MUSTANG

A MUltiple Space and Time scale Approach for the quaNtification of deep saline formations for CO2 storaGe

Project Number:227286

Work-Package: WP02

WP Title

Site Characterization

Deliverable D024

Data files describing the conceptual model for each test site for the computational model

23 March 2012

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RE	Restricted to the consortium members, the SIRAB, the end-users and the EU officers	
CO	Confidential (only the consortium and the EU officers)	

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Deliverable name	**Data files describing the conceptual model for each test site for the computational model**
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Executive summary

This deliverable includes a comprehensive summary on the available data sets from the five sites included in the MUSTANG site characterization programme. The aim of the deliverable is to give a comprehensive description on type of data, data format, availability, maintenance, and data hosting organisation for the different sites. This metadata deliverable is intended to be a guidance document giving an overview of the existing data sets, which facilitates the process of data retrieval for various studies. The amount of data, data gaps and descriptions of the sites has previously been presented in deliverables D022 and D023.

Keywords	Data files, format, availability, hosting organization, meta data, Mustang sites

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1. Introduction

The deliverable D024 includes a description of existing data sets from the five MUSTANG test sites, i.e South Scania (Sweden), Horstberg (Germany), Valcele (Romania), Hontomín (Spain) and Heletz (Israel). The data itself has been compiled and presented in previous deliverables of the WP02, i.e. primarily the D023 deliverable in august 2011. Much of the existing and gathered data from the different sites is repeatedly communicated with the modeling work package (WP07) as well as input to the work package dealing with the Decision Support System (WP09). This process will continue throughout the MUSTANG project. The gathered data will thereafter be maintained by the hosting partner for at least 2 years after termination of the MUSTANG project.

The aim of the deliverable is to give a comprehensive description on type of data, data format, availability, maintenance, and data hosting organisation for the different sites. This meta-data is intended to be a guidance document giving an overview of the data sets, which facilitates the process of data retrieval for various studies.

2. Data files describing the conceptual geological and existing parameters from the investigated sites

2.1 Data files describing the South Scania site, Sweden

The characterization of the ca. 1000 km^2 large South Scania site is primarily based on information from a great variety of data sets from older hydrocarbon prospecting campaigns including 2D seismic surveys, well information (lithologs, wire-line logs) and various petrological, physical and chemical analyses on rock samples and formation fluids. Information from 15 deep older wells penetrating the seal and target aquifers are included in the data set.

Main part of the information from these older wells is primarily in analogue format. The analogue data is publically available at the archives at the Geological Survey of Sweden (SGU). In addition to these wells there are two relatively new wells (FFC-1 and FFC-2) drilled by E.ON for geothermal purposes in a central position of the site area. Here a large amount of investigations have generated valuable digital information which constitutes an important reference data-set for the parameter database. The FFC-1 well is also used as a reference well for definition of the target layers included in the presented geological model.

Several geological studies have been performed within the site area, which contribute with valuable information on the correlation of the different units. A number of key papers are included in the data summary, table 2.1. The table furthermore includes a summary of existing data sets, formats, availability and who is maintaining and hosting the data.

In general the compiled and existing data describing the defined parameters according to the constructed templates are available in ASCII and excel-format as well as presented in tables included in the previous deliverables (D022 and D023).

The data describing the 3D geometric model has been constructed by the use of a GIS-application (MapInfo) in combination with the ENCOM Discover 3D software. The Swedish coordinate system RT 90 (2.5° Gon W) is used. All depths given are in metres below ground level. The individual surfaces (layers) and structures in the 3D model can be exported in various grid formats (Arc Ascii, Vertical Mapper, GeoSoft, ERMapper, Surfer binary, Mapinfo) and as dxf files.

A comprehensive summary of the data sets is given in table 2.1

2.2 Data files describing the Horstberg site, Germany

For test purposes the GEOZENTRUM of Hannover operates the borehole Horstberg Z1 since 2003 (an abandoned, about 4000 m deep gas well), which is located about 80 km northeast of Hannover. A large amount of investigations have been conducted in and around the Horstberg well after it had been released from the gas and oil industry.

Due to intensive 2-dimesional (2D) seismic profiling, carried out for oil and gas exploration during the years 1970–1988 the subsurface was identified as belonging to the geological saline Fassberg formation. The stratigraphy of the subsurface is typical for the north German basin. Data from the Dreilingen Z1 gas drilling, located only 800 m away, supports the geological model. Detailed 3D seismic profiling and interpretation of seismic surveys carried out by LIAG in the environment of Horstberg Z1 improved the accuracy of the results considerably and made a quantitative interpretation possible. The seismic data is stored in the archives of the LBEG (Landesamt für Bergbau, Energie und Geologie) and is not accessible to public. Maps, reports and depictions of the geological model are presented in several analogue and digital formats and are available to public.

Prior to hydraulic testing, an undisturbed temperature-depth profile was acquired down to the final depth of the well (4120 m) using the wire line equipment of the LIAG institute. For the final depth, a maximum temperature of 158°C was recorded. To test different concepts of geothermal energy exploitation in the sandstone layers of the middle Bunter (low Triassic) formations, the Detfurth and Solling sandstones (depth 3626–3926m) were hydraulically stimulated by several massive water injections. In particular it was shown by two dimensional hydraulic evaluations of the Detfurth that also in dense sedimentary rock large artificial fractures of the order of 10^5 m² could be created.

Despite the carrying out of micro seismic measurements, the quality of the signals was so poor, that no evidence for area and orientation could be derived. Supplementary geophysical measurements of the fracture geometry, such as tilt measurements and electromagnetic methods at the surface also did not yield evaluable results.

Data and evaluation of these tests are stored in the archives of LIAG and are available to the public. For all geographic maps the so called German Gauß Krüger Coordinate system (Deutsches Hauptdreiecksnetz DHDN http://www.crs-geo.eu) is used. All depths are given in metres below ground level. The individual surfaces (layers) and structures in the 3D model can be exported in pixel and pdf – formats.

Several geological and numerical studies have been performed within the site area. A number of key papers are included in the data summary table 2.2. The table additionally includes a summary of existing data sets, formats, availability and who is maintaining and hosting the data.

A comprehensive summary of the data sets is given in table 2.2

2.3 Data files describing the Vâlcele site, Romania

The Vâlcele area represents a Paleogene anticline which is covered by Badenians and Sarmatians deposits, as well as with Pliocene formations, all broadly molding and burrowing the structural shape of the Oligocene.

In the Vâlcele structure there are 241 boreholes drilled for hydrocarbon purposes. The deepest borehole (F5205), reaches a depths of 4656 m. Of these boreholes there are:

- 24 boreholes producing oil and associated gases,
- 11 boreholes producing associated gases and
- 7 boreholes producing free gases.

A new 2D seismic investigation was launched in 2009 and in 2010 a new 3D seismic model of the Vâlcele structure was constructed. There is now a detailed geological model showing the extension and position of the major faults and the occurrence of hydrocarbon productive traps and formations in the structure.

The 3D model is composed of two components:

1. a 3D model of the geometric structure (*Fig.1*) and,
2. a 3D parametric model of the porosity and permeability distribution (*Fig.2)*.

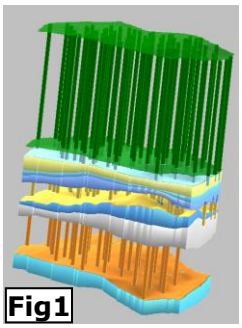
Fig1

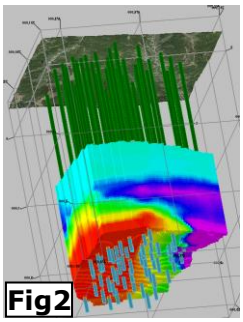
Fig2

The 3D models are based on information provided by:

- 3D seismic investigations
- borehole geophysics and
- well site logging and documentation.

Four different geological investigations have been performed within the Vâlcele site area, which contribute to the correlation of the ten complexes selected for the storage of CO_2. A number of key papers regarding the description of these complexes as well as the general site geology are included in the data summary table 2.3. The table also includes a summary of existing data sets, formats, availability and who is maintaining and hosting the data. In general the compiled and existing data describing the defined parameters according to the constructed templates are available in ASCII and excel-format as well as presented in tables included in the previous deliverables (D022 and D023).

The 3D models have been constructed by the use of Rockworks application and a relative metric coordinate system. The compiled and presented data can be exported in various grid formats (surfer type, excel type, ascii file etc.) and different raster files (tiff, Jpg).

A comprehensive summary of the data sets is given in table 2.3.

2.4 Data files describing the Hontomín site, Spain

The available geological data consist of:

1. Surface data: Geographic, geologic and other thematic maps, publicly available from central and regional Spanish authorities. Data quality is generally good, but scale is often restricted to 1:50000.
2. Seismic and structural data, and 3D information: Some 2-D seismic and other geophysical surveys from oil exploration activities, carried out in the 1960's to 1990's are available, but data quality is poor. New seismic, geoelectric and other geophysical surveys have been carried out during the last few years, with very good data quality and resolution.
3. Well reports and wire-line logs: Data from 4 oil exploration wells drilled between 1965 and 2007 at the storage site location is available, mostly as paper copies. The quality of the older copies is often poor. Data quality for the most recent well, Hontomin-4 which was drilled in 2007, is much better.
4. Physical and chemical parameters: Available rock samples are not from the storage reservoir and seal, but from surface outcrops of the corresponding formations. Quality of the analyses is good, but in-situ parameters of the actual target formations may be quite different. Storage formation fluid was obtained from well Hontomin H-2 in October-November 2010 at 1355m depth, and analysed in the lab. However, samples were not adequately preserved before analysis, so oxidation and precipitation reactions likely altered fluid chemistry.
5. Geological setting – key publications: A comprehensive review of available geological data was carried out in 2009 by the Institute of Earth Sciences "Jaume Almera" for the CIUDEN Foundation, in order to select suitable sites for its CO2 Geological Storage program. In this report, Hontomin was identified as the most suitable site.

A comprehensive summary of the data sets is given in table 2.4

2.5 Data files describing the Heletz site, Israel

The Heletz site located at the Southern Mediterranean Coastal Plain of Israel is selected as a test site for a small-scale CO_2 injection experiment within the MUSTANG project. To assist the planning of the experiment, as well as to provide input for a general site characterization, a 3D geological model of the potential CO_2 reservoir has been built.

The main sources of information on the site include drilling reports, well test data, well logs (wire-line and composite) and small cuttings and cores description and analysis from ~ 40 wells located within the Heletz site. The original data are available in analog form at the archives of the Geophysical Institute of Israel. In addition, wire-line well logs, well test data and core description and analysis are available in digital form.

A number of seismic lines from old 2D oil exploration surveys are also available.

The 3D model produced for the site describes the main geological features and petro-physical properties of the potential reservoir and cap rock layers. The overall well data quality was good to fair enabling reliable identification of the reservoir layers and spatial correlation of the layers between the wells. The spatial extension of the model is limited to the Heletz oil field (~5.5 km by 4.0 km) within the depth interval of -1300 to -1600 m. The model is represented by a set of maps and geological cross-sections describing the structural features (layers geometry, pinch-out lines, faults) and physical parameters (porosity, permeability, pressure, salinity) of the reservoir layers. The maps are represented in the Israel coordinate system (OIN). The depths are shown in meters below the MSL.

The model has been produced using HDS software for well log analysis and Golden software (Surfer, Strater and Grapher) for geological mapping. The graphical output is represented in JPG format whereas the digital output (map grids) is either in ASCII format (dat files) or in Surfer grid format (grd files).

A comprehensive summary of the data sets is given in table 2.5. The table specifies all the existing data sets, their formats, availability and who is maintaining and hosting the data. A number of key publications on the geological setting of the area are also included in the table.

Table 2.1 Summary of data sets, formats, availability and hosting organization for the South Scania site.

Data set	Data type	Format	Host and maintenance	Contact	Availability
Surface data					
Geological maps	Analogue and digital	Arc GIS shape Tiff, jpg. pdf	SGU	www.sgu.se	Public
Geographic data	Analogue and digital	Arc GIS shape Tiff, jpg. pdf	Lantmäteriet	www.lantmateriet.se	Public
Location of seismic survey lines and wells	Digital	Arc GIS	SGU	www.sgu.se	Public
Seismic and structural data and 3D information					
Site dimensions, thicknesses and areal extent	Template Table	Excel and word	SGU	-"-	Public, presented in D023
Processed 2D Seismograms, - regional OPAB campaigns 1970-1980 in Two Way Tine (TWT)	Analogue	Tiff, jpg	SGU	www.sgu.se	Public
Processed 2D seismograms –local EON survey around the FFC-1 well	Digital	SEGY	EON/SGU Sweden	M.Erlström Mikael.erlstrom@sgu.se	Restricted to Mustang project tasks
Local 3D processed data around the FFC-1 well (TWT and metric)	Digital	SEGY	EON/SGU	-"-	Restricted to Mustang project tasks
3D surfaces for identified layers and structures	Digital	various grid formats	SGU	-"-	Public, presented in D032
Well reports and wire-line logs					
Wire-line logs from the older 15 wells	Analogue	Tiff, jpg	SGU	www.sgu.se	Public
Well reports from the older 15 wells	Analogue	pdf	SGU	-"-	-"-
FFC-1/-2 wire-line logs	Digital	LAS	EON/SGU	M.Erlström Mikael.erlstrom@sgu.se	Restricted to Mustang project tasks

Table 2.1 (cont.)

FFC-1/-2 Well report	Analogue	pdf	-"-	-"-	-"-
FFC-1/-2 synthetic log interpretation	-"-	pdf	-"-	-"-	-"-
FFC-1/-2 Test report	-"-	Pdf	-"-	-"-	-"-
Physical and chemical parameters					
Cap rock properties, Numerical data	Template Tables	Excel and Askii	SGU	M.Erlström Mikael.erlstrom@sgu.se	Public, presented in D023
Reservoir properties, Numerical data	Template Tables	Excel and Askii	SGU	-"-	Public, presented in D023
Geological setting – key publications					
Basin analysis of the uppermost Triassic to Lower Cretaceous, Danish Basin Biostratigraphy and log correlation. 2011	Analogue	pdf	SGU/GEUS	M.Erlström Mikael.erlstrom@sgu.se S. Lindström sli@geus.dk www.sgu.se	Public

Table 2.2 Summary of data sets, formats, availability and hosting organization for the Horstberg site.

Data set	Data type	Format	Host and maintenance	Contact	Availability
Surface data					
Geological maps	Analogue and digital	Various Grid and CAD Formats, Arc GIS shape Pixel and PDF - formats	LBEG LGN	www.lbeg.niedersachsen.de www.fis-geophysik.de	Public
Geographic data	Analogue and digital	Various Grid and CAD Formats, Arc GIS shape Pixel and PDF- formats	LBEG LGN	www.lbeg.niedersachsen.de www.lgn.niedersachsen.de www.fis-geophysik.de	Public
Location of seismic survey lines and wells	Analogue and digital	Pixel and PDF- formats	LBEG	www.lbeg.niedersachsen.de	Public
Seismic and structural data and 3D information					
Site dimensions, thicknesses and areal extent	Table	Excel, Word, PDF	LIAG	LIAG	Public
Processed 2D Seismograms, - campaigns 1970-1988	Analogue and digital	SEGY	EXON Mobile LBEG,BEB LIAG	LBEG R.Sedlacek Robert.Sedlacek@lbeg.niedersachsen.de	Confidential
Processed 2D seismograms	Analogue and digital	SEGY	EXON Mobile LBEG LIAG	LBEG R.Sedlacek	Confidential

Table 2.2 (cont.)

Local 3D processed data in the environment of the Horstberg well	Analogue and digital	SEGY	EXON Mobile BEB LBEG LIAG	LBEG R.Sedlacek	Confidential
3D surfaces for identified layers and structures	digital	Pixel and PDF - Formats	LBEG LIAG	K.Kühne R.Reimann klaus.kuehne@liag-hannover.de	Public
Well reports and wire-line logs					
Y-Ray	Analogue	Pixel Formats	LIAG	T.Wonik, R.Schellschmidt	Public
Temperature log	Analogue and digital	Pixel Formats ASCII	LIAG	T.Wonik R.Schellschmidt	Public
Physical and chemical parameters					
Cap rock properties	Analogue and digital		LIAG	LIAG	confidential
Reservoir properties, for Bunter (Triassic) sandstone formations Detfurth and Solling	Analogue and digital	EXCEL ASCII PDF	LIAG	H.Sulzbacher Hans.Sulzbacher@liag-hannover.de	
Hydraulic parameters Thermal parameters Heat transport parameters (Bunter sandstone formations)	Analogue and digital	EXCEL ASCII PDF	LIAG	H.Sulzbacher	Public
Tracer test results (2004-2006) (Bunter sandstone formations)	Analogue and digital	EXCEL ASCII PDF	LIAG	Prof. M.Sauter M.Sauter@uni-göttingen.de	Public
pumping test results (Bunter sandstone formation)	Analogue and digital	GRAPHER	LIAG	H.Sulzbacher	Public

Table 2.2 (cont.)

Geological setting – key publications			
Structural geological Model	Structural model of the Inversion structure FASSBERG interfered from 3D seismic data	LIAG F.Binot Franz.Binot@Liag-Hannover.de	public
Overview on site and data Description of methods Description of water frac technik	Verbundprojekt: GeneSys Vorstudie .- Erprobung der Wasser-frac-Technik und des Einsonden–Zweischicht Verfahrens für die Direktwärmenutzung aus gering permeablen Sedimentgesteinen Abschlussbericht zum Vorhaben FKZ 327 112 & 0327116 Juli 2006	R.Jung, J.Orzol, P.Kehrer, R.Jatho	public
Description of methods and results	Verbundprojekt: GeneSys Horstberg II Methoden und Konzepte zur Erdwärmegewinnung aus gering permeablen Sedimentgesteinen Abschlussbericht zum Vorhaben FKZ 0329995 Dezember 2009	R. Schellschmidt A. Hesshaus H. Sulzbacher R. Junker T. Tischner R. Jatho	public
In Situ hydraulic fracturing of Detfurth and Solling sandstone formations	JUNG, R., ORZOL, J., KEHRER, P., JATHO, R. (2006): Verbundprojekt GeneSys: Vorstudie–Erprobung der Wasserfrac-Technik und des Einsonden-Zweischichtverfahrens für die Direktwärmenutzung aus gering permeablen Sedimentgesteinen. - BGR/LIAG Abschlussbericht zum Vorhaben FKZ 0327112 & 0327116, 70 S.; Hannover		public
Laboratory investigations of self propping in structured sedimentary rocks	Renner (2008) Experimentelle und numerische Untersuchungen zum Selbststützungsmechanismus von hydraulisch-induzierten Rissen in geschichteten Sedimenten Abschlussbericht, Experimentelle Geophysik Institut für Geologie, Mineralogie, und Geophysik, Ruhr-Universität Bochum	Universität Bochum Prof. Jörg Renner Renner@geophysik.rub.de	public
Geothermal Energy, reservoir modelling	Sulzbacher, H. & Jung, R. (2010): Numerical Simulation of the Heat Recovery from Hydraulic Fracture by Cyclic Injection and Production. - Zeitschrift der Deutschen Geologischen	LIAG Hans Sulzbacher	public

Table 2.3 Summary of data sets, formats, availability and hosting organization for the Valcele site, ROMANIA

Data set	Data type	Format	Host and maintenance	Contact	Availability
Surface data					
Geological maps	Analogue and digital	Arc GIS shape Tiff, jpg. pdf	IGR	www.igr.ro	Public
Geographic data	Analogue and digital	Arc GIS shape Tiff, jpg. pdf	OMV-PETROM-PITESTI	-	Public
Seismic and structural data and 3D information					
Site dimensions, thicknesses and areal extent	Template Table	Excel and word	OMV-PETROM-PITESTI		Public, presented in D023
3D surfaces for identified layers	Digital	grid formats	OMV-PETROM-PITESTI	-	Restricted to the MUSTANG project
Well reports and wire-line logs					
Wire-line logs from the older 4 wells	Analogue	Tiff, jpg	OMV-PETROM-PITESTI		Public
Well reports from the older 4 wells	Digital	LAS	OMV-PETROM-PITESTI		-"-
Physical and chemical parameters					
Cap rock properties, Numerical data	Template Tables	Excel and Ascii	OMV-PETROM-PITESTI		Public, presented in D023
Reservoir properties, 3D Numerical model	Template Rkw database	Excel and Askii Rkw files Jpg, tiff	OMV-PETROM-PITESTI UB-FGG		Public, presented in D023
Geological setting – key publications					
3D parametric model of the potential trap for carbon dioxide storage. Case study: oil Valcele , Romania, 2011, EGU, Vienna	Analogue	pdf	UB, Faculty of Geology and Geophysics.	D.Scradeanu daniel.scradeanu@g.unibuc.ro M.Pagnejer mihaelapag@yahoo.com	Public presented in DO23

Table 2.4 Summary of data sets, formats, availability and hosting organization for the Hontomín site.

Data set	Data type	Format	Host and maintenance	Contact	Availability
Surface data					
Geographic data	Analogue and digital	Paper maps, CD-ROM, shp	Infraestructura de Datos Espaciales de Castilla y León (IDECyL)	List of maps: http://www.sitcyl.jcyl.es/sitcyl/cuerpolistloc.sit	Public, for purchase
Topographic data	digital	geotiff	IDECyL	www.sitcyl.jcyl.es	Public
Geological maps 1:50.000	Analogue and digital	jpg	IGME – Geological and Mining Institute of Spain	http://www.igme.es/internet/cartografia/cartografia/datos/magna50/jpg/d1_jpg/Editado_MAGNA50_167.jpg	Public, free
Geological site map 1:5.000	Analogue and digital	shp, jpg, pdf	GEOMODELS/CIUDEN	T. Rötting tobias.roetting@upc.edu	Restricted to Mustang project tasks
Location of seismic survey lines and geophysical information	Digital	Web application	IGME – Geological and Mining Institute of Spain	Start page: http://www.igme.es/internet/sigeof/inicio_spa.html	Public, for purchase
Aerial photos – visible spectrum	Digital	tif	Infraestructura de Datos Espaciales de Castilla y León (IDECyL)	ftp://ftp.itacyl.es/cartografia/01_Ortofotografia/2011/Color/H-0167/	Public, free
Aerial photos – IR spectrum	Digital	tif	Infraestructura de Datos Espaciales de Castilla y León (IDECyL)	ftp://ftp.itacyl.es/cartografia/01_Ortofotografia/2011/Infrarrojo/H-0167/	Public, free
Digital Terrain Model and other cartographic data	Digital	tif	Infraestructura de Datos Espaciales de Castilla y León (IDECyL)	ftp://ftp.itacyl.es/cartografia/	Public, free
Hydrogeology	digital	Pdf, xls	AITEMIN/CIUDEN	T. Rötting tobias.roetting@upc.edu	Restricted
Petrophysical & petrological outcrops	Digital	Pdf	CIEMAT/CIUDEN	-"-	Restricted

Table 2.4 (cont.)

Bioindicators	Analogue and digital	pdf	ULe/CIUDEN	-"-	Restricted
Gas emissions	digital	Xls, shp, pdf	UPM/CIUDEN	-"-	Restricted
GBSAR & DInSAR	digital	Tiff,pdf	Institute of Geomatics/CIUDEN	-"-	Restricted
Seismic and structural data and 3D information					
Pre-existing well and seismic data	Analogue and digital	Tiff, pdf, sgy, las	ENRESA, INH, SHESA, IGME	-"-	Restricted
Passive seismic network	digital	Sac,pdf	ICTJA-CSIC/CIUDEN	-"-	Restricted
3D seismic reflection	digital	sgy	ICTJA-CSIC/CIUDEN	-"-	Restricted
Seismovie	digital	sgy	ICTJA-CSIC, CGG/CIUDEN	-"-	Restricted
CSEM	Digital	Grid, pdf	GEOMODELS-MT/CIUDEN	-"-	Restricted
3D Geology	digital	Grid, ts	GEOMODELS/CIUDEN	-"-	Restricted
Gravity	digital	Grid	IGME	-"-	Restricted
Well reports and wire-line logs					
Summary and results (Hontomin 1 to 3 boreholes): - Geological description - Porosity - Salinity - Production test	Digital	Doc	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential
Summary diagram of Hontomin 1 to 3 boreholes. - Pre and post drilling interpretation. - Drilling results	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential

Table 2.4 (cont.)

General descriptions: - Geological - Cores - Log	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential
Hontomin-1 Drilling description and results - Geological description - Logs and cores list - Estimulation test	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential
Hontomin-1 Log evaluation chart - Induction log - Sonic log - Density log - Brief core description - Brief production test description	Digital	Tiff	Hidrocarburos de Euskadi (SHESA)	http://www.shesa.es/	Confidential
Hontomin-2 borehole description. - Workover operations - Exended pump test	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential

Table 2.4 (cont.)

Hontomin-3 borehole description. - Geological description - Drilling program - Samples and cores taken - Wireline logging - Petrophysical analysis - Log list	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential
Well abandonment report Hontomin 2 and 3 boreholes - Adopted procedure - Final situation	Digital	Pdf	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (SHESA)	Confidential
Hontomin-4 borehole description. -Geological description -Borehole Hontomin-4 complatation (figure)	Digital	Doc	Spanish Ministry for Industry, Energy and Turism	www.minetur.gob.es (CPS-TETHYS)	Confidential
Physical and chemical parameters					
Cap rock properties, Numerical data	Template Tables	Excel and Ascii	IDAEA-CSIC	T. Rötting tobias.roetting@upc.edu	Public, presented in D023
Reservoir properties, Numerical data	Template Tables	Excel and Ascii	IDAEA-CSIC	-"-	Public, presented in D023
Petrophysical reservoir and seal properties - Laboratory measurements	digital	Pdf	CIUDEN Foundation	-"-	Restricted to Mustang project tasks
Hydro-geochemistry of reservoir	digital	Pdf, xls	CIEMAT/CIUDEN	-"-	Restricted to Mustang project tasks
Geological setting – key publications					
Report on regional geology (in Spanish)	Digital	Pdf	CIUDEN Foundation	T. Rötting tobias.roetting@upc.edu	Restricted to Mustang project tasks

Table 2.5 Summary of data sets, formats, availability and hosting organization for the Heletz site.

Data set	Data type	Format	Host and maintenance	Contact	Availability
Surface data					
Topographic map	Analogue and digital	jpg GIS	GII	www.gii.co.il vladi@gii.co.il	Public
Air photo	Analogue and digital	jpg GIS	GII	-"-	Public
Location of wells and seismic lines (coordinates and maps)	Analogue and digital	jpg Excel	GII	-"-	Public
General geological information					
Geological description of the site	Digital	doc, pdf	GII	-"-	Public
Description of aquifers in the Heletz area	Digital	doc, pdf	GII	-"-	Public
General lithostratigraphic section	Analogue and digital	jpg grf	GII	-"-	Public, presented in D023
Well and seismic data					
Drilling reports	Analogue	jpg	GII	-"-	Public
Well testing reports	Analogue and digital	Excel	GII	-"-	Public
Wire-line logs	Analogue and digital	LAS	GII	-"-	Public
Composite logs	Analogue	jpg	GII	-"-	Public
Expanded composite logs in 3 wells (H-18, H-38 and HE-A1)	Analogue	jpg	GII	-"-	Public
Core analysis	Digital	Excel	GII	-"-	Public
Well log analysis	Digital	Excel	GII	-"-	Public
Permeability vs Porosity – regional relationship	Analogue	jpg	GII	-"-	Public
Estimated porosity and permeability	Digital	Excel	GII	-"-	Public

Table 2.5 (cont.)

Summary of reservoir parameters	Digital	Excel	GII	-"-	Public
Seismic sections	Analogue	jpg	GII	-"-	Restricted to Mustang project tasks
3D Model (structural model and physical parameters)					
Templates for site characterisation	Digital	Excel	GII	-"-	Public
Structural maps for 3 horizons	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public, presented in D022
Isopach maps for reservoir layers and cap rock	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public, presented in D022
3D surfaces representing layers and structures	Analogue	jpg	GII	-"-	Public
Geological cross-sections	Analogue	jpg	GII	-"-	Public, presented in D022
Porosity maps for reservoir layers	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public, presented in D023
Permeability maps for reservoir layers	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public, presented in D023
Pressure map	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public
Salinity map	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public
Map of oil-water contact	Analogue and digital (grids)	jpg dat, grd	GII	-"-	Public

Table 2.5 (cont.)

Geological setting – key publications					
Shenhav, H., 1971. Lower Cretaceous sandstone reservoirs, Israel: petrography, porosity, permeability. AAPG Bulletin, v.55, p.2194-2224	Analogue		GII	-"-	Public
Gilboa, Y., Fligelman, H., Derin, B., 1990. Heletz-Brur-Kohav Field – Israel, Southern Coastal Plain. In: Beaumont, E.A., Foster, N.H., compilers. Treatise of petroleum geology – Atlas of oil and gas fields. Structural traps IV – Tectonic and nontectomic fold traps. Tulsa,OK: AAPG, p.319-345.	Analogue		GII	-"-	Public
Gilboa, Y. and Fligelman, Y., 1991. Further development of the nearly depleted Heletz oilfield. Isr. J. Earth Sci., 40, p.233-244	Analogue		GII	-"-	Public