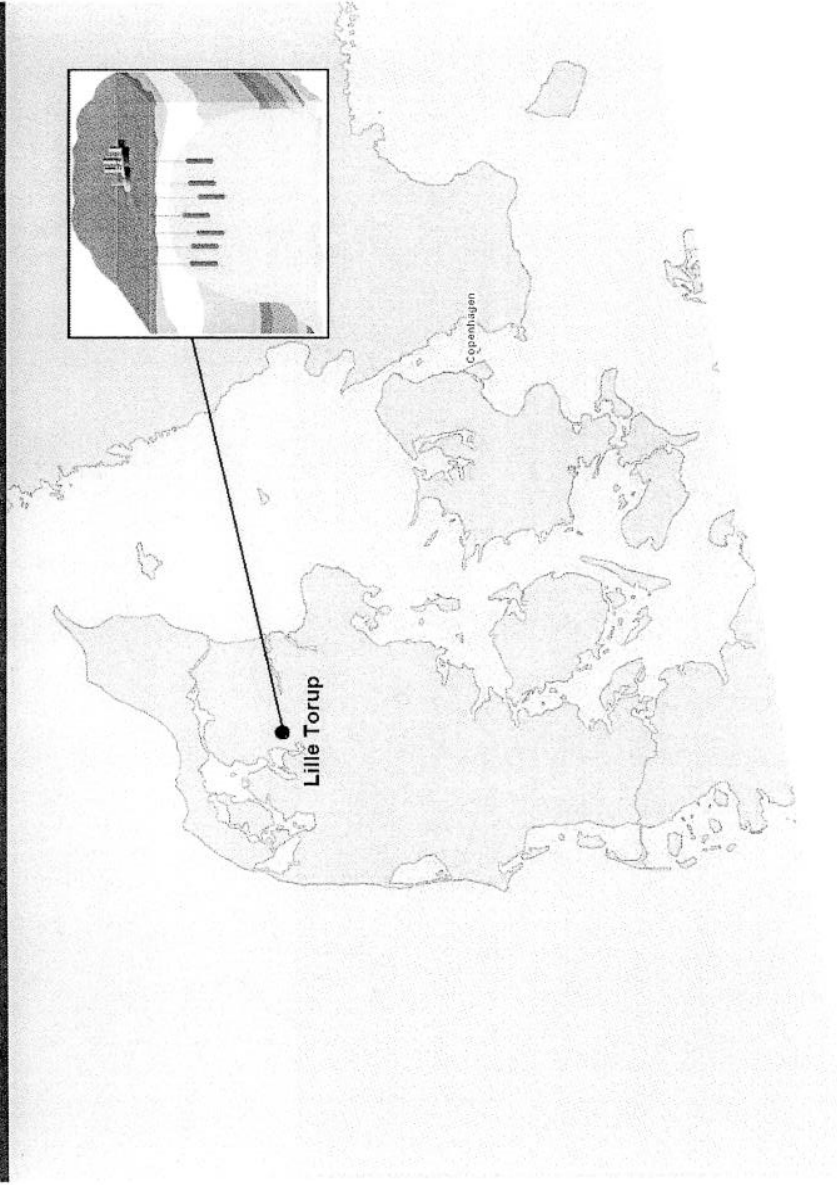


Detailed working procedure for sample collection - Lille Torup 2007

TO-5, TO-6, TO-7, TO-8, TO-9 and TO-10



REV.	DESCRIPTION	PREPARED	CHECKED	JAK	PFM	TLA	DATE	DATE
0	Approved edition						2007-11-08	2007-11-08
							2007-11-08	2007-11-08

27-491-GH-5003						
DOC. NO.						

Contents

1 General information.....3

1.1 Introduction3

1.2 Location.....3

1.3 Organisation.....3

1.4 Time schedule4

2 Construction and workplace conditions.....4

2.1 General demands4

2.2 Safety policy4

2.3 Division of work5

2.4 Alternations in programme5

2.5 Reporting.....5

2.6 Personnel requirements at cavern area.....5

2.7 Equipment requirements at cavern area5

2.8 Access.....6

2.9 Working hours and working permit6

2.10 Environment.....6

2.11 Confidentiality6

3 Operational procedures.....6

3.1 General information.....6

3.2 Well History6

3.3 Check of tools and pressure test certificates.....6

3.4 Reference Depth7

3.5 Rig up and Test wireline Equipment7

3.6 Sampling Operation.....7

3.7 TO-058

3.8 TO-068

3.9 TO-078

3.10 TO-089

3.11 TO-099

3.12 TO-10	9
3.13 Sample collection	9
3.14 Sample analysis	10
4 Appendices	11
Appendix 1: Sonar surveys.....	12
Appendix 2: X-mas tree for TO-5 – TO-10	18
Appendix 3: Completion schematic TO-5 – TO-10	20
Appendix 4: Tool for dummy run	26
Appendix 5: Sampling tool	27

1 General information

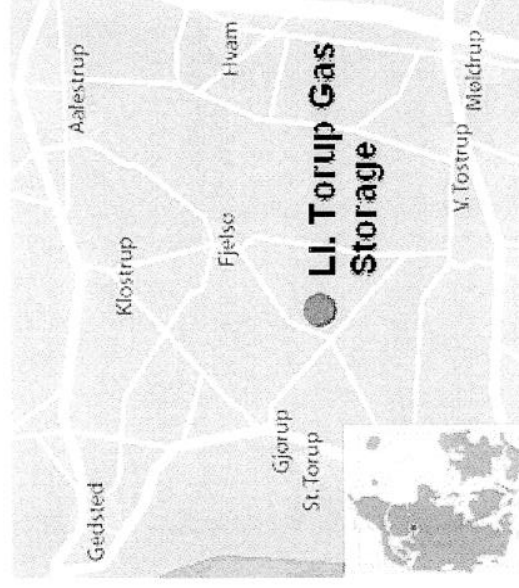
1.1 Introduction

In the recent years there has been an increased need for gas storage capacity in Denmark. Energinet.dk is currently investigating the possibility for capacity incensement of Ll. Torup Gas Storage. It is under investigation whether old caverns should be re-leached, new caverns should be leached or a combination of both. The seven existing caverns contain each a sump of brine which was produced under leaching. It is believed that the sumps now contain traces of triethylenglycol and lubricating oils which is caused by gas injection over the years. Furthermore two caverns contain a layer of Oppanol®. In order to gather information about the chemical and physical composition of the sumps in the caverns of Ll. Torup Gas Storage Facility, samples shall be collected.

The purpose of this document is to describe the activities and responsibilities involved in the sample collection.

1.2 Location

Energinet.dk Gaslager, Rækkeborgvej 4, DK-9620 Aalestrup.



1.3 Organisation

Client Representative
 Ll. Torup technician
 Hydraulic man-lift Operator
 Ll. Torup Safety Group
 Crane Operator
 Well Intervention Supervisor
 Wire Line Contractor
 Wire Line Operator
 Wire Line Operator
 Wire Line Operator

Pelle Funder Michelsen – Energinet.dk
 Torben Madsen – Ll. Torup Gas Storage
 Torben Madsen – Ll. Torup Gas Storage
 Safety Steward Kristian Nielsen – Ll. Torup Gas Storage
 Aars Vognmandsforretning (Telephone: +45 98 62 23 99)
 Botho Saalbach – KBB
 Martin Beiküfner - Schlumberger
 Bjoern Kullenbaeck - Schlumberger
 Josef Meier - Schlumberger
 Joerg Suedbeck – Schlumberger

1.4 Time schedule

Planning meeting, 31st of October 2007

Sample collection, 19th – 26th of November 2007

Day one: safety policy, samples from one cavern

The following days: 1-2 caverns per day

Sample analysis, 29th of November and approximately 2 weeks ahead

2 Construction and workplace conditions

2.1 General demands

The contractor shall meet all relevant demands from the authorities, including demands from The Danish Working Environment Service and the environmental authorities. In addition to this, demands with reference to the safety procedures of Energinet.dk shall be obeyed:

- 29-000-GH-5095 Personlige værnemidler
(Equipment for personal safety)
- 29-000-GH-5096 Arbejdstilladelser i Gastra
(Working Permits)
- 29-000-GH-5100 Sikkerhedsinstruktion
(Safety instructions)
- 29-000-GH-5102 Arbejde på Gastra anlæg
(Work performed at plants owned by Gastra)
- 29-000-GH-5110 Rapportering uheld, ulykker og nær-ved-hændelser
(Reporting on accidents and nearly incidents)
- Sikkerhedshåndbog for Energinet.dk's gastelekniske anlæg
(Safety handbook)

The above mentioned safety procedures of Energinet.dk are only prepared in Danish. Non Danish-speaking contractors will therefore verbally be informed during Safety Instruction (see section 2.2). The client representative and the LI. Torup technician will be present at all work performed with a special focus on safety.

2.2 Safety policy

Energinet.dk safety policy is to take care of personnel, environment and equipment. When working on locations of Energinet.dk you should be in possession of a valid work permit.

Energinet.dk believes that Zero incident is possible on each job, therefore below words is expectations on all Energinet.dk operations.

Every person has the right and the duty to stop all operation that seems unsafe and call time out for safety.

Assure good Communication between all parties involved in the job.

Clearly define roles and processes Co-operation between all persons on the project.

When arriving to LI. Torup Gas Storage, Personnel who have not been working at the site must watch the Safety Instruction Video and go through a questionnaire.

This Safety Instruction is valid for 12 month.

2.3 Division of work

Energinet.dk is the client. The client representative only observes and acts as liaison to Energinet.dk management, the service organisation and the local management at Ll. Torup Gas Storage. Schlumberger provides Wire Line Operator assistance regarding the actual sample collection, and act as Wire Line Contractor.

The Ll. Torup technician provides assistance regarding practical issues.

KBB UT will supervise the work on site as Well Intervention Supervisor and act as sparring partner through out the period of sample collection. **KBB is responsible for safety under well intervention.** In addition KBB will make a subcontract with the analysing laboratory, Weßling. Ll. Torup Gas Storage Control Room Operator will hand over control of each well to KBB before each intervention. After end intervention KBB will hand over control of the well to Ll. Torup Gas Storage Control Room Operator.

2.4 Alternations in programme

Any programme alternations shall be reported to the client representative and the Ll. Torup Gas Storage Safety group. The safety group will decide whether the specific alternation gives rise to a risk assessment, with reference to the internal safety procedures of Energinet.dk.

2.5 Reporting

Schlumberger shall daily report on the result of the operation to KBB and client representative. The client representative passes on the daily reports to the Danish Energy Agency. The daily reports will be summarized in a final written report, prepared by the client representative.

2.6 Personnel requirements at cavern area

- 1 x Well Intervention Supervisor from KBB
- 1 x Schlumberger Wire line Contractor
- 3 x Schlumberger Wire line Operators
- 1 x Crane Driver for a 50TM mobile crane
- 1 x Client representative
- 1 x Ll. Torup Gas Storage technician

2.7 Equipment requirements at cavern area

Energinet.dk will provide the equipment listed below:

- Projectors to light up the cavern areas
- Steam Cleaner to heat the sample tube if required and to clean the tool between runs
- 50TM mobile crane with an elevating height of 25 meter above well head
- Air operated power wrench and a compressor used for flanging work
- Hydraulic man-lift with operator at each cavern area
- Soft-iron rings for sealing the well head flange and X-mas tree cap, minimum two per X-mas tree.
- Nuts and bolts for flange connection

All other equipment will be supplied by Schlumberger.

2.8 Access

2.8.1 Main buildings

By entering the main gate you get access to the administration buildings and control room. Parking takes place out side the fence, before entering the main gate. The contractor must continuously, in the event of possible emergencies, inform the client just how many people are present on the site.

2.8.2 Caverns

Access to cavern areas shall be authorized by the LI. Torup Gas Storage Control Room Operator.

2.9 Working hours and working permit

When work is performed on facilities of Energinet.dk, a work permit must always be applied for. It needs to be pointed out, that work at the gas storage facility, as far as possible, must take place during normal working hours, and well operations are normally not conducted after the brake of darkness. If it is necessary to work out side normal working hours, a new work permit must be applied for. A permit will only be valid for one day at a time, therefore the contractor must, before normal working hours are over, submit an application for work permits for the following day to the client.

2.10 Environment

The contractor shall organize the daily work in such a way that the environment is protected in the best conceivable manner. This includes reducing the use of resources, environmentally damaging chemicals, spillage and noise. Environmentally accidents shall be reported to the client representative and to LI. Torup Safety Group. Furthermore a statement shall be prepared by Schlumberger.

2.11 Confidentiality

All personnel involved shall be made aware that information about activities and results obtained during the operation are confidential and should not be discussed with other parties.

3 Operational procedures

3.1 General information

All equipment provided by Schlumberger will be detailed in load-out lists. Upon arrival on site it is the responsibility of the senior representative of the Schlumberger to check and confirm that the correct equipment is on site and that it is suitable for the operation. Any deficiency must be highlighted immediately to the Well Service Supervisor from KBB on site.

3.2 Well History

The intervention history of the wells can be seen in appendix 3, Completion Schematics.

3.3 Check of tools and pressure test certificates

All down hole equipment and tools that will be used on any of the wells, is required to be visually and physically checked regarding the OD sizes. This check should be recorded and compared against the well schematic. Pressure test certificates of wire line equipment shall further more be checked by Well Intervention Supervisor from KBB.

3.4 Reference Depth

The well sketches and information of the sonar surveys from 2005 will be used. These can be found in appendix 1. The sampling depth will be at the gas-brine interface.

3.5 Rig up and Test wireline Equipment

1. Spot Slickline Truck and commence lay out lubricator and tools.
2. Make up the Toolstring and test tools on surface.
3. Take control of the well. Override the remote shut down system, as per agreement with the Control room.
4. Close in well (incl. Wing Valve (WV) 4 and WV5) and isolate Master Valve (MV) 1 and MV2 from the site Control Panel shutdown system.
5. Open the Swab valve (SV3) and evacuate the Xmas Tree. Close in on the swab valve again and remove the tree cap flange adapter.
6. Install the necessary flange adapter from Xmas Tree to slickline pressure control equipment.
7. Install the BOP (blow out preventer) and function tests same.
8. Install tool string for Drift Run in lubricator and stab it on BOP. (Dummy tool, see appendix 4).
9. Open the well (excl. WV4 and WV5) in order to leak test lubricator and BOP. (+/- 5 minutes)
10. Run in hole to maximum depth (gas/brine interface) and record time
11. Pull out of hole and run tools into lubricator
12. Close Swab Valve (SV3)
13. Bleed down pressure from lubricator
14. Disconnect Lubricator at BOP and uninstall Drift Run tools

3.6 Sampling Operation

The zero point for the depth counter is taken at the Ground Level (GL).

Note: The clock for the sampler shall be set to: Time to TD of drift run plus 15 minutes

15. Make up Toolstring for Sampling Run No. 1 in Lubricator and stab on BOP
16. Open the well in order to leak test lubricator and BOP. (+/- 5 minutes)
17. Run in hole to gas/brine interface = sampling depth. Watch weight indicator closely (Sampling tool, see appendix 5).
18. Wait for min. 25 Minutes to allow the sampler to close
19. Pull out of hole and run tools into lubricator
20. Slowly bleed down pressure from lubricator. Note: It is essential to bleed off the lubricator slowly to avoid loosing a substantial part of the sample!
21. Disconnect Lubricator at BOP and uninstall Sampler. Note: It is essential to keep the sampler in a vertical position until the sample tube has been retrieved!
22. Retrieve the sample tube
23. Visual inspect sample and label / take photo / transfer if required
24. Redress sampler and prepare for Sample Run No. 2
25. Follow operation as described from Point 15 to 24
26. Rig Down Pressure control equipment incl. Well Head Adapter Flange
27. Install Tree Cap Adapter

3.7 TO-05

3.7.1 Well Status

The cavern has been filled with natural gas and is ready for production for the winter.

3.7.2 Well details

Well details:
 Maximum well head pressure: 185.8 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (9-5/8"): 1173.5 m MDGL
 Tubing shoe: 1205.4 m MDGL
 Deepest point of the cavern: 1548.9 m MDGL
 Maximum temperature (1997): 42.0 °C @ 1360 m MDGL

3.8 TO-06

3.8.1 Well Status

The cavern has been filled with natural gas and is ready for production for the winter.

3.8.2 Well details

Well details:
 Maximum well head pressure: 185.8 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (9-5/8"): 1148,8 m MDGL
 Tubing shoe: 1130,7m MDGL
 Deepest point of the cavern: 1552 m MDGL
 Maximum temperature (1997): 42.0 °C @ 1362 m MDGL

3.9 TO-07

3.9.1 Well Status

The cavern has been filled with natural gas and is ready for production for the winter.

3.9.2 Well details

Well details:
 Maximum well head pressure: 194.0 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (13-3/8"): 1343.0 m MDGL
 Tubing shoe: 1330.7 m MDGL
 Deepest point of the cavern: 1688.7 m MDGL
 Maximum temperature (1997): 45.2 °C @ 1630 m MDGL

3.10 TO-08**3.10.1 Well Status**

The cavern has been filled with natural gas and is ready for production for the winter.

3.10.2 Well details

Well details:
 Maximum well head pressure: 159.5 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (13-3/8"): 1004.7 m bgl
 Tubing shoe: 988.5 m bgl
 Deepest point of the cavern: 1348. 6 m bgl
 Maximum temperature (1997): 39.0 °C @ 1300 m bgl

3.11 TO-09**3.11.1 Well Status**

The cavern has been filled with natural gas and is ready for production for the winter.

3.11.2 Well details

Well details:
 Maximum well head pressure: 155.9 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (13-3/8"): 1012.9m bgl
 Tubing shoe: 944.68 m bgl
 Deepest point of the cavern: 1310.4 m bgl

3.12 TO-10**3.12.1 Well Status**

The cavern has been filled with natural gas and is ready for production for the winter.

3.12.2 Well details

Well details:
 Maximum well head pressure: 155.9 bar (10/31/07)
 Well Head Adapter Flange Type: Gate Valve type FC 7 1/16"
 Min. Restriction: ID 6.375" 3M
 Cemented casing shoe (13-3/8"): 943.5 m bgl
 Tubing shoe: 929.1 m bgl
 Deepest point of the cavern: 1262m bgl

3.13 Sample collection

The cavern sequences will be determined on site. Two samples from each of the caverns TO-5 – TO-10 will be collected at the gas brine interface. The sample shall be labelled with:

- Well number
- Sample number (1 or 2)
- Date and depth
- KBB will do documentation on site during the process, with assistance from the client representative

3.1.4 Sample analysis

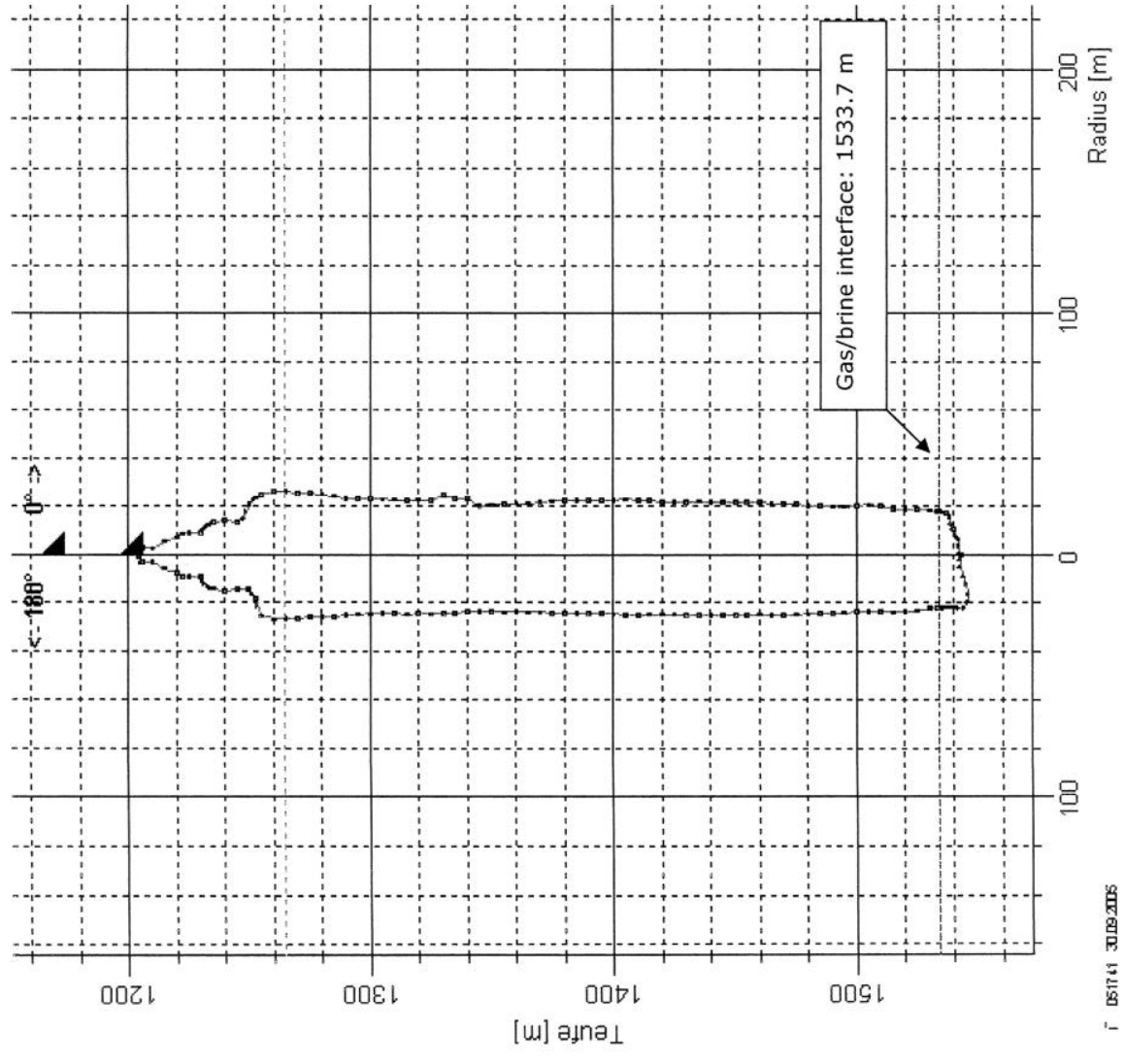
One set of samples from each cavern will be transported to Weßling laboratories in Germany by Schlumberger. Identical samples will be stored by Energinet.dk. Analysis results shall be provided in English. Detection limits shall be given

4 Appendices

- Appendix 1: Sonar surveys TO-5 – TO-10
- Appendix 2: X-mas tree TO-5 – TO-10
- Appendix 3: Completion schematic TO-5 – TO-10
- Appendix 4: Tool for dummy run
- Appendix 5: Sampling tool

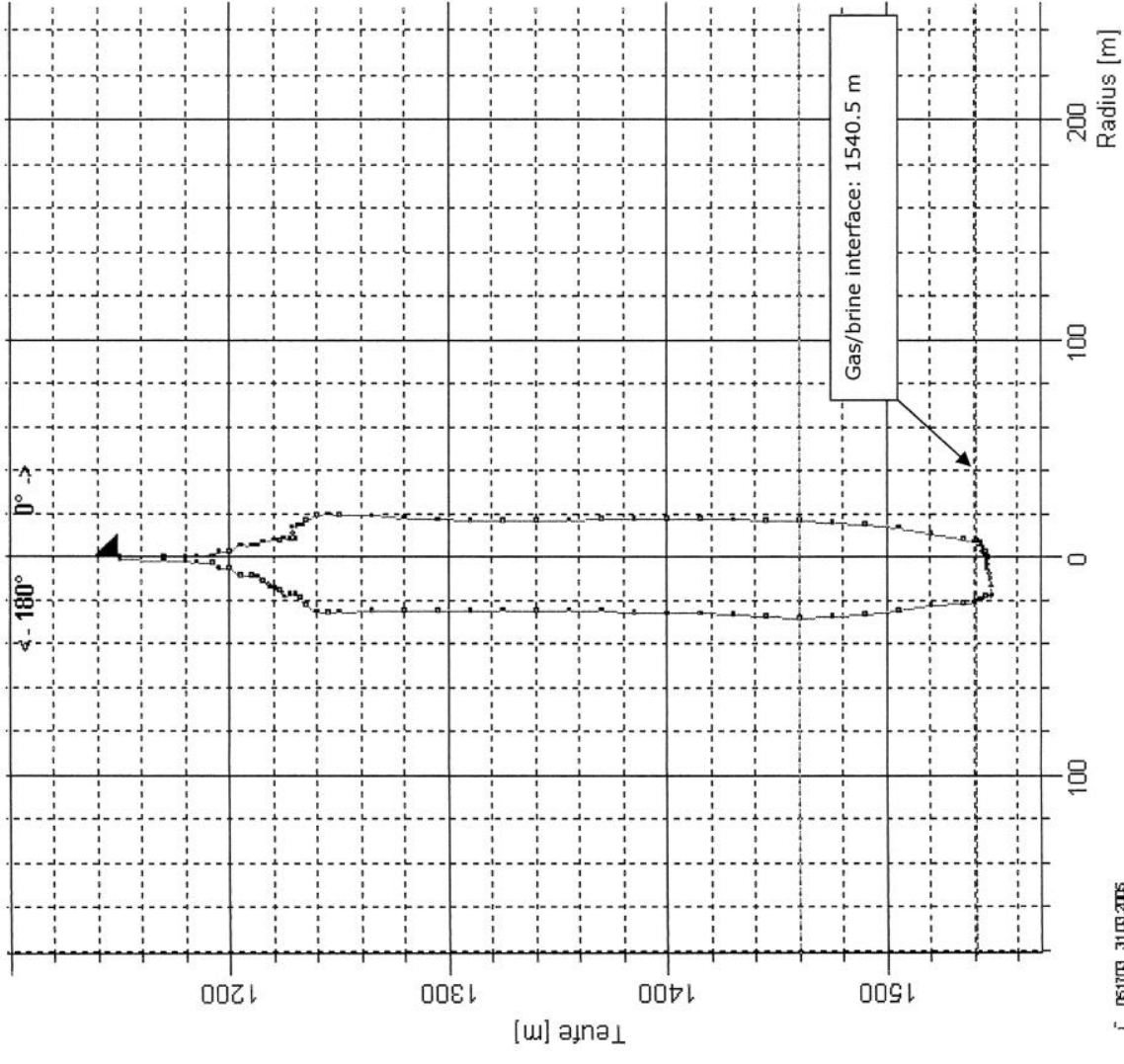
Appendix 1: Sonar surveys

Cavern TO-5
Sonar survey 30-09-2005



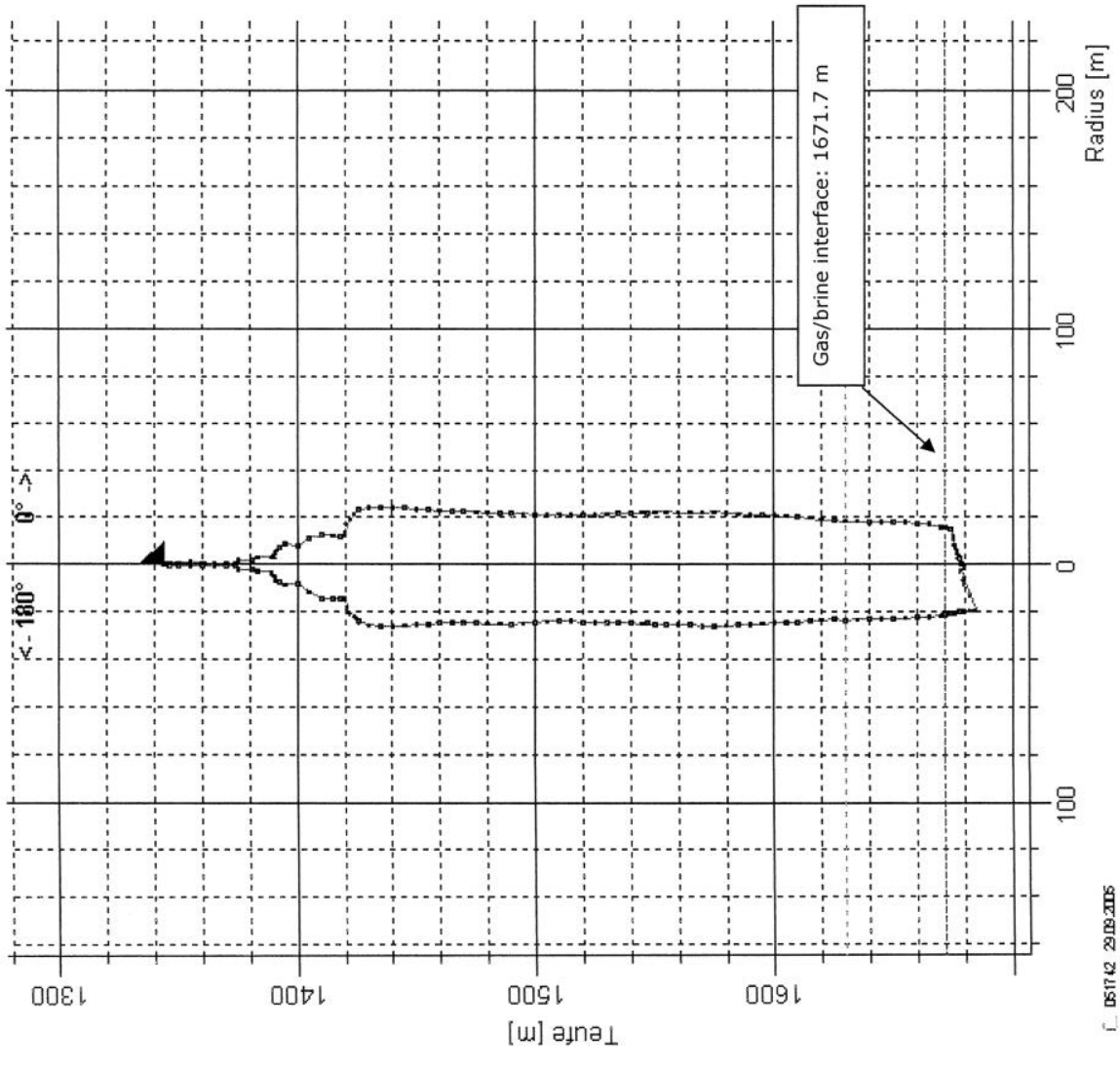
Cavern TO-6

Sonar survey 31-03-2005



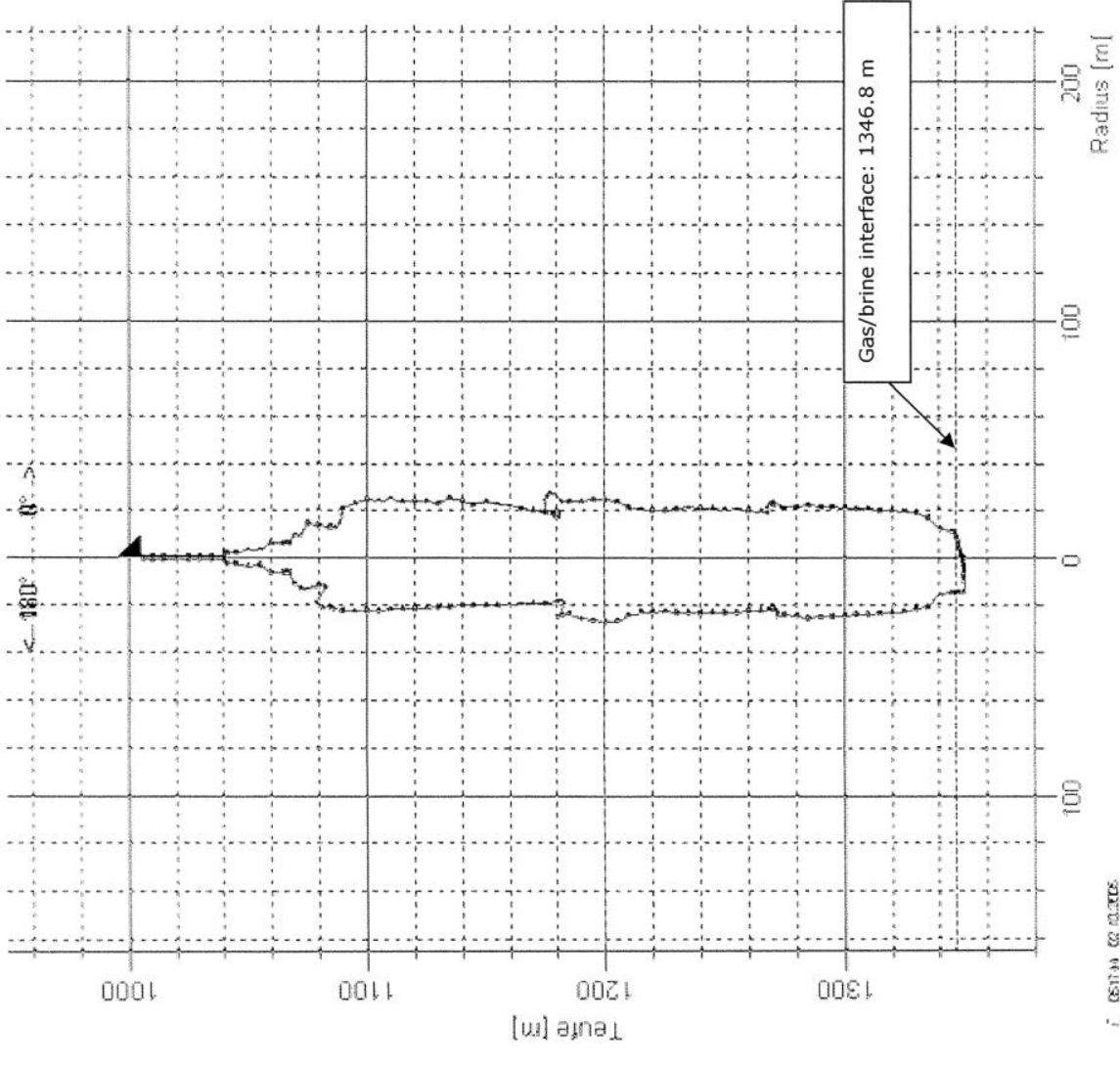
Cavern TO-7

Sonar survey 27-09-2005



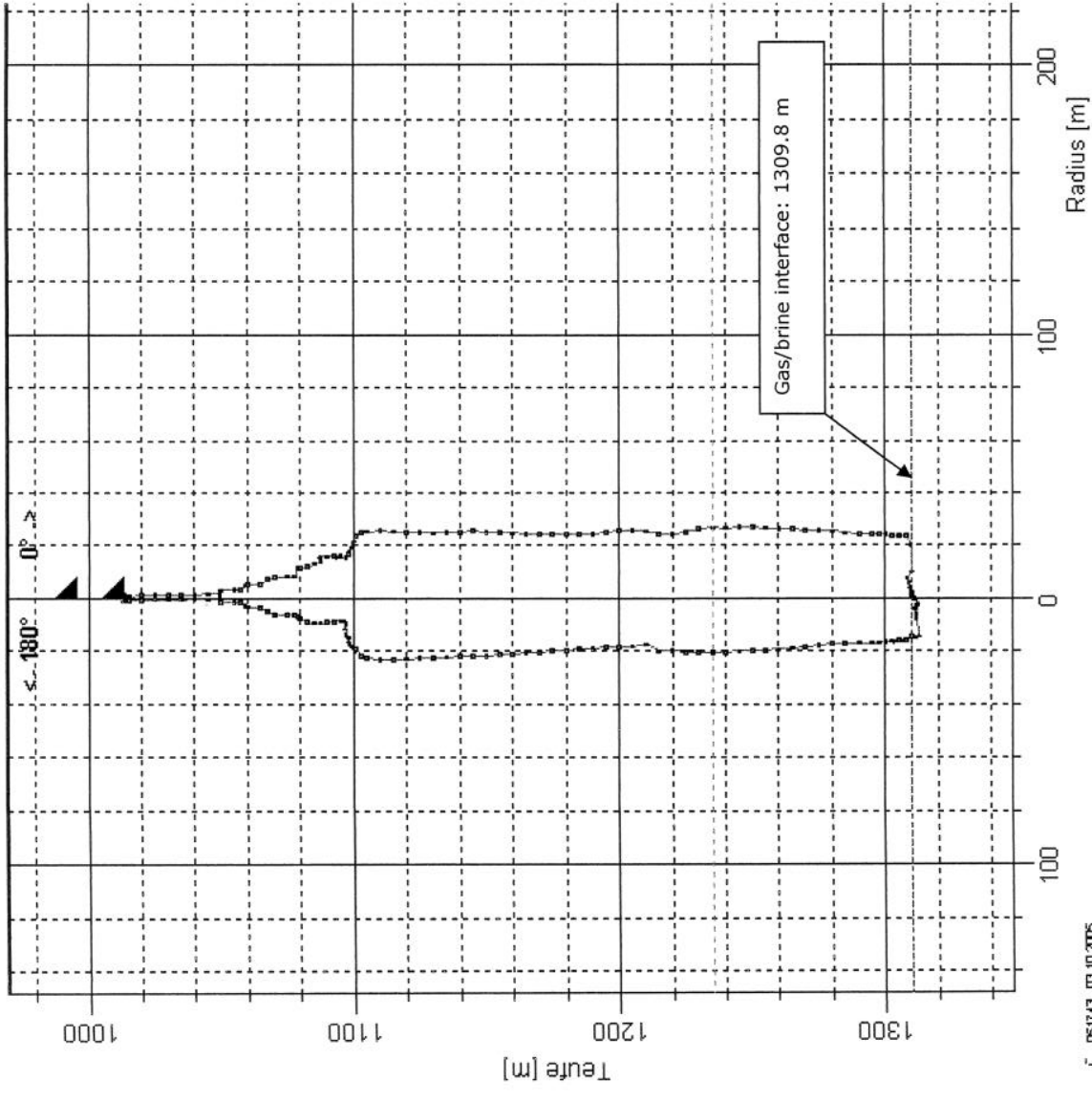
Cavern TO-8

Sonar survey 02-10-2005



Cavern TO-9

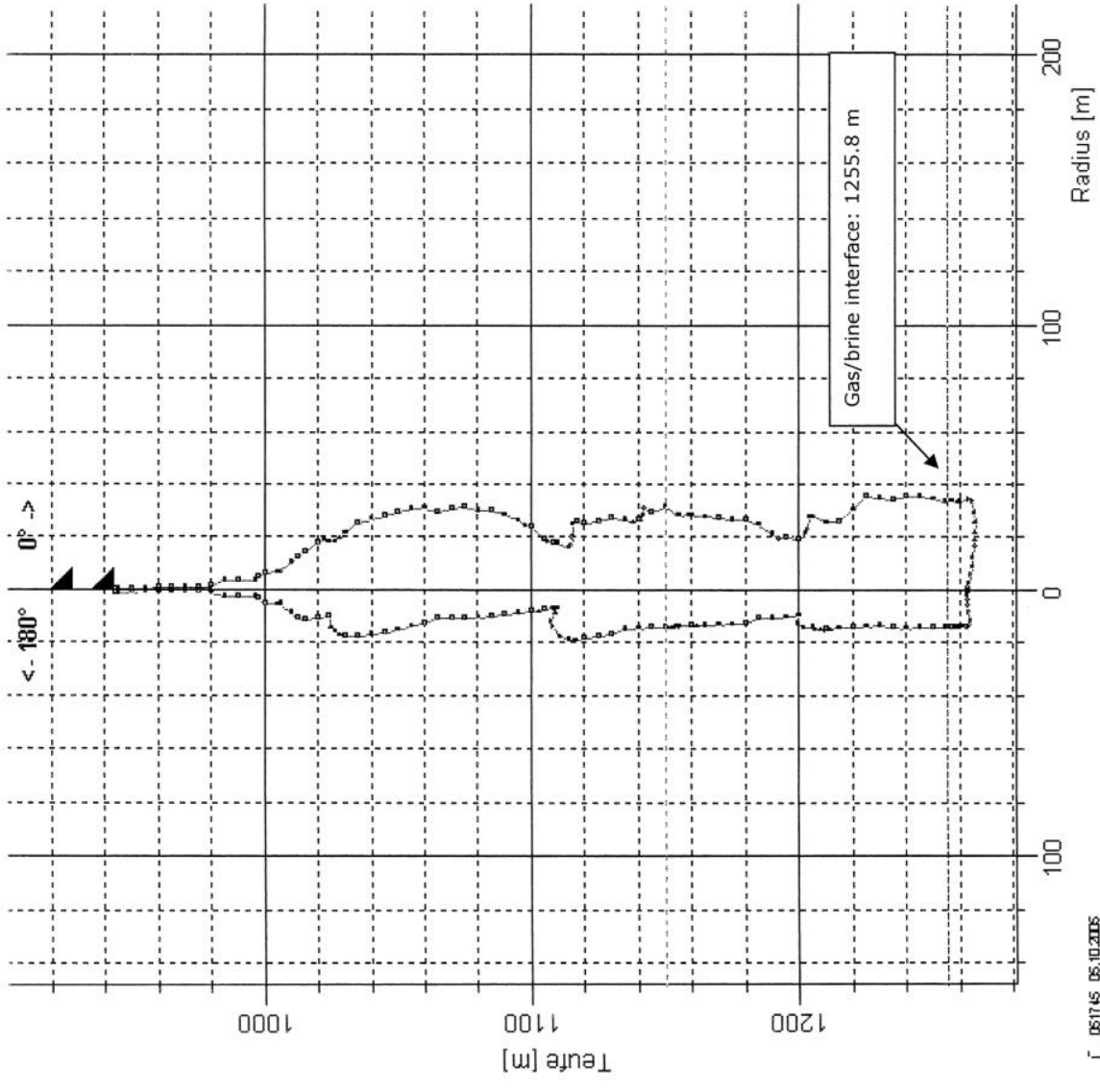
Sonar survey 03-10-2005



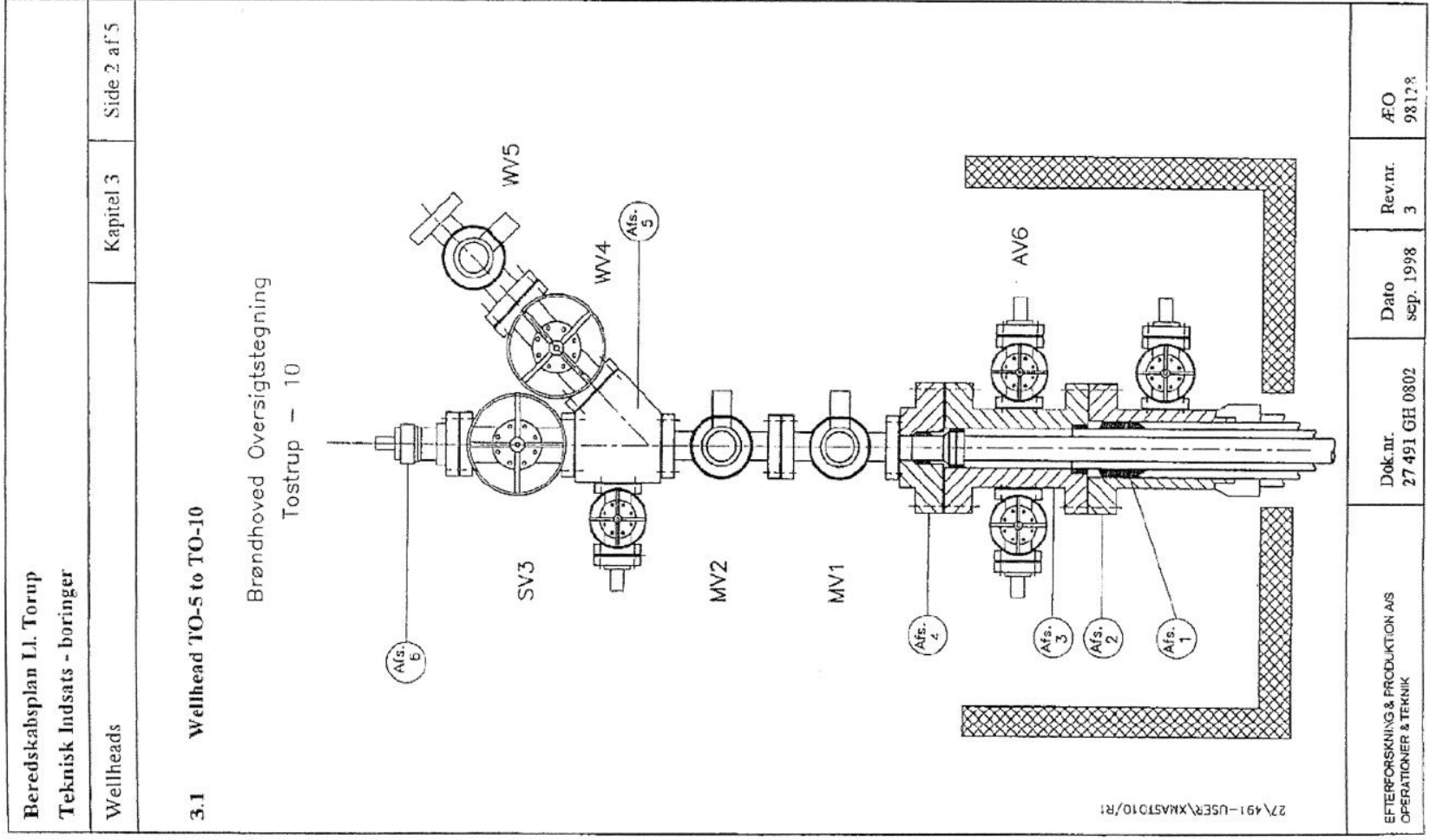
1. 051143 03.10.2005

Cavern TO-10

Sonar survey 05-10-2005



Appendix 2: X-mas tree for TO-5 - TO-10



Beredskabsplan L.L. Tårup		Kapitel 3	Side 3 af 5
Teknisk Indsats - boringer			
Wellheads			
Gas Cavern Christmas Tree			
Item	Description	Size	Stock/part no.
Cameron Equipment List.			
Afsn. 1	Casing Hanger		
Afsn. 2	Casing Head	21 1/4" x 2M 27 r	
Afsn. 3	Casing Head Spool	21 1/4" x 13 5/8" 3M 12.626" bore	656758-01-00-00
Afsn. 4	Adapter Spool Type F	7.087" bore 3M	656767-01-00
MV1	11" Ball valve with secondary seal. Hydro-pneumatic actuator	10" 3M	505799-90-21-00
MV2	11" Ball valve with secondary seal. Hydro-pneumatic actuator	10" 3M	505799-90-21-00
Afsn. 5	Spe. Tubing Head Spool. 45° 7/16" Side outlet and 90° 2 1/16" side outlet	3M	656788-01-00-00
SV3	Gate Valve type FC 7 1/16"	ID 6.375" 3M	638074-01-00-00
WV4	Gate Valve type FC 7 1/16" P & F prox. Switches	ID 6.375" 3M	638065-01-00-00
WV5	Automatic Safety Valve Type FC 7 1/16"	ID 6.375" 3M	618087-10-02-03
Afsn. 6	7 1/16" API, 3M, RTJRX-45 with 4 1/2" EUE 8rd Pck Up Thread Top	ID 4.45" 3M	656740-01-00-00
AV6	Gate valve Type FC 2 1/16"	ID 2.0625" 3M	697331-10-01-00

EFTEFORSNING & PRODUKTION A/S
OPERATIONER & TEKNIK

Dok.nr.
27 491 GH 0802

Dato
sep. 1998

Rcv.nr.
3

AEO
98128

Lille Torup
 Well: TO-06 (Main Wellbore)
 Compl.: 1.00 Tub.Inst.Date: 20-04-1
 Page 1 of 1
 TO-06 Completion Schematic
 Prep. by: AST Date: 23-04-2005
 Rev.: 1.07 Opr.Fin.Date: 24-04-1986

Rig: BJR-800 Status: Gas Injector/WI
 Remark: Note 1: Gas Storage Land Well Completed with 9.625" tubing (Cavern).

MID [RKB]	Symbol	Symbol Extra Info	Length [m]	Angle [Deg]	TVD [m]	ID [inch]	Description	Comment
4.50			0.50		8.76	8.76	Tubing Hanger	
5.00			1102.67			8.76	9.625" Tubing 43.5 ppf	
Casing: 13.625-4.59 861.10								
1107.57			10.65			8.60	9.625" Travel Joint	
1118.32			1.59			8.50	9.625" Internal Seal Unit	
1119.91			0.77			8.50	13.625" OTIS HB Perm. Production Packer	
1120.58			3.43			8.50	9.625" Mill-out Extension	
1124.11			0.29			8.50	9.625" x 7" X-over	
1124.40			4.60			6.28	7" Pup Joint	
1129.00			0.63			5.96	7" Landing Nipple Type "S1" "S2"	
1129.63			4.70			6.28	7" Pup Joint	
1134.33			0.63			5.96	7" Landing Nipple Type "S1" "S2"	
1134.96			0.22			5.77	7" No-Go Ring	
1135.16			0.34			6.26	7" Bell Guide	
1135.52								

Casing: 13.625 851.10 - 1195.00
 TD: 1613.80m

Perforation

Zone	Start	End	Depth	Perforation	Shoal	Base Seat	Date Closed
1	1135.52	1135.52	1135.52				

Completion Data

Item	Value	Unit	Max/Min
90 TVD	1613.80	m	1613.80
90 MD	1613.80	m	1613.80
Top of H/L/O	1135.52	m	1135.52
Full Depth	1135.52	m	1135.52
Up-Data Weight	43.5	ppf	43.5
Plunger ID	4.5	inch	4.5

Completion History

Date	Comment
24-04-1986	Zone 1 Completion Operator
17-08-1987	Zone 2 Run Start Survey in Cavern from 1135.16 to 1135.52
17-08-1987	Zone 2 Run Start Survey in Cavern from 1135.16 to 1135.52
25-05-1988	Zone 2 Run Start Survey in Cavern
30-10-1988	Zone 5 Run Start Survey including High Precision Station in well
17-01-1989	Zone 5 Run Start Survey including High Precision Station in well
02-04-1992	Zone 7 Run Start Survey including High Precision Station in well
05-07-1994	Zone 8 Run Start Survey in Cavern

Lille Torup		TO-07 Completion Schematic		Page 1 of 1	
Well: TO-07 (Main Wellbore)		Prep. by: STHA Date: 13-09-2004		Rev.: 1.07 Opr.Fin.Date: 04-11-1988	
Rig: BIR-800 Status: Gas Injector/WI		Length		TVD	
MD (RKB) Top [m]	Symbol	[m]	[Deg]	[RKB]	[m]
	Extra Inf				
4.40		0.72		8.76	Tubing Hanger
5.12		11.38		8.76	9.625" Tubing 43.5 ppf
16.50		5.84		8.76	9.625" Pup Joint 43.5 ppf
22.34		1237.51		8.76	9.625" Tubing 43.5 ppf
1259.85		1.81		8.76	9.625" Pup Joint 43.5 ppf
1261.66		11.45		8.60	9.625" Travel Joint
1273.11		2.88		8.76	9.625" Pup Joint 43.5 ppf
1275.99		39.05		8.76	9.625" Tubing 43.5 ppf
1315.04		3.77		8.76	9.625" Pup Joint 43.5 ppf
1318.81		0.53		7.55	9.625" Packer Seal Assy
1319.34		2.20		7.50	13.375" OTIS "WD" Perm. Production Packer
1321.54		2.77		8.60	9.625" Mill-out Extension
1324.31		0.28		6.29	9.625" x 7.0" X-over
1324.59		4.61		6.28	7.0" Pup Joint 26 ppf
1329.20		0.62		5.97	7" S2 Landing Nipple
1329.82		4.58		6.28	7.0" Pup Joint 26 ppf
1334.40		0.62		5.97	7" S1 Landing Nipple
1335.02		0.36		6.26	7" Bell Guide
1335.38					

Case: 13.375.4.50 964 70

Case: 13.375.984 70 - 1345 00

TD: 1637.30m



Lille Torup
Well: TO-08 (Main Wellbore)
Compl.: 1.00 Tub.Inst.Date: 02-05-1
Rig: BIR-8085 Rambler Status: Gas

Remark: According to the Completion Report one of the landing nipples is not installed. Which one is not known.

MD [RKB] Top [m]	Symbol	Symbol Extra Info	Length [m]	Angle [Deg]	TVD [RKB] [m]	ID [inch]	Description	Comment
5.19			0.38		8.76		Tubing Hanger	
5.37			953.35		8.76		9.625" Tubing 43.5 ppf	
963.72			7.86		8.60		9.625" Travel Joint	
971.58			0.44		8.50		9.625" Internal Seal Unit	
972.02			2.55		8.50		13.625" OTIS HB Perm. Production Packer	
974.57			2.81		8.50		9.625" Mill-out Extension	
977.38			0.28		8.50		9.625" x 7" X-over	
977.66			4.90		6.28		7" Pup Joint	
982.56			0.63		5.97		7" S2 Landing Nipple	
983.19			4.60		6.28		7" Pup Joint	
987.79			0.63		5.97		7" S1 Landing Nipple	
988.42			0.22		5.77		7" No-Go Ring	
988.64			0.34		6.26		7" Bell Guide	
988.98								

Casing 13.376 S 16 642 50

Casing 13.376 S4269 1000.20

TD: 1423.00m

Completion History
Date Comment
08-10-2004 Note 1: Well completed
23-05-1986 Note 2: Run Survey Survey to level, level two steps
23-05-1986 Note 3: Run METT Log Corrosion Log, from 500 m depth to surface
25-05-1986 Note 4: Run Survey Survey in Casing
08-10-2004 Note 5: Run METT Log from 500 m depth to surface
01-02-1985 Note 6: Run Survey Survey in Casing

Completion Data
TOVID m TOVD m Max deviation
TOVID m TOVD m Min depth
Top of hole m TOVD m Av. angle thru job
SFE deg SFE deg SFE deg
Updown weight Max weight
Sector size Production rate

Casing
Size Top ID Set ID Min ID Max ID
inch inch inch inch
5.91 5.19 4.83 4.57
18.63 5.19 224.40 136.21 11.10 K-55
13.38 5.19 842.00 107.15 12.35 H-50
13.38 6.425 1000.00 128.09 11.22 H-50

Formation
Interval MD Top MD Bottom
Zone m m m m
Shale Gas Sand Basic Chert

Lille Torup
 Well: TO-09 (Main Wellbore)
 Compl.: 1.00 Tub.Inst.Date: 10-11-1
 Rlg: BIR-8085 Rambler Status: Gas

TO-09 Completion Schematic
 Prep. by: AST Date: 10-10-2004
 Rev.: 1.06 Opr.Fin.Date: 15-11-1985

MD [RKB]	Symbol	Symbol Extra Info	Length [m]	Angle [Deg]	TVD [RKB] [m]	ID [inch]	Description	Comment
5.21			0.18			8.76	Tubing Hanger	
5.38			969.85			8.76	9.625" Tubing 43.5 ppf	
975.24		Casing 13 375 5.21 - 531.80						
983.14			7.90			8.60	9.625" Travel Joint	
983.58			0.44			8.50	9.625" Internal Seal Unit	
			2.55			8.50	13.625" OTIS HB Perm. Production Packer	
986.13			2.75			8.50	9.625" Mill-out Extension	
988.88			0.28			8.50	9.625" x 7" X-over	
989.16			4.70			6.28	7" Pup Joint	
993.86			0.63			5.97	7" S2 Landing Nipple	
994.49			4.45			6.28	7" Pup Joint	
998.94			0.63			5.97	7" S1 Landing Nipple	
999.57			0.33			6.26	7" Bell Guide	
999.90								

Completion History

Date	Comment
15-11-1985	Note 1: Gas Shutoff Valve completed
15-08-1985	Note 2: Run Gravimetric Measurement at completion
15-08-1987	Note 3: Run Seal Survey in Well, over top days.
15-10-1989	Note 4: Run METLOG from 596.0 m MDRT to surface
08-10-2001	Note 5: Run Seal Survey in Well
01-10-2002	Note 6: Run METLOG from 999.9 m MDRT to surface
02-10-2002	Note 7: Run Seal Survey in Well

Perforation

Zone	Start	End	Depth	Interval	Class
1	13 375	531.80	1618	10	

TD 1456.00m

Completion Data

PRG	MD	TV	W	W	W	W	W	W	W
13 375	531.80	1618	10	10	10	10	10	10	10

Casing

Size	Top MD	Bot MD	Norm	WT	ID	Multi	Spec	Interface
8.76	5.21	13 375	13 375	43.5	8.76	43.5	43.5	Weld
8.60	975.24	983.14	17.76	17.76	8.60	17.76	17.76	ETC
8.50	983.58	999.90	12.35	12.35	8.50	12.35	12.35	ETC
6.28	994.49	998.94	12.25	12.25	6.28	12.25	12.25	ETC

Lille Torup
 Well: TO-10 (Main Wellbore)
 Compl.: 1.00 Tub.Inst.Date: 31-12-1
 Rigr: BJR-8085 Rambler Status: Gas
 Prep. by: AST Date: 23-10-2004
 Rev.: 1.05 Opr.Fin.Date: 31-12-1988

Page 1 of 1

TO-10 Completion Schematic

MD (RKB) Top [m]	Symbol	Symbol Extra Info	Length [m]	Angle [Deg]	TVD (RKB) [m]	ID Description	Comment Asss
4.94			0.72		8.76	Tubing Hanger	
5.66			851.75		8.76	9.625" Tubing 43.5 ppf	
857.41		Casing 13.375 x 18 560 18	2.91		8.76	9.625" Pup Joint 43.5 ppf	
860.32			11.15		8.60	9.625" Travel Joint	
871.47			3.04		8.76	9.625" Pup Joint 43.5 ppf	
874.51			39.09		8.76	9.625" Tubing 43.5 ppf	
913.60			3.86		8.76	9.625" Pup Joint 43.5 ppf	
917.46			0.62		7.55	9.625" Packer Seal Assy	
918.08			2.25		7.50	13.375" OTIS "WD" Perm. Production Packer	
920.33			2.85		8.60	9.625" Mill-out Extension	
923.18			0.30		6.29	9.625" x 7.0" X-over	
923.48			4.91		6.28	7.0" Pup Joint 26 ppf	
928.39			0.62		5.97	7" S2 Landing Nipple	
929.01			4.61		6.28	7.0" Pup Joint 26 ppf	
933.62			0.63		5.97	7" S1 Landing Nipple	
934.25			0.36		6.26	7" Bell Guide	
934.61							

Completion Notes
 Date: 23/10/04
 1-12-1988 Note 1 Gas Storage Well (Cavern) completed. Exact date unknown
 2-08-1997 Note 2 Run Stair Survey in Cavern
 25-08-1997 Note 3 Run Stair Survey in Cavern
 28-10-2002 Note 4 Run Stair Survey in Cavern
 02-11-2002 Note 5 Run 662 11-4.09 from end of nipple to surface
 04-12-2002 Note 6 Run Stair Survey in Cavern

Directional
 Interval MD Exp. MFD Interval Crossing Street Date Start Date Close
 Zone m m m Deg

TO 1994.00m

Completion Data

Symbol	WD	Max Diameter
917.46	100	100
918.08	100	100
920.33	100	100
923.18	100	100
923.48	100	100
928.39	100	100
929.01	100	100
933.62	100	100
934.25	100	100
934.61	100	100

Casing

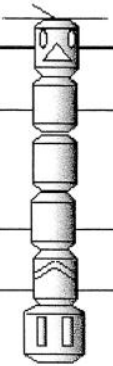
Size	Top MD	Bottom MD	Length	Weight	Grade	Notes
13.375	5.66	857.41	851.75	17.78	43.5	W40
9.625	4.94	5.66	0.72	14.35	43.5	W40
9.625	857.41	860.32	2.91	14.35	43.5	W40
9.625	860.32	871.47	11.15	14.35	43.5	W40
9.625	871.47	874.51	3.04	14.35	43.5	W40
9.625	874.51	913.60	39.09	14.35	43.5	W40
9.625	913.60	917.46	3.86	14.35	43.5	W40
9.625	917.46	918.08	0.62	14.35	43.5	W40
9.625	918.08	920.33	2.25	14.35	43.5	W40
9.625	920.33	923.18	0.30	14.35	43.5	W40
9.625	923.18	923.48	4.91	14.35	43.5	W40
9.625	923.48	928.39	0.62	14.35	43.5	W40
9.625	928.39	929.01	4.61	14.35	43.5	W40
9.625	929.01	933.62	0.63	14.35	43.5	W40
9.625	933.62	934.25	0.36	14.35	43.5	W40
9.625	934.25	934.61		14.35	43.5	W40

Appendix 4: Tool for dummy run

Client :	Energinet.dk	Rig :	Schlumberger
Field:	Li. Torup	Date:	
Well :		Run No. :	









Temperature :	Grad Celsius	Casing :	
Deviation :		Liner :	
Zone :		Cushion weight :	
Sand :		Mud weight :	FT: Sven Schmöckel

Tool String	Description		OD (mm)	ID (mm)	Box	Pin	Length (m)
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	SL Rope Socket	SLB	44,00		Wire	PCE Quicklock	0,200
	Stem 1.78 "	SLB	44,00		PCE Quicklock	PCE Quicklock	1,500
	Stem 1.78 "	SLB	44,00		PCE Quicklock	PCE Quicklock	1,500
	Stem 1.78 "	SLB	44,00		PCE Quicklock	PCE Quicklock	1,500
	Mechanical Jar	SLB	44,00		PCE Quicklock	PCE Quicklock	2,200
	Gauge Ring 130 mm	SLB	130,00		PCE Quicklock		0,200
							Final Length: 7.10

Appendix 5: Sampling tool

Client :		Rig :		Schlumberger
Field:		Date:		
Well :		Run No. :	5 " Sampler	
Temperature :	Grad Celsius	Casing :		
Deviation :		Liner :		
Zone :		Cushion weight :		
Sand :		Mud weight :		FT: Sven Schmöckel

Tool String	Description	OD (mm)	ID (mm)	Box	Pin	Length (m)
	SL Rope Socket	SLB 44,00		Wire	PCE Quicklock	0,200
	Stem 1.78 "	SLB 44,00		PCE Quicklock	PCE Quicklock	1,500
	Stem 1.78 "	SLB 44,00		PCE Quicklock	PCE Quicklock	1,500
	Stem 1.78 "	SLB 44,00		PCE Quicklock	PCE Quicklock	1,500
	Mechanical Jar	SLB 44,00		PCE Quicklock	PCE Quicklock	2,200
	Memory Temp. Pressure Gauge (WCOR)	SLB 31,00		PCE Quicklock	15 /16" SR	2,000
	Time Activator for Sampler	SLB 40,00		15 /16" SR	15 /16" SR	1,000
	5" Sampler	SLB 127,00		15 /16" SR	Lower Head	2,710
Final Length: 12,61						