
Fax +47 51 50 62 51

www.dongenergy.com
Company No. 931 713 671

Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen AB11 6AR

21 September 2007

Our ref. EP-041781 1 002

oskha@dongenergy.no
Tel +47 51 50 62 88

MCP-01 Decommissioning Programme Petroleum Act 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, DONG E&P Norge AS confirm that we authorise TOTAL E&P UK Limited to submit on our behalf an abandonment programme relating to the MCP-01 facilities as directed by the Secretary of State on 7th September 2007.

We confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK

Limited in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully
for and on behalf of DONG E&P Norge AS

Oskar Hagen
Head of Department, Gassled

Page 1/1

Registered office
Bjergstedveien 1, 4007 Stavanger, Norway

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Approval from the Section 29 notice holders of the third party pipeline system on MCP-01

The Section 29 notice holders are:

1. Texaco Britain Limited
2. Texaco North Sea U.K. Company
3. ARCO British Limited
4. Talisman Energy (UK) Limited
5. Talisman North Sea Limited
6. Transworld Petroleum (U.K.) Limited
7. Eni UK Limited
8. Talisman Energy Alpha Limited

The Section 29 notice holders of the third party pipeline system on MCP-01 each confirm that they support the proposals detailed in the Decommissioning Programme dated 14 September 2007, which is submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7 September 2007, in so far as they relate to the third party pipeline system on MCP-01.

Letters from the Section 29 notice holders of the third party pipeline system on MCP-01 confirming these matters are attached herewith.

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Chevron

Chevron Upstream Europe
Chevron North Sea Limited
Chevron House
Hill of Rubislaw
Aberdeen, AB15 6XL
Tel 01224 334000
Fax 08701 400140

17 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Texaco Britain Limited confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours faithfully

Chris Stevens
Planning and Commercial Manager and Director
For and on behalf of Texaco Britain Limited

Chevron North Sea Limited
Registered in England:
Registration No 1546623
Registered Address:
4th Floor
95 Wigmore Street
London W1U 1QW

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Chevron Upstream Europe
Chevron North Sea Limited
Chevron House
Hill of Rubislaw
Aberdeen, AB15 6XL
Tel 01224 334000
Fax 08701 400140

17 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Chevron Captain Company (previously named Texaco North Sea UK Company) confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours faithfully

Chris Stevens
Planning and Commercial Manager and Director
For and on behalf of Chevron Captain Company

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bp

Iain House
Business Development Manager
North Sea

19 September 2007

BP Exploration Operating Company Ltd
Burnside Road
Farburn Industrial Estate
Dyce
Aberdeen AB21 7PB
UK

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Direct 01224 832011
Main 01224 832000
housei@bp.com
www.bp.com

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Arco British Limited, confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours faithfully

Iain House
Business Development Manager
For and on behalf of Arco British Limited

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TALISMAN
ENERGY

TALISMAN ENERGY (UK) LIMITED
TALISMAN HOUSE
163 HOLBURN STREET
ABERDEEN
AB10 6BZ
TEL +44 (0) 1224 352500
FAX +44 (0) 1224 353400

Our Ref.: JC/LR
Date: 25 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Talisman Energy (UK) Limited confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours sincerely,
For and on behalf of Talisman Energy (UK) Limited

Jacquelynn Craw

Jacquelynn Craw
Legal Manager/Company Secretary

a Director

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TALISMAN
ENERGY

TALISMAN NORTH SEA LIMITED
TALISMAN HOUSE
163 HOLBURN STREET
ABERDEEN
AB10 6BZ
TEL +44 (0) 1224 352500
FAX +44 (0) 1224 353400

Our Ref.: JC/LR
Date: 25 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Talisman North Sea Limited confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours sincerely,
For and on behalf of Talisman North Sea Limited

Jacquelynn Craw

Jacquelynn Craw
Legal Manager/Company Secretary
& Director

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TALISMAN
ENERGY

TRANSWORLD PETROLEUM (U.K.) LIMITED
TALISMAN HOUSE
163 HOLBURN STREET
ABERDEEN
AB10 6BZ
TEL +44 (0) 1224 352500
FAX +44 (0) 1224 353400

Our Ref.: JC/LR
Date: 25 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Transworld Petroleum (U.K.) Limited confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours sincerely,
For and on behalf of Transworld Petroleum (U.K.) Limited

Jacquelynn Craw

Jacquelynn Craw
Legal Manager/Company Secretary
& Director

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Eni UK

Eni UK Limited

Eni House
10 Ebury Bridge Road
London SW1W 8PZ
Tel: 0207 344 6000
Fax: 0207 344 6044

Registered in England (Company No. 862823)

Legal Department Fax: 020 7344 6332

LEG/LF/ar

21st September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7 September 2007.

We, Eni UK Limited, confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14 September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7 September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and Eni, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14 September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours faithfully

Vincenzo Di Lorenzo

Vincenzo Di Lorenzo
Managing Director
For and on behalf of Eni UK Limited

LF

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TALISMAN
ENERGY

TALISMAN ENERGY ALPHA LIMITED
TALISMAN HOUSE
163 HOLBURN STREET
ABERDEEN
AB10 6BZ
TEL +44 (0) 1224 352500
FAX +44 (0) 1224 353400

Our Ref.: JC/LR
Date: 25 September 2007

Department for Business, Enterprise & Regulatory Reform
Offshore Decommissioning Unit
4th Floor
Atholl House
86-88 Guild Street
Aberdeen
AB11 6AR

Dear Sir or Madam

MCP-01 DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 7th September 2007.

We, Talisman Energy Alpha Limited confirm that we support the proposals detailed in the MCP-01 Decommissioning Programme dated 14th September 2007, which is to be submitted by TOTAL E&P UK Limited as directed by the Secretary of State on 7th September 2007, in so far as they relate to the third party pipeline system on MCP-01, operated by TOTAL E&P UK Limited and currently owned by the Talisman Group and ENI, as described in Section "General Introduction", page 87 in the MCP-01 Decommissioning Programme dated 14th September 2007, in respect of which we have a notice served under section 29 of the Petroleum Act 1998.

Yours sincerely,
For and on behalf of Talisman Energy Alpha Limited

Jacquelynn Craw

Jacquelynn Craw
Legal Manager/Company Secretary
& Director

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Preface

TOTAL E&P UK Limited, affiliate of TOTAL S.A., believes in leading by example particularly on key industry issues such as decommissioning. At the heart of our company's corporate strategy is a commitment to sustainable development which requires an integrated approach to business balancing economic, environmental and social responsibilities.

The decommissioning of disused offshore oil and gas structures is a prime example of how a proactive sustainable development strategy can be applied to a project where the balance of the different factors is particularly important.

Over the last years, TOTAL Group has built up some of the best experience in decommissioning in the North Sea where the activity is particularly complex due to the large structures needed for the deep waters and harsh weather conditions.

TOTAL E&P UK Limited, as operator of MCP-01, is now undertaking decommissioning of a large concrete gravity base structure that has reached the end of its useful life. The decommissioning of the Manifold Compression Platform (MCP-01) was originally planned to take place when the gas pipelines were expected to be taken out of service. These pipelines passing through the bottom part of the platform have been rerouted to bypass MCP-01 to allow the platform to be decommissioned and a continuous use of the gas pipeline system.

Installed in 1976, the platform was designed to act as a compression and interconnection platform to control the pressure in the pipelines connecting outlying gas fields to the St Fergus Gas Terminal in Scotland.

Although MCP-01 is in UK waters and is primarily a UK platform, the structure is connected to the Frigg Transport System and as such comes under the Frigg Treaty which was set up to manage the exploitation of the British-Norwegian Frigg Field. This means that we have been working with both the UK and Norwegian governments in seeking approval for our recommendations.

Our primary objective is to ensure that the platform is decommissioned in a responsible manner balancing safety, environment, technical feasibility, society and economic factors. We are committed to working from a base-case of complete removal of the facilities, provided it is feasible.

Integral to meeting our objectives is our stakeholder consultation process. We believe that it has only been by engaging with stakeholders at the earliest opportunity and taking into account their views and concerns that we have been able to assess all the options and recommend the best overall decommissioning arrangements for MCP-01. We would like to thank all those involved who helped us this far in our journey.

This MCP-01 Decommissioning Programme sets out the owners recommendations for the decommissioning of MCP-01 following a thorough comparative assessment of all the options. These plans are being presented to the UK and Norwegian Governments for approval.

Roland Festor
Managing Director
TOTAL E&P UK Limited

14 September 2007

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Executive Summary

1. General

The Manifold and Compression Platform no. 1 (MCP-01), is a concrete gravity base structure originally constructed and installed in 1976 to serve the two 32" pipelines transporting gas from the Frigg Field to the St Fergus Gas Terminal in Scotland. MCP-01 came into service in 1977 when gas started to flow from the Frigg Field.

This intermediate platform mid-way to St Fergus was required to control the pressure in the pipelines as well as to facilitate internal inspection of the pipelines. The platform is located in UKCS Block 14/9, 175 km north east of St Fergus Gas Terminal mid-way to the Frigg Field.

Following the discovery of the Frigg Field in 1971, an agreement between the UK and Norwegian governments was deemed necessary to regulate the exploitation of the Frigg Field reservoir and the transmission of gas from the Frigg reservoir, straddling the UK and Norwegian continental shelves. Accordingly an agreement was prepared entitled **"Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway relating to the Exploitation of the Frigg Field Reservoir and the Transmission of Gas therefrom to the United Kingdom".** This agreement, known as the Frigg Treaty, was signed 10th May 1976, and came into force later that year. It was later revised in 1998.

The UK Department for Business, Enterprise & Regulatory Reform (DBERR) and the Norwegian Ministry of Petroleum and Energy (MPE) have decided, under the provision of the Frigg Treaty, that there will be a joint approach by the UK and Norway to the decommissioning of MCP-01.

The ownership of the various facilities on MCP-01 is as follows:

- TOTAL E&P UK Limited, hereafter named TOTAL E&P UK ("UK interest")
- Gassled* ("Norwegian interest")

    Gassled consists of the following Norwegian companies:
    1. Petoro AS** (100% owned by the Norwegian State)
    2. Statoil ASA
    3. Norsk Hydro Produksjon AS
    4. TOTAL E&P NORGE AS
    5. ExxonMobil Exploration and Production Norway AS
    6. Mobil Development Norway A/S
    7. Norske Shell Pipelines AS
    8. Norsea Gas A/S
    9. Norske ConocoPhillips AS
    10. Eni Norge AS
    11. A/S Norske Shell
    12. DONG E&P Norge AS

* Operated by Gassco on behalf of Gassled.
** Petoro AS is the licensee for the Norwegian State's direct participation share (State's Direct Financial Interest – SDFI)

This MCP-01 Decommissioning Programme is submitted by TOTAL E&P UK, on behalf of the owners who are the parties to the Decommissioning Programme, to the United Kingdom Department for Business, Enterprise & Regulatory Reform (DBERR) and the Norwegian Ministry of Petroleum and Energy (MPE) and the Norwegian Ministry of Labour and Social Inclusions.

The parties who hold a Section 29 notice for the third party pipeline system on MCP-01, operated by TOTAL E&P UK and currently owned by the Talisman Group and Eni, are not party to this Decommissioning Programme.

The Frigg UK pipeline and the Vesterled pipeline, which in the past have run through the bottom part of MCP-01, have been rerouted to allow decommissioning of MCP-01 to commence. During summer 2004 the Frigg UK pipeline was rerouted together with the Talisman pipeline while the Vesterled pipeline bypass took place during summer 2005. The pipeline sections which become redundant following the bypass do not form part of this MCP-01 Decommissioning Programme, with the exception of the pipeline parts which are located inside MCP-01. These sections will be included in the decommissioning programmes for the complete pipeline systems when eventually taken out of service sometime in the future.

Consequently "Disused Pipeline Notification" forms for the pipeline sections next to MCP-01 belonging to the Frigg UK pipeline (PL 06B) and the Talisman pipeline (PL 014A) have been submitted to the DBERR in March 2004. The corresponding notification for the Vesterled pipeline sections (PL 07C) following the bypass operation was submitted in October 2004 to the MPE by the pipeline operator Gassco. These disused pipeline sections outside MCP-01 will be subject to regular external inspection along with the complete pipeline systems, in order to monitor their condition.

2. Description of MCP-01

MCP-01 is a gravity base structure resting secure on the seabed by virtue of its own weight. After the platform was installed in 1976, the compartments inside the external walls were filled with 173,000 tonnes of sand ballast to keep the platform stable on the seabed. The total weight of the concrete substructure, including the ballast is 386,000 tonnes.

The concrete substructure has never been used for storage of crude oil nor drilling operations. There are no drill cutting accumulations either inside the substructure or on the seabed near the platform.

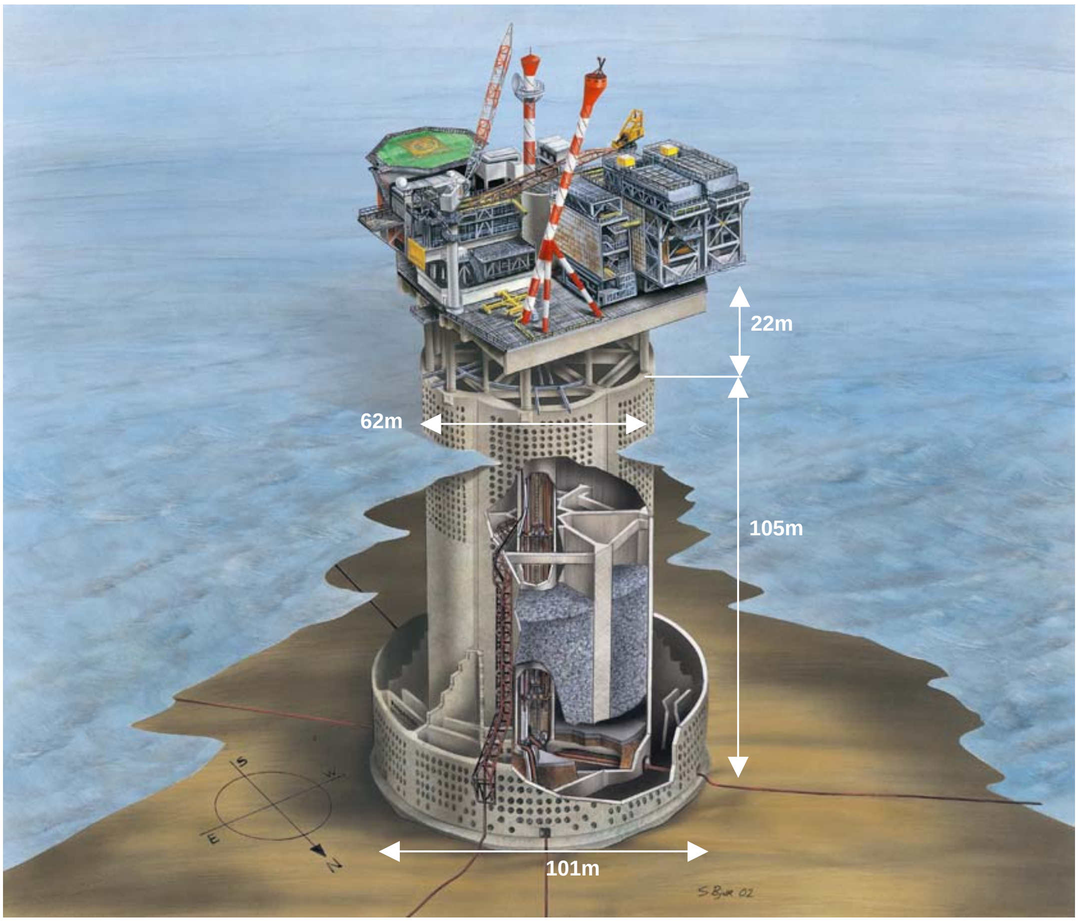


Figure E.1 Manifold and Compression Platform No.1 - MCP-01.

3. Overall Approach to Decommissioning

In 1998, the contracting parties of the Convention for the Protection of the North East Atlantic (known as the OSPAR Convention) took a legally binding decision that provides the regulatory framework for decommissioning all offshore structures in the OSPAR maritime area, which includes the North Sea

In respect of gravity based concrete structures, the Decision 98/3 states that *"The dumping, and the leaving wholly or partly in place, of disused offshore installations within the maritime area is prohibited",* but adds that *"…if the competent authority of the Contracting Party concerned is satisfied that an assessment …shows that there are significant reasons why an alternative disposal …is preferable to reuse or recycling or final disposal on land, it may issue a permit for …a concrete installation…to be dumped or left wholly or partly in place …".* The part of the concrete platform where such alternative disposal options may be assessed would be the concrete substructure; i.e. the load bearing structure supporting the topside facilities.

This process has therefore been followed to determine the recommended arrangements according to the “waste hierarchy” which values reuse above recycling and disposal onshore above disposal at sea.

4. Evaluation Principles

The objective of the evaluations and comparative assessments has been to identify the best disposal arrangements for the MCP-01 facilities that take due account of safety and working environment considerations, the environmental impact and commercial aspects. All recommendations are made in accordance with national and international legislation and conventions.

The following aspects have been considered when evaluating the various disposal alternatives:

- Technical Feasibility
- Risk to Personnel
- Environmental Impact (including impact on society)
- Cost
- Stakeholders concerns

Technical Feasibility

The technical feasibility of a disposal arrangement has been judged based upon knowledge of existing equipment and practices, although in some instances, the possible extension of existing technology has been included, where this is reasonably foreseeable. In such situations, the implication of being unable to develop and test the necessary technology prior to use has been assessed. Leading independent experts in many different fields have been consulted to provide input to the studies and verify the conclusions. A major factor in assessing technical feasibility has been the level of uncertainty associated with the activities to be undertaken. This uncertainty particularly arises due to insufficient knowledge as to the exact structural condition of the concrete substructure and the behaviour of the structure under the load conditions arising during decommissioning activities. Again, specialist input has been obtained from independent experts in the relevant fields to allow verification of the results produced and the conclusions reached.

The risk of being unable to complete an operation or activity as planned is referred to as **“technical risk”.** The maximum acceptable probability of a major accident occurring during the decommissioning operations (with the associated large financial loss) has been set as 1 x 10^{-3} (1 in 1000 or 0.1%).

This figure is in-line with the guidance contained in Part 1 of the "Rules for Planning and Execution of Marine Operations" published by Det Norske Veritas in January 1996 [Ref. 5.1]. In these rules DNV state that it was not possible to set a definitive acceptable risk level for marine operations at that time, due to the scarcity of data. DNV further state that they will seek further data and that **"A probability of total loss equal to or better than 1/1000 per operation will then be aimed at."** These same rules indicate that during marine operations a probability of **structural** failure ten times less than this (that is 1 in 10,000) should be aimed at.

Risk to Personnel

When evaluating the risks associated with a project, it is normal to express the risk to personnel in terms of both Potential Loss of Life (PLL) and Fatal Accident Rate (FAR).

PLL is a measure of the probability of a fatality "likely" to occur whilst undertaking a defined amount of work. In most practical instances this will be less than one and thus, it is often expressed in an alternative form as the probability of a fatality occurring. In this document both the estimated statistical fatalities, and the probability of a fatality, are reported. Whether an estimated PLL is acceptable or not has to be judged on a case-by-case basis, depending upon the size of the project and the specific tasks involved. PLL is particularly useful in comparing the relative risk of a fatality for different project options.

The average yearly risk of fatality for any person may be expressed as a Fatal Accident Rate (FAR). The FAR is calculated from the average yearly risk based upon the number of manhours worked by an individual in a year. For a "normal" offshore worker on the UKCS who spends approximately 4300 hours a year offshore, an average yearly risk of fatality of 1 in 1000 is equivalent to a yearly average FAR value of 22.9. This is **the highest risk to an individual that can be tolerated and a risk considerably less than this must be sought.**

Environmental Impact

The method used for assessing non-quantifiable environment impacts takes account of the effect itself and the sensitivity or value of the area in which the effect occurs. The methodology is described in Section 3.2. of the Environmental Impact Assessment (EIA) forming Part 2 of this MCP-01 Decommissioning Programme.

The purpose of the Environmental Impact Assessment is to:

- Present information about possible impacts in a manner that can assist in the evaluation of the disposal alternatives.
- Clarify the consequences of the relevant disposal alternatives for the MCP-01 facilities that may have a significant impact on the environment, natural resources and society.
- Present proposals for mitigating any damage and nuisance caused by the chosen disposal alternatives.

Cost

The cost presented is expressed in year 2004 money terms and represents a 50/50 estimate; i.e. a 50% chance of being correct reflecting the high uncertainties identified in the risk assessments.

Stakeholders concern

TOTAL E&P UK is committed to conducting an extensive programme of consultation with both statutory consultees and other interested parties in the UK and partly in Norway. The views and opinions expressed during various individual meetings are particularly important in trying to balance conflicting or alternative factors.

5. Possible Reuse of MCP-01

A number of reuse potentials have been assessed for MCP-01; either at its current location or at a different location. However, none of the arrangements for the reuse of the MCP-01 facilities in situ are judged to be economically viable at the present moment, and are therefore not taken forward. There are also a number of technical uncertainties associated with many of the possible reuses.

The feasibility of reuse at a different location does depend entirely upon the ability to safely re-float the concrete substructure, which was not designed specifically for removal at a future date.

There are limited possibilities for the reuse of parts of the topside equipment. The age of the equipment, and the uncertainties associated with their ongoing maintenance and logistical support, reduce their reuse potential. However TOTAL E&P UK will continue to pursue any reuse opportunities.

6. MCP-01 Topside Facilities

6.1 Impact on Removal

In the absence of any viable reuse potential for the MCP-01 topside facilities at their current location, evaluations have been carried out to determine how the facilities can be decommissioned.

In accordance with the UK and Norwegian regulations, and OSPAR Decision 98/3, full removal and onshore disposal has been the only disposal option considered. An evaluation of feasible methods for removal and onshore disposal has been undertaken. The cost and risks associated with this work have also been estimated.

The studies undertaken indicate that the topside facilities on MCP-01 may be removed using conventional offshore methods of working. This Decommissioning Programme assumes that removal will use conventional reverse installation methods in combination with “piece small” removal method. This assumption is confirmed with the award of contract for removal of the topside facilities.

Based upon the actual manhours and tasks estimated by the contractor appointed to carry out the decommissioning of the MCP-01 topsides analyses indicates that the probability of a fatality during the work is approximately 4% and the equivalent average Fatal Accident Rate for workers removing the MCP-01 topsides is approximately 7. Further risk evaluations will be presented in the Abandonment Safety Case due to be submitted to the UK HSE at least six months prior to start of offshore work.

The impact on the environment of removing the topsides is generally low. The “small negative” or “moderate negative” impacts arising from the energy usage, emissions and aesthetic effects during the removal and onshore disposal are balanced by the “moderate positive” impact in respect to materials management arising from the reuse or recycling of materials.

The cost of engineering, preparation, removal, transportation and onshore disposal of the MCP-01 topsides has been estimated to about £70m / 840 MNOK (in 2004-value).

Figure E.2 MCP-01 Topsides Facilities.

6.2 Recommended Disposal Arrangements for Topsides

Based on the results of the studies evaluating the feasibility of removing the MCP-01 topside facilities, it is recommended that:

The topside facilities on MCP-01 should be removed and brought onshore for disposal. Once onshore, as much of the topsides equipment and materials as possible will be reused or recycled.

6.3 Integration with Frigg Cessation Project

The offshore removal and onshore disposal of the topside facilities on MCP-01 will be integrated into the Frigg Cessation Project, operated by TOTAL E&P NORGE, using the same contractor Aker Kværner Offshore Partner. The contract was awarded in October 2004 after an international tendering and provide for engineering, preparation, offshore removal and onshore disposal.

Significant synergy effects are expected from such collaboration. The technical and safety challenges are very much the same. It is particularly the removal of topsides from MCP-01 and its sister platform CDP1 on Frigg where the detailed engineering and the offshore works are comparable. They are both located in UK waters and require similar Abandonment Safety Cases to be submitted to the Health and Safety Executive (HSE).

7. MCP-01 Concrete Substructure

In the absence of any viable reuse potential for the MCP-01 concrete substructure, **comparative assessments** have been carried out to determine how the substructure can best be decommissioned.

The objective of the comparative assessments has been to identify the best disposal arrangements for the concrete substructure that take due account of technical feasibility, safety and working environment considerations, the environmental impact, cost and stakeholders concerns.

In accordance with UK and Norwegian regulations and OSPAR Decision 98/3, full removal of the concrete substructure has been the first option considered. The various alternative arrangements considered in the comparative assessments are summarised in Table E.1.

Alternative A	Alternative B	Alternative C	Alternative D
Re-float, tow to shore, demolish and dispose on-shore	Remove external and internal steelwork, re-float and dispose at a deep water location	Remove internal and external steelwork and cut down sub-structure to provide a clear draught of 55m	Leave in place, removing as much external steelwork as reasonably practicable

Table E1 Main Disposal Alternatives considered for the MCP-01 Concrete Substructure

At the time MCP-01 was designed and constructed, consideration for a future removal operation was not included in the design process.

7.1 Summary of Technical Feasibility Assessment

Alternative A – Refloat the concrete substructure and onshore disposal

Weather dependency

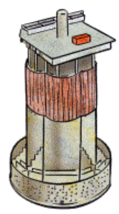
The main uncertainty relating to the possible refloat and onshore disposal of MCP-01 is the need to undertake a large amount of weather sensitive offshore work in one season. If delays occur, it may not be possible to refloat the substructure in the same season as the majority of ballast is removed and the cofferdams are installed to seal the wave breaking holes in the external wall. With the ballast removed and the cofferdams in place the substructure is very susceptible to damage by winter storms. If the substructure has to stand through a winter period in this condition it has been determined that both sliding and rotational failure of the foundations will occur and severe damage to the base slab and external walls of the substructure is virtually certain. Such extensive damage would make it virtually impossible to refloat the substructure in the following season due to the lack of water tightness of the substructure.

Removal of solid ballast

One of the causes of possible delay is the operation to remove the solid ballast from within the structure. Although some of this may be removed in the season prior to the refloat attempt, it is necessary to leave at least half the solid ballast in place to give the platform satisfactory structural stability during the winter period. If it proves difficult to remove the solid ballast due to any reason, the schedule of work will be delayed and the possibility of running out of weather windows for the refloat attempt increases significantly.

Installation of steel cofferdams

Another cause of possible delay is problems associated with the installation of the six steel cofferdams to seal the wave breaking holes in the external wall. These large steel cofferdams, which each weigh approximately 250 tonnes are particularly susceptible to wave loads and therefore can only be installed in calm weather conditions. It is necessary to accurately install all six of the steel cofferdams in one season in order to be able to refloat the substructure. Detailed evaluation of the weather conditions at the offshore location indicates that there is a significant possibility that it will not be possible to successfully install all the cofferdams in one season.



Leaks

Due to the inherent design of the substructure, the water tightness cannot be verified until the solid ballast has been removed and all the cofferdams installed. It is, therefore, not possible to identify any damage to the cofferdams during their installation. Thus any significant leakage either through the cofferdams or through ineffectively closed penetrations or cracks in the walls and base slab of the substructure cannot be identified until late in the programme when remedial works may be difficult to undertake.

Although the condition of the concrete substructure is thought to be generally satisfactory it is not possible to be sure that there are no cracks in the base slab or the lower sections of the external wall. Such leaks would only become obvious when the refloat operation was started and would most probably be difficult or impossible to seal before the end of the summer working season.

Probability of not succeeding

Based upon the judgement and input of leading independent experts, the probability of being unable to refloat the substructure, or a major accident occurring during the refloat and tow to shore has been estimated to be in the order of 60%. This risk is extremely high due to the inherent uncertainties in the extensive offshore activities that need to be performed. No similar operations on the scale envisaged have been undertaken before and thus there is a significant probability that delays would prevent the refloating of the substructure in one season and thus result in the substructure being severely damaged during the following winter storms. The risk of being unable to undertake the refloat operation is approximately 600 times higher than the 0.1% acceptance criterion for asset/financial loss during decommissioning.

Consequence of accidents

The consequences of a major accident during the refloat operations have been shown to be particularly severe, especially in respect to the safety of personnel and cost. In addition, if due to leakage, (or delays which result in damage to the substructure), it proved impossible to refloat the substructure, then the only other removal alternative would be to cut up the concrete substructure into suitably sized sections which would then be transported to shore for disposal. Such operations would involve considerable amounts of diving and would be unacceptably hazardous.

Alternative B – Refloat the concrete substructure and disposal in deep water

The activities performed to refloat the substructure for disposal in deep water are essentially the same as for the onshore disposal option (Alternative A). The main difference, apart from the final disposal method, is that if deep water disposal is being used additional steel items would be removed offshore before the substructure was refloated. When at a deep water location, the sinking process is initiated with explosive charges.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m

Cutting down the substructure to allow a clear 55m draught above the remaining substructure would allow the free passage of vessels.

Method

Cutting down the walls and central shaft of the substructure (up to 120cm thick) is felt to be theoretically feasible, although many factors militate against such an approach. There is a high level of uncertainty surrounding the method of cutting up such an integrated structure in which the strength and stability of each wall depends to a great extent on the adjacent walls. The feasibility of the concrete cutting method is also debatable and considerable effort and expenditure would be necessary before the method could be considered field proven.

The amount of diving necessary also makes this alternative disposal method very questionable and the risk to personnel engaged in the work is considered to be unacceptably high. Due to the complexity of the MCP-01 substructure and the amount of cutting required it is not considered feasible with today's technology to undertake the work using only remotely operated vehicles.

Relevant precautions and minimization of effect will be followed should explosives be required. TOTAL E&P UK will in particular follow necessary mitigation procedures in accordance with Joint Nature Conservation Committee (JNCC) guidelines.

Probability of not succeeding

Uncertainties associated with the process of cutting and toppling the upper sections of wall result in a 66% chance that one or more walls might collapse in an uncontrolled manner. This is approximately 660 times greater than the acceptance criterion and is considered unacceptable. In the event of a major accident, the additional works to achieve the 55m draught would be extremely hazardous resulting in a significant increase in the risk to personnel. The total cost of the work would also be substantially increased.

Alternative D - Leave the concrete substructure in place
The steelwork on the outside of the concrete substructure will be removed as much as reasonably practical so there will be no risk of corroded steel items falling onto the seabed where they could be a hazard to fishermen. It is important to note that cleaning of the MCP-01 concrete substructure is not required, as it has never been used for the storage of crude oil. This would also mean that there is judged to be insignificant levels of discharge to the marine environment.

Serious damage to all parts above sea level with a possible breakdown to the sea level is estimated would take place in roughly 200 years. Breakdown of the breakwater wall and the central shaft down to about 27m below sea level is predicted take place in 400 to 800 years. A breakdown below 55m could take more than 1000 years.

7.2 Summary of Risk to Personnel

The risk to personnel involved in the planned operations for the MCP-01 substructure disposal alternatives that have been considered has been estimated based upon the anticipated work tasks and relevant historical accident rates. The predicted numbers of fatalities expressed in statistical terms are shown in Table E.2.

	Alternative A Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
Potential Loss of Life (Predicted Number of fatalities)	0.64	0.21	0.75	Less than 0.01
Probability of a Fatality	47%	19%	53%	< 1%
Fatal Accident Rate (averaged across all workers)	19	18	47	7

Table E.2 Estimated Risk to Personnel during Disposal Alternatives for MCP-01 Concrete Substructure

It can be seen from Table E.2 that Alternative D has a significant lower probability of a fatal accident occurring compared with the other alternatives. The probability of a fatality is more than 47 times higher for Alternative A than for Alternative D. It should also be noted that the analytical method used to estimate the likely fatalities and major injuries tends to **underestimate,** rather than overestimate, the risk to personnel

For Alternative A, the main contributors to fatality risk are inshore/onshore demolition (48%), offshore marine operations (23%), and offshore diving operations (12%). The main contributor to the diving risk is surface diving in the area around the wave-breaking holes in the external wall. From previous experience in the North Sea this is known to be particularly hazardous area, due to the strong currents and turbulence caused by the sea flowing through the holes.

Based upon the estimated fatalities, the **average** Fatal Accident Rate (FAR value) for the complete removal and onshore disposal work is estimated to be in the order of 19. This is approximately 1.5 times the estimated average risk, FAR=13.1, to workers on MCP-01 when it was fully operational.

If the walls of the substructure were cut down to –55m (Alternative C) the probability of a fatality is more than 53 times higher than the leave in place option (Alternative D). The **average** FAR value for the work involved in cutting down the walls of MCP-01 is estimated to be in the order of 47. This is well above the maximum tolerable limit for operational personnel on TOTAL E&P UK operated platforms and approximately 3.6 times the average risk to workers on MCP-01 when it was fully operational.

The average FAR value for all personnel engaged in Alternative D has been estimated as 7 on the basis that the subsea steelwork removal work can be undertaken using ROVs. There is a possibility that a small amount of diving work may be needed and in that event there would be some increase in the average FAR for the project.

The probability of a fatality as reported in Table E.2 assumes that it is possible to complete the work as planned. If a major accident occurred, the probability of a fatality during the initial work together with the necessary rectification work would be even higher.

The annual number of seafarer fatalities estimated from vessel collision if the concrete substructure is left in place, is estimated to 2.8×10^{-4}, or 1 fatality in 3,600 years. It has been estimated by specialists [Section 8 in the Disposal Plan, Ref. 8.28] that the TOTAL E&P UK measures and industry developments would reduce the collision frequency by approximately 50%.

7.3 Summary of Environmental Impact

The Environmental Impact Assessment for the disposal alternatives for the concrete substructure has been carried out by Det Norske Veritas in Aberdeen and Stavanger. Their assessment is summarised in Table E.3.

	Environmental Impact Summary			
Issues	**Alternative A** Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
Energy Consumption (Million GJ)	1.98 – "Moderate negative"	0.64 – "Small negative"	0.44 – "Small negative"	0.05 - "Insignificant"
Total Energy Impact (Million GJ)	1.98 – "Moderate negative	0.96 – "Small negative"	0.77 – "Small negative"	0.41 – "Small negative"
Total CO_2 Emissions (1000 tonnes)	137	47.0	32.8	3.7
Discharges to sea	"Insignificant"	"Insignificant"	"Insignificant"	"Insignificant"
Physical / habitat effects	"Moderate negative"	"Moderate negative"	"Moderate negative"	"Moderate negative"
Aesthetic	"Small - Moderate negative"	"Insignificant"	"Insignificant"	"Insignificant"
Material Management	"Moderate positive"	"Insignificant"	"Insignificant"	"Insignificant"
Littering	"Insignificant"	"Small Negative"	"Small negative"	"Small negative"
Impacts on fisheries	"Small positive"	"Small positive"	"Moderate negative"	"Small negative"
Impacts on free passage	"Insignificant"	"Insignificant"	"Insignificant"	"Small negative"

Table E3 Summary of Environmental Impact of Alternative Disposal Arrangements for the MCP-01 Concrete Substructure

The EIA Report (included in this Programme) concludes that the outcome of the environmental impact assessment indicates that from a total environmental perspective, Alternative D – leaving in place the concrete substructure, is considered the best option.

7.4 Summary of Cost

The estimated costs of the four disposal alternatives for the concrete substructure and concrete deck beams of MCP-01 are given in Table E.4 below.

Alternative A Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
£446.6m/5,359 MNOK	£387.6m/4,651 MNOK	£461.6m/5,539 MNOK	£11.7m/140 MNOK

Table E.4 Estimated Cost of Alternative Disposal Arrangements for the Concrete Substructure of MCP-01 (The cost of disposal of the topsides is not included)

The costs presented are expressed in year 2004 money terms and represent a 50/50 estimate reflecting the high uncertainties identified in the risk assessments, 1£=12.0 NOK.

Cost of remedial activities following a major accident is estimated in broad terms to be between £440m / 5,280 MNOK to £820m / 9,840 MNOK for Alternatives A, B or C.

7.5 Summary of Stakeholders Concern

As part of the MCP-01 consultation process, some stakeholder groups have expressed their preference for the full removal to shore option (Alternative A). However, if it can be documented that full removal of the concrete substructure is technically unfeasible or inherently unsafe, then the leave in place option (Alternative D) would be preferred to Alternatives B and C (deep water disposal and cut down to –55 meters respectively). The main reason for this preference was to maintain the option of full removal should new technology become available in the future to make removal possible.

Deep-water disposal (Alternative B) was viewed as environmentally unacceptable by society. Further, if the substructure could be safely refloated, it should be brought to shore for disposal.

Cutting down the substructure to –55m (Alternative C) was not considered a viable option by stakeholders because it would still remain as a hazard to fishing operations. It would also mean that any future removal of the structure by refloating could not be attempted.

7.6 Recommended Disposal Arrangements for the Concrete Substructure

In the light of the severe safety implications, the limited environmental benefit and the financial implications of being unable to refloat the substructure or of having a major accident during the work, the inherent uncertainties surrounding the complete refloat and onshore disposal of the MCP-01 concrete substructure are considered unacceptable.

The refloat of the substructure for offshore disposal is similarly uncertain and, in addition, the dumping of structures in the deep ocean is considered to be generally undesirable by society. Consultation with stakeholders has indicated that, if the substructure could be refloated, then it should be brought to shore for disposal, rather than dumped in the ocean. Removal and disposal in deep water, is therefore also not recommended (see Annex B).

Due to the risk to personnel, the uncertainties associated with the decommissioning operations, and the fact that cutting down the substructure to –55m is also unattractive to some stakeholders, particularly the fishing industry, it is recommended that this alternative be rejected.

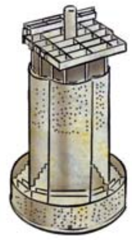
Leaving the concrete substructure in place is therefore considered to be the best solution when considering health and working environment, safety, environmental aspects, cost and stakeholder concern.

It is not planned to use explosives in the proposed disposal alternative for the concrete substructure. Should such consideration be made then all relevant precautions and minimization of effect will be followed after consultation with the JNCC.

The possibility of removing the concrete substructure in the future should new technology become available that would allow this to be carried out safety and effectively, has been carefully considered by TOTAL E&P UK. At present it is difficult to foresee how the inherent uncertainty of the many technical issues associated with refloating the MCP-01 substructure would be reduced by the development of new technology in the future. Although advances in automation and robotics may allow some of the tasks to be carried out with less risk to humans, the technical risks associated with the refloat operation itself are unlikely to reduce significantly. This fact, taken together with other considerations, means that the recommended disposal arrangements would remain unchanged.

After an overall judgement of the comparative assessment for the disposal alternatives for the MCP-01 concrete substructure, it is recommended that:

After the topsides facilities of MCP-01 platform have been removed and brought onshore for disposal, the concrete substructure (including the concrete deck beams) should be suitably marked and left in place after the removal of the external steelwork. As much as practicable of the equipment and materials removed from the concrete substructure will be reused or recycled (Alternative D).



8. Public Consultation

During Spring 2003 TOTAL E&P UK informed the main stakeholder groups that an early decommissioning of MCP-01 was being considered.

Following the owners' decision in December 2003 to bypass the pipelines passing through MCP-01 and thereby bringing the decommissioning of MCP-01 forward, the public consultation process was launched in January 2004.

An informal roundtable discussion meeting was held on May 27th, 2004 with the main stakeholder groups at the TOTAL E&P UK's offices in London. The aim of the meeting was to ask stakeholders for their views and concerns regarding the different decommissioning alternatives for MCP-01. The participants included representatives from fishermen, environmental, regulator and academic organisations and two members of the public. The meeting was chaired by an independent facilitator to ensure the consultation process remained fair and balanced for all concerned (see Annex B).

The public consultation on the decommissioning of MCP-01 plays a very important part in TOTAL E&P UK's evaluation of the decommissioning alternatives for MCP-01. It ensures that the company has not missed any important issues or made any assumptions that do not sit comfortably with interested parties.

Although MCP-01 is located in UK waters, the structure is part of the Frigg Transport System and, as such, comes under the Frigg Treaty. Therefore, the UK and Norwegian governments have agreed to a joint approach to the decommissioning of MCP-01. The consultation process will mainly involve stakeholders in the UK with a limited consultation in Norway.

The statutory consultation period of the Second Draft of the MCP-01 Decommissioning Programme was launched on 9 March 2005 and ended on 25 April 2005. The UK's usual 30-day consultation period was extended to 45 days to accommodate the Norwegian stakeholders who would normally have a much longer consultation period (see Annex D).

Figure E.3 shows in a diagrammatic form how the consultation process has been and will be carried out simultaneously in the UK and Norway.

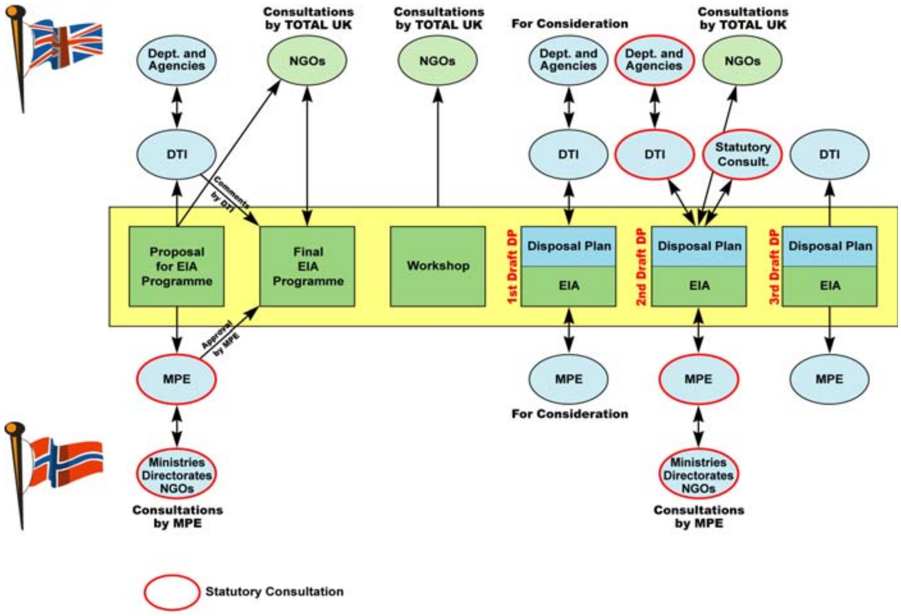


Figure E.3 Decommissioning Consultation and Approval process in the UK and Norway

9. OSPAR Consultation

In view of the recommendation by the MCP-01 owners that the concrete substructure of MCP-01 should be left in place, an assessment in accordance with Annex 2 was prepared and submitted to the UK and Norwegian authorities. In line with the integrated approach to the decommissioning of the MCP-01 facilities, a common assessment document was prepared. This assessment document may be viewed on TOTAL E&P UK's website: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp

The UK Department for Business, Enterprise & Regulatory Reform and the Norwegian Ministry of Petroleum and Energy informed the OSPAR Executive Secretary in separate letters dated 23 May 2006 that they were considering issuing a permit, under paragraph 3b of OSPAR Decision 98/3, for the disposal of the MCP-01 concrete substructure within their jurisdiction at its current location.

The OSPAR Executive Secretary sent the assessment, together with letters from the Norwegian Ministry of Petroleum and Energy and the UK Department for Business, Enterprise & Regulatory Reform, to all the OSPAR Contracting Parties on 26 May 2006.

By the end of the 16-week consultation period no objections had been received to either the UK Department for Business, Enterprise & Regulatory Reform or the Norwegian Ministry of Petroleum and Energy issuing permits in accordance with paragraph 3b of OSPAR Decision 98/3 in respect to the MCP-01 concrete substructure. Comments were however received from two Contracting Parties and these are detailed in Section 10.6 in the Disposal Plan and Annex E.

10. Schedule

By summer 2005 the preparatory offshore work campaigns under the responsibility of TOTAL E&P UK was completed. During 2006 a number of campaigns took place to facilitate required inspection and preparation for the removal contractor.

The removal of the MCP-01 topside facilities commenced in July 2006. During the removal campaigns a flotel with a bridge connection to MCP-01 is stationed next to the platform.

It is planned to complete the offshore removal of the topside facilities during 2008 with a short lifting campaign in summer 2009 to lift off cranes and temporary equipment. During this period the permanent aid to navigation is planned to be installed. The corresponding onshore disposal is planned to be completed in 2009.

The Talisman riser, umbilical caisson and supporting steel structure attached to the external concrete wall of the substructure is planned to be removed during the period 2008 to 2010.

The debris clearance within a 500m zone around MCP-01 is planned to be completed during 2009/2010 following the completion of the offshore removal works, and will be combined with a survey of the concrete substructure. A seabed survey will also be completed during this period which will include seabed sampling. The final trawling test will then be performed in 2010.

It is therefore assumed that the recommended programme of disposal activities will be completed by 31 December 2010 as shown on Figure E.4. The offshore removal and onshore disposal activities for the topside facilities on MCP-01 are shown in yellow, starting with onshore engineering in November 2004.

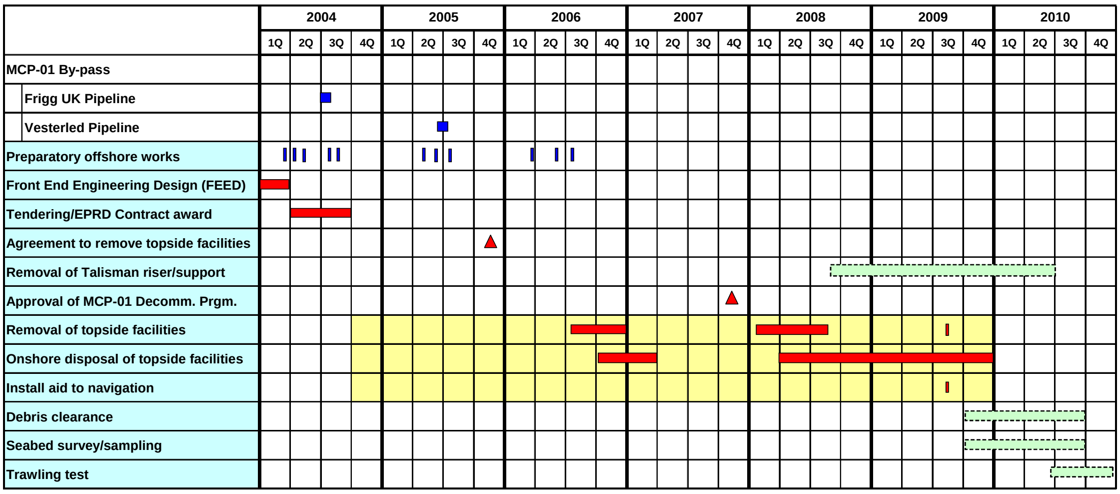


Figure E.4 Proposed Schedule for Recommended Disposal Activities

TOTAL E&P UK received the UK and Norwegian Governments' agreement in November 2005 for the early removal of the topside facilities. This agreement followed the statutory consultation as outlined in Section 10 in the Disposal Plan of this Programme and shown on the schedule in Figure E.4. This agreement is necessary for the MCP-01 work to be integrated into a cross-border project with the Frigg Cessation Project. Collaboration between two TOTAL affiliates will gain maximum synergy effects. The basis for this application was the issue of the Third Draft of the Decommissioning Programme reflecting the comments received from the public consultation

The agreement to remove the topside facilities, before gaining approval of the full MCP-01 Decommissioning Programme, does not prejudice the assessment of decommissioning alternatives applicable to the concrete substructure.

It is possible that the proposed schedule may be modified in light of changed circumstances. As part of a very large and challenging removal project, the contractor may, under certain circumstances, request a different removal sequence that would benefit the overall project. In contracting for the removal and disposal activities, a degree of flexibility has been introduced in respect of the execution of work. Past experience indicates that this is also cost efficient for the contractors performing the decommissioning work. Planning flexibility is also advantageous in relation to the onshore disposal work, as it may encourage reuse alternatives.

11. Project Management and Verification

As operator of MCP-01, TOTAL E&P UK will ensure that the commitment to safe and effective operation will continue throughout the decommissioning phase.

The recommended decommissioning programme for MCP-01, except for the offshore removal and onshore disposal of the topside facilities, will be executed under direct project management of TOTAL E&P UK under the principles outlined in Section 12.2 in the Disposal Plan.

As a consequence of integrating the removal and onshore disposal of the MCP-01 topside facilities into the Frigg Cessation Project operated by TOTAL E&P NORGE, a common Project Execution Plan will be established with due consideration of both TOTAL affiliates role and responsibilities. A “Director Cessation Project Frigg and MCP-01” has been appointed with the objective to develop synergies between the Frigg and MCP-01 removal and onshore disposal and award contract(s) for the execution of the works. The Project Director will report to the Managing Directors of TOTAL E&P UK, Aberdeen, and TOTAL E&P NORGE, Stavanger, through a steering committee. Section 12.3 in the Disposal Plan outlines the principles on which this Project Management System will be based on.

12. Pre- and Post-Decommissioning Surveys

During summer 2002 sediment and biota samples were taken from eight locations around MCP-01. The samples were analysed to determine their metal and hydrocarbon contents. Marine growth samples were also collected from eight locations at various depths on the concrete substructure.

At the end of the decommissioning work programme, an environmental survey, including seabed sampling, will be undertaken to document the environmental conditions at the end of the removal and disposal operations. A survey of the condition of the concrete substructure will also be undertaken. The need for further monitoring activities will then be determined based upon the findings of the surveys and discussions with the relevant parties (see Section 14.2 in the Disposal Plan).

Debris on the seabed forming a hazard to other users of the sea within 500 meters of MCP-01 is planned to be removed. The condition of the seabed will then be verified by appropriate surveys and trawling tests (see Section 13 in the Disposal Plan).

13. Maintenance and Monitoring

The aid to navigation installed on the concrete substructure will be designed and maintained to ensure a high level of reliability. It will incorporate back-up systems and parts of the system will be changed at regular intervals.

Regular surveillance will be carried out to check that the navigation aids are operational. The navigation aids will be designed in such a way as to allow them to be changed from a helicopter, thus obviating the need to man the platform for this purpose. The responsibility for the maintenance of the navigation aids remains with the owners of MCP-01, unless otherwise agreed with the authorities.

A visual check on the above-water condition of the concrete substructure will be undertaken and recorded when the navigation aids are being checked by helicopter. The implications of any observed deterioration of the substructure, in relation to the safety of users of the sea, will be assessed and any required action determined in consultation with the UK and Norwegian authorities.

The above-water deterioration of the concrete structure will, however, take place relatively slowly and the navigation aids may be expected to remain in place for several hundred years.

Breakdown of the breakwater wall and the central shaft down to about 27m below sea level is predicted to take place in 400 to 800 years. A breakdown below 55m could take more than 1000 years.

Measures will be taken to ensure that the position of the concrete substructure left in place are correctly identified and marked on relevant charts. To assist fishermen, it is planned to introduce the position of the concrete structure into the UK “FishSAFE” programme. The 500m safety zone around the concrete substructure will remain in place during the approved decommissioning work, after which consideration will be given to removing it.

14. On-going liability

If left in place, the MCP-01 concrete substructure will remain the property and responsibility of the MCP-01 owners. However, both the UK and Norwegian authorities recognise that the question of long-term residual liability should be discussed and agreed with present owners in order that suitable arrangements are made.

It is therefore the intention of the owners of MCP-01 to enter into dialogue with the authorities at an appropriate time in order to determine suitable arrangements regarding future liabilities in respect to the MCP-01 concrete substructure.

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General Introduction

This document sets out the Decommissioning Programme for the Manifold Compression Platform (commonly known as MCP-01) located in Block 14/9, 173km north east of Aberdeen, in the UK sector of the North Sea Continental Shelf. The operator of the platform is TOTAL E&P UK Limited (hereafter named TOTAL E&P UK).

MCP-01 is a concrete gravity base structure originally constructed and installed in 1976 to serve the two 32" pipelines transporting gas from the Frigg Field to the St Fergus Gas Terminal in Scotland. MCP-01 came into service in 1977 when gas started to flow from Frigg.

Figure I.1 Manifold and Compression Platform MCP-01.

Following the discovery of the Frigg Field in 1971, an agreement between the UK and the Norwegian governments was deemed necessary to regulate the exploitation of the Frigg Field reservoir and transmission of gas from the Frigg reservoir, straddling the UK and Norwegian continental shelves. Accordingly an agreement was prepared entitled ***"Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway relating to the Exploitation of the Frigg Field Reservoir and the Transmission of Gas therefrom to the United Kingdom".*** This agreement, known as the Frigg Treaty, signed 10th May 1976, came into force later that year. It was revised in 1998.

Under the terms of the Frigg Treaty two 32" pipelines were installed between 1974 and 1977 to transport the gas from the Frigg Field to the St Fergus Gas Terminal in Scotland. The pipeline leaving the UK platform TP1 on Frigg was named the UK Frigg pipeline and is owned by UK interests.

The other pipeline leaving the Norwegian platform TCP2 on Frigg was named the Norwegian Pipeline - known today as the Vesterled pipeline. It is owned by Norwegian interests and is under Norwegian jurisdiction until it enters the UK territorial waters.

MCP-01 was then installed mid-way between Frigg and the St Fergus Gas Terminal to control the pressure in the pipelines, as well as to facilitate internal inspection of the pipelines (using intelligent pigging tools). Under the Frigg Treaty the MCP-01 platform forms part of the "UK Pipeline" and the "Norwegian Pipeline" as an "associated installation(s) serving [the] pipeline on an intermediate platform…". The DBERR and the MPE have therefore agreed to a joint approach by the UK and Norway to the decommissioning of MCP-01 under the provision of the Frigg Treaty.

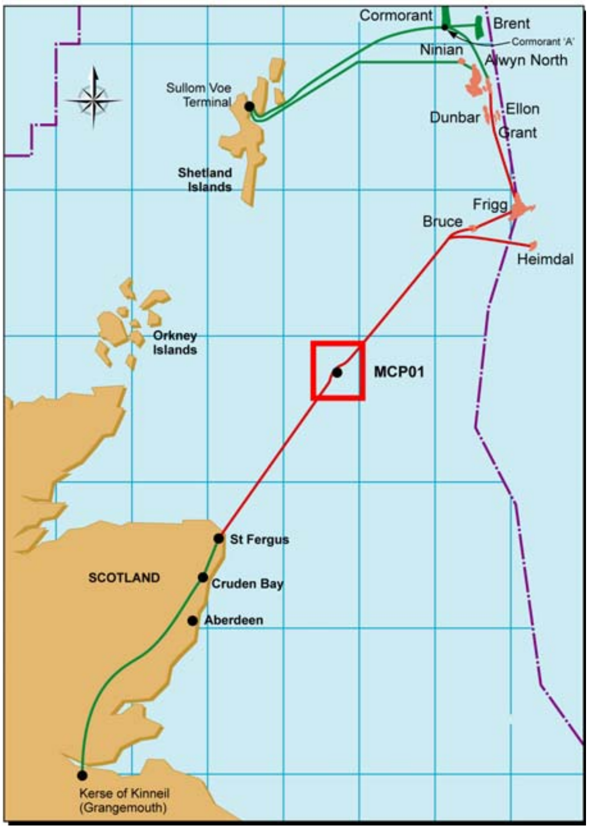

Figure I.2 Location of MCP-01 and the two pipelines from Frigg to St Fergus Gas Terminal

Figure I.3 St Fergus Gas Terminal

Parties to the Decommissioning Programme

The 1992-initialled version of the Frigg Transportation System Facilities Participants Agreement governs the split of ownership of MCP-01 between the UK and Norwegian interests. The owners who are parties to this Decommissioning Programme, of the various facilities on MCP-01 are as follows (see also page 7):

Common Facilities
Comprising the concrete substructure with its integrated concrete support frame, topside facilities as secondary structures and platform utility and safety systems, owned by:

- TOTAL E&P UK* (the "UK interest") 50%
- Gassled** (the "Norwegian interest") 50%

Gassled consists of the following Norwegian companies:

1. Petoro AS*** (100% owned by the Norwegian State)	38.245%
2. Statoil ASA	20.180%
3. Norsk Hydro Produksjon AS	11.620%
4. TOTAL E&P NORGE AS	8.086%
5. ExxonMobil Exploration and Production Norway AS	5.298%
6. Mobil Development Norway A/S	4.267%
7. Norske Shell Pipelines AS	4.140%
8. Norsea Gas A/S	2.839%
9. Norske ConocoPhillips AS	1.946%
10. Eni Norge AS	1.574%
11. A/S Norske Shell	1.115%
12. DONG E&P Norge AS	0.690%

* Elf Exploration PLC sold its interest in MCP-01 and the Frigg Transportation System to TOTAL E&P UK in 2006
** Operated by Gassco on behalf of Gassled.
*** Petoro AS is the licensee for the Norwegian State's direct participation share (State's Direct Financial Interest – SDFI)

UK Facilities
Comprising one disused 32" riser and associated pipework for the UK Pipeline system on MCP-01 and the cold vent system, owned by:

- Total E&P UK 100%

Norwegian Facilities
Comprising one disused 32" riser and associated pipework for the Norwegian Pipeline system on MCP-01, two compression modules and one separation module, owned by:

- Gassled 100%

Third Party Facilities

The parties who hold a Section 29 notice for the third party pipeline system on MCP-01, operated by TOTAL E&P UK and currently owned by the Talisman Group and Eni, will not be a party to this Decommissioning Programme. However, statements from the Section 29 notice holders will be submitted along with the final version of the programme confirming their agreement for the work related to their equipment in order to decommission MCP-01 (see page 33).

The third party facilities on MCP-01 consist of an 18" riser and umbilical caisson within a steel support structure attached to the external concrete wall, a topside skid and two 12" pipes in the central shaft connected to the Frigg UK pipeline and the Vesterled pipeline at the bottom of the shaft.

The fields that have used MCP-01 as an entry point for export of gas to the St Fergus Gas Terminal are described in Section 2.2 in the Disposal Plan.

Submission to UK and Norwegian Authorities

In the UK, the main provisions relating to the production of hydrocarbons are set out in the Petroleum Act 1998; Part IV of which, deals with the decommissioning of offshore installations.

Under the provisions of Section 29 of the UK Petroleum Act 1998 the Secretary of State may, by written notice, require the submission of a costed decommissioning programme detailing the measures proposed to be taken in connection with the decommissioning of an offshore installation or subsea pipeline.

In Norway, the provisions relating to the cessation of petroleum activities are set out in the "Act of 29 November 1996 No. 72 relating to petroleum activities" and the "Regulations to Act relating to Petroleum activities laid down by Royal Decree 27 June 1997" made under the above Act.

The Norwegian Regulations of 27 June 1997 require that the owners prepare a Decommissioning Programme (Avslutningsplan) which must be submitted to the Ministry of Petroleum and Energy and the Ministry of Labour and Social Inclusion, with copies sent to the Norwegian Petroleum Directorate and the Petroleum Safety Authority. The Decommissioning Programme shall consist of two parts, one part dealing with the disposal of the facilities, and the other dealing with the social and environmental impacts of the disposal activities. These two parts of the Decommissioning Programme (Avslutningsplan) are referred to in the regulations as the Disposal Plan (Disponeringsdel) and the Environmental Impact Assessment Report (Konsekvensutredning).

Although there are some differences in the terminology and detailed arrangements between the two national legislative frameworks, the general procedures and requirements are broadly similar. It has therefore been agreed that a common document, designated the MCP-01 Decommissioning Programme, will be submitted by TOTAL E&P UK, on behalf of the owners, which details the recommended decommissioning arrangements for MCP-01.

The MCP-01 Decommissioning Programme is organised in two parts:

Part 1 MCP-01 Disposal Plan
Part 2 MCP-01 Environmental Impact Assessment Report (EIA Report)

Therefore, in accordance with the requirements of Part IV, Section 29 of the United Kingdom Petroleum Act 1998, this document is submitted by TOTAL E&P UK, on behalf of the MCP-01 owners who are parties to the Decommissioning Programme, to the United Kingdom Department for Business, Enterprise & Regulatory Reform as the Decommissioning Programme in respect to the facility registered as 14/9 - MCP-01.

Additionally, in accordance with the Norwegian Act of 29 November 1996 No. 72 relating to petroleum activities, this document is submitted by TOTAL E&P UK, on behalf of the MCP-01 owners who are parties to the Decommissioning Programme, to the Norwegian Ministry of Petroleum and Energy and the Norwegian Ministry of Labour and Social Inclusion as the Decommissioning Programme (Avslutningsplan) in respect to the facility registered as 14/9 – MCP-01.

This Decommissioning Programme is submitted in English to both the UK and Norwegian authorities. The EIA Report is translated into Norwegian and available as a separate document.

Further detailed documentation relating to the implementation of the decommissioning activities on this UK registered platform, as outlined in this Decommissioning Programme, will be submitted to the relevant UK authorities in accordance with national legislation. This will include the Abandonment Safety Case for MCP-01. Other specific permit applications will be prepared and submitted as required. Appropriate information will be given to the Norwegian authorities in accordance to the terms of the Frigg Treaty.

The two 32” pipelines to St Fergus will remain in operation after being rerouted round MCP-01, and approval for their disposal is not sought within this document. Even though the Frigg Field ceased gas production on 26 October 2004, other fields will continue using the two 32” pipelines for transporting their gas to the St Fergus Gas Terminal. Separate decommissioning programmes will be prepared at the end of the lives of fields served by the pipelines.

Except where specifically noted in the text, the name “TOTAL E&P UK” has been used in this document to mean both TOTAL E&P UK Limited, or the predecessor TOTAL Group companies in the UK which operated the Frigg Transportation System previously. The TOTAL affiliate TOTAL E&P NORGE AS, the operator of the Frigg Field, is shortened in the text to TOTAL E&P NORGE.

In accordance with common practice, the abbreviation “UK” has been used throughout this document to refer to the United Kingdom of Great Britain and Northern Ireland.

Reference to the Talisman riser and Talisman pipeline means the riser and pipeline owned by the Talisman Group and Eni, operated by Talisman.

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Disposal Plan – Contents

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1. Introduction to the Disposal Plan

The MCP-01 Decommissioning Programme has been arranged in two parts in order to comply, to the greatest extent possible, with both UK and Norwegian legislation.

Disposal Plan of the Decommissioning Programme
The sections in the Disposal Plan of the MCP-01 Decommissioning Programme have been grouped in the following manner:

Sections 2 - 4 Background Information

This includes the history of MCP-01, details of the facilities to be decommissioned and an inventory of materials.

Section 5 – 9 Assessments and Recommendation

This includes assessments of all the possible disposal alternatives for the MCP-01 facilities and recommendations regarding the disposal arrangements for the platform. The overall impact of the decommissioning activities, in terms of risk to personnel, is also presented together with details of the overall environmental impact of the proposed arrangements. The mitigating measures recommended by the Environmental Impact Assessment are summarised with the planned actions.

Section 10 - 15 Details of Proposed Decommissioning Arrangements

A description of the ongoing public consultation activities being undertaken by TOTAL E&P UK is included. The implementation of the proposed disposal activities including a description of the planned activities, the schedule, and the arrangements for managing the work in a safe and effective manner are given. Details of the various surveys that will be undertaken after the decommissioning work is completed are described, and the issue of long-term liability is addressed.

Section 16 Supporting Studies to the Disposal Plan

This section provides details of all the supporting studies, research and assessments that have been carried out as part of the process for determining the recommended disposal arrangement for the MCP-01 facilities. The list of supporting studies is provided to give an **overview** of the research that has been undertaken. Specific documents, which are particularly relevant to the text, are listed under the headings “Section References” at the end of each main section.

Environmental Impact Assessment Report of the Decommissioning Programme:
This part of the MCP-1 Decommissioning Programme consists of the Det Norsk Veritas (DNV) report on the Environmental Impact Assessment (EIA Report) for MCP-01. Some minor editing has been made to prevent undue repetition with the Disposal Plan of the MCP-01 Decommissioning Programme.

The findings are in their document entitled “MCP-01 Decommissioning - EIA“, DNV Report No. 2004-4046, rev. 7, dated 20 January 2005. Professor Cliff Johnston carried out a peer review of the EIA Report, rev. 2 dated 3 May 2004.

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2. Background Information

2.1 Development

When the large discovery of gas reserves was made at the Frigg Field and sold to the British Gas Corporation, a new transportation system to the gas terminal at St Fergus in Scotland had to be built. Two 32” pipelines were laid from Frigg to St Fergus where the gas could be further treated before delivery for the UK domestic market. This became known as the “Frigg Transportation System”. One pipeline is owned by British interests and is now referred to as the “Frigg UK pipeline” (indicated as Line 1 UK in Figure 2.1). The other pipeline, now called the “Vesterled pipeline”, is owned by Norwegian interests.

However, an intermediate platform mid-way to St Fergus was required to facilitate the control of pressure in the pipelines as well as assisting the internal inspection equipment for the pipelines (known as intelligent pigging tools). A concrete platform was therefore constructed and installed in 1976 to serve these two 32” pipelines, located in UKCS Block 14/9, 175 km north east of St Fergus Gas Terminal mid-way from the Frigg Field (see Figure 2.1).

The structure became the “Manifold and Compression Platform No. 1” (abbreviated to MCP-01). This concrete platform has a very similar design to the concrete platform CDP1 at the Frigg Field. MCP-01 came into operation in September 1977 when gas from the Frigg Field started to flow.

As part of the initial configuration, the two pipelines enter MCP-01 through the bottom of the concrete substructure by separate tunnels (see also Figure 8.5 in the Disposal Plan). They each then continue to the topside facilities through the central concrete shaft. After pressure control, the gas left the topsides in separate pipelines down the same central shaft but through different tunnels at the bottom of the structure on their way to St Fergus.

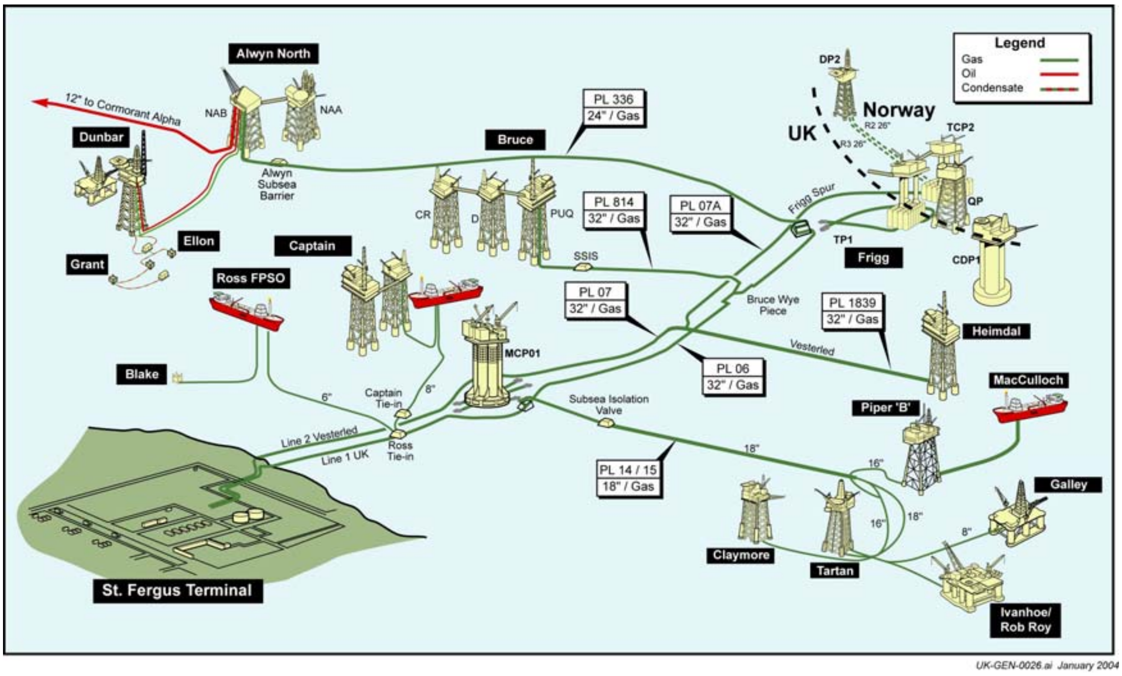

Figure 2.1 The original Frigg Transportation System between Frigg, MCP-01 and the St Fergus Gas Terminal in Scotland, illustrating the required bypass of the pipelines at MCP-01 and Frigg/TP1

Most of the topsides facilities were installed after the platform was installed in 1976 as shown on Figure 2.2.

Figure 2.2 MCP-01 during installation of topside facilities.

Although space was provided on the platform to install compression facilities for both pipelines as shown on Figure 2.3, compressors were only installed for the Norwegian gas pipeline in 1982. However, the compression facilities were taken out of service in 1989, but were left in place awaiting the final decommissioning of the platform.

In 1992 the platform was re-configured to allow it to be operated as a "not-normally-manned" platform controlled from the St Fergus Gas Terminal. At the same time the two 32" pipelines were modified to pass through the bottom part of the concrete substructure rather than being routed via the deck of MCP-01. The topside facilities associated with the pipelines were then cleaned and permanently shut-in. This conversion resulted in about 90% of the process equipment on the platform being redundant and 40% of the platform structure no longer in use.

Figure 2.3 MCP-01 before two compression and one treatment modules were installed.

2.2 Tie-ins

The original design of the platform allowed for future tie-ins of other gas fields for transport of their gas to the St Fergus Gas Terminal. In 1978 the Piper spurline (Talisman pipeline) was installed to provide an export route for gas from the Piper platform, which up to that point had been flared. Since then other fields have been connected to the Talisman pipeline: Tartan, Claymore, Galley, MacCulloch and the Ivanhoe/Rob Roy fields. See also Figure 2.1.

The only live process equipment on MCP-01 since 1992 have been associated with the tie-in of the gas export from the Piper/Tartan area to St Fergus. However, during summer 2004 the Talisman pipeline was rerouted to bypass MCP-01 with a subsea connection to the Frigg UK pipeline as explained in Section 2.5 and shown on Figure 2.4.

2.3 Operations

When the platform was being remotely controlled, a dedicated maintenance campaign was carried out about four times a year. The maintenance team was part of the work force operating from the St Fergus Gas Terminal.

During its operational life, the facilities on MCP-01 have had a regularity of nearly 100%.

2.4 Early Decommissioning

Decommissioning of MCP-01 was originally planned to take place at the end of the lives of the fields served by the pipelines. Recent safety studies, however, have concluded that even with the existing level of maintenance work, it is uncertain whether an acceptable standard of safety for the maintenance crew can be maintained on a not-normally-manned platform which would be nearly 50 years old at the time of decommissioning.

Both the Frigg UK pipeline and Vesterled pipeline will continue to transport gas to St Fergus, and will therefore not be part of this MCP-01 Decommissioning Programme.

2.5 Pipelines Bypass

The Frigg UK pipeline and the Vesterled pipeline, which in the past have run through the bottom part of MCP-01 (see Figure 8.5), have been rerouted to allow decommissioning of MCP-01 to commence. The 32" Frigg UK pipeline and the 18" Talisman pipeline were rerouted during summer 2004 as illustrated in Figure 2.4. The bypass for the Vesterled pipeline took place during summer 2005.

The 18” Talisman pipeline will be cut and capped just outside the lower external wall of MCP-01 when removing the 18” riser attached to the platform. The disused sections of two 32” pipelines and the 18” pipeline sections have been cut and rock dumped to provide a fishing friendly profile at the tie-in points for the new bypasses (see Figure 2.4).

An acoustic survey in May 2003 observed the disused sections on the Frigg UK pipeline to be 10% natural burial, 6% gravel dumped and 84% exposed. For the Vesterled sections the survey showed 48% natural burial, 5% gravel dumped and 47% exposed. The pipeline sections remain stable with little change noted year on year, and have no spans greater than 10m in length and 0.8m in height.

The pipeline sections which have become redundant following the bypass do not form part of this MCP-01 Decommissioning Programme, with the exception of the pipeline parts which are located inside MCP-01. These disused sections of pipe will be included in the decommissioning programmes for the complete pipeline systems when eventually taken out of service sometime in the future. This will not jeopardise any final decommissioning options for these sections of pipe. In order to monitor their condition they will continue to be subject to regular external inspection along with the complete pipeline systems. They will not pose any increased risk to other users of the sea.

Consequently "Disused Pipeline Notification" forms for the pipeline sections next to MCP-01 belonging to Frigg UK pipeline (PL 06B) and the Talisman pipeline (PL 014A) have been submitted to the DBERR in March 2004 (see Figure 2.4). The corresponding application for the Vesterled pipeline sections (PL 07C) left at MCP-01, following the bypass operations, was submitted to MPE by the pipeline operator Gassco in October 2004.

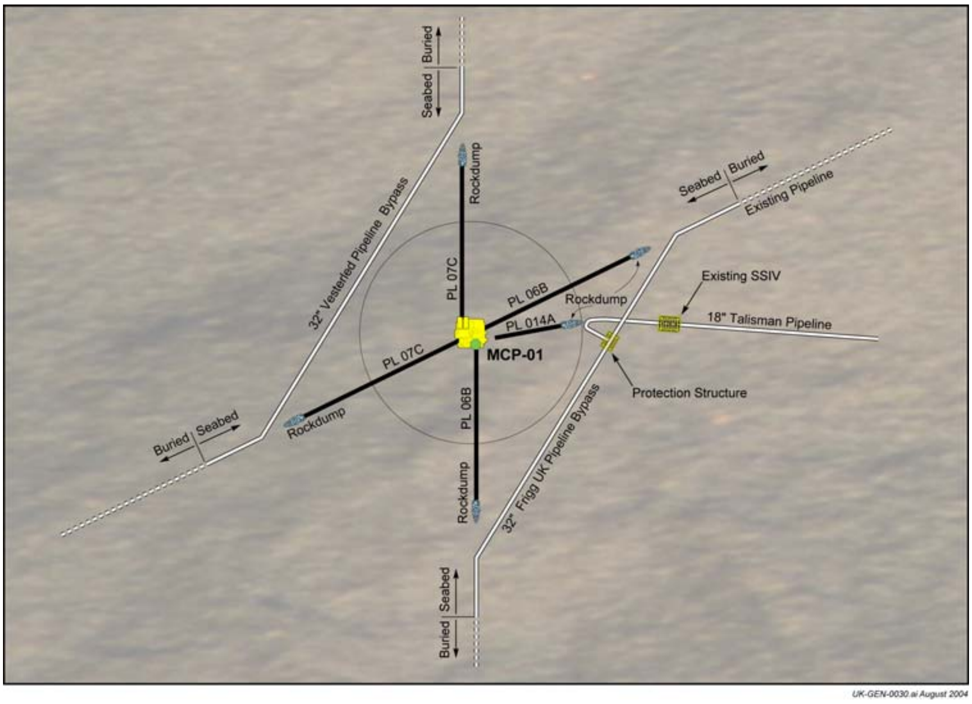

Figure 2.4 Bypass routes for the Frigg UK pipeline, Talisman pipeline and the Vesterled pipeline at MCP-01

2.6 Prevailing Metrological and Oceanographic Conditions

Details of the meteorology and oceanography at the location of MCP-01 are detailed in Section 6 of the Environmental Impact Assessment forming Part 2 of this Decommissioning Programme. A summary of the conditions is provided below. Reference is also made to the MCP-01 Operational Safety Case [Ref. 2.1].

The prevailing direction of the wind is south westerly, although for design purposes of MCP-01 the wind speeds are considered omni directional. The 100-year maximum three second gust is 48.2m/s at 10.0m above sea level.

Air temperature likely to be experienced will range between a maximum of +22 ºC to a minimum of –9 ºC, whilst sea temperatures will range between 6 to 14 ºC. Relative humidity in the area around MCP-01 can vary between 40% and 100%.

The water depth at Mean Sea Level (MSL) is 94m.

The 100 year return sea current speeds at MCP-01 are 1.57m/s at the surface, and 0.47m/s at the bottom, with variations being approximately linear, not taking into account current field distortion due to the presence of the structure.

MCP-01 was originally designed and constructed to withstand wave conditions as follows:-

- Operating: 18.0m with 12.5 second period
- 100 year maximum: 29.0m with 16.0 second period

A re-assessment of environmental data in 1993 indicates a 100 year maximum of 26.4m with a 16.5 second period.

Based on various survey data, the area of the seabed on which MCP-01 is located, consists of 2-3 metres upper layer of brown medium sand with shell fragments. Underneath this upper layer (to about 30 metres) is a layer of fine grey sand interspersed with thin centrimetric levels of clayey silt and layers of organic matter. A few inter-bedded levels of gravel are also present.

Bathymetric maps show that MCP-01 is located on a slight rise in the seabed with a depth of about 94m, falling to a depth of approximately 96m at the 500m zone. The seabed in the vicinity is comprised of mud, sandy mud, patches of shell and exposed clay. The elevated mound/bank covers an area of 1.2 x 2.0 km as shown in Figure 2.5.

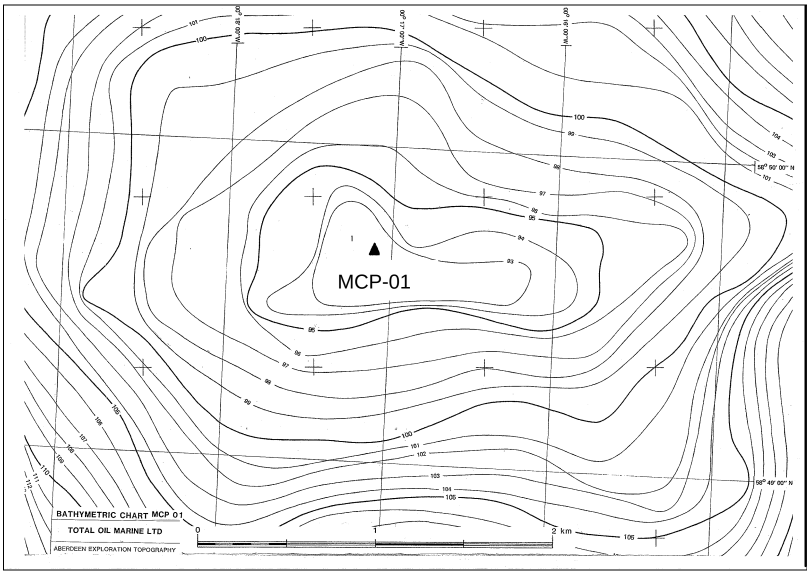

Figure 2.5 Bathymetric map showing the location of MCP-01 (depth shown in m below MSL)

Section References

2.1 "MCP-01 Operational Safety Case", TOTAL E&P UK PLC, rev. 03, dated November 2003.

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3. Description of Facilities to be Decommissioned

This section provides a description of MCP-01 facilities that are to be decommissioned. See also Figure 3.1 on the next page.

MCP-01 is a gravity base structure resting securely on the seabed by virtue of its own weight. The concrete substructure was built in Sweden to a design by CG Doris.

After the platform was installed in 1976, the compartments inside the external walls were filled with 173,000 tonnes of sand ballast to keep the platform stable on the seabed. Total weight of the topside facilities and the concrete substructure including the ballast is 386,000 tonnes.

The substructure consists of a series of concentric cylindrical concrete walls of different heights connected together by the base slab and radial concrete walls. The main external walls extend from the base slab to about 11m above the water level. The upper 37m section of the external wall is perforated with about 1282 holes to reduce the wave forces on the substructure. Inside the external wall a central concrete shaft runs from the base slab to about 24m above the concrete deck beams.

The deck consist of a series of 4m deep reinforced concrete beams that are supported on the central concrete shaft and a series of concrete filled steel columns mounted on top of the main external wall. These concrete beams support the topside modules and equipment.

Scour mats were initially placed around the circumference of the base and overlay the soil adjacent to the base. These have been replaced by a band of rock dumped around the entire circumference to prevent scouring.

During its 28 years of operational life, no major structural damage has been reported on the substructure.

The concrete substructure has never been used for the storage of crude oil. There are no drill cutting accumulations either inside the substructure or on the seabed near the platform.

MCP-01	Dry Weight (tonnes)	Overall Dimensions	Comments
Topsides	Basic weight 13,500 Weight of the two Largest modules 1,800	Dimension of Topsides: 63m x 63m	The topsides consist of about 40 modules; living quarters, electrical power generation, compressors, separation module, helicopter deck
Concrete Substructure	Concrete 137,000 Reinforcement steel 10,800 Sand and concrete ballast 222,200 Marine growth (estimated) 2,600 Steelwork inside the external walls 1,000 Steelwork outside the external walls 100	Height: (top of central shaft) 146m Diameter of base slab: 101m External wall diameter: 62m	The concrete weight includes the weight of the integrated concrete support beams

Table 3.1 Key Platform Data for MCP-01

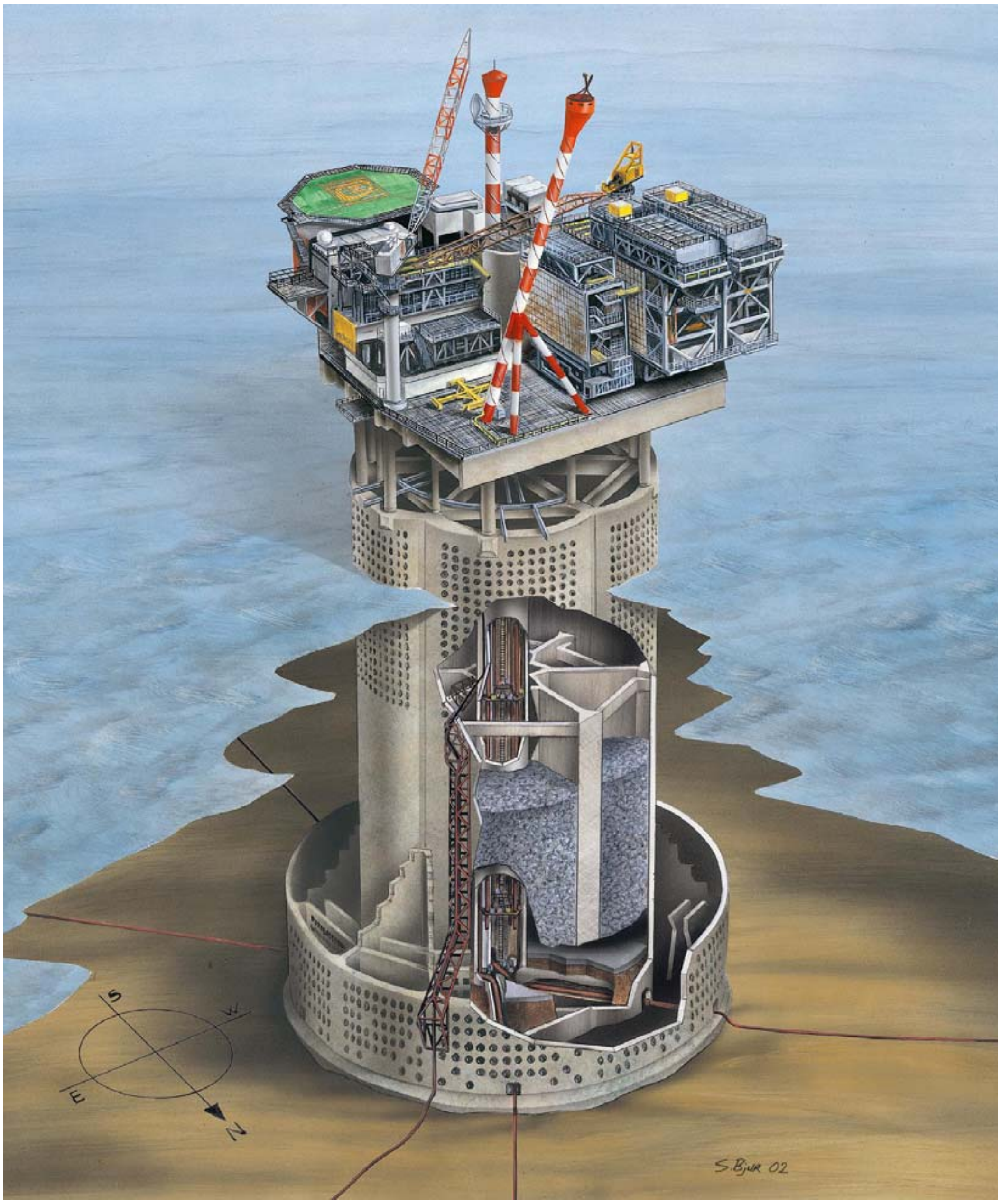

Figure 3.1 Manifold and Compression Platform No.1 - MCP-01

4. Inventory of Materials

An inventory inspection has been carried out on MCP-01. The inventory of materials has been based upon surveys undertaken by independent organisations [Ref. 4.1 to 4.3].

As part of the EIA process, inventory inspections and analyses have been completed for the MCP-01. Quantities of materials have been estimated, based on platform data, available onshore and comparable values from other similar platforms (CDP1 at the Frigg Field).

Table 4.1 provides details of the materials inventory for the MCP-01 topsides, after the removal of process and utility fluids, and the cleaning of equipment. Table 4.2 gives details on the inventory of materials for the MCP-01 concrete substructure.

4.1 Topsides Inventory

The inventory of materials for the MCP-01 topsides is shown in Table 4.1.

Material	Topside tonnages
Carbon steel	8,888
Stainless steel	1,056
Copper and Nickel/Copper	189
Other metals*	2,246
Concrete	24
Paint	29
Plastic	32
Batteries	7
Insulation, incl. architectural construction materials	581
Electrical and electrical equipment	136
Asbestos concrete	76
Mandolite spray (fire protection)	217
Total	**13,480**

* Aluminium and unspecified metals

Table 4.1 MCP-01 Topsides - Inventory of Materials

4.2 Concrete Substructure Inventory

The inventory of materials for the MCP-01 concrete substructure is shown in Table 4.2.

Material	Substructure tonnages
Concrete	137,000
Pre-stressed steel bars	2,600
Reinforcement steel	8,200
Ballast sand placed onshore during construction	47,000
Concrete ballast	2,200
Ballast sand placed offshore	173,000
Marine growth (estimated)	2,600
Steel items inside central shaft	400
Steel items inside the external wall	600
Steel items outside the external wall	100
Total Substructure weight	**373,700**

Table 4.2 MCP-01 Concrete Substructure - Inventory of Materials

4.3 Specific Issues

During the operational phase of the platform, many process vessels were cleaned and mothballed as they came out of use. A number of vessels were made cold when the platform was converted to normally-not-manned operational status in 1992. In preparation for final decommissioning further cleaning operations are ongoing, as described in Section 7.3 in the Disposal Plan. Specific checks are being made to verify the absence of any heavy metals. There is no indication of any Naturally Occurring Radioactive Materials (NORMS) in the process equipment. Further information on these procedures is included in Annex A on page 267 in this Decommissioning Programme.

A survey has been carried out by a qualified inspector to identify the asbestos on accessible parts on the platform [Ref. 4.2]. The materials identified, which contain asbestos, do not pose an immediate health risk except for one item which has since been removed. During the removal and disposal of the topside facilities, special warnings that materials may contain asbestos will be provided to the contractors involved. The asbestos register established for MCP-01 will be made available.

As MCP-01 has only been handling gas during its operational life, the occurrence of LSA scale is unlikely to be present. Measurements in the process system have confirmed this. However, if LSA scale is found, it will be brought to shore where suitable measures will be taken to dispose of it in accordance with appropriate procedures and legislation.

A significant number of fluorescent light tubes are present on board which will be brought onshore for destruction.

Halon fire extinguishing agents will be removed before or during the decommissioning work.

The lightning preventer contains the radioactive source Americium-241. It was removed in 2005 as part of the offshore works making the platform cold. The removal contractor submitted it to TOTAL E&P UK who ensured that it was safely disposed of in accordance with the responsibilities under the Radioactive Substance Act 1993 when disposing of radioactive materials (see also Section 7.4).

The Caesium-137 source used for level measurement of the halon cylinders was removed from MCP-01 in 2001. Disposal of the source was carried out via the QSA division of AEA Technology. Supporting documentation is available with TOTAL E&P UK.

No two-component paint systems have been identified as having been used on the platform which may generate isocyanates at high temperatures or paints containing PCB. However, special care will be taken during the recycling of painted steel components to prevent any hazard to health arising from possible generation of isocyanates.

As there have been no drilling activities from MCP-01, no drill cutting accumulations exist inside the external walls or on the seabed next to the platform.

Samples of marine growth around the platform have been analysed without detecting any traces of PCB [Ref. 4.3].

Section References

4.1 "Weight report for topside", Aker Kværner /Aker Offshore Partner, Doc. No. RE-MC-75-21-642232, rev. 2, dated 18.07.2003

4.2 "Asbestos Survey of MCP-01", RPS Consultants Ltd, ref. AM5512/4720/AF/HR, dated 10.07.2003

4.3 "MCP-01 Platform – Sediment and biota sampling, ROV pipeline inspection survey", ERT Scotland Ltd, dated September 2003

5. Overall Approach to Decommissioning

5.1 General

It is TOTAL E&P UK's primary objective to ensure that MCP-01 is decommissioned in a responsible and sustainable manner balancing safety, environment, technical feasibility, societal and economic factors. The base case for decommissioning is full removal of the facilities to land, provided it is feasible and safe.

As a concrete gravity base platform, the MCP-01 substructure is a possible candidate for derogation under the terms of OSPAR Decision 98/3. The Decision states that if there are significant reasons why complete removal is not feasible, alternative disposal methods for the concrete substructure might be considered.

Studies undertaken by TOTAL E&P NORGE in Norway for MCP-01's twin platform CDP1 at the Frigg Field, have, to some extent, been used as a reference point. However, as these two structures have different functions and histories, it has been important to address the specific challenges arising from the various disposal alternatives for MCP-01 on its own merits.

5.2 Legal Framework

As part of the original Frigg Transportation System for the Frigg Field, MCP-01 is covered by the Frigg Treaty (see also General Introduction). As such the decommissioning of the platform falls under the jurisdiction of both UK and Norwegian governments. The evaluations and comparative assessments detailed in this MCP-01 Decommissioning Programme are, therefore, undertaken in compliance with the UK Petroleum Act 1998 and the Norwegian Act of 29 November 1996 No.72 relating to petroleum activities, and the OSPAR Decision 98/3.

Frigg Treaty

In accordance with their interpretation of the terms of the Frigg Treaty revised in 1998, the UK and the Norwegian Authorities have agreed to have a joint approach to the decommissioning of MCP-01.

OSPAR

Both the UK and the Norwegian governments are signatories to the **1992 Convention for the Protection of the Marine Environment of the North-East Atlantic**, known as the OSPAR Convention. As such, both governments have committed to take all possible steps to prevent and eliminate pollution from offshore sources. This commitment was reiterated in 1998 in the Sintra Statement made by Ministers on the Disposal of Disused Offshore Installations.

At the same meeting in 1998, the Contracting Parties of the Convention for the Protection of the North East Atlantic (known as the OSPAR Convention) took a legally binding decision that provides the regulatory framework for decommissioning all offshore structures in the OSPAR maritime area, which includes the North Sea.

In respect of gravity based concrete structures, the Decision 98/3 states that "The dumping, and the leaving wholly or partly in place, of disused offshore installations within the maritime area is prohibited", but adds that "…if the competent authority of the Contracting Party concerned is satisfied that an assessment …shows that there are **significant reasons** why an alternative disposal …is preferable to reuse or recycling or final disposal on land, it may issue a permit for …a concrete installation…to be dumped or left wholly or partly in place …". The part of the concrete platform where such alternative disposal options may be assessed would be the concrete substructure; i.e. the load bearing structure supporting the topside facilities. The granting of such a permit may only take place after the submission of an appropriate comparative assessment to the national authority and after a designated consultation process with the signatories to the OSPAR Convention.

5.3 The Evaluation Process

The OSPAR Sintra Statement emphasises the *presumption of removal* for all redundant offshore facilities. This, therefore, forms the departure point for all the evaluation process for all the facilities on MCP-01.

For each of the component parts to be decommissioned, the following sequential process forms the basis for determining the best disposal arrangements according to the "waste hierarchy", which values reuse above recycling and disposal onshore above disposal at sea:

- Evaluation of the possibility of reusing all or parts of the offshore facilities either at the current location or at another site
- Evaluation of the possibility of recycling all, or parts, of the offshore facilities
- Evaluation of the possibility of disposal onshore
- Evaluation of the possibility of disposal at sea

An assessment of the possible reuse potential for the MCP-01 facilities at their current location is considered first, (see Section 6). Both oil and gas usage and non-oil and gas usage have been considered. In assessing the possible reuse potential of the facilities, the technical feasibility has been considered in the light of existing proven technology and the financial viability based upon current economics.

A general approach has been adopted which is that if reuse is not possible, either at the current location or at another site, then as much of the equipment and materials as practicable will be brought to shore and recycled. If recycling is not possible, then the material will be disposed of in a responsible manner. This principle has been extensively taken into account throughout the Environmental Impact Assessment where the energy requirements and discharges during the recycling processes have been included in the assessment.

In accordance with the UK and Norwegian regulations, and OSPAR Decision 98/3, full removal and onshore disposal has been the only disposal option considered for the **topsides.** For these elements, an evaluation of feasible methods for removal and onshore disposal has been undertaken. The cost and risks associated with this work have also been estimated.

In the case of the **concrete substructure**, the evaluation has involved a comparative assessment of the different disposal alternatives which takes into account technical, safety, environmental, commercial and societal considerations for each alternative.

The various alternative arrangements considered for MCP-01 are summarised in Table 5.1.

	Evaluation of Disposal Methods			
Topsides	**Alternative A** Removal and onshore disposal			
	Comparative Assessment of Disposal Alternatives			
Concrete Substructure	**Alternative A** Refloat, tow to shore, demolish and dispose onshore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place, removing as much external steelwork as reasonably practicable

Table 5.1 Evaluations and Comparative Assessments Conducted for the MCP-01 Facilities

The input from interested parties received during the ongoing public consultation process, as described in Section 10, forms an integral part of the development of an acceptable decommissioning solution for MCP-01.

The objective of the evaluations and comparative assessments process has been to identify the best disposal arrangements for the MCP-01 facilities that take due account of safety and working environment considerations, the environmental impact, commercial aspects as well as the stakeholders concern, and are in accordance with national and international legislation and conventions.

5.4 Principles for the Evaluations and Comparative Assessments

The approach for evaluating the disposal alternatives for MCP-01 facilities, and in particular as a basis for the comparative assessment for the concrete substructure, have addressed the following aspects:

- Technical Feasibility
- Risk to Personnel
- Environmental Impact (including impact on society)
- Cost
- Stakeholders concern

The recommended disposal alternative for each of the components on MCP-01 has been based upon consideration of all the aspects listed above and in the light of the feedback received so far from the public consultation process.

Technical Feasibility
The technical feasibility of a disposal arrangement has been judged based upon knowledge of existing equipment and practices, although in some instances, the possible extension of existing technology has been included, where this is reasonably foreseeable. In such situations, the implication of being unable to develop and test the necessary technology prior to use has been assessed. Leading independent experts in many different fields have been consulted to provide input to the studies and verify the conclusions. A major factor in assessing technical feasibility has been the level of uncertainty associated with the activities to be undertaken. This uncertainty particularly arises due to insufficient knowledge as to the exact structural condition of the concrete substructure and the behaviour of the structure under the load conditions arising during decommissioning activities. Again, specialist input has been obtained from independent experts in the relevant fields to allow verification of the results produced and the conclusions reached.

The technical feasibility of most operations has been assessed qualitatively based upon current technology and studies as well as the judgement of expert personnel. In the case of the concrete substructure, however, a quantitative analysis of the technical feasibility has been undertaken to allow more detailed consideration of the risks associated with the work. Independent experts from Norway, Germany and Switzerland, as well as TOTAL Group experts, have verified the quantitative assessment of technical feasibility.

Where quantitative analysis of the technical risks has been made, both the probability and the consequences of major accidents during the planned activities have been determined. The effect on personnel safety, the environment and project cost has been estimated, taking due account of both the original accident and any subsequent remedial work that would be required. The implication of these “worst case” scenarios has been an important factor in the decision making process.

Risk to Personnel
Both qualitative and quantitative assessments of the risks to personnel engaged in the removal and disposal operations have been carried out. Current practice has been a major factor in the qualitative assessments. Expert judgement and experience of many of the personnel who were engaged in the initial design, fabrication and installation of the facilities have also been taken into account. Practicable risk reducing measures, identified during the qualitative risk assessment, have been included into the planned activity arrangements.

Quantitative estimates of the risks to personnel have been made, based upon the number of man-hours involved for the various tasks and the risk for each task, estimated from both offshore and onshore construction or demolition experience. This method is regarded as the best available at the present time but has a tendency to **underestimate the risk to personnel** due to the fact that hazards which are specific to the actual work are not fully included. The degree of underestimation of risk is not possible to quantify, but experts in this field judge that in some situations the actual risk may be up to double the risk estimated solely on the basis of generic historical data.

In common with risk analysis practice, the risk to personnel has been expressed in terms of the predicted number of fatalities during the work, often referred to as Potential Loss of Life (PLL). The predicted number of major injuries during the work, often referred to as Potential Major Injuries or PMI, have also been estimated. Both values are determined based upon the anticipated decommissioning work and historical accident statistics.

> Potential Loss of Life (PLL) is the number of fatalities that are "likely" to occur whilst undertaking a defined amount of work.
>
> Similarly, Potential Major Injuries (PMI) is the number of major injuries that are "likely" to occur whilst undertaking a defined amount of work.

The physical significance of the parameters Potential Loss of Life and Potential Major Injuries is somewhat difficult to appreciate, particularly when expressing a fatality or injury level less than 1. Accordingly, the **probability** or "likelihood" of a fatality occurring during the work scope in question has also been calculated, and is expressed either in percentage terms, (such as a 13% chance of a fatality) or in terms of "odds" (such as a 1 in 7 chance of a fatality).

The Fatal Accident Rate (FAR) for a particular activity or set of activities is also presented. Fatal Accident Rate is a statistical parameter that expresses the "likely" number of fatalities that would occur during 100 million man-hours of the activity (or activities) in question. Fatal Accident Rates are commonly used to express the risk associated with particular activities such as construction work, scaffolding, helicopter flying etc. Fatal Accident Rates are also widely used as a way of comparing the risk of different types of activity. Fatal Accident Rates are also sometimes used to express the "average " risk for an operation which includes many different activities, of differing durations, each having different numbers of participants. When used in this way FAR values only give a general indication of the "average" risk. This can be helpful in making relative comparisons between different options, but is not appropriate to use as an absolute decision making criterion.

> Fatal Accident Rate (FAR) is the number of fatalities that are "likely" to occur whilst undertaking 100 million hours of a particular activity

Environmental Impact

The impact of the disposal operations on the environment and society has been estimated using generally accepted methods and principles. The Environmental Impact Assessment Report (EIA Report) has been carried out by DNV. A slightly edited version of their report forms part of this MCP-01 Decommissioning Programme.

The purpose of the Environmental Impact Assessment is to:

- Present information about possible impacts in a manner that can assist in the evaluation of the disposal alternatives.
- Clarify the consequences of the relevant disposal alternatives for the MCP-01 facility that may have a significant impact on the environment, natural resources and society.
- Present proposals for mitigating any damage and nuisance caused by the chosen disposal alternatives.

The parameters studied in the Environmental Impact Assessment fall generally into two main categories as listed below.

Environmental Impacts
- Energy consumption
- Releases (emissions) to atmosphere
- Releases (discharges) to sea, water, or ground
- Physical impact on the environment (includes marine noise)
- Aesthetic impact: noise, odour, visual effects
- Waste/resources management
- Littering
- Risk to the environment from unplanned events

Social / Community Impacts
- Fisheries
- Free passage at sea
- Costs and national supplies
- Employment effects

Some of these environmental impacts can be quantified, but where this has not been possible, qualitative assessments have been made based upon consideration of the potential scale of the effect and its value or sensitivity. Where qualitative judgements have been used, the impacts are presented using a series of categories ranging from “very large positive” impact through “insignificant/no” impact to “very large negative” impact. See also Section 3.2 in the EIA Report.

The overall environmental impact of a particular disposal alternative has been judged based upon the impact on the individual parameters listed above. The significance of both the overall and the individual impacts has been assessed from both the short term and long term perspective. The EIA Report has been peer reviewed by an independent expert, professor Cliff Johnston.

The positive experience from the EIA for the Frigg Field Cessation Plan has been a reference in establishing the EIA for MCP-01.

Cost
The estimated cost of the various disposal alternatives considered has been based upon studies performed by several different consultants in the UK, Norway and France, using appropriate current rates and norms. Independent consultants in the UK, Denmark and Norway have also been used to verify the estimated costs.

The costs presented for the different disposal alternatives are expressed in year 2004 money terms and represent a 50/50 estimate: i.e. a 50% chance of being correct reflecting the high uncertainties identified in the risk assessments.

Stakeholders Concern
TOTAL E&P UK is committed to conducting an extensive programme of consultation with both statutory consultees and other interested parties in the UK and in Norway (see Section10 and Annex A). The views and opinions expressed during various individual meetings are particularly important in trying to balance conflicting or alternative factors. Particular attention has been given to the safety and environmental implications. In the case of the concrete substructure, however, the uncertainties associated with the removal operations have resulted in technical feasibility being of particular importance. The views expressed by the stakeholders during the consultation process will be reported in the annexes to this report (see Annex A, B and D).

Overall Evaluation
The recommended disposal arrangements for MCP-01 have been arrived at following consideration of both short term and long term conditions. The recommendations are based upon judgements involving working environment, safety, environmental, technical and financial aspects, made on the basis of the best available information, and feedback from public consultation.

5.5 Risk Acceptance Principles

The general principles of risk management used within the TOTAL Group, and industry as a whole, apply equally during decommissioning and disposal activities as during field development and production operations.

The following risk acceptance criteria have therefore been considered when assessing the various disposal alternatives. For a definition of the various terms used see Section 5.4.

Technical Risk

The technical feasibility associated with an operation, or series of activities, may be expressed as the likelihood of being unable to complete the work as planned. There may be many reasons why it is impossible to complete the operation, including uncertainties in the original conditions, inappropriate or inadequate methods, or accidents due to failure of materials or equipment or due to human error. The risk of being unable to complete an operation or activity as planned is referred to as "**technical risk".**

The consequences of being unable to complete an operation, or activity, as planned are normally expressed in terms of financial loss. The financial loss may result from delay, additional works, repairs and remedial works or replacement of facilities or equipment. For any operation there will normally be a number of possible consequences of differing seriousness, each with their own probability of occurrence. The acceptability of a technical risk is therefore based upon the acceptability of the estimated financial loss and other associated factors.

Criteria have been used within the TOTAL Group for a number of years to limit the risk of financial loss arising from differing levels of damage to offshore platforms. These risk acceptance criteria have been adopted as the basis for determining the acceptability of technical risk during the decommissioning of MCP-01.

Based upon these criteria, the maximum acceptable probability of a major accident occurring during the decommissioning operations (with the associated large financial loss) has been set as 1×10^{-3} (1 in 1000 or 0.1%).

This figure is in-line with the guidance contained in Part 1 of the "Rules for Planning and Execution of Marine Operations" published by Det Norske Veritas in January 1996 [Ref. 5.1]. In these rules DNV state that it was not possible to set a definitive acceptable risk level for marine operations at that time, due to the scarcity of data. DNV further state that they will seek further data and that **"A probability of total loss equal to or better than 1/1000 per operation will then be aimed at."** These same rules indicate that during marine operations a probability of **structural** failure ten times less than this (that is 1 in 10,000 or 0.01%) should be aimed at.

In the 1970s when MCP-01 was constructed and installed, quantitative risk analysis was not in general use and the necessary computational methods and tools were not available to allow a full quantitative assessment of the risks during the installation process. It is therefore not possible to directly compare the risks during the decommissioning phase with those experienced during installation.

If TOTAL E&P UK were to install a new platform at the present time the probability of a major accident during the installation operations would need to be less than 1 in 1000, as indicated in the DNV Rules referenced above. In addition, the probability of structural failure during the installation operations would need to be less than 1 in 10,000 also as indicated in the DNV Rules. In actual fact, risk levels considerably lower than these values would be sought in accordance with the general risk acceptance principles in the TOTAL Group.

Personnel Risk
The risk of fatality for any individual shall not be greater than **1 x 10^{-3} per year** (1 in 1000) and **shall be as low as reasonably practicable.** This criterion is in accordance with generally accepted principles applied throughout industry, supported by the UK Health and Safety Executive [Ref. 5.2 and 5.3], and is the individual risk limit stated in the TOTAL E&P UK's management procedures (see Section 12.2). The risk of 1 in 1000 is the highest risk that is permissible for an individual and, in practice, a personnel risk level considerably lower than this is sought for all operations in accordance with the principle that risks should be as low as reasonably practical.

The average yearly risk of fatality for any person may be expressed in an alternative form as a Fatal Accident Rate (FAR) as described in Section 5.4. The FAR is calculated from the average yearly risk based upon the number of manhours worked by an individual in a year. For a "normal" offshore worker on the UKCS who spends approximately 4300 hours a year offshore, an average yearly risk of fatality of 1 in 1000 is equivalent to a yearly average FAR value of 22.9. This is **the highest risk to an individual that can be tolerated and a risk considerably less than this must be sought.**

Potential Loss of Life (PLL), see also Section 5.4, is a measure of the probability of a fatality "likely" to occur whilst undertaking a defined amount of work. In most practical instances this will be less than one and thus, it is often expressed in an alternative form as the probability of a fatality occurring. In this document both the estimated statistical fatalities, and the probability of a fatality, are reported. Whether an estimated PLL is acceptable or not has to be judged on a case-by-case basis, depending upon the size of the project and the specific tasks involved. PLL is particularly useful in comparing the relative risk of a fatality for different project options.

Environmental Impact
The method used for assessing non-quantifiable environmental impacts is described below based upon the method of categorisation shown in Figure 5.1. The method was developed by DNV and ASPLAN and further details are given in Section 3.2. of the EIA Report in this MCP-01 Decommissioning Programme.

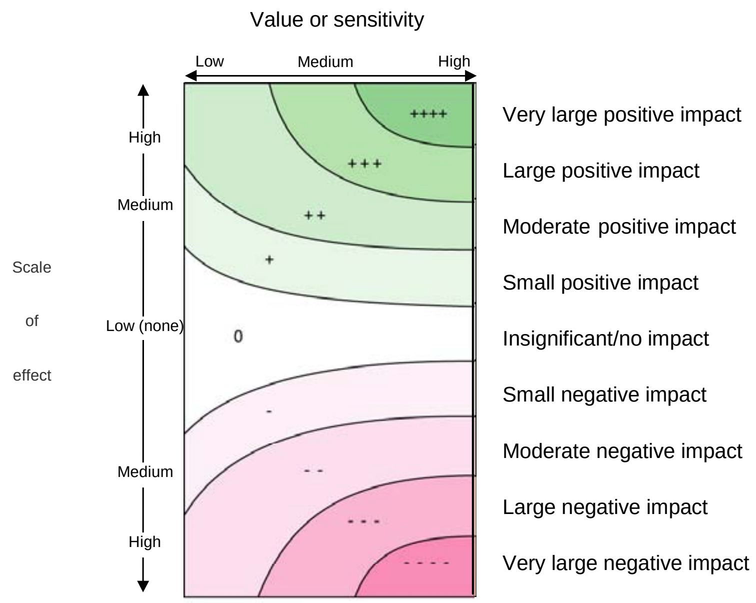

Figure 5.1 Methodology for Assessment of Non-Quantifiable Impacts.

The assessment distinguishes the important impacts from those that are less important. This is done by considering the effect of an impact in the area in which it is occurring ("value" or "sensitivity"), combined with the scope of the effect, to arrive at the total impact. By using this method the same magnitude of effect may then give different impacts depending on the value or sensitivity of the impacted environmental component. Additionally, the same type of effect will give a different impact depending on the sensitivity of the recipient/environment. This is considered by DNV to be a sound basis for assessing and presenting the impacts.

The terms used to express the findings of the assessment of the non-quantifiable impacts are marked with quotation marks, e.g. "small negative" when used in this Decommissioning Programme.

Section References

5.1 "Rules for Planning and Execution of Marine Operations", Det Norske Veritas, January 1996.

5.2 "The Tolerability of Risk from Nuclear Power Stations", UK Health and Safety Executive Report, ISBN 0 11 886368 1, Dated 1988, Revised 1992.

5.3 "Reducing Risks, Protecting People", UK Health and Safety Executive Report, ISBN 0 7176 21510, Dated 2001.

6. Assessment of Reuse Potential

6.1 Possible Oil and Gas Reuse in Place

Extensive studies during the past years addressing technical and safety aspects of MCP-01 concluded that the overall best option was to initiate plans for decommissioning the platform (see also Section 2.4). Its function as a pipeline export centre will therefore cease when the pipelines systems have been rerouted in 2004 and 2005 as described in Section 2.5.

Reuse as a Treatment Centre for Adjacent Fields

At present there are no known reservoirs in the vicinity that can be economically developed from MCP-01. In addition, the prospect for new developments in the area is limited.

Possible reuse as a treatment centre for adjacent fields would require completely new topside facilities. The fact that MCP-01 has never been used as a drilling or treatment platform also limits the reuse options. Its sole function during the past 27 years has been to facilitate gas transport through the two 32" pipelines to the St Fergus Gas Terminal.

It is therefore concluded that a reuse of MCP-01 for oil and gas activities at its current location is neither likely nor economically viable.

6.2 Possible Non Oil and Gas Reuse in Place

No specific studies have been initiated as part of the decommissioning studies for MCP-01 as they would duplicate the extensive studies carried out for the three Frigg Field concrete substructures [Ref. 6.1]. In this section the main conclusion from these studies are summarised since they are valid for MCP-01.

The following non oil and gas reuse alternatives were specifically evaluated:

- Artificial Reefs
- Wind-generators
- Emission-Free Gas Fired Power Plants

Artificial Reef

The establishment of an artificial reef utilising a concrete substructure is not considered to be a favourable option. This is mainly due to the fact that large concrete surfaces do not offer a hiding place for the fish in the same way as a steel substructure would. It is concluded that the use of the MCP-01 substructure as artificial reefs is not a desirable reuse alternative.

Wind-generator

Studies performed for the Frigg Field using the concrete substructures as a foundation for wind-generators, has shown that it is technically feasible to supply power from wind-generators to a nearby platform via subsea cables. However, the economic viability of offshore electricity generation based on wind-power systems depends upon its cost relative to electricity generation based on the combustion of hydrocarbons. The price of electricity generated by offshore wind power systems has been estimated to be considerably higher than the cost of electricity generated from hydrocarbons.

It is therefore judged that electricity generated offshore from one wind-generator placed on MCP-01 would not be competitive in the energy market, even if the cost of production could be significantly reduced. The cost uncertainties associated with the conversion and maintenance of the aging MCP-01 facilities and its logistical support, also mitigate strongly against using MCP-01 as support for one wind-generator.

It should also be noted that any potential consumer of wind generated electrical power would need to install and maintain a back-up source of power for times when there is insufficient wind to meet the required power demand.

The reuse of MCP-01 as a foundation for an offshore wind-generator is therefore judged not to be viable at the present time.

Emission-Free Gas-Power Plant
The installation of an emission-free gas-fired power plant on MCP-01 has been assessed based upon the studies performed for the Frigg Field Cessation Plan. Here it is assumed that the electricity generated would be exported to other platforms in the area by subsea cable. The gas (CO_2/Nitrogen) from the power generation process would be exported, via pipelines, to fields in the area for use in reservoir pressure support and enhanced oil recovery.

Although the reuse of a concrete platform as an electrical power plant is considered to be technically feasible in principle, it has been concluded that such an option should not be pursued further, due to the following reasons:-

- There are a number of technical uncertainties surrounding the concept as it is still only at the pilot-scheme stage. The estimated capital cost of such a project therefore has to reflect this level of technical uncertainty.
- Although the cost figures are still somewhat uncertain it seems likely that there would not be a market for the electricity and gas at the price necessary to ensure commercial viability. This conclusion is valid even ignoring the cost of additional back-up power supplies that may be required by the electricity consumer. There will also be a significant financial risk associated with the continuing maintenance and logistical support of the aging structures.
- Although the concept is emission-free, large quantities of high-temperature cooling water would be discharged into the sea. There is no practical possibility of recovering and using this energy and thus the energy balance for such a scheme is not environmentally attractive.

The reuse of MCP-01 as an emission free gas power plant is therefore judged not viable at present.

6.3 Reuse MCP-01 Facilities at Another Location

Reuse of Concrete Substructure
A general assessment of the potential reuse opportunities has been carried out and possible scenarios established. One option, that could provide added value to society, is to use the concrete substructure as bridge foundations for fjord crossings. Such a use has the potential to provide cost savings on the bridge construction cost. The concrete substructure could also be incorporated into some form of quay foundation or be used as landfill for industrial purposes.

The feasibility of such schemes does, however, depend entirely upon the ability to safely re-float the substructure, which was not designed specifically for removal at a future date. The studies reported in detail in Section 8 indicate that for the concrete substructure the risk of a major accident or incident occurring during an attempted refloating operation is high. There would also be risks associated with towing to a new location and installation which are not possible to quantify at present.

Reuse of Parts of the Topsides
In the absence of any reuse potential for the topsides as a whole, the possibility of using parts of the facilities has been considered. The original equipment on MCP-01 was constructed and installed in the mid 1970s. The possibility of being able to reuse the twenty eight year old equipment is not considered to be very high.

6.4 Conclusion

A number of potential reuses have been assessed, either at its current location or at a different location. However, none of the arrangements for the reuse of the MCP-01 facilities at its current location are judged to be economically viable at the present moment. There are also a number of technical uncertainties associated with many of the possible reuses.

The feasibility of reuse at a different location does depend entirely upon the ability to safely re-float the concrete substructure.

There are limited possibilities for the reuse of parts of the topside equipment. The age of the equipment, and the uncertainties associated with their ongoing maintenance and logistical support, reduce their reuse potential. However TOTAL E&P UK will continue to pursue any reuse opportunities.

None of the owners see any further use for the MCP-01 facilities.

Section References

6.1 "Frigg Field Cessation Plan", TOTAL E&P NORGE AS, dated 9 May 2003.

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7. MCP-01 Topside Facilities

7.1 Introduction

In accordance with the UK and Norwegian legislation and OSPAR Decision 98/3, the topsides facilities will be removed and brought to shore where the equipment and materials will be reused or recycled as far as practicable.

Alternative disposal arrangements have not been considered for the topsides as full removal and onshore disposal is considered to be technically feasible. Thus the evaluation of the topside disposal arrangements is limited to a description of the proposed method and an estimation of the risk to personnel, environmental impact and cost.

It is considered necessary to remove the topside facilities even if a reuse of the platform is identified. Most of the facilities have been out of service since 1989 when the compression of the gas was no longer required and the platform was modified to a normally-not-manned mode operated from the St Fergus Gas Terminal.

Removal of the topsides will also be required before a removal operation of the concrete substructure could be attempted. In that event it would be necessary to remove as much topsides as possible to provide sufficient buoyancy to refloat the substructure.

The modules on MCP-01 are supported by a series of concrete deck beams that are an integral part of the concrete substructure. The disposal of these concrete deck beams has therefore been considered in the assessment for the concrete substructure as detailed in Section 8. This section therefore, only deals with the removal of the topsides modules, steel deck beams and steel deck plating [Ref. 7.1, 7.2].

It is planned to remove the topside modules and the steel deck components in a systematic manner which will ensure the integrity of the topsides at all times, see Figure 7.1.

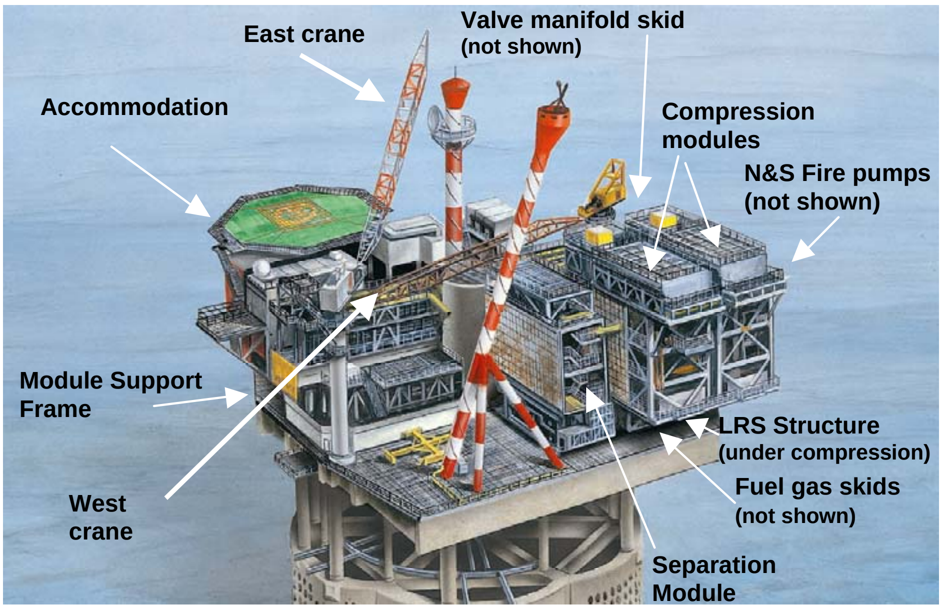


Figure 7.1 Drawing of the MCP-01 Topsides

7.2 Integration with Frigg Cessation Project

The offshore removal and onshore disposal of the topside facilities on MCP-01 will be integrated into the Frigg Cessation Project, operated by TOTAL E&P NORGE, using the same contractor Aker Kværner Offshore Partner. The contract was awarded in October 2004 after an international tendering and provide for engineering, preparation, offshore removal and onshore disposal. The scope of work for the Frigg Cessation Project includes removal and onshore disposal of five topsides and three steel substructures.

Significant synergy effects are expected from such collaboration. The technical and safety challenges are very much the same. It is particularly the removal of topsides from MCP-01 and its sister platform CDP1 on Frigg where the detailed engineering and the offshore works are comparable. They are both located in UK waters and require similar Abandonment Safety Cases to be submitted to the Health and Safety Executive (HSE).

This collaboration also meets the expectations from the OSPAR Ministerial meeting at Sintra in July 1998 where the Contracting Parties agreed to: "promote collaboration between operators of offshore installations in joint operations to decommission such installations".

As a consequence of this cross-border project a common management has been established for the execution of these two removal projects, reporting to the Managing Directors of TOTAL E&P UK and TOTAL E&P NORGE. See Section 12 for a description of the Project Management System for the decommissioning of MCP-01.

Figure 7.2 shows the west side of the topside facilities on MCP-01.

Figure 7.2 View of the MCP-01 Topsides from the sea

7.3 Offshore Removal of Topside Facilities

7.3.1 Making the Facilities Ready for Removal

Prior to starting removal operations of the topside facilities, the materials inventory will be verified and hazard assessments carried out to ensure that there are no adverse effects on the health and safety of personnel, or the environment, arising from the planned activities. Hazardous equipment and materials would be identified and either made safe or removed. Process equipment and pipe works will be cleaned by flushing and made inert, in accordance with the TOTAL E&P UK specification which complies with UK national codes and standards.

The current inspection and maintenance personnel dedicated to this “normally-not-manned” platform will execute this work. For specific tasks this team, who are well acquainted with present condition on the platform, will have the necessary support from external contractors. The plan is to perform the required work in a number of campaigns during 2004 and until July 2005. The platform will then be kept in a “cold” phase until the removal contractor starts the removal works in August 2006.

The offshore work will be organised and executed within the present approved operational safety case for MCP-01.

Figure 7.3 Construction activities on MCP-01 during 1976/1977

Figure 7.4 Lifting a module on MCP-1

7.3.2 Offshore Removal

It is planned to remove approximately half of the topside weight using a heavy lift crane barge (Saipem 7000) which will also bring the parts to shore at a deep water quay at Aker Kværner yard at Stord.

The remaining facilities will be removed by a "piece small" approach using the platform cranes in which one (currently out of service) is replaced by a new one from Frigg and the other is up-rated to a higher lifting capacity. In addition two large and one small excavators equipped with special scissors for cutting will work from a temporary deck which will be skidded around the main deck as the works proceeds. Some structures and equipment will be cut by mechanical, flame or abrasive cutting techniques. Others will be cut using the excavators.

The stairs leading down to the top of the breakwater wall as shown on Figure 7.5 will be removed. They represent the only access to the topsides from the sea. Handrails on breakwater elevation will be removed. For safety reasons the gratings at the breakwater level will remain in place to facilitate rescue from the moon-pool should that be necessary. Various caissons and the 18" Talisman riser from the topsides will also be removed approximately down to top of the breakwater wall. See Section 8.6.1 regarding the removal of the riser and support frame attached to the external concrete wall.

The steel rails on top of the radial walls inside the breakwater wall used to support the diving module to facilitate diving inside the breakwater wall will remain. It is also planned to leave the steel works in place inside the central shaft with the shaft filled with water. No storage of hydrocarbons or chemicals exists in this area of the platform.

Having reached a suitable size in the "piece small" cutting approach, the parts will be assembled into containers and lifted on to supply boats for transportation to the onshore disposal site at Greenhead Base next to Lerwick in Shetland.

Figure 7.5 Steel works on top of breakwater wall

A flotel will also be required during offshore work for accommodation of personnel as well as supplying the platform with firewater, potable water, electricity, diesel and pressurised air etc. Figure 7.6 illustrates the different means planned for the offshore removal of the MCP-01 topside facilities.

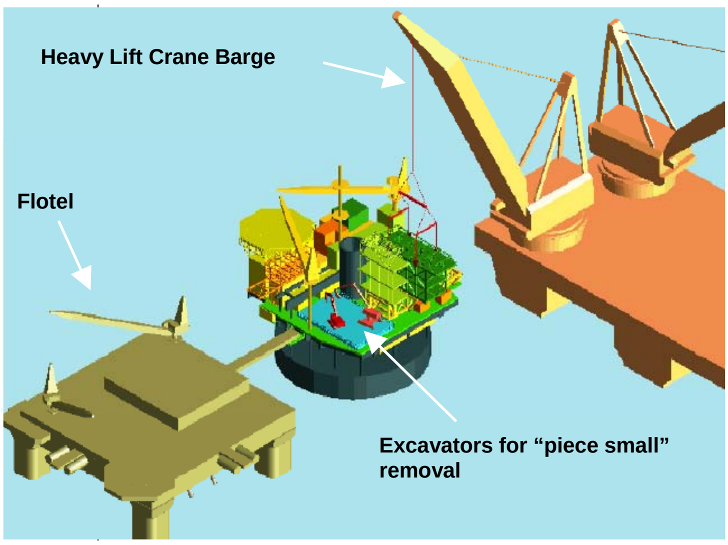


Figure 7.6 Means planned for removal of MCP-01 Topside Facilities

The same heavy lift barge will return to MCP-01 to make the final lifts required to complete the offshore removal works. During this campaign it is planned to install the aid to navigation (see also Section 14.3) on a concrete cover on top of the central shaft.

The UK Hydrographic Office will receive information at least six weeks in advance of the offshore activities planned in 2006, 2008 and 2009 (see Section 11).

An Abandonment Safety Case will be prepared for the removal of the MCP-01 topside facilities and submitted to the HSE at least six months before the planned start of works.

7.4 Onshore Disposal of Topside Facilities

All the components will be transported back to shore for reuse, recycling or disposal to the greatest extent practicable. No facilities will however be removed, transported, or disposed of without the necessary approvals being obtained from the relevant national and international regulatory authorities. Import duties will be paid as appropriate.

Materials arriving ashore during the works in making the platform cold and ready for the removal contractor, will be handled for disposal under the present contract TOTAL E&P UK have with Total Waste Management Alliance plc, in Aberdeen; e.g. accessible items like oils, fluids, electrical fittings, domestic equipment etc. The removal of the lightning preventer in 2005 containing the radioactive source Americium-241 was given special attention. TOTAL E&P UK ensured its safe disposal in accordance with the responsibilities under the Radioactive Substances Act 1993 when disposing of radioactive materials. Specific arrangements are being made for some items that have been identified for reuse or consumption by others (e.g. the fire training schools in the Aberdeen area are taking the surplus / redundant fire fighting foams etc).

The removal contractor Aker Kværner Offshore Partner AS will have arrangements for environmental licenses in place with disposal yards at the Greenhead Base in Shetland and at their own disposal yard at Stord in Norway. TOTAL E&P NORGE has in place audit programmes to verify the capabilities of these locations prior to the start of the activity.

Any movements of materials or waste for the purpose of recovery or disposal to a State other than the UK, will be carried out in compliance with the Transfrontier Shipment of Waste Regulations 1994 (TFSW 1994). In such cases prior notification will be given to the Competent Authority in the UK and in the destination state. Approvals from those Competent Authorities shall be received before commencement of the decommissioning activities.

7.5 Consequences

Technical Feasibility

The methodology chosen by Aker Kværner Offshore Partner for the offshore removal and onshore disposal of the topside facilities has been confirmed in a number of studies. They were one of five contracting joint ventures who where commissioned to confirm their methodology in Front End Engineering Design (FEED) studies prior to entering into the formal tendering phase for this work.

Risk to Personnel

The risk to personnel undertaking the removal and disposal of MCP-01 topsides was initially estimated based upon the anticipated work tasks and relevant historical accident rates [Ref. 7.3]. The results of this analysis are shown in Table 7.1, expressed in statistical terms. Some risk figures have been revised after the award of contract for the topside removal, as explained below. A definition of the terms used in this table is given in Section 5.4.

Potential Loss of Life (Predicted number of fatalities)	0.12, revised to 0.04
Probability of a Fatality	11%, revised to 4%
Fatal Accident Rate (averaged across all workers)	9, revised to 7
Potential Major Injuries (Predicted number of major injuries)	6.7
Probability of a Major Injury	>90%

Table 7.1 Estimated Risk of Fatality or Major Injury during the Removal and Onshore Disposal of MCP-01 Topsides

Based upon the initial estimate of manhours and tasks [Ref. 7.1], the average Fatal Accident Rate (FAR) for personnel engaged in the removal and disposal of the topsides of MCP-01 was estimated to be of the order of 9 (averaged over the entire work force). This may be compared with the maximum tolerable FAR value of 22.9, as detailed in Section 5.5.

Recent analysis based upon more detailed manhours and tasks estimated by Aker Kværner Offshore Partner has now been undertaken. This indicates that the probability of a fatality during the work is approximately 4% (rather than 11%) and the equivalent average FAR value for workers removing and disposing the MCP-01 topsides is approximately 7 (rather than 9). Further risk evaluations will be presented in the Abandonment Safety Case due to be submitted to the UK HSE at least six months prior to start of offshore work.

Environmental Impact

The environmental impact of removing the topsides of MCP-01 may be found in the Environmental Impact Assessment for the decommissioning of MCP-01. A summary of the findings is given in Table 7.2.

The EIA Report in this Decommissioning Programme was established well in advance of the contract award for the topside removal and before the final destination for onshore disposal was known. However, the conclusions made in the EIA Report on the impact of removing the MCP-01 topside facilities have not changed.

Issue	Environmental Impact
Energy Consumption (Million GJ)	0.4 - “Small negative”
Total Energy Impact (Million GJ)	0.4 - “Small negative”
Total emissions (1000 tons)	34
Discharges to sea	“Insignificant”
Physical / habitat effects	“Insignificant”
Aesthetic	“Small - Moderate negative”
Material management	“Moderate positive”
Littering	“Insignificant”
Impacts on fisheries	“Insignificant”
Impacts on free passage	“Insignificant”

Table 7.2 Environmental Impact of Removal and Onshore Disposal of the MCP-01 Topsides

Costs
The cost of engineering, preparation, offshore removal, transportation and onshore disposal of the MCP-01 topsides has been estimated to about £70m / 840 MNOK (in 2004-value, £1 = 12.0 MNOK).

7.6 New Technology related to Topsides Removal

TOTAL E&P UK through its ownership in the Frigg Field (39.18%) is supporting the development research into safer and more cost effective decommissioning.

Through the high ownership percentage of the Frigg Field, TOTAL E&P UK has been involved in a number of Joint Industry Projects (JIP) in recent years addressing both the technical and safety aspects of offshore removal operations. Those, which are particularly relevant to the topsides removal of MCP-01, are:

- DNV Recommended Practice DNV-RP-H102 for “Marine Operations during Removal of Offshore Installations”, dated April 2004
- “Quantitative Risk Analysis of Decommissioning Activities”, with the objective of providing an authoritative reference document containing the most up to date information relating to quantification of risk to personnel during decommissioning and removal operations of offshore installations
- New technology for Removal of Offshore Structures – Single Lift concepts

In addition there are a number of other JIPs that TOTAL E&P UK have supported as part of its commitment to contribute to research and development in the field of decommissioning, as described below:

- Studies in detail of Jacket Removal
- UKOOA Drill Cuttings Initiative
- Number of underwater cutting studies

7.7 Summary – Topsides Facilities

The feasibility of removing the topside facilities and their subsequent disposal onshore has been confirmed by extensive studies performed by the contractor Aker Kværner Offshore Partner who has been appointed to carry out the decommissioning of the MCP-01 topsides. Independent analysis based upon the manhours and tasks estimated by the removal contractor indicates that the probability of a fatality during the work is approximately 4% and the equivalent average Fatal Accident Rate for workers removing and disposing the MCP-01 topsides is approximately 7. Further risk evaluations will be presented in the Abandonment Safety Case due to be submitted to the UK HSE at least six months prior to start of offshore work.

The impact on the environment of removing the topsides is generally low. The “small negative” or “moderate negative” impacts arising from the energy usage, emissions and aesthetic effects during the removal and onshore disposal are balanced by the “moderate positive” impact in respect to materials management arising from the reuse and recycling of materials.

The cost of offshore removal, transportation and onshore disposal of the MCP-01 topsides has been estimated to about £70m / 840 MNOK.

7.8 Recommended Disposal Arrangements for Topside Facilities

Following a thorough evaluation of the possible method for removal of the topside facilities, the following is recommended:

The topside facilities on MCP-01 should be removed and brought onshore for disposal. Once onshore, as much of the topsides equipment and materials as possible will be reused or recycled.

Section references

7.1 “MCP01 Topsides disposal study”, book 1, London Offshore Consultants (LOC), Doc. No. 14700-RP-001, dated 20.05.2003

7.2 “Feasibility study for the removal of the three heaviest modules with HLV “Stanislav Yudin”, Seaway Heavy Lifting Engineering B.V., Doc. No. 47.1154.GE-010, rev. C, dated 11.07.2003

7.3 “MCP01 – Platform disposal options safety evaluation”, SAFETEC, Doc. No. ST-20367-RA-1-Rev 01, dated September 2003

8. MCP-01 Concrete Substructure

8.1 Introduction

In accordance with UK and Norwegian regulations and OSPAR Decision 98/3, full removal of the concrete substructure of MCP-01 has been the first alternative considered.

At the time MCP-01 was designed and constructed, consideration for a future removal operation was not included in the design process. The mechanical systems used for controlling and positioning the concrete substructure were only designed for use during that phase, and were thus abandoned when the platform was in place.

Due to these facts and the complexity and uncertainties associated with full removal and onshore disposal of the concrete substructure, other decommissioning alternatives have also been considered as specifically provided for in Clause 3 and Annex 2 of OSPAR Decision 98/3.

8.2 Comparative Assessment of Disposal Alternatives

The main alternative disposal arrangements considered for the concrete substructure are summarised in Table 8.1 below:

Alternative A	Alternative B	Alternative C	Alternative D
Re-float, tow to shore, demolish and dispose on-shore	Remove external and internal steelwork, re-float and dispose at a deep water location	Remove internal and external steelwork and cut down sub-structure to provide a clear draught of 55m	Leave in place, removing as much external steelwork as reasonably practicable

Note:-The requirement for a clear water column of 55m above any parts of an installation left in place is taken from the International Maritime Organisation (IMO) document *"Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone"* adopted by the IMO Assembly in 1989.

Table 8.1 Main disposal alternatives considered for the MCP-01 Concrete Substructure.

Figure 8.1 illustrates how the evaluations and comparative assessments of the disposal alternatives for MCP-01 concrete substructure are reported in this Section 8. The technical feasibility of each alternative has been assessed in individual sections; see Section 8.3 to 8.6. The proposed method is included as part of the technical feasibility assessment. The risk to personnel, impact on the environment and the cost are described in individual sections covering all alternatives; see Section 8.7 to 8.9. The overview and recommended disposal arrangements are given in Section 8.13 and 8.14.

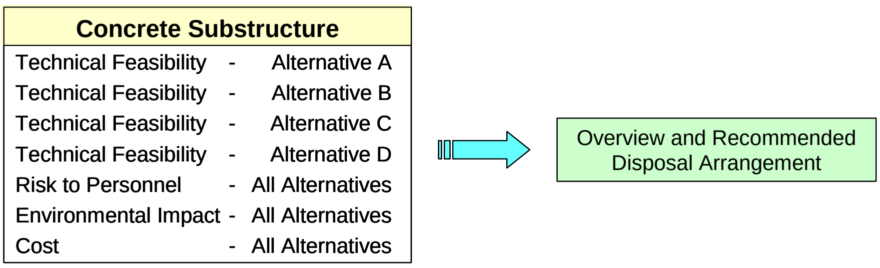
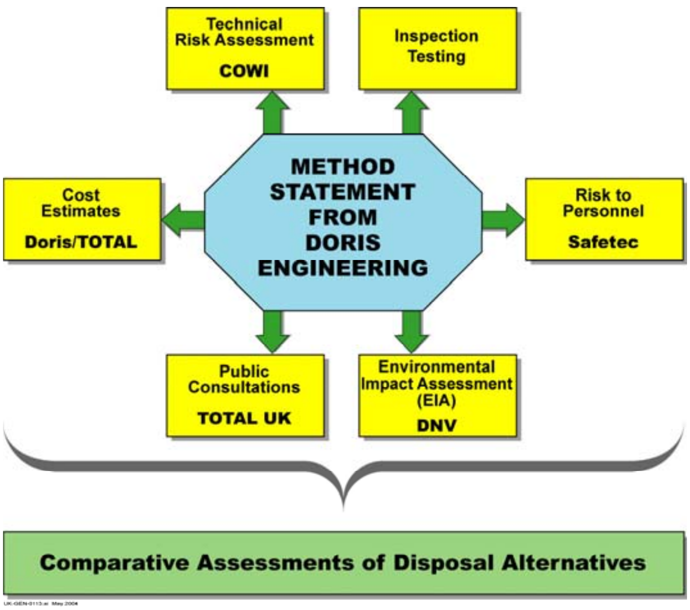


Figure 8.1 Evaluations and Comparative Assessment of Disposal Alternatives for MCP-01 Concrete Substructure.

Considerable effort has been given to the assessment process. Input has been sought from the engineering company Doris Engineering who was responsible for the original design of MCP-01. Independent consultants, academics from reputable institutions in a number of European countries, Det Norske Veritas and Total Group experts have been involved in the process.

Data input, which was used and validated in the previous studies for the Frigg CDP1 concrete substructure removal has not been subjected to any additional verification.

Figure 8.2 gives an overview of the various studies and verifications that have formed part of the overall assessment for the concrete substructure. The list of studies that have been undertaken can be found in Section 16 of this Disposal Plan.



Independent Verification
Technical Aspects/Risks:
- Det Norske Veritas
- SINTEF
- University of Munich
- Noble Denton
- Norwegian Geotechnical Institute

Environmental Impact Assessment
- Prof. Cliff Johnston

Figure 8.2 Assessment Process for Refloat and Onshore Disposal Alternative (Alternative A)

Development of Method Statement

Doris Engineering, the company involved in the original design and construction of MCP-01 in the 1970s, was engaged to conduct the initial engineering and feasibility studies for the disposal of the concrete substructure in 2003 [Ref. 8.1 to 8.15].

The main objective of the studies was to assess the feasibility of refloating the substructure. Different methods were considered and a recommended methodology was proposed by Doris Engineering based upon a number of engineering evaluations. The recommended methodology was described in the form of a general procedure or "method statement", which was reviewed to identify risks to personnel engaged in the disposal activities. The method statement was then modified as necessary, to reduce or eliminate unacceptable risks. Scandpower, working together with Doris Engineering, undertook the qualitative safety assessments using "SAFOP" (Safe Operation) techniques.

Whilst developing the method statements, new or innovative activities or operations that were beyond current experience were identified. The feasibility of these activities was assessed and the need for programmes to develop the necessary technology was highlighted.

In parallel, Doris Engineering assessed the feasibility of other disposal options (Alternatives B, C and D as defined earlier in this section) and prepared method statements for each, which described the proposed method of undertaking the work.

Studies undertaken for its sister platform CDP1 in the Frigg Field, operated by another affiliate in the TOTAL Group (TOTAL E&P NORGE), have to some extent been used as a reference point. However, as these two concrete substructures have different functions and histories, it has been important to address the specific challenges arising in the removal of MCP-01 on its own merits. Doris Engineering was at the very beginning instructed to consider MCP-01 concrete substructure as a new platform, but take on board the past experience from the previous extensive studies performed on the concrete substructures on the Frigg Field.

The method statements and engineering studies were reviewed and validated by a group of independent experts including representatives from SINTEF, Norwegian Geotechnical Institute, Noble Denton, Munich University and Det Norske Veritas [Ref. 8.16 to 8.21].

Technical Risk Assessment

The Danish consulting engineers COWI, then conducted a technical risk assessment [Ref. 8.22] based upon the method statements developed by Doris Engineering. The aim of this technical risk assessment was to estimate, in quantitative terms, the risk of being unable to complete the removal and disposal work as planned, in other words, the feasibility of the alternative disposal methods. Experts from Norway, UK, Germany, Switzerland and France were used to provide specialist input to this technical risk analysis.

Inspection and Testing

Offshore inspections were carried out during 2002 to determine the condition of certain key mechanical systems and structural elements. The results from this inspection and testing provided additional input and validation to the technical risk assessment.

Risk to Personnel

In addition to the qualitative safety assessments carried out during the development of the method statements, Safetec conducted a numerical assessment of the risk to personnel [Ref. 8.27]. The probability of death or serious injury occurring during the removal and onshore disposal operations, was estimated based upon the planned activities and historical accident data for similar offshore and onshore activities. The safety of personnel involved in all the disposal alternatives was assessed.

Environmental Impact Assessment

The impact on the environment and society of the total removal option and other disposal alternatives were assessed by Det Norske Veritas, in Aberdeen and Stavanger, using well established principles and methods. Their report forms the Environmental Impact Assessment in this MCP-01 Decommissioning Programme.

Cost Estimates

The cost estimates associated with each disposal alternative were estimated based upon the proposed disposal methods. Possible increases in the cost of the works were also estimated based upon the technical uncertainties associated with the disposal alternatives.

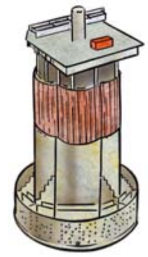
Public Consultation

Input from the stakeholder dialogue process conducted by TOTAL E&P UK (see Section 10) has been particularly useful when assessing the sometimes conflicting requirements of safety, environmental protection, technical feasibility and cost.

The studies and assessments detailed in this section have been structured to allow demonstration of compliance with the relevant legislation of the UK and Norway.

8.3 Technical Assessment of Alternative A - Refloat the concrete substructure and onshore disposal

8.3.1. Proposed Method



Before beginning the platform decommissioning the pipelines which were originally connected to the platform would be diverted as described in Section 2.5. The topside modules and steel components would then be removed as described in Section 7. The redundant sections of pipeline connected to the platform after the diversion of the operational pipelines would be cut and the ends of the risers capped. A water de-ballasting system, to be used in refloating the platform, would then be installed in the central shaft. The towing points on the substructure would be inspected and reinstated to a satisfactory condition if necessary. Marine growth in specific areas would be removed, particularly in the area where the steel cofferdams will be installed to seal the holes in the external wall.

Debris on top of the solid ballast between the central shaft and the external wall would be removed by ROVs or, if necessary, by divers.

Up to half of the solid ballast (sand and gravel) would then be removed during the summer season before the planned refloat operation. A suction dredging system would be installed on the concrete deck beams. The non-contaminated sand and gravel ballast would be deposited on the seabed a short distance away from the platform. The gravel around the base of the substructure would be removed using a hopper dredger and debris inside the foundation raft would be removed by ROVs or divers.

The remaining solid ballast would be removed at the beginning of the following summer season using the air operated dredging system and also deposited on the seabed in close proximity to the platform.

The wave-breaking holes in the outer wall would be sealed by installing six prefabricated steel cofferdams on the external face of the wall. After the installation of these steel cofferdams a test would be undertaken to check the water tightness of the substructure. This would involve limited water deballasting of the structure prior to the main deballasting and removal operation.

If the water-tightness test proves satisfactory, the substructure would then be de-ballasted by pumping out water from inside the external wall. There are no “skirts” penetrating into the soil and no cement grout between the base slab and the soil. Geotechnical studies indicate that there is likely to be limited “suction” between the substructure and the soil, although there is a possibility that the forces necessary to lift the structure could exceed its buoyancy weight.

Following the “lift off” of the substructure from the seabed, it would continue to be de-ballasted until it reached a draught suitable for towing. During the refloat and towing operations the platform would be unmanned. Operation of the de-ballasting systems, while the platform is unmanned, would be by remote control from an adjacent boat.

After the substructure had reached a suitable draught it would be towed to a sheltered inshore mooring.

Any remaining sections of the topsides steel structure, which were not removed offshore along with the steelwork in the central shaft, could then be removed first using a floating crane. The concrete deck beams and columns, and a part of the central shaft, would then be cut into pieces using diamond sawing techniques and also removed, using the floating crane. Most of the steel cofferdam would then be lifted off and the outer concrete wall cut into pieces and taken ashore for disposal. Demolition of the concrete shaft, outer walls and radial walls would continue until most of the walls had been removed. During this phase of the work the remaining solid ballast would be broken out and removed. Another cofferdam would then have to be installed around the wall on the edge of the foundation slab to provide buoyancy during the later stages of demolition. The bottom section of the substructure would then be towed into a dry dock where it could be demolished.

All the sections of reinforced/prestressed concrete cut from the substructure would be crushed onshore to allow recovery of the steel and concrete. The steel would then be sent for re-smelting whilst it is anticipated that the crushed concrete would be reused or disposed of in landfill.

Debris on the seabed at the original platform location would be cleared using remotely operated vehicles or divers.

8.3.2. Technical Feasibility

During the design of the MCP-01 concrete substructure, no consideration was given to its removal at a later date. Accordingly the ability of the structure to resist the loads during a refloat operation was not checked and no specific features were incorporated into the design to facilitate removal.

In assessing the technical feasibility of refloating the MCP-01 concrete substructure, a number of aspects have been identified that would be critical to the success of the operation. The most important aspects, which have the potential to cause the refloat operation to be aborted, are shown in diagrammatic form in Figure 8.3 and are explained further in the following text. For ease of reference the same headings are used in the text as shown in Figure 8.3.

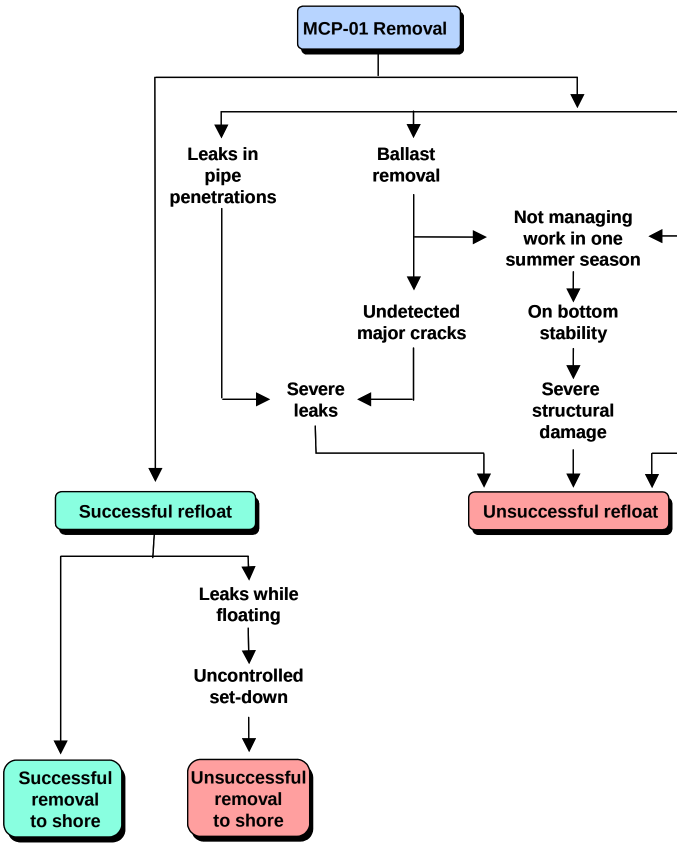


Figure 8.3 Areas of Uncertainty Affecting the Success of the Refloat and Towing of MCP-01

8.3.3. Uncertainties During the Refloat Operations

Severe Leaks due to:-

- **Undetected major cracks**
- **Cofferdam Installation**
- **Leaks in Pipe Penetrations**

The feasibility of refloating the MCP-01 concrete substructure is dependent upon the water-tightness of the walls, the base slab and the cofferdam used to close the holes in the external wall. Reports produced during the construction phase suggest that the condition of the concrete substructure, when installed, was good. There is also no evidence to indicate that there were any major leaks whilst the platform was floated into position and floated down into position onto the sea bed. The platform has, however, been in location since 1976 and during its 28 years of operation has been subject to severe storm loading. The overall integrity of the concrete substructure is not in doubt, as this is checked by periodic subsea inspections. However, there is a possibility that cracking of the concrete may have occurred, particularly in the area of the base slab, as a result of the loads incurred during the platform's operational life. The probability of severe cracking in the base slab is not considered high but it is not possible to verify that there is no significant cracking in the base slab until the majority of the ballast has been removed and the steel cofferdams have been installed to seal the holes in the external wall.

There are 1282 large holes in the external wall of the concrete substructure which were provided to reduce the wave forces on the platform. Approximately 1000 of these holes are below mean sea level and would need to be effectively sealed before it is possible to attempt to refloat the substructure. Alternative methods of sealing the holes to allow refloat have been evaluated by Doris Engineering and it has been determined that providing individual seals for each hole would not be practicable. The most effective arrangement for sealing the holes is considered to be **six steel cofferdams,** one of which would be installed on the outer face of each of the six lobes of the external wall; as illustrated in Figure 8.4.

These large steel cofferdams would each weigh in the order of 250 tonnes and measure approximately 30m by 30m. Although using a cofferdam is considered better than trying to seal the holes individually, it will still be extremely difficult to ensure the water-tightness of the cofferdam. The installation work would involve extensive, complex and demanding operations. There will be inevitable geometric deviations between the concrete wall and the cofferdams. Extensive measures can be taken to prevent leakage, including the provision of rubber sealing strips and grouting, however the size of the cofferdam and the fact that it will need to be installed on an old concrete structure, in the open sea, means that there is a **very high probability of significant leakage occurring.** These leaks will not be apparent until the water tightness test is performed after all the cofferdams are in place.

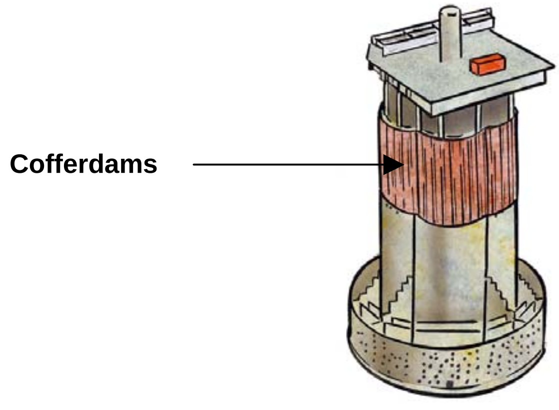


Figure 8.4 Location of the Steel Cofferdam Installed to seal the holes in the external wall of MCP-01

A further cause of uncertainty is the possibility of leakage through the seals around the four 32" pipelines. Although both the 32" diameter Frigg UK pipeline and the Norwegian Vesterled pipeline will have been diverted around MCP-01 by the time of any refloat attempt, the redundant sections of pipeline will still be connected to the concrete substructure. The redundant sections of pipeline are routed through tunnels in the base of the concrete substructure, as illustrated in Figure 8.5. The seals, which prevent flooding of the tunnels and central shaft, are known to be in poor condition. As a result of this TOTAL E&P UK has, in recent years, severely restricted work in these areas. In order to attempt a refloat operation it will be necessary to cut the redundant sections of pipeline just before they enter the tunnels. It is believed that cutting the pipelines near to the seals could degrade the performance of the seals still further. There is therefore considered to be a significant probability that **failure of the seals around the pipelines** could result in flooding of the central shaft during deballasting and refloat operations. It should also be noted that the pipeline seals on the Frigg Field TP1 and TCP2 platforms have experienced failures.

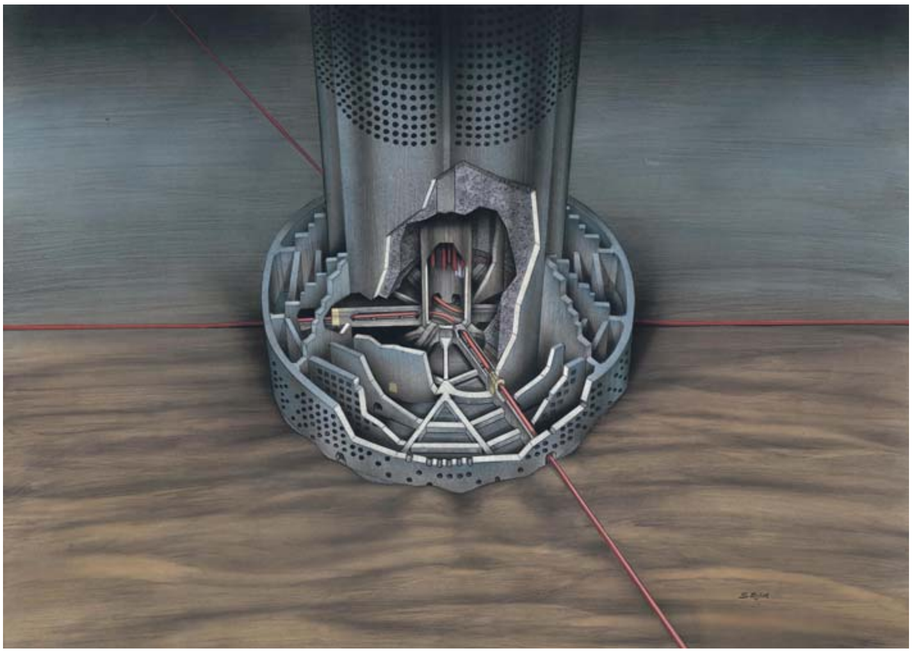


Figure 8.5 The 32" pipelines passing through the tunnels of MCP-01.

Due to the design of the substructure, it is not possible to test or demonstrate the water-tightness of the structure until the solid ballast has been removed as planned, the cofferdam has been installed around the external wall, as illustrated in Figure 8.4, and the water level inside the external wall has been adequately lowered. In view of all this and, in the absence of information to the contrary, it must be assumed that there is a significant probability of leakage during any refloat operation.

Not Managing Work in one Summer Season

- **Ballast Removal**
- **Cofferdam installation**

In considering the feasibility of refloating the MCP-01 substructure particular attention has been given to evaluating the possibility that delays could prevent all the necessary work from being completed in one season. The design of the structure is such that the concrete substructure cannot be left over a winter period with less than half the solid ballast in place without risk of serious damage occurring. Indeed even with half the ballast left in place the substructure will be overloaded when exposed to common winter storms. Once a few steel cofferdams have been installed, the wave forces on the substructure will increase significantly and similarly it is not possible to leave the substructure over a winter period without the risk of serious damage to the structure. Installing the cofferdams before removing the sand ballast would introduce additional technical uncertainties and an increased risk of not being able to complete the work.

It is therefore necessary to remove at least half the solid ballast (if not more), install the six cofferdams, commission all the necessary deballasting and control systems, test the water tightness, refloat the substructure and tow to an inshore location within one summer season.

No major concerns as to the technical feasibility of the sand ballast removal have been identified, although there is a possibility that compression of the material over the last 28 years will result in the task taking longer than planned.

Each of the six cofferdams is a very large steel panel which will be prefabricated onshore and transported to the offshore site by barge. Each cofferdam will then be lifted off the barge using a floating crane and positioned over the holes in one of the lobes of the external wall. The offshore installation of such large panels can only be undertaken in extremely calm weather conditions and the platform designers Doris Engineering have determined that a 72 hour weather window with a significant wave height of 1m or less is necessary for the installation of each of the cofferdams.

In addition to these critical operations there will be extensive diving and other subsea operations with similar severe weather limitations.

The possibility of delays in removing the sand ballast, installing the steel cofferdams, and testing the water tightness of the substructure has been estimated based upon detailed analysis of the tasks to be performed and the likely weather conditions at MCP-01. The probability of having the requisite periods of very good weather during the summer working season has been evaluated based upon predictions of a specialist environmental consultant. Based upon these analyses it has been determined that there is a very high probability of not being able to carry out all the operations necessary to complete the refloat operation within one summer season.

Thus, it is highly likely that the substructure would have to remain in place throughout the winter period in a deballasted condition with the cofferdams installed. In that condition it is virtually certain to sustain significant damage during the winter storms due to a combination of sliding and rotational instability. The redistribution of stresses arising from this movement of the substructure would lead to extensive cracking of the base slab and the radial and external walls. If the platform stands through a winter period in an un-ballasted condition with the cofferdams in place it is highly likely that the water tightness of the structure will be impaired and it will therefore be impossible to refloat the substructure in the following season.

8.3.4. Probability of Failure During Refloat and Disposal

In view of the uncertainty associated with many aspects of the MCP-01 concrete substructure removal operations, the probability and consequences of a major accident have been investigated. There are an infinite number of possible accidents and outcomes but in order to make a broad estimate of the likelihood and consequences of a major accidental event, four **representative** “worst case scenarios” have been investigated:-

1. Accident before refloat	Damage to the external wall during marine operations.
2. Leakage preventing refloat or accident during refloat	Leakage preventing the removal of water from inside the external wall or failure of a critical system or structural member during the refloat operation. Such leakage may be due to leaks in the cofferdams, leaks in the pipeline seals or cracks in the concrete structure. Such cracking of the concrete may arise either from the existing condition of the substructure, or due to delays in the refloat operations which result in the substructure having to remain in an unballasted condition over a winter season during which time it is likely to be severely damaged. Significant leakage would mean that it was impossible to refloat the substructure or possibly failure during the refloat operation resulting in loss of buoyancy and impact with the seabed. The impact would result in severe damage to the walls and/or base slab.
3. Accident during tow	Leakage or failure of a critical system or structural member during the tow to shore resulting in loss of buoyancy and impact with the seabed. The impact could result in severe damage to the walls and base slab. The substructure including the deck is likely to be totally submerged after impact with the seabed.
4. Accident during demolition	Leakage, or failure of a critical system or structural member during the inshore demolition operation resulting in loss of buoyancy and impact with the seabed. The impact would result in disintegration of the remaining substructure.

For many of the worst case scenarios, the risks inherent in the required remedial works would be so high as to make them unacceptable and, in that case, it would not be possible to undertake remedial work. However, when evaluating the consequences of the worst case scenarios in this assessment the risks involved have been estimated, although it is appreciated that the risk to the personnel involved would most probably be so high that the work would not be attempted.

When assessing the implications of the accident scenario prior to the refloat operation, it has been assumed that in most cases it will be possible to repair the damage to the substructure. If it proved impossible to empty the structure of water due to leaks arising from accidental damage, cracking of the concrete or inadequately sealed holes, then attempts would be made to identify the location of the leaks and then to repair them. It is questionable whether such repair operations would be successful even if it were possible to identify the location of the leak. If it was not possible to make the substructure watertight then the refloat operation would have to be aborted and consideration given to cutting the whole substructure into sections for transportation to shore. Such an operation would be extremely hazardous and very costly.

The time necessary to locate, investigate, design and execute the repair, possibly carry out grouting, injection etc., which needs to set, virtually ensures that any leakage will cause severe delays.

If significant leakage occurred whilst the substructure was floating, (that is, during the refloat, tow and demolition phases) then it is likely that the substructure would sink back onto the seabed. In this event, the damage to the base slab and lower walls could be so severe that it would be impossible to refloat the substructure again. In order to remove the concrete substructure it would then be necessary to cut it into small sections which could be lifted to the surface and transported to shore for disposal.

These operations would be extremely hazardous due to the damaged condition of the substructure and the need for most of the cutting and lifting to be done underwater. In the case of accident scenarios 2 and 3, the work would also need to be undertaken at an exposed offshore location, which would significantly increase the risk. The likely cost of such remedial work would be very high, although the overall impact on the environment is generally small. The main negative impacts are; the effect on the local marine environment (seabed and natural resources); and the emissions to atmosphere during the extensive remedial works. The environmental impact analysis did however identify a number of specific situations where the environmental impact would be much greater due to local conditions (e.g. when towing the substructure over an oil pipeline or in the area of particular fishing grounds or near inshore fish farms.

The possibility of being unable to refloat the substructure due to leaks and the likelihood of major accidents during the planned removal and disposal operations has been estimated using probability theory based upon appropriate historical data and input from a group of independent experts [Ref. 8.22]. The probabilities of the various accident scenarios are given in Table 8.2.

	Description	Consequence	Probability
1	Accident before refloat	Damage to external walls	>0.1%
2	Leakage preventing refloat or accident during refloat	Inability to deballast the substructure or severe damage to walls and base slab in an accident or a delay over a winter season.	In the order of 60%
3	Accident during tow	Severe damage to walls and base slab	0.4%
4	Accident during demolition	Disintegration of substructure	0.1%

Table 8.2 Probability of being unable to Refloat the Substructure or having a Major Accident during MCP-01 Refloat and Inshore Disposal Operations (Alternative A)

The overall probability of being unable to refloat the substructure or having a major accident during the removal and disposal operations for the MCP-01 concrete substructure is estimated to be in the order of 60% which is six hundred times greater than the acceptance criterion.

The main reason for the very high probability of not being able to refloat the substructure as planned is the likelihood that it will not be possible to undertake all the required tasks in one season and that consequently the structure will be damaged during the winter that follows. The analysis undertaken [Ref. 8.22] has identified the fact that the weather limitations for the installation of the steel cofferdams are responsible for the greatest delay.

In order to assess the sensitivity of the analysis results to the weather limitations on the installation of the cofferdams, the analysis was re-run using the assumption that it would perhaps be possible to install each of the cofferdams in a 72 hour weather window with seas having a significant wave height (Hs) up to 2m rather than the requirement for waves less than 1m Hs as specified by Doris Engineering [Ref. 8.23]. It must be stressed that it is by no way certain that an installation procedure for the cofferdams can be developed to allow their deployment in seas with a significant wave height of 2m. Notwithstanding this consideration, the analysis indicated that the probability of being unable to complete the removal work as planned is reduced to 7% if the cofferdams could be installed in sea states up to a significant wave height of 2m, which is seventy times greater than the acceptance criterion.

These analyses were based upon the results of a study by Fugro Global Environmental and Ocean Sciences Ltd who reviewed the available environmental data for the period 1989 to 1998 [Ref. 8.24]. Based upon this data Fugro predicted the likely wind speeds and wave heights during the summer work season and estimated the number of suitable weather windows in each month. For the period June, July and August, the average number of 72 hour weather windows having a significant wave height of 1m or less was predicted to be 4. For the same period the number of weather windows where the significant wave height would be 2m or less was predicted to be 19.

A further sensitivity analysis was undertaken in which the effect of delays due to weather constraints was ignored, in effect, assuming that the significant wave height was less than 1m throughout the year. It is appreciated that this is unrealistic but, by eliminating the weather constraints, an indication of the inherent probability of mission failure is obtained although this is only of theoretical interest. When the weather constraints were removed from the analysis, the probability of being unable to complete the removal work as planned was estimated to be in the order of 3%, which is thirty times greater than the acceptance criterion.

Figure 8.6 shows the estimated probability of being unable to refloat MCP-01 depending upon the limiting sea states for critical marine operations (pink area).

The corresponding values for Frigg CDP1 (sister platform to MCP-01) are shown in the blue line in Figure 8.6 [Ref. 8.23]. The higher probabilities of mission failure for CDP1 are mainly due to structural and leak uncertainties arising from the fact that 24 conductor holes were drilled through the base slab, and due to structural damage to the external diaphragm walls which occurred due to insufficient sand ballast in the early years of operation.

In the Frigg Field Cessation Plan [Ref. 8.29] the probability of mission failure for CDP1 was estimated to be in the order of 30%. The higher probability of mission failure for MCP-01 (60%), as presented in this Decommissioning Programme, is due to the fact that the effect of delays due to weather constraints was not fully accounted for in the CDP1 evaluations. This is illustrated on Figure 8.6, where the probabilities of being unable to refloat the two concrete substructures (referred to as mission failure) are shown, depending on the sea states that limit certain critical marine operations. This shows that the higher the permissible wave height the lower the risk as there is a potentially greater period of time when decommissioning activities can be carried out. The probability of mission failure when sea state limitations are ignored is also shown.

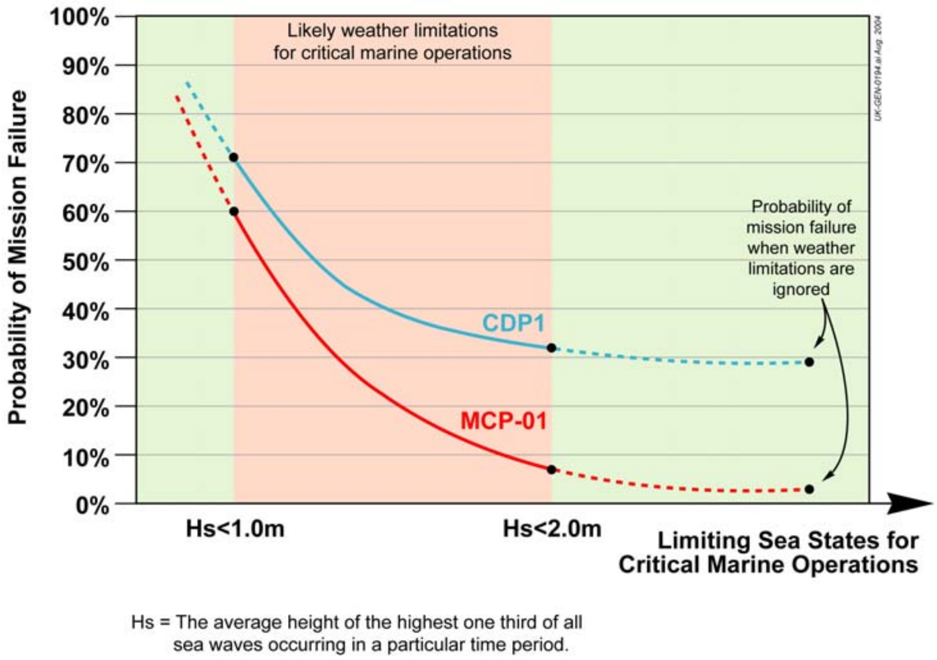


Figure 8.6 Probability of Failure of the Refloat and Onshore Disposal Alternative (Alternative A) as a function of Limiting Sea States for Critical Marine Operations

8.4 Technical Assessment of Alternative B - Refloat Concrete Substructure and Disposal in Deep Water

8.4.1 Proposed Method

The activities performed to refloat the substructure for disposal in deep water (Alternative B) are essentially the same as for the onshore disposal option (Alternative A). The main difference, apart from the final disposal method, is that if deep water disposal is being used additional steel items would be removed offshore before the substructure was refloated. The steel deck panels, deck extensions, skid beams and modules between the concrete deck beams and the steelwork in the central shaft would therefore be removed before starting the refloat operations, rather than at the inshore location, as would be the case for the onshore disposal alternative.

After the structure lifts off the bottom it would continue to be de-ballasted until it reached a draught suitable for towing. It would then be towed to the deep-water disposal site and ballasted down to a draught of 75m. As for Alternative A, the platform would be unmanned during the refloat and towing operations. Operation of the deballasting systems when the platform is unmanned would be by remote control from an adjacent boat. The de-ballasting system mounted on the concrete deck, including generators, hydraulic power pack etc., would be retrieved before the substructure is sunk. The sinking process would be initiated with explosive charges considering all relevant precautions and minimization of effects after consultation with the JNCC.

8.4.2 Technical Feasibility

The feasibility of Alternative B depends essentially on the possibility of being able to refloat the substructure. The concerns noted for Alternative A also apply to Alternative B.

8.4.3 Probability of Failure During Refloat and Disposal

The refloat operation for Alternative B is essentially the same as for Alternative A and the same uncertainties therefore apply. As a result, the accident scenarios considered for Alternative A are also valid for Alternative B, apart from scenario 4 (Accident during inshore demolition) which is obviously not relevant in the case of disposal in deep water.

The probabilities of the various accident scenarios have been estimated [Ref. 8.22] and are given in Table 8.3.

	Description	Consequence	Probability
1	Accident before refloat	Damage to the substructure	<0.1%
2	Leakage preventing refloat or accident during refloat	Inability to deballast the substructure or severe damage to walls and base slab in an accident.	In the order of 60%
3	Accident during tow	Severe damage to walls and base slab	0.4%

Table 8.3 Probability of being unable to refloat the Substructure or having a Major Accident during MCP-01 Refloat and Towing Operations for Disposal in Deep Water

The overall probability of being unable to refloat the substructure or of having a major accident during the removal and deep water disposal operations for the MCP-01 concrete substructure is estimated to be in the order of 60% which is six hundred times greater than the acceptance criterion.

Sensitivity analyses undertaken for Alternative B show that, as for Alternative A, the probability of failing to refloat the substructure reduces to 7%, which is seventy times higher than the acceptance criteria, if the sea state requirement for installation of the cofferdams is relaxed from less than 1m to less than 2m. Similarly if the effect of weather delays is ignored completely the probability of failure reduces to 3% which is thirty times higher than the acceptance criteria.

8.5 Technical Assessment of Alternative C – Cut down the concrete substructure to provide a clear draught of 55m

8.5.1 Proposed Method

The modules, steel deck components, and the steelwork in the central shaft would be removed and the pipelines disconnected and plugged. The solid ballast between the central shaft and the outer wall would then be removed using an air operated dredging system working from the concrete deck beams. The ballast would be relocated into the open foundation cells around the outer wall. Any steel items exposed when the ballast between the central shaft and the outer wall has been removed would be cut out of the structure and lifted away.

The concrete deck and the concrete filled steel columns on top of the outer wall would be cut into pieces, lifted, and placed on the seabed near the substructure.

The concrete substructure would then be partially demolished by isolating sections of the substructure and toppling them outwards. Each section of wall would be separated from the rest of the substructure by cutting using either diamond saw or diamond wire cutting equipment, operated by divers. The last cuts for each section of wall and the toppling would be achieved using explosives considering all relevant precautions and minimization of effects after consultation with the JNCC. After the sections of the outer wall have been toppled, the radial walls and the central shaft would also be cut into sections and toppled using explosives.

The cuts would be made at locations that would ensure there was a minimum of 55 metres of clear water above the substructure when all the sections had been toppled; as illustrated in Figure 8.7.

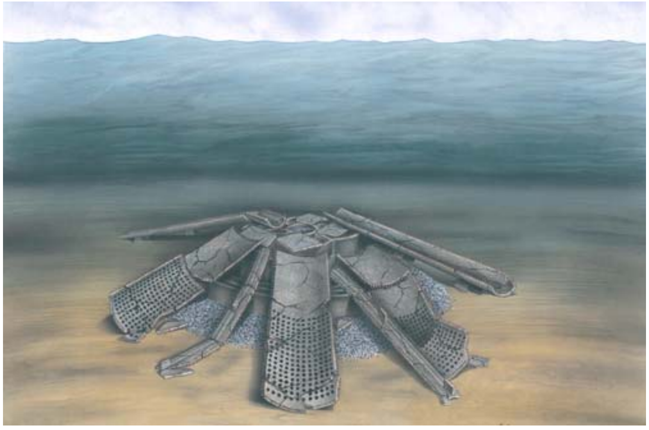


Figure 8.7 MCP-01 Concrete Substructure cut down to –55m.

8.5.2 Technical Feasibility

The partial demolition of such a large concrete structure in the open sea has not been attempted before. It is considered that although such a process of demolition may theoretically be possible, many aspects would need to be resolved before the toppling operations could be regarded as practicable.

The following aspects limit the level of confidence that can be placed on the feasibility of Alternative C :-

Concrete Cutting Methods

A substantial programme of work would be needed to develop the equipment necessary for cutting the walls as this is considerably beyond anything that has been attempted to date [Ref. 8.12 and 8.25]. The thickness of the concrete walls (up to 120cm thick) and the large amount of pre-stressing and reinforcing steel in them would make them extremely difficult to cut. It is still far from certain that the subsea equipment necessary to effectively cut through the highly reinforced concrete walls could be developed.

The ability of explosives to effectively cut thick concrete walls with substantial amounts of pre-stressing and reinforcing steel is not well proven and involves many uncertainties. A considerable amount of development work, including full size trials, would be necessary before such a scheme could be confidently proposed. The firing of the explosive charges to topple the structure is a “point of no return” and may result in an unplanned situation from which it is impossible, or extremely difficult, to recover.

Relevant precautions and minimization of effect will be followed should explosives be required. TOTAL E&P UK will in particular follow necessary mitigation procedures in accordance with the Joint Nature Conservation Committee (JNCC) guidelines.

Structural Strength and Stability

The MCP-01 concrete substructure is made up of a base slab and a series on interconnected walls. Each wall provides support and restraint to the neighbouring walls and slabs. The strength and stability of the individual parts of the substructure during the demolition process is therefore a major concern.

The integrity of the structure may also be impaired due to wave loading causing one or a number of partially cut sections of wall to topple in an unplanned manner. Initial assessments of the structural stability of the external walls in a partially cut down condition indicate that they would be very susceptible to wave loading. In some situations the ability of the walls to resist waves as small as 2.5m in height is questionable. The structural integrity under wave loading would have to be addressed in detail for every step of the proposed dismantling sequence although the exact temporary condition of the structure might be unknown. It is also possible that a section of the outer wall could topple inwards rather than outwards due to the position of its centre of gravity.

The operations would include weather sensitive diving and other subsea work and significant weather delays must be foreseen. If it proves impossible to complete all the toppling activities within one summer season the remaining part of the substructure will be subject to loads from winter storms. The uncertainties surrounding the cutting methods indicate that a delay over the winter period is very possible. An unplanned collapse of all or part the substructure during a winter storm is likely to result in a pile of debris with less than 55m of clear water above it. It is also likely that the pile of debris would be unstable, thereby severely limiting the possible remedial measures.

Ineffective Toppling

The toppling of the different sections of the substructure is, by its very nature, a rather imprecise operation. Many sections of wall will need to be toppled. There is therefore a significant possibility that one or more of the sections may not fall in the intended position. If a section of wall becomes stuck or is left in an unstable condition it would be extremely dangerous to carry out the actions necessary to achieve the necessary 55m of clear water above the demolished substructure. The use of divers in this situation would be unsafe and therefore unacceptable to TOTAL E&P UK.

Unplanned stacking of some sections could also impede access for cutting machines and divers to work on subsequent sections. Delays and high fatality risks for divers could result.

8.5.3 Probability of Failure during Cutting Down Operations

Uncertainties surrounding the cutting and toppling of the various wall sections mean that these operations may not be successfully completed. There is a great deal of hazardous and technically uncertain work involved in cutting down the concrete substructure, due to the arrangement of interconnected walls. It is envisaged that at least 20 sections of wall would need to be cut and toppled if this disposal arrangement was adopted. There is therefore considerable potential for one or more sections of the substructure to fall in such a way that the clear draught for shipping of 55m, as required in the IMO Guidelines, was not achieved. In that event extensive remedial works would be required, with an unacceptable level of danger to human lives, to achieve a satisfactory condition for the substructure.

The probability of this situation occurring and the consequences have been assessed based upon two representative scenarios as detailed below:-

1. **Unsuccessful cutting** — Failure of the cutting systems or associated equipment requiring redevelopment and re-qualification of cutting system.

2. **Uncontrolled collapse of sections of wall** — Collapse of walls during the cutting operations resulting in not achieving the required 55m of clear water above the remaining structure on the seabed.

The operations to clear a collapsed section of wall would likely be extremely hazardous especially if the wall were in an unstable condition. In that condition the risk of diving in the vicinity of the walls would be unacceptable and thus complex and expensive tools would need to be developed which could be deployed using underwater remotely operated vehicles. The likely cost of such remedial work would be very high. The overall impact on the environment would be generally small although the local marine environment would be affected by the remedial activities.

The likelihood that major problems would be encountered during the cutting and toppling activities has been estimated, as for Alternatives A and B, using probability theory based upon appropriate historical data and input from a group of independent experts [Ref. 8.22]. The probabilities of the various accident scenarios are given in Table 8.4.

	Description	Consequence	Probability
1	Unsuccessful cutting	Delay, increased cost and increased risk to personnel	0.3% - 0.5%
2	Uncontrolled collapse of a wall or walls	Collapse with insufficient shipping draught, increased risk to personnel and increased cost	In the order of 66%

Table 8.4 Probability of a Major Accident or Incident during the Cutting Down of MCP-01 (Alternative C)

The overall probability of a major accident or incident during the cutting down of the MCP-01 concrete substructure is estimated to be in the order of 66% which is six hundred and sixty times greater than the acceptance criterion. (In this context it should be noted that some experts, including DNV, are of the opinion that the probability of structural failure should be less than 0.01%, that is, ten times lower than the acceptance criterion adopted by TOTAL E&P UK. Loss of structural integrity and uncontrolled collapse of a wall, or walls, resulting principally from environmental loading of the partially demolished structure is the main reason for the very high probability of mission failure. It is very likely that such an uncontrolled collapse would result in a situation where the 55m clear shipping draught was not achieved. In that case, to rectify the situation, extensive work on the substructure would be necessary whilst the substructure was in a very dangerous condition.

The estimated risk of collapse of the walls during cutting operations for MCP-01 is considerably higher than the value estimated for the similar Frigg Field CDP1 concrete substructure. The two substructures are relatively identical and the assumed cutting methods are similar. The reason for the much higher probability of collapse for MCP-01 is that more detailed calculations have shown that the external walls have much lower reserves of strength than previously estimated when in the partly cut condition.

8.6 Technical Assessment of Alternative D - Leave the concrete substructure in place

8.6.1 Proposed Method

Alternative D involves leaving the concrete substructure in place after removing the topside modules, the steel deck components, and the steel items on the outside of the concrete substructure as much as reasonably practical, principally the 18” diameter Talisman riser and the supporting steel truss (see Figure 8.8).

The topside modules would be removed first, as described in Section 7. Following this, the additional steel items in the deck would be removed including the deck panels, deck extensions, skid beams and the modules between the concrete deck beams.

The steelworks inside the concrete shaft would be left in place.

The 18” diameter Talisman riser, umbilical caisson and supporting steel structure would be cut into sections and lifted away as it could represent potential hazards for bottom trawl fishing activity. The extension of the supporting steel structure located in the compartment between the external wall and the lower exterior wall, is planned to be left in place as this part will not represent any hazards (see Figure 8.8). Divers and work class ROVs could carry out this work. The removal of miscellaneous steelworks inside of the external concrete walls and above the breakwater wall are discussed in Section 7.3.2.

After the removal of the topsides steel items, the necessary navigation aids would be installed on the substructure, as explained in Section 14.3. The plans for debris clearance on the seabed around the MCP-01 substructure and the final trawl test are explained in Section 13.

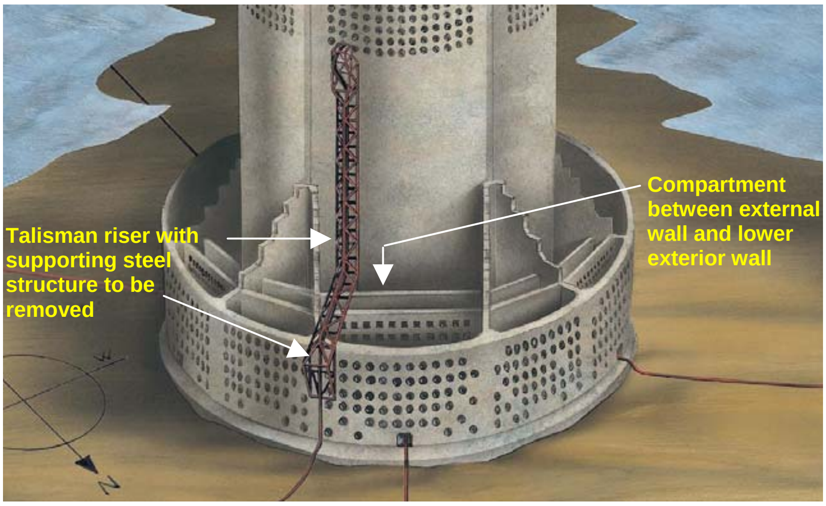


Figure 8.8 Position of Talisman riser with supporting steel structure attached to the Concrete Substructure.

8.6.2 Technical Feasibility

No significant technical problems associated with the work have been identified. The work is not considered to involve any unusual technical risk and the risk of not being able to complete the planned work tasks is considered to be very low.

8.6.3 Long Term Durability of Concrete Substructure

In view of the recommendation that the MCP-01 concrete substructure should be left in place for natural decay, an assessment of its likely long-term durability has been made [Ref. 8.26].

After about 100 years the main reinforcement with limited cover in the splash zone and above become ineffective. Impacts from waves would cause risk of local structural damage to the central shaft and the breakwater wall in the splash zone. Serious damage to all parts above sea level with a possible breakdown to the sea level is estimated to take place in roughly 200 years.

Breakdown of the breakwater wall and the central shaft down to about 27m below sea level is predicted to take place in 400 to 800 years. A breakdown below 55m could take more than 1000 years.

The above-water deterioration of the concrete structure will, however, take place relatively slowly and the navigation aids may be expected to remain in place for several hundred years.

Accelerated leaching tests of the concrete samples taken from MCP-01 showed that only minor amount of a lignosulphonate based plasticizing admixture could be extracted from the pulverised concrete. The amount and the nature of the admixture will not pose any threat to aqueous environment if left in place.

8.7 Risk to Personnel – All Alternatives

8.7.1 During Decommissioning Operations

The risk to personnel involved in the planned operations for the MCP-01 substructure disposal alternatives that have been considered has been estimated based upon the anticipated work tasks and relevant historical accident rates [Ref. 8.27] and are shown in Table 8.5 below. A definition of the terms used in this table is given in Section 5.

	Alternative A Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
Potential Loss of Life (Predicted number of fatalities)	0.64	0.21	0.75	Less than 0.01
Probability of a Fatality	47%	19%	53%	< 1%
Fatal Accident Rate (averaged across all workers)	19	18	47	7
Potential Major Injuries (Predicted number of major injuries)	30	8	10	0.3
Probability of a Major Injury	More than 90%	More than 90%	More than 90%	26%

Table 8.5 Estimated Risk to Personnel during Disposal Alternatives for MCP-01 Concrete Substructure

It can be seen from Table 8.5 that Alternative D has a significant lower probability of a fatal accident occurring compared with the other alternatives. The probability of a fatality is more than 47 times higher for Alternative A than for Alternative D. It should also be noted that the analytical method used to estimate the likely fatalities and major injuries tends to **underestimate,** rather than overestimate, the risk to personnel.

For Alternative A, the main contributors to fatality risk are inshore/onshore demolition (48%), offshore marine operations (23%), and offshore diving operations (12%). The main contributor to the diving risk is surface diving in the area around the wave-breaking holes in the external wall. From previous experience in the North Sea this is known to be particularly hazardous area, due to the strong currents and turbulence caused by the sea flowing through the holes.

Based upon the estimated fatalities, the **average** Fatal Accident Rate (FAR value) for the complete removal and onshore disposal activities is estimated to be in the order of 19. This is approximately 1.5 times the estimated average risk to workers, FAR=13.1, on MCP-01 when it was fully operational.

If the walls of the substructure were cut down to –55m (Alternative C) the probability of a fatality is more than 53 times higher than the leave in place option (Alternative D). The **average** FAR value for the work involved in cutting down the walls of MCP-01 is estimated to be in the order of 47. This is well above the maximum tolerable limit for operational personnel on TOTAL E&P UK operated platforms and approximately 3.6 times the average risk to workers on MCP-01 when it was fully operational.

The average FAR value for all personnel engaged in Alternative D has been estimated as 7 on the basis that the subsea steelwork removal work can be undertaken using ROVs. There is however a possibility that a small amount of diving work may be needed and in that event there would be some increase in the average FAR for the project.

The probability of a fatality as reported in Table 8.5 assumes that it is possible to complete the work as planned. If a major accident occurred, the probability of a fatality during the initial work together with the necessary rectification work would be even higher, as indicated in Figure 8.9.

8.7.2 Post Decommissioning

The effect on the safety of shipping of leaving MCP-01 concrete substructure in place (Alternative D) has been addressed [Ref. 8.28]. The annual number of seafarer fatalities estimated from vessel collision if the concrete substructure is left in place, is estimated to be 2.8×10^{-4}, or 1 fatality in 3,600 years.

The annual risk of fishing vessels colliding with the MCP-01 concrete substructure, if left in place, has been estimated to be in the order of 5.5×10^{-3}, corresponding to a collision return period of 183 years based upon current fishing activity in the area. Because the concrete substructure is visible, the probability of fishing vessels snagging their gear on the substructure is considerably less than if the base were left on the seabed after the substructure is cut down. For passing vessels the annual risk of collision is estimated to be 7.9×10^{-5}, an average of one collision in 12,600 years.

The risk of pollution occurring as a consequence of such collision is even smaller. In the worst-case scenario of a serious collision involving a laden crude tanker, a large outflow of oil could potentially occur (in excess of 10,000 tonnes). However data indicates that such incidents are extremely rare. The vast majority of the spills which occur are small [Ref. 8.28]. Therefore the total risk is considered low.

The introduction of more sophisticated navigational equipment such as ECDIS (Electronics Charts Display and Information System) and higher levels of training for mariners in accordance with international conventions is predicted to reduce the probability of collision further. In addition, TOTAL E&P UK will take measures to ensure that the MCP-01 substructure remain marked on navigation charts and will circulate relevant information about the MCP-01 decommissioning project to mariners. Suitable navigation aids will be installed on the substructure and regularly maintained as explained in Section 14.3. It has been estimated by specialists [Ref. 8.28] that the TOTAL E&P UK measures and industry developments would reduce the collision frequency by approximately 50%.

8.8 Environmental Impact – All Alternatives

The environmental impact of the four removal and disposal alternatives considered for the MCP-01 concrete substructure is found in Section 8 of the EIA Report of this MCP-01 Decommissioning Programme. The environmental impacts of the four disposal alternatives considered are summarised in Table 8.6.

	Environmental Impact Summary			
Issues	**Alternative A** Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
Energy Consumption (Million GJ)	1.98 – "Moderate negative"	0.64 – "Small negative"	0.44 – "Small negative"	0.05 - "Insignificant"
Total Energy Impact (Million GJ)	1.98 – "Moderate negative	0.96 – "Small negative"	0.77 – "Small negative"	0.41 – "Small negative"
Total CO_2 Emissions (1000 tonnes)	137	47.0	32.8	3.7
Discharges to sea	"Insignificant"	"Insignificant"	"Insignificant"	"Insignificant"
Physical / habitat effects	"Moderate negative"	"Moderate negative"	"Moderate negative"	"Moderate negative"
Aesthetic	"Small - Moderate negative"	"Insignificant"	"Insignificant"	"Insignificant"
Material Management	"Moderate positive"	"Insignificant"	"Insignificant"	"Insignificant"
Littering	"Insignificant"	"Small Negative"	"Small negative"	"Small negative"
Impacts on fisheries	"Small positive"	"Small positive"	"Moderate negative"	"Small negative"
Impacts on free passage	"Insignificant"	"Insignificant"	"Insignificant"	"Small negative"

Table 8.6 Summary of Environmental Impact of Alternative Disposal Arrangements for the MCP-01 Concrete Substructure, (see Figure 5.1 for explanation on use of colours).

The EIA Report concludes that the outcome of the environmental impact assessment indicates that from a total environmental perspective, Alternative D – leaving in place the concrete substructure, is considered the best option.

The environmental impact detailed in Table 8.6 assumes that the operations are carried out essentially as planned and there is no need to undertaken extensive remedial works resulting from a major accident during the disposal operations. It is important to note that cleaning of the MCP-01 concrete substructure is not required, as it has **never been used for the storage of crude oil.**

8.9 Costs – All Alternatives

The estimated costs of the four disposal alternatives for the concrete substructure and concrete deck beams of MCP-01 are given in Table 8.7 below (1£=12.0 NOK).

Alternative A Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
£446.6m/5,359 MNOK	£387.6m/4,651 MNOK	£461.6m/5,539 MNOK	£11.7m/140 MNOK

Table 8.7 Estimated Cost of Alternative Disposal Arrangements for the Concrete Substructure of MCP-01 in 2004 value (The cost of disposal of the topsides is not included)

The cost estimate is based upon studies performed by several different contractors both in Norway and UK, using appropriate North Sea rates and the principles used for the Frigg Field concrete substructures verified by personnel within the TOTAL Group.

The costs presented are expressed in year 2004 money terms and represent a 50/50 estimate reflecting the high uncertainties identified in the risk assessments.

Cost of remedial activities required following a major accident during the disposal Alternatives A, B and C were estimated in broad terms for the sister platform CDP1 on the Frigg Field [Ref. 8.29]. These cost estimates are very comparable in relation to the methods statements established for MCP-01 by Doris Engineering. Applying the same assumptions, the cost for completing the planned work for MCP-01 after an accident as described in Sections 8.3.4, 8.4.3 and 8.5.3 are shown below.

- Alternative A (see Table 8.2) £500m - £820m / 6,000 MNOK – 9,840 MNOK
- Alternative B (see Table 8.3) £440m - £770m / 5,280 MNOK – 9,240 MNOK
- Alternative C (see Table 8.4) £530m - £560m / 6,360 MNOK – 6,720 MNOK

The estimated cost includes the incurred cost up to the time of the accident plus the cost of remedial works following the accident. It is emphasised that the quoted accident related cost are very uncertain, and are included to illustrate the cost picture in case an unforeseen event should take place during the planned work for the three disposal alternatives.

8.10 Stakeholders Concern – All Alternatives

As part of the MCP-01 consultation process, some stakeholder groups have expressed their preference for the full removal to shore option (Alternative A). However, if it can be documented that full removal of the concrete substructure is technically unfeasible or inherently unsafe, then the leave in place option (Alternative D) would be preferred to Alternatives B and C (deep water disposal and cut down to –55 meters respectively). The main reason for this preference was to maintain the option of full removal should new technology become available in the future to make removal possible.

Deep-water disposal (Alternative B) was viewed as environmentally unacceptable by society. Further, if the substructure could be safely refloated, it should be brought to shore for disposal.

Cutting down the substructure to –55m (Alternative C) was not considered a viable option by stakeholders because it would still remain as a hazard to fishing operations. It would also mean that any future removal of the structure by refloating could not be attempted.

8.11 New Technology related to Removal of the Concrete Substructure

The possibility of removing the concrete substructure in the future should new technology become available that would allow this to be carried out safety and effectively, has been assessed [Ref. 8.30]. At present it is difficult to foresee how the inherent uncertainty of the many technical issues associated with refloating the MCP-01 substructure would be reduced by the development of new technology in the future. Although advances in automation and robotics may allow some of the tasks to be carried out with less risk to humans, the technical risks associated with the refloat operation itself are unlikely to reduce significantly. This fact, taken together with other considerations, means that the recommended disposal arrangements would remain unchanged.

8.12 Recent Industry Experience

The Maureen steel gravity platform operated by ConocoPhillips UK Ltd was successfully removed in June 2001. This was a platform which was designed for removal. As a major partner in the Maureen Field, (ownership of 28.96% of the Maureen facilities), TOTAL E&P UK was involved in reviewing the decommissioning plans for the platform. One key feature in the refloat operations was pumping of water underneath the substructure to obtain an extra uplift to allow a controlled break away from the seabed. This was possible due to the steel skirt below each of the three steel tanks. MCP-01 rests on the seabed without any such features making such a method in assisting a refloat operation unfeasible.

Two concrete platforms in the Schwedeneck-See close to Kiel in the Baltic Sea, operated by RWE-DEA, were removed during summer 2002. The platforms (which are of the tower and caisson type) are very much smaller than MCP-01 and stood in only 16m and 26m of water as compared with the 94m depth for MCP-01. They were extracted from the seabed using external steel buoyancy tanks attached by water pressure to the roof of the caisson. The particular design of MCP-01 does not have similar caisson features where external buoyancy tanks could be attached. It is also considered that such arrangement would not be prudent to use in the more hostile waters of the northern North Sea.

8.13 Summary of Concrete Substructure Comparative Assessment

This section summarises and evaluates the most important aspects related to each of the disposal alternatives considered. Based upon these evaluations a recommended arrangement for the disposal of the MCP-01 concrete substructure is proposed in Section 8.14.

8.13.1 Alternative A – Refloat the concrete substructure and onshore disposal

Weather dependency

The main uncertainty relating to the possible refloat and onshore disposal of MCP-01 is the need to undertake a large amount of weather sensitive offshore work in one season. If delays occur, it may not be possible to refloat the substructure in the same season as the majority of ballast is removed and the cofferdams are installed to seal the wave breaking holes in the external wall. With the ballast removed and cofferdams in place, the substructure is very susceptible to damage by winter storms. If the substructure has to stand through a winter period in this condition, it has been determined that both sliding and rotational failure of the foundations will occur and severe damage to the base slab and external walls of the substructure is virtually certain.

Such extensive damage would make it virtually impossible to refloat the substructure in the following season due to the lack of water tightness of the substructure.

Removal of solid ballast

One of the causes of possible delay is the operation to remove the solid ballast from within the structure. Although some of this may be removed in the season prior to the refloat attempt, it is necessary to leave at least half the solid ballast in place to give the platform satisfactory structural stability during the winter period. If it proves difficult to remove the solid ballast due to any reason, the schedule of work will be delayed and the likelihood of running out of weather windows for the refloat attempt increases significantly.

Installation of steel cofferdams

Another cause of possible delay is problems associated with the installation of the six steel cofferdams to seal the wave breaking holes in the external wall. These large steel cofferdams, which each weigh approximately 250 tonnes are particularly susceptible to wave loads and therefore can only be installed in calm weather conditions. It is necessary to accurately install all six of the steel cofferdams in one season in order to be able to refloat the substructure. Detailed evaluation of the weather conditions at the offshore location indicates that there is a significant possibility that it will not be possible to successfully install all the cofferdams and perform all the required weather sensitive subsea operations in one season.

Leaks

Due to the inherent design of the substructure, the water tightness cannot be verified until the solid ballast has been removed and all the cofferdams installed. It is therefore not possible to identify any damage to the cofferdams during their installation. Thus any significant leakage either through the cofferdams or through ineffectively closed penetrations or cracks in the walls and base slab of the substructure cannot be identified until late in the programme when remedial works may be difficult.

Although the condition of the concrete substructure is thought to be generally satisfactory it is not possible to be sure that there are no cracks in the base slab or the lower sections of the external wall. Such leaks would only become obvious when the refloat operation was started and would most probably be difficult or impossible to seal before the end of the summer working season.

Probability of not succeeding

Based upon the judgement and input of leading independent experts, the probability of being unable to refloat the substructure or a major accident occurring during the refloat and tow to shore has been estimated to be in the order of 60%. This risk is extremely high due to the inherent uncertainties in the extensive offshore activities that need to be performed. No similar operations on the scale envisaged have been undertaken before and thus there is a significant probability that delays would prevent the refloating of the substructure in one season and thus result in the substructure being severely damaged during the following winter storms. The risk of being unable to undertake the refloat operation is approximately 600 times higher than the 0.1% acceptance criterion for asset/financial loss during decommissioning.

The decommissioning risk acceptance criterion is in line with the guidance given in the DNV rules for marine operations. Additional problems are expected to become apparent during the detailed engineering phase of a major project of this nature. These would have the effect of increasing further the probability of accident and delay. It is also to be noted that some experts, including DNV, are of the opinion that the probability of **structural failure** during a refloat operation should be less than 0.01%, that is, ten times lower than the acceptance criterion adopted by TOTAL E&P UK.

Consequence of accidents

The consequences of a major accident during the refloat operations have been shown to be particularly severe, especially in respect to the safety of personnel and cost. In addition, if due to leakage, (or delays which result in damage to the substructure), it proved impossible to refloat the substructure, then the only other removal alternative would be to cut up the concrete substructure into suitably sized sections which would then be transported to shore for disposal. Such operations would involve considerable amounts of diving and would be unacceptably hazardous.

Risk to personnel
During the anticipated activities involved in removal and onshore disposal operations, the probability of a fatality has been estimated as being in the order of 47% (approximately 1 in 2). This is a very high risk. The average fatal accident rate for the removal and onshore disposal is estimated to be in the order of 19 which is considered not acceptable in the light of normal operating risk to personnel on oil and gas platforms in the North Sea. The probability of fatalities would increase significantly if large amounts of offshore work were required as the result of major leakage or a major accident during a removal operation. It should also be noted that the analytical method used to estimate the likely fatalities and major injuries tends to **underestimate,** rather than overestimate, the risk to personnel.

Environmental impact
The full removal alternative represents the best permanence in terms of material utilisation, due to the high level of high value (i.e. steel) material recycling and reuse, but will give a poor performance in terms of energy consumption and emission of CO_2. Full removal is also judged to have a "small positive" impact on fisheries.

Cost
The cost of removing the concrete substructure of MCP-01, if possible, has been estimated to be approximately £446m / 5,352 MNOK assuming that no major accidents occur and the operations go as planned. There is however a significant possibility that the cost could increase by a factor of 2 if it was impossible to refloat the substructure or a major accident occurred whilst the substructure was being refloated or towed to shore. The risk of fatalities during a salvage operation following an accident would increase the cost significantly.

Stakeholders concern
Some stakeholder groups have expressed that the preferred alternative would be full removal to shore if it can be done in a safe manner.

Overall assessment
In the light of the limited environmental benefit and the severe safety and financial implications of being unable to refloat the substructure or having a major accident during the work, the inherent uncertainties surrounding the complete refloat and onshore disposal of the MCP-01 concrete substructure are considered unacceptable.

8.13.2 Alternative B – Refloat the concrete substructure and disposal in deep water

The refloat of the substructure for offshore disposal is similarly uncertain and, in addition, the dumping of structures in the deep ocean is considered to be generally undesirable by society. Consultation with the stakeholders has indicated that, if the substructure could be refloated, then it should be brought to shore for disposal, rather than dumped in the ocean.

Overall assessment
Alternative B, removal and disposal in deep water, is therefore not recommended.

8.13.3 Alternative C – Cut down the concrete substructure to provide a clear draught of 55m

Cutting uncertainties
Cutting down the walls and central shaft of the substructure might to be theoretically feasible, although many factors militate against such an approach. There is a high level of uncertainty surrounding the method of cutting up such an integrated structure in which the strength and stability of each wall depends to a great extent on the adjacent walls. The feasibility of the concrete cutting method is also debatable and considerable effort and expenditure would be necessary before the method could be considered field proven. The amount of diving necessary also makes this alternative disposal method very questionable and the risk to personnel engaged in the work is considered to be unacceptably high. Due to the complexity of the MCP-01 substructure and the amount of cutting required it is not considered feasible with today's technology to undertake the work using only remotely operated vehicles.

Probability of not succeeding

Cutting down the substructure to allow a clear 55m draught above the remaining substructure would allow the free passage of vessels. Uncertainties associated with the process of cutting and toppling the upper sections of wall results in a 66% chance that one or more walls might collapse in an uncontrolled manner. This is approximately 660 times greater than the acceptance criterion and is considered unacceptable. In the event of a major accident, the additional works to achieve the 55m draught would be extremely hazardous resulting in a significant increase in the risk to personnel. The total cost of the work would also be substantially increased. Additionally, this method of decommissioning MCP-01 is not considered desirable by both the UK and Norwegian fishing industries, due to the danger it represents to fishing activity.

Risk to personnel

During the anticipated activities to allow a clear 55m draught above the remaining substructure, the probability of a fatality has been estimated as being in the order of 53% (approximately 1 in 2). This is a very high risk. The average fatal accident rate is estimated to be in the order of 47 which is well above the maximum tolerable limit and approximately 3.6 times higher than the average risk to workers on MCP-01 when it was fully operational.

Environmental impact

The –55m option is judged to have a “moderate negative” impact on fisheries.

Cost

The cost of cutting the concrete substructure of MCP-01 down to –55m, if possible, has been estimated to be approximately £461m / 5,532 MNOK assuming that no major accidents occur and the operations go as planned. There is however a significant possibility that the cost could increase due to the number of technical uncertainties. The risk of fatalities during the operation following an accident would increase the cost significantly.

Stakeholders concern

Some stakeholder groups have expressed that cutting down to –55m would not be a preferred alternative compared to full removal to shore if it can be done in a safe manner.

Overall assessment

Due to the risk to personnel, the uncertainties associated with the decommissioning operations and the fact that this solution is also unattractive to some stakeholders, particularly the fishing industry, it is recommended that this alternative be rejected.

8.13.4 Alternative D – Leave the concrete substructure in place

Technical Feasibility

No significant technical problems associated with the work have been identified. The work is not considered to involve any unusual technical risk, and the risk of not being able to complete the planned work tasks is considered to be very low. The steelwork on the outside of the concrete substructure will be removed as much as reasonably practical to avoid risk of corroded steel items falling onto the seabed where they could be a hazard to fishermen.

Risk to Personnel

The risk of a fatality during the removal of the external riser and support frame is less than 1% which is considerably less than the other alternatives. The average fatal accident rate as estimated as 7 on the basis that the subsea steelwork removal work can be undertaken using ROVs.

Environmental impact

The concrete substructure is not polluted by hydrocarbons or other chemicals or materials and thus there is judged to be an insignificant level of discharge to the marine environment. It is important to note that cleaning of the MCP-01 concrete substructure is not required, as it has never been used for the storage of crude oil.

The predicted environmental impact if the substructure was left in place has been estimated as small apart from the obstruction caused to fishing vessels and other users of the sea and a possible effect on habitats. Quantitative assessments indicate that the probability of vessels colliding with the MCP-01 concrete substructure is, however, relatively low and appropriate risk reducing measures will be taken (see Section 9 and Section 14.3 for mitigating measures).

The EIA Report concludes that Alternative D represents the Best Environmental Option from a total environmental perspective.

Cost
The cost of leaving the concrete substructure in place is estimated to be around £11.7m / 140 MNOK covering the removal of external steel, debris clearance and various on-site surveys to document the conditions upon completion of the decommissioning programme.

Stakeholders concern
If it can be documented that full removal of the concrete substructure is technically unfeasible or inherently unsafe, then the leave in place option would be preferred above deep water disposal and cut down to –55 meters respectively.

Overall assessment
Leaving the concrete substructure in place is therefore considered to be the best solution when considering health and working environment, safety, environmental aspects, cost and stakeholders concern.

8.13.5 Comparison of Disposal Alternatives

The predicted consequences, in terms of safety, environmental impact and cost, of adopting the main disposal alternatives considered, are summarised in Figure 8.9. This table does not include the removal and offshore disposal alternative (Alternative B), as the implications are rather similar to the removal and onshore disposal alternative (Alternative A). In addition society's general aversion to offshore dumping makes this alternative unattractive.

	Remove and Dispose Onshore		**Cut Down to –55m**		**Leave in Place**	
	As Planned	**Major Unplanned Event**	**As Planned**	**Major Unplanned Event**	**As Planned**	**Major Unplanned Event**
Technical Feasibility Probability of a major unplan ned event		Probability In the order of **60%** i.e. 600 times greater than acceptance criterion		Probability in the order of **66%** i.e. 660 times greater than acceptance criterion		No potential for major unplanned event
CONSEQUENCES						
Safety Probability of a Fatality	**47%**	**50-70%**	**53%**	**62-73%**	**< 1%**	**-**
Impact on Environment Total Energy Impact (1000GJ)	**1980**	**2300-3700**	**770**	**2700-3900**	**410**	**-**
CO_2 Release (1000 tonnes)	**137**	**157-260**	**33**	**190-280**	**4**	**-**
Physical I mpact on Environment	**"Moderate Negative"**	**"Moderate Negative" plus "Small Negative"**	**Moderate Negative"**	**"Large / Moderate Negative"**	**"Moderate Negative"**	**-**
Cost £m / MNOK	**£446m/ 5359MNOK**	**£500-820m/ 6000-9840 MNOK**	**£461m 5539 MNOK**	**£530-560m 6360-6720 MNOK**	**£11.7m 140MNOK**	**-**

Figure 8.9 Predicted Consequences of Disposal Alternatives A, C and D for MCP-01 Concrete Substructure

8.14 Recommended Disposal Arrangements for the Concrete Substructure

Based on the extensive comparative assessment made of the disposal alternatives for the MCP-01 concrete substructure, the following is recommended:

After the topsides facilities of MCP-01 platform have been removed and brought onshore for disposal, the concrete substructure (including the concrete deck beams) should be suitably marked and left in place after the removal of the external steelwork. As much as practicable of the equipment and materials removed from the concrete substructure will be reused or recycled.

The UK Hydrographic Office will be notified of the position and status of the concrete substructure to enable the relevant Admiralty charts to be updated.

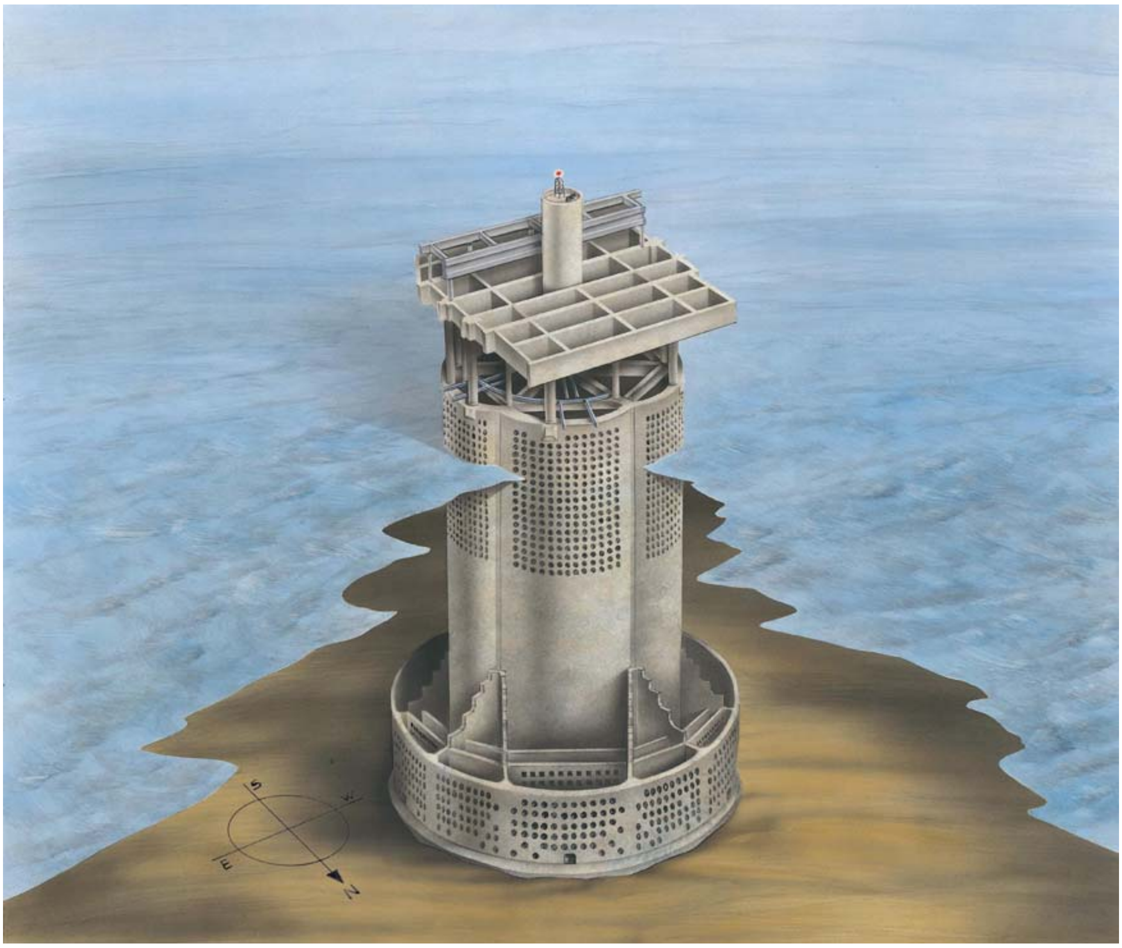


Figure 8.10 Recommended Decommissioned Condition of the MCP-01 Concrete Substructure after Removal of Topside and External Steelwork

Section References

8.1 "MCP-01 Disposal Study – Executive summary report", Doris Engineering, Report no. 65-1733-MC-01, rev. 1, dated 15.04.03.

8.2 "MCP01 Disposal Study – Final report", Doris Engineering, Report no. 65-1733-MCP01-Final Report, rev. 2, dated 15.04.03.

8.3 "MCP-01 Disposal Study – Design criteria – Design premises", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0001, rev. 2, dated 26.03.03.

8.4 "MCP-01 Disposal Study – Option No. 1 – Leave in place", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0002, rev. 2, dated 26.03.03.

8.5 "MCP-01 Disposal Study – Option No. 2 – Outline method statement", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0003, rev. 2, dated 26.03.03.

8.6 "MCP-01 Disposal Study – Option 2 – List of steel items to be removed", Doris Engineering, Report no. 65-1733-MCP01-SS-F-0001, rev. 2, dated 26.03.03.

8.7 "MCP-01 Disposal Study – Option 3 – Partial platform demolition – outline method statement", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0004, rev. 2, dated 26.03.03.

8.8 "MCP-01 Disposal Study – Option No. 3 & 4 – Removal of solid ballast", Doris Engineering, Report no. 65-1733-MCP01-DI-E-0002, rev. 1, dated 26.03.03.

8.9 "MCP-01 Disposal Study – Option 4 – Assessment of mechanical systems", Doris Engineering, Report no. 65-1733-MCP01-PI-E-001, rev. 2, dated 26.03.03.

8.10 "MCP-01 Disposal Study – Option 4 – Structural strength assessment", Doris Engineering, Report no. 65-1733-MCP01-SC-D-0001, rev. 1, dated 26.03.03.

8.11 "MCP-01 Disposal Study – Disposal options - Scheduling", Doris Engineering, Report no. 65-1733-MCP01-DI-I-0001, rev. 2, dated 25.03.03.

8.12 "MCP-01 Disposal Study – Option 3 – Methods of cutting the upper part of the GBS", Doris Engineering, Report no. 65-1733-GEN-DI-E-0001, rev. 1, dated 26.03.03.

8.13 "MCP-01 Disposal Study – Option No. 4 – On-bottom stability during removal steps", Doris Engineering, Report no. 65-1733-MCP01-WT-D-0004, rev. 1, dated 26.03.03.

8.14 "MCP-01 Disposal Study – Option No. 4 – Structural assessment during removal steps", Doris Engineering, Report no. 65-1733-MCP01-SC-D-0002, rev. 1, dated 26.03.03.

8.15 "MCP-01 Disposal Study – Option No. 3 – Structural assessment", Doris Engineering, Report no. 65-1733-MCP01-SC-D-0003, rev. 1, dated 26.03.03.

8.16 "Cessation Project – Platform MCP-01 – Review of structural strength assessment", SINTEF Memo, Project No. 227133.00, dated 15.07 2003.

8.17 "Review of the disposal study of the MCP-01 platform", Norwegian Geotechnical Institute (NGI), dated 27.04.2003.

8.18 "MCP01 Disposal study", Noble Denton, Report No.L19924/NDE/JR, rev. B, dated 12.06.04.

8.19 “Confirmation of review of reports concerning disposal of MCP-01 concrete substructure”, Professor Dr.-ing. Peter Schiessl, dated 10.07.2003.

8.20 “MCP01 – Comments on Disposal Study prepared by Doris Engineering” K. Hove, Det Norske Veritas, dated 13.06.03.

8.21 “Minutes of Meeting, MCP01 , 2nd Workshop, MCP-01 Technical Risk Assessment”, 12 and 13 May 2003, at COWI in Copenhagen.

8.22 “Disposal of MCP-01 concrete substructure – Technical risk assessment” COWI Report, Ref. no. P 57124-A-001, dated November 2003.

8.23 “Disposal of MCP-01 concrete substructure – Comparison of the results from the technical risk assessment for CDP1 and MCP-01”, COWI Report, Ref. No. 57124A-201, dated 05.03.2004.

8.24 “MCP-01 Decommissioning Study”, Fugro GEOS, Ref. No. C50256/2845/R2, dated April 2003.

8.25 “MCP01 Disposal study – Review of –55m option”, Stolt Offshore, Report No. RE-613017-019, rev. 3.0, dated 28 02.2003.

8.26 “Evaluation of Residual Lifetime for the MCP-01 Gas Booster Platform in the North Sea”, SINTEF Report, STF22 F03604, dated 29 April 2003.

8.27 “MCP01 – Platform disposal options safety evaluation”, SAFETEC, Doc. No. ST-20367-RA-1-Rev 01, dated September 2003.

8.28 “MCP-01 Ship Collision Risk Assessment”, Anatec UK Limited Report, Ref. A1212-TOT-CR-1, dated 31 March 2004.

8.29 “Frigg Field Cessation Plan”, TOTAL E&P NORGE AS, dated 9 May 2003.

8.30 “Assessment of future technologies for safe removal of MCP-01 concrete substructure”, Dr. Tech. Olav Olsen a.s, Doc. No. 2698/001, rev. B, dated 30.07.04.

9. Mitigating Measures

A number of mitigating measures have been identified in Section 9 of EIA Report in this MCP-01 Decommissioning Programme. The suggested measures (not by order of priority) related to the recommended disposal arrangements for MCP-01 and the planned actions are detailed in Table 9.1.

Mitigating Measure Suggested by DNV	Planned Action
Clean-up of seabed debris to eliminate the risk of damage to fishing gear, and to reduce the potential for littering. This should be planned as a three stage process – identification, removal and verification.	All these activities will be undertaken as described in Section 13 of this Disposal Plan.
Install and maintain navigation aids on the substructure if left in place to prevent the occurrence of dangerous situations with passing vessels.	The plan for aids to navigation is described in Section 14.3 of this Disposal Plan.
Removal of external steelwork on the concrete substructure if left in place to limit the obstruction and risks to fisheries.	All steelwork attached on the outside of the concrete substructure which it is proposed to leave in place, will be removed as far as is reasonably practicable.
Comply with the implemented ISO 14001-certified EMAS to ensure that continuous improvement and openness are key parts of the planning and execution of all work associated with the decommissioning of MCP-01.	The EMAS system will be used to achieve the defined objectives.
Steel items covered with polyurethane paint should be identified before demolition. Cutting with thermal means will cause release of isocyanates, which could cause serious harmful effects to humans.	For offshore work, TOTAL E&P UK has in place procedures to prevent personnel being exposed to isocyanates when cutting polyurethane painted items. TOTAL E&P UK will make the contractor who is responsible for the onshore demolition work, aware of the possible presence of polyurethane paint so that suitable protective measures may be taken.
Sound material and waste management with optimal reuse/recycling is considered very important, and a stretched target for reuse/recycle should be considered. A dedicated waste handling module capable of tracking all waste fractions has been developed to be included in the EMS environmental accountancy system.	Comprehensive material and waste management procedures will be implemented.
Contractual arrangements should be made with onshore disposal contractor to ensure that aesthetic effects are mitigated.	Suitable clauses will be included in the contract with the disposal contractor.
Discuss liability issues with the authorities in respect to any facilities left in place.	The issue of future liability is discussed in Section 15 in the Disposal Plan.

Table 9.1 Mitigating Measures Proposed in the Environmental Impact assessment and Planned Actions

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10. Public Consultation

10.1 General

The consultation process and, in particular, the input from interested parties is an integral part of the development of an acceptable decommissioning solution for MCP-01. The views and concerns of all stakeholders are important to TOTAL E&P UK and the company is keen that the process is seen to be fair and open from the planning phase of the decommissioning through to execution.

This section provides an overview of the statutory and wider public consultation processes that are being undertaken for MCP-01 as well as the key milestones and a summary of the outcome of the process.

Although MCP-01 is located in UK waters, the structure is part of the Frigg Transportation System and, as such, comes under the Frigg Treaty. The Treaty was set up to manage the exploitation of the Anglo-Norwegian field. Therefore, the UK and Norwegian governments have agreed to a joint approach to the decommissioning of MCP-01.

The statutory consultation process mainly involved stakeholders in the UK with a limited consultation in Norway following advice from MPE, since MCP-01 is located in UK waters. Figures 10.1 and 10.2 show how the statutory consultation process takes place in the UK and Norway. In addition TOTAL E&P UK is engaging a wider consultation to involve stakeholder groups that may have an interest in following the decommissioning of MCP-01.

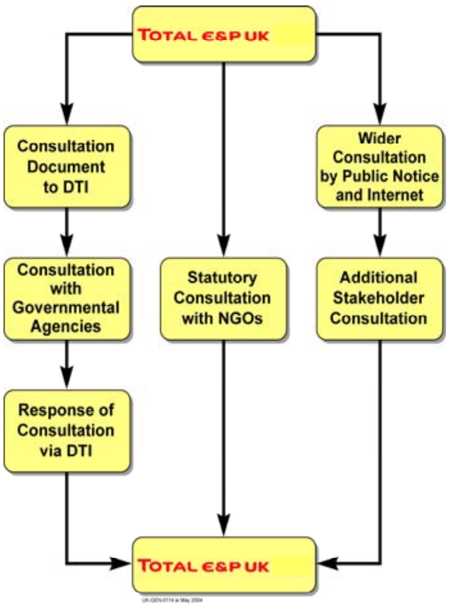

Figure 10.1 Public Consultation in the UK

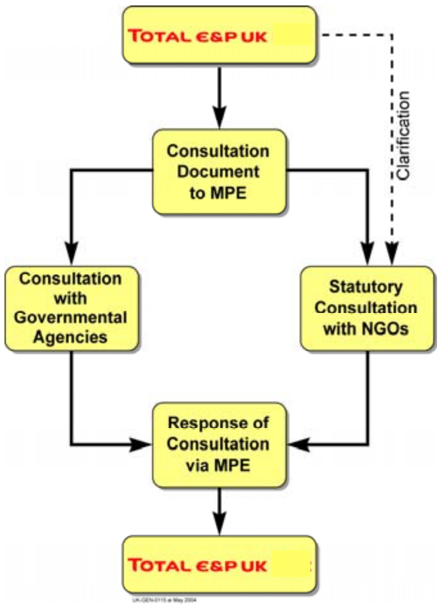

Figure 10.2 Public Consultation in Norway

The statutory consultation focused on the Second Draft of the Decommissioning Programme document itself and regulatory guidelines in both the UK and Norway stipulate which organisations should be consulted. In the UK the requirements are specified under the provisions of Section 29(3) of the Petroleum Act 1998 and statutory consultees are given 30 days in which to comment. Since the decommissioning of MCP-01 also involves statutory consultees in Norway where the practice is a 90 day consultation period, an agreement was reached by the two governments that, exceptionally for MCP-01, the period for stakeholders to respond on the statutory consultation of the Second Draft would be 45 days.

In addition to the statutory process, a much wider group of mainly UK stakeholders were invited to participate in the consultation process and contribute to developing an acceptable outcome.

10.2 MCP-01 Public Consultation Process

Since the regulatory review of decommissioning in 1998, a number of large platform decommissionings have been undertaken or are in the process of being completed, including Maureen, Ekofisk, Hutton TLP and Frigg. All four decommissionings have involved lengthy interested party consultation, often with the same stakeholders. Although each of the fields had its own particular challenges, stakeholders now have far more information and familiarity with generic decommissioning issues in respect of large offshore structures in the North Sea. Many of the concerns raised by stakeholders over the last five years have now been addressed and integrated into the normal business of decommissioning.

With this in mind, TOTAL E&P UK is concerned that stakeholders do not become disenchanted with the consultation process through information and communication overload. However, each structure has issues which are unique and which need to be addressed. Consultation therefore plays a very important part in evaluating the decommissioning alternatives for MCP-01 and ensuring that the company has not missed any important issues or made any assumptions that do not sit comfortably with interested parties.

The consultation process for MCP-01 has therefore ensured that interested parties are consulted on how the consultation process itself is conducted as well as issues relating to MCP-01. Dialogue is tailored to each of the stakeholders who have committed to participating in the process and includes e-mails and letters, fact sheets, face-to-face meetings, and when appropriate round-table discussions at key milestones. General information and consultation documents are published on the TOTAL Corporate web site for the UK: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp

Figure 10.3 shows, in diagrammatic form, how the consultation process is being carried out simultaneously in the UK and Norway.

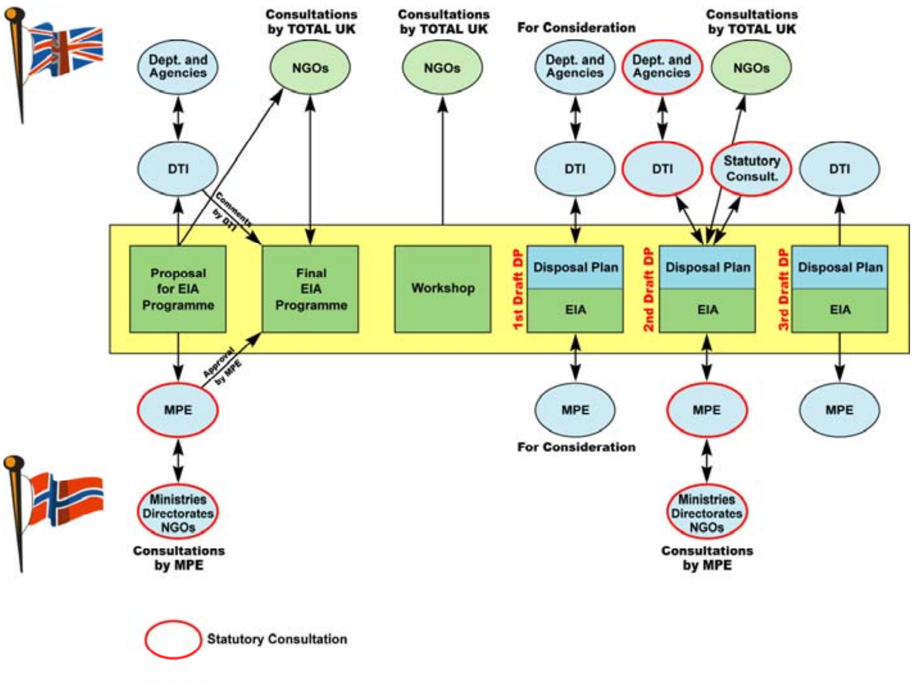

Figure 10.3 Decommissioning Consultation and Approval process in the UK and Norway.

10.3 Stakeholder Dialogue and Statutory Consultation Process

Stakeholder Dialogue

During the development of the MCP-01 Decommissioning Programme efforts have and will continue to be made to ensure that an open and transparent dialogue takes place with all interested parties. Stakeholder responses to the letters advising of the decommissioning of MCP-01 and the public announcement which appeared in key publications in January 2004, have identified those stakeholders with a particular interest in participating in the decommissioning consultation process. However, the process continues to be open to as many stakeholders as are interested in following the decommissioning of MCP-01.

To date the consultation process has focused on a number of aspects, including:-

- ensuring that stakeholders continue to view the consultation process as fair and open
- the technical uncertainties surrounding the decommissioning of the concrete substructure
- the presentation of the MCP-01 Environmental Impacts Assessment (EIA)

It is intended to continue dialogue with stakeholders throughout the planning and implementation phases of the MCP-01 decommissioning process.

Consultation with stakeholders is being carried out in a number of ways, see Table 10.1 below:

Method	Description
Web site	All documents of interest to stakeholders are posted on the MCP-01 Decommissioning web site which can be found at: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp Stakeholders are invited to comment or request further information on the documents posted on the web site via e-mail.
Advertisements	A series of advertisements were placed in key UK and international publication to identify as wide a range of stakeholders as possible, and to raise awareness that plans for the decommissioning of MCP-01 were being prepared.
Fact Sheets	Fact sheets are published and sent to stakeholders as well as posted on the web site.
Face to face meetings	Regular meetings are held with interested stakeholders to discuss issues of concern.
Workshop	Informal round-table discussions are held with key stakeholder groups to discuss issues of concern.
Letters, e-mails, telephone calls	On-going dialogue is conducted with all stakeholders as required. Feedback is welcomed at every stage.
Formal Consultation	A copy of the Second Draft of the MCP-0-1 Decommissioning Programme was sent to all main stakeholders (including statutory consultees) for their comments as part of the statutory consultation process. Wider groups of stakeholders were advised by letter that a copy of the document is available for downloading from the TOTAL E&P UK web site.

Table 10.1 Methods of Communication with Stakeholders

A video animation has been prepared to illustrate the uncertainties associated with attempting to refloat, or cut down the concrete substructure. This video is being used during discussions with stakeholders to explain and show the problems involved.

Statutory Consultation Process

In preparation for the formal consultation period, a First Draft of the MCP-01 Decommissioning Programme was sent to both the UK (DBERR) and the Norwegian (MPE) authorities for their consideration. In accordance with national practices, UK governmental organisations were invited by the DBERR to consider the First Draft. In Norway comments from governmental organisations are only sought on the Second Draft of the document. The MPE requests comments from external stakeholders on the Environmental Impact Assessment only, while in the UK, stakeholders are asked to comment on the decommissioning programme. Section 10.5 and Annex D give a summary of the written responses received following the statutory consultation on the Second Draft.

10.4 Consultation Milestones

Table 10.2 below lists each of the key consultation milestones to date, chronologically:

Date	Milestone	Description
March/April 2003	Face to face meetings	Informing the main stakeholder groups that TOTAL E&P UK was considering an early decommissioning of MCP-01
Jan 2004	Public Announcement	A public announcement was placed in 14 key UK national, regional and specific interest publications to ensure that a wide group of stakeholders were made aware that the consultation around MCP-01 had begun and inviting them to participate in the process.
Jan 2004	Dedicated MCP-01 Internet page launched	An internet page providing background information and links to key documents was developed to ensure that all stakeholders have access to all the information. See the dedicated website: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp
Jan 2004	Letters, information pack and reply form	49 letters with an information pack were sent to existing and statutory stakeholders inviting them to participate. A reply form was included to ascertain the stakeholders' level of interest so that contact by the company is tailored to their wishes.
Jan 2004	EIA Scope of Work	Stakeholders were invited to comment on the MCP-01 proposed scope of work for the Environmental Impact Assessment on 7 January. Although not a statutory requirement in the UK, TOTAL E&P UK was keen to provide stakeholders with the option to participate in the planning of the EIA at the earliest opportunity. Responses were requested by 9 February 2004. Annex A reports on the responses received.
Feb 2004	EIA Scope of Work consultation	Meeting with the Fishermen's organisations (SFF and NFFO)
Mar 2004	Approval of the EIA Programme	A formal approval of the EIA Programme was issued by MPE.
May 2004	Workshop in London	Key stakeholders groups were invited to an informal round table discussion of MCP-01 decommissioning issues. See Annex B for a Summary Note from the meeting.
September 2004	First Draft of MCP-01 Decommissioning Programme	Submitted to the DBERR and the MPE for consideration. Annex C reports on the comments received.
9 March – 25 April 2005	Statutory Consultation on the Second Draft of MCP-01 Decommissioning Programme	Submitted to consultees both in the UK and Norway. See Annex D for a detailed description of the written responses received.

Table 10.2 Consultations Milestones

March/April 2003
During Spring 2003, TOTAL advised the main stakeholder groups that an early decommissioning of MCP-01 was being considered. It was thought important to ensure that stakeholders became involved at the earliest possible stage.

January 2004
The owners' decision in December 2003 to bypass the pipelines running through MCP-01 made an early decommissioning of the platform possible and the public consultation was therefore launched on January 7th 2004. The stakeholders were formally advised that TOTAL E&P UK was preparing to decommission the structure which had come to the end of its useful life.

March 2004
A formal approval of the EIA Programme was issued by MPE with reference to the Norwegian Petroleum Act.

May 2004 Roundtable Discussion
An informal roundtable discussion meeting was held on May 27th, 2004 with the main stakeholder groups at the TOTAL offices in London. The aim of the meeting was to ask stakeholders for their views and concerns regarding the different decommissioning alternatives for MCP-01.

The participants included representatives from fishermen, environmental, regulator and academic organisations and two members of the public. The meeting was chaired by an independent facilitator to ensure the consultation process remained fair and balanced for all concerned.

The meeting began with a review of the main stakeholder concerns raised around the decommissioning of the concrete platforms at the Frigg field and how TOTAL has been addressing these.

Presentations and discussion then focused on the particular technical and safety issues relating to the disposal alternatives for the MCP-01 substructure. Participants were shown an animated video describing the potential difficulties that would be encountered in attempting to remove all, or part, of the structure from its present location.

A draft of the EIA Report had been sent to the participants prior to the meeting, which was also discussed following a presentation by Det Norske Veritas (DNV) who carried out the assessment for TOTAL E&P UK.

A full summary of the meeting and comments made by the participants has been recorded by the facilitator and circulated to stakeholders to ensure that all comments have been captured fairly. A summary note issued by the facilitator is included in Annex B in this Decommissioning Programme. The summary has also been posted on the MCP-01 web page: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp

September 2004
First Draft of MCP-01 Decommissioning Programme was submitted to the UK Department for Business, Enterprise & Regulatory Reform and the Norwegian Ministry of Petroleum and Energy for consideration. Annex C summarises the comments received from the UK Governmental organisations.

March/April 2005
The statutory consultation period of the Second Draft of the MCP-01 Decommissioning Programme was launched on 9 March 2005 and ended on 25 April 2005. The UK's usual 30-day consultation period was extended to 45 days to accommodate the Norwegian stakeholders who would normally have a much longer consultation period. See also Section 10.5.

10.5 Stakeholders Response to the Formal Consultation on the Second Draft of MCP-01 Decommissioning Programme

Key issues Raised by Stakeholders
An analysis of the written responses received from the statutory consultation shows the following issues to be the most important to the stakeholders:

1. The fishermen's organisations' preferred disposal alternative is a full removal to shore for disposal; while some appreciate the risks involved in such an operation.

2. The question of long term liability and the need for establishing a Fishermen's Trust Fund.

3. The need for appropriate marking of the concrete substructure if left in place.

4. The need for ongoing monitoring if the concrete substructure is left in place.

Annex D in this Decommissioning Programme summarises in more detail the written responses received with comments from TOTAL E&P UK.

1. Full removal of the concrete substructure
The owners of MCP-01 recognise the "presumption for removal" of all disused installations in the OSPAR Maritime Area. Therefore the first alternative investigated was a full removal for onshore disposal of the concrete substructure.

Comparative assessment with the other identified disposal alternatives have fully complied with the requirements of the OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations. The studies which form the basis of the assessment have been the subject of verification and peer review from a number of independent experts.

Section 8 in the Disposal Plan and the Environmental Impact Assessment Report set out the significant reasons why the "leave in place" alternative is considered as the preferred disposal arrangement for MCP-01 after it has been suitably marked and navigation aids installed.

2. Long term liability and associated funding
The MCP-01 concrete substructure will remain the property and responsibility of the MCP-01 owners if given a permit to be left in place; see also Section 15 in the Disposal Plan.

However, it is the intention of the owners of MCP-01 to enter into dialogue with the authorities at an appropriate time in order to determine suitable arrangements regarding future liabilities in respect of the MCP-01 concrete substructure.

The present dialogue between the SFF and NFFO and the UK Offshore Operators Association (UKOOA) to establish a Fishermen's Trust Fund, should be considered as a separate process and should not be linked to the approval process for an appropriate disposal arrangement of the MCP-01 concrete substructure.

3. Appropriate marking
Navigation aids will be built and installed on top of the concrete substructure in accordance with specifications issued by the UK Northern Lighthouse Board. The basis for the design will be based on the experience from a full scale test offshore on the Frigg Field where performance and availability will be tested; see also Section 14.3 in the Disposal Plan.
To assist the fishermen it is further planned to modify the UK "FishSAFE" data base to show the post-decommissioning of the concrete substructure.

The UK Hydrographic Office will be notified of the position and status of the concrete substructure to enable the relevant Admiralty charts to be updated.

4. Monitoring

A survey to document the environmental conditions at MCP-01 will be performed at the end of the decommissioning work. The condition of the concrete substructure will also be recorded. The requirements for further surveys will be discussed with the authorities depending on the results of these surveys.

Regular surveillance will be carried out to check that the navigation aids are operational. The navigation aids will be designed in such a way as to allow them to be changed from a helicopter, thus obviating the need to man the platform for this purpose.

A visual check on the above water condition of the concrete substructure will be undertaken and recorded when the aids to navigation are being checked by helicopter. The implications of any observed deterioration of the substructure, in relation to the safety of users of the sea, will be assessed and any required action determined in consultation with UK and Norwegian authorities. The UK Hydrographic Office will be informed of any deterioration which may result in falling debris causing an obstruction.

Section 14. in the Disposal Plan outlines the plans for the post-decommissioning monitoring and maintenance.

10.6 OSPAR Consultation Process

OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations generally prohibits the leaving in place of offshore installations. However provisions, by way of derogation, are included for certain categories of installations (e.g. a concrete substructure), provided there are significant reasons why leaving it in place is preferable to reuse or recycling or final disposal on land.

The reasons for seeking a derogation need to be set out in an assessment, as defined in Annex 2 to the OSPAR Decision 98/3 entitled "Framework for the Assessment of Proposals for the Disposal at Sea of Disused Offshore Installations".

In view of the recommendation by the MCP-01 owners that the concrete substructure of MCP-01 should be left in place, an assessment in accordance with Annex 2 was prepared and submitted to the UK and Norwegian authorities. In line with the integrated approach to the decommissioning of the MCP-01 facilities, a common assessment document was prepared (Ref 10.1). This assessment document may be viewed on TOTAL E&P UK's website: www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp

The UK Department for Business, Enterprise & Regulatory Reform and the Norwegian Ministry of Petroleum and Energy informed the OSPAR Executive Secretary in separate letters dated 23 May 2006 that they were considering issuing a permit, under paragraph 3b of OSPAR Decision 98/3, for the disposal of the MCP-01 concrete substructure within their jurisdiction at its current location.

The OSPAR Executive Secretary sent the assessment, together with letters from the Norwegian Ministry of Petroleum and Energy and the UK Department for Business, Enterprise & Regulatory Reform, to all the OSPAR Contracting Parties on 26 May 2006.

By the end of the 16-week consultation period no objections had been received to either the UK Department for Business, Enterprise & Regulatory Reform or the Norwegian Ministry of Petroleum and Energy issuing permits in accordance with paragraph 3b of OSPAR Decision 98/3 in respect to the MCP-01 concrete substructure. Two Contracting Parties raised some points for consideration, among which were the following:-

- The need to ensure that the concrete substructure is properly marked to warn other users of the sea.
- The need to consider possible measures to ensure the safety of users of the sea when the concrete substructure starts to disintegrate.

These matters have been addressed during the preparation of the MCP-01 Decommissioning Programme and, in accordance with OSPAR Decision 98/3, will be subject to the terms of the permits to be issued by the UK and Norwegian authorities.

Details of points raised by the Contracting Parties during the OSPAR consultation process may be found in Annex E, together with the comments of TOTAL E&P UK.

Section References

10.1 "MCP-01 Concrete Substructure – An Assessment of Proposals for the Disposal of the Concrete Substructure of Disused MCP-01 Installation", dated 10 February 2006.

11. Schedule

11.1 Proposed Schedule for Undertaking the Recommended Disposal Activities

As outlined in Section 7, the removal of the MCP-01 topsides and onshore disposal is integrated into the same offshore removal and onshore disposal contract as the Frigg Cessation Project.

By summer 2005 the preparatory offshore work campaigns under the responsibility of TOTAL E&P UK was completed (see also Section 7.3.1). During 2006 a number of campaigns took place to facilitate required inspection and preparation for the removal contractor.

The removal of the MCP-01 topside facilities commenced in July 2006 (see also Section 7.3.2). During the removal campaigns a flotel with a bridge connection to MCP-01 is stationed next to the platform.

It is planned to complete the offshore removal of the topside facilities during 2008 with a short lifting campaign in 2009 to lift off cranes and temporary equipment. During this period the permanent aid to navigation is planned be installed. The corresponding onshore disposal is planned to be completed by the end 2009.

The Talisman riser, umbilical caisson and supporting steel structure attached to the external concrete wall of the substructure is planned to be removed during the period 2008 to 2010.

The debris clearance within a 500m zone around MCP-01 is planned to be completed during 2009/2010 following the completion of the offshore removal works, and will be combined with a survey of the concrete substructure. A seabed survey will also be completed during this period which will include seabed sampling. The final trawling test will then be performed in 2010.

It is therefore assumed that the recommended programme of disposal activities will be completed by 31 December 2010 as shown on Figure 11.1. The offshore removal and onshore disposal activities for the topside facilities on MCP-01 are shown in yellow, starting with onshore engineering in November 2004.

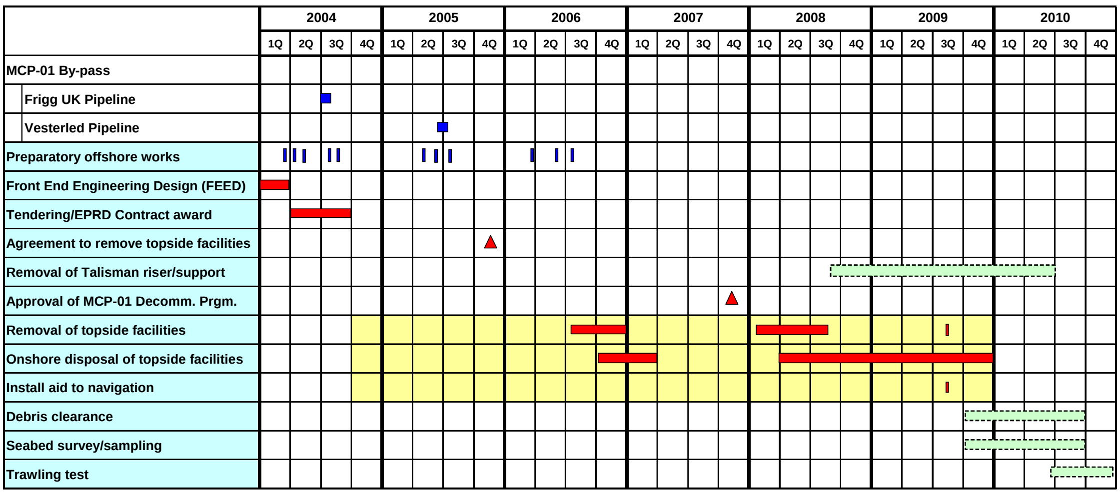

Figure 11.1 Proposed Schedule for Recommended Disposal Activities

11.2 Early Removal of Topside Facilities

TOTAL E&P UK received the UK and Norwegian Governments' agreement in November 2005 for the early removal of the topside facilities. This agreement followed the statutory consultation as outlined in Section 10 and shown on the schedule in Figure 11.1. This agreement is necessary for the MCP-01 work to be integrated into a cross-border project with the Frigg Cessation Project. Collaboration between two TOTAL affiliates will gain maximum synergy effects. The basis for this application was the issue of the Third Draft of the Decommissioning Programme reflecting the comments received from the public consultation.

The removal of the topside facilities before obtaining approval of the full MCP-01 Decommissioning Programme does not prejudice the assessment of decommissioning alternatives applicable to the concrete substructure. Before attempting a possible refloat of the substructure all the topsides and most of the ballast inside the external wall would have to be removed in any case. See also Section 8. Figure 11.2 shows the tow-out of MCP-01 in 1976 illustrating that present topside facilities were installed offshore after the platform was resting on the seabed.

Figure 11.2 Tow-out of MCP-01 in 1976

11.3 Preparatory Activities

The removal activity on MCP-01 can only begin after the Frigg UK pipeline, the Talisman pipeline and the Vesterled pipeline have been rerouted around MCP-01 as explained in Section 2.5. Following the bypass of the Talisman pipeline in 2004, the cleaning of the topsides could commence. Since the platform was modified to a normally-not-manned operation in 1992, about 90% of the process equipment has been redundant while about 60% of the structure has been operational. The preparatory works were completed late summer 2005 after the Vesterled pipeline was bypassed in June that year.

11.4 Factors Influencing the Proposed Schedule

It is possible that the proposed schedule may be modified in light of changed circumstances. Some of the factors, which may affect the proposed programme of work, are detailed below:

Co-ordination with the Frigg Cessation Project

As explained in Section 7.2, the removal of MCP-01 topsides is integrated into the Frigg Cessation Project. As part of a very large and challenging removal project the contractor, may under certain circumstances, request a different removal sequence and timing that would benefit the overall project.

The other decommissioning activities like final debris clearance, seabed survey/sampling and final trawling tests could at a later stage be incorporated with similar activities on the Frigg Field to save cost.

Contract strategy

In contracting for the removal and disposal activities, a degree of flexibility has been and will continue to be introduced in respect of the execution of work. Past experience indicates that this is also cost efficient for the contractors performing the decommissioning work. Planning flexibility is also advantageous in relation to the onshore disposal work, as it may encourage reuse alternatives.

Reuse considerations

The recommended schedule for disposal works has been prepared before the reuse potential of parts of the MCP-01 facilities have been finalised, which is why the schedule does not take the reuse opportunities fully into account. Even though no reuse alternatives have been identified at this early stage of the project, opportunities may arise and the schedule may be adjusted accordingly.

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12. Project Management and Verification

12.1 Principles

As operator of MCP-01, TOTAL E&P UK will ensure that the commitment to safe and effective operation will continue throughout the decommissioning phase.

The recommended decommissioning programme for MCP-01, except for the offshore removal and onshore disposal of the topside facilities, will be executed under direct project management of TOTAL E&P UK under the principles outlined in Section 12.2.

As a consequence of integrating the removal and onshore disposal of the MCP-01 topside facilities into the Frigg Cessation Project operated by TOTAL E&P NORGE (see also Section 7), a common Project Management System has been established with due consideration of both TOTAL affiliates role and responsibilities. A "Director Cessation Project Frigg and MCP-01" has been appointed with the objective to develop synergies between the Frigg and MCP-01 removal and onshore disposal and award contract(s) for the execution of the works. The Project Director will report to the Managing Directors of TOTAL E&P UK, Aberdeen, and TOTAL E&P NORGE, Stavanger, through a steering committee. Section 12.3 outlines the principles on which this Project Management System will be based on.

12.2 TOTAL E&P UK Management and Verification System

The overall TOTAL E&P UK control mechanism is the integrated Company Management System (CMS) that contains all the necessary elements for the effective management of safety, health, the environment, business and operations. It is the principal means by which TOTAL E&P UK implements its policy on health and safety at work and care for the environment.

The CMS provides the structure for the management of the safety, health, environmental, business and operational elements into one management process for TOTAL E&P UK.

The effectiveness of the safety, health and environmental elements of the CMS are assessed through internal monitoring and independent audit as well as by consideration of Company Key Performance Indicators (KPI).

The CMS encompasses all the procedures and processes that are required to control Company operations or activities and provides guidance on how to translate the policy requirements into practice.

TOTAL E&P UK has not established a stand-alone Quality Management System, as it considers that the necessary elements of quality management (namely stating policy and objectives, establishing controls, performance of auditing and management review) are recognised within this integrated CMS. A summary of the structure and content of the CMS documentation is represented pictorially in Figure 12.1.

Level 1 - Strategy Documents

Level 1 CMS documents establish the high level policies, rules, expectations, objectives, philosophies and management responsibilities for the Company.

Level 2 - Corporate / Technical Support or Multi-Site Documents

Level 2 CMS documents principally detail implementation of the established level 1 CMS strategy for:

- corporate and technical services provided across the Company (e.g. Safety, Health & Environment; Financial Control; Contracts & Procurement; Logistics & Marine; Information Systems; Human Resources; etc.) or
- controls that apply to more than one Operational Site.

Level 3 – Site Specific Documents

Level 3 CMS documents are used to detail the implementation of the established Level 1 CMS strategy requirements for activities that are applicable to a single Operational Site.

Level 4 – Facility Specific Operating Document

CMS documents used to detail the implementation of the established Level 1 CMS strategy requirements that concern a specific Operational Facility. These comprise: Operational Procedures, Temporary Operating Instructions, Intervention Procedures and Site Directives. Level 4 documents are originated, maintained and controlled by the responsible site.

The triangle named E&P Referential refer to the most important reference documents in the TOTAL Group exploration (E) and production (P) activities.

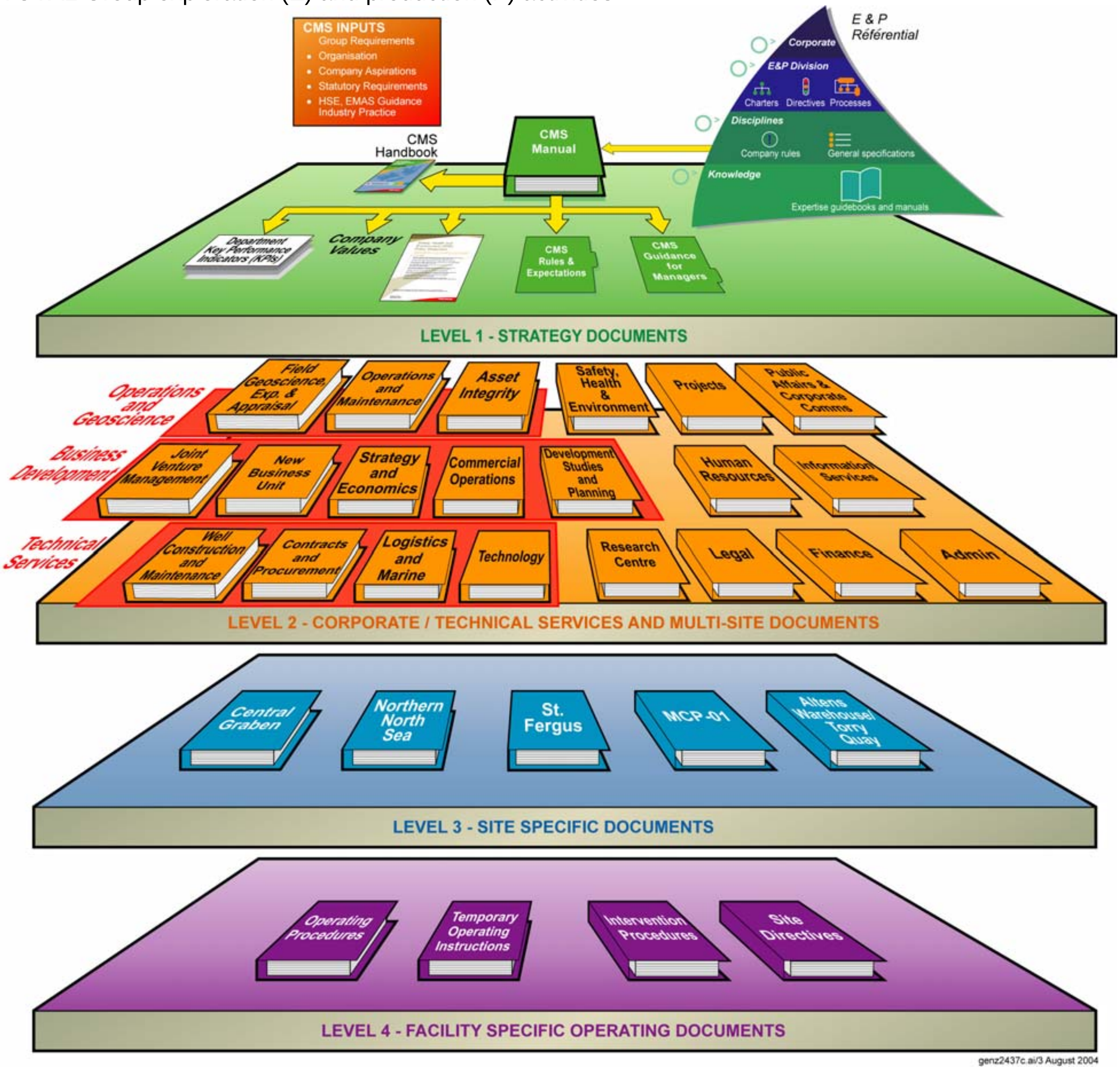

Figure 12.1 The Company Management System (CMS)

The Safety, Health and Environmental (SHE) Policy Statement, see Figure 12.2, endorsed by the Managing Director exists at the highest level within the CMS and is implemented by the CMS Level 1 to Level 4 documents explained previously.

The Company SHE Policy Statement recognises the importance of protecting the safety and health of everyone who works for the Company and the protection of the environments in which we operate. The SHE Policy statement is signed by the Managing Director with copies posted at various prominent positions in all TOTAL E&P UK worksites both offshore and onshore as well as being published within the CMS Handbook.

Safety, Health and Environment Policy Statement

TOTAL E&P UK Limited is committed to conduct its business without causing harm to people, with care for the environment and respecting the principles of sustainable development.

It is our policy to:

- Encourage a positive SHE culture through strong leadership from management and supervision, workforce involvement, personal responsibility and a spirit of openness and co-operation.
- Comply with all legal requirements and TOTAL Group policies.
- Ensure that all risks associated with our operations are identified and controlled and that personnel working on our sites manage these risks to ensure a safe, healthy working environment and the prevention of pollution.
- Strive to achieve continuous improvement by setting measurable SHE objectives and reviewing performance through statistical analysis and audits.
- Work with those industrial and commercial partners who demonstrate a commitment to SHE equal to our own.
- Ensure that employees and contractors are trained and competent to meet the Company's SHE requirements.
- Develop, maintain, and test plans for emergency preparedness.

Compliance with this policy is an important element in the performance evaluation of all employees, particularly those with line management responsibilities.

ROLAND FESTOR
Managing Director
January 2007

TOTAL

Figure 12.2 SHE Policy statement valid for the TOTAL E&P UK activities

TOTAL E&P UK's Environmental Management System (EMS) comprises five key components as illustrated in Figure 12.3: Commitment and Policy, Planning, Implementation and Operation, Checking and Corrective Action and Management Review. The EMS has been designed around the International Standards Organisation (ISO) 14001 and forms an integral part of the CMS. TOTAL E&P UK has achieved formal accreditation to ISO 14001. Reference is also made to Section 2.4.5 in the EIA Report.

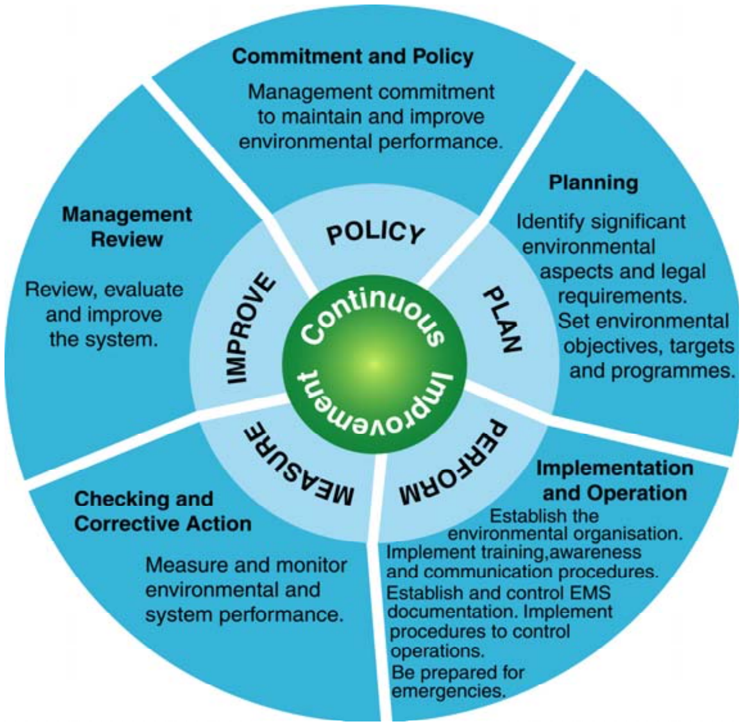

Figure 12.3 TOTAL E&P UK's Environmental Management System Framework

12.3 Common Project Management System for Topsides Removal and Onshore Disposal

The cross-border project, which will cover the removal and onshore disposal of MCP-01 topsides as well as five topsides and three steel substructures on the Frigg Field, will have a common Project Execution Plan describing the project management and verification systems.

It will be based on the document structure valid for TOTAL E&P NORGE (see Section 12.4), but will incorporate the principles laid down in the TOTAL E&P UK Company Management System and SHE Policy Statement as outlined in Section 12.2. A gap analysis will be performed to assist establishing the project's documentation system. Verifications that the appropriate TOTAL E&P UK procedures related to HSE activities and on duty holder role and responsibility are properly implemented in this common system, will be made.

The HSE Management Plan will describe the manner in which health, environment and safety issues will be managed during the execution of the Frigg & MCP-01 Cessation Project.

The EPRD contractor will establish an HSE Programme based on his HSE Management System being subject for approval by TOTAL E&P UK and TOTAL E&P NORGE. An acceptable method for monitoring compliance with the HSE policy and progress against HSE objectives will be implemented. The contractor will also establish a system that systematically identifies hazards associated with the work with an assessment of risk to the health and safety of personnel and the risk to the environment. Necessary measures shall be taken by the contractor to ensure that the risk to personnel and the environment are as low as reasonably practical.

Both TOTAL E&P UK and TOTAL E&P NORGE are committed to sustainable development and to continuous improvement in environmental performance. This commitment extends to all contractors working on the removal and onshore disposal for MCP-01. During the execution of the work, the contractor and its subcontractors will be obliged to record and track the following into an internet based version of the "Total Environmental Accounting and Management System" on a monthly basis:

- All wastes
- Redundant material
- Emission to air
- Discharges to sea
- Accidental releases

The basic philosophy is to handle the waste in a manner that reduces the overall impact on humans and the external environment as much as practically possible with due consideration being given to cost and existing recycle/reuse opportunities for redundant material and waste.

12.4 Document Structure in TOTAL E&P NORGE

TOTAL E&P NORGE AS Shared Principles is the highest-level document in TOTAL E&P NORGE. It details the Vision, Objectives and Strategies of the company, provides Ethical Guidelines for the operation of the company and defines arrangements for the Management of Quality (MQ). The MQ document, within the TOTAL E&P NORGE Shared Principles, gives an overall description of quality management principles in the company.

The Health, Safety and Environment Policy support the TOTAL E&P NORGE Shared Principles

The methods by which this policy is implemented are defined in this document, the Health, Safety and Environment Management System (HSE Management System)

The system documentation within TOTAL E&P NORGE describes actions and activities that need to be implemented and defines how they shall be performed. The documents, which are brief and to the point are, tailored to the user's requirements and are easily accessible either in electronic or paper format.

Specific system documents in TOTAL E&P NORGE fall within two general categories: those with general application throughout the company and those having application only within a particular entity within the company.

For all system documentation the control responsibility is defined regarding verification and approval of the content of documents, distribution, filing / archiving, retrieval, revisions and removal of obsolete documents.

The system documentation at company level describes TOTAL E&P NORGE common targets, values, principles and instructions, which are valid for all employees.

Below the management system documents, the other documents, having general relevance throughout TOTAL E&P NORGE are described, grouped into the following general categories:

- HSE management
- budget control and acquisition of goods and services
- company administration

Below the company level documentation there is a raft of entity specific system documentation. This includes quality manuals, procedures, specifications and guidelines.

Each Asset Team and functional entity prepares and controls the system documentation required for the sustainable performance of the activities of the specific entity. This is undertaken within the framework of the company level system documentation.

The arrangement of TOTAL E&P NORGE's documents structure within a hierarchical structure is shown in the Figure 12.4 below.

<table>
<tr><td>1</td><td colspan="3">TOTAL E&P NORGE AS Shared principles</td><td>Principles</td></tr>
<tr><td>2</td><td colspan="3">Health Safety and Environmental Policy</td><td>Policy</td></tr>
<tr><td>3</td><td colspan="3">Health Safety and Environment Management System</td><td>Management Systems</td></tr>
<tr><td>4</td><td>HSE Management

Principles for Risk Control and Acceptance Criteria

Environmental Specifications (S-GE-00-00-658849)

Working Environment Specifications (S-GE-10-00-0022)

Security Requirements

Onshore Duty Manual</td><td>Budget Control and Acquisition of Goods and Services

Budget Delegation and Decision Making Process

Authority for Approval

Contract and Procurement Procedure

Incoming and outgoing invoices</td><td>Company Administration

Organisation Chart

Interfaces and Entity Descriptions

Personnel Administration Manual

Information Security Manual</td><td>Company specific system documentation</td></tr>
<tr><td>5</td><td colspan="3">Other:
Quality Manuals
Procedures
Specifications
Guidelines etc</td><td>Entity specific system documentation</td></tr>
</table>

Figure 12.4 Document Structure in TOTAL E&P NORGE

Further reference is made to the Frigg Field Cessation Plan, Section 17 in the Disposal Part where the Project Management and Verification documentation for the Frigg Cessation Project is described in principle.

13. Debris Clearance

13.1 Introduction

The objective of the debris removal operation is to remove from the seabed all debris forming a hazard to other users of the sea, within 500 meters of MCP-01. After the clean-up activities have been completed the condition of the seabed will be verified by appropriate surveys and trawling tests.

As shown in the project schedule in Section 11, debris clearing and the subsequent post-clean-up surveys are planned to be the final activities in the decommissioning work.

13.2 Estimated Amount of Debris to be recovered

An estimate of the likely amount of debris on the seabed around MCP-01 is judged as an aid to planning the debris removal operations and onshore disposal activities. The debris on the seabed is likely to have accumulated during the following phases of the field life:-

- Installation and construction activities
- Operations over 28 years
- Removal and disposal activities

Based upon consideration of the activities undertaken during the field life the debris on the seabed within 500-metres of MCP-01 is likely to be in the range of 25 tonnes. This approximate estimate assumes debris originating from marine activity in the area including, supply vessels, support vessels and construction vessels.

It is anticipated that most of the debris around the platform will have originated from the platform itself, whilst debris from marine craft will be scattered more widely within the 500-metre zone.

It is likely that sand movements, over time, covered a certain proportion of the smaller, heavier items.

13.3 Surveys and Debris Recovery

Pre-Debris Removal Survey

After the removal of the topsides facilities as described in Section 7, a pre-debris removal survey will be carried out. The survey will identify the location of the debris within the 500-metre zone.

Debris Recovery

It is envisaged that a diving support vessel will be used for the debris clearance. The majority of the debris will be recovered using remotely operated vehicles, although diver assistance may be required in certain instances. If larger items are encountered it may be necessary to use divers to sling the load for recovery to the surface. Debris recovered from the seabed will be transported to shore for recycling or disposal.

Post Clean-Up Survey

At the end of the debris clearance operation, a post clean up survey will be undertaken by sonar sweep, to document that the seabed is clear. The results from the survey including information on debris recovered will be submitted to the appropriate UK authorities.

Trawling Test

Trawling tests are planned to verify that no obstructions remain in the area that would impede fishing operations. The test programme will be established in co-operation with the fishermen's federations in the UK and Norway to ensure that representative equipment is used in the test. The results from the trawling test and confirmation of clearance of the seabed will be submitted to the appropriate UK and Norwegian authorities.

14. Pre- and Post-Decommissioning Monitoring and Maintenance

14.1 Pre-Decommissioning Surveys

During the summer of 2002 sediment and biota samples were taken from eight locations around MCP-01. The samples were analysed to determine their metal and hydrocarbon contents.

Marine growth samples were also collected from eight locations at various depths on the concrete substructure.

The analysis of the samples taken is given in Section 6 in the Environmental Impact Assessment forming part 2 of this Decommissioning Programme.

14.2 Post-Decommissioning Surveys

At the end of the decommissioning work programme, an environmental survey, including seabed sampling, will be undertaken to document the environmental conditions at the end of the removal and disposal operations.

A survey of the condition of the concrete substructure and the adjacent seabed will also be undertaken at the end of the decommissioning work programme.

The scope for these environmental and condition surveys will be discussed with the DBERR. The results will be submitted to the appropriate UK and Norwegian authorities.

The need for further monitoring activities will then be determined based upon the findings of the surveys and discussions with the relevant parties.

14.3 Installation of Aid to Navigation

Aid to navigation will be installed on top of the central shaft on the concrete substructure recommended to be left in place. The navigation system will be built in accordance with the specification established by the UK Northern Lighthouse Board [Ref. 14.1]. This specification requires 99.8% reliability, solar power and with a maintenance interval of four years.

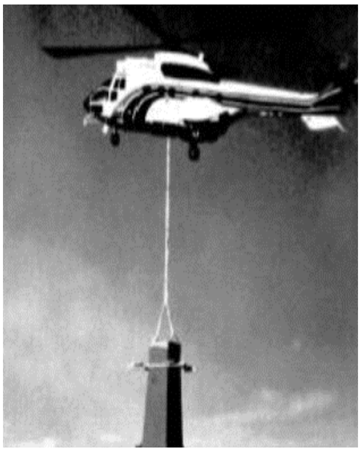

Figure 14.1 Illustration how a helicopter could place the aid to navigation on top of the concrete substructure.

It is expected that the weight of the system including a docking system would weigh about 1000kg. The system will be designed to be installed/removed by use of a helicopter as illustrated in Figure 14.1. The transportation to and from MCP-01 will be with a supply boat.

A prototype system was installed early 2005 on the Frigg Field for testing over a period of six to eight months. Its performance was monitored via satellite from onshore as would be the case when the actual system has been installed.

The Northern Lighthouse Board in Edinburgh was responsible for the monitoring of the prototype during the test period.

After the test period TOTAL E&P UK and the authorities will review the design before fabricating two systems for MCP-01, with one stored onshore as a back up.

14.4 Maintenance

Regular surveillance will be carried out to check that the navigation aids are operational. It is envisaged that the navigation aids will be designed in such a way as to allow them to be changed from a helicopter, thus obviating the need to man the platform for this purpose. Unless and until otherwise agreed with the authorities, the responsibility for the maintenance of the navigation aids remains with the owners of MCP-01.

A visual check on the above water condition of the concrete substructure will be undertaken and recorded when the aid to navigation are being checked by helicopter. The implications of any observed deterioration of the substructure, in relation to the safety of users of the sea, will be assessed and any required action determined in consultation with UK and Norwegian authorities. The UK Hydrographic Office will be informed of any deterioration which may result in falling debris causing an obstruction.

Measures will be taken to ensure that the position of the concrete substructure left in place is correctly identified and marked on relevant charts. To assist fishermen, it is planned to introduce the position of the concrete substructure into the UK “FishSAFE” programme.

The 500m safety zone around the concrete substructure will remain in place during the approved decommissioning work, after which consideration will be given to removing it.

Section Reference

14.1 Specification to: ”Aid to Navigation Engineering for MCP-01 Decommissioning”, issued by the UK Northern Lighthouse Board, dated 4 October 2005.

15. Ongoing Liability

If left in place, the MCP-01 concrete substructure will remain the property and responsibility of the MCP-01 owners. However, both the UK and Norwegian authorities recognise that the question of long-term residual liability should be discussed and agreed with present owners in order that suitable arrangements are made.

It is therefore the intention of the owners of MCP-01 to enter into dialogue with the authorities at an appropriate time in order to determine suitable arrangements regarding future liabilities in respect of the MCP-01 concrete substructure.

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16. Studies Supporting the Disposal Plan

Studies Related to Safety

- "MCP-01 Operational Safety Case", TOTAL E&P UK PLC, rev. 03, dated November 2003.
- "Asbestos Survey of MCP-01", RPS Consultants Ltd, ref. AM5512/4720/AF/HR, dated 10.07.2003.
- "Rules for Planning and Execution of Marine Operations", Det Norske Veritas, January 1996.
- "The Tolerability of Risk from Nuclear Power Stations", UK Health and Safety Executive Report, ISBN 0 11 886368 1, Dated 1988, Revised 1992.
- "Reducing Risks, Protecting People", UK Health and Safety Executive Report, ISBN 0 7176 21510, Dated 2001.
- "MCP01 – Platform disposal options safety evaluation", SAFETEC, Doc. No. ST-20367-RA-1-Rev 01, dated September 2003.
- "MCP-01 Ship Collision Risk Assessment", Anatec UK Limited Report, Ref. A1212-TOT-CR-1, dated 31 March 2004.
- Specification to: "Aid to Navigation Engineering for MCP-01 Decommissioning", issued by the UK Northern Lighthouse Board, dated 4 October 2005.

Studies Related to Topsides

- "Weight report for topside", Aker Kværner /Aker Offshore Partner, Doc. No. RE-MC-75-21-642232, rev. 2, dated 18.07.2003.
- "MCP01 Topsides disposal study", book 1, London Offshore Consultants (LOC), Doc. No. 14700-RP-001, dated 20.05.2003.
- "Feasibility study for the removal of the three heaviest modules with HLV "Stanislav Yudin", Seaway Heavy Lifting Engineering B.V., Doc. No. 47.1154.GE-010, rev. C, dated 11.07.2003.

Studies Related to Concrete Substructure

- "MCP-01 Disposal Study – Executive summary report", Doris Engineering, Report no. 65-1733-MC-01, rev. 1, dated 15.04.03.
- "MCP01 Disposal Study – Final report", Doris Engineering, Report no. 65-1733-MCP01-Final Report, rev. 2, dated 15.04.03.
- "MCP-01 Disposal Study – Design criteria – Design premises", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0001, rev. 2, dated 26.03.03.
- "MCP-01 Disposal Study – Option No. 1 – Leave in place", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0002, rev. 2, dated 26.03.03.
- "MCP-01 Disposal Study – Option No. 2 – Outline method statement", Doris Engineering, Report no. 65-1733-MCP01-GL-E-0003, rev. 2, dated 26.03.03.
- "MCP-01 Disposal Study – Option 2 – List of steel items to be removed", Doris Engineering, Report no. 65-1733-MCP01-SS-F-0001, rev. 2, dated 26.03.03.

- “MCP-01 Disposal Study – Option 3 – Partial platform demolition – outline method statement”, Doris Engineering, Report no. 65-1733-MCP01-GL-E-0004, rev. 2, dated 26.03.03.
- “MCP-01 Disposal Study – Option No. 3 & 4 – Removal of solid ballast”, Doris Engineering, Report no. 65-1733-MCP01-DI-E-0002, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Option 4 – Assessment of mechanical systems”, Doris Engineering, Report no. 65-1733-MCP01-PI-E-001, rev. 2, dated 26.03.03.
- “MCP-01 Disposal Study – Option 4 – Structural strength assessment”, Doris Engineering, Report no. 65-1733-MCP01-SC-D-0001, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Option 4 – Hydrodynamic behaviour at pop-up”, Doris Engineering, Report no. 65-1733-MCP01-WT-D-0002, rev. 2, dated 15.04.03.
- “MCP-01 Disposal Study – Option 2, 3 & 4 – methods for disconnection of flowlines”, Doris Engineering, Report no. 65-1733-MCP01-DI-E-006, rev. 2, dated 26.03.03.
- “MCP-01 Disposal Study – Safety studies report”, Doris Engineering, Report no. 65-1733-MCP01-SF-E-0001, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Disposal options - Scheduling”, Doris Engineering, Report no. 65-1733-MCP01-DI-I-0001, rev. 2, dated 25.03.03.
- “MCP-01 Disposal Study – Option 3 – Methods of cutting the upper part of the GBS”, Doris Engineering, Report no. 65-1733-GEN-DI-E-0001, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Identification of offshore disposal site”, Doris Engineering, Report no. 65-1733-DI-E-0002, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Identification of onshore disposal site”, Doris Engineering, Report no. 65-1733-GEN-DI-E-0003, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Option 4 – Recycling & reuses of equipment & materials”, Doris Engineering, Report no. 65-1733-GEN-DI-E-0004, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Option 4 – Methods for cutting and recycling concrete and steel materials”, Doris Engineering, Report no. 65-1733-GEN-DI-E-0005, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Use of explosives – Environmental assessment”, Doris Engineering, Report no. 65-1733-GEN-EN-E-0001, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Concrete demolition – Environmental Assessment”, Doris Engineering, Report no. 65-1733-GEN-EN-E-0002, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Major waste streams – Environmental assessment”, Doris Engineering, Report no. 65-1733-GEN EN-E-0003, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – End uses/disposal options for concrete – Environmental Assessment”, Doris Engineering, Report no. 65-1733-GEN-EN-E-0004, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Vessels operation – Environmental Assessment”, Doris Engineering, Report no. 65-1733-GEN-EN-E-0005, rev. 1, dated 26.03.03.
- “MCP-01 Disposal Study – Assessment of disintegration rate of the GBS”, Doris Engineering, Report no. 65-1733-GEN-DI-E-0004, rev. 1, dated 26.03.03.

- "MCP-01 Disposal Study – Maintenance and inspection activities – Post-abandonment", Doris Engineering, Report no. 65-1733-GEN-IN-E-0001, rev. 1, dated 26.03.03.
- "MCP-01 Disposal Study – Limiting conditions for marine spread operation", Doris Engineering, Report no. 65-1733-GEN-MO-E-0001, rev. 1, dated 26.03.03.
- "MCP-01 Disposal Study –Marine operations – Marine spread documentation", Doris Engineering, Report no. 65-1733-GEN-MO-E-0002, rev. 1, dated 26.03.03.
- "MCP-01 Disposal Study – Option No. 4 – On-bottom stability during removal steps", Doris Engineering, Report no. 65-1733-MCP01-WT-D-0004, rev. 1, dated 26.03.03.
- "MCP-01 Disposal Study – Option No. 4 – Structural assessment during removal steps", Doris Engineering, Report no. 65-1733-MCP01-SC-D-0002, rev. 1, dated 26.03.03.
- "MCP-01 Disposal Study – Option No. 3 – Structural assessment", Doris Engineering, Report no. 65-1733-MCP01-SC-D-0003, rev. 1, dated 26.03.03.
- "Evaluation of Residual Lifetime for the MCP-01 Gas Booster Platform in the North Sea", SINTEF Report, STF22 F03604, dated 29 April 2003.
- "Review of the disposal study of the MCP-01 platform", Norwegian Geotechnical Institute (NGI), dated 27.04.2003.
- "MCP01 Disposal study", Noble Denton, Report No.L19924/NDE/JR, rev. B, dated 12.06.04.
- "Confirmation of review of reports concerning disposal of MCP-01 concrete substructure", Professor Dr.-ing. Peter Schiessl, dated 10.07.2003.
- "MCP01 – Comments on Disposal Study prepared by Doris Engineering" K. Hove, Det Norske Veritas, dated 13.06.03.
- "Disposal of MCP-01 concrete substructure – Technical risk assessment" COWI Report, Ref. no. P 57124-A-001, dated November 2003.
- "Disposal of MCP-01 concrete substructure – Comparison of the results from the technical risk assessment for CDP1 and MCP-01", COWI Report, Ref. No. 57124A-201, dated 05.03.2004.
- "Minutes of Meeting, MCP01, 2nd Workshop, MCP-01 Technical Risk Assessment", 12 and 13 May 2003, at COWI in Copenhagen.
- "MCP01 Disposal study – Review of –55m option", Stolt Offshore, Report No. RE-613017-019, rev. 3.0, dated 28 02.2003.
- "Cessation Project – Platform MCP-01 – Review of structural strength assessment", SINTEF report 227133.00, dated 15.07.2003.
- "MCP-01 Decommissioning Study", Fugro GEOS, Ref. No. C50256/2845/R2, dated April 2003.
- "Assessment of future technologies for safe removal of MCP-01 concrete substructure", Dr. Tech. Olav Olsen a.s, Doc. No. 2698/001, rev. B, dated 30.07.04.

Studies Relating to the Decommissioning of other Platforms

- "Frigg Field Cessation Plan", TOTAL E&P NORGE AS, dated 9 May 2003.

Studies Relating to the Environmental Impact Assessment Report

- A full list of the studies supporting the Environmental Impact Assessment Report (EIA Report) is to be found at the end of that part in this MCP-01 Decommissioning Programme.

Preface

Contents

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Environmental Impact Assessment Report

Annexes

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"MCP-01 Decommissioning - Environmental Impact Assessment Report" has been undertaken by Det Norske Veritas (DNV), Aberdeen and Stavanger, and their findings are reported in their document entitled:

"MCP-01 Decommissioning
Environmental Impact Assessment Report",
DNV Report No. 2004-4046, Rev. 07
dated 20 January 2005.

This report forms the Environmental Impact Assessment Report (EIA Report) in this MCP-01 Decommissioning Programme. The following sections have been subject to some editorial changes to prevent undue repetition with the Disposal Plan in this MCP-01 Decommissioning Programme:

- **Section 2.5 "Public Consultation"**
- **Section 4. "Description of MCP-01"**

The EIA Report without these editorial changes is available upon request. A translation into Norwegian is also available.

Note:
The name Department of Trade and Industry (DTI) is kept in the EIA Report as it was issued in January 2005, although this department changed name in July 2007 to the Department for Business, Enterprise & Regulatory Reform (DBERR).

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Environmental Impact Assessment Report
Contents

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1. Conclusive Summary

The Manifold Compression Platform (MCP-01) is located on the UK Continental Shelf and was initially installed to serve as a compression platform for the two 32" gas export pipelines from the Frigg Field to the St Fergus Gas Terminal in Scotland. An early decommissioning of MCP-01 has been decided by the owners of the platform.

This Environmental Impact Assessment report (denoted EIA Report) forms the second part of the MCP-01 Decommissioning Programme and represents the results of the Environmental Impact Assessment (denoted EIA) performed to asses the disposal options for the MCP-01 platform.

The scope of the assessment covers:
1. The disposal alternatives considered for the facility, including the topsides and the concrete substructure;
2. The processes associated with both disposal activities and the results of final disposal.

It is noted that shutting down the facilities, including initial stages of decommissioning preparatory work (e.g. cleaning of process equipment, stripping down modules etc.) is not evaluated since they come under the operational phase and as such is dealt with under different regulations.

The EIA covers issues relevant to both the environment and society. Table 1 shows the disposal alternatives for the facilities to be assessed. It is noted that a comparative assessment is only required for the substructure, where multiple disposal alternatives have been identified. There are no multiple alternatives for the disposal of MCP-01 topsides, as summarised in Table 1.

Evaluation of Disposal Methods				
Topsides	**Alternative A** Removal and onshore disposal			
Comparative assessment of Disposal Alternatives				
Concrete Substructure	**Alternative A** Refloat, tow to shore, demolish and dispose onshore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place, removing as much external steelwork as reasonably practicable

Table 1 Evaluations and comparative assessments conducted for the MCP-01 Facilities.

Topsides
Topsides facilities will be removed and taken to shore for dismantling in accordance with OSPAR Decision 98/3 [1]. The materials will be reused wherever possible, recycled and certain parts will be disposed of where no feasible alternatives are found.

Impacts to the environment are generally insignificant, though energy consumption and atmospheric emissions will occur. The total energy consumption of all operations is calculated to be about 0.4 million GJ. The atmospheric emissions will be about 33,000 tonnes of CO_2.

The most positive environmental impact is resource utilisation. It is estimated that about 97% of the materials will be recycled or reused.

The impact on UK employment generation will be about 500 – 800 man-years, including consumer effects.

Concrete Substructure
Alternative D – leaving the concrete substructure in place, and removing as much external steelwork as reasonably practicable has by far the best performance in terms of energy impact and CO_2 emissions. Complete removal for onshore demolition (Alternative A) will give poor performance in terms of energy consumption (2 million GJ), will result in large emissions of CO_2 (137,000 tonnes), and will also result in negative physical and aesthetic impacts.

Alternatives B, C and D have no aesthetic impacts. Alternative A, however, has the potential to cause "moderate negative" aesthetic impacts.

Alternative A has the best performance in terms of material utilisation, due to large percentages of high value (i.e. steel) material recycling and re-use.

All disposal alternatives will result in a predicted "moderate negative" impact for physical impacts to the environment, as a result of the discharge of inert ballast material onto the seabed or the deposition of the substructure as it degrades over time. The "moderate negative" impact is not necessarily associated with the area of impact, but rather the sensitivity of receiving environment (i.e. potential *Nephrops* habitat that exists beyond the sandy mound where MCP-01 is situated).

Alternatives B, C and D will have a "small negative" littering impact. Although considered small, it will be a long-term impact.

Alternatives A and B offer the best performance in terms of fisheries and impacts on free passage. Alternative D will have the least beneficial performance in terms of free passage, however the impacts are considered "small negative". In real terms, the effects will be more or less similar to the present situation.

The impact on UK employment generation will be about 7,000-8,300 man-years for Alternative A, about 3,300-4,700 for Alternative C, about 3,000 - 4,200 for Alternative B, and about 75 - 150 for Alternative D.

The outcome of this assessment indicates that from a total environmental perspective, Alternative D - leaving the concrete substructure in place, is considered the best option.

2. Introduction and Legislation

2.1 Description of the Area

The Manifold Compression Platform (MCP-01) is operated by TOTAL E&P UK Limited (hereafter referred to as TOTAL E&P UK) and is located offshore on the UK Continental Shelf (UKCS), approximately 100 km west of the UK/Norwegian median line and 150 km from the north-eastern coast of Scotland (58º49’39 N, 00º17’12 W as per Figure 2.1.1). It is situated in a shallow, sandy/muddy depression between the central and Northern North Sea basin, less than 100 m deep, known as the Dutch Bank Basin. There are some major faults surrounding the MCP-01, namely the Witch Ground graben and the Fladen Ground spur. The MCP-01 is located 100 km from The Witch Ground and 50 km from the Fladen Ground area.

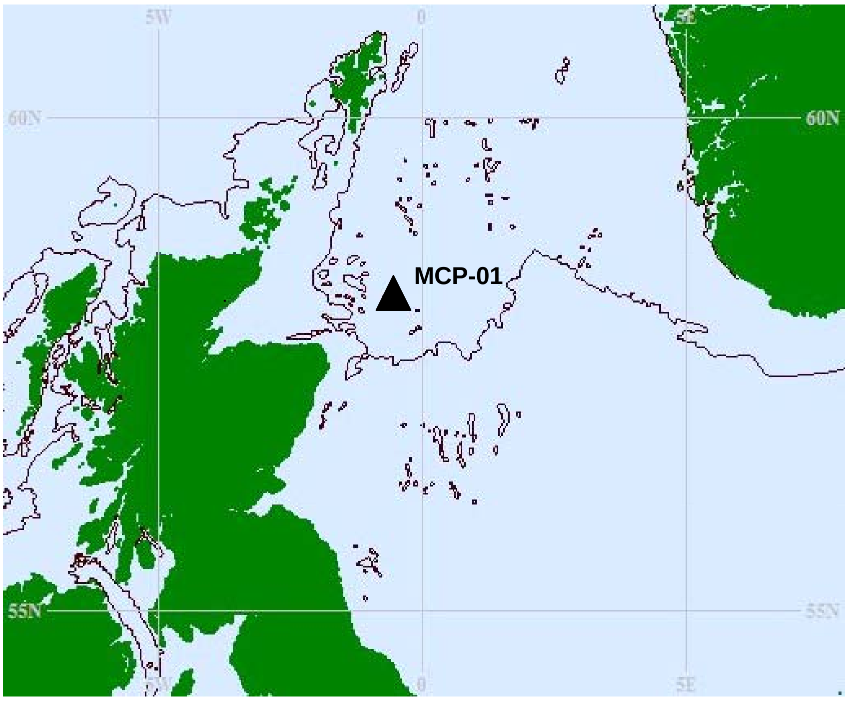

Figure 2.1.1 Bathymetric map showing the 100 m depths contour in black and the location of MCP-01 [2].

2.2 Objectives

The main objective of this EIA is to represent decision support with respect to the final disposal of the MCP-01 structure. Applicable disposal options shall be assessed objectively and results presented transparently to represent a broad and levelled decision basis for the authorities making the decision on final disposal.

Based on the framework outlined in international conventions and national legislation, the EIA process will ensure an objective assessment and will document all relevant impacts for all reasonable disposal alternatives. Open communication and consultation processes with stakeholders will further ensure that all relevant issues are evaluated and form part of the overall decision.

Accordingly, the objectives of the EIA are to:

- Clarify the consequences of the relevant disposal alternatives for the MCP-01 which may have a significant impact on the environment, natural resources and society.
- Present information about the possible environmental and societal impacts in a manner that can assist in the evaluation of disposal alternatives.

2.3 Environmental Impact Assessment Planning

The EIA Process

This document provides an overview and details of the ongoing EIA process for the decommissioning of the MCP-01 located in Block 14/9 in the UK sector of the North Sea Continental Shelf.

TOTAL E&P UK developed an EIA programme [4] as part of the initial stages of the EIA process. In order to determine the environmental impacts from the decommissioning of the MCP-01, re-use and disposal options were identified by TOTAL E&P UK and presented in the EIA programme [4].

Descriptions of, and impacts *arising* from the relevant re-use and disposal alternatives contained in this document are based on available knowledge of the possible effects on the natural resources, environment, society, fisheries and other commercial interests.

The EIA report includes details of the MCP-01 facilities, an inventory of materials, an assessment of the various disposal alternatives, including details of the environmental and social impacts of each alternative and is a key part of the whole decommissioning process, assisting in the assessment of the various alternatives, including details of the environmental and social impacts of each alternative.

In line with the decision of the UK and Norwegian authorities to have a joint approach on the decommissioning of MCP-01, the EIA methodology and the subsequent content of this EIA Report fulfils the requirements of the regulatory regimes in both countries as described in Chapters 2.4.2 and 2.4.3.

Both this report and the EIA programme will support stakeholders throughout the public consultation process and fulfil the requirements of both Norwegian and UK EIA requirements, as described in Section 2.5 and in Section 10 in the Disposal Plan in this Decommissioning Programme.

2.4 Regulations and Requirements

2.4.1 Frigg Treaty

MCP-01 was originally a pigging station used to control pressure in the two 32" pipelines from Frigg to St. Fergus Gas Terminal. As the Frigg reservoir extends across the median line between the UK and Norwegian sectors of the North Sea Continental Shelf, an agreement was deemed necessary to regulate the exploitation and transportation of gas from the Frigg reservoir. Accordingly an agreement was prepared entitled "Agreement between the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Norway relating to the Exploitation of the Frigg Field Reservoir and the Transmission of Gas there from to the United Kingdom". This agreement, known as the Frigg Treaty [5], came into force in 1976.

UK and Norwegian authorities have announced that, in accordance with their interpretation of the terms of the Frigg Treaty revised in 1998 both authorities have agreed to have a joint approach to the decommissioning of MCP-01.

2.4.2 United Kingdom Legislation

The British legal framework regarding offshore decommissioning is presented in the UK Petroleum Act of 1998 [6]. The Act requires an Abandonment Programme (commonly known a Decommissioning Programme) including an EIA before disposal can be executed.

The following requirements may also be applicable to the MCP-01 facility in the UK sector:

- Confirmation that the requirements of the Coast Protection Act 1949 [7] have been satisfied
- Acceptance of an Abandonment Safety Case under the Offshore Installations (Safety Case) Regulations 1992 (installations only) [8]
- Fulfilment of notification requirements to HSE under regulation 22 of the Pipeline Safety Regulations 1996 [9]

The disposal of materials on land must comply with the relevant health, safety, and pollution prevention and waste requirements, particularly Part II of the Environmental Protection Act 1990 [10]. In certain circumstances, authorisation under the Radioactive Substances Act 1993 [11] may also be necessary.

Other important acts that have to be considered include, but are not limited to:

- Health and Safety at Work Act 1974 [12]
- Waste Management Licensing Regulations 1994 [13]
- Special Waste Regulations 1996 [14]
- Transfrontier Shipment of Waste Regulations 1994 [15]

A more comprehensive description of the UK regulative processes regarding decommissioning is given on the UK Department of Trade and Industry (DTI) web site [16].

2.4.3 Norwegian Legislation

In Norway the planning for decommissioning and final disposal of redundant offshore installations falls under the jurisdiction of the Petroleum Act of 1996 [17]. In accordance with the Act and its Regulations, an Impact Assessment Programme shall be established based on an interactive process with stakeholders. This programme forms basis for the EIA which again will be subject to consultation prior to any governmental decision. The scope of the EIA is set by the Ministry based on the proposal for an EIA Programme submitted by the Licensees.

Disposal decisions are to be made based on a broad-based evaluation in each individual case, with emphasis placed on technical, safety, environmental and economic aspects, as well as due consideration for other users of the sea. The Act envisages a socio-economic evaluation where the costs and safety risks associated with the various disposal alternatives are weighted against environmental, fisheries and other users' interests, and that alternative uses are considered.

The Regulations to the Petroleum Act specify that a Decommissioning Programme shall contain a Disposal Plan and an EIA report. This report must contain a description of the effects that each of the relevant disposal alternatives is expected to have on society and the environment. Furthermore, the report must discuss mitigation measures to reduce discharges and emissions in connection with disposal and to remedy any damage or inconvenience.

The further details of the Regulations are available at the web site of Norwegian Petroleum authorities (Norwegian Petroleum Directorate [18] and Norwegian Petroleum Safety Authority [19]).

2.4.4 International Legislation

Oslo – Paris (OSPAR) Convention

In making decisions regarding disposal of the MCP-01 facilities, the UK authorities will also consider certain international conventions and guidelines, e.g. the 1992 OSPAR Convention and OSPAR Decision 98/3 [1].

The OSPAR Convention's Decision 98/3 states that the dumping, and / or leaving wholly or partly in place of disused offshore installations within the North East Atlantic (including the North Sea) is prohibited.

This is applicable in all cases except those where the national authority, having jurisdiction of the offshore facility in question carries out an assessment in accordance with Annex 2 of OSPAR Decision 98/3 and is satisfied that there are significant reasons why an alternative disposal is preferable. In these cases, the following permits may be issued:

- All or part of steel footings of steel substructures weighing more than 10,000 tonnes and placed in the maritime area before 9th February 1999, may be left in place
- A concrete installation and / or installation constituting a concrete anchor base may be dumped or left wholly or partly in place
- Any other disused offshore installation may be dumped or left wholly in place, when exceptional and unforeseen circumstances resulting from structural damage or deterioration, or some other cause presenting equivalent difficulties, can be demonstrated

Any permit for a disused offshore installation to be disposed of or permanently left wholly or partly in place shall be subject to consultation within the OSPAR Convention which could last up to 32 weeks, before the national authority makes the final decision.

As part of this process, OSPAR stipulates in Annex 2 to the OSPAR decision 98/3 all documentation that is required from the authorities to perform an assessment before a permit can be granted.

Emissions Trading Schemes

CO_2 is the main contributor to the greenhouse effect. As a global ecological problem, the exact location of the release is not relevant. Even though international regulations to stabilise emissions of CO_2 (e.g. the Kyoto protocol [20]) are still not agreed upon within the international community, European governments, such as UK have implemented programmes to support CO_2 emission reduction principles. The UK Emissions Trading Scheme, for example, is a voluntary programme that provides financial incentives for companies to reduce CO_2 emissions. In addition to this, the EU Emissions Trading Scheme [21] is a compulsory emissions reduction programme, which will be implemented in 2005.

Although TOTAL E&P UK is not taking part in the voluntary UK scheme, they will actively participate in the EU scheme for their offshore operations where thermal installations with rated thermal input (i.e. combustion) exceed 20MW. MCP-01 operations, however, are below this (EU-defined) threshold and will not be controlled within the EU emissions reduction scheme.

UNCLOS / IMO Guidelines

The United Nations Law of the Seas Convention gives the global premises for safety of navigation, including preferences for abandonment of installations or structures in the maritime area. Article 60(3) reads: “Any installations or structures which are abandoned or disused shall be removed to ensure safety of navigation, taking into account any generally accepted standards established in this regard be the competent international organization”. The International Maritime Organisation (IMO) is the competent international organisation in this respect.

In 1989 the IMO adopted Guidelines and Standards for the Removal of Offshore Installations (“The IMO Guidelines” [22]) for the purpose of promoting safety of navigation. The IMO Guidelines are not formally binding and thus are advisory in nature. These guidelines are currently followed by TOTAL E&P UK in the planning process and will continue to be followed during the execution of the work. The IMO Guidelines recommend a case-by-case evaluation to determine whether a redundant offshore installation should be left wholly or partly on the sea-bed, by considering the effects on navigation, costs, risks, safety and technical feasibility.

According to the IMO Guidelines, if the Coastal State determines that an installation shall be partly removed to below the sea surface and will not be re-used (e.g. as an artificial reef), an unobstructed water column of at least 55 metres to the sea surface should be provided.

According to the IMO, the function of the coastal State is to ensure that those installations not entirely removed are indicated on nautical charts and must be properly marked with navigational aids. Any disused installation that projects above the sea surface should be adequately maintained. The purpose of the IMOs maintenance recommendation is to ensure preservation of the navigation aids and thereby promote maritime safety. This requirement would be relevant for Alternative D.

2.4.5 Company Systems, Procedures and Objectives

Environmental Management System

In addition to meeting regulatory requirements, TOTAL E&P UK is also committed to their SHE policy, which is supported by their Environmental Management System (EMS) [23]. The TOTAL E&P UK EMS comprises of five key components: policy, planning, implementation and operation, checking and corrective action and management review (Figure 2.4.1). The EMS has been certified to the International Standards Organisation (ISO) 14001 [24]. Planning and execution of the MCP-01 decommissioning project will be encased within the boundaries of the EMS; this ensures legal compliance and effective environmental management for the duration of the project. The following sections summarise the core elements of the EMS and explain how they will be applied to the MCP-01 decommissioning project.

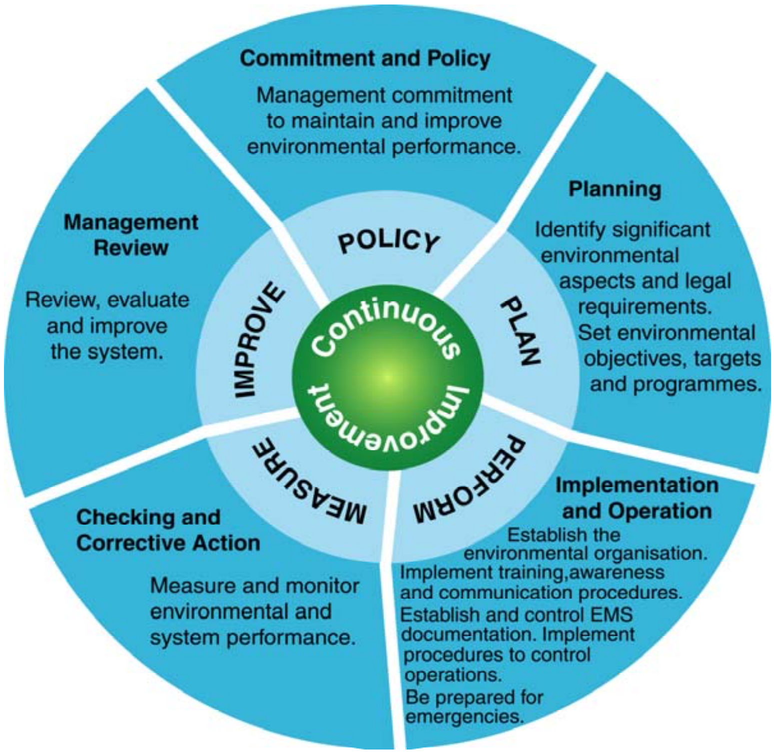

Figure 2.4.1 Environmental management system framework [23]

EMS elements will be applied to the project as follows:

Planning

- Environmental aspects and impacts from decommissioning operations will be identified and documented within the Register of Significant Environmental Aspects.
- Compliance with legal requirements will be identified within a project Notification/Consents matrix. Compliance assurance will be achieved via the matrix coupled with implementation of TOTAL E&P UK's Environmental Consents procedure.
- There will be linkages with EMS objectives and targets, as these improvement goals are defined for operations that result in significant environmental impacts, i.e. the MCP-01 decommissioning. Many of the improvement targets will link to specific emissions and discharges.
- An Environmental Management Programme will be established to define actions required for achieving objectives and targets associated with the MCP-01 decommissioning. The programme will be regularly reviewed (and revised, if required) throughout the project.

Performing

- Roles and Responsibilities within the EMS and the MCP-01 decommissioning team, including contractors, will be specified to ensure that project personnel are aware of environmental protection measures and EMS requirements.
- Environmental training requirements will be identified, in particular for specific positions with environmental protection linkages. TOTAL E&P UK will provide specific training for their staff and contractors.
- Emergency Response procedures specific to the MCP-01 decommissioning project will be established, including appropriate oil spill response plans.

Measuring

- For the duration of the decommissioning project, Monitoring Programmes (i.e. audits, measurement schemes, etc.) will be established for project-specific performance parameters. These monitoring parameters will be relevant to legal requirements; specified operating criteria; environmental objectives and improvement targets.
- Corrective Actions will be defined and implemented when non-conformances are identified.

Improvement

- EMS Management Reviews will take into account any relevant MCP-01 decommissioning project matters including findings from audits, non-conformances, environmental performance and the continuing suitability of the SHE policy.

Company Procedures

- Corporate procedure COR-PLA-SE-ENV-03 Oil Spill Contingency Plans for North Sea Installations will provide guidance for actions to be taken in the event of unplanned discharges during offshore decommissioning operations. Contractor procedures will be evaluated for alignment with TOTAL E&P UK Corporate Oil Spill Contingency Plan requirements to reduce the risk of an unplanned event and to ensure that the environmental impacts of such unplanned events are minimised.

- In the event that there are discharges of oil or chemicals to sea, a PON1 will be raised in accordance with UK regulations. TOTAL E&P UK has an established PON1 system for spill notification and this will be a procedural requirement for all offshore decommissioning contractors.

2.5 Public Consultation

The consultation process and, in particular, the input from interested parties is an integral part of the development of an acceptable decommissioning solution for MCP-01. The views and concerns of all stakeholders are important to TOTAL E&P UK and the company is keen that the process is fair and open from the planning phase of the decommissioning through to execution. Reference is made to Section 10 in the Disposal Part of this Decommissioning Programme.

2.5.1 General

Section 10 "Public Consultation" in the Disposal Plan in this Decommissioning Programme describes in full the consultations taking place for the decommissioning of MCP-01. Annexes A and B gives further details of the consultations taken place so far.

2.5.2 The EIA Programme

The proposal for an EIA programme was issued for formal public consultation in Norway in January 2004 and simultaneously informally issued to the UK DTI. It was also made publicly available on the internet.

Comments on the impact assessment programme were received from the following Norwegian entities:
1. The Ministry of Labour and Government Administration (AAD)
2. Ministry of Finance (FIN)
3. Ministry of Fisheries (FID), incl. Coast directorate, the Directorate of Fisheries and the Institute of Marine Research
4. Ministry of the Environment (MD), incl. Norwegian Pollution Control Authority (SFT)
5. Ministry of Trade and Industry (NHD)
6. Norwegian Fishermen's Union (Norges Fiskarlag)

MPE approved the programme for the EIA in a letter dated 22 March 2004.

Annex A in this Decommissioning Programme describes the comments received from the Norwegian stakeholders, along with a subsequent evaluation of each comment and a reference to the relevant section of the EIA Report where the issue is addressed.

Comments to the EIA programme were also received from the DTI Offshore Environment Unit, SEERAD and SEPA. These comments are generally related to the hazardous substances present on MCP-01 and their correct management and disposal. Such issues will be managed through the preparation for removal phase, which is not defined as part of the scope of this EIA (refer to EIA scope boundaries in section 3.1). The comments given are presented in Annex A in this Decommissioning Programme with an evaluation of how these issues will be managed through decommissioning and final disposal.

2.5.3 Stakeholder Meeting

An informal Stakeholder dialogue meeting was held in London 27 May 2004. Representatives from authorities, environmental organisations, fisheries interest associations, academics and two attending as private persons, were present. The scope of the dialogue was the entire decommissioning planning process, but comments and suggestions for the EIA process were also discussed. A draft of the EIA Report was also presented to the participants, which they had received prior to the meeting.

See also Section 10.4 "Consultation Milestones" in the Disposal Plan.

Annex B gives the Summary Note issued by the independent facilitator after the meeting.

The following issues discussed during the dialogue are reflected in this EIA Report:

- It was felt that the relevance of the UN Law of the Seas Convention should be elaborated upon. This international instrument is presented in Section 2.4.4.
- Aspects such as aesthetics impacts are subjective and also temporary. The EIA Report should clearly document the basis for the judgement of the impact category for each aspect assessed to ensure transparency. The method for assessing the impact category for the various non-quantifiable impacts is presented in Section 3.2. The documentation for the different assessments made is given in the impact Sections 7 and 8. In addition, specific Impact Assessment Forms will be presented in a separate report [86].

3. The Environmental Impact Assessment (EIA) Premises

3.1 Scope of Assessment and Issues Examined

This EIA examines the effects of activities and circumstances connected with the different disposal options for the facilities, as well as the long term effects of the disposal alternatives on the environment, natural resources, and society, where knowledge about these factors exists. The boundaries of the EIA scope are illustrated in Figure 3.1.1. Shutting-down and handover operations on the platform (activity 2, Figure 3.1.1) are not explored within the EIA process since they come under the final stage of the production phase and as such are dealt with under different UK regulations.

These operations will include:

- Removal
- Tank cleaning
- Pipework
- Flushing
- Mechanical and electrical system isolation

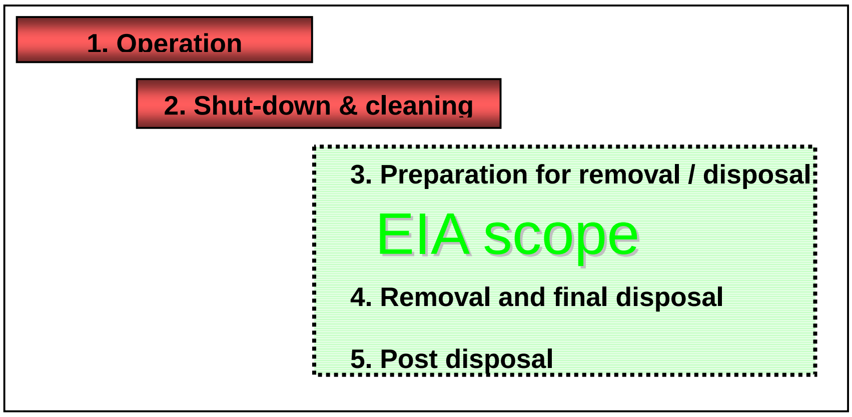

Figure 3.1.1 EIA scope boundaries.

The different disposal alternatives are summarised in Section 5. The technical issues discussed for each alternative are presented in referenced technical documents [26], [27], [28], [29].

The topics examined in this report relate to disposal activities for the decommissioning alternatives, and embrace both the short and the long-term effects. Typical activities are marine operations, demolition, transport, and re-cycling of recovered material. The removal aspect in the final analysis can cover anything from various forms of sea disposal, sale of parts and equipment, reuse, recycling or disposal on a waste facility. Based on the scope of work for the EIA programme and the comments received from interested parties, the following EIA issues are examined for each of the disposal alternatives:

Environmental issues

- Energy consumption
- Releases (emissions) to atmosphere
- Releases (discharges) to sea, water, or ground
- Physical impact to environment (includes marine noise)
- Aesthetic pollution: noise, odour, visual effects
- Waste/resources management
- Littering
- Risk to the environment from unplanned events

Social/community issues

- Fisheries
- Free passage at sea
- Costs and national supplies
- Employment effects

In cases where documentation allows the releases or other effects to be quantified, this is done and discussed. In other cases qualitative assessments are made, together with discussions on the possible impacts and potential mitigating actions that could avert negative effects and promote positive benefits. The experience from the EIA for the Frigg Field Cessation Plan [3] has also been an important reference in defining and establishing the EIA process for MCP-01.

3.2 Methodology

3.2.1 General

The methodology presented is based on the principles set out in the Norwegian Oil Industry Association's (OLF) Handbook for Decommissioning Environmental Impact Assessments [30]. The methodology has been further developed based on EIA experiences from various decommissioning projects. The impact assessment methodology used for MCP-01 EIA, therefore, reflects current requirements and is in full compliance with the contents for Environmental Impact Assessment as specified in both UK and Norwegian regulations.

Where possible, the methodology involves the quantification of impacts to the environment (i.e. energy consumption and atmospheric emissions), fisheries and society. Factors that cannot be quantified are described and are then subject to a technical evaluation relating to its scope, effect, and its consequences.

This process has sought to distinguish between important impacts from those that are less important. This was done by considering a) the effect of an impact in the area in which it is occurring (in terms of its "value" or "sensitivity"), combined with b) the scope of the effect, to arrive at the total impact. The method is outlined in Figure 3.2.1. By using this method, the same magnitude of effect may give a different impact depending on the value or sensitivity of the receiving environmental component. Similarly, the same type of effect will give different impact depending on the sensitivity of the recipient/environment. This could mean that a small-scale localised effect could have increased negative impacts if the receiving environment is considered to be highly sensitive. On the other hand, a large-scale regional effect could have minimal negative effects if the receiving environment is not considered to be sensitive or is low-value. This is considered a sound basis for assessing and presenting the impacts. The duration of the effect (i.e. short term to long term, and the estimated recovery time for the impacted resource/environment) will further form part of the "Scale of effect" assessment.

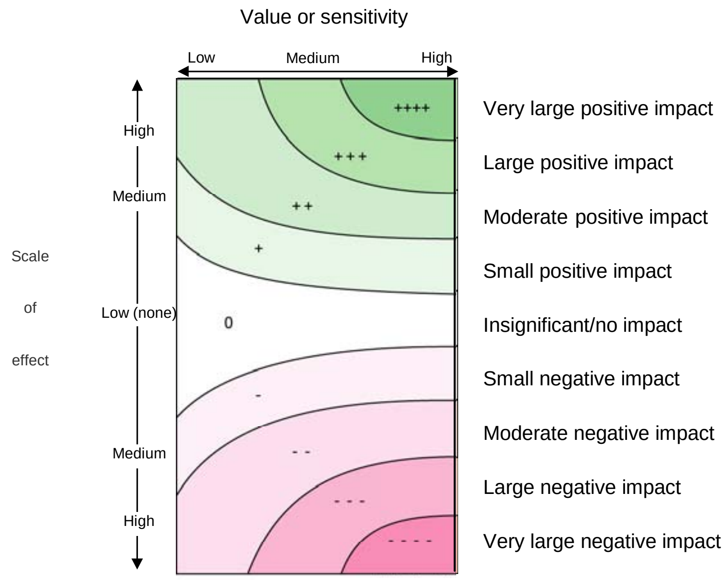

Figure 3.2.1 Methodology for assessment of non-quantifiable impacts [30]

Each impact assessed is thus a function of the value or sensitivity of the natural resource/receiving environment and the scale of effect, which will include the spatial and temporal effects. The EIA Report documentation will then provide assessment details (e.g. long term effects are considered compared to short term effects, how spatial effects are weighted etc). Hence, the impact category (small, moderate, large, etc.) cannot be defined in universal terms but is assessed for each potential impact individually and identified in accordance with the OLF matrix (Figure 3.2.1). Thorough assessments are made in order to identify the impact level. These assessments are documented in “Impact Assessment Forms” (see Figure 3.2.2 for the layout and description of the Impact Assessment form) per aspect assessed to allow for transparency in evaluations made and priorities given. In the actual EIA Report, however, focus is put on the results of the assessments and the Impact Assessment Forms may need to be consulted in order to get the overall overview of the assessments made [86].

<table>
<tr><td colspan="2">Category: (e.g. Environmental, Fisheries, or Society issue)
Consequence evaluation for: (aspect)</td></tr>
<tr><td colspan="2">1. General description of the area (situation and characteristics)</td></tr>
<tr><td colspan="2">Describe the basis for evaluating value or sensitivity of an area. What are the facts, literature sources or statements this is based upon. Indicate further factors considered more important than other arriving at this conclusion.

Evaluation of the value:
Small Medium Large
|----------|----------|
x</td></tr>
<tr><td>2. Description of the extent of effect</td><td>3. Total (environmental) impact</td></tr>
<tr><td>Describe the scientific information and data the assessment is based on. Describe further how it is interpreted in this context, etc. What has been given highest priority, and why? This also includes an assessment of spatial and temporal effects.
Document the reasons for effect rating
Evaluation of extent:
Very neg. Medium neg. Little/no Medium pos. Very pos.
|---------------|------------------|----------------|-------------------|
x</td><td>Combine 1) and 2) in the impact matrix (figure 3.2.1). The total impact can then be identified, and stated here.</td></tr>
</table>

Figure 3.2.2 Example of Impact Assessment Form

The assessment of the non-quantifiable impacts is marked with quotation marks in this report, e.g. “small negative”.

No attempt has been made to rank or weigh the factors against each other; however this is part of the operator’s overall assessment process in reaching the recommended disposal alternative.

3.2.2 Environmental Impact Assessment Methodologies

Energy
Energy issues are considered to be important factors in the evaluation of all environmental impacts of decommissioning and disposal of redundant offshore installations. The method cited in this report has been established and is recommended as an international standard by the Institute of Petroleum [31], and is based on a life cycle approach, which considers both direct and indirect energy consumption.

Figure 3.2.3 shows the factors included in the scope of energy calculations. In general, this includes all operations from preparatory work for the removal, transport, onshore demolition, and onshore transport and re-melting of metals. In the case of replacement, calculations for the production of new metals are considered, of which steel has been identified as the most important material. The replacement of concrete is not included in the calculations, as this material will not be directly recycled into new raw materials (cement and sand). Possible reuse of such material is not included in the energy assessment, but will be part of the material management assessment. It is noted that replacement energy assessment uses information provided from the materials inventory studies [29].

This report uses the following definition, successfully used for the Ekofisk I [32] and Frigg EIA [3]:

"**Total Energy Impact**" (**E_{TOT}**) for each Alternative is equal to the sum of direct and indirect energy consumptions. On the other hand, **"Energy Consumption" E_{CONS}**, is the sum of all direct energy sources (i.e. those used for disposal and recycling operations). **E_{TOT}** and **E_{CONS}** are illustrated in Figure 3.2.2 and are represented by the following formulae:

$$E_{TOT} = E_{DIR} + E_{REC} + E_{REP}$$
$$E_{CONS} = E_{DIR} + E_{REC}$$

whereby:

E_{DIR} = the direct energy consumption for the solution (fuel, electricity)

E_{REC} = the energy consumed by recycling/melting down metal

E_{REP} = A theoretical quantity of energy equivalent to the amount of energy required to produce a quantity of material equivalent to the quantities of material disposed and not recycled/re-used (see Figure 3.2.3)

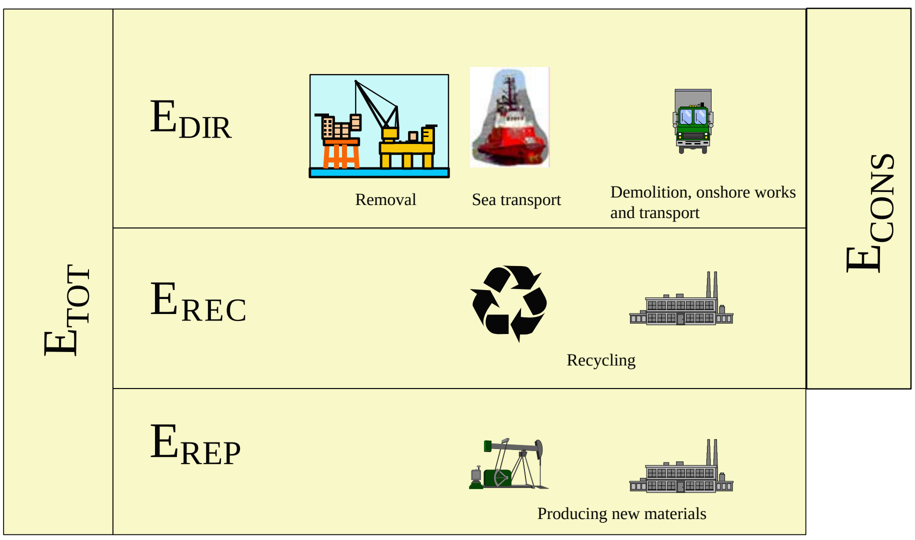

Figure 3.2.3 Illustrations of the elements in the total energy calculations [3]

The energy calculations for each disposal alternative use operational data (i.e. work duration, vessel and equipment type etc) from the technical background studies and data on fuel consumption estimates from the Institute of Petroleum's report [31].

The energy impact categories (see Table 3.2.1) were developed for the Frigg field EIA and will be used to categorise the energy impact and consumption of the different alternatives. It is important to note that these categories have been developed to evaluate and rank significant differences between alternatives in relative terms. The "impact" is therefore not documented scientifically. The key also gives reference to energy consumption for a corresponding number of cars for one year to illustrate the magnitude of energy.

In addition, and in order to assess the extent of energy impacts relating to decommissioning activity, the results of the impact assessment can be presented as a proportion of total UKCS energy output. By using the energy value for crude oil of 43 GJ / tonne (36.6 GJ/$m^{3)}$ [81], and a total UKCS production output of 4.2 million BOPD in 2003, the energy value of total UKCS production is calculated to be 8.9 billion GJ. This value will be used to further emphasise the magnitude of energy.

Reference unit	Impact Categories				
	Insignificant	Small negative	Moderate negative	Large negative	Very large negative
Energy (Million GJ)	<0.1	0.1-1	1-3	3-6	>6
Energy equivalent (Cars run in one year)	<2,500	2,500-25,000	25,000-75,000	75,000-150,000	>150,000

Table 3.2.1 Key for categorisation of energy impact

Emissions to Atmosphere

Contrary to the energy assessments, atmospheric emissions are focussed entirely on actual releases and are quantified on the basis of the data given in Institute of Petroleum's standard [31]. The primary emission components carbon dioxide (CO_2), Nitrogen Oxides (NO_X) and Sulphur Dioxide (SO_2) are quantified and assessed. The rationale for not adopting a life cycle approach for emissions is that some of these emissions are not global, but rather local or regional in their impact potential. Environmental impact could thus be very different from one area to another, even for the same emission.

CO_2 is the main contributor to the greenhouse effect. As a global ecological problem, the exact location of the release is not relevant. In the context of offshore field decommissioning, CO_2 is not a driving factor of impact assessment, although quantified emission discharges will form part of the overall assessment of alternatives. CO_2 emission estimates will be quantified and compared against total UK offshore operations, as reported by UK government authorities. The main source of CO_2 emissions during MCP-01 decommissioning will be the combustion processes during offshore marine operations and onshore metals recycling.

For nitrogen oxides (NO_X) and sulphur dioxide (SO_2), the effects are more regional and local in nature. There is also significant geographical difference in tolerance to these emissions with respect to the following:

- The nature of the soil and water
- Biota composition
- Present and historical load of acid rain.

NO_x is produced from combustion processes (e.g. ship engines and smelters for recycling metals), and react with humidity in the air to create nitric acid, which in turn will fall as acidic precipitation (acid rain). NO_x will cause adverse effects on vegetation and fauna, and may contribute to respiratory complaints in humans. These effects arise because NO_X not only contributes to the generation of acid rain, but to the creation of ground-level ozone and over-fertilisation of soil. Offshore vessel operations are the main area of relevance with regard to NO_x. These emissions will be part of the comparative assessment as their inclusion enables the evaluation to be based on a broader scope.

Similarly, SO_2 produced from processes will react with humidity and create acid rain. The most dominant acidification effects from SO_2 are acidification of lakes, changes in vegetation (e.g. the disappearance of vulnerable species such as heather, peat bog-areas and lichen and moss in oligotrophic forests), and corrosion of materials (buildings, monuments etc.). In the context of offshore decommissioning, SO_2 is relevant in operations with combustion of oil or diesel.

Due to the uncertainty regarding where the disposal work will take place, and in particular the location of metals recycling operations, no assessment has been made of potential NO_X and SO_2 effects on the specific local environment. No key for the categorisation of impacts is thus made for atmospheric emissions. These are however evaluated in relative terms between the alternatives, based on the volumes emitted.

Discharges to Sea, Water or Ground

The evaluation criteria outlined in Section 3.2.1 will be applied to discharges to sea, water and ground and will take into account the following issues:

- Type of discharge (inert material, hazardous material);
- Amount of discharge (overall volumes and area of impact);
- Timing of discharge in relation to environmental sensitivity;
- Duration of discharge;
- The receiving environment in relation to the sensitivity or value of the receiving environment; and
- Effects on natural resources, their nature and how they can be mitigated.

Discharges to water and ground are of very little relevance with regard to decommissioning of the MCP-01. All systems will be cleaned prior to disposal for all alternatives. Any discharge of water containing chemicals and/or traces of oil will only be performed after having the proper discharge permit, and will also be in line with the project-specific cleaning criteria. Discharges to water and ground are therefore considered to be a very small contributor in the assessment process.

However, detailed assessments of these factors for discharges to sea have been performed where relevant. These “discharges” will be mainly secondary pollution and increased turbidity following disturbance of sediments and discharge of solid ballast.

For onshore scrapping processes the yard will have specific permission to perform such work, including controlled systems for collecting drainage etc. No discharges exceeding the permitted levels are thus anticipated.

Physical Impacts

Physical impacts relate specifically to the marine environment, rather than any onshore environmental compartments and will also undergo qualitative comparative assessment in alignment with the OLF methodology [30]. The evaluation criteria for physical impacts will take into account the following issues:

- The size (area) of the impact
- The receiving environment (in terms of value or sensitivity)
- The recovery period from the impact

Examples of physical impacts are damage to fish or the seabed caused by underwater explosions, disturbance from marine noise, smothering effects from discharged materials, disturbed seabed sediment and reef-like effects from the presence of the substructure on the seabed.

Aesthetic Impacts
Aesthetic impacts largely relate to health and the local environment (noise, dust, odour, visual intrusion). These issues are relevant to near shore and onshore activities, and will therefore be applicable to those alternatives where work will be performed at an existing industrial yard (demolition, recycling and disposal).

As with physical impacts, aesthetic impacts will also be subject to qualitative comparative assessment in alignment with the OLF methodology [30]. The aforementioned evaluation criteria for aesthetic impacts will take into account the following issues:
- The location of the industrial yard;
- Proximity of local population;
- The timing and duration of operations;
- The recovery period from the impact; and
- The value or sensitivity of the receiving environment.

Materials Management
This section addresses the sound utilisation of resources (i.e. redundant materials that are recovered from the topsides and substructure), where recycling is the most desirable materials management alternative. It is noted that re-use is not a viable materials management option, as discussed in Section 5.1. This semi-quantitative assessment uses information from the materials inventory studies [29] to assess the potential for recycling recovered materials, and to quantify the volumes of material to be disposed of as waste.

Materials management will also be subject to qualitative comparative assessment, which will again be in alignment with the OLF methodology [30]. The evaluation criteria will take the following issues into account:
- The type of recovered material (hazardous/non-hazardous, recyclable/non-recyclable, etc);
- The amount of recovered material;
- The market value of the recyclable material; and
- Recycling targets for recovered materials, as defined by TOTAL E&P UK.

Littering
Littering is defined as any ‘remaining debris’ from platform operations, or occurring as a result of the disposal of the structure. Littering issues relate mainly to the sea, since waste taken to land will be handled in accordance with regulations and detailed waste handling procedures. TOTAL E&P UK is aware of its continuing liability with respect to the final disposal of non-recyclable waste, which will also be dealt with within the boundaries of the EMS and waste management procedures.

In order to examine littering from an ecological perspective, the study considers whether leaving the substructure in place could have littering consequences and dispersal problems. Littering is considered to be among the most important environmental issues from a long-term perspective. In many respects there is a high degree of uncertainty related to the long-term effects of littering (duration of material deterioration, sedimentation processes, and other external processes). In cases where litter is deemed to potentially constitute a problem, this is emphasised.

Floating material will be collected and brought onshore for disposal. The potential for littering would thus mainly consist of leaving steel and concrete in place. It is noted that a seabed debris sweep is required by law and must be completed to remove components or parts of the facilities which have fallen during previous activities (including normal operations as well as decommissioning operations).

The littering aspect therefore mainly concerns those alternatives involving final disposal offshore.

Risk to the Environment from Unplanned Events
The activities related to all disposal alternatives have a certain uncertainty with regard to the possibility for failure of undertaking the activity as planned. Normally the consequence will be reversible, often just a delay of the work. Some failure may result in events having an impact on the environment or third party activities. Examples are operational events (e.g. lifting operation) giving a discharge of oil or chemicals to sea, or a fundamental failure in removal/towing operations of the concrete substructure resulting in a misplaced disposal. Such issues are briefly assessed.

3.2.3 Social Impact Assessment Methodologies

Fisheries
As part of an overall assessment of the effects on fisheries from decommissioning of the MCP-01, the importance of the area to the fishing industry has been evaluated. Based on fisheries baseline descriptions outlined in Section 6.4, the MCP-01 vicinity is considered to be of medium to high importance to fisheries (i.e. it is an area of relatively high value especially for some specific North Sea fisheries). This establishes the basis for evaluating the impact on fisheries from decommissioning operations and disposal alternatives.

The comparative assessment for the impact on fisheries is also qualitative and is determined using the OLF methodology [30]. The following issues have been identified as bearing direct relevance to the fisheries impact and will be applied to the methodology:

- Areas excluded for fisheries;
- Direct hindrance to fishing (resulting in physically damaged gear);
- Effects form the creation of new habitats (i.e. reefs) on fisheries; and
- The value or sensitivity of the area of impact from a fisheries perspective.

Free Passage at Sea
Offshore installations represent a risk to shipping. The magnitude of this risk will depend mainly on the extent of the shipping activities and the measures and systems used to identify the installation and avoid collisions.

There will be increased maritime activity during the offshore phases of the MCP-01 decommissioning project and some disposal alternatives will result in a more extended or permanent hindrance to shipping. The risk of such will be calculated according to common risk analysis methodologies at a later stage in the decommission process. At this stage the risk is evaluated qualitatively, using the OLF methodology [30], based in part on information from Quantitative Risk Assessments (QRAs) and other sources. The following criteria are used in the evaluation:

- The proximity of the shipping lanes to the immediate vicinity of the MCP-01 site (closest point of approach); and
- Frequency of passage (number of ships per year).

Cost and National Supplies
Qualitative comparative assessments for national supplies (goods and services) are based on the decommissioning project cost estimates and compared against the relevant goods and services in the UK. Information on UK goods and services is based on general knowledge of petroleum related industries and data obtained from TOTAL E&P UK and the supplier industry.

The objective of this assessment is to quantify:

- Overall costs for each disposal option;
- The percentage of UK goods and services associated with each disposal option; and
- The anticipated cost of work, shared across relevant UK industry sectors.

The assessments of impacts on national supplies are based on a breakdown of costs into different components, representing various phases in the service and supply chain. A national share of the work is established, depending on the type of activity and whether the different services can be undertaken by the following national industry types:

- Yard;
- Transport;
- Maritime / marine operations;
- Building & construction;
- Goods; and
- Commercial services.

As this a subjective assessment, there is a degree of uncertainty associated with the results.

Employment Effects
The EIA uses a model for assessing the employment effects of each alternative within different categories of trading and industry [33].

This model is based on the estimated goods and provision of services broken down by industry and year. From this, the total UK *production value* created in industry is calculated. The production value is then converted into employment (on a man-year basis) using the statistical production per man-year quoted for different industries [33]. The result of these modelling calculations is the estimated *direct employment effect* within vendor/supplier companies, and the estimated *indirect employment effects* within sub-vendors/subcontractors. The total employment effect is the sum of the direct and indirect employment effects.

The purchase of goods and services in one segment often spreads to a secondary industry/society (supplies for the primary purchase brings about a chain of new supplies upstream in industry). This enhances the effect from total value added. The overall employment effects are therefore the sum of the direct supplies, the indirect supplies and delivered activities due to increased private consumption.

As with the assessment relating to costs and national supplies, this method is subject to some uncertainties. The main sources of uncertainty are:

- Assumptions in cost estimates (e.g. the duration of the operations, the market situation and rates in the future).
- Developments in technology and removal methods.
- Assumptions for UK supplies on MCP-01. The supplies may be different from the assumed level and may also involve other industries.

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4. Description of MCP-01

4.1 Overview

The EIA Report includes the topsides facilities and the concrete substructure of MCP-01. They have been treated in separate sections in this report.

For a more comprehensive description, reference is made to the Disposal Plan in this MCP-01 Decommissioning Programme Section 3 "Description of Facilities to be Decommissioned" and Section 4 "Inventory of Materials".

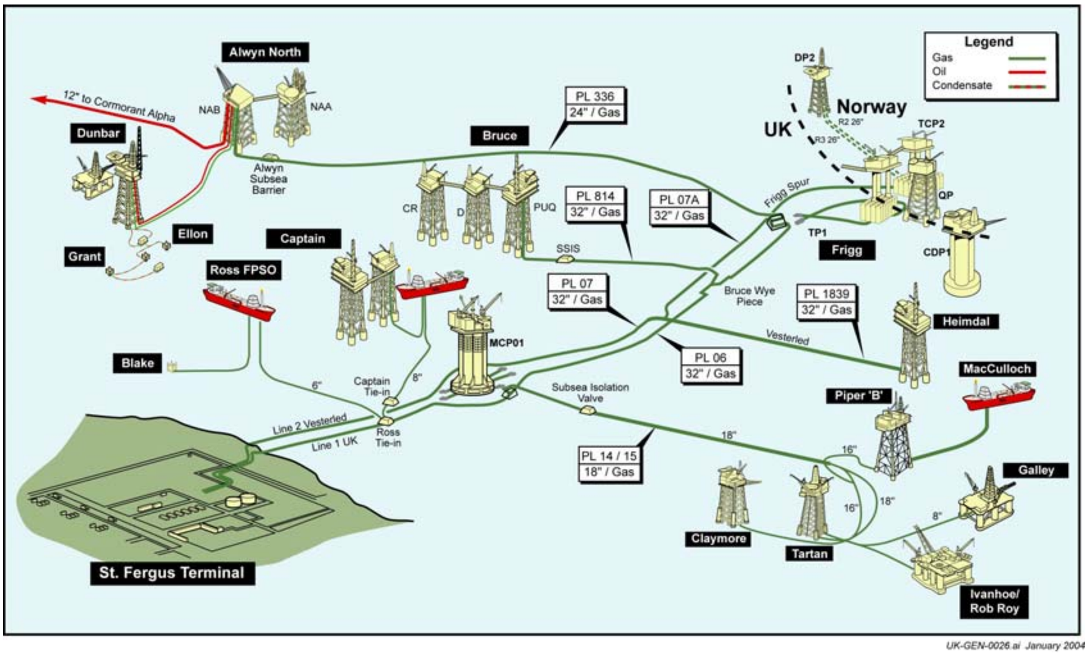

Figure 4.1 1 MCP-01 in the gas transportation system after the pipelines have been rerouted to bypass the platform [34]

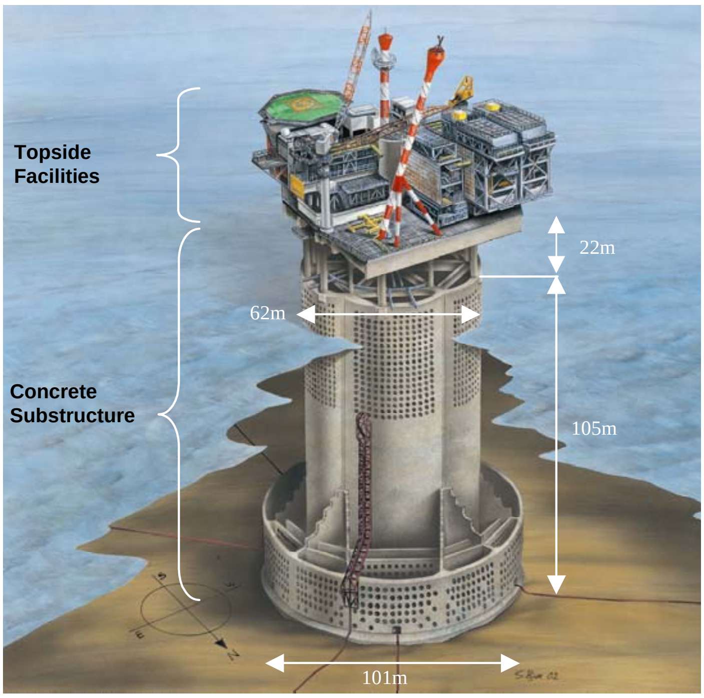

Figure 4.2.1 Main dimensions of MCP-01 [35]

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5. Description of Disposal Alternatives

TOTAL E&P UK are considering a number of alternatives with respect to re-using all or part of MCP-01 and if this is not possible, disposing of it in a safe and responsible manner. Section 5.1 presents a discussion on possible re-use options for the installation and Section 5.2 provides an overview of the alternative options currently being considered for disposal of MCP-01. Table 5.0.1 presents a summary of these disposal options.

Evaluation of Disposal Methods				
Topsides	**Alternative A** Removal and onshore disposal			
Comparative assessment of Disposal Alternatives				
Concrete Substructure	**Alternative A** Refloat, tow to shore, demolish and dispose onshore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place, removing as much external steelwork as reasonably practicable

Table 5.0.1 Disposal alternatives for MCP-01

5.1 Other use of MCP-01

5.1.1 Further Use in the Petroleum Industry

Further use in the petroleum industry is not an option. MCP-01 is a Manifold Compression platform and it is not designed for oil or gas processing. There are no known hydrocarbon recoverable resources in the immediate vicinity of MCP-01 that could utilise the facility today.

5.1.2 Other Use in Place

MCP-01 is technically very similar to the Frigg Field/CDP1 Platform (operated by TOTAL E&P NORGE). No specific studies have been initiated as part of the decommissioning studies for MCP-01 as they would duplicate the extensive studies carried out for the three Frigg Field concrete substructures (see also Section 6 “Assessment of Reuse Potential” in the Disposal Plan). The main areas considered were:

- Artificial Reefs
- Wind generators.

The economic viability of offshore renewable electricity generation depends on its cost relative to electricity generated from conventional means (i.e. the combustion of hydrocarbons). The assessment concluded that the price of electricity generated from offshore renewable power plants is considerably higher, despite taking into account the tax levied on CO_2 emissions in the Norwegian sector [36]. It is therefore likely that there would not be a market for any renewable energy at a price necessary to ensure commercial viability.

Furthermore, the age and former use of the facility is an important consideration when assessing its potential re-use. MCP-01 is an ageing structure. The feasibility of these options is therefore technically uncertain and none of the arrangements are judged to be economically viable.

5.1.3 Reuse of the Concrete Substructure at another location

A general assessment of the potential re-use opportunities has been carried out and scenarios established [27] [28]. One conclusion that has been made is that if MCP-01 is to be re-floated, it would be more desirable to re-use the whole structure or part of it rather than to use deep-sea disposal or dismantling and recycling. It is difficult to identify a single definite re-use application at this stage although in the case of the platform being re-floated, the search for re-use applications should be started. The following list outlines the possible re-use options. These proposals are not related to specific re-use and are generic in nature.

The structure could be cut into large sections, which could then be used for coastal protection.
MCP-01 could be placed inshore as part of a jetty structure (as with the Brent Spar at Mekjarvik harbour in Western Norway) or as a bridge pier. The upper sections would probably be removed and the structure filled with sand or gravel dredged from the seabed to help the walls withstand wave actions. It is however doubtful if the platform design is attractive for this purpose as other types of structures may be more appropriate for such use.
The structure could be used as a support for marine engineering operations with additional secondary functions once in place, such as aquaculture.

5.1.4 Reuse of Modules and Equipment

Installation equipment brought to shore will be marketed for re-use. If reuse is not possible, alternative methods for recycling will be investigated for the following components:

- Concrete
- Pipelines
- Cables
- Steel
- Equipment

The main equipment on MCP-01 was installed in the 1970s / 1980s and has been out of service for 15 years without any maintenance. This will limit the interest for any re-use opportunities for these items and as such, it is more likely that they will be recycled or disposed of in accordance with the relevant waste management regulations.

5.2 Description of Non-Reuse Disposal Alternatives

5.2.1 General

The OSPAR convention bans leaving in place and dumping as disposal options for disused offshore installations, with some possible case by case derogation for concrete gravity based structures (with the exception of their topsides).

With regard to the disposal of MCP-01's topsides, the only option under OSPAR is for complete removal and either reuse or disposal on land. There are, however, three alternative removal methods being considered for the topsides, and these are discussed further in Section 5.2.2. In summary, the topsides removal methods being considered are:

- Reverse Installation – A reverse of installation operations by removing the facilities module by module using a heavy lift vessel.
- Piece-Small - Cutting the facilities into sufficiently small pieces so that platform cranes can transfer them to transfer vessels.
- Combination Lifts - Removal of multiple modules in single lifts using a heavy lift vessel.

For the concrete substructure, four alternatives are being considered which range from total removal with disposal on land, to leaving it in place with navigation lights to help prevent dangers to navigation. These four alternatives are discussed further in Section 5.2.3.

5.2.2 Disposal Alternatives for Topsides

The topsides on MCP-01 is shown in Figure 5.2.1

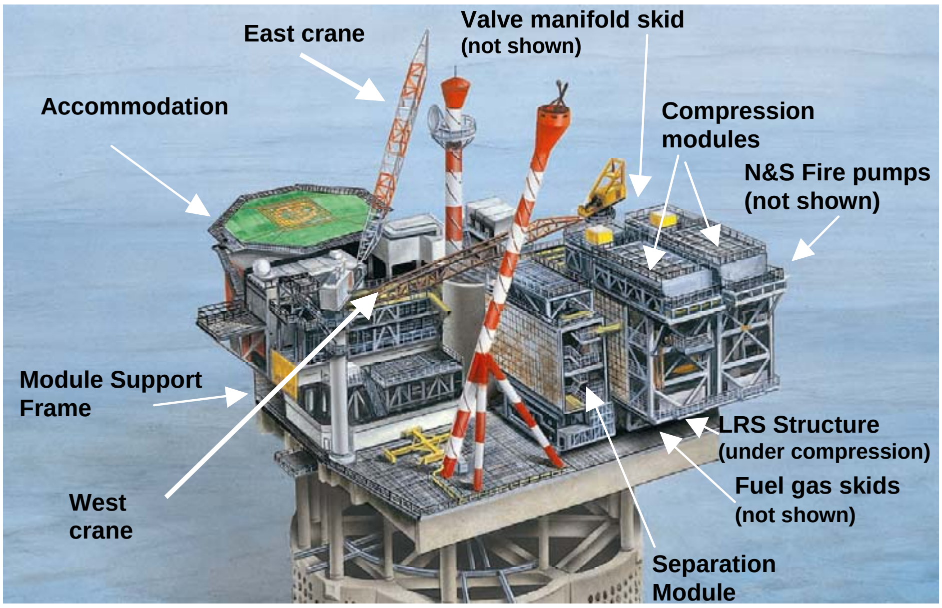

Figure 5.2.1 MCP-01 topsides [35]

The topsides on MCP-01 include:

- All modules above the concrete Module Support Frame (MSF) including cantilever platforms;
- Flare, antenna and steel deck plates;
- Baskets between the concrete beams;
- Pipes entering into the Central Shaft cut on the inside of the wall;
- Steel structures on top of the Central Shaft; and
- Steel pipes, the 18" Talisman riser, fire water & other caissons and structures cut at the top of the breakwater (EL 105m).

Of the two platform cranes only the east crane is currently operable and this has been down rated from 100 to 7.5 tonnes. This single crane cannot reach the entire platform deck area. If during decommissioning additional craneage is required, the cruciform base of a temporary crane which is still located at the base of the flare (shown in Figure 5.2.1) could be re-used.

Only the temporary emergency accommodation is currently available within the redundant living quarters. All other areas of the living quarters have been decommissioned and sealed.

Access to the platform is by helicopter but no refuelling facilities exist on the platform. Two flotel bridge landing platforms exist at under deck level (one on the east and the other on the west), although they have not been used since 1992.

The living quarters were installed as 4 separate packages, and the utilities modules were installed as two separate lifts. The entire north portion of the main deck was formed from 31 deck panels each weighing up to 40 tonnes. The remaining deck area was left open or grated to allow access.

The approximate weight of the topsides facilities (excluding the concrete MSF) is 12,300 tonnes.

Due to the ownership of the various facilities, it has been proposed that the topsides removal will be conducted in two phases: Phase 1 activities are concerned with the removal of the

Norwegian owned modules and Phase 2 the removal of the remaining modules in separate operations. The following modules would be included in Phase 1:

- Compression module M11;
- Compression module M12;
- Separation module M13;
- LRS Structure;
- 2 fuel gas skids (MP-K-2101/2102);
- North fire pump module;
- South fire pump module; and
- Valve manifold skid.

All the remaining work would be included in Phase 2. Whether the two phases would be separate or combined is still to be decided.

Three general strategies for the removal of the topsides have been considered:

- To remove the topsides in the **reverse** order of the installation process;
- To cut the topsides down into sufficiently small parts so that on-platform cranes can be used to transfer the loads to barges **("piece small"** approach); and
- To **combine** installation loads into fewer larger loads.

An overview of each strategy is provided in the following sections. As the Combination Lifts strategy is believed to be the most likely option from a technical viewpoint, this strategy is described in greater detail than the other two.

Reverse Installation

When installed the topsides on MCP-01 were constructed in a building-block approach with individual modules, pieces of equipment, etc., being lifted onto support frames. For example, the living quarters were installed as 4 separate packages on two levels from the main deck. The reverse installation strategy is to reverse the installation process, making use of the original lifting structures, where possible.

Structural considerations that will have an impact on the removal of the modules include:

- Uncertainty over lift weights and centre of gravity for the modules; and
- Integrity of existing lift points.

In addition, during installation of the topsides modules, various lifts would have been undertaken by the platform cranes, one on the east side and the other on the west. These cranes have not been maintained, resulting in the original load capacity of the east crane being reduced from 100 tonnes to 7.5 tonnes and the west crane being considered unserviceable. Lack of crane capacity and coverage will have an impact on topsides removal.

Piece-Small

"Piece-small" has been defined as the in-situ systematic dismantling of the platform topsides with maximum weight of the sections removed being governed by the capacity of the (available/temporary) platform cranes. Removed materials and equipment would then be transported to an onshore facility for further processing.

As previously highlighted, the topsides has two cranes but one is now not serviceable and the other has a reduced capacity of 7.5 tonnes. Should the piece-small strategy be considered, one of the first activities is to improve the craneage provision on MCP-01.

London Offshore Consultants Ltd. (LOC) assessed piece-small removal along with the other removal strategies [37] and concluded that the piece-small strategy was not viable for the following reasons:

- Piece-small removal is not considered cost effective when fully compared with the alternative methods of removal.
- There is considerable uncertainty associated with the removal rate of 200T/week.
- Piece-Small removal presents a significant challenge with respect to safety [38].

LOC went further by concluding that it is not practical, safe or economical to dismantle the MCP-01 structures with one crane, the east crane only. Skidding and dragging the structures into the reach of the east crane is also not considered feasible given the limited reach of the crane and the different deck levels encountered on the platform.

Combination Lifts
By increasing the size of the lifts (e.g. by combining modules together into a single lift) fewer heavy lifts are required.

An overview of the planned sequence of events to complete the topsides removal using the combination lifts strategy is provided below:

1. Mobilise derrick barge at disposal yard
2. Load new west platform crane onto derrick barge
3. Sail to MCP-01
4. Run anchors - derrick barge North of MCP-01
5. Prepare MCP-01 & inspect access
6. Prepare, rig, load old west platform crane onto derrick barge
7. Prepare, install and weld out new west platform crane
8. Repeat until topsides removal is complete:
   - Moor barge alongside
   - Rig, load & sea fasten loads onto barge
   - Finalise sea fastening
   - Move out to cast away barge
9. Pick-up anchors
10. Demob derrick barge

To complete the topsides removal, four 500+ tonne lifts will be needed in addition to approximately 100 lifts required for removing smaller pieces of equipment or systems, rigging, and the like. Table 5.2.1 presents the estimated weights of the lifts to remove the topsides.

Lift Description	Weight (tonnes)
Compression module mod 11	1,865
Compression module mod 12	1,865
Fuel gas skid	17
Fuel gas skid	17
North Fire pump module	55
South Fire pump module	55
Valve manifold skid	44
Separation mod 13	830
LRS structure	1,221
Miscellaneous lifts	6,500
Total	**12,468**

Table 5.2.1 Estimated weights of lifts for topsides removal

Table 5.2.2 presents the estimated durations for the key marine vessels that are required to undertake the topsides removal assuming a combined lifts strategy is followed.

Vessel	Days In Port	Days In Transit	Days Working
SSCV 200'	2	3	17
Flotel	5	6	150
Tug 100-150	4	4	46
Cargo B Tug	12	10	28
Supply	2	3	40
Standby	2	2	18

Table 5.2.2 Estimated Duration of Marine Activities for Topsides Removal

5.2.3 Disposal Alternatives for Concrete Substructure

As part of the topsides removal, all topsides support steelwork will be removed along with pipes and umbilicals down to +106m. The remaining concrete substructure is shown in Figure 5.2.2.

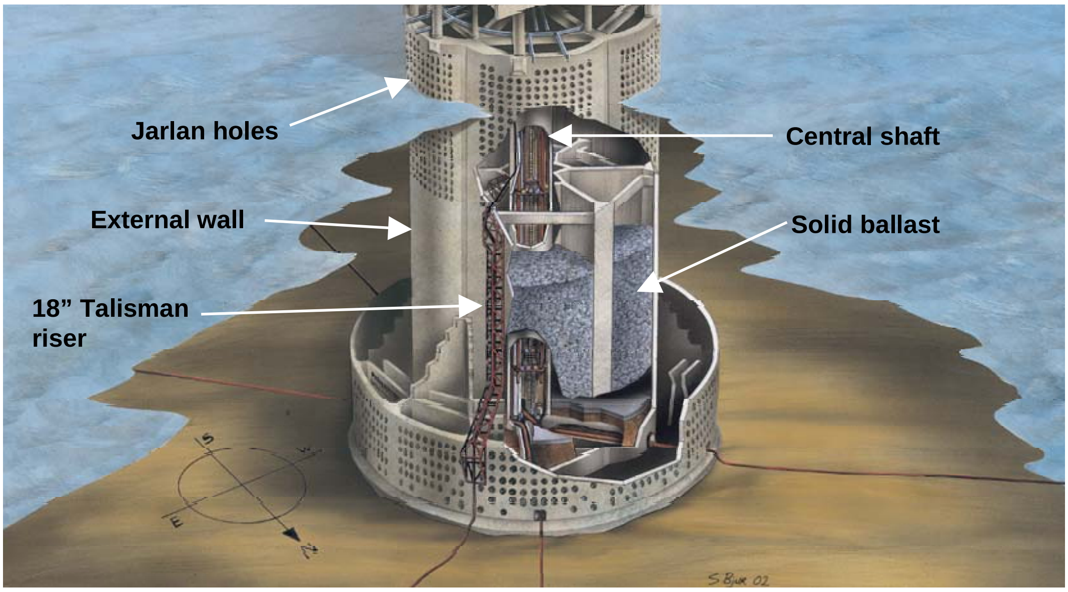

Figure 5.2.2 Concrete Substructure [35]

The disposal alternatives being considered for the substructure are listed in Table 5.2.3 and presented in greater detail in the following subsections.

Alternative A	Alternative B	Alternative C	Alternative D
Re-float, tow to shore, demolish and dispose on-shore.	Remove external and internal steelwork, re-float and dispose at a deep water location	Remove internal and external steelwork and cut down sub-structure to provide a clear draught of 55m.	Leave in place, removing as much external steelwork as reasonably practicable.

Table 5.2.3 Disposal alternatives for concrete substructure

Alternative A: Refloat concrete substructure and onshore disposal

Alternative A consists in the complete removal of the concrete substructure and the subsequent dismantling of the structure at an inshore/onshore site. The scope of work to complete Alternative A is presented below:

- Perform necessary inspections and surveys;
- Removal of topside modules, steel deck, skid beams and basket modules, etc. – as per Section 5.2.2;
- Removal of steel items outside the external wall including the 18'' Talisman riser and its support structure;
- Disconnection of pipelines, plug risers and ensure water tightness;
- Removal of steel items between the central shaft and the external wall;
- Removal of solid ballast from within the external wall;
- Removal of marine growth to ensure clean towing points and Jarlan holes for plugging;

- Removal of rip-rap away from platform;[1]
- Plugging of the Jarlan holes;
- Installation of water de-ballasting system and instrumentation as required for re-float and tow;
- Re-floating of the substructure;
- Towing to inshore/onshore disposal site;
- Removal of steel items inside the central shaft;
- Dismantling of the concrete structure down to level EL. +26m;
- Installation of temporary cofferdam around the external wall to increase freeboard;
- Further dismantling;
- Installation of temporary cofferdam around the anti-scour wall;
- Towing into dry dock;
- Dismantling of the remaining concrete structures;
- Clear seabed of remaining obstructions; and
- Undertake trawl test.

To complete Alternative A the following marine facilities will be required:

- Offshore Works:
  - Flotel moored alongside substructure up to time of re-floating;
  - Diving support vessel (DP);
  - Crane vessel (600 – 1000t);
  - Work boat (moored alongside flotel);
  - Hopper dredger for rip-rap removal;
  - Control vessel for re-floating and towing stages;
  - 6 tugs for towing substructure to inshore location;
  - Supply vessel for general cargo movement;
  - Tug and cargo barge for non-general cargo movement; and
  - Survey vessel for tow route survey.
- Inshore Works:
  - Anchor handling vessel;
  - Tender barge;
  - Cargo barges;
  - Harbour tugs; and
  - Sheerleg crane vessel.

Table 5.2.4 gives the estimated durations for the key marine vessels that are required to undertake the option.

Vessel	Days In Port	Days In Transit	Days Working
HLV	3	3	25
SSCV	3	3	800
Flotel	5	5	90
Tugs (6 off)	6 x 3	6 x 6	6 x 50
DSV	4	6	31
Supply	2	3	15
Standby	4	6	145

Table 5.2.4 Estimated duration of marine activities for Alternative A

[1] Rip-Rap – “Layers of broken rock, cobbles or fragments of sufficient size to resist erosive forces of flowing water and wave action.”

Alternative B: Refloat the concrete substructure and disposal in deep water
Alternative B is similar to Alternative A except that instead of towing the substructure inshore for dismantling the substructure is towed to a suitable deep water location and immersed.

The scope of work to complete Alternative B is presented below:

- Perform necessary inspections and surveys;
- Removal of topside modules, steel deck, skid beams and basket modules, etc. – as per Section 5.2.2;
- Removal of steel items outside the external wall including the 18'' Talisman riser and its support structure;
- Removal of steel items inside the central shaft;
- Disconnection of pipelines, plug risers and ensure water tightness;
- Removal of steel items between the central shaft and the external wall;
- Removal of solid ballast from within the external wall;
- Removal of marine growth to ensure clean towing points and Jarlan holes for plugging;
- Removal of rip-rap away from platform;
- Plugging of the Jarlan holes;
- Installation of water de-ballasting system and instrumentation as required for re-float and tow;
- Re-floating of the substructure;
- Clear seabed of remaining obstructions;
- Undertake trawl test;
- Towing to offshore disposal site; and
- Immerse

To complete Alternative B the following marine facilities will be required:

- Flotel moored alongside substructure up to time of re-floating;
- Diving support vessel (DSV);
- Crane vessel (600 – 1000 tonnes);
- Work boat (moored alongside flotel);
- Hopper dredger for rip-rap removal;
- Control vessel for re-floating and towing stages;
- 6 Tugs for towing substructure to inshore location;
- Supply vessel for general cargo movement;
- Tug and cargo barge for non-general cargo movement; and
- Survey vessel for tow route survey.

Table 5.2.5 presents the estimated durations for the key marine vessels that are required to undertake the option.

Vessel	Days In Port	Days In Transit	Days Working
HLV	6	6	32
Flotel	15	15	245
Tugs (6 off)	6 x 3	6 x 6	6 x 55
MSV	4	6	20
DSV	4	6	35
Supply	4	6	75
Standby	8	12	275

Table 5.2.5 Estimated duration of marine activities for Alternative B

Alternative C: Cut down concrete substructure to provide a clear draught of 55m.
Alternative C involves undertaking sufficient dismantling activities in order to comply with the IMO (International Maritime Organisation) Guidelines [22] and Standards which require that offshore structures located in more than 75m of water depth should (as a minimum) be partially removed to a depth of 55m below the sea surface to avoid any navigational hazard.

Alternative C would require the concrete structure to be cut into sections, with each section being toppled onto the seabed around the structure base. Figure 5.2.3 shows the concrete structure following toppling of the external walls and central column.

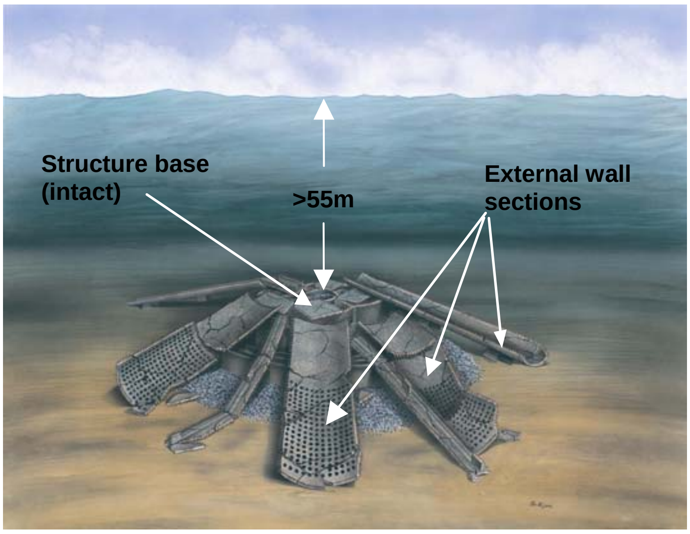

Figure 5.2.3 Alternative C substructure toppling

The scope of work to complete Alternative C is presented below:

- Perform necessary inspections and surveys;
- Removal of topside modules, steel deck, skid beams and basket modules, etc. – as per Section 5.2.2;
- Removal of steel items outside the external wall including:
  - 18'' Talisman riser and its support structure
  - Umbilical caisson
  - Access ladders
  - Mooring devices
  - Bumper ladders
  - Ballasting seawater loading pipes
  - Ballasting seawater pumps bumpers
  - 32" sealine sections
- Removal of steel items between external wall and the central shaft including:
  - Utility risers
  - Diving rails
  - Horizontal section of the 18" Talisman riser
  - Vertical section of the 18" Talisman riser running up central shaft
- Removal of steel items inside the central shaft including:
  - Risers and piping including their supports
  - Access ladders, hoist system and working platforms
  - Flowlines and piping inside tunnels
  - Pumps and tanks inside tunnels
- Removal of the solid ballast from the external cells down to El. +28m;
- Removal of the concrete deck beams and columns;
- Cutting of the external wall sections from the substructure (explosive cutting);
- Toppling the external wall sections to provide 55m clear water space (explosive cutting);

- Cutting and toppling of the upper strut and radial beams (explosive cutting);
- Separating and toppling the intersections between the breakwater/external wall and the radial diaphragm walls to provide 55m clear water space (explosive cutting);
- Separating and toppling of the lower strut beams and the radial diaphragm walls to provide 55m clear water space (explosive cutting); and
- Splitting and toppling the central shaft to give 55m clear water space (explosive cutting).

To complete Alternative C the following marine facilities will be required:
- Offshore Works:
  - Flotel;
  - Diving support vessel;
  - Crane vessel (500 – 1000 tonnes);
  - Barge/vessel for temporary storage of beams and columns;
  - Anchor handling vessel;
  - ROV support vessel;
  - Work boat;
  - Supply vessel for general cargo movement; and
  - Tug and cargo barge for non-general cargo movement.

Table 5.2.6 gives the estimated durations for the key marine vessels that are required to undertake the option.

Vessel	Days In Port	Days In Transit	Days Working
SSCV	2	6	30
Flotel	10	6	114
Tugs	6	6	259
DSV	2	3	145
Supply	6	3	259

Table 5.2.6 Estimated duration of marine activities for Alternative C

Alternative D: Leave concrete substructure in place, removing as much external steelwork as practicable

Alternative D involves the removal of all steel items located outside the external wall (up to El. +68m) and outside the breakwater wall (above El. +68, as per Alternative A). After removal of steel items, navigation aids will be installed on top of the remaining installation.

The scope of work to complete Alternative D is presented below:
- Perform necessary inspections and surveys;
- Removal of topside modules, steel deck, skid beams and basket modules, etc. – as per Section 5.2.2
- Removal of steel items outside the external wall including:
  - 18’’ Talisman riser and its support structure,
  - Umbilical caisson
  - Access ladders
  - Mooring devices
  - Bumper ladders
  - Ballasting seawater loading pipes
  - Ballasting seawater pumps bumpers
- Installation and periodic maintenance of navigation aids

To complete Alternative D the following marine facilities will be required:
- Diving support vessel
- ROV support vessel
- Work boat
- Supply vessel for general cargo movement
- Tug and cargo barge for non-general cargo movement

Presented in Table 5.2.7 are the estimated durations for the key marine vessels that are required to undertake the option.

Vessel	Days In Port	Days In Transit	Days Working
Tugs	2	6	25
DSV	1	6	30
Supply	2	3	25

Table 5.2.7 Estimated duration of marine activities for Alternative D

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6. Natural Resources and Environment – Current Situation

The environmental descriptions contained within this baseline study will be based on general information about the area in vicinity of MCP-01, as well as site-specific data.

The main reference source data for both general and site-specific information is the SEA 2 report [39], issued in 2001 by the Department for Business, Enterprise & Regulatory Reform, as part of its ongoing research programmes, the DTI is undertaking Strategic Environmental Assessments (SEA) before any UK Continental Shelf (UKCS) license rounds for oil and gas exploration and production. MCP-01 falls within the SEA2 area. Further key data sources used include the site-specific ERT (Scotland) Limited Pipeline Inspection Survey [40] that was carried out in September 2002. This survey included video footage and analysis of both seabed sediment samples and marine growth samples.

6.1 Oceanography and Meteorology

6.1.1 Stratification, Salinity, and Temperature

Several water masses in the North Sea are derived from mixing of North Atlantic sea water and freshwater run-off from land, and can be identified on the basis of temperature and salinity distribution, residual current patterns, and stratification. Density stratification is well developed in the summer months of most years in the central and northern North Sea, with the relative strength of the thermocline determined by solar heat input and turbulence generated by wind and tides. Temperature sections across the North Sea at 57º 17'N demonstrate thermocline development at a depth of around 50m.

Table 6.1.1 below shows the salinity and temperature distributions at the MCP-01site:

Location	Salinity
Mean surface salinity Winter	35.2 ppt
Mean surface salinity Summer	35.1 ppt
Mean bottom salinity Winter	35.25 ppt
Mean bottom salinity Summer	35.25 ppt
Location	Temperature
Max Sea surface	18-20ºC
Min Sea surface	2º C
Mean bottom temperature Winter	6.5-7.0ºC
Mean bottom temperature Summer	7.0-8.0ºC
Mean surface temperature Winter	6.5-7.0ºC
Mean surface temperature Summer	14-14.5ºC

Table 6.1.1 Salinity and temperature distributions at the MCP-01 site [2].

Likely site-specific air will range between a maximum of +22ºC to a minimum of -9ºC, whilst sea temperatures will range between 6.5ºC and 14.5ºC [2]. Relative humidity in the area around MCP-01 can vary between 40% and 100% [41].

6.1.2 Waves, Winds and Tides

Tidal currents in North Sea offshore waters decrease in velocity from south to north. The chief water movements are influxes of Atlantic water through the Fair Isle Channel (between Orkney and Shetland) and to the east of Shetland, as well as a major outflow through the Norwegian Trough. Water circulation in the North Sea is anticlockwise, with an eddy forming over the Fladen Ground. The water column of the southern North Sea remains mixed throughout the year while to the north it becomes layered (i.e. stratified) in summer, which effectively isolates surface and near bottom waters until autumn gales break down the stratification.

The North Sea is frequently rough from October to March with wave heights in excess of 4m within the area of the MCP-01 site. Sea currents speeds in the immediate area of MCP-01 are 1.57m/s at the surface and 0.47 m/s at the bottom, with variations being approximately linear, not taking into account current field distortion due to the presence of the structure [42].

Table 6.1.2 (below) shows tidal characteristics in the MCP-01 area (coordinates 59°53'17"N, 2°04'42"E)

Astronomical tide characteristics	ESLWD* (feet)
Highest Astronomical Tide	5.1
Mean High Water Springs	4.4
Mean High Water	4.0
Mean High Water Neaps	3.7
Mean Tide Level	2.1
Mean Low Water Neaps	0.6
Mean Low Water	0.2
Mean Low Water Springs	-0.2
Lowest Astronomical Tide	-0.9
Maximum Range	6.0
Spring Range	4.6
Mean Range	3.8
Neap Range	3.1

*(ESLWD = Equatorial Spring Low Water Datum)

Table 6.1.2 Normal astronomical tide characteristics at coordinates 59°53'17"N, 2°04'42"E [42]

The prevailing wind direction at the MCP-01 site is south westerly (see Figure 6.1.1a), with an accompanying wave height at 2-3.9 ft. The following figures show the annual average percentage frequency of occurrence of wind- speed and wave -height direction groups in the North Sea. The figures are based on met ocean data of conditions affecting offshore petroleum operations at the Frigg site in Norway, through to the MCP-01 site and further along the pipeline route from Frigg site to Peterhead, Scotland.

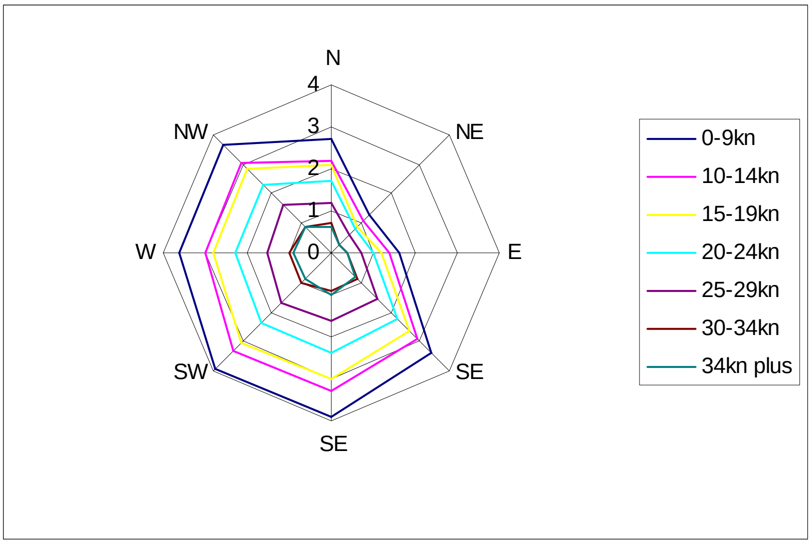


Figure 6.1.1a MCP-01 site-specific annual average percentage frequency of occurrence of wind speed direction groups [42].

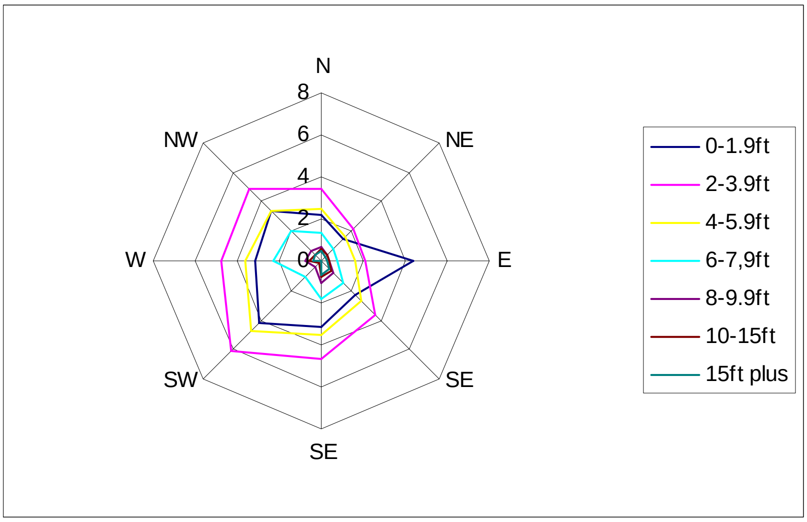


Figure 6.1.1b Average percentage frequency of occurrence of wave height-direction groups at the coordinates 59°53'17"N, 2°04'42"E [42].

In terms of wave movement, most waves in the vicinity of MCP-01 have a period of 0-5 seconds, with 70% at wave heights of 1-1.9 ft (See Figure 6.1.1c).

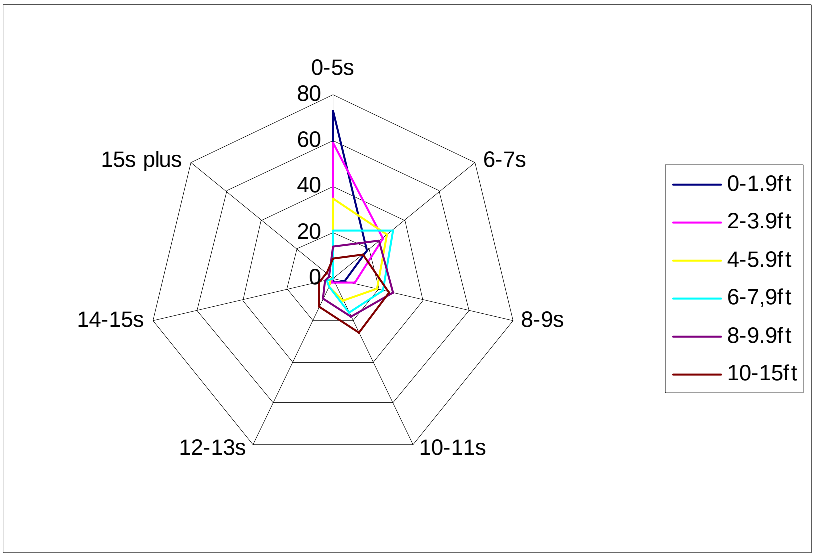


Figure 6.1.1c Average percentage occurrence of significant wave period in significant wave heights categories at the coordinates 57°48'00"N, 1°28'00"E [42].

6.2 The Seabed Topography and Sedimentology

Based on various site-survey data, the area of the seabed on which MCP-01 is located consists of 2-3 metres upper layer of brown medium sand with shell fragments. Underneath this upper layer (to about 30 metres) is a layer of fine grey sand interspersed with thin centrimetric levels of clayey silt and layers of organic matter. A few inter-bedded levels of gravel are also present [43] (See Figure 6.2.1 below).

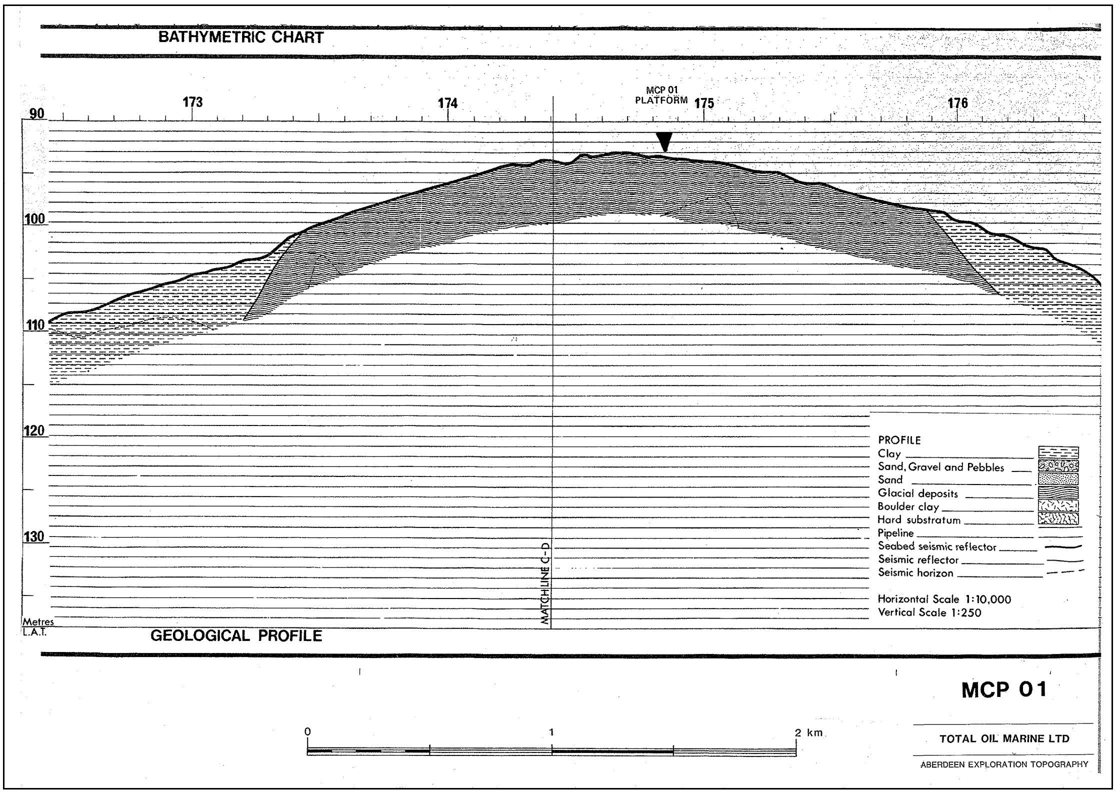


Figure 6.2.1 Geological profile showing the sand mound and mud/clay distribution at the MCP-01 site [43].

Site-specific Bathymetric maps [43] confirm that the platform is situated on a sandy elevated mound/bank on 94m depth that covers an area of 1.2 x 2.0 km with surrounding muddy/clay areas commencing at 100 m depth contour (See Figure 6.2.2). This has also been confirmed by local fishermen [58], and by the site-specific video footage taken during the ERTSL Pipeline Inspection Survey [40]

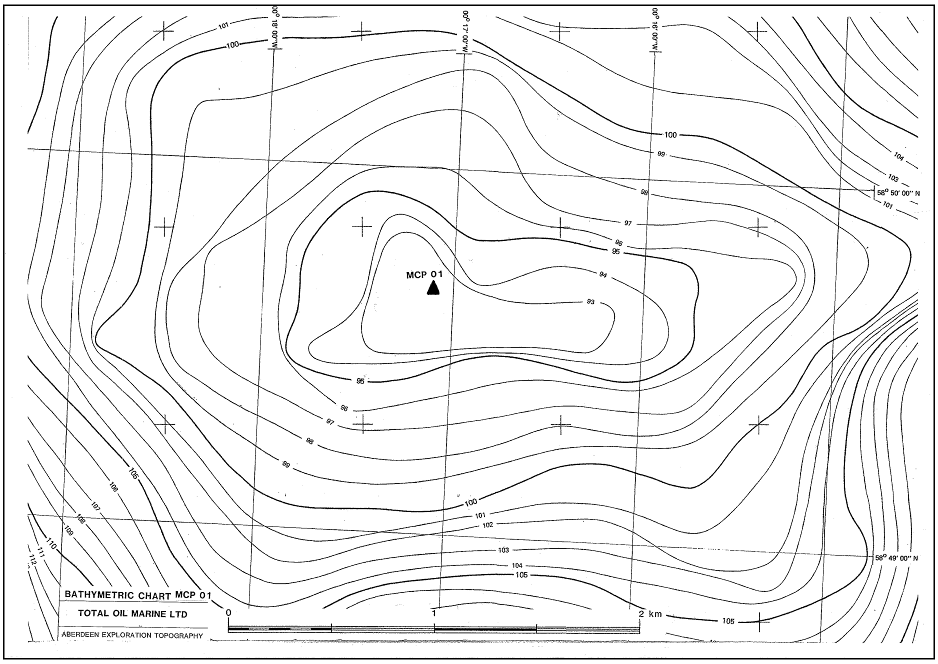


Figure 6.2.2 Bathymetric map showing the location of MCP-01 [43]

6.2.1 Pockmarks and MDACs (Methane-derived Authigenic Carbonate)

Seabed features like pockmarks and Methane-derived Authigenic Carbonate structures fall under the EU Habitats Directive [50] and hence they are considered relevant to the EIA process for the decommissioning of MCP-01.

MDAC occurs as rock-like concretions formed when a carbonate precipitate cements to the normal seabed sediment. MDAC presents itself as crusts and slabs at the seabed (often covered by a thin layer of sediment), or as exposed lumps sitting on the seabed. The hard ground structures provided by these carbonates, the microbial utilisation of the methane and, subsequent hydrogen sulphide may have impacts on the benthic ecosystem. North Sea pockmarks are formed by gas escaping from the seabed and as MDACs might form within the pockmarks there is an association between pockmarks and MDAC.

Pockmarks, in addition to MDAC, may also present ecological significance to an area due to:
- Their utilisation of methane and its by-product, H_2S, by chemo synthesisers;
- Chemosynthetic organisms are a potential food-source for other organisms (e.g. filter feeders);
- The MDACs within the pockmarks provide a hard substrate suitable for colonisation by certain benthic organisms.

Pockmarks, seeps and MDAC are also of interest to the offshore industries for the following reasons:
- In petroleum exploration, seeps of thermogenic gases provide indications of the presence and character of petroleum at depth;
- Shallow gas accumulations are hazards to offshore petroleum drilling;
- Pockmarks are obstacles to offshore structures, seabed pipelines and cables;
- MDAC impedes the ploughing of trenches for pipelines and cables;
- Gas seeps release methane (a potent Greenhouse gas) to the hydrosphere and the atmosphere.

The EU Habitats Directive [50] outlines areas and habitats that are of potential conservation interest. MDACs and pockmarks are considered to be habitats of potential conservation interest and fall within the Habitats Directive definition of: "Submarine structures made by leaking gases and Reefs."

The structures within the pockmarks can also be classified as biogenic reefs (i.e. a reef that has a significant, rigid skeletal framework that influences deposition of sediments in its vicinity). Biogenic reefs are topographically higher than the surrounding sediment and have been developed as a combination of biological and geological processes. Animals associated with such reefs are mussel beds (on rocky substrates), invertebrate specialists of hard marine substrates (e.g. sponges, Bryozoa and cirripedian Crustacea).

Distribution and vulnerability
There is a trend for individual pockmark sizes to be greater towards the centre and smaller towards the edges of a pockmark area. Smaller pockmarks are usually inactive and may be filled up with sediment. Hence the possibility for the presence of designated MDAC structures within the pockmarks are reduced which make them less significant and less vulnerable [80].

The MCP-01 platform is located at the edge of the Witch Ground Basin pockmarks area as shown below in Figure 6.2.3. As described in section 6.2, the platform is situated on a sandy elevated mound/bank and therefore there is little or no evidence that would suggest that this would provide suitable conditions for the development of any significant pockmarks in the immediate vicinity of the MCP-01 platform. The site-specific ERTSL video survey (2002) [45] also confirms that there are no visible pockmarks at the MCP-01 site and within 100m of the site. Figure 6.2.4 shows typical sandy seabed features 100m from the MCP-01 platform. It is noted, however, that there have been no site-specific surveys carried out to date to determine the existence of pockmarks beyond this 100m zone.

It can be concluded from an EU Habitats perspective, that the apparent absence of MDAC and pockmarks in the vicinity of MCP-01 means that this is not an area of high sensitivity.

The information contained within this section is based on; the DTI SEA 2 report [39], on a telephone conversation with Zoë Crutchfield JNCC [80], the photo material from the MCP-01 site-specific ERTSL video survey [45], and the Interpretation Manual of European Union Habitats (EUR15/2) [25].

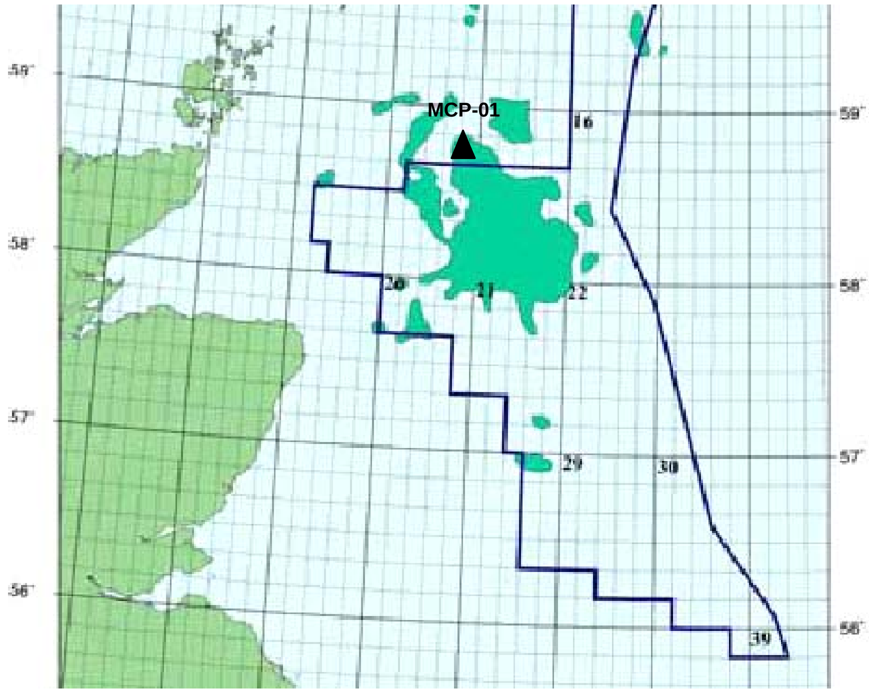


Figure 6.2.3 The distribution of pockmarks in the UK North Sea and the location of MCP-01 [39].

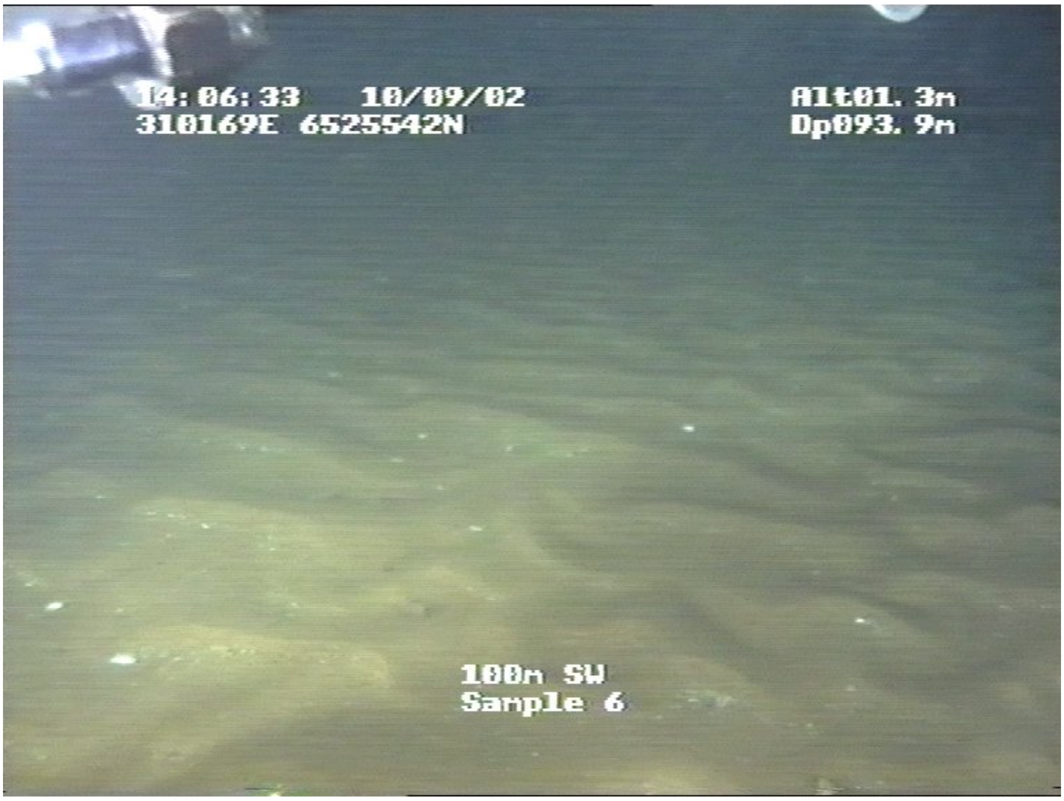


Figure 6.2.4 Sandy seabed from 93.9m depth 100 m SW of the MCP-01 platform [45].

6.2.2 Metals in Sediments and Biota Tissues

During the MCP-01 Platform Sediment and Biota Sampling Inspection Survey (2002) grab sediment and biota samples were taken from a total of eight locations: 50 and 100 m approximately to the northeast, northwest, southeast, and southwest of MCP-01 [40], [45]. The samples were analysed for metals and hydrocarbon contents. Marine growth samples were also collected from eight locations on the concrete jacket: in the splash zone (5-10m), and at various depths (15-30 & 50m and below) on the east and west side of the structure.

Many of the elements studied (Barium (Ba), Cadmium (Cd), Chromium (Cr), Copper (Cu), Mercury (Hg), and Nickel (Ni)) for the sediments around MCP-01 indicate comparable (or lower) levels than the mean NNS (Northern North Sea) reported background concentrations (1975-1995) and lower than EAC (Ecotoxicological Assessment Criteria)/BRC (Background reference concentrations) and mean levels of these elements reported for the North Sea Quality Status Report 1993 [46].

Tables 6.2.1 and 6.2.2 show the levels of metals in sediment and biota (*Mytilus edulis*). Levels of arsenic, iron, lead, vanadium, and zinc are all elevated above the NNS mean background although (where data exists) some are comparable (or lower) to EAC/BRC quoted levels. It is unclear from the data whether this is due to deposition around the locality of MCP-01 or an artefact of the sediments/shell debris at this site.

Limited data exists within the cited literature for metal levels in the tissue of the Blue mussel (*Mytilus edulis*) apart for Ecotoxilogical Assessment Criterion (EAC) which are the concentrations of specific substances in the marine environment below which no harm to the environment or biota is expected, see Table 6.2.1.

Measured levels of mercury and lead in the tissue samples are comparable to the background ranges. Cadmium and copper levels appear elevated for the MCP-01 platform against these data although a recommended standard of 2.5 µgg-1 has been set (in Scotland) for cadmium in mussels under the terms of the EC Shellfish Growing Waters Directive [47].

This directive has also set the standard for zinc levels at 83 µgg-1. Based on these limited references it would appear that the metals burdens reported for the Blue mussel tissue are unlikely to be of concern.

Station	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Strontium	Vanadium	Zinc
1	17.9	46	0.04	19	51	17,400	54	173	<0.01	9	220	33	557
4	29.3	12	<0.01	20	49	23,000	47	136	<0.01	5	89	57	455
5	26.1	634	0.04	22	39	36,300	51	306	<0.01	6	105	58	524
7	14.8	14	0.02	14	26	15,300	30	130	<0.01	5	151	26	380
Ref Values (EAC*)	1-10	No ref	0.1-1	10-100	5-50	No ref	5-50	No ref	0.05-0.5	5-50	No ref	No ref	50-500

* EAC = Ecotoxicological Assessment Criteria. EACs are the concentrations of specific substances in the marine environment below which no harm to the environment or biota is expected.

Table 6.2.1 Summary of metals in sediment compared to NNS and OSPAR reference values [49].

Station	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Strontium	Vanadium	Zinc
10	1.1	<1	2.46	<1	5	<1	<1	4	<0.01	<1	5	<1	48
12	0.9	<1	0.45	1	9	<1	<1	<1	<0.01	<1	8	<1	15
13	0.9	<1	0.62	<1	4	<1	<1	<1	<0.01	<1	8	<1	15
Ref Values (EAC)	No ref	No ref	0.07 to 0.11	No ref	0.7 to 1.10	No ref	0.01 to 0.19	No ref	0.005 to 0.10	No ref	No ref	No ref	No ref

Table 6.2.2 Summary of biota (Mytilus edulis) tissues compared to OSPAR Region II Greater North Sea background/reference values and EAC (Ecotoxiological Assessment Criteria). [49]

6.2.3 Hydrocarbons in Sediment and Biota Tissues

Apart from one location (station 1, 50 m NE) the hydrocarbon profiles of the sediments were similar to each other and typical of hydrocarbon distributions found in marine sediments remote from main centres of anthropogenic activity. The weathered hydrocarbon material present at Station 1 is possibly derived from some oil product used in the construction phase of MCP-01 or later works (see Table 6.2.3).

The total hydrocarbon concentrations for sediments around the platform at the 50 m stations can be considered background in relation to the NNS and background levels quoted for the OSPAR Quality Status Report in 1993 [46]. A similar conclusion can be drawn when comparing the MCP-01 sediment aromatic concentrations against the OSPAR background/reference concentrations and the EAC (Ecotoxiological Assessment Criteria) [46]. See Table 6.2.4a.

Total hydrocarbon concentrations found in the tissue of the blue mussel (*Mytilus edulis*) samples indicate no marked difference between the zones sampled (i.e. splash zone to the deepest station at 50 m). No reference values were found for THC concentrations in blue mussel tissues, however Table 6.2.4b shows a range of PAH's and their concentrations found at MCP-01 are well below the EAC.

Station	Sediments (μgg^{-1} dry sediment)	Blue mussel tissue (μgg^{-1} wet tissue)
1	7.9	50.1
4	1.1	54.1
5	0.8	45.4
7	0.9	37.6

Table 6.2.3 Summary of THC (total hydrocarbons) in sediment and biota tissues at the MCP-01 site [40]

Station	Naphthalene (128)	Phenanthrene/ Anthracene (178)	Flouranthene/ Pyrene (202)
1 (50m) NE	$12*10^{-3}$	$10*10^{-3}$	$6*10^{-3}$
4 (50m) NW	$3*10^{-3}$	$2*10^{-3}$	$1*10^{-3}$
5 (50m) SW	$2*10^{-3}$	$1*10^{-3}$	$2*10^{-3}$
7 (50m) SE	$<1*10^{-3}$	$<1*10^{-3}$	$<1*10^{-3}$
EAC	0.05-0.5	0.1- 1	0,5- 5

Table 6.2.4a PAH in sediments (Units: μgg^{-1} dry sediment) samples from MCP-01, compared with EAC from OSPAR, Quality Status Report, 2000 [49]

Station	Naphthalene (128)	Phenanthrene/ Anthracene (178)	Flouranthene/ Pyrene (202)
10 (Splash zone)	$72*10^{-3}$	$45*10^{-3}$	$16*10^{-3}$
12 (20m)	$103*10^{-3}$	$111*10^{-3}$	$36*10^{-3}$
13 (20m)	$78*10^{-3}$	$73*10^{-3}$	$23*10^{-3}$
16 (50m)	$77*10^{-3}$	$37*10^{-3}$	$20*10^{-3}$
EAC	0.5-5	5-50	1-10

Table 6.2.4b PAH in biota (Units: μgg^{-1} wet tissue) samples from MCP-01, compared with EAC from OSPAR, Quality Status Report, 2000 [49]

6.3 Natural Resources

6.3.1 Plankton

The majority of the plankton occurs in the top 20m of the sea, known as the photic zone (i.e the layer where light penetrates to allow photosynthesis). In the North Sea and in the water masses surrounding the MCP-01, plankton blooms start during March/April. The phytoplankton cells utilise the light and suspended nutritious matter from the water, producing oxygen and food for zooplankton and fish stocks. During the summer months in the NNS the activity is low due to the stratification of water masses. This stratification of the water masses causes denser concentrations of plankton to accumulate in upper layers. The vertical position of the boundary between these layers in the water column can vary throughout the year [39] and a second plankton bloom occurs when the water masses mixes during the autumn (September-October). Figure 6.3.1 shows the annual fluctuations in plankton concentration. This pattern will also apply to the water masses surrounding the MCP-01 platform.

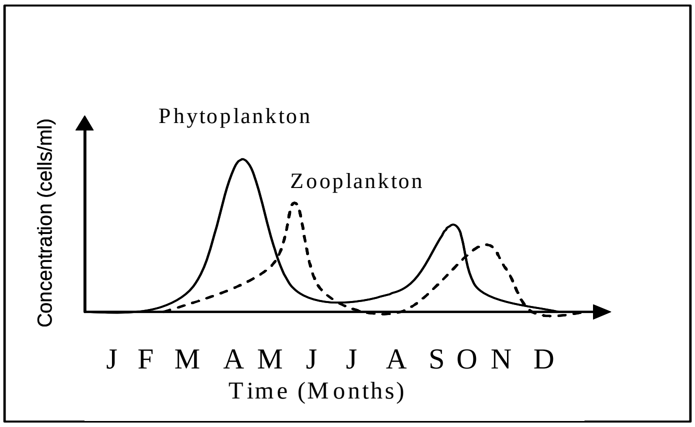


Figure 6.3.1 Normal annual plankton fluctuations. These conditions are also applicable to the area where MCP-01 is situated [39]

Vulnerability

The most common phytoplankton groups are the diatoms, dinoflagellates and the smaller flagellates. Much of this group consists of bacteria, in addition to blue-green algae, and at times may make up 15% - 33% of the total plankton biomass [39].

There is a complex interaction between phytoplankton abundance, productivity, nutrient, and light availability and the degree of mixing in the water column. This interaction plays a role in the geographic heterogeneity of phytoplankton distribution, and presumably controls phytoplankton species succession in the North Sea [39].

Temporal and spatial heterogeneity in the abundance of phytoplankton in the North Sea is regularly monitored and surveys based on collection of data by CPR (Continuous Plankton Recorder) show that the horizontal distribution pattern of zooplankton biomass are high; >10g dryweight/m^2 in the NNS extending into the CNS (2 May-13 June, 1986, see table 6.3.1). The distribution of zooplankton biomass varies between years and seasons, as such this value represents only the specific period of sampling [39].

Zooplankton biomass (g dry weight/m^2) in the NNS	
> 10g	High
5-10	Medium
< 5	Low

Table 6.3.1 Zooplankton biomass in the NNS (2 May-13 June, 1986) [39]

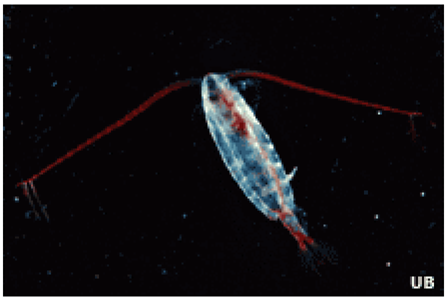


Figure 6.3.2 *Calanus* sp. [51]

Among zooplankton, Copepods have the highest abundance, with *Calanus* sp. species dominating. Copepods are small, insect-like crustaceans that range from 0.5mm to 6 mm. These are known to reach large concentrations and constitute a major food resource for many commercial fish species, such as cod and herring. It is a strong grazer on phytoplankton [39] and therefore changes in their populations are of considerable importance also in the MCP-01 area [39]. All plankton species will be vulnerable to any chemical/hydrocarbon discharges that reach the photic zone i.e. the upper 20 metres, particularly in March-June and September-October.

6.3.2 Benthos

The major factors underlying the distribution and abundance of the infauna and epifauna are related to depth and the sedimentary characteristics [52]. Between 1980 and 1985, 152 stations in the NNS were sampled to assess the abundance and distribution of the epibentic fauna. 196 taxa were found, representing all the major epifaunal groups, although the most frequently recorded were Echinoderms; decapod Crustacean, molluscs, polychaeta, bryozoans, hydroider Porifera and Anthozoa were also represented. The distribution of many of these species is poorly documented [52].

In the area where MCP-01 is located the most common species found during the survey was the anemone *Balocera tuadiae* [52].

The DTI commissioned a survey of habitats of potential conservation interest within the SEA 2 areas where MCP-01 is situated. These habitats are defined by the EU Habitats Directive [50], and in those relevant to the MCP-01 are sandbanks in shallow water and submarine structures made by leaking gases. Preliminary results from the survey did not reveal the presence of any outstanding animal species or communities [39].

Table 6.3.2 shows the MCP-01 site-specific benthos distribution with regard to total benthos biomass, density and species diversity. The data is gathered from UKDMAP [2] and were originally displayed as distribution maps. MCP-01 levels are marked in blue.

Range of total benthos biomass in grams per m^2	Range of total benthos density in number of individuals per m^2	Range of diversity of benthos species as index value per m^2
>20	>8000	>100
10-20	4000-8000	50-100
5-10	2000-4000	35-50
2-5	1000-2000	25-35
1-2	500-1000	20-25
0-1	<500	<20

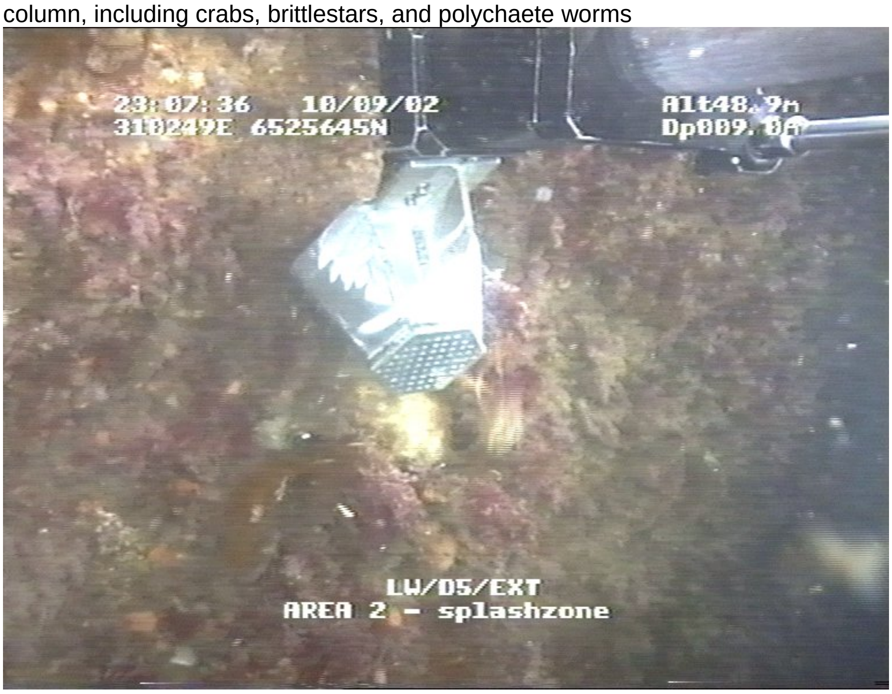
Table 6.3.2 Range of benthos biomass, density, and diversity. Site-specific levels are marked in blue [2].

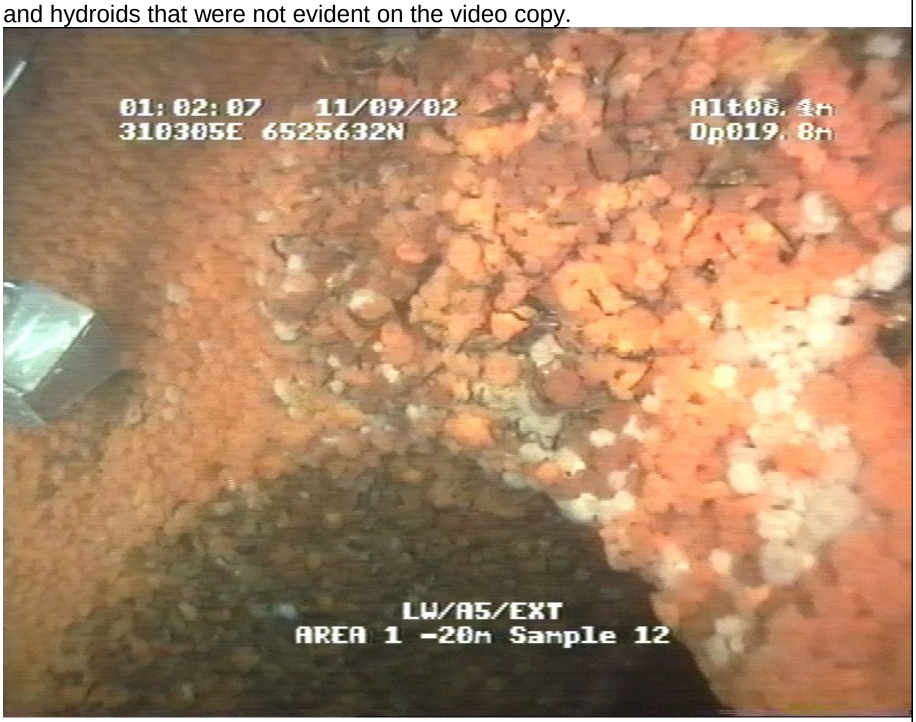
Vulnerability
Benthic organisms would be vulnerable to mechanical and chemical disruption in the seabed environment, such as covering with sand/mud. The overall benthos concentrations at the MCP-01 site is considered to be low-medium when compared to the NNS zooplankton biomass values outlined in Table 6.3.1.

6.3.3 Marine Fouling

Site-specific video assessments of the seabed within 100 m of MCP-01 and of the fouling growth on the MCP-01 structure have been conducted during ROV Pipeline Inspection Survey in September 2002 [45]. The findings from this survey show that marine growth on MCP-01 is abundant and the main species present are typical of fouling communities in clean inshore Scottish waters. In addition, the depth-related zonation pattern is similar to that expected on most vertical rock faces in open water at comparable depths [45].

Figures 6.3.3a, b and c describe the fouling growth on the MCP-01 platform reported from the ERTSL inspection survey [45], where photographs were taken to show the most significant features from each zone/depth.

Depth/Zone	Fouling growth
From splash zone down to 10 m	At the splash zone stations, fouling growth was dominated by large brown seaweeds, including the kelp *Laminaria hyperborea*, and various species of red foliose seaweed (see figures below). The kelp fronds were typically heavily colonised by the encrusting bryozoan (sea mat), *Membranipora membranacea*. Beneath the larger algae, a short fouling 'turf' covered the external wall that included mussels (*Mytilus edulis*) within a matrix of unidentified anemones, sponges, ascidians, small red algae, and patches of pink encrusting coralline alga. Mobile fauna were not in evidence, though edible crabs (*Cancer pagurus*) and common starfish (*Asterias rubens*) were seen on occasions. The ROV operator could also see hydroids and tubeworms, though these were not visible at the magnification/resolution of the VHS tape copy. Disturbance of the biota by the sampling device led to the dislodging of many small cryptic species into the water column, including crabs, brittlestars, and polychaete worms  **Figure 6.3.3a** Small red algae and pink encrusting coralline alga from 9.0 m depth

Depth/Zone	Fouling growth
From 15-20m	At approximately 15 to 20 m depth, the large brown algae had disappeared but thinning stands of red foliose algae remained in the fouling community together with a fauna dominated by extensive growths of soft coral (*Alcyonium digitatum*) and plumose anemones (*Metridium senile*). Yellow sponges (possibly *Clione celata*) occurred occasionally, and the ROV operator reported the presence of barnacles and hydroids that were not evident on the video copy.  **Figure 6.3.3b** Soft corals from 19.8m depth

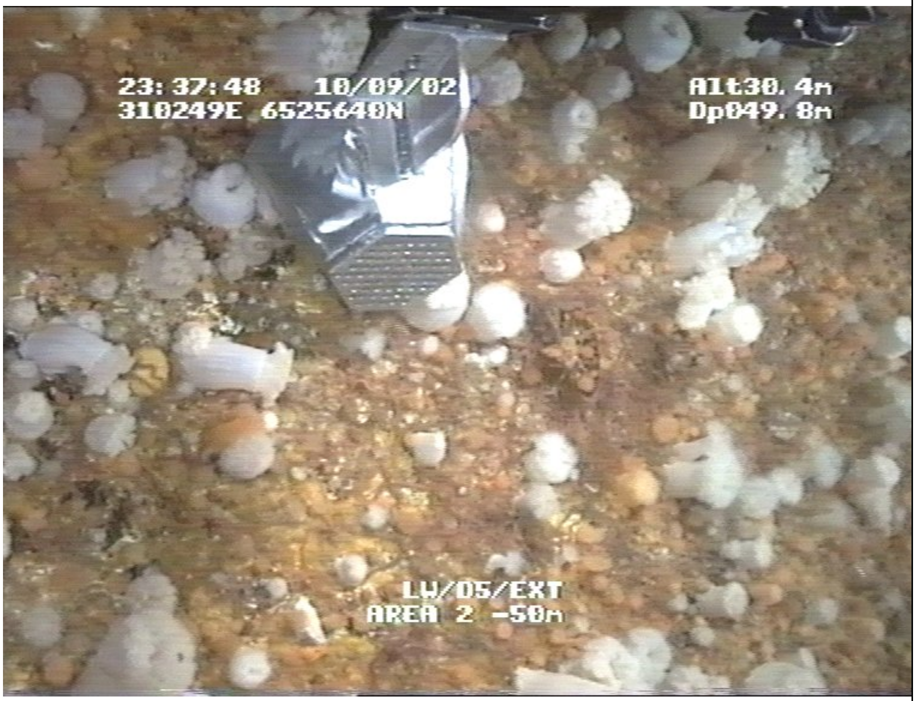
Depth/Zone	Fouling growth
From 50m and below	At a depth of 50 m, no seaweeds were evident, and the fouling growth consisted predominantly of plumose anemones (*Metridium senile*). At this depth, soft corals were present but not in the extensive colonies noted at the 20 m stations. The faunal turf on the external wall between the plumose anemones appeared to be thinner than at shallower depths, though its components were not identifiable from the ROV video footage. Yellow sponges, tubeworms, and what appeared to be hydroids, were occasionally evident.  **Figure 6.3.3c** Anemones

Table 6.3.3 Descriptions from site-specific video assessments of the fowling growth on the MCP-01 structure [45].

Vulnerability
Over time, all anchored structures will become covered by marine growth and will provide shelter and support for a various number of marine species. Since the main species present on MCP-01 are typical of fouling communities in clean inshore Scottish waters [45], the vulnerability is the same as it would be when removing similar other substrates from the seabed.

6.3.4 Fish and Shellfish

Fish
References from UKDMAP v.3.0 show that the MCP-01 area provides habitat for Haddock, Saithe, Whiting, Sprat, Norway Pout and *Nephrops* [2]. This is supported by accounts from SFF members, who have stated that the area in immediate vicinity of the MCP-01 provides habitat for commercial fish species such as cod and haddock, which are fished from the end of August to February [58].

Data of spawning and nursing areas/periods for main commercial species is collected from Fisheries Sensitivity Maps in British waters, 1998 as part of the UKDMAP [2]. The MCP-01 site-specific spawning and nursing species are Norway Pout, Blue whiting, Sprat and *Nephrops*. Table 6.3.4 shows spawning periods with peak spawning for the site-specific species.

Pout, Whiting and Sprat falls in under low-value industrial fish-species and these species have widespread spawning grounds throughout the whole North Sea.

Species	J	F	M	A	M	J	J	A	S	O	N	D
Norway Pout		*	*									
Blue Whiting			*	*								
Sprat					*	*						
Nephrops				*	*	*	*					

Table 6.3.4 Spawning periods (coloured) with peak spawning * for the MCP-01 site-specific species [2]

It is important to realise that fisheries-independent survey data describes a snapshot of the distribution of a species in a region at a particular time. Spawning areas and nursery grounds are dynamic features of fish life history and are rarely fixed in one location from year to year. While some fish species exhibit the same broad patterns of distribution from one year or season to the next, others show a large degree of variability. These natural variations can be influenced by climatic effects, such as a particularly cold winter, or by the distribution of their prey items.

Crustaceans (Shellfish)

The Fladen Ground is the largest known *Nephrops norwegicus* habitat area, with around 28,200km^2 of suitable mud/sand substratum, and is the only major offshore *Nephrops* ground in Scottish waters. Shrimp fishery is also well established in this area on Fladen Ground. As *Nephrops* do not migrate far from their burrows, the distribution of spawning grounds is best illustrated by the distribution of landings (see Figure 6.3.4).

As Figure 6.3.4 indicates the MCP-01 platform is located on the edge of the Fladen Ground *Nephrops* habitat area. However, there is no evidence of *Nephrops* burrows during survey investigation so the sandy raised slope area of MCP-01 is not suitable as *Nephrops* habitat. The muddy clay areas surrounding the sandy mound may provide suitable habitat for *Nephrops*. It is noted that there are no reported *Nephrops* catches within the MCP-01 vicinity in the fisheries statistics.

Vulnerability

Fish

Fish populations are most vulnerable during spawning and nursing periods, where eggs and juveniles are exposed (See Table 6.3.4).

Shellfish

The female *Nephrops* mature at about 3 years old and, from then on, carry eggs each year from September to April or May. After hatching, the larval stage lasts 6 to 8 weeks, before settling to the seabed. While carrying eggs, females come out of their burrows very infrequently, and are naturally protected from disturbances. The most vulnerable period will be April-July.

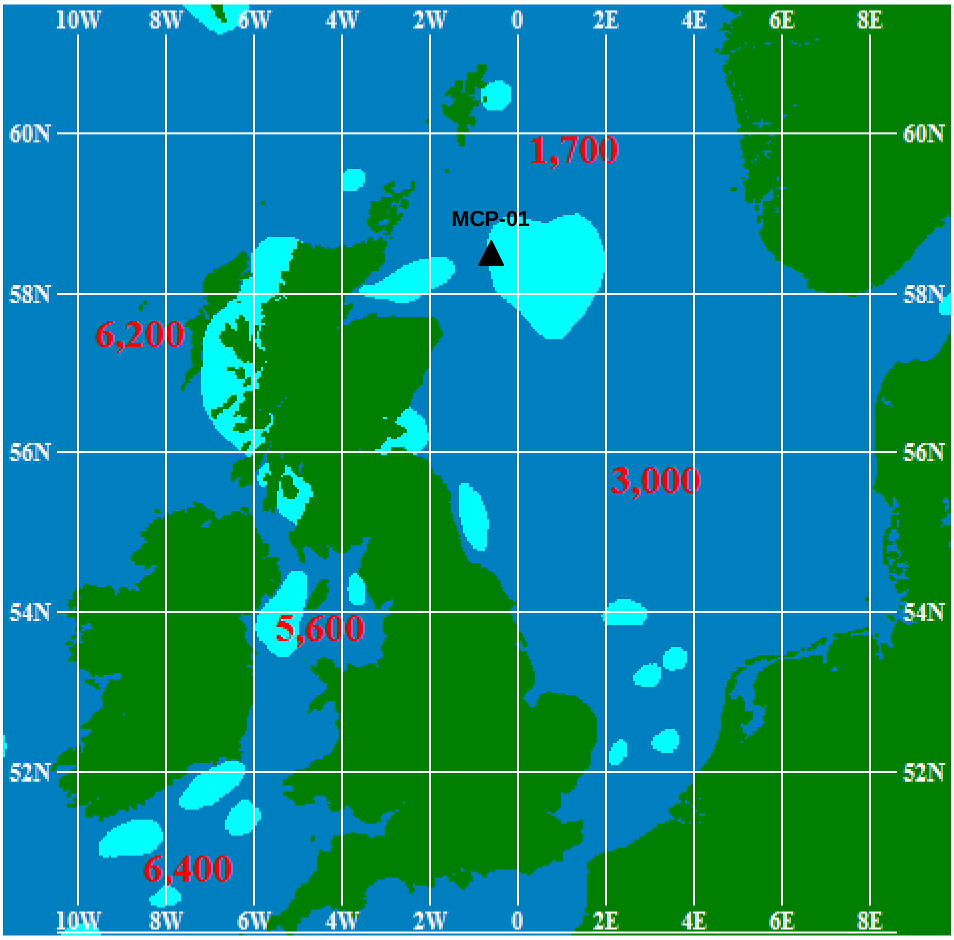


Figure 6.3.4 The fishing areas of *Nephrops* norvegicus and the catch sizes (ICES divisions, 1998).The location of MCP-01 is pinpointed [2].


Figure 6.3.5 *Nephrops* norvegicus on its preferred sandy mud substratum [54].

6.3.5 Seabirds

Since the Seabirds at Sea Team (SAST) was established in 1979 by the Nature Conservancy Council, seabird monitoring programmes have studied seabirds in the sea north of Scotland. The programme is now being managed by the Joint Nature Conservation Committee (JNCC).

The offshore distribution of seabirds is largely influenced by their lifecycle e.g. concentrations of breeding colonies that are more widely dispersed over offshore areas. The distance that birds will travel from their colonies for food varies greatly between species and this influences offshore distribution. This is especially true for offshore species where food resources and environmental conditions can be unpredictable. Non-breeding birds may be found foraging further offshore than breeding birds. Table 6.3.5 shows the seabird species that are present in the MCP-01 area.

Species	January-March	April-June	July-September	October-December	Vulnerability to oil pollution
Fulmar	Low-Medium density	Medium density	Medium-High density	Very high density	High Vulnerability
Guillemot	Low density	Low-Medium density	Medium-High density	Medium-High density	High Vulnerability
Little auk	Low density	Low density	Low density	Medium-High density	Moderate Vulnerability
Kittiwake	Medium	Low density	Low density	Low density	Low Vulnerability

Density in number of birds / km^2	
0.01-0.09	Low
1.00-1.99	Medium
2.00-4.99	High
>5.00	Very High

Table 6.3.5 Block 14/9 specific seabird species present in number of birds/ km^2 [55]

Fulmar (*Fulmarus glacialis*)

Guillemot (*Guillemot sp.*)

Little Auk *(Alle alle)*

Figure 6.3.6 A Fulmar in its dark colouring stage, a Guillemot diving for fish and a little Auk [65]

Vulnerability
The vulnerability of seabird species to oil pollution at sea varies considerably throughout the year and is dependant on a number of factors:
- The amount of time spent on the water;
- Total bio geographical population;
- Reliance on the marine environment and;
- Potential rate of population recovery.

Seabird vulnerability to oil and gas activities peaks in late summer (July-August), following the breeding season when the birds disperse into the North Sea, and during the winter months with the arrival of over wintering birds (September-December).

Offshore species that are most vulnerable to oil pollution are those that spend a great amount of time on the sea surface (such as auks), while more aerial species such as northern fulmars and black-legged kittiwakes are of less vulnerable. The little auk dives for planktonic nourishment, and is present in the North Sea predominantly during the winter season with a high density on the MCP-01 site (See Table 6.3.5). In the period of late April to June, distribution of most seabird species is heavily influenced by breeding activities. Breeding birds are largely concentrated in areas close to colonies although they may travel greater distances to feed.

During late June and July, guillemot and razorbill chicks leave cliff ledges and swim together with the male parent out to sea. Guillemots tend to move rapidly south or east from the colonies, and are found in high numbers in the northern parts of the North Sea. Towards the end of July fully grown birds start to moult and loose their ability to fly. For these reasons both species are vulnerable to disturbance, and they tend to dive when they are disturbed. Because of the amount of time spent on water and prey catching method the pelagic diving species (i.e. guillemots, razorbill, little auk and puffins) are considered the most vulnerable species. Table 6.3.6 shows the overall seasonal vulnerability of seabirds in block 14/9 [55].

Overall seasonal seabird vulnerability in block 14/9	
January	Very high
February	Moderate
March	Very high
April	Very high
May	High
June	Very high
July	Moderate
August	Moderate
September	Low
October	Low
November	Low
December	Low

Table 6.3.6 Overall seasonal vulnerability of seabirds in block 14/9 [55]

6.3.6 Marine Mammals

The waters of the North Sea support a wide variety of marine mammals with internationally important numbers of grey and common seals. The abundance of particular species varies during the year due to their seasonal cycle which includes feeding and breeding. The abundance also varies from year to year as food availability varies. Many species are observed migrating northwards, feeding during summer and moving southward during autumn and winter in a breeding migration to warmer waters.

A wide range of cetaceans has been sighted in the North Sea, the most common being the harbour porpoise and white beaked dolphin. [57]. Minke whales have also been sighted in the vicinity of MCP-01 during the summer months [56].

The harbour porpoise is the most common cetacean in the North Sea. Highest densities in summer are north of 56ºN, mostly in a north-south band between 1ºE and 3°E. In summer 1994, there were an estimated 268,000 porpoises in the North Sea. White-beaked dolphins are restricted to the North Atlantic. In the North Sea, they occur year-round where they are most commonly distributed between 54°N and 59°N. Summer abundance of white-beaked dolphins in the North Sea is estimated at 7,900 animals. Seasonal distribution of marine mammals in the vicinity of MCP-01 is outlined in Table 6.3.7

Figure 6.3.7 Harbour porpoise (*Phocoena phocoena*) and White beaked dolphins (*Lagenorhynchus albirostris*) [57].

Species	J	F	M	A	M	J	J	A	S	O	N	D
White beaked dolphin												
Harbour porpoise												
Minke Whales												

0.01-0.09	
1.00-1.99	
2.00-4.99	
>5.00	

Number of animals/km

Table 6.3.7 Seasonal distribution of mammals residing in the area of MCP-01 [44]

Seals

Extensive information on the distribution of British grey seals at sea shows that although they do sporadically occur in the vicinity of the MCP-01, neither the grey seal nor the harbour seal populations as a whole spend significant time in the MCP-01 site-specific area [39].

Vulnerability

Increased oil and gas activities and / or decommissioning activities might increase the level of noise and use of explosives. Explosives, helicopter traffic and vessel noise can increase the frequency of disturbance behaviour exhibited by the animals that live and/or stay in the area. Whales often react to aircraft over-flights and high noises by hasty dives, turns or other changes in behaviour. The significance of these short-term behavioural responses to the long-term well being of individuals and populations is largely unknown [39].

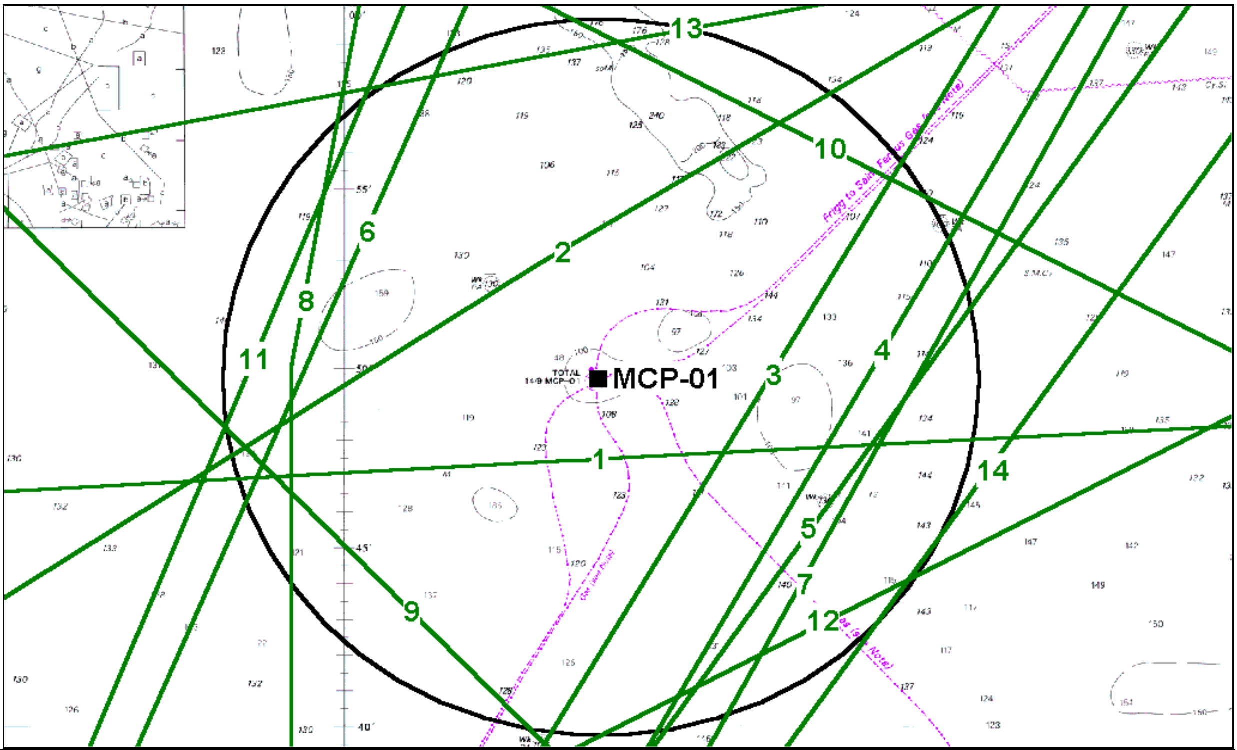
In particular, the use of underwater explosives in the marine environment has been demonstrated to be harmful to marine mammals. Underwater shock waves resulting from the detonation of high velocity chemical explosives are potentially lethal to marine mammals, and sub lethal damage to their auditory systems could occur at considerable distances from explosions. There is no known experimental study which determines the vulnerability of marine mammals to explosive shock waves, although considerable experimental work using land mammals as test organisms have been performed. Findings from these land mammal studies show that the principal damage sites were lungs, the hollow viscera and the ear. A review of the physiology of marine mammals concludes that marine mammals are probably less vulnerable to gross physical damage from underwater shock waves, when compared to land mammals of comparable size. This is primarily due to physiological adaptations to pressure changes encountered while diving and the increased thickness of the body wall [71].

6.3.7 Socio-Economic Environment

Shipping Activity
The North Sea is home to some of the busiest shipping lanes in the world. In 1996 alone there were 37,055 shipping movements transporting 48 million tonnes of cargo between the North Sea and the Baltic [59].

The shipping traffic within the NNS and CNS is relatively moderate with an average of between 1 and 2 vessels per day (568 vessels per annum) on one of 14 shipping routes passing through waters within 10nm of the MCP-01 site [59]. Figure 6.3.8 below shows the shipping activity in the immediate vicinity of the MCP-01 site. The North America - Bonknafjorden route (#1 in Figure 6.3.8) passes within 2.2nm due south of MCP-01. There are no routes passing within 2nm of the site.

The majority of shipping traffic comprises merchant ships, supply vessels and tankers. Within the CNS merchant vessels represent over 61% of the total number of vessels and 45% fall within the weight class 0-1499 dwt. The majority (60%) of the vessels entering the area within 10 nm of MCP-01 are in the 1500-5000 dwt categories [59]. Most supply vessels originate in the Ports of Aberdeen or Peterhead and transect the region along the shipping lanes.



Route No.	Description	CPA (nm)	Bearing (°)	Ships Per Year	% of Total
1	America North-(Rogaland, W Norway)*	2.2	177	12	2%
2	Leadon-Moray Firth Shuttle*	3.6	327	16	3%
3	Aberdeen-N Norway/Russia*	3.8	121	68	12%
4	Tay-N Norway/Russia*	6.1	119	56	10%
5	Storfjorden-Peterhead	7.0	124	8	1%
6	NW Hutton-Aberdeen ASCo EoS	7.3	293	87	15%
7	N Norway/Russia-Forth*	7.5	118	40	7%
8	Dover Strait-Sullom Voe*	8.0	277	60	11%
9	Hamburg-Iceland	8.3	226	20	4%
10	Limfjorden (DK)-Iceland	8.4	28	8	1%
11	Thistle-Aberdeen ASCo EoS	8.7	292	85	15%
12	Moray Firth-Marstein (W Norway) *	8.9	152	48	8%
13	America North-Bomlafjorden (W Norway)*	9.1	349	48	8%
14	Aberdeen-Froysjoen*	9.9	125	12	2%
TOTAL				568	100%

** Where two or more routes have identical Closest Point of Approach (CPA) and bearing they have been grouped together. In this case, the description lists the sub-route with the most ships per year.*

Figure 6.3.8 Shipping activities within 10 nm of the MCP-01 area [59]

Oil and Gas

There are no producing installations in the immediate vicinity of MCP-01. The nearest is Claymore located 45km in a southward direction.

Telecommunications
There are no submarine cables in the vicinity of MCP-01 [39].

Military exercise areas
There is no military exercise area in UK waters located in the vicinity of MCP-01 [39].

The four areas situated closest by are:
1. Flamborough Head submarine exercise area
2. Outer Silver Pit submarine exercise area
3. D316 air combat training area; and
4. D317 air combat training area

Wreck sites
There are 1157 confirmed and possible wrecks within the SEA2 area [39]. According to the SEA2 distribution maps of wreck sites, there are no wrecks located within the vicinity of MCP-01.

6.4 Fisheries Activities in the Area

6.4.1 Introduction

The North Sea is of international importance as a spawning, growth, and feeding area for many different fish species. The fishing activity in this area is high and total catches from the North Sea represent about 5% of the total world catch from fisheries [60].

Fisheries in the NNS can be split into three main groups [61]:

- Demersal trawling: for bottom living species for direct consumption (mainly cod, haddock, whiting, crustacean and different species of flatfish);
- Industrial trawling: for Norway pout, sand eel, blue whiting and sprat;
- Pelagic trawl with net gear: which exploit species living in the water column (herring, horse mackerel and mackerel)

The northern part of the North Sea is an important living area for adult stages of many common fish species, especially cod, saith and herring. Because of high concentrations of commercially exploitable fish and crustacean species in these areas, both trawl and net fisheries are present in the ocean around MCP-01.

Otter and pair trawl accounts for most of the fishing effort in the northern North Sea. Beam trawls are rarely used. According to Figure 6.4.2, MCP-01 is located in one of the key areas of otter trawl effort. Scottish and Danish fishing vessels have the greatest fishing effort in this area, with some Norwegian fishing vessels.

MCP-01 is located in the western part of the Fladen Ground (Figure 6.4.1), which is an important fishing ground in the NNS.

6.4.2 Fishery Statistics

The main data sources for evaluating the significance of fisheries in the vicinity of MCP-01 in the North Sea include the following:

- Scottish fisheries statistics from Marine Laboratory [60];
- Statistics from Fisheries Directories in England, Denmark [62];
- Statistics from Fisheries Directories in Norway [63]; and
- Information from Strategic Environmental Assessment (SEA) [39].

Despite several attempts, fishing statistics from France, Holland and Germany have not been obtained.

Official collected fishery statistics include landings from six ICES rectangles (47E8, 47E9, 47F0, 46E8, 46E9 and 46F0) for 2000, 2001, 2002 [60] [62] [63] in Scotland, Denmark and Norway. The total landings in Scotland and Denmark contain catches from national and foreign vessels, while the landings in Norway contain catches from Norwegian vessels. MCP-01 is located in the north western part of the Fladen Ground (Figure 6.4.1). The region of the SEA 2 covers most of the Fladen Ground, except the north western part which is included within the SEA 5 region. Technical reports for SEA 5 are still in preparation with no availability of documentation to date.

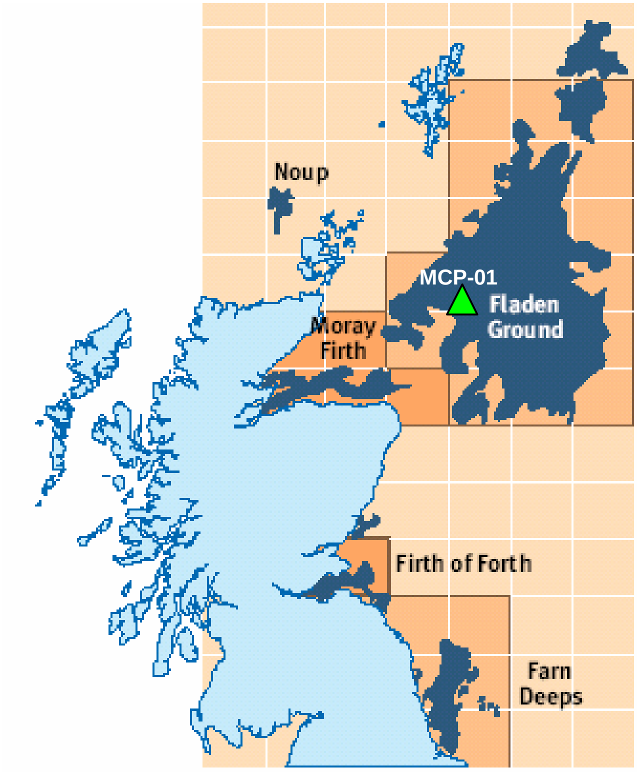


Figure 6.4.1 North Sea *Nephrops* grounds and functional units (Scottish interests) [65]

SEA 2 describes the fisheries in the NNS and is based on data obtained from a number of different sources, including official landing statistics, anecdotal information from local ports, surveillance data and fishery sensitivity maps [60].

Information on Scottish *Nephrops* fisheries from the Common Fisheries' study project, entitled "Technical Improvements in the Assessment of Scottish *Nephrops* and Atlantic Clam Fisheries" [67] is also used as a data source.

6.4.3 Fishing Efforts during the Year

Surveillance data for otter trawlers shows that the trawling effort varies for different parts of the Fladen Ground area throughout the year. Based on surveillance data for 1990-1995, the otter trawling effort close to MCP-01 is highest during January-March and July-September [60]. Figure 6.4.2 illustrates the otter trawl over flight surveillance data.

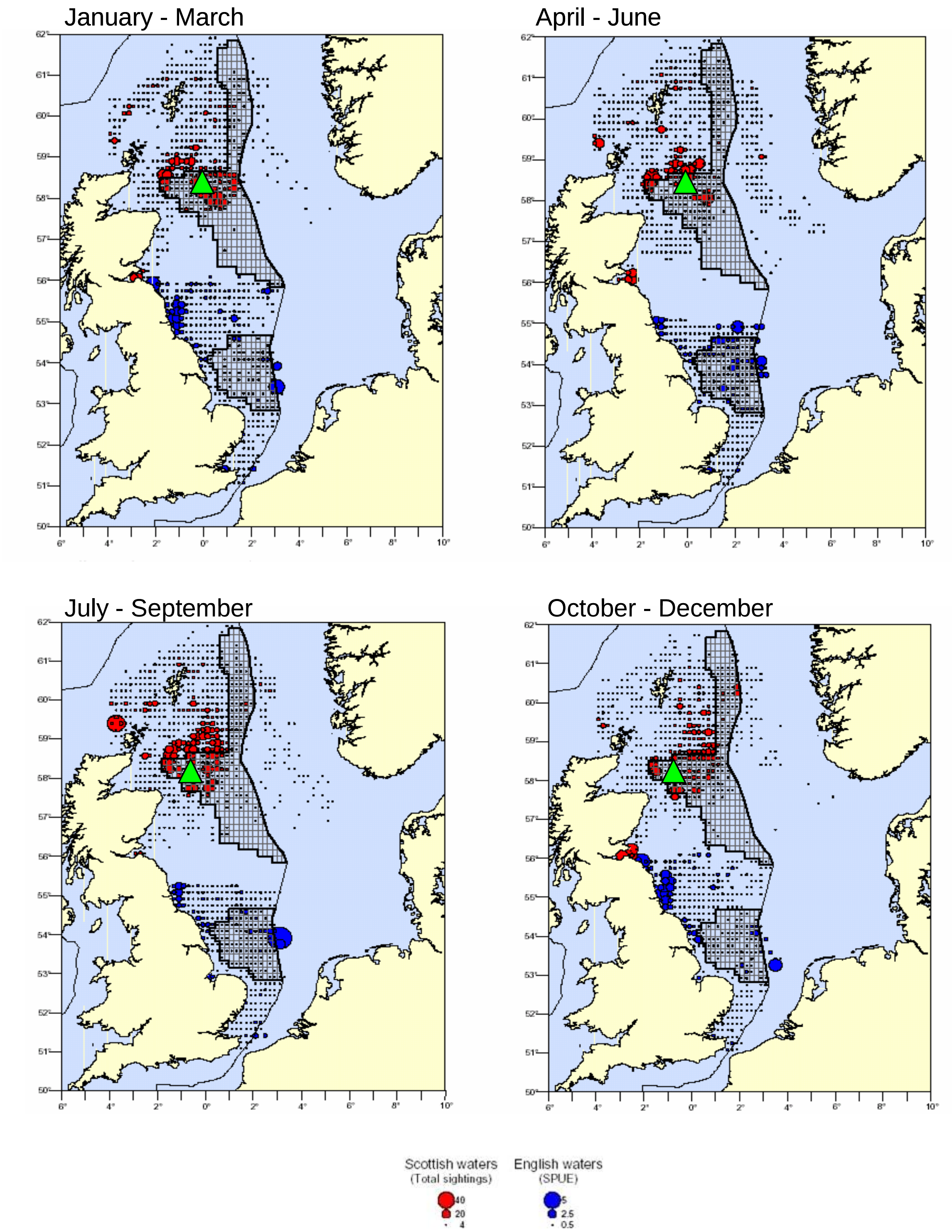


Figure 6.4.2 Distribution of overflight data (otter trawlers) (using observations for 1990-2000 (English Waters) and 1999-2000 (Scottish Waters). Distribution of vessels is not corrected for observation effort) [60].

6.4.4 Landing Volumes

According to available statistical material from this area (ICES 47E8, 47E9, 47F0, 46E8, 46E9 and 46F0, [60] [62] [63], the catches are mainly landed in Denmark and Scotland (Figure 6.4.3). The landings in Denmark are mainly delivered by Danish vessels. Vessels from Sweden and UK also deliver their catches in Denmark. The Scottish landings are dominated by Scottish vessels, but vessels from Denmark, France, England and Wales deliver their catches in Scotland. The fisheries for herring and mackerel are dominated by the Norwegian vessels. The landings delivered by Norwegian vessels consist mainly of herring and *Nephrops*.

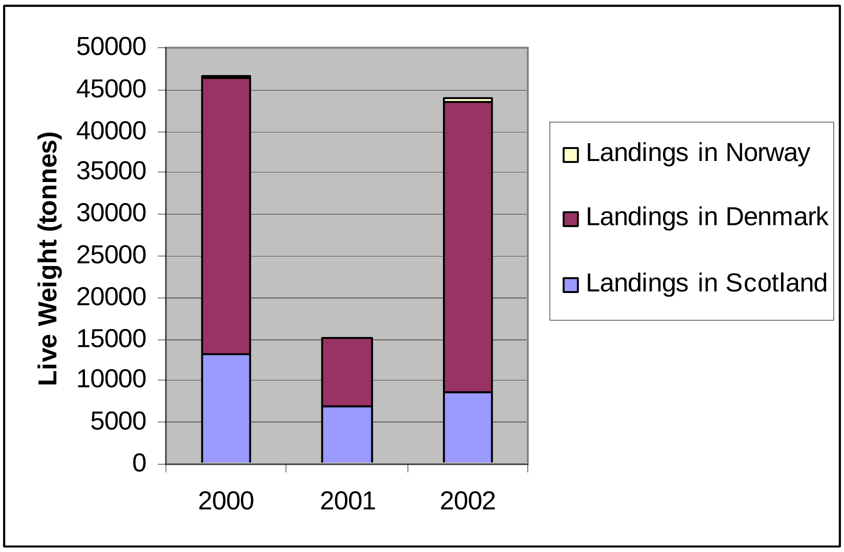


Figure 6.4.3 Total landings in 2000, 2001 and 2002 (live weight, tonnes) from six ICES statistical rectangles 47E8, 47E9, 47F0, 46E8, 46E9 and 46F0, delivered by national and foreign vessels in Scotland and Denmark and by Norwegian vessels in Norway [62] [63] [60].

Norway pout are of great importance to European industrial fisheries, especially in Norway where pout is used for fishmeal products [62]. As a result, pout are the focus of (larger) Danish and (smaller) Norwegian trawl fishery operations. According to the statistic data [62] [63] [60], the fishing period is from August –January, which is different from rest of the Norway pout fishery in the North western part of the North Sea; this fishing effort takes place throughout the year, with Norway pout landings peaking from April/May to October.

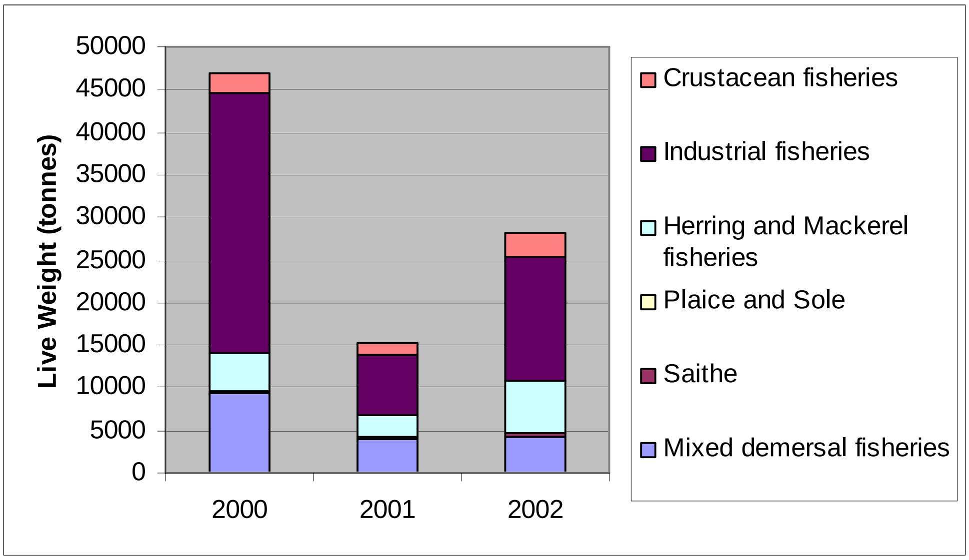


Figure 6.4.4 From six ICES statistical rectangles (47E8, 47E9, 47F0, 46E8, 46E9 and 46F0), total landings for different Fishery Categories in 2000, 2001 and 2002, as delivered by national and foreign vessels in Scotland and Denmark and by Norwegian vessels in Norway, [62] [63] [60].

The mixed demersal fishery targets cod, haddock and whiting, taken by otter trawlers, seines and pair trawlers. Cod is usually taken by demersal trawl and sometimes by demersal pair trawl. Smaller quantities are taken by seine net, *Nephrops* trawlers and pair seines. Statistical data, [60] [62] [63], suggests that July-February is a key period for harvesting. The rise in cod landings in the second half of the year throughout the northern part of the North Sea is due to migration of adult fish to spawning grounds, as identified in SEA 2, [39].

Haddock is mainly taken by demersal trawl and demersal pair trawls. Haddock is also caught by seine net and pair seines. According to the available statistical data [60] [62] [63], haddock is caught throughout the year in vicinity of MCP-01, which is also confirmed by findings of SEA 2 [39]. Landings of haddock are concentrated in the north western North Sea and only occur there during year of strong recruitment.

The majority of the whiting catch has been taken by demersal trawl, as well as a considerable amount by demersal trawl and pair trawl and some by seine net or pair seine. Data from the vicinity of MCP-01 [60] [62] [63] shows that whiting are caught throughout the year, which is typical for the NNS [66]. The largest landings were from October –December.

The European *Nephrops* fishery accounts for landings of approximately 60,000 tonnes per annum [66], of which approximately one third come from waters around Scotland, where *Nephrops* is by far most important shellfish species [67]. The Fladen Ground is the largest and most important field for trawlers or whitefish trawlers targeting *Nephrops* in Scottish waters, which has expanded at this field since the mid-1980s. The exploitation rate at the Fladen Ground in 2001 is relatively low, around 6%, which equates to approximately 6000 tonnes [67]. The current Total Allowable Catch (TAC) for the Fladen Ground field 9,000 tonnes, and has remained unchanged since 2001. The TAC is based on the evaluation of stock abundance using underwater video surveillance, and then conservatively applying a proportional estimate of the stock thought to be safe for annual removal [67]. This allows for some expansion of *Nephrops* fishery operations. Fishery statistics [60] [62] [63] tend to indicate the north western part of the Fladen Ground being of highest importance. It is however important to note that MCP-01 is located on a sandy mound in the area (see Figure 6.2.2) and thus considered of low value to *Nephrops* and fisheries for such. However, the muddy clay seabed surrounding this sandy mound may be a suitable *Nephrops* habitat. The Fladen Ground fishery operations target *Nephrops* in the spring and summer [60] [62].

6.4.5 Relative Value of the Area around MCP-01 and Other Fishery Areas in the Northern North Sea

As an indication of overall economic productivity, the UK Fisheries Agencies [66] defines the relative value (i.e. financial yield per ICES square) of fishing areas around the UK. The area in vicinity of MCP-01 has a high relative value, as illustrated in Figure 6.4.5, with *Nephrops*, shrimps, and demersal species are of the greatest importance. Landing volume tonnages shown in Figure 6.4.3 indicates that the industrial fisheries by Danish trawlers dominate this area, targeting mainly Norway pout, but also blue whiting and sprat. Demersal fishery operations are considerably mixed, but are dominated by Scottish vessels, which targets cod haddock and whiting. There are also herring and mackerel fishery operations in the area, targeted by Danish and Scottish vessels which are landed in Denmark and Scotland. Crustaceans fisheries are dominated by Scottish and Danish landings. The Scottish vessels mostly target *Nephrops* (i.e. Norway lobster), while the Danish vessels target pink prawns. The size of the *Nephrops* catches compared to total landings for the Fladen Ground [67] also indicates that the *Nephrops* fisheries in this area is of high importance.

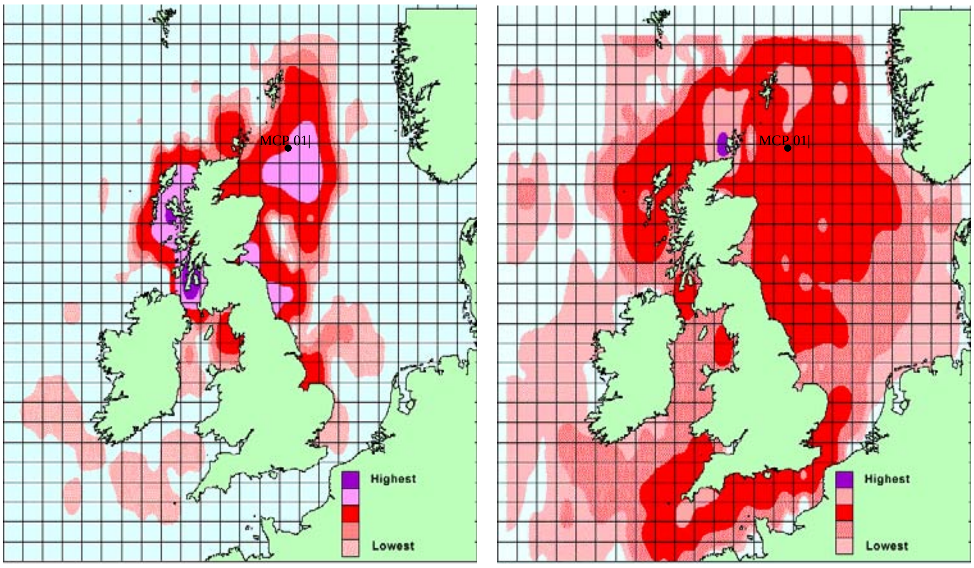


Figure 6.4.5 Fishery sensitivity maps in British Waters. Left: Relative Value for (1996) for *Nephrops* and shrimps. Right: Relative Value (1996) for demersal species [67]

6.5 Emissions in the Area

There is very limited oil and gas activity in the vicinity of MCP-01 (the nearest installation is Claymore which is 45km South of the MCP-01 site). In addition, there are only minor shipping activities in the vicinity. Local discharges from oil in water and atmospheric emissions are thus considered small, but no quantitative data are available.

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7. Impact Assessment for Disposal of Topsides

7.1 Environmental Impacts from Disposal of Topsides

As a reminder, there is only one identified disposal alternative for topsides (Alternative A: Removal and Onshore Disposal). Combined lifts has been identified as the likely removal method (see Section 5.2.2) and therefore has been used to evaluate the scale of energy consumption, emissions/discharges to air, sea and land and physical impacts. Where quantitative impact assessment has been carried out, the numbers calculated are indicative of the extent of operations, and are not definite figures.

7.1.1 Energy

The energy impact for the removal and onshore recycling of the topsides is found to represent a small negative impact, based on the impact key (Figure 3.2.1 and table 3.2.1) presented in Section 3.2.2. The table below shows the total energy impact and its components of removing the individual topsides for onshore disposal. The total energy demand of removing and recycling the topsides is around 430,300 GJ, corresponding to an average annual fuel (energy) consumption of 10,000 family cars and 1.76% of total daily UKCS production.

Operation	MCP-01 topside Energy (GJ)
$\mathbf{E_{DIR}}$ Marine operations	320,500
$\mathbf{E_{DIR}}$ Dismantling	15,800
$\mathbf{E_{REC}}$ Recycle of metals	94,000
$\mathbf{E_{CONS}}$ Energy Consumption	**430,300**
$\mathbf{E_{REP}}$ Energy for replacing the materials	-
$\mathbf{E_{TOT}}$ Total Energy Impact	**430,300**

*For key of terms, see explanation of energy calculations in Section 3.2.2

Table 7.1.1 Total energy impact for removing and recycling MCP-01 topsides (in GJ)

Although 87% of all the topsides are recycled, E_{REP}, the energy for replacing the topsides is assumed to be zero, as the majority of non-recyclable materials are non-metallic (i.e. concrete, plastics, insulation, others). See Table 7.1.3.

7.1.2 Emissions to Atmosphere

The general impact effects from atmospheric discharges are described in Section 3.2.2. Table 7.1.2 shows the different emissions to air from the removal and recycling options for the topsides. The total emissions of CO_2 for removing and recycling the topsides are about 33,100 tonnes and 455 tonnes of NO_x. The main source of emissions is fuel combustion during the marine operations.

In terms of the atmospheric emissions for UKCS (2002) [84], these levels equate to 0.2% for CO_2 and 0.7 % for NOx.

Operation	MCP-01 topside Atmospheric Emissions (tonnes)
CO_2 emissions	
Marine operations/dismantling	23,600
Recycle of metals (Carbon and stainless steel)	9,500
Total CO_2 emissions topside	**33,100**
NO_X emissions	
Marine oper./ dismantle	439
Recycle of metals (Carbon and stainless steel)	16
Total NO_X emissions topside	**455**
SO_2 emissions	
Marine oper./ dismantle	21
Recycle of metals (Carbon and stainless steel)	38
Total SO_2 emissions topside	**59**
Total Atmospheric Emissions topside	**33,614**

Table 7.1.2 Total Emissions to air from removing and recycling MCP-01 Topside (tonnes)

7.1.3 Discharges to Sea, Water, Land, or Groundwater

Discharges from topsides removal and onshore recycling and disposal are found to represent "insignificant" impacts on the environment.

Potential areas of concern, which have been identified and assessed, are:

- Discharges associated with the cleaning of equipment, tanks, etc;
- Releases from onshore dismantling;
- Leachate from waste materials disposed of via landfill sites; and
- Permitted surface water discharges in the vicinity of waste treatment facilities.

As stated in Section 3.1, enclosed systems and tanks will be cleaned prior to commencement of decommissioning work. All planned discharges will be managed via consent conditions outlined in permits issued by local governments. Throughout the cleaning processes, the objective is to use minimum amounts of chemicals, and wherever possible implement steam or "recycling cleaning" processes. Because of planned mitigation measures, discharges from tank-cleaning operations are considered to be "insignificant".

Very little residual fluid is expected from live pipe work, control loops, sumps, closed drains or mothballed process areas. Any fluids found during depressurisation and cleaning will be contained and sent onshore for disposal.

Although no discharges are expected during offshore removal operations, safe operating procedures and satisfactory oil spill contingency arrangements will be implemented throughout the duration of marine operations.

Onshore dismantling operations will be performed at a demolition site according to relevant procedures and regulations. These yards are constructed with proper drainage and collection systems to prevent discharge of any oils and chemicals to the surrounding environment. This will be ensured through robust and established contractor selection procedures and TOTAL E&P UK auditing requirements. No discharges are therefore expected from these operations.

The waste generated will be handled according to local and national waste regulations at the respective site. The majority of the waste generated from these operations is considered to be inert (e.g. isolation and building materials such as plastic, wood, gypsum) and will be deposited in licensed and properly managed landfill sites. All landfills will generate seepage water containing metals contaminants. However, as part of proper management of licensed operations, landfills are required to have leachate water monitoring and control systems to avoid discharges of contaminated seepage water. As such, the impact from landfill discharges is considered to be "insignificant".

Some of the waste generated from onshore dismantling operations will be considered special or recyclable waste and will undergo specialised treatment for disposal. Invariably, some of these sites will have surface water discharges, but these will be managed via permitted consent conditions issued by local governments. As a result, these discharges would therefore be considered "insignificant".

7.1.4 Physical Impacts to the Environment

The physical environmental impact for both offshore removal and onshore dismantling operations is considered to be "insignificant".

The only offshore issues identified with relevance to possible physical effects are the impact of anchors on the seabed during lifting (if vessels are equipped with dynamic positioning, DP) and noise / disturbance to marine life.

Most vessels will have DP capability, as required and outlined within the Marine Operations Description. Widespread use of DP throughout topsides removal operations will minimise the development of anchor mounds from anchoring operations. Anchor mound physical impacts are therefore considered to be "insignificant".

The noise generated from vessel engines (in particular vessels utilising dynamic positioning: DP) throughout topsides removal operations will result in disturbance to marine life. The expected noise levels from typical vessels of the type that would be used are listed below (units in dB re 1uPa at 1m) [64]:

- Tug / barge / tanker / merchant vessel 140 to 170 dB
- Tug at sea 170 dB
- Supply boat 170 – 180 dB
- Guard boat (fishing boat) 110 – 145 dB
- DP vessel (full thruster power) 180 – 190 dB

The sea, the sea/air interface and the seabed, forms a complex medium for the propagation of sound. In travelling through the sea, underwater sound becomes delayed, distorted and weakened. As sound spreads out from a source its energy is not lost, rather it is spread over a progressively larger surface area thus reducing its magnitude. This category of noise reduction is known as "Spreading Loss". The other main contributor to noise reduction within the sea is "Actuation Loss", where noise is absorbed and scattered.

It is recognised that more research is needed to fully understand the impact of marine noise disturbance on fish, mammals and other marine life. In order to gain an understanding of the underwater noise disturbance impacts, a simplified model used to obtain approximate values of Transmission Loss (i.e. the ratio of the intensity of sound at the source to that at a distance from the source) can be applied, as follows [53]:

$TL = 20\log(r) + r + A$

Where: TL = Transmission Loss (dB)
r = distance from source (m)
A = factor to account for scatter, reverberation, reflection and other bottom-loss effects

Sound from a source will therefore decrease by the following equation:

$$SL = S_{org} - (20\log(r) + r + A)$$

Where: SL = Sound Level
S_{org} = Sound at source

As sea characteristics with respect to the A factor are dependent upon the physical conditions encountered, determining a suitable A factor is very complex and has not been undertaken for this study. The absence of the A factor in the TL equation is conservative since its effect is to decrease the Transmission Loss which leads to an increase in the assumed sound transmission.

Figure 7.1.1 presents the estimated noise level reduction, based on the above formula, for two typical marine vessels, a 190 dB DP vessel and a 170 dB tug.

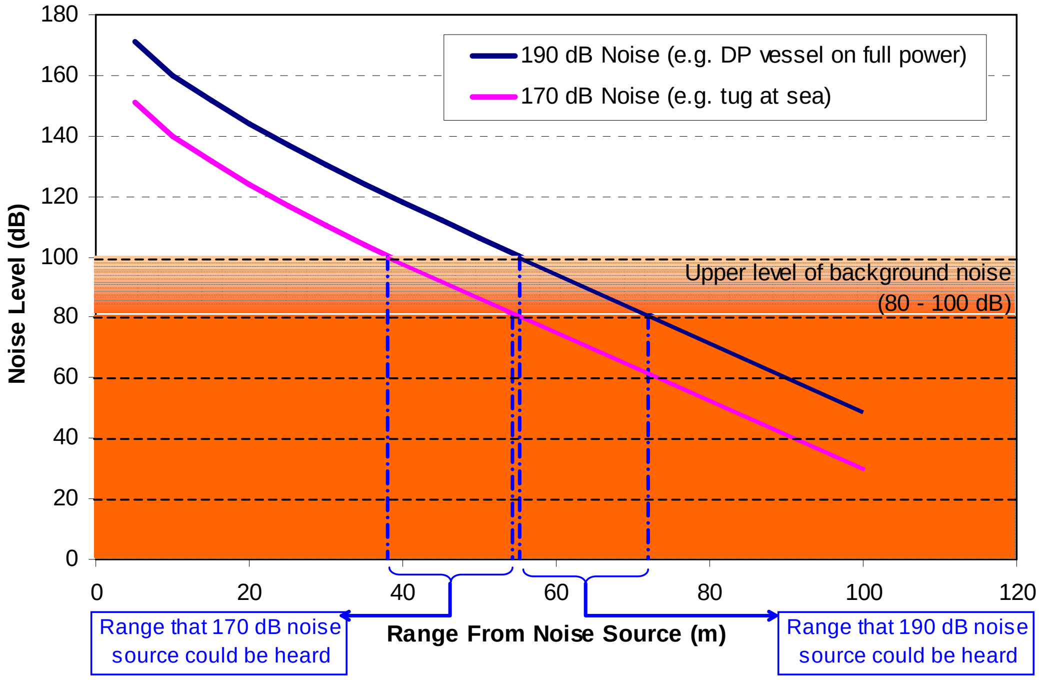

Figure 7.1.1 Noise level reduction with distance from source [53]

From Figure 7.1.1 it can be seen that within a range of approximately 70m the noise from a 190 dB vessel should not be noticeable above background noise. Noise from the various marine vessels used to undertake topsides removal operations is therefore considered to be "insignificant".

There are no identified issues of concern with regard to the onshore physical environment.

7.1.5 Aesthetic Impacts

Aesthetic impacts from topsides removal, onshore recycling, and disposal operations are found to be "small" to "moderate negative".

Potential areas of concern, which have been identified and assessed, are:

- Visual impacts
- Noise

As topside segments are transported to an onshore dismantling site, the visual effects could be perceived negative for the inhabited areas in the vicinity of the yard. Any effect will be temporary and is therefore considered "insignificant".

The negative aesthetic impacts from dismantling of the topsides are principally associated with noise. Dismantling operations at the yard are expected to increase noise levels in the local community. This impact is controlled and monitored via permits issued by local governments. Nevertheless, results from noise surveys taken at similar Norwegian industrial sites indicate that it is important to ensure a physical distance to the nearest neighbours [68].

Noise emissions from onshore dismantling operations of the topsides are considered to be the main aesthetic impact, and are expected to vary from “small to moderate negative”, depending on the environmental sensitivity of the selected yard location. As such, TOTAL E&P UK will make contractual arrangements with the demolition contractors to ensure that possible negative effects are minimised or mitigated.

It is noted that there are no aesthetic issues of concern arising as a result of offshore operations, due to the geographical location.

7.1.6 Material Management

Since most materials from removal, onshore recycling, and disposal of the topsides will be recycled, the impacts are found to be “moderate positive”. The material assessment is based on detailed material inventories for the facility [29].

Dismantling sites for the topsides and the concrete substructure have not been chosen, hence the evaluation of waste/resource utilisation will concentrate on types and amounts of waste generated. Types of (topsides) waste considered are:

- Metals;
- Concrete;
- Wood;
- Other building and construction material;
- Insulation material;
- Electrical and electronic waste;
- Plastic products including flooring;
- Paint; and
- Asbestos.

Dismantling the topsides will generate considerable amounts of materials, which will either be disposed of as waste or recycled. The different types of waste expected to be on the topsides are described Table 7.1.3. TOTAL E&P UK has established project objectives with regard to recycling of materials. These objectives for topsides materials are included within Table 7.1.3. It is noted that “Recycling Target” reflects obtainable degree of recycling based on today’s technology. 99% of the recyclable materials are high-value metals and as such, this is considered to result in a “moderate positive” materials management impact.

Material	Topside (tonnes)	Recycled (tonnes)	Disposal (tonnes)	Recycling target (%)
Carbon steel	8,888	8,444	444	95
Stainless steel	1,056	1,003	53	95
Copper and Nickel/Copper	189	170	19	90
Other metals*	2,246	2,078	168	92.5
Concrete	23	7	16	30
Paint	29	0	29	0
Plastic	32	6	25.6	20
Batteries	7	0	7	0
Insulation, incl. architectural construction materials	581	0	581	0
Electrical and electrical equipment	136	0	136	0
Asbestos concrete	76	0	76	0
Mandolite spray (fire protection)	217	0	217	0
Total	**13,480**	**11,708**	**1,772**	**87%**

* Aluminium and unspecified metals

Table 7.1.3 Topsides component weight breakdown, with tonnages of recycle and disposal materials, based on TOTAL E&P UK recycling targets [72]

As previously stated, all systems will be purged and/or cleaned, and certified on cleanliness prior to the commencement of any offshore dismantling activity and there will be no hydrocarbon residues in utility systems and tanks. As part of this work, paint, batteries, fluorescent tubes and other items containing hazardous substances will also be removed for onshore treatment and disposal.

The possibility for having lead isotopes in the gas stream was previously considered by TOTAL E&P Norge. Their presence was concluded to be unlikely due to the nature of gas processing operations, and no further investigation was made. Regular monitoring has confirmed that there have been no incidences of LSA or NORM sources during the entire operating history of the platform and a further comprehensive on-board monitoring plan will be implemented as part of decommissioning activities.

The lightning conductor on board MCP-01 has been highlighted as an Americium-241 source to the potential removal contractors. This will be disposed of separately using a specialist contractor. In addition, all vessels and pipes will be routinely checked for radioactivity during the topsides preparation/cleaning phase.

Metals
The main materials on the topside are metals, notably steel, copper and some aluminium. In addition, nickel, cadmium and zinc may also be present in minor amounts in alloys. Metals recycling, which encompasses the sorting, handling, re-melting and sale of various materials, is a well-established industry. Emissions discharge and waste production are managed and minimised via pollution control systems and consented releases from local or national authorities. It is assumed that the vast majority (95%) of steel on the MCP-01 topside will be recycled (see Table 7.1.3). Any coated steel, such as painted steel, may cause problems for the re-melting plant. Process control of emissions from toxic gasses, dust of heavy metals and contaminated slag during re-melting are challenges regularly met by the industry.

Copper is found mainly in recovered electrical cables. The metal content for cables used offshore is approximately 30 - 40%, as well as 60 – 70% plastic material. Wire metal is separated from the plastic sheath via industrial processes which utilise varying specific gravities of plastic and metal. The metal (copper, aluminium and lead) is melted, while the plastic material will be recycled, disposed of on a landfill site, or used as an energy source in combustion. It is anticipated that 20% of the plastic will be recycled [72]. There are strict regulations governing combustion operations, especially processes burning chlorinated plastics, which may create dioxins.

Aluminium is a part of the structure of the topsides, and will normally be recovered by the aluminium producers. 95% of recovered aluminium is expected to be recycled [72].

Batteries are used for different purposes on the topsides, for instance in emergency lightning. Nickel and cadmium are parts of these batteries, and these metals will be recycled and recovered.

Concrete
On topsides, concrete is mainly used in the screed coats and is a two-component concrete. The thickness of this concrete varies between 27 mm and 50 mm, depending on range of use of the floor. Areas with tiles often have a thinner layer of screed than areas covered by vinyl or carpet. Concrete from the topsides will most probably go to landfill as it may be contaminated with other materials. If clean, some parts may be reused as road fill or as raw material in new concrete. It is assumed that 30% of the concrete will be recycled [72].

Other Building and Construction Material
This material is mainly contained in panelled ceilings, doors and windows, and most often is found in accommodation areas and analogous materials used in control rooms, workshops, and compressor rooms. The walls contain painted steel plates isolated by mineral wool and an interior film of aluminium.

Difficulty in the dismantling, separating and sorting of building and construction material makes re-use an unlikely option. This is mainly due to the fact that the material is made up of many different components; major metallic components from these materials can be recovered and recycled, but it is anticipated that most building and construction material will not be re-used and will be disposed of in landfill sites. A coarse estimate on disposal of the different types of building and construction material gives that 10% will be recovered and recycled, a further 10% will be used as energy source and the remaining 80% will be disposed.

Insulation Material
External walls in the accommodation areas and some of the walls in the modules contain insulation materials, mainly comprising of various Rockwool-products. Some insulation may also be present in pipes and pressure vessels. Materials such as insulation and construction materials have a restricted reuse potential and will therefore normally be disposed of in properly managed landfill sites.

Electrical and Electronic Waste
Registered electrical and electronic waste contractors have well-established practices onshore, and will be utilised for the disposal/treatment of all waste electronic material arising from MCP-01 topsides. Computers, TVs and other electronic components will be removed prior to the offshore dismantling. Electrical and electronic waste material, such as electrical and telecommunications equipment, instruments, and cables, are fully integrated into the topside's infrastructure. Electronic waste material consists mainly of cables which may be recovered as described under the metals sub-section.

Waste electrical equipment may contain heavy metals, which complicates the recycling process. The heavy metals will require to be removed prior to crushing of the electrical equipment.

Fluorescent tubes will be handled, transported and disposed of as hazardous waste, by registered specialist contractors.

It is estimated that 70% of the electronic waste which is not directly reused will be recovered, while 20% will be used as an energy source, and the remaining 10 % will be disposed of on a landfill site.

Plastic Products Including Flooring
Plastic materials throughout the topsides comprise of a mixture of many different components. Although minor amounts of this material may be recycled/reused (e.g. using plastic granules in the foundation on racetracks), the majority of plastic will be disposed of in landfills.

Clean fractions of plastic may be milled into granulates which may be combusted and used for energy recovery. Today, plastics are normally disposed of in landfills. However, as the energy content in this product is high, solutions to recover the energy in this type of waste are under development. Considering both plastics and flooring, it is expected that 20% will be recovered or used for energy source combustion. The remainder will be disposed of on a landfill site.

Paint
Different types of paint have been used on parts of the topside, and methods of painting have changed over the years. This makes it difficult to achieve a clear overview of the content of residual paint and possible heavy metals or other potential hazardous substances.

Paint will seldom be removed prior to steel re-melting and will be included with the steel processed in the smelter. In some cases however, paint and other kinds of coating may be removed by sandblasting prior to recycling, but this is an intensive process. In addition, sandblasting operations create hazardous waste (i.e. waste sand contaminated with various chemicals and metals from the paint), which will require additional treatment.

It is likely that a 50 microns layer of polyurethane paint has been used as topcoat in epoxy-paint systems on parts of MCP-01 during the 1980's. Since then, it has not been used. It is also known that steel items covered in polyurethane paint cause the release of isocyanates during the cutting by heating process. Isocyanates could cause serious harmful effects to humans such as asthma, bronchitis and other impaired lung function when breathed in [69].

This situation should be monitored and proper Personal Protective Equipment (PPE) should be used during thermal process operations. The demolition works both offshore and onshore should therefore be performed within the national rules and regulations for such activities. This type of paint is used in some areas exposed to corrosive salt atmospheres.

A survey will be performed to verify the presence of polyurethane paint and any identified materials will be collected and managed according to national regulations.

Asbestos
Material containing asbestos may have been used in the following areas within the topside:
- Fire walls – floor and roof;
- Plates used for walls, floor and roof;
- Interior insulation in gaskets, walls, roof and floor;
- Insulation of pipes and vessels;
- Piping systems and valve inserts/ weather stripping;
- Weather stripping in fire doors; and
- Brake bands and clutch plates.

Asbestos is often combined with other building materials. Removal of the asbestos from the building materials (to recycle the latter) is a labour intensive process that could ultimately result in significant risk to health with very little environmental benefit.

As such, building materials, insulation materials and similar containing asbestos must be handled separately according to strict guidelines. When working on asbestos contaminated material, special precautions must be taken and only certified personnel can undertake this work. Asbestos materials are classified as hazardous waste and must be delivered to a licensed treatment facility for landfill disposal.

Asbestos in topside modules will be disposed of at licensed waste disposal sites in accordance with strict local and national regulatory requirements. From analyses and taking into account assumed hidden sources, an estimated 76 tonnes of asbestos concrete is contained within MCP-01 topsides

Halon/Freon
According to the materials inventory report, there are no reported halon and freons within the topside units. If, however, halon and freons are found, they will be collected, handled and delivered for destruction according to UK and Norwegian regulations.

Figure 7.1.2 illustrates the weight percentage distribution of waste management for the topsides.

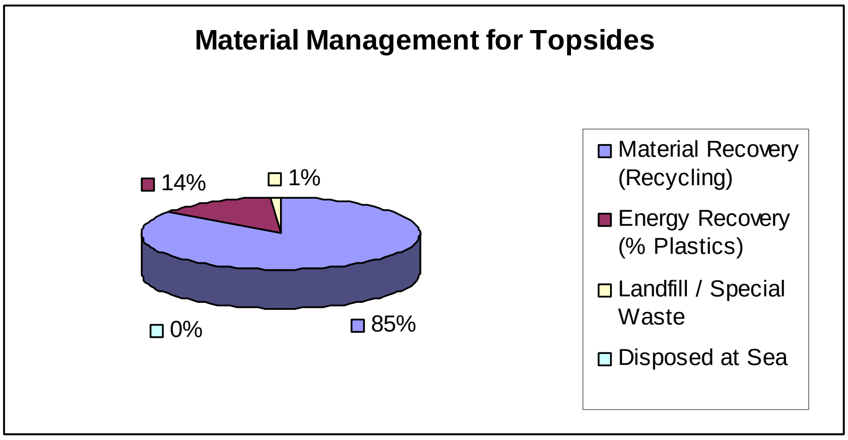

Figure 7.1.2 Material management for the topsides indicating maximum amount for recycling (weight %) [28]

7.1.7 Littering

It is likely that objects and materials will be dropped onto the seabed throughout offshore marine operations. These operations however, will not result in any littering impact as the seabed will be swept for debris upon completion of offshore operations and onshore waste management procedures will prevent littering. The possible associated pollution effect is considered below.

7.1.8 Risk to the Environment from Unplanned Events

Risk to the environment from unplanned events during topsides removal operations are primarily associated with damage to hoses and / or dropped objects (directly or indirectly), resulting in discharge to sea.

From a general safety point of view, the major hazards from lifting operations are mostly associated with the consequences of dropped objects (i.e. injury, death, damage) on personnel and critical equipment. Dropped objects will also result in environmental impacts, in particular, the failure of hydraulic-lift equipment during lifting operations.

When studying undesired-incident statistics offshore, it is clearly evident that failures/fracturing on hydraulic hoses and other components on the lifting equipment are far more common as operational undesired incidents than dropped objects. The environmental effects from hydraulic fluid discharged to sea are normally considered to be minor and local in nature. The amounts of such fluid accidentally discharged to sea may vary, normally within the order of 5 to 50 litres. The environmental impact of such a discharge will be negligible.

Key environmental risk reduction measures associated with heavy lift operations would include observed / manned operations, coupled with the use of a register of bulk transfer hoses (to ensure that all hoses are properly maintained and replaced). In addition, the different tank/fluid containments (e.g. diesel and hydraulic-fluid tanks) on the installation are assumed to be in empty condition, indicating that the risk of dropped objects on the installation causing serious spills to sea is small.

Although the probability of dropped object(s) when performing lifting operations is generally small, dropped-objects statistics clearly indicate that the probability for dropped objects/wrong operation of the crane is higher for the smaller/lighter routine lifts than for heavier lifts /special lifts. Even if the dismantling operations on MCP-01 will entail many smaller lifts to be undertaken, these cannot be considered as routine lifts, rather special lifts that are well planned for. Thus the probability of such incidents to occur is considered small.

Dropped objects may collide with the transport vessel itself, or fall overboard, hitting a pipeline or other critical equipment on the seabed. Even if such accidents are very rare, the environmental consequences are dependent on the type and amount of containment released by the accident. The worst-case scenario is of course that the vessel sinks and relatively large amounts of diesel fuel and other environmentally hazardous fluids are released to the sea. Or, if a pipeline is fractured by a hit, larger quantities of oil may leak into the water before the pipeline flow halted. The probability of such is however extremely low and the associated impacts not evaluated further. During marine towing / transport operations, there is also an equally low probability that dropped objects would land on sensitive areas (i.e spawning, special conservation habitat etc) of the North Sea seabed.

7.2 Social impacts from disposal of topside

7.2.1 Impacts on Fisheries

Impacts on fisheries from the removal of the topsides are considered to be "insignificant".

The majority of topside removal operations will take place within the 500m exclusion zone, and will not affect current fishing activities.

7.2.2 Impacts on Free Passage

Shipping activity will be increased for the duration of topsides removal and transport (i.e. tow to shore) operations. It is not anticipated that these operations will have any practical impact on the free passage of the area.

7.2.3 Costs and National Supplies (Goods and Services)

The only disposal option for the topsides and modules is full removal to shore. For the purposes of this assessment, it is assumed that all topsides removed will be sent to UK shores. The parts of the structure removed to shore will be re-used or recycled where possible, the associated costs of which are estimated at £70m / 840 MNOK.

The UK content is estimated at 35-65% or £25m-£47m / 300 MNOK-564 MNOK. Based on expected UK supply, the national employment effects can be estimated. The Figure 7.2.1 shows the high and low estimate for UK content broken down by industries which can potentially supply directly to the topsides project.

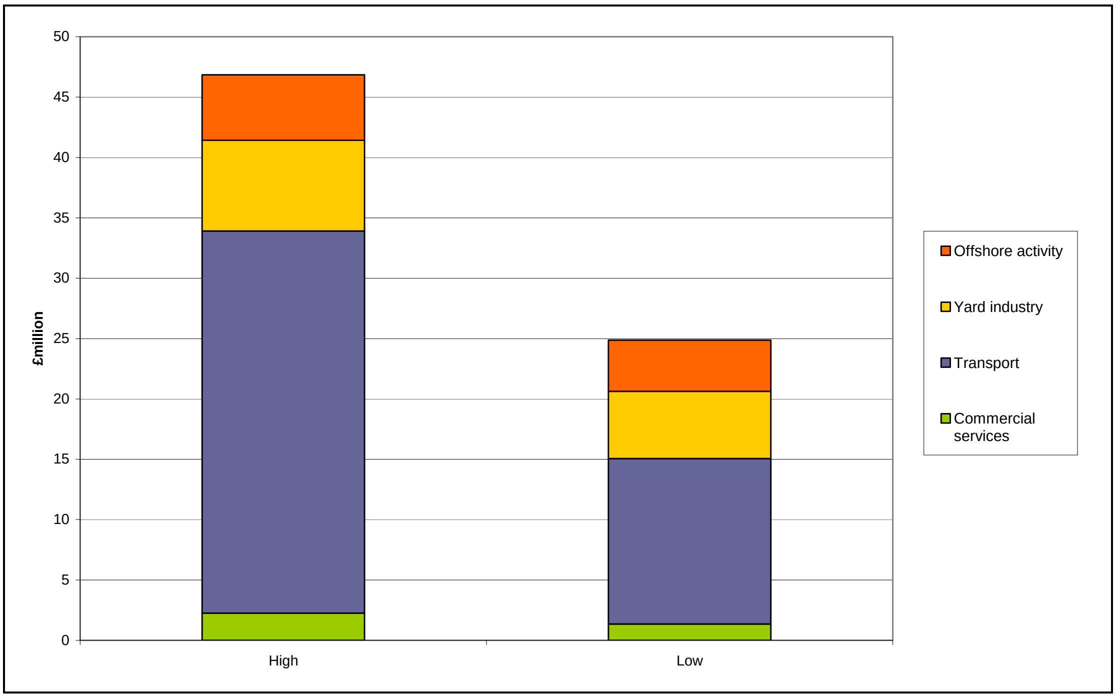

Figure 7.2.1 MCP-01 Topside UK content, broken down by industry – high and low estimate

The following points clarify information presented within Figure 7.2.1:

- The largest UK contracts are expected to be awarded to the transport industry for the hire of a flotel, helicopter transport, supply vessels, standby vessels, survey vessels and towing operations. There are no UK contractors capable of performing the marine lifting operations.

- The offshore operators' activity would focus on operator's project management and support. Yard industry in UK can carry out the work associated with preparing the topsides prior to lifting off, as well as the demolition and recycling work on shore. Commercial services include engineering design and engineering consultancy.

- An income in the range of £1m / 12 MNOK can be expected, assuming a price of £85 / 1,020 NOK per tonne of recycled steel from the MCP-01 topsides (11,909 tonnes).

7.2.4 Employment Effects

Based on an industry breakdown of the expected UK supplies, the national employment effects have been estimated. The goods and services will be supplied both directly and indirectly to determine UK production effects.

Production effects in the UK are expected to amount to 340-530 man-years from the offshore removal and onshore disposal of the topsides. Figure 7.2.2 shows a high and low estimate and the industry categories that may benefit from the production effects in UK.

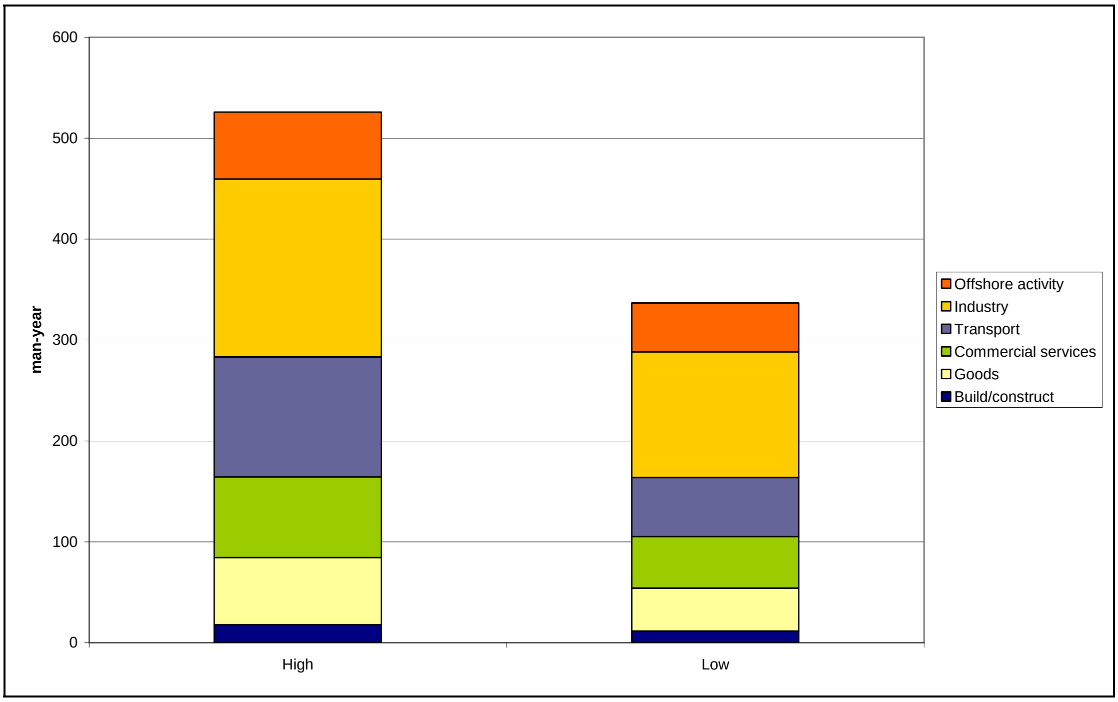

Figure 7.2.2 MCP-01 topsides – UK production effects broken down by industry (man-year) – high and low estimate

As would be expected, a large part of the production effects come from industry. The preparatory work done prior to lifting off the topsides, as well as the demolition and recycling work on shore are expected to yield production effects in the UK yard industry.

UK Commercial services will also benefit. These services include engineering and studies and offshore activity includes operators' project management and support.

In addition, Consumer effects will amount to around an additional 50% of the production effects. The total resultant employment effects in UK are estimated to be 500-800 man-years.

It is noted that the employment effects will be spread over the years during the removal, demolition and recycling activities. The tentative target is to complete the disposal, including onshore activities, by end of 2008.

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8. Impact Assessment for Disposal of Concrete Substructure

8.1 Description of Disposal Alternatives for the Concrete Substructure

As described in Section 5.2.3, there are four separate alternatives (see Table 8.1.1, below) that will be evaluated in this comparative EIA.

Alternative A	Alternative B	Alternative C	Alternative D
Re-float, tow to shore, demolish and dispose on-shore.	Remove external and internal steelwork, re-float and dispose at a deep water location	Remove internal and external steelwork and cut down sub-structure to provide a clear draught of 55m.	Leave in place, removing as much external steelwork as reasonably practicable.

Table 8.1.1 Disposal Alternatives considered for the MCP-01 Substructure

8.2 Environmental Impacts from Disposal of Substructure

8.2.1 Energy

Total Energy Impact for the concrete substructure alternatives range from 0.4 – 1.98 million GJ; this reflects the fact that concrete cannot be directly recycled. As outlined in Section 3.2.2, this equates to a “small negative” to “moderate negative” energy impact. Recycled concrete can be used as a filling material for road construction or as an additive in the production of new concrete. Although the energy associated with recycling concrete is relatively small, there are uncertainties surrounding the use or value of such large volumes crushed concrete material. In all likelihood, the crushed concrete will be re-used (as clean roadfill or for landfill lining/capping), rather than landfilled or recycled. Therefore, the energy required to replace non-recycled concrete has not been included in the energy calculations. For comparative purposes, Figure 8.2.1 is a graphic representation of the total energy impacts for each alternative.

To put the Total Energy Impact estimates into context 0.4-1.98 million GJ of energy is the equivalent to 0.004-0.02% of the annual production output from the UKCS in 2003.

It is noted that these energy figures vary from those reported for the CDP1 installation on the Frigg Field. This is due to the differences in the CDP1 substructure materials characteristics and marine spread and duration since the CDP1 has structural damages.

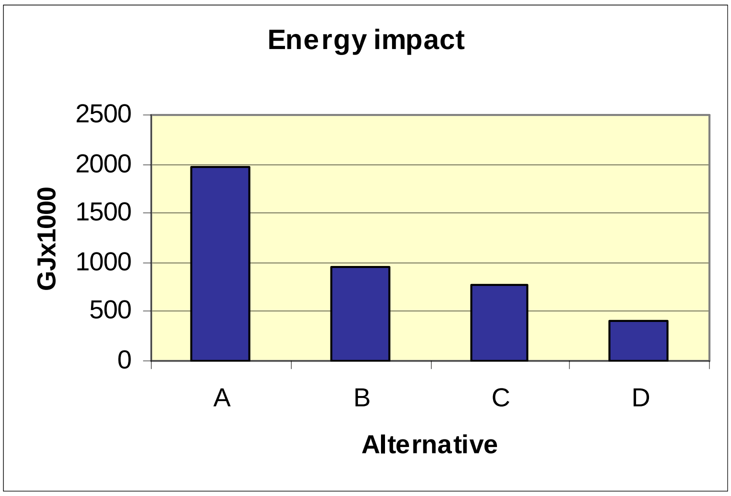

Figure 8.2.1 Total energy impact from MCP-01 disposal alternatives

Alternative A – Refloat the concrete substructure and onshore disposal

As Alternative A leads to a complete recycling of all the steel from the substructure, its E_{REP} (energy for producing new materials) is set to zero. The Total Energy Impact then equals the Energy Consumption (see Section 3.2.2 for terms), and is estimated to be 2 million GJ. This equates to a "moderate negative" energy impact and represents the annual fuel consumption of 105,000 family size cars or 0.2% of the annual energy output from UKCS. For comparison against the Frigg decommissioning estimates, the similar CDP1 substructure had a calculated energy impact of 2.2 million GJ; this is a slightly higher energy impact that reflects the need for more marine operations that would be required for removal of CDP1's damaged substructure.

Alternative A Operation	MCP-01 Substructure Energy Impact (GJ)
$\mathbf{E_{DIR}}$ Marine operations	1,720,000
$\mathbf{E_{DIR}}$ Dismantling	160,000
$\mathbf{E_{REC}}$ Recycle of metals	100,000
$\mathbf{E_{CONS}}$ **Energy Consumption**	**1,980,000**
$\mathbf{E_{REP}}$ Energy for replacing the materials	0
$\mathbf{E_{TOT}}$ **Total Energy Impact**	**1,980,000**

Table 8.2.1 Total Energy Impact for Alternative A: Substructure removed and brought to shore for dismantling and disposal.

Alternative B – Refloat the concrete substructure and disposal in deep water

Table 8.2.2 below shows that the Total Energy Impact for Alternative B is calculated to 964,000 GJ. This represents a "small negative" energy impact and is approximately 41% of the alternative with the highest energy impact (i.e. Alternative A).

Alternative B Operation	MCP-01 Substructure Energy Impact (GJ)
E_{DIR} Marine operations	620,000
E_{DIR} Dismantling	1,800
E_{REC} Recycle of metals	14,300
E_{CONS} Energy Consumption	**636,000**
E_{REP} Energy for replacing the materials	328,000
E_{TOT} Total Energy Impact	**964,000**

Table 8.2.2 Total Energy Impact for Alternative B: Substructure removed and disposed of in deep water

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
For Alternative C, the external and internal steelwork will be removed before the substructure is partially demolished to provide a 55m draught clearance. The majority of energy consumption for this Alternative is associated with marine operations where a flotel and DSV will be utilised for the duration of operations. Alternative C has a "small negative" energy impact (770,000 GJ). This includes the energy required to replace the metals in the partially abandoned substructure. See Table 8.2.3

Alternative C Operation	MCP-01 Substructure Energy Impact (GJ)
E_{DIR} Marine operations	425,000
E_{DIR} Dismantling	1,800
E_{REC} Recycle of metals	14,300
E_{CONS} Energy Consumption	**441,000**
E_{REP} Energy for replacing the materials	328,000
E_{TOT} Total Energy Impact	**770,000**

Table 8.2.3 Total Energy Impact for Alternative C: Substructure cut down to provide a clear draught of 55m

Alternative D - Leave the concrete substructure in place
Alternative D will result in a "small negative" energy impact (408,000 GJ). Alternative A and C are similar in nature, but for Alternative D there is more energy consumption linked with the replacement of lost materials and less energy required for marine operations. See Table 8.2.4. 408,000 GJ is equivalent to 0.004% of the annual UKCS energy output for 2003.

Alternative D Operation	MCP-01Substructure Energy Impact (GJ)
E_{DIR} Marine operations	45,000
E_{DIR} Dismantling	400
E_{REC} Recycle of metals	3,300
E_{CONS} Energy Consumption	**49,000**
E_{REP} Energy for replacing the materials	360,000
E_{TOT} Total Energy Impact	**408,000**

Table 8.2.4 Total Energy Impact for Alternative D: Leave the substructure in place

8.2.2 Emissions to Atmosphere

CO_2 emissions from all alternatives are estimated to be 3-137 kilo tonnes. 137 kilo tonnes correspond to 0.02-0.7% of the annual CO_2 emissions from all UK offshore operations for 2002 as reported by DTI [84]. Figure 8.2.2, provides a summary of the CO2 emissions for the four MCP-01 substructure disposal alternatives. The calculated emissions for each alternative are presented in the following sections for key of terms, see assessment methodologies explanation for atmospheric emissions (Section 3.2.2).

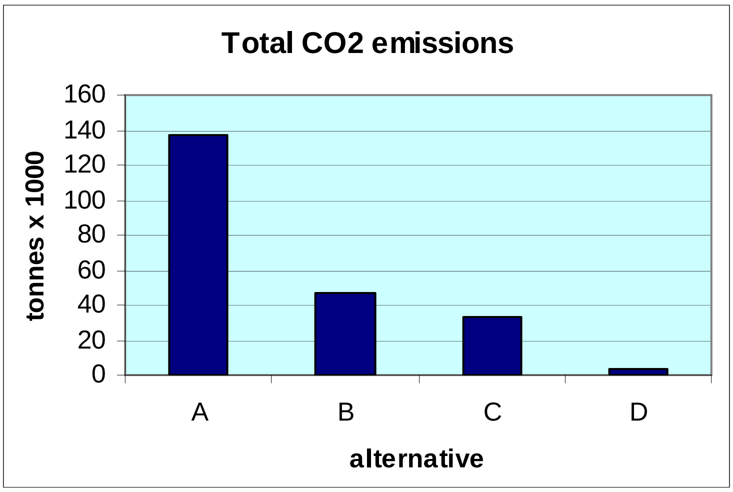

Figure 8.2.2 Total CO_2 emissions (tonnes) for MCP-01 substructure disposal alternatives

Alternative A – Refloat the concrete substructure and onshore disposal
The total atmospheric emissions associated with Alternative A are shown in Table 8.2.5.

With almost 140,000 tonnes of estimated atmospheric emissions, Alternative A has the highest atmospheric impact out of all substructure disposal alternatives. Most of these emissions (137,000 tonnes) are CO_2. This is mainly linked to the emissions released from offshore marine operations and represents 0.7% of the annual UKCS CO_2 emissions for 2002 [84].

Alternative A will also result in the discharge of 2,400 tonnes of NO_x. Most of these emissions arise from marine operations and represents 3.9% of the annual NO_x emissions from UKCS in 2002 [84].

Alternative A Operation	MCP-01 Substructure Emissions to Air (tonnes)
CO_2 emissions	
Marine operations	126,000
Recycle of metals (Carbon and stainless steel)	11,000
Total CO_2 emissions	**137,000**
NO_X emissions	
Marine operations	2,350
Recycle of metals (Carbon and stainless steel)	18
Total NO_X emissions	**2,400**
SO_2 emissions	
Marine operations	112
Recycle of metals (Carbon and stainless steel)	42
Total SO_2 emissions	**154**

Table 8.2.5 Total emissions (tonnes) to air for Alternative A: Substructure removed and brought to shore for dismantling and disposal.

Alternative B – Refloat the concrete substructure and disposal in deep water
The total emissions to atmosphere from the removal and deepwater disposal of the substructure are shown in Table 8.2.6. The total CO_2 emissions from Alternative B are estimated to be 47,000 tonnes which ranks 2nd in terms of negative atmospheric impact of all the alternatives.

Alternative B Operation	MCP-01 Substructure Emissions to Air (tonnes)
CO_2 emissions	
Marine operations	45,600
Recycle of metals (Carbon and stainless steel)	1,500
Total CO_2 emissions	**47,000**
NO_X emissions	
Marine operations	850
Recycle of metals (Carbon and stainless steel)	3
Total NO_X emissions	**850**
SO_2 emissions	
Marine operations	40
Recycle of metals (Carbon and stainless steel)	6
Total SO_2 emissions	**46**

Table 8.2.6 Total emissions (tonnes) to air for Alternative B: Substructure removed and disposed of in deep water

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m

The estimated atmospheric emissions from the partial removal of the substructure are outlined in Table 8.2.7. The results show that total CO_2 emissions are about 72% less than Alternative A (highest impact) and almost 9 times higher that the alternative with the lowest (atmospheric) environmental impact.

Alternative C Operation	MCP-01 Substructure Emissions to Air (tonnes)
CO_2 emissions	
Marine operations	31,300
Recycle of metals (Carbon and stainless steel)	1,500
Total CO_2 emissions	**32,800**
NO_X emissions	
Marine operations	580
Recycle of metals (Carbon and stainless steel)	5
Total NO_X emissions	**585**
SO_2 emissions	
Marine operations	28
Recycle of metals (Carbon and stainless steel)	6
Total SO_2 emissions	**34**

Table 8.2.7 Total emissions (tonnes) to air for Alternative C: Substructure partially cut down to provide a clear draught of 55m

Alternative D - Leave the concrete substructure in place
Atmospheric emissions for Alternative D include 3,700 tonnes of CO_2 and 63 tonnes of NO_x (see Table 8.2.8). When compared to other substructure disposal alternatives, this alternative has the lowest atmospheric emissions impact. The discharge estimates represent 0.02% CO_2 and 0.1% NO_x emissions release from UKCS 2002 production [84].

Alternative D Operation	MCP-01 Substructure Emissions to Air (tonnes)
CO_2 emissions	
Marine operations	3,300
Recycle of metals (Carbon and stainless steel)	350
Total CO_2 emissions	**3,700**
NO_X emissions	
Marine operations	62
Recycle of metals (Carbon and stainless steel)	1
Total NO_X emissions	**63**
SO_2 emissions	
Marine operations	3
Recycle of metals (Carbon and stainless steel)	1
Total SO_2 emissions	**4**

Table 8.2.8 Total emissions (tonnes) to air for Alternative D: Leave substructure in place

8.2.3 Discharges to Sea, Water, or Ground

Alternative A – Refloat the concrete substructure and onshore disposal
Operational discharges from removal and onshore recycling and disposal of the concrete substructure are found to represent “insignificant” impacts on the environment. Potential areas of concern, which have been identified and assessed, are:

- Offshore removal of marine growth;
- Dropped objects, concrete and steel particles (from cutting operations) in the water column;
- De-watering of the central shaft of MCP-01 and discharge of seawater;
- Removal and deposition of solid ballast; and
- Dismantling and disposal.

As outlined in Section 5.2, marine growth must be removed prior to re-float in order to clear the Jarlan holes and clean the towing points (at El +67.23 m) and mooring points. The fouling will be dispersed on the seabed around the substructure. No environmental impacts are expected from this limited volume of organic material, which is naturally occurring in this environment. Although there are linkages with discharges to the sea, this impact is considered to be more physical in nature.

Cuttings operations during Alternative A will result in the suspension of concrete and steel particles in the water column which will gradually re-settle on the seabed. The amount of concrete and steel particles in suspension during the cutting operations is assumed to be small, especially if diamond cutting is utilised [78]. Although this impact is considered to be more physical in nature, it is expected to be localised with “insignificant” impacts relating to marine environment discharges.

As mentioned in Section 5.2, the central shaft must be de-watered prior to re-float. This will result in the discharge of seawater, potentially with trace iron contaminants from the corrosion of steel. It is expected that this discharge will have no environmental impact.

The re-float and deballast operations will result in the discharge of 91,000m³ of solid ballast from the MCP-01 substructure onto the seabed outside the external walls; this discharge is considered to be more of a physical impact (See section 8.2.4). The majority of the ballast is inert material (sand) and deposition of the ballast onto the sandy mound surrounding the MCP-01 is expected to have “insignificant” environmental impacts, relative to discharges to the sea.

The onshore dismantling work will be performed in a deep water quayside/yard with on-site pollution control monitoring and containment. Dismantling will be carried out in compliance with local/national regulations and permitted consent limits. Because of these control measures, any discharges to the environment during these operations would be considered “insignificant”.

The concrete material may be recovered for re-use or deposited on a landfill site. Most of the concrete is expected to be recycled in material recovery and only minor parts of the concrete are expected deposited on a landfill site. Disposal of concrete residues on landfill sites may result in the release of leachate with trace contaminants of chlorides, alkalis and iron. 2,650 tonnes of marine growth will also be removed from the concrete substructure for landfill disposal. The land filled marine growth will generate organic-based leachate. All landfill sites used for disposal of concrete and marine growth will be properly permitted with appropriate leachate control systems, resulting in “insignificant” impact to the land-based environment.

Alternative B – Refloat the concrete substructure and disposal in deep water

The total extent of discharges to the sea during re-floating the concrete substructure and disposing it at a designated deep water disposal site, is expected to be low, and the environmental (discharge) impacts are evaluated to be “none or insignificant”. Potential areas of concern, which have been identified and assessed, are:

- Removal and discharge of marine growth;
- Dropped objects, concrete and steel particles (from cutting operations) in the water column;
- Removal and deposition of solid ballast;
- De-watering of the central shaft of MCP-01 and discharge of seawater;
- Degradation of structural materials (concrete and steel); and
- Degradation of electrical and anode material.

As outlined in Alternative A, some marine growth must be removed prior to re-float operations. The fouling will be discharged onto the seabed within immediate vicinity of MCP-01. No environmental impacts are expected from this limited volume of organic material naturally occurring in this environment. This impact is considered to be more physical in nature.

As is the case with Alternative A, cutting operations will result in the discharge of concrete and steel particles into the water column with eventual deposition onto the seabed. The discharge of these inert materials is expected to have an “insignificant” impact to the marine environment.

As part of the remedial work, the central shaft of MCP-01 will be de-watered. This discharge (seawater with, potentially, some elevated levels of iron from steel corrosion) is not considered to contain environmentally harmful components, and no impacts are anticipated.

The substructure must be de-ballasted before re-float. This implies the same operations as described in Alternative A, with the same environmental impact to the marine environment. It is noted that this discharge is more closely associated with physical impacts.

After deep-water disposal, the substructure will slowly degrade, releasing diluted contaminants (i.e. the by-products of concrete and steel degradation) over long periods of time. The effects on the deepwater marine environment from this diluted discharge is expected to be “none or insignificant” because of the duration of the release rate, coupled with the low concentration of inert contaminants.

Decomposition of cathodic protection devices (i.e. anodes) left on the substructure will result in the discharge of dilute concentration of metals to the sea over extended periods of time. The main components are copper, aluminium and zinc, with copper having the most environmental concern. Because of the low concentration and slow release-rates of the leaching metals, the impact of this discharge is considered to be “insignificant”.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
Discharges to the sea from Alternative C, where part of the substructure is cut down and left on the seabed, are expected to result in “insignificant” (discharge) impacts on the environment. Potential areas of concern, which have been identified and assessed, are:

- Concrete suspension/slurry in the water;
- Degradation of concrete;
- Degradation of electrical and anode material;
- Removal of ballast; and
- Discharge of explosives.

The partial removal of a concrete gravity base structure will result in the discharge of concrete and steel particles from cutting and explosion operations. Similar to impacts for previously described alternative, these operations will result in an increased turbidity as particles flow through the water column, with eventual deposition on the seabed. It is anticipated that these impacts, however, will be localised and are considered to be “insignificant”.

Environmental impacts will arise from the gradual degradation of concrete and steel as the partially demolished substructure lays abandoned on the seabed. There will be no release of hydrocarbons as the structure gradually degrades, because the substructure was never used for hydrocarbon storage. As is the case with Alternatives B and D, the effects of this leaching are expected to be “none or insignificant” because of the duration of the release-rate coupled with the low concentration of the leached materials, from both concrete and steel materials.

Likewise, degradation of anode and electrical materials will also result in the release of diluted metals over long periods of time. As with the structural materials, the impact of this discharge is considered to be “insignificant”.

58,700 m³ of solid ballast from the MCP-01 structure will be disposed of on the seabed outside the external wall, over the foundation raft as part of the partial dismantling. The majority of the ballast is inert material (sand). MCP-01 is located on a sandy mound. It is anticipated that the sand ballast will be deposited in immediate vicinity of MCP-01’s current location, which would result in little or no change to the existing seabed habitat. The impact from seabed disposal of the ballast is, therefore considered to be “insignificant”. The effects from deposition of the ballast material are considered to be more of a physical impact.

Explosive operations will primarily result in physical impacts to fish and marine mammals in vicinity of MCP-01. It is noted, however, that explosive charge chemicals (mainly aluminium) will also be released during these operations, but the dilute concentrations are not expected to have any environmental impact.

Alternative D - Leave the concrete substructure in place
Discharges from Alternative D, where the substructure is left in place at its current location, are considered to have “insignificant” impacts on the environment. Potential areas of concern, which have been identified and assessed, include:

- Degradation of structural materials (i.e. concrete and steel); and
- Degradation of electrical and anode material

As the structure degrades over time, materials from the decomposition of concrete, steel, and electrical and anode material will leach from the substructure. Leachate from the structure decomposition will be discharged to the marine environment in very dilute concentrations over long periods of time. The MCP-01 platform was built with high quality concrete specially designed to withstand the corrosive physical and chemical actions of sea water for a period larger than 25 to 30 years. The actual life span of the concrete is expected to be much longer. Deterioration of concrete marine structures such as MCP-01 is caused by physical and chemical interaction with seawater. The greatest rate of deterioration will occur in the splash zone caused by [70]:

- Mechanical action of the waves;
- Swelling and shrinkage caused by alternate saturation and drying;
- Atmospheric conditions (wind, exposure to sun, freezing); and
- Electrochemical corrosion of steel reinforcement.

The degradation of the submerged structure will occur at considerably slower rates because of reduced levels of oxygen availability on the seabed [70].

However, the effects of this leaching are expected to be “none or insignificant” because of the duration of the release-rate coupled with the low concentration of the leached materials, from both concrete and steel materials.

Likewise, degradation of anode and electrical materials will also result in the release of diluted metals over long periods of time. As with the structured materials, the impact of this discharge is considered to be “insignificant”.

The steel material removed from the structure will be brought to shore for recycling. Invariably, some of these recycling sites will have surface water discharges, but these will be managed via permitted consent conditions issued by local governments. These discharges would therefore be considered “insignificant”.

8.2.4 Physical Impacts to the Environment

Alternative A – Refloat the concrete substructure and onshore disposal
The overall physical impacts are found to be “moderate negative”. For Alternative A, the main issues of concern relating to physical impact include:

- Marine noise from vessel operations;
- Formation of anchor mounds from vessels throughout marine operations;
- Discharge of concrete and steel particles (from cutting operations) into the water column;
- Seabed disturbance as substructure is raised through the water column;
- Deposition of ballast material onto seabed; and
- Dismantling and disposal of structural materials (including marine growth).

The noise generated from vessel engines (in particular vessels utilising DP) throughout substructure re-float operations will result in disturbance to marine life. A detailed evaluation of noise disturbance impacts from marine vessel operations is outlined in topsides Section 7.1.4 (Physical impacts to the environment). The vessel types used in topsides removal operations will also be utilised for substructure refloat operations. As identified in section 7.1.4, the marine noise disturbance from these operations would result in an “insignificant” physical impact.

Extensive marine operations will be required to re-float the substructure and tow it back to shore. For those vessels not utilising DP, anchor mounds will be created on the seabed during these marine operations. Most vessels will have DP capability, as required and outlined with the Marine Operations Description. Widespread use of DP throughout substructure removal operations will minimise the development of anchor mounds from anchoring operations, and this impact is considered to be “insignificant”.

Localised impact to the water column and seabed will occur as a result of suspension and deposition of concrete and steel particles discharged into the water column during cutting operations. Taking into consideration the short duration, and the localised nature of this effect, the impacts on the benthic community are expected to be “insignificant”.

Operations to release the substructure from the seabed will disturb sediments and the water quality will deteriorate because of an increasing amount of particles in the water column. This effect has a very short duration and is considered overall as a “small negative” impact.

The sediments on the seafloor around the edge of the "raft-structure" of MCP-01 will be affected from the discharge of the main bulk of ballast (91,000m³) before re-floating. The necessary licences will be in place to allow this discharge to be made (e.g FEPA). High turbidity during this operation will possibly constitute a threat to bottom dwelling organisms some distance away from the ballast discharge area, though this effect is assumed to be small and of short duration. All benthic fauna in the discharge area will be covered and smothered. It is expected that new fauna could be re-established within a few years since the material will be clean. The MCP-01 ballast material left on the seafloor will create an area with low nourishment for several years. The sediment in the vicinity of the platform is described as silty sand covered by empty bivalve mollusc shells [45]. The ballast consists of sand and will form a contrasting layer on the seafloor. The area covered is expected to be approximately 90,000 m^2 (equivalent to about 12 football pitches) and up to 1m thick. Although this area is a tiny percentage of the 750,000km^2 North Sea seabed, it is likely that the impacted seabed will include *Nephrops* habitat, which is considered to be sensitive. The physical environmental impact from the deposition of ballast is, therefore, assessed to be “moderate negative”.

The onshore dismantling work could be performed in a dockyard with a concrete lined surface with on-site pollution control monitoring and containment, in accordance with local and national regulations. This part of the dismantling is not expected to cause any physical impact on the environment outside the permitted consent limits.

The concrete material may either be recovered or deposited on a landfill site. Most of the concrete will be used in material recovery with an expected small percentage to be disposed of in a landfill site. It is also noted that 2,650 tonnes of marine growth removed from the outer surface of the substructure will be disposed of in a landfill. These waste materials will be disposed of at designated landfill sites; there will be no change to the physical onshore habitat, and hence resulting in an “insignificant” environmental impact.

Alternative B – Refloat the concrete substructure and disposal in deep water

Because of similar operations, the physical impacts of Alternative B on the marine environment in the vicinity of MCP-01 are the same as described for Alternative A. Mainly due to the extent of ballast material deposited on the seabed, total physical impact from re-floating this substructure and disposing in deep sea is found to be “moderate negative”. For Alternative B, the main issues of concern relating to physical impact include:

- Marine noise from vessel operations;
- Formation of anchor mounds from vessels throughout marine operations;
- Discharge of concrete and steel particles (from cutting operations) into the water column;
- Seabed disturbance as substructure is raised through the water column;
- Deposition of ballast material onto seabed;
- Seabed disturbance as the substructure is deposited in deep water;
- Physical presence of the substructure on the seabed of the deep water dump site.

As concluded with Alternative A, the marine noise impact from Alternative B is considered to be “insignificant”.

As with Alternative A, the formation of anchor mounds is considered to be a localised “insignificant” environmental impact.

The discharge of concrete and steel particles during cutting operations will have an “insignificant” environmental impact, as concluded with Alternative A.

Operations to release the substructure from the seabed will disturb sediments and the water quality will deteriorate because of an increasing amount of particles in the water column. This effect has a very short duration and is considered overall as a “small negative” impact, as concluded with Alternative A.

As with Alternative A, ballast dump operations are required prior to re-float, resulting in the deposition of 91,000m^3 of inert sand material on the seabed. The physical environmental impact from the deposition of ballast is assessed to be “moderate negative”.

The MCP-01 substructure is not expected to implode as it sinks through the water column and impacts the seabed. It is likely that the force of impact will partly or completely crush the substructure. In addition, the impact force can create pressure waves similar to an explosion, but the effect of the pressure wave is expected to be small and local in nature. The deep sea seabed is dominated by fine sediments and silt. The expected high turbidity in the dumping area is assumed to smother or disturb organisms (disrupt breathing and/or feeding functions) a distance of several hundred meters away from the impact site [71]. This is a temporary and localised negative impact which is considered to be “small”.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
Partial removal is considered to give an overall “moderate negative” impact mainly due to the deposition of the substructure on the seabed as it degrades. This impact will be significantly reduced with the implementation of defined mitigation measures. The overall impact from the blasting and the longer term physical effect on the seabed is therefore considered to result in “moderate negative” impacts. Main issues of concern relating to physical impact that were evaluated include:

- Marine noise from vessel and explosive cutting operations;
- Formation of anchor mounds from vessels throughout marine operations;
- Discharge of concrete and steel particles (from cutting and explosion operations) into the water column;
- Deposition of ballast material onto seabed;
- Physical presence of the cut down substructure on the seabed and;
- Seismic effects from explosive cutting operations.

The marine noise impact arising from vessel engines throughout dismantling operations is considered to be “insignificant”, as is concluded with other substructure disposal alternatives. It is noted that marine noise impacts will also arise from explosive cutting operations. The primary physical impact from these operations is linked with fish mortality (as discussed below), rather than disturbance from noise.

As with Alternatives A and B, the formation of anchor mounds is considered to be a localised “insignificant” environmental impact.

Localised impact to the water column and seabed will occur as a result of suspension and deposition of concrete and steel particles discharged into the water column during cutting/explosion operations. Taking into consideration the short duration, and the localised nature of this effect, the impacts on the benthic community are expected to be “insignificant”, as was concluded for Alternatives A and B.

During dismantling operations, 58,700m^3 of solid ballast (sand) will be discharged of on seabed in immediate vicinity of MCP-01. Deposition of the ballast will smother bottom-dwelling organisms (i.e. benthic fauna) and alter the current habitat. It is expected that new fauna could be re-established within a few years since the ballast is inert (sand) material. The area affected by this change of habitat is not known, but if the discharged ballast had a 1 m thickness, the surface area would be 60,000m^2 (the equivalent of approximately 9 football pitches). Although this area is a tiny proportion of the 750,000km^2 North Sea seabed, it is likely that sensitive *Nephrops* habitat would be included within the area of impact. This effect is, therefore, considered to be “moderate negative”.

When finally disposed of, the structure on the seabed will represent reef-like solid substrata in a homogenous area of sand, and attract the settlement of hard-bottom species of organisms. As this constitutes a change in the natural environment the impact on the undisturbed seafloor is considered to be of a “moderate negative” nature, similar to a large ship wreck on the seafloor.

The cutting of the external wall and the central column will be performed by means of explosive charges. Shock waves from explosives have very damaging effects on fish, especially young fish and fish with swimming bladders. Based on the amount of explosive and type of charge, the potential mortality picture for fish of different sizes and distance from the platform are modelled based on [71] and [75] and shown in Figure 8.2.3. The fish mortality modelling is the same that was applied for the Frigg decommissioning studies, where explosive charged would be required for underwater cutting operations of the CDP1.

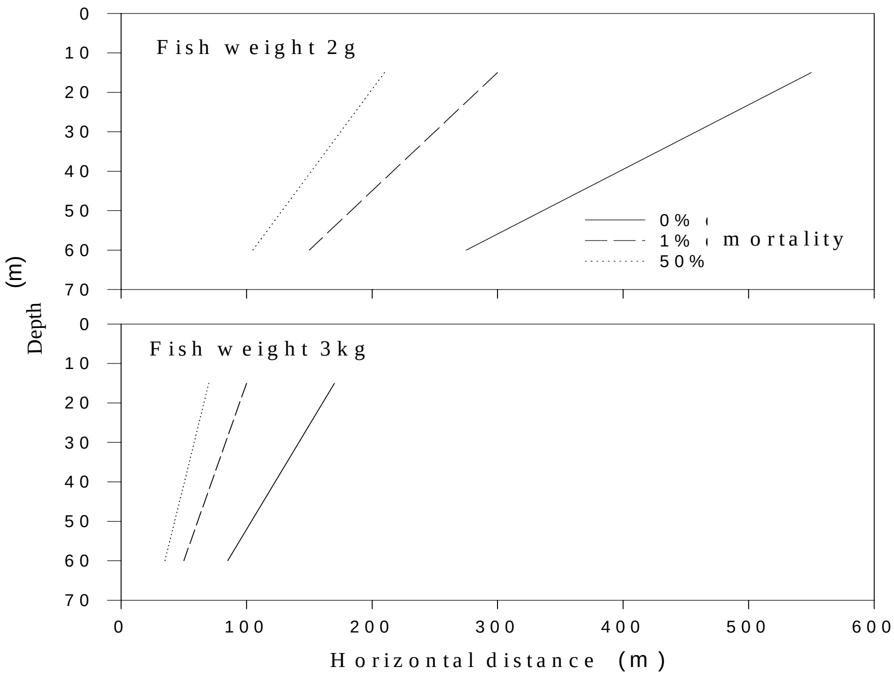

Figure 8.2.3 Mortality probability plot for 2g and 3kg fish with distance, and based on 80kg charges per meter at –60m water depth [71].

As the result from the modelling show individual fish larvae will be killed within 300-600m distance, however with small probability. About 50% of such small individuals will be killed within100-200m depending on water depth. For larger fish (3kg) the lethal range is mainly within 50m. It should be noted however that communications with Scottish fishermen indicate that the sandy mound on which MCP-01 is located provides habitat for larger demersal fish such as cod [58]. It is, therefore, quite likely that a few to some tens of tonnes of demersal fish will be present within a 100m radius, and one should assume a maximum 50% mortality from the blasting operation described. Compared with fish being caught by fishermen this amount is modest. In environmental terms, however, such a consequence will be considered "insignificant". Fish without swim bladders will not be affected by explosion shock and pressure wave reverberation. This means that higher value *Nephrops* in vicinity of the blasting operations would not be included in estimated mortality effects. This effect will be of short duration and localised, bearing in mind that new fish will migrate back into the area. There are, however, different means to mitigate such negative effects, which should be planned for, and are outlined below.

Mitigation measures to reduce underwater explosion impact on fish & larvae

Mitigation measures could include the use of small charges before the blasting operation to scare fish off (e.g. ten repeated charges within half an hour). This is proven to have an effect up to some thousand meters, but since larvae have low mobility it will mainly be effective for larger fish [71], as illustrated in Figure 8.2.3. Other measures include performing the blasting operations when there is some wave action to prevent the deflected acoustic waves [76].

Temperature also affects the acoustic effects, whereby higher temperatures in the top layer yield more negative effects than deeper layers. Depending on dominating presence of pelagic or demersal species, blasting operations should also occur at a time of year with the presence of highest deflection properties: August/September [71].

Finally, as larvae are most susceptible to blasting, and since aforementioned mitigation measures are not as effective on larvae, time of year should be selected when larvae are not present or only present in low concentrations. Fish larvae will mainly be present in the upper water level in this area in summer and early autumn.

Mitigation measures to reduce underwater explosion impacts on marine mammals

Similar to fish and larvae, marine mammals are also vulnerable to the effects arising from underwater explosives. See Section 6.3.6 for vulnerability details. Mitigation measures can be used to avoid or reduce the negative effects on marine mammals from underwater blasting and these should be planned for. The main mitigation measure is to establish a caution zone and safety zone. There are no established specific equations for calculations of safety zones regarding this project. As an example, equations developed by the U.S Army corps of Engineers Jacksonville District for unconfined charges in open water blast gives the Caution zone radius $R_{caution}$ (ft)= 260 * ((charges in lbs)$^{1/3}$). The safety zone is then given by the equation R_{safety} (ft) = 560 * ((charges in lbs) $^{1/3}$). The caution zone is the radius from the detonation where mortality (but not necessarily injury), would not occur in an open water blast, while the safety zone is the approximate distance where non-serious injury is unlikely to occur from an open water explosion [76].

For an 80 kg charge in open water, this will give an $R_{caution}$ of 466 m and R_{safety} of 933 m. Since the explosions used at MCP-01 are not open water it is likely that these figures would be conservative. This evaluation is identical to those applied for the Frigg decommissioning EIA, where disposal of the CDP1 concrete substructure would also require explosive cutting operations.

Additional measures to minimise the effects of explosions on marine mammals include:

- Design of charges to minimise environmental effects;
- Placing charges inside the external wall of MCP-01;
- Providing a bubble curtain around the blast to provide some elasticity into the water;
- Using delayed detonators to sequence the blast initiation;
- Provision of baffles around blast locations;
- Monitoring the locality R_{safety} for the presence of marine life with experienced personnel (i.e. a Marine Mammal Observer), and delaying blast (i.e. 20 minutes from the last sighting) to minimise the number of individuals affected;
- Use small charges before the blasting operation to scare mammals off (e.g. ten repeated charges within half an hour);
- Perform the blasting operation when there is some wave action to prevent deflected acoustic waves [76]; and
- Temperature also affects the acoustic effects; higher temperatures in the top layer give more effects in deeper layers. The highest deflection is expected in August/September and would therefore be the most appropriate time to undertake blasting [71].

It is noted that some of these mitigation measures comply with the JNCC guidelines for Minimising Acoustic Disturbance to Marine Mammals from Seismic Surveys [73].

Alternative D - Leave the concrete substructure in place

The effect of removing steelwork and leaving the concrete substructure in place, in itself, mirrors MCP-01's current situation. The structure will degrade over several hundred years, and mainly constitute a navigational obstacle with a hard-bottom effect for local organisms. As the structure slowly degrades, but remains standing, the physical impact is considered to be "none or insignificant". However, when the installation is fully deteriorated it will form heaps of concrete fragments and solid ballast. This constitutes a change in the natural environment of an undisturbed seafloor. Although this is a localised effect, nearby *Nephrops* habitat may also be impacted (i.e. beyond the sandy mound). The sensitivity of the recurring environment means that the physical impact would then be considered as “small to moderate negative”.

8.2.5 Aesthetic Impacts

Alternative A – Refloat the concrete substructure and onshore disposal

The aesthetic impacts from removing the substructure and bringing it onshore for dismantling would be considered “small to moderate negative”. Potential areas of concern include:

- Visual effects;
- Odour;
- Noise;
- Dust.

All of the aesthetic effects from onshore dismantling operations fall within the scope of local and national regulations and are controlled via permitted consent limits. Dismantling operations will take place at existing onshore yards, with similar current activities, thus these activities will not represent something new or unique to normal business. As the onshore yard has not been selected, the sensitivity of the receiving environment is unknown. It is also noted that on-shore dismantling operations could take up to 3 years [28].

During onshore dismantling and disposal operations, visual effects may contribute to negatively perceived impacts for inhabited areas (if any) nearby the dismantling site. However, when these operations take place in an existing industrialised area, the visual impacts will be “insignificant”.

Most of the marine growth will be removed onshore. Odour from the decomposition of the marine growth may cause problems in nearby inhabited areas. The marine growth can be removed via high pressure water jetting. The potential effect is dependent upon the extent of marine growth, temperature, and the time between exposing the growth to air, drying the growth, and removing/disposing the growth. The potential effect from the decomposition odour is not fully known and will depend on the local population; if the area is highly populated or commonly used for recreational purposes, the smell could have temporary “small negative” effects for the local area.

Dismantling operations of a substructure that is 100+m tall will last up to 3 years [28]. During this time, noise is expected to have the most significant potential for negative aesthetic impact. Noise abatement measures can be implemented to reduce degrees of impact significance. Noise-abatement mitigation measures include limiting operations to daylight hours, providing sheltered work areas that will shield noise, etc. Depending on the location of the dismantling site, the total scale of the aesthetics impacts will vary. If the dismantling site has a low aesthetic value and if noise-abatement measures are implemented, then aesthetic impacts will be greatly reduced to “insignificant”. The extended duration of dismantling operations, coupled with potential sensitivities of the receiving environment means that noise impacts are considered to be “small to moderate negative”.

Blasting, drilling, and crushing the concrete substructure will result in the considerable release of airborne dust. Similar crushing plant operations had measured dust concentrations of 4,000mg/m^3 at 30m distances from the plant [77]. As a reference, the current Norwegian regulations define a threshold level at 300mg/m^3 when dust reduction measures must be implemented. Dust may be classified as two types: suspended dust and precipitating dust. Suspended dust has the greatest concern to human health. Water mist/spray is a commonly used method for reductions in worksite dust concentrations and will be a requirement as part of the dockyard health and safety consents/licenses. The generation and discharge of worksite dust during dismantling operations is considered to have a “moderate negative” impact, because of the extended duration of dismantling operations and potential sensitivity of the receiving environment.

It is noted that marine noise from offshore vessel operations has been addressed in physical impacts.

Alternative B – Refloat the concrete substructure and disposal in deep water
For this alternative, offshore worker exposure to operational noise is the only aesthetic effect and would be considered “insignificant”.

It is noted that marine noise from offshore vessel operations has been addressed in physical impacts.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
As with Alternative B, noise is the only aesthetic effect arising from offshore dismantling operations, which would affect people working on-site for a limited time period. This impact would be considered “insignificant”.

It is noted that marine noise from offshore vessel operations has been addressed in physical impacts.

Alternative D - Leave the concrete substructure in place
Leaving the structure in place will have a minor visual impact on shipping, fishing, and other passing vessels that would be considered “insignificant”.

It is noted that marine noise from offshore vessel operations has been addressed in physical impacts.

8.2.6 Material Management

Dismantling sites for the concrete substructure have not been chosen, and the evaluation of waste/resource utilisation will concentrate on types and amounts of waste generated. Section 7.1.6 (Topsides Material Management) provides details on waste management systems/procedures which will also be adopted for substructure materials management.

For each disposal alternative, Table 8.2.9 gives an overview of the main materials (concrete and steel) within the MCP-01 substructure and the anticipated disposal routes, as defined in alternative descriptions and in accordance with TOTAL E&P UK project objectives.

Substructure Material	Substructure (tonnes)	Landfill/Sea Disposal (tonnes)	Re-use (tonnes)	Recycle (tonnes)	Recycle/Reuse target (%)
Alternative A: Substructure removed and brought to shore					
Concrete	137,000	27,400	109,600		80
Steel	11,900	595		11,305	95
Alternative B: Substructure removed and disposed of in deep water					
Concrete	137,000	137,000			
Steel	11,900	10,855		1045	95
Alternative C: Cut down sub-structure to provide a clear draught of 55m.					
Concrete	137,000	137,000			
Steel	11,900	10,855		1045	95
Alternative D: Leave substructure in place					
Concrete	137,000	137,000			
Steel	11,900	11,805		95	95

Table 8.2.9 MCP-01 substructure component breakdown, with tonnages of likely disposal, re-use, and recycling endpoints

For comparative purposes, Figure 8.2.4 provides a summary of materials management breakdown for the main substructure constituents (concrete and steel). The majority of recovered materials (steel and concrete) will be either recycled or re-used. Solid ballast will be disposed of at sea, with little likelihood for re-use. Recovered marine growth will be disposed of onshore (landfill).

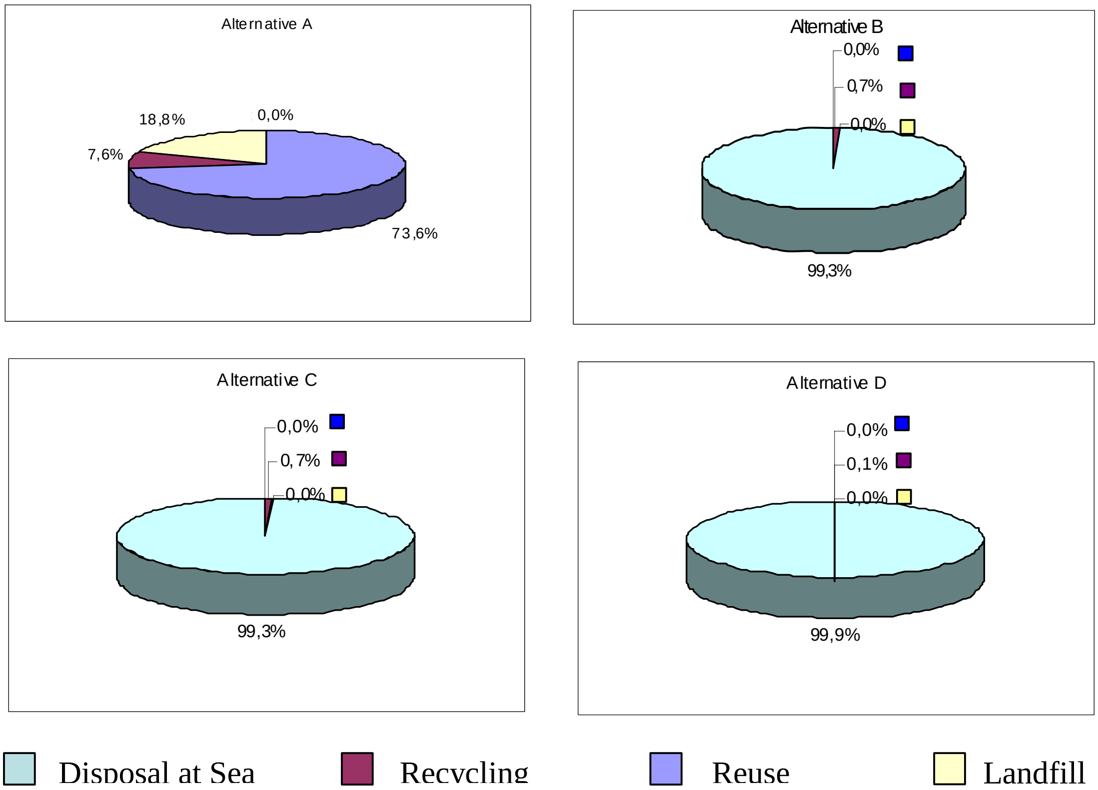

Figure 8.2.4 Materials management for concrete and steel of the MCP-01 substructure (weight percent), as per defined disposal alternative

Alternative A – Refloat the concrete substructure and onshore disposal

There is some uncertainty how much of the concrete material that realistically can be recycled. The concrete material would be recycled as much as practically feasible, and the environmental impact is considered "moderate positive"; this is mainly attributed to the 11,305 tonnes of recycled steel and other metals, which are high value recyclable materials. Materials/types of waste considered within the materials management evaluation include:

- Concrete;
- Steel (reinforcement, pre-stressing cables);
- Cables and electrical equipment;
- Marine growth; and
- Anodes.

Removal of the substructure will result in the recovery of considerable amounts of concrete, which will require crushing prior to reuse as aggregate (i.e. roadfill) or for landfill cell-lining capping. It is intended that most (80%) of the recovered concrete will be re-used, rather than landfilled. In addition to the concrete, steel will also be recovered from the substructure. The concrete and the reinforcing rods will be segregated, and the majority (95%) of the iron will be recycled. All reinforcement steel is considered suitable for recycling when separated from the concrete. There is very little experience with recycling of a large amount of solid concrete material; as such, there are uncertainties in defining realistic recycling percentages. TOTAL E&P UK's objective is to obtain as high a degree of re-use and recycling as possible.

Separate steel components (i.e. the risers) in the substructure will also be segregated for recycling.

Marine growth will represent large amounts of organic waste (approximately 2,650 tonnes), which must be dealt with shortly after transporting the substructure to shore to avoid odour problems. The sea disposal of large volumes of marine growth at the demolition yard would lead to a local concentration of organic waste in the water and seabed. Therefore this method is not recommended when demolishing the substructure. The marine growth will most probably be disposed of at a suitable waste disposal site.

Cables and electrical equipment will be handled in a similar manner to that described for the topsides (see Section 7.1.6).

The substructure is protected from corrosion by aluminium or zinc based sacrificial anodes. Reuse of these anodes is not feasible, and they will be recycled within a defined target of 90% [72].

Alternative B – Refloat the concrete substructure and disposal in deep water
Disposal of materials at sea are generally evaluated in Section 8.2.7 (Littering). As mentioned in Section 3.2.2, materials management focuses on the re-use, recycling, and onshore disposal elements. Thus the impact on material management for deep water disposal of the concrete substructure is considered "insignificant" as no onshore waste material is expected to be generated from Alternative B. To support this finding, a large amount of material with low recycling benefit (concrete) will not be recovered and recycled, while a small amount of material with high recycling benefit (1,045 tonnes of steel) will be recycled. This recycling benefit is not as great as those identified for alternative A because the recovery tonnages are significantly lower.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
This alternative is similar to Alternative B in that small amounts (1,045 tonnes) of steel will be recovered for recycling and the remaining substructure will remain partially dismantled at its current location. As concluded with Alternative B, partially dismantling the structure and leaving it in place will result in an "insignificant" materials management impact. The recycling benefit for this option is once again offset by the lower recovery tonnages.

Alternative D - Leave the concrete substructure in place
For Alternative D, most materials will be left on the seabed, with the recovery of 95 tonnes of recyclable steel. Although positive, this impact is "insignificant" from a material management perspective. As highlighted in the assessment for options B and C, the recycling benefit for this option is also offset by the lower recovery tonnages.

8.2.7 Littering

Alternative A – Refloat the concrete substructure and onshore disposal
No litter effect is expected in the marine environment because the structure will be removed for onshore disposal. Although most materials will be recycled onshore, any materials that are disposed of will be done in accordance with national regulations. Therefore, no littering effects are expected for Alternative A. It is likely that objects and materials will be dropped onto the seabed throughout offshore marine operations. These operations however, will not result in any littering impact as the seabed will be swept for debris upon completion of offshore operations and onshore waste management procedures will prevent littering.

Alternative B – Refloat the concrete substructure and disposal in deep water
There will be long-term littering effect arising as a result of the deep sea disposal of the removed substructure. The force of the structure hitting the seabed will cause it to partially collapse, creating a rubble pile of inert material. There is no seabed fishing at deep water depths (i.e. 3,000 – 4,700 m), therefore eliminating the potential for additional spread of the rubble. The magnitude of the littering potential is unknown and difficult to evaluate. The inert material coupled with the low potential for spread would mean the littering impact of Alternative B is considered to be "small negative".

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
As with Alternative B partially dismantling the substructure and leaving it in place will result in same long-term littering effects: "small negative".

Alternative D - Leave the concrete substructure in place
By leaving the substructure in place, there will be some long-term littering effects, as the substructure degrades and eventually collapses onto the seabed. Reinforcement and concrete fragments may spread on the seabed in vicinity of MCP-01's current location. In addition, fishing gear interaction may spread the collapsed structural material. As concluded for Alternatives B and C, this littering impact is considered to be "small negative".

8.2.8 Risk to the environment from unplanned events

Alternative A – Refloat the concrete substructure and onshore disposal
Alternative B – Refloat the concrete substructure and disposal in deep water
In trying to make the structure float large steel panels will be installed on the outer structure. Possible impacts from lifting operations in general are described in the topsides section (cf. Section 7.1.8).

More seriously, these alternatives represent a certain possibility of mission failure during the lifting and / or towing. The probability for not succeeding in removing the concrete substructure is considered high. In most circumstances the consequence will be to perform re-engineering work and make a second removal attempt. The consequence is then mainly economical. A mission failure could as the worst case however cause that the substructure or associated marine vessel(s) may collapse/sink. For the Frigg cessation planning a relevant study was undertaken to study impacts of mission failure [79] (the concrete substructure CDP1 on Frigg is very similar to MCP-01). Scenarios studied were:

- A1. Damage to the concrete structure that prevents it being re-floated (*The structure has been damaged during topside removal, and t`he structure has to be repaired).*
- A2. Loss of buoyancy during re-float (*The structure has been damaged and is set down at approx. the original location, topside will be lifted off offshore and concrete substructure will be removed in pieces).*
- A3. Loss of buoyancy during towing to shore (*The structure sinks during tow and the topside is 15 m below sea level. Divers need to be used to remove topside, concrete substructure will be retrieved in pieces).*
- A4. Loss of buoyancy at the inshore demolition site (*The structure collapses at onshore demolition site).*

The substructure itself has a very low pollution potential (concrete and steel). A marine vessel being damaged or that sinks will however have a certain pollution risk associated with its diesel/bunkers fuel. The volume will normally be maximum a few hundred tonnes. Environmental impacts will primarily be on seabirds as such a volume of oil this far from shore will not reach the beach and the volume will be too small to significantly impact fish (larvae) beyond the individual level. The magnitude of impacts on seabirds from a minor offshore oil spill will generally be small, however depends largely on geography and seabird concentrations in the actual time of the event. Marine mammals will normally avoid oil polluted waters, and the probability for overlap with such a small spill is however very small.

The worst case scenario is if the substructure is lost during tow (see scenarios above). As this is not planned for it could happens any place along the towing route, including more or less sensitive areas. This includes areas of importance to ecology, fishery or other third parties (e.g. pipelines or other petroleum related infrastructure). The latter has a very severe impact potential, however the probability of such an event is very remote, and the impact is not further addressed. Such issues will be considered in a contingency plan for the operation.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
Unplanned events with possible impacts on environment from this alternative could be the failure by use of explosives or mission failure with regard to not succeeding in executing the cut down operation as planned. The latter could induce higher safety risk in mitigating the situation to bring the substructure down to the required -55m. Environmentally its consequence will be higher energy consumption and emissions to air as extensive marine work will be required.

The mission failure study [79] considered the following scenarios.

- C1. Incomplete cutting of the columns or walls (*The cutting operations fail and new techniques have to be prepared and used, the marine-operations requirement doubles compared to successful operation*).
- C2. Failure to achieve 55 m of clear water above the remaining structure (*The cutting operations fail and new techniques have to be prepared and used, the marine-operations requirement triples compared to successful operation*).

If not succeeding in reaching the required safe sail over the risk for interference with ships will be introduced. The probability for such is however considered very low and the impact potential not further addressed.

Alternative D - Leave the concrete substructure in place
Unplanned events with environmental consequences for this alternative are mainly related to the probability for ship collision. This is dealt with in Section 8.7.2 in the Disposal Plan of this Decommissioning Programme [59].

8.3 Social Impacts from Disposal of Substructure

8.3.1 Impacts on Fisheries

The 500m safety zone around the concrete substructure will remain in place during the approved decommissioning work, after which consideration will be given to removing it. A possible removal of the safety zone may depend on the final disposal solution and will be at the discretion of UK authorities (HSE). From a fisheries perspective, this will make an additional available area of about 0.9km^2. The implemented decommissioning alternative will theoretically not have any significant effect on the area open to fishing. In practice, however, this administrative zone is not considered the most important issue in evaluating the impacts on fisheries.

Alternatives A and B: Substructure removed and either towed to shore for dismantling or disposed of in deep water
Removing of the concrete substructure is considered to result in "small positive" impacts on fisheries as it improves the access to the area around MCP-01. This is offset slightly by the negative impact arising from the deposition of ballast material in vicinity of the MCP-01 location. Overall impact on fisheries from implementation of Alternatives A and B is considered to have a "small positive" effect. Issues of concern that were identified and evaluated for impacts on fisheries included:

- The creation of additional area available for fisheries;
- The deposition of 91,000m^3 of ballast material onto the seabed; and
- The physical presence of the substructure in deep sea disposal site (Alternative B only);

As described above, the elimination of the safety zone will make available an area of about 0.9km^2 for fisheries. If the concrete substructure is removed the area should be open to fisheries with no residual hindrance. The availability of the area could, however, be dependent on decommissioning of pipelines and other artificial material (gravel fillings, mattresses.). If all obstacles in the water column and on the seabed are removed from the field the impacts of this alternative are characterised as "moderate positive" to the fisheries in the vicinity of MCP-01.

For both Alternatives, re-float operations will result in the discharge of an estimated 91,000m^3 of solid ballast. As outlined in Section 8.2.4, the physical impacts this inert (sand) material will result in a smothering effect to all bottom-dwelling organisms and alter the current habitat. Although difficult to define, the area of deposition is estimated to be 12 football pitches (or 0.15km^2) with a 1 metre thickness. From a fisheries perspective, this is particularly harmful for areas where *Nephrops* are harvested or during period of spawning or nursing. As outlined in Section 6.3.4 (Natural Resources), the raised slope area of the MCP-01 is not suitable as *Nephrops* habitat. In addition, survey investigations do not provide any evidence of *Nephrops* burrows. MCP-01 is also within spawning and nursing areas (see Section 6.3.4) for a few low-commercial fish species (i.e. Norway pout, whiting and sprat). These areas would be affected from the deposition of ballast but this can be avoided if de-ballast operations occur out with the spawning seasons. The impact to fisheries from discharge of the ballast would therefore be considered “small negative”.

Specifically relevant to Alternative B, the deep sea disposal site the substructure will be placed far deeper (> 2000m) than current fishing vessels and gear will operate. Although some deep water trawling does occur at depths up to 1800m in other oceanic areas, this is not likely to occur in the north-eastern Atlantic slope because of the low densities of commercially-valuable fish at these depths [74]. Therefore, “no” fisheries effects, in terms of obstacles, are expected with this deep sea disposal Alternative.

Alternative C - Cut down the concrete substructure to provide a clear draught of 55m
Cutting the concrete substructure down to –55m water depth is considered to result in “moderate negative” impacts on fisheries. Main issues of concern identified as part of the fisheries impact evaluation included:

- The deposition of 58,700m^3 of ballast material onto the seabed;
- The physical presence of the substructure, creating an avoidance area for trawling fisheries; and
- The physical presence of the substructure resulting in the creation of an artificial reef.

Alternative C dismantling operations will result in the discharge of an estimated 58,700m^3 of solid ballast. As outlined in Section 8.2.4, the physical impacts this inert (sand) material will result in a smothering effect to all bottom-dwelling organisms and alter the current habitat. Although difficult to define, the area of deposition is estimated to be 9 football pitches (or 0.08 km^2) with a 1 metre thickness. This same effect will also arise from de-ballast operations for Alternatives A and B. The impact to fisheries from discharge of the ballast would therefore be considered “small negative”, as concluded for Alternatives A and B.

The lower parts of the concrete substructure (below –55m) will be left in place in this alternative, with the dismantled upper top sections disposed next to the base; this disposal Alternative will result in an a fisheries avoidance obstacle, because of gear interference risks. The degree of avoidance may however be different for the different types of fishery. Net gear operating in the surface layers may not be completely hindered, while trawling operations will be completely hindered by the remaining parts of the structure. From an overall fisheries perspective, Alternative C does not alter the current industry practice as the area is within the safety zone of MCP-01. The continued exclusion of trawling operations from the current MCP-01 location and risk associated with the toppled concrete structure would therefore result in a “moderate negative” impact to fisheries.

The design of the concrete substructure is unsuitable to serve as an artificial reef if disposed according to this alternative. Irrespective of this, the findings from the artificial reef study performed regarding the Frigg field decommissioning study [3] can be applied to Alternative C. One of the conclusions from this study was that the pelagic fishery, which is dominant in the Frigg area, is unlikely to be significantly enhanced by the establishment of an artificial reef. Based on the results of this study and the limited knowledge on effects of artificial reefs in the North Sea in general, no significant positive fisheries effects would be expected from Alternative C.

Alternative D - Leave the concrete substructure in place
Leaving the concrete substructure in place is considered to result in “small negative” impacts on fisheries. The main issues of concern identified as part of the fisheries impact evaluation included:

- The physical presence of the substructure, creating an avoidance area for trawling fisheries; and
- The physical presence of the substructure resulting in the creation of an artificial reef.

The existence of the 500 m exclusion zone around the MCP-01 has adverse effects area on fisheries. In particular, trawling vessels have to begin deflection manoeuvres very early to avoid moving into the exclusion area; this implies that an area larger than the actual exclusion zone is unavailable for trawling fisheries. The practical exclusion area for net and trawl vessels due to a 500m safety zone surrounding an installation is illustrated in Figure 8.3.1.

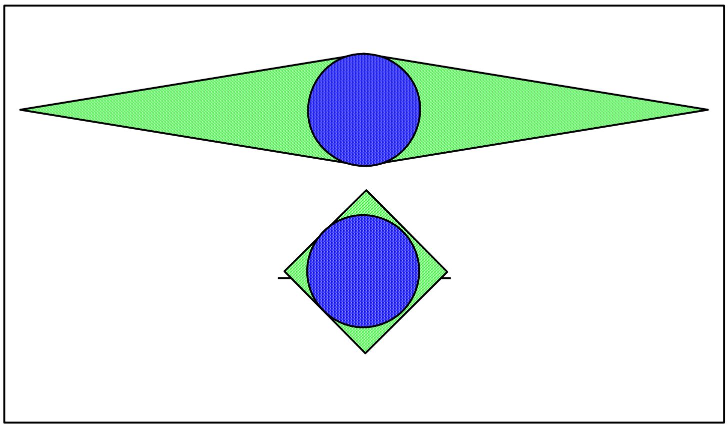

Figure 8.3.1 Principle sketch of safety zone (blue area) and actual exclusion area (green area) for trawl (upper) and net (lower) fisheries [75].

From a long-term perspective, leaving the substructure in place will result in the continued presence of an exclusion zone. The long term consequences for the fisheries in the MCP-01 area are difficult to predict, due to the uncertainties on how the fisheries in this area will develop in the future. Based on fisheries statistics [60] [62] [63], the immediate area around MCP-01 is most important for cod and haddock fisheries and less important for *Nephrops*. The reason for this is that MCP-01 is located on a sandy mound representing an area of 1.0 x 2.5 km. According to SFF this sandy mound is an area with good catches of Cod and Haddock, it is also stated that there are no *Nephrops* in the vicinity of the MCP-01 [58].

There may be changes in the future, but no predictions are possible on these issue. However, assuming that in the future, the fishery will be present to a comparable extent as it is today, leaving the concrete substructure in place is regarded to have “small negative” impacts on the fisheries.

8.3.2 Impacts on Free Passage

The impact on free passage relates to the density of shipping traffic in vicinity of MCP-01. Figure 6.3.8 shows that the nearest shipping lane (#1) passes within 2.2 nm of MCP-01. Shipping lanes have a defined width (1-2 nm) meaning that some vessels will pass within the immediate vicinity of the MCP-01 site. Despite this, total shipping activity in the 3 lanes nearest to the site gives an average of 1 ship every 3 days.

A summary of the effects of substructure decommissioning alternatives is outlined in Table 8.3.1.

Alternative	Comments
Alternative A Refloat the concrete substructure and onshore disposal	"No free passage effect" is expected with Alternative A as disruption to shipping traffic would only be present for the duration of marine operations.
Alternative B Refloat the concrete substructure and disposal in deep water	As is the case with Alternative A, there would be "no" impact on free passage as this effect is only present for the duration of offshore marine operations.
Alternative C Cut down the concrete substructure to provide a clear draught of 55m	As with Alternative B, partially dismantling the substructure and leaving it in place will result in the same free passage effects: "insignificant".
Alternative D Leave the concrete substructure in place	Leaving the substructure in place will result in a negative impact to free passage, but this is considered to be "small negative" because of the frequency of traffic, as previously described.

Table 8.3.1 Summary of the effects of the 4 substructure decommissioning alternatives

8.3.3 Costs and National Supplies (Goods and Services)

An assessment of cost estimates was completed, according to methodologies outlined in Section 3.2.3 (Cost and National Supplies). The assessment was completed in order to quantify:

- Overall costs for each disposal alternative;
- The percentage of UK goods and services associated with each disposal alternative (high and low estimate); and
- The anticipated cost of work, shared amongst relevant UK industry sectors.

Four disposal alternatives have been explored for the MCP-01 substructure:
- Alternative A: Re-float, tow to shore, demolish and dispose on-shore,
- Alternative B: Remove external and internal steelwork, re-float and dispose at a deep water location,
- Alternative C: Remove internal and external steelwork and cut down sub-structure to provide a clear draught of 55m and
- Alternative D: Leave in place, removing as much external steelwork as reasonably practicable.

Table 8.3.2 outlines cost estimates for each substructure disposal alternative. The detailed breakdown of the cost estimates are not given due to commercial sensitivity.

Alternative A	Alternative B	Alternative C	Alternative D
£446.6m / 5,359MNOK	£387.6m / 4,651MNOK	£461.6m / 5,539MNOK	£11.7m / 140MNOK

Table 8.3.2 Cost estimates for the disposal alternatives for the Concrete Substructure

Based on expected UK supply, the national employment effects can be estimated. Table 8.3.3 outlines the percentage of UK content of each disposal alternative for the concrete substructure.

	Alternative A	Alternative B	Alternative C	Alternative D
High estimate	70	60	60	85
Low estimate	55	35	40	0

Table 8.3.3 UK content for alternative solutions (%)

Figure 8.3.2 illustrates the breakdown (by industry) of UK supplies in connection with each disposal Alternatives for the substructure. The figure illustrates high and low estimate for each Alternatives.

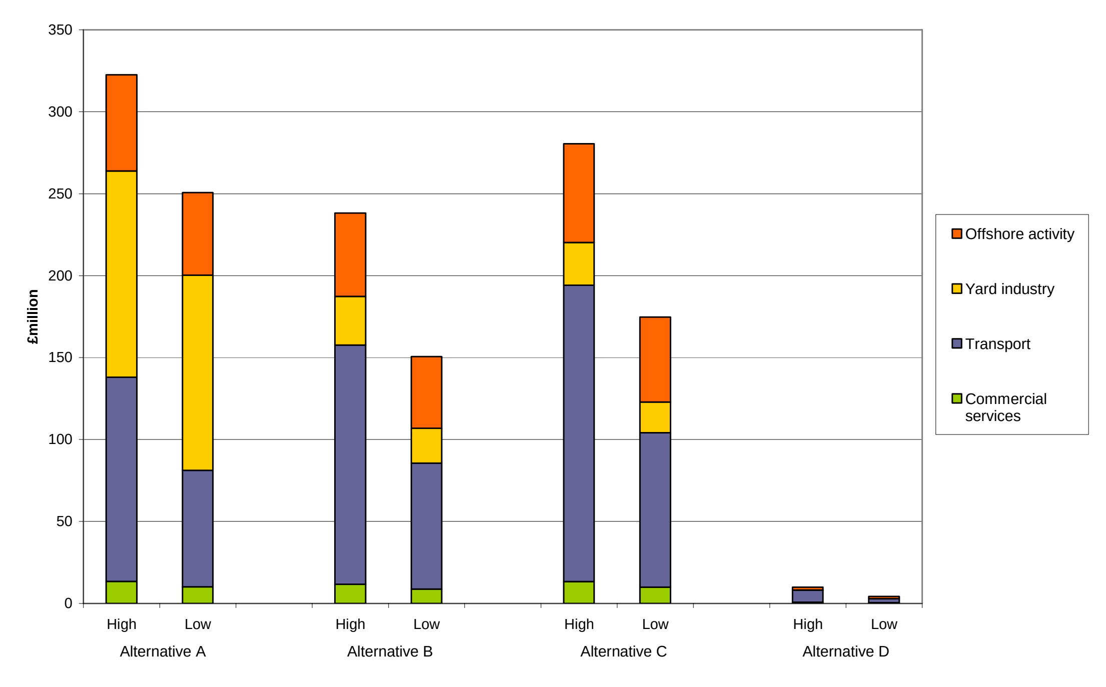

Figure 8.3.2 MCP-01 substructure disposal - UK content, broken down by industry for each alternative (£ million) – high and low estimate

The disposal for the MCP-01 substructure can provide a basis for UK supplies in the range of £250m-£325m / 3,000 MNOK-3,900 MNOK for Alternative A to £4m-£10m / 48 MNOK-120 MNOK for Alternative D.

The largest contracts in UK are expected to be awarded to the marine transport industry for offshore operations. Contracts for onshore disposal are expected to be awarded to the yard industry. Heavy Lift Crane Vessel (HLCV) including anchor handling tugs, diving vessels (MSV/DSV), hire of a flotel, helicopter transport, supply vessels, standby vessels and towing operations are the main components of the contracts that are likely to be awarded to the transport. There are no UK contractors capable of performing the marine lifting operations.

Costs may be offset slightly by income generated from recycled steel that is recovered from the substructure. The revenue will depend on market price of the scrap at the time in question. Assuming a price of £85 / 1020 NOK per tonne of recycled steel from the MCP-01 concrete substructure, this will give an income in the range of £960,000 / 11,5 MNOK for Alternative A to £8,000 / 96,000 NOK for Alternative D (see Table 8.3.4). Possible income from re-using/recycling concrete will have to be studied further.

	Steel (tonne)	Income (£)
Alternative A	11,305	£960,000 / 11.5 MNOK
Alternative B	1,045	£88,000 / 1.1 MNOK
Alternative C	1,045	£88,000 / 1.1 MNOK
Alternative D	95	£8,000 / 96,000 NOK

Table 8.3.4 MCP-01 substructure disposal: Potential recycling income for each disposal Alternative

8.3.4 Employment Effects

Based on an industry breakdown of the expected UK supplies, the national employment effects have been estimated. The goods and services will be supplied directly and indirectly to give production effects at national level in UK.

Production effects are detailed in Figure 8.3.3 below, with an expected man-year breakdown per disposal alternative:

- Alternative A: 4,700-5,500 man-years
- Alternative B: 2,000-2,800 man-years
- Alternative C: 2,200-3,100 man-years
- Alternative D: 50-100 man-years

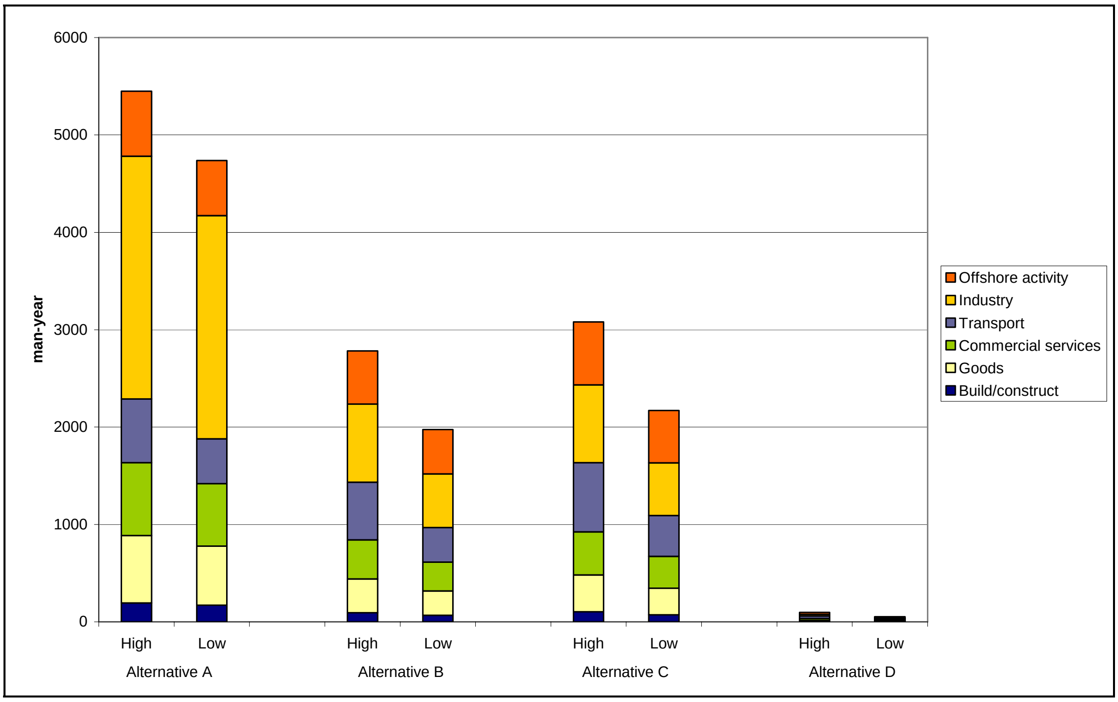

Figure 8.3.3 Production Effects from disposal of substructure (man-years) – high and low estimate

The production effects are expected to come mainly within transport and industry. They will derive from offshore transport and towage, demolition and recycling. Engineering service will have production effects within commercial services.

In addition, Consumer effects will amount to around 50% of the production effects. The total resultant employment effects in UK are estimated to be:

- Alternative A: 7,000-8,300 man-years
- Alternative B: 3,000-4,200 man-years
- Alternative C: 3,300-4,700 man-years
- Alternative D: 75-150 man-years

Results from the production effects evaluation indicate a potential benefit to UK industries from the disposal of the MCP-01 concrete substructure. It is noted that the employment effects will be spread over the years during the removal, demolition and recycling activities. The tentative target is to complete the disposal including onshore activities by end of 2008.

9. Mitigating Measures and Monitoring

It is one of the main objectives of an EIA to suggest mitigation measures to reduce negative impacts and to enhance positive impacts. Many mitigation measures have already been incorporated to the solutions at the feasibility stage, based on knowledge of impacts and previous experience of different measures.

Some additional mitigation measures, suggestions for monitoring and other remedial actions are also discussed as part of the assessment of impacts for the different alternatives. The planned actions in response to the suggested mitigating and monitoring measures will be outlined in the MCP-01 Decommissioning Programme.

The most important measures are listed below, although not in order of priority. Those measures which have been categorised as 'general' will be applicable to all disposal alternatives for both topsides and substructure. Certain alternative-specific mitigation measures are also presented.

9.1 Mitigation Measures – General

- Clean-up of seabed debris to eliminate the risk of damage to fishing gear, and to reduce the potential for littering. This should be planned as a three-stage process – identification, removal and verification.
- Comply with the implemented ISO14001-certified EMS to ensure that continuous improvements and openness are key parts of the planning and execution of all work associated with the decommissioning of MCP-01.
- Steel items covered by polyurethane paint should be identified before demolition. Cutting with thermal means will cause release of isocyanates, which could cause serious harmful effects to humans.
- Sound material and waste management with optimal reuse/recycling is considered very important, and a stretched target for reuse/recycle should be considered. A dedicated waste-handling module capable of tracking all waste fractions has been developed to be included in the EMS environmental accountancy system.
- Contractual arrangements should be made with onshore disposal contractor to ensure that aesthetic effects are mitigated.
- Discuss liability issues with authorities in respect to any facilities left in place.

9.2 Alternative-specific Mitigation Measures

Alternative C

- Select favourable time of year, favourable weather conditions and protect and scare fish away to limit impacts if using explosives to obtain the –55m clearance for the partial removal option. Develop guidelines for observation for cetaceans to be incorporated in the execution plan.
- Removal of external steelworks on the concrete substructure if left in place to limit the obstruction and risks to fisheries.

Alternative D

- Install and maintain navigational aids on the substructure if left in place to prevent the occurrence of dangerous situations with passing vessels.
- Removal of external steelworks on the concrete substructure if left in place to limit the obstruction and risks to fisheries.

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10. Conclusions

In this EIA Report, all relevant disposal alternatives for the MCP-01 structure have been assessed and documented as described in TOTAL E&P UK's Environmental Impact Assessment Program [4].

10.1 Topsides

The topsides will be removed and taken to shore for deconstruction to meet with the requirements of international conventions. As mentioned in Section 5.2, Combined Lifts will be the likely removal method for topsides. There is therefore no comparative assessment of disposal alternatives and the recommended option (best environmental option) is the only option. Impacts of such removal, deconstruction and recycling/disposal operations are generally found to cause "insignificant" and "small negative" impacts. See Table 10.1 for a summary of environmental and social impacts from the removal of topsides and onshore disposal.

Issue	Environmental Impact
Energy Consumption (Million GJ)	0.4 - "Small negative"
Total Energy Impact (Million GJ)	0.4 - "Small negative"
Total emissions (1000 tons)	34
Discharges to sea	"Insignificant"
Physical / habitat effects	"Insignificant"
Aesthetic	"Small - Moderate negative"
Material management	"Moderate positive"
Littering	"Insignificant"
Impacts on fisheries	"Insignificant"
Impacts on free passage	"Insignificant"

Table 10.1 Environmental impacts from removal and onshore disposal of topsides from MCP-01

The energy consumption for the removal and onshore deconstruction work corresponds to the annual fuel consumption of about 10,000 family size cars or the equivalent of 1.2% of the daily UKCS production [82].

The total emissions from the entire removal process are estimated to be 33,600 tonnes, including the metal re-smelting. This corresponds to the DTI's environmental emissions reporting figures of 0.2% of the annual CO_2 offshore emissions from the UK in 2002 [84].

There are no planned discharges from the removal operations, and hence no negative environmental impacts for discharges to the sea. The marine spread will most likely not impact the seabed or other physical habitats.

Aesthetic impacts are considered to range from "small negative" to "moderate negative". These aesthetic impacts relate specifically to noise and may vary in severity, depending on the environmental sensitivity within the vicinity of the selected yard. Such issues are managed as part of the yards' operating permits, and impacts should not be worse than corresponding effects from similar activities at the yard.

Since the majority of materials on the topsides will be reused, recovered and / or recycled, a "moderate positive" impact is reported as a materials management effect.

As the entire topsides will be removed, and the seabed cleared for debris after removal, littering of the seabed is not considered an issue. Hence there will not be any impacts from this removal on fishing vessels and other ships with the exception of temporary marine work during removal execution.

10.2 Substructure

The OSPAR convention applies to disposal alternatives for the concrete substructure. All relevant options are evaluated and compared on the various issues. Environmental impacts for all substructure disposal alternatives range from "moderate positive" to "moderate negative".

The environmental and societal impacts associated with the different disposal alternatives for the concrete substructure are summarised in Table 10.2 below:

	Environmental Impact Summary			
Issues	**Alternative A** Refloat, tow to shore, demolish and dispose on-shore	**Alternative B** Remove external and internal steelwork, refloat and dispose at a deep water location	**Alternative C** Remove internal and external steelwork and cut down substructure to provide a clear draught of 55m	**Alternative D** Leave in place removing as much external steelwork as reasonably practical
Energy Consumption (Million GJ)	1.98 – "Moderate negative"	0.64 – "Small negative"	0.44 – "Small negative"	0.05 - "Insignificant"
Total Energy Impact (Million GJ)	1.98 – "Moderate negative	0.96 – "Small negative"	0.77 – "Small negative"	0.41 – "Small negative"
Total CO_2 Emissions (1000 tonnes)	137	47.0	32.8	3.7
Discharges to sea	"Insignificant"	"Insignificant"	"Insignificant"	"Insignificant"
Physical / habitat effects	"Moderate negative"	"Moderate negative"	"Moderate negative"	"Moderate negative"
Aesthetic	"Small - Moderate negative"	"Insignificant"	"Insignificant"	"Insignificant"
Material Management	"Moderate positive"	"Insignificant"	"Insignificant"	"Insignificant"
Littering	"Insignificant"	"Small Negative"	"Small negative"	"Small negative"
Impacts on fisheries	"Small positive"	"Small positive"	"Moderate negative"	"Small negative"
Impacts on free passage	"Insignificant"	"Insignificant"	"Insignificant"	"Small negative"

Table 10.2 Summary Table of Impacts from the disposal of MCP-01 substructure

A "moderate positive" impact is associated with substructure Alternative A, where maximum recovery of high-value recyclable materials (i.e. steel and other metals) is achievable. Although this is the most positive obtainable impact, there are also "moderate negative" effects from high fuel consumption (energy) during marine and recycling operations, which is also reflected in a high total energy impact ("energy balance"). The alternative also has a potential for varying negative aesthetic impacts, as the magnitude of impact depending on sensitivity near the deconstruction location. There is also a certain risk of mission failure with potential negative environmental impacts associated with the alternative.

All disposal alternatives will result in a predicted "moderate negative" impact for physical impacts to the environment, as a result of the discharge of inert ballast material onto the seabed or the deposition of the substructure as it degrades over time. The "moderate negative" impact is not necessarily associated with the area of impact, but rather the sensitivity of receiving environment (i.e. potential *Nephrops* habitat that exists beyond the sandy mound where MCP-01 is situated).

Among the offshore disposal alternatives (Alternatives B, C and D) the impact picture is more equal. The deep sea disposal alternative (Alternative B) is the most positive with regard to fishing activities. However, Alternative B has the highest energy consumption among the offshore disposal alternatives and also the largest unplanned-event risk element among these. Alternative C is more positive than Alternative D with regard to shipping issues. Alternative C (as identified in the consultation process) is a permanent / irreversible disposal option. Alternative C is therefore more negative than Alternative D, which may be a candidate for a different final disposal option if new technology is developed in the future.

From a total environmental perspective, Alternative D is considered to be the best option. The environmental impacts are generally “insignificant” and “small” with a potential for “moderate negative” impacts due to physical changes in local substrata. On this latter issue, the impact potential is most limited for Alternative D, as it will impact the smallest area.

Before a disposal solution is recommended by the owners, different decision factors will be evaluated. In addition to environmental effects, these criteria include technical feasibility, safety and costs.

It is important to note that an impact mitigation plan will be made to reduce any negative impacts arising from a number of sources (i.e. fish and mammal mortality and disturbance from underwater explosives; dust and noise from onshore dismantling operations; navigation aids to prevent ship collision, etc). This plan will be developed as part of the detailed planning of the execution of the disposal work.

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Annex A

Stakeholder Comments on the Proposed Environmental Impact Assessment Programme and TOTAL E&P UK responses

Introduction

The proposal for the scope of work for the Environmental Impact Assessment (EIA) for the MCP-01 Decommissioning Programme was submitted under a letter dated 18th December 2003 to the Department for Business, Enterprise & Regulatory Reform (DBERR) in Aberdeen and the Norwegian Ministry of Petroleum and Energy (MPE) in Oslo. The Proposal was then subjected to a simultaneous public consultation in the UK and Norway. The written comments received have been summarised and are reported in this Annex A.

As part of the consultation process, the proposal for the EIA programme was made available on the TOTAL E&P UK Internet web site on 7th January 2004.

Public Consultation in UK

In the UK the public consultation with the non-governmental organisations (NGOs) about the proposed scope of work EIA studies was co-ordinated by TOTAL E&P UK, as operator of MCP-01. The consultation with governmental bodies was managed by the DBERR.

The proposed EIA programme was sent to 49 stakeholders including the statutory list defined by DBERR in an E-mail dated 9th December 2003. The deadline for comments was 9th February 2004.

In addition advertisements were published in 14 selected UK newspapers/magazines which appeared from 9th to 16th January 2004. Representatives of the UK media were informed by letter of the public consultation process being started by TOTAL E&P UK relating to the decommissioning of the MCP-01 facilities.

As a result of the advertisement and media coverage, additional stakeholders expressed a wish to be involved in the MCP-01 public consultation process.

In the UK meetings were held with some of the leading NGOs at which the proposed EIA programme was presented.

Public Consultation in Norway

In Norway the public consultation was co-ordinated by MPE. The proposed scope of work for the EIA was submitted by the MPE to governmental and non-governmental organisations (NGOs) in a letter dated 7th January 2004 with a deadline for comments of 9th February 2004.

Response to the Public Consultation

This Annex A presents the comments received and discusses their relevance in relation to the original proposal for the EIA programme. The way these comments have been incorporated into the EIA process has also been noted.

Written comments were received from the following parties:

From UK organisations collated by the Offshore Decommissioning Unit, Department for Business, Enterprise & Regulatory Reform, Aberdeen:

1. Offshore Environmental Unit, Department for Business, Enterprise & Regulatory Reform, (DBERR), Aberdeen
2. Scottish Executive Environment and Rural Affairs Department (SEERAD), Edinburgh
3. Scottish Environmental Protection Agency (SEPA), Aberdeen

From UK non-governmental organisations received by TOTAL E&P UK:

4. Scottish Fishermen's Federation, Aberdeen

From Norwegian organisations collated by the Norwegian Ministry of Petroleum and Energy, Oslo:

5. Norwegian Ministry of Labour and Government Administration, Oslo, including:
   - Petroleum Safety Authority (Petroleumstilsynet), Stavanger
6. Ministry of Finance, Oslo
7. Norwegian Ministry of Fisheries, Oslo, including:-
   - Coastal Directorate (Kystdirektoratet), Oslo
   - Directorate of Fisheries (Fiskeridirektoratet), Bergen
   - Institute of Marine Research (Havforskningsinstituttet), Bergen
8. Norwegian Ministry of the Environment, including the Norwegian Pollution Control Authority (SFT)
9. Ministry of Trade and Industry, Oslo
10. Norwegian Fishermen's Federation (Norges Fiskarlag), Trondheim

The comments are presented per organisation making the comment indicated with the same number as given in the above list.

UK – Governmental Organisations (Collated by the Department for Business, Enterprise & Regulatory Reform (DBERR))

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
1.	**Offshore Environment Unit, DBERR**	2 March 2004 via E-mail.	• TOTAL should identify in the materials inventory the current contents of any tanks/vessels holding polluting matter, such as oil and chemicals, and provide brief details as to what is the disposal options. This should include any diesel or fuel storage tanks required for emergency power generation or for helicopter usage. • Gas export facilities can concentrate heavy metals over time, for example mercury, in equipment containing or allowing throughput of gas. The EIA should identify any such heavy metal concentrations. • Similarly, radionuclides, for example lead-210, can be concentrated in pipework/storage vessels/pumps *etc*. An assessment of whether such radionuclides are present in the gas, and therefore have the potential to be entrained in the facilities, should be included in the EIA.	• This will be done as part of our preparation for removal of topsides. A specific set of procedures shall be followed to test all equipment for current content and safely remove any such content. There are no heli-fuel facilities remaining on MCP-01. Diesel fuel shall be run down to lowest possible levels prior to handover – any residual will be identified to the removal contractor for their action once they have a work vessel alongside • TOTAL E&P UK is aware of the current concerns reference heavy metal occurrence in gas facilities. Checks are being made as part of the preparation for handover. Any findings will be passed on to the removal contractor. No findings are anticipated however. • TOTAL E&P UK is currently only routinely test for Radon within the gas. No evidence of occurrence has been found, but this is being evaluated at present. • There is no indication that Naturally Occurring Radioactive Materials (NORMS), such as lead 210, is present in either the gas products from the Alwyn or Bruce sources or from the Norwegian sourced gases. • MCP-01 was only ever a manifold pumping station with no production facilities and no discharges so the likely hood of any such presence is negligible. The only gas passing through the platform over the past 12 years has been sourced in the Piper catchments – again not a source.

<table>
<tr><th>No.</th><th>Organisation</th><th>Date and Communications means</th><th>Summary of comments</th><th>TOTAL E&P UK Response</th></tr>
<tr><td></td><td></td><td></td><td>• The scoping document states that the EIA will address noise; any noise study should encompass the effects of explosives which may be used in the decommissioning process. If explosives are used, then the mitigation measures on possible disturbances to the environment should be assessed. This should take account of guidance issued by the JNCC.

General Comment
The Offshore Environment Unit have requested that TOTAL meets with the DBERR assigned Environmental Inspector and Environmental Manager to discuss in more detail areas of the installation / decommissioning process which may have the potential to cause environmental impacts during decommissioning activity. They have suggested you discuss the following requirements in more detail:

• Any vessels or tanks containing polluting matter should be emptied and the contents disposed of in a controlled manner to prevent potential for spillage to sea prior to lifting / decommissioning. Should there be any plans to discharge any vessel/tank contents/flush water to sea then TOTAL should seek communication with DBERR at the earliest opportunity.

• TOTAL should ensure that satisfactory oil spill contingency plan arrangements are in place throughout the decommissioning operation taking into account any changes in personnel and circumstances managing the operations.</td><td>• It is unlikely, given the understanding at present of the proposed disposal alternative, that any explosives will be used in the decommissioning process. Should such consideration be made then all relevant precautions and minimization of effect will be followed. The issues of impacts from the possible use of explosives are assessed in Section 8.2.4 in the EIA Report. Relevant mitigation measures are discussed in Section 9 and will be due to consultation with the JNCC if the use of explosives becomes necessary.

• A meeting was held on 9th April 2004 between DBERR and TOTAL E&P UK where the comments from DBERR Environmental Unit was discussed, as explained below:

• Testing and cleaning all vessels and tanks is part of the procedure to be followed by the operations team prior to handover of the facility to the removal contractor. All fluids are to be collected and shipped ashore in appropriate tote tanks for controlled disposal. There are no plans to discharge any fluids to the sea. This includes any fluids currently held captive within the sea-sump.

• For the period up to end of platform operations there are a number of procedures which are applied – specifically for MCP-01 we have a Safe Operating Procedure (SOP 713) Oil Spills which gives guidance on actions to be taken in the event. The corporate procedure COR-PLA-SE-ENV-03 Oil Spill Contingency Plans for North Sea Installations is also referred.</td></tr>
</table>

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
			• During the decommissioning operation TOTAL must notify the DBERR and other required authorities using a PON1 should evidence of un-regulated oil discharges be apparent. Similarly, a PON 1 should be used to report any spillages of chemicals to sea. • Any discharges of condensate or contaminated fluids from pipelines being discharged to sea must be exempted under the provisions of the relevant legislation before the discharge takes place. Should this be applicable then TOTAL should seek consultation with DBERR.	• The PON1 system is currently used for such notification. Its continued use will be included in the procedures passed across to the decommissioning contractor • Duly noted but such discharge is not anticipated within the operations periods.
2.	**SEERAD, Radioactive Waste Team**	2 March 2004 via E-mail.	• The materials inventory should include consideration of any radioactive sources or low-specific-activity scale in or on the structure.	• Historically there has been no incidence of LSA or NORM sources neither on MCP-01 nor in the facilities feeding gas through the facility. Monitoring has been regularly applied during the entire operating history and as part of the preparation for removal a comprehensive on-board programme of testing is being prepared.
3.	**SEPA**	2 March 2004 via E-mail.	• SEPA are aware that the MCP-01 holds a registration under the 1960 Radioactive Substances Act, in respect of a lightning conductor incorporating ^{241}Am. SEPA would wish to be assured that the source will be disposed of safely during decommissioning. Such disposal is likely to require the source to be returned to the UK mainland. Any associated material would then need to be disposed of in accordance with appropriate regulations such as the waste management-licensing regime. • Any EIA which involves the transportation of any topside or substructure of an onshore installation may need to consider the requirements of the waste management licensing regime under Part 2 of the Environmental Protection Act 1990 or the Pollution Prevention and Control (Scotland) regulatory regime. Any decommissioning activity must consider the implications of the Water Framework Directive.	• The issue of the Americium 241 source has been highlighted to the potential removal contractors. The instruction is that the contractor will be expected to remove the source from its installed position (using the enhanced crane facilities they will have) and pass the source to Total for disposal. It is intended to use Amersham International as the disposal agency. • During all removal and transportation activity it is inherent that the regulatory directives for the zone where the works are taking place are applicable.

UK – Fishermen's Organisations

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
4.	**Scottish Fishermen's Federation (SFF)**	9 February 2004 - letter	• The SFF is content with the Scope of Work as set out in the Document and as summarised in the planned contents of the EIA; the Document seems to cover all relevant headings. As highlighted with meetings with TOTAL E&P UK, the SFF is keen to provide input, as necessary during all stages of the compilation / drafting of the EIA, and indeed those associated studies which will also be executed by TOTAL as part of the Decommissioning Programme. • In a meeting with SFF and NFFO on 8th April 2004, the NFFO confirmed that the content of the letter from the SFF was also representative for the NFFO views.	• TOTAL E&P UK acknowledge the comments, and welcome the SFF's keen interest in providing input during the process of establishing the MCP-01 Decommissioning Programme.

NORWAY – Governmental Organisations (Collated by the Norwegian Ministry of Petroleum and Energy)

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
5.	**Ministry of Labour and Government Administration (AAD), incl. Petroleum Safety Authority**	9 February 2004 - letter	• The AAD have no comments to the impact assessment programme concerning safety and work environment related problems. Safety authorities will return to these questions when the decommissioning/reclamation plan is available. The Petroleum safety authority will follow this up in cooperation with the British safety authorities according to relevant agreements.	• TOTAL E&P UK acknowledges the comments..
6.	**Ministry of Finance (FIN)**	11 February 2004 - letter	• FIN has no comments to the proposed impact assessment programme	• Response duly noted

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
7.	**Ministry of Fisheries (FID), (incl. Coastal Directorate, Directorate of Fisheries, and Institute of Marine Research**	24 February 2004 - letter	• FID are concerned that the disposal solution which is selected does not come in conflict with the access to sea either in the short or long term. They point out the importance of evaluating whether an in situ abandonment can be done without representing a danger/obstacle for shipping as long as the structure exists	• TOTAL E&P UK confirms that this is a central issue which is evaluated for all of the alternative disposal solutions and presented in the impact assessment. Risks for conflict with fishing activities and other maritime industries are assessed in Sections 8.3 in the EIA Report.
8.	**Ministry of the Environment (MD), incl. Norwegian Pollution Control Authority (SFT)**	27 January 2004 - letter	• MD supports the comments from SFT. Beyond this MD have no further comments to the impact assessment program. • SFT states that the impact assessment will consider the same impact assessment themes as for Frigg, and that the requirements for a impact assessment program is met and will give a good basis for carrying out the impact assessment.	• TOTAL E&P UK confirms that the impact assessment themes are equivalent to those for the Frigg Field and that there has been significant experience transfer from the environmental impact assessment prepared for the Frigg Field Cessation Plan. The issues of assessment are presented in Section 3.1 in the EIA Report.
9.	**Ministry of Trade and Industry (NHD)**	27 January 2004 - letter	• NHD have no comments to the proposal for impact assessment programme.	• Response duly noted.

NORWAY – Fishermen's Organisations (Collated by the Norwegian Ministry of Petroleum and Energy)

No.	Organisation	Date and Communications means	Summary of comments	TOTAL E&P UK Response
10.	**Norwegian Fishermen's Federation (Norges Fiskarlag)**	15 January 2004 - telefax	• The Norwegian Fisherman's Federation consider that the British authorities have set a precedent when giving a permission to leave in place the concrete platform CDP1. They request that a thorough assessment is made for removal of MCP-01 from today's location to an area which will have less effect on fishing, alternatively for scrapping or recycling. It is noted in this respect that MCP-01 has not been exposed to the same stresses as CDP1, and that the studies and investigations around complete removal are thus important in the decision making process.	• TOTAL E&P UK will evaluate both the abandonment and removal options, including recycling, sea disposal and deconstruction, for MCP-01. Specific knowledge about the MCP-01 structure and its condition form the basis for the studies. The results will form the basis for the recommended solution, and each alternative is documented in Section 8 in the Disposal Plan and in Section 8 in the EIA Report in this MCP-01 Decommissioning Programme.

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Annex B

Stakeholder meeting on 27 May 2004

This Annex B reports on the informal roundtable stakeholder meeting held in London on 27 May 2004 on the decommissioning of MCP-01. The invitees where those stakeholders that had expressed a wish to have an active participation on the decommissioning of MCP-01 in a response to letters sent out by TOTAL E&P UK and a public announcement early January 2004.

Altogether eight stakeholders had the opportunity to attend the meeting (Greenpeace UK, Scottish Fishermen's Federation (2), National Federation of Fishermen's Organisation, Department for Business, Enterprise & Regulatory Reform, University of Hull Scarborough Campus, two members of the public).

The agenda for the day was as follow:

Decommissioning continues:
a round table meeting to review progress and priorities

Date 27 May 2004

Venue: TOTAL offices - 33 Cavendish Square, London W1

Purposes:

- To review decommissioning issues in the light of the knowledge gained since the Frigg stakeholder workshop in September 2000
- To gather from participants their reflections on decommissioning MCP-01

OUTLINE AGENDA

11.00 **Introductions and ground rules**

Session 1: Review of progress
- Total's experience of decommissioning since 2000
- Issues raised by stakeholders in September 2000
- Total's responses to those issues
- Discussion

12.00 **Session 2: The new challenge - MCP-01**
- The challenges around MCP-01
- Questions, answers, discussion

12.45 **Lunch**

1.30 **Session 2**: continues

2.00 **Session 3: MCP-01 Environmental Impact Assessment**
- Introduction to EIA process for MCP-01
- Presentation of draft EIA
- Discussion of EIA

3.15 **Session 4: Reviewing the role of stakeholders**
- Discussion of future stakeholder involvement in decommissioning

3.45 Tea

4.00 **Close**

The following is the Summary Note written by the independent facilitator Andrew Acland, Dialogue by Design, who chaired the informal roundtable stakeholder meeting.

Quote

MCP-01 Decommissioning Meeting, Thursday 27 May 2004

The following record of the meeting is based on contemporaneous notes. The meeting was informal and it was agreed that there should be no attribution of the discussion to individual participants.

Session 1: Review of progress

Erik Hjelde of TOTAL explained the context of the meeting, the timetable for progress towards decommissioning of MCP-01, and the progress made on decommissioning of platforms in the North Sea and the Baltic Sea since the Frigg stakeholder workshop in September 2000. The ongoing importance of decommissioning as a whole for the fishing industry was pointed out.

He then itemised the main concerns expressed in September 2000 and explained how TOTAL has responded to them. Participants discussed each of the main concerns in turn and commented on them as follows:

1. Navigation aids

- It is unclear why audible signals such as foghorns are not included.
- A common specification for navigation aids from the UK and Norwegian authorities has been issued for the Frigg Field.
- The omission of sound signals may be on the advice of the Northern Lighthouse Board. Requirements for navigation aids are derived from the International Association of Lighthouse Authorities (IALA).
- Erik Hjelde will investigate and inform participants.

2. Residual Liability

- There is informal discussion within the industry about long-term liability but no progress on the idea of a residual liability fund.
- It might be smart to establish some government responsibility for managing long-term liability as companies may not still be in business when liabilities emerge.
- The model established by the nuclear industry was discussed, but the differences of a private vs. taxpayer-funded industry were pointed out.
- The current understanding is that liability remains with companies even after a production license ends.

3. Why not attempt to remove concrete structures?

- The fishing industry's position has always been, and remains, that efforts should be made to remove concrete structures completely, and it is disappointed by the lack of serious attempts to do so. Environmentalists share this preference.

4. Monitoring

- *No comments.*

5. Waiting for new technology

- De-ballasting was discussed and the difficulty of removing all ballast within a single season.

6. Using OSPAR Decision 98/3 as a basis for decommissioning

- Can a derogation be reversed if new technology becomes available?
- The answer is negative, but the basis on which derogations are granted is reviewed every five years, so if new technology is developed the power to give derogations may be reduced or removed.
- Going back also assumes that a company still exists or that there is a fund to finance removal.

Other concerns:

- The combined effect of many structures remaining in place becomes an issue in itself.
- There is concern about the safety of personnel involved in decommissioning being used as a reason for derogation; leaving a structure in place transfers the risk to other users of the sea - for example the risk of collision if vessels lose power. In that situation no assistance would be available from an abandoned structure.
- The purpose of risk assessment is to identify areas of risk and introduce mitigation measures. It is felt that sometimes the process of risk assessment is misused to emphasise the dangers to safety rather than the opportunities for risk mitigation.
- Much less is heard about the risks and problems when there is oil to be extracted.

Session 2: the new challenge - MCP-01

David Bayly of TOTAL introduced the issues and showed a video about the decommissioning of MCP-01 made to explain the uncertainties and problems involved in cutting down to –55m and/or full removal of the concrete substructure. TOTAL asked for feedback on the video.

Participants made the following comments:

- MCP-01 is on a prime fishing ground and the loss of access to it is linked to the safety issue - there will be risk while there are any structures left because they attract fish and fish attract fishermen even though for fishermen safety is always the priority.
- How should the safety of fishermen be balanced against the safety of people involved in refloating and removing structures?

The options for MCP-01 were then discussed:

- Cutting down to -55m is worse than leaving something visible as fishermen have to navigate the seabed as well as the surface, but there is also the long-term concern that any structure left will eventually crumble and become even more dangerous.
- The fishing industry might look very different in the future, though it was pointed out that fishing is the second oldest profession and has not changed much in the last few thousand years. The fishing industry's lobbying has always been for future generations of fishermen.
- It is difficult to know what these structures might be a danger to in the future.
- The logic of cutting down to -55 m is that the 500m exclusion zones around them also serve as fish conservation areas, while other users of the sea can pass over them.

Discussion then turned to issues specific to MCP-01:

- Worries about the lighting of the structure in perpetuity
- The cumulative impact of leaving structures in place increases the reason for removing each one - because every one left makes life more difficult for fishermen and other users.
- FishSafe has been a great asset but now needs updating and more units are needed.
- The fishing industry is now asking for 'maximum' rather than 'total' removal.
- Ideally MCP-01 should be totally removed, but nobody thinks it will be.
- The preference is for Option A [total removal] but not if 1. it is technically unfeasible - and TOTAL has to prove this or 2. if removal is inherently impossible because it is unsafe.
- Option B [dumping in deep water] is politically out of the question and anyway if it can be removed it should be brought ashore. Option C [cutting down to -55m] cannot be reversed in the way that Option D [leave the concrete sub-structure in place] can be: it could be revisited in the future if new technology becomes available. So Options A or D preferred because C will always be a liability.
- Option B is included for comparative assessment purposes.
- Option D: the problem is progressive deterioration which may rule out options in the future (though research into concrete leftovers from D-Day suggest concrete remains sound for many years.)
- If complete removal is not possible then Option D is preferable because more time is available to develop new technology to remove concrete structures than steel ones.

Comments on the video:
- It paints a one-sided picture
- It's too negative
- The way safety is discussed in relation to decommissioning is different to the way it is discussed in relation to commissioning.
- Video does not offer comparable assessments of all options.

Session 3: MCP-01 Environmental Impact Assessment

Steinar Nesse of DNV then presented the draft EIA report which the participants had received by mail before the meeting. This report is now subject to peer review. Participants made the following comments on the draft EIA:
- No mention of Law of the Sea despite pervasive influence.
- Climate change is the biggest threat facing the planet. The way CO_2 emissions are present is not helpful - the emissions around taking MCP-01 ashore are irrelevant. Industrial responsibility is far more important; arguing for Option D on basis of CO_2 emissions implies an impact that isn't there. Recycling and re-use is about a global movement towards industrial responsibility. Aesthetics are subjective and also temporary so judgment should be qualified. Public perception is a social issue that should be addressed. There should be more background including the public undertaking [to remove all structures] given in 1975 - otherwise looking at individual structures in isolation does not give the full picture. For example, nowadays we don't dump anything, and options should be considered in the light of this change in the global and societal context.
- Law of Sea should be mentioned as part of background legal context.
- There should be comparisons with decommissioning in Gulf of Mexico and elsewhere. There may be lessons to be learned from decommissioning outside the UK.
- Issue of liability needs to be clearly addressed.
- Macro strategic issues need to be taken into account.
- Surprised at 'small negative' on littering and 'moderate negative' on aesthetics.
- How do you account for effects lasting a long time in your judgments?
- Impacts summarised into tables can give a misleading impression because people read the tables and not the supporting information and this leads to poor judgments.
- Precedent setting should be included
- Precedents are not really set because only a minority of structures are involved.
- Difficulty in the EIA is not knowing where it might be taken ashore if Option A is chosen. Taking MCP-01 onshore will require separate EIA.
- There should be further mention of SEPA in the EIA.

Session 4: Reviewing the role of stakeholders
- The fishing industry is committed to involvement in stakeholder processes around decommissioning, but is often disappointed by lack of feedback on its submissions on decommissioning.
- Would like presentations to be more positive and objective about the options available.
- Need a broader and more transparent view of issues.
- Agenda 21 sets out who the stakeholders are and how to involve them but there are always questions of 1) access and 2) capacity of stakeholders to participate.
- Small meetings are more effective than large meetings. The Internet can also be useful.
- Feedback after meetings is vital.
- If MCP-01 is brought ashore in the UK this will need local consultation.
- The question was also asked as to whether stakeholders are still interested in being involved. One answer is that it helps tell people when cases are going to OSPAR.

Andrew Acland
Dialogue by Design
2 June 2004

Unquote

Annex C

Comments from UK Governmental Organisations on First Draft of the MCP-01 Decommissioning Programme

In accordance with UK practice, the First Draft of the MCP-01 Decommissioning Programme which was issued to the UK Department for Business, Enterprise & Regulatory Reform (BBERR) for consideration, was also circulated by the DBERR to other Government Departments and Agencies. The following entities were given the opportunity to review the document and send comments to DBERR who collated the responses and passed them to TOTAL E&P UK.

1. Department for Business, Enterprise & Regulatory Reform (DBERR), Aberdeen
2. The Crown Estate, London
3. Centre for Environment, Fisheries and Aquaculture Science, Lowestoft
4. Department for Transport, Ports Division, London
5. Foreign and Commonwealth Office, London
6. H M Customs and Excise, Aberdeen
7. Health and Safety Executive, Offshore Division, London
8. Inland Revenue, International (Energy Group), London
9. Joint Nature Conservation Committee, Aberdeen
10. Scottish Environment Protection Agency, Stirling
11. Scottish Environment Protection Agency, Aberdeen
12. Scottish Executive Environment and Rural Affairs Department, Water Environment Division (Marine Strategy Team), Edinburgh
13. Scottish Executive Environment and Rural Affairs Department, Environment Protection Unit, Edinburgh
14. Scottish Executive Environment and Rural Affairs Department, Fisheries Research Services – Marine Laboratory, Aberdeen
15. The UK Hydrographic Office, Taunton, Somerset
16. Royal Commission on the Ancient and Historical Monuments of Scotland, Edinburgh

The following table summarises the main comments received from the DBERR under cover of letter dated 7 December 2004, and provides details of the actions taken by TOTAL E&P UK.

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Subject	Summary of comments collated by the DBERR	TOTAL E&P UK Response
Third Party Facilities	There should be more clarity regarding the inclusion of the third party facilities in the programme and liability of the parties who hold a notice under Section 29 of the Petroleum Act 1998 for this equipment. • Clarify that the third party owners/Section 29 notice holders will not be party of the programme, as is already inferred by the statements on page 40 regarding submission of the programme by the MCP-01 owners only. • There should be an explanation that agreement from all third party Section 29 notice holders for the work related to their equipment will be submitted along with the final version of the programme.	• A new section has been introduced in Section "General Introduction" stating "the parties who hold a Section 29 notice for the third party pipeline system on MCP-01, operated by TOTAL E&P UK and currently owned by the Talisman Group and Eni, will not be a party to this Decommissioning Programme. However, statements from the Section 29 notice holders will be submitted along with the final version of the programme confirming their agreement for the work related to their equipment in order to decommission MCP-01".
Offshore Activities	• The UK Hydrographic Office should be informed at least six weeks in advance of offshore activities. • They should be notified of any amendments to the existing installations, particular platform heights, installation of new navigational aids etc. • It is also important that the Hydrographic Office are informed of any deterioration which may result in falling debris causing an obstruction.	• The comment is acknowledged and noted. • The text in Section 8.14 in the Disposal Plan has been amended. • The text in Section 14.4 in the Disposal Plan has been amended.
Removal of Wastes to Onshore Facilities	• When removing wastes to onshore facilities, it is imperative TOTAL ensures that such facilities have all the necessary environmental licences in place before commencement of decommissioning activities in the UK and in other States to which materials from the programme may be consigned. We would remind you of your responsibilities under RSA 93 when disposing of radioactive materials. • In addition to the Americium-241 source identified on page 210, records indicate that a registration is held by TOTAL for a Caesium-137 source for the purpose of level detection in halon cylinders. If this source is no longer on the platform then TOTAL, as a requirement of its registration certificate, must have kept a record of the date of removal of the source from the registered premises, and of the address and the occupier of the premise to which the source was removed. • If TOTAL opts to move materials or waste for the purposes of recovery or disposal to a State other than the UK, it is imperative that such movements are carried out in compliance with the Transfrontier Shipments of Waste Regulations 1994.	• The text in Section 7.4 in the Disposal Plan has been amended to clarify the responsibilities. • It is planned to remove the Americium-241 source during the 2005. Appropriate text is added in Section 4.3 in the Disposal Plan. The text has also been amended making reference to the responsibilities under Radioactive Substances Act 1993 when disposing of radioactive materials. The Caesium-137 source used for level measurement of the halon cylinders was removed from MCP-01 in 2001. The text in Section 4.3 in the Disposal Plan has been amended to include this information. • The text in the last chapter in Section 7.4 in the Disposal Plan has been modified to make reference to the Transfrontier Shipments of Waste Regulations 1994.

Subject	Summary of comments collated by the DBERR	TOTAL E&P UK Response
Abandonment Safety Case	• TOTAL is required to comply with all relevant regulations providing for the health and safety of persons. A key requirement is to reduce, as far as is reasonably practicable, the risks to persons from work activities. Control of such risks will need to be described in the safety case for abandonment, which is subject to acceptance by the HSE before the work may proceed.	• The comments are acknowledged and noted. The text in Section 7.3.2 states now that an Abandonment Safety Case will be prepared for the removal of the MCP-01 topside facilities submitted to the HSE at least six months before the planned start of works.
CDP1 Comparison	• Would it be possible to find some words to explain the use of the 30% number for CDP1 and the 60% for MCP-01 other than the structural integrity used. • There is also a significant difference in the numbers given for uncontrolled collapse of the walls during the cut to –55m option for MCP-01 and CDP1. These differences should be explained.	• Text in Section 8.3.4 in the Disposal Plan has been added to explain the reasons. • An explanation has been added in Section 8.5.3 in the Disposal Plan.
Risk	• Throughout the programme it would be useful if you could provide additional information on the risks to personnel	• Suitable text has been included at the appropriate Sections 5.5, 7. and 8. in the Disposal Plan. Fatal Accident Rates have been added for the different disposal alternatives addressed.
Navigation	The Northern Lighthouse Board (NLB) comments on the following phases of the decommissioning: • Phase 1 – Topside Removal The NLB outline their recommendations for navigation warning systems on the platform (manned or unmanned) and any supporting vessels and barges during the decommissioning phase. • Phase 2 – Substructure Removal If the concrete substructure receives an approval to be left in place, the platform must be re-categorised as a “Disused Structure” and marked accordingly.	• The recommendations from the NLB are acknowledged and noted. • A meeting will be held with the NLB to finalise the criteria for aid to navigation if the concrete substructure receives a permit to be left in place. The requirements for the concrete substructures on the Frigg Field will be used as a reference.

Annex D

Stakeholders' Comments on Second Draft of the MCP-01 Decommissioning Programme

Contents

1. Introduction

This Annex D contains a summary of the written responses received from stakeholders during the statutory consultation period for the Second Draft of the MCP-01 Decommissioning Programme. The public consultation started on 9 March 2005 and finished on 25 April 2005.

The formal consultation process in the UK included the statutory consultations required under Section 29(3) of the Petroleum Act 1998.

In Norway the formal consultation process followed previously established practice seeking comments on the Environmental Impact Assessment Report only. However, the entire MCP-01 Decommissioning Programme was sent for information to the same stakeholders.

Those entities issued with a copy of the Second Draft of the MCP-01 Decommissioning Programme in the UK had previously responded that they would like to be actively involved in the decommissioning of MCP-01. Those who had requested to be only informed about the progress were notified that a copy could be provided if requested or could be downloaded from the Internet.

Hard copies of the document were made available for review at the TOTAL E&P UK office in Aberdeen. Public Notices advertising this fact were placed in the UK national press informing that the document could also be viewed on the Internet.

The comments summarised in this Annex D originate solely from the statutory consultation process described above. It is, however, important to note that a wide-ranging consultation process with stakeholders has been on going since Spring 2003. The views and concerns expressed by stakeholders over the last two years has been an important input when preparing the MCP-01 Decommissioning Programme. Many of the comments received during this consultation period are set out in Annexes A, B and C.

In summarising the written responses every effort has been made to accurately reflect the views of stakeholders, whilst at the same time allowing an overview of the comments to be obtained.

2. Stakeholders Involved in the Formal Consultation Process

2.1 Consultation in UK

The following UK entities received a copy of the Second Draft of the MCP-01 Decommissioning Programme dated 17 February 2005. Copies of the document were issued to the UK Departments and Agencies via the Department for Business, Enterprise & Regulatory Reform, who also gathered and collated their responses (in the same way as described in Annex C).

UK Governmental Organisations

1. Department for Business, Enterprise & Regulatory Reform (DBERR), Aberdeen

UK Statutory Consultees

2. Scottish Fishermen's Federation, Aberdeen
3. The National Federation of Fishermen's Organisation, Grimsby
4. Global Marine Systems, Chelmsford, Essex
5.. Northern Ireland Fishermen's Federation, Portagovie, County Down

UK Non-Statutory Consultees

6. Greenpeace UK, London
7. KIMO-Local Authorities International Environmental Organisation, Lerwick, Shetland
8. University of Hull University Scarborough Campus, Scarborough
9. International Association of Oil and Gas Producers, London
10. United Kingdom Offshore Operators Association (UKOOA), London
11. The Fishermen's Association Ltd., Peterhead
12. International Marine Contractors Association (IMCA), London
13. University Of Aberdeen, Aberdeen
14. Specialist Maintenance Service Ltd., Aberdeen
15. Core Technical Services Ltd.

UK Private Individuals

16. Leon Muller, St. Andrews
17. Ken Mitchell, Aberdeenshire
18. Tony Read, Hitchin, Herts.

2.2 Consultation in Norway

Norwegian consultees were requested by the Norwegian Ministry of Petroleum and Energy (MPE), who coordinated the statutory consultations in Norway, to comment only on the Environmental Impact Assessment (EIA) Report of the MCP-01 Decommissioning Programme. To facilitate this consultation, the EIA Report was therefore translated into Norwegian.

However, the MPE enclosed a copy of the Second Draft of the MCP-01 Decommissioning Programme dated 17 February 2005 for information to each consultee (written in English).

The following entities were requested to comment on the EIA Report:

Norwegian Governmental Organisations

1. Ministry of Fisheries and Coastal Affairs (Fiskeri- og kystdepartementet)
2. Ministry of the Environment (Miljøverndepartementet)
3. Ministry of Finance (Finansdepartementet)
4. Ministry of Labour and Social Affairs (Arbeids- og sosialdepartementet)
5. Ministry of Trade and Industry (Nærings-og handelsdepartementet)

Norwegian Non Governmental Organisations

6. Norwegian Fishermen's Federation (Norges Fiskarlag, Trondheim)

3. Stakeholders Response

The following tables summarise the written responses received from the statutory consultation on the Second Draft of the MCP-01 Decommissioning Programme dated 17 February 2005.

The last column outlines the TOTAL E&P UK comments to the stakeholders main comments.

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UK – Governmental Organisations

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
1.	**Department for Business, Enterprise & Regulatory Reform (DBERR)** (including collated comments from other UK Governmental Departments)	22 April 2005 – letter	• Seond Draft was well presented and was well received by other Governmental Departments. • Some additional information about Fatal Accident Rate (FAR) should be included in Section 8.7.1. • DBERR informed that the ownership of the third party equipment on MCP-01 has changed. • Commented that during the decommissioning operation TOTAL E&P UK should contact the DBERR assigned Environmental Inspector and other required authorities should there be any unpermitted oil or chemical discharges. In such cases a PON1 should be submitted.	• Comments noted. Revisions have been made at the appropriate sections.

UK – Statutory Consultees

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
2.	**Scottish Fishermen's Federation (SFF)**	21 April 2005 - letter	• First generation of operators' promise to return the sea bed to original state on completion of operation. • Pleased that the topsides and associated external steel work will be removed to shore. • SFF notes that the redundant pipeline sections next to MCP-01 will be addressed in future decommissioning programmes for the complete pipeline systems. It is important to place on record that SFF has been tracking these particular matters in parallel with the bypass of the pipelines at MCP-01. • Derogation is not in line with SFFs preferred policy position. • Concern relating to residual liability in perpetuity of remaining substructure.	• SFFs comments have been reviewed and the points raised have been carefully considered. However, the comparative assessment shows leaving in place is the most appropriate disposal solution, as described in Section 8 in the Disposal Plan. • The long-term liability issues are acknowledged as being of great importance to the fishing industry in particular. The parties to the MCP-01 Decommissioning Programme will remain responsible for the substructure in accordance to prevailing legislation.

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
			• Without the setting up of the a Fishermen's Trust Fund in agreement with UKOOA, SFF believe that the DBERR/UK Government should not grant a permit for derogation. • The SFF wish to place on record its sincere thanks and appreciation for the constructive and open manner in which TOTAL have conducted the MCP-01 Decommissioning dialogue process. It is imperative that this dialogue process continuous on a regular basis going forward.	• The approval process for an appropriate disposal arrangement for the MCP-01 concrete substructure should not be linked to the ongoing dialogue with UKOOA to establish a Fishermen's Trust Fund. • TOTAL E&P UK has very much appreciated SFFs constructive participation in the decommissioning process of MCP-01, and will continue to keep a close contact until the completion of the decommissioning work.
3.	**National Federation of Fishermen's Organisations (NFFO)**	18 April 2005 – letter	• Industry's original promise to remove all infrastructure at the end of development and operation of a field. • Reminder that OSPAR Decision 98/3 does provide for derogation in certain cases. • NFFO's and SFF's negotiations with UKOOA to set up a Fishermen's Trust Fund to address the issue of residual liability for remains in perpetuity. In the absence of such an agreement being reached through UKOOA, NFFO believes that the DBERR should not grant a derogation for MCP-01. • Reminder of overarching principles in the DBERR's Decommissioning Guidance Notes. • Desire for a pragmatic approach and a collaboration approach to decommissioning between the two industries, as has been the case during the offshore development.	• See above comments to SFFs concern. • See above comments to SFFs similar proposal. • NFFOs constructive participation in the decommissioning process of MCP-01 has been very much appreciated, and TOTAL E&P UK will continue to keep a close contact until the completion of the decommissioning work.
4.	**Global Marine Systems Limited**	14 March 2005 - Letter	• No substantive comments received	
5.	**Northern Ireland Fishermen's Federation**	No reply received		

UK – Consultees

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
6.	**The Fishermen's Association Limited (FAL)**	25 April 2005 - Letter	• State preference for total removal option. Recall early government promise to remove MCP-01 in its entirety at the development phase. • Understand the need to reduce risk to personnel. • Considered the steps TOTAL would take to mitigate impacts on fisheries if Alternative D is adopted. • State that FAL is not a member of SFF and therefore to only use SFF members for post decommissioning trawling tests would be unacceptable to FAL • Concern regarding the ongoing liability for any parts of the structure left in place. Feel that TOTAL's commitment to enter into dialogue with the authorities at an appropriate time is somewhat vague and indeed lacks conviction'. • Understand that there is a possibility for derogation under OSPAR Decision 98/3 for MCP-01. FAL would like to know if this permit has been obtained as yet.	• See comments made for SFF. • UK fishermen's organisations, having representative bottom trawl gear for fishing in the area of MCP-01, will be contacted in the planning of the final trawling test. • The parties to the MCP-01 Decommissioning Programme will remain responsible for the substructure in accordance to prevailing legislation, see also Section 15 in the Disposal Plan. • No permit to leave the substructure in place has yet been issued by the authorities.
7.	**KIMO (Local Authorities International Environmental Organisation, KIMO Secretariat located at Lerwick, Shetland)**	25 April 2005 –E-mail	• The issue of long term liability still remains unresolved subject to dialogue with the Governments concerned. • With reference to the decommissioning of the Forbes Field where debris was left just outside the 500m zone, KIMO ask that the size of debris survey to be extended • Makes reference to the comments made on the Frigg Field consultation for any other comments at this stage.	• Reference is made to Section 15 in the Disposal Plan • If any debris of significant size were observed just outside the 500m zone, appropriate consideration would be made to remove it. • Response duly noted.

NORWAY – Governmental Organisations

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
1.	**Ministry of Fisheries and Coastal Affairs (FKD)**	26 April 2005– Letter	• FKD states that the platform is located in an area of relatively limited fishing activity. It contains, because of its function, insignificant levels of special substances that may represent a hazard to the environment. • Leaving the installation in place mean that a certain area around the platform remains inaccessible for fishing, and the platform will remain a hindrance for a free passage at sea. The Ministry of Fisheries and Coastal Affairs assumes that if the alternative to leave the platform in place is chosen, it must be marked in an appropriate manner and that regular monitoring will take place to ensure that the marking of the platform is functioning at any time. • FKD is of the opinion that the issues related to leaving an installation in place in the North Sea should be carefully evaluated from a point of view of principle, as this alternative may, initially, look like the most environmental friendly alternative; for example compared to the energy consumption for the removal option. In that respect they refer to the UN's definition of marine pollution where hindrance to fishing is included.	• Comment duly acknowledged. • Aids to navigation will be installed on top of the concrete shaft of the substructure, as explained in Section 14.3 in the Disposal Plan. • Comment duly noted.
2.	**Ministry of the Environment (MD)**	2 May 2005 - Letter	• MD has no comments concerning the environmental impact assessment.	• Response duly noted.
3.	**Ministry of Finance (FIN)**	9 May 2005 - Letter	• FD has no comments concerning the environmental impact assessment.	• Response duly noted.
4.	**Ministry of Labour and Social Affairs (ASD)**	22April 2005 - Letter	• The Petroleum Safety Authority has no comments on issues related to the working environment and safety. • ASD has no comments.	• Response duly noted.
5.	**Ministry of Trade and Industry (NHD)**	4 April 2005 - Letter	• NHD has no comments concerning the environmental impact assessment.	• Response duly noted.

NORWAY – Consultees

No	Organisation	Date and Communications means	Summary of comments	Response from TOTAL E&P UK
6.	**Norwegian Fishermen's Federation (Norges Fiskarlag)**	17 March 2005 – telefax	• Pleased with the consultation process in establishing the EIA and particularly with regard to mapping the issues. • Reminder that the Norwegian Fishermen's Federation demand that following cessation of production, fields are returned to that state it was in prior to development and operation to allow for normal fishing activities. The only acceptable alternative is therefore total removal of MCP-01 with reference to the EIA. • Refer to the CDP1 technical challenges and state that no such arguments have been made for MCP-01 with regard to full and partial removal • Support the SFF position of total removal. • Concern that for the leave in place option, TOTAL proposes to remove all 'steel plates' without giving reasons for this. Concern that the removal of the steel would cause faster deterioration of the concrete structure left in place. If there is no proper maintenance programme for the structure left in place, parts could fall off and present an obstruction for fishing activities and other users of the sea • Cannot see from the document that there are any technical hindrance for not completely removing MCP-01 and therefore demands that this be the only option considered.	• See above comments to SFFs similar concern. • The detailed technical arguments, which have lead the owners of MCP-01 to recommend the 'leave in place' alternative, are not covered in the EIA Report. This is described in Section 8 in the Disposal Plan of the MCP-01 Decommissioning Programme which was sent for information to the Norwegian stakeholders by the MPE. Here a detailed description of the technical challenges of completely removing MCP-01 is given which have led to the view that the best alternative is to leave the concrete sub-structure in place. A comparison with Frigg-CDP1 is also made (see Section 8.3.4). • The comment is duly noted. • No recommendations are made for removing "steel plates", except for external steelworks fixed to the external concrete wall (see Section 8.6.1). Section 14.3 gives a description of the proposed long-term measures which will be put in place to mitigate against collision. • See second bullet point above on this page.

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Annex E

Comments from Contracting Parties during OSPAR Consultation Process

On 26 May 2006 the OSPAR Executive Secretary circulated to all the OSPAR Contracting Parties letters from the UK Department for Business, Enterprise & Regulatory Reform and the Norwegian Ministry of Petroleum and Energy saying that they were considering issuing a permit, in accordance with paragraph 3b of OSPAR Decision 98/3, for the disposal of the MCP-01 concrete substructure within their jurisdiction, at its current location.

At the same time an assessment, prepared in accordance with the requirements of Annex 2 of OSPAR Decision 98/3, was also sent to the OSPAR Contracting Parties. The assessment entitled "MCP-01 Concrete Substructure – An Assessment of Proposals for the Disposal of the Concrete Substructure of Disused MCP-01 Installation", dated 10 February 2006, may be viewed on the TOTAL E&P UK website at:
www.uk.total.com/activities/st_fergus_terminal_mcp_decommissioning_mcp.asp

By the end of the 16-week consultation period no objections had been received to either the UK Department for Business, Enterprise & Regulatory Reform or the Norwegian Ministry of Petroleum and Energy issuing a permit in respect to the MCP-01 concrete substructure.

Some comments were however received from two OSPAR Contracting Parties and these are detailed in the table below together with TOTAL E&P UK's comments.

Comment of Contracting Party	Comments by TOTAL E&P UK
The concrete substructure needs to be properly marked to warn other users of the sea.	The navigation aids installed on the concrete substructure will be designed and maintained to ensure a high level of reliability. They will incorporate back-up systems and parts of the navigational aids system will be changed at regular intervals. The navigational aids themselves, and their maintenance programme, will satisfy the requirements of both national regulations and the International Maritime Organisation. TOTAL E&P UK has made contact with the responsible authority in UK to ensure that the navigation aids will comply fully with relevant national requirements. In addition measures will be taken to ensure that the MCP-01 substructure remains marked on navigation charts and relevant information about the MCP-01 decommissioning project will be circulated to mariners.
Should further evaluations show the existence of hydrocarbon deposits on the substructure, every possible effort should be executed in order to empty the structure for any residual oil or hazardous chemicals.	MCP-01 has primarily been used as a riser platform serving the two 32" gas pipelines transporting gas from Frigg to St Fergus in Scotland. The concrete substructure has therefore never been used for the storage of crude oil and thus cleaning operations to remove hydrocarbon deposits are not required. No drilling activities have neither taken place on the facilities leaving any drill cuttings inside or on the sea bed next to the substructure. No hazardous chemicals will be left after the topside facilities have been removed.

Comment of Contracting Party	Comments by TOTAL E&P UK
The safety of users of the sea needs to be ensured when the concrete substructure starts to disintegrate leaving behind obstacles that reach almost to the surface.	TOTAL E&P UK has commissioned studies to evaluate the effect of natural decay and the long-term durability of the concrete substructure (see Section 8.6.3 and Ref. 8.6 in the Disposal Plan). After about 100 years the main reinforcement with limited cover in the splash zone and above becomes ineffective. Impacts from waves would cause risk of local structural damage to the central shaft and the breakwater wall in the splash zone. Serious damage to all parts above sea level with a possible breakdown to the sea level is estimated to take place in roughly 200 years. Breakdown of the breakwater wall and the central shaft down to about 27m below sea level is predicted to take place in 400 to 800 years. A breakdown below 55m could take more than 1000 years. The above-water deterioration of the concrete structures will however take place relatively slowly and the navigation aids on the substructure may be expected to remain in place for several hundred years. After that time suitable measures, such as buoys, will be provided to ensure the safety of users of the sea.

Annex F

Abbreviations and Glossary

Ag	Silver
As	Arsenic
Ba	Barium
B(a)P	Benzo-a-pyrene
CDP1	Frigg Field Concrete Drilling Platform 1
Cd	Cadmium
CMS	TOTAL E&P UK Company Management System
CO_2	Carbon dioxide
Cr	Chromium
Cu	Copper
DBERR	UK Department for Business, Enterprise & Regulatory Reform (formerly the UK Department of Trade and Industry (DTI))
DNV	Det Norske Veritas
DP	Dynamic Positioning
DSV	Diving Support Vessel
DTI	UK Department of Trade and Industry (changed to DBERR in July 2007)
E_{tot}	Total Energy Impact
E_{cons}	Energy Consumption
EIA	Environmental Impact Assessment
EMAS	Eco-Management and Audit Scheme
EMS	TOTAL E&P UK Environment Management System
FAR	Fatal Accident Rate (fatalities per 100million manhours of exposure)
Gassco	Operator of the Vesterled pipeline
Gassled	Group of Norwegian oil and gas companies having interest in MCP-01
GJ	Giga Joules (1,000 million joules)
GSm^3	Giga cubic meters of gas at standard conditions (1,000 million m^3)
Hg	Mercury
HSE	UK Health and Safety Executive
Hs	The average height of the highest one third of all sea waves occurring in a particular time period
ICES	International Council of the Exploration of the Seas
IMO	International Maritime Organisation
IMO Guidelines	International Maritime Organisation document “Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone” adopted by the IMO Assembly in 1989 (Resolution A.672(16))
IP	UK Institute of Petroleum
JIP	Joint Industry Project
JNCC	Joint Nature Conservation Committee, UK
KIMO	Kommunenes Internasjonale Miljøorganisasjon – Local Authorities International Environmental Organisation
kg	Kilogram
kWh	Kilo watt hour
km	Kilometre
l	litre
LSA	Low Specific Activity
m	metre
m^3	cubic metre
MAFF	UK Ministry of Fisheries and Food (now DEFRA – Department of Environment, Food and Rural Affairs)
mg	milligram
MCP-01	Manifold and Compression Platform No. 1
MPE	Norwegian Ministry of Petroleum and Energy
MSL	Mean Sea Level

NFD	Norwegian Fishing Directorate
NFFO	National Federation of Fishermen's Organisation
NGO	Non-Governmental Organisation
Ni	Nickel
NO_x	Nitric Oxides
NPD	Norwegian Petroleum Directorate
NSTF	North Sea Task Force
OLF	Norwegian Offshore Operators Association (Oljeindustriens Landsforening)
OSPAR	The Convention for the Protection of the Marine Environment of the North East Atlantic 1992.
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Poly Chlorinated bi-phenyls
PLL	Potential Loss of Life (predicted number of fatalities)
ppt	Parts per thousand
PSA	Norwegian Petroleum Safety Authority
PMI	Potential Major Injuries (predicted number of major injuries)
QRA	Quantitative Risk Assessment
Riser	The part of a subsea pipeline running from the seabed up to the topside
ROV	Remotely Operated Vehicle
SEERAD	The Scottish Executive Environment and Rural Affairs Department
SEPA	The Scottish Environmental Protection Agency SFF Scottish Fishermen's Federation
SFT	Norwegian Pollution Control Authority
SINTEF	The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology
SMS	Safety Management System
Sn	Tin
SO_2	Sulphur Dioxide
SSCV	Semi Submersible Crane Vessel
TEAMS	The Environmental Accounting and Management System
THC	Total Hydrocarbon Concentration
TOTAL E&P NORGE	TOTAL E&P NORGE AS
TOTAL E&P UK	TOTAL E&P UK Limited
UK	The United Kingdom of Great Britain and Northern Ireland
UKOOA	United Kingdom Offshore Operators Association
UN	United Nations
WEMS	Working Environment Management System
Zn	Zinc
"	inch