Rialtas na hÉireann
Government of Ireland

APPENDIX A - DATABASE

Merlin
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PIP
Petroleum
Infrastructure
Programme

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SEISMIC DATABASE

An overview of the seismic database in this study is provided in Atlas Section A, Introduction. All surveys that have been interpreted, in part, are listed in the spreadsheet IS16_04_Ire_Interpreted_Seismic_listing.xlsx provided in the Digital Addenda to this Atlas. It should be noted that no survey has been interpreted in its entirety and few of the lines listed have been interpreted across their whole length at all geological horizons.

Seismic data quality is highly variable across the offshore Ireland region. The best data quality is available from west of Ireland on the whole, within which the long offset PAD 2014 lines offer the best resolution. On these lines, a clear set of regionally developed seismic sequences are recognisable from the Jurassic to Cenozoic intervals. Unfortunately, in the Fastnet – North Celtic Sea – Central Irish Sea basins, seismic data quality is generally significantly poorer. Nevertheless, it has been possible to recognise a consistent set of regionally developed seismic sequence boundaries (horizons) in the latter area. The main seismic horizons interpreted in the offshore areas of Ireland are tabulated in **Table A.5.**

In the case of the basins east of Ireland (Fastnet, South Celtic Sea, North Celtic Sea, Central Irish Sea, Kish Bank) many of the earlier vintage, and some of the later vintage lines, were of very poor seismic quality especially within areas of Chalk at seabed, such as parts of the North Celtic Sea Basin. Consequently, a selection of the better quality seismic data was made to provide a grid of lines intersecting all well locations and offering a general, but extremely coarse, basin wide seismic coverage. In such poor data quality areas, and even on these better-quality lines, it has not been possible to ascertain the phase of the data despite considerable investigation of the data, nature of the sea bed reflection, etc. Therefore, the lines from these basins are displayed in their original form with no attempt made to convert the data to the standard polarity described above. Illustrated line coverage focuses upon the North Celtic Sea, Fastnet, Kish Bank and Central Irish Sea Basins. Very few lines were selected for interpretation within the South Celtic Sea and Cockburn Basins because of the lack of wells drilled within these areas.

In order to accurately tie the well chronostratigraphic and lithostratigraphic tops to the seismic data, reliable well time-depth data are required. All well time-depth data are plotted in **Figure A.A. 1**. The curves have been colour coded according to basin location and plotted below mean sea level. Significant variations from basin to basin may be observed. Wells to the south and east of Ireland, the North and South Celtic Sea basins, Kish Bank and Central Irish Sea basins, demonstrate the fastest (highest) velocity profiles (green curves). To the west of Ireland, the Donegal, Slyne, Erris and Fastnet Basins show intermediate to fast velocities (red curves). The Porcupine area shows the slowest velocities (cyan curves). As expected, the limited number of deep water wells drilled within the Slyne/Erris area show the very slowest velocities (three red curves labelled 'Deeper water wells').

Borehole 16/28-Sb01 time depth assumptions

The 16/28-Sb01 is an important borehole, located in the Macdara Basin and has been described by Haughton *et al*. (2005). It is a key data point for Cenozoic stratigraphy in that basin and also it penetrates a lava (here termed the Selkie Member) near the base of the borehole that is of considerable interest. The lava is interpreted herein as being of Late Jurassic age. The interpretation of a seismic line (TRDP-115) located 200m from the borehole has been carried out in this project, as illustrated in **Figure D.7.31** (Upper Jurassic chapter). The borehole was tied to this seismic line by creating pseudocheckshots at mean sea-level, seafloor and the Selkie Member basalt encountered at the base of the borehole, as below.

Marker	TVDSS (m)	TWT (s)	Comments
MSL	0	0	
Seafloor	-1465	1.96	Assuming seawater velocity 1495 m/s
Selkie Member	-1611	2.13	

See section D.7, Selkie Member description, for discussion of the interpretation of the interpretation of this borehole in relation to this member and its age. This line is also discussed in the Cenozoic section (D.10) in relation to the base of the Killeany Formation and the base of the C50 sequence.

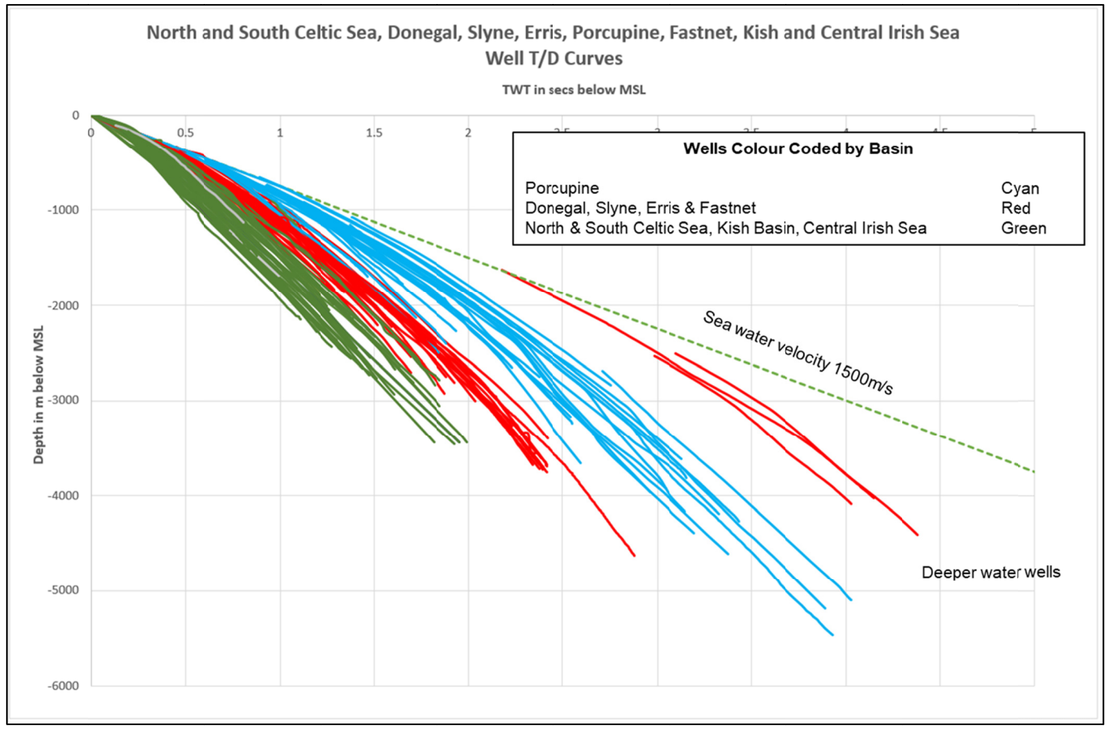

Figure A.A. 1. ***Well Time-Depth data plotted for all wells. The curves are subdivided by basin area and indicate significant velocity variations from basin to basin.***

WELL DATABASE

The nature and extent of the well and boreholes database has been discussed in Atlas Section A, Introduction. Here, comments are provided regarding questions of data quality that have been encountered and addressed as part of this study.

At the project outset, significant time was spent researching and organising the well nomenclature, in particular, addressing inconsistencies in naming for pilot holes, well re-entries and side-tracks. An updated well header listing of oil and gas project wells was generated by this process and approved by the PAD. In addition, it was necessary to investigate the accurate matching of data (e.g. LAS files, reports) to the correct wells. There were several instances in which the wireline log las file data was labelled as from one well whereas it was actually from another (e.g. data from the re-entry well was allocated incorrectly to the original hole), or in some cases data represented that from a pilot hole merged with an individual sidetrack for instance. In some cases, there were biostratigraphic reports from original holes and sidetracks, or just from one of the holes, while the title of the report was sometimes unclear regarding the origin of the data. In all such cases, data sets were investigated and matched with the correct well section.

Several further issues were encountered with wireline logs provided to the study from Ireland wells by PAD. These included depth errors with certain logs in certain wells, data quality issues around casing points, and missing logs from the digital (las) files where logs were known to have been run. These examples were referred to the PAD who arranged to have these errors corrected and new logs supplied. For example, in the 26/28-A2 well, depth inconsistencies were recognised between wireline logs and LWD logs for the well. Digital logs in the supplied LAS file did not all match to those on the operator's composite log and LWD logs were used for interpretation and well display. LWD logging runs, as on the composite log, include gamma, resistivity (shallow and medium), neutron and density logs only; the sonic wireline log has been shifted by +6.8 m for this project in order to match the other displayed logs.

By carrying out these cross checks and corrections, the existing well data for the project were improved and made consistent, with correct attribution of data to a consistently named well header data set.

Issues of data quality regarding the biostratigraphic database are discussed in Atlas Appendix B, Biostratigraphy.

BOREHOLE DATABASE

Data from 19 DSDP/IODP/ODP holes located within the Ireland offshore area were utilised, and accessed from the public domain, primarily the ODP website; http://www-odp.tamu.edu/publications/. From this site, shipboard scientific party reports (from which key biostratigraphic marker occurrences, including in some cases, microfossil distribution charts) and digital wireline LAS data are available via free download. A significant quantity of data is available from the boreholes and cores, covering a wide range of geological disciplines. For some boreholes, limited or no data are available, however. The data in the DSDP/IODP/ODP reports (e.g. the biostratigraphic data) is typically reported by depth (metres below the top of a particular core) and has been converted by Merlin to metres below sea floor (mbsf) and measured depth below drill floor.

A considerable amount of quality control checking of the digital wireline logs obtained from the ODP website has been necessary. The wireline logs are figured in the DSDP/IODP/ODP reports and these have been used to try to cross check with the digital wireline log data, however, it is unknown whether these figured logs are the "original" or "processed" logs. In some cases, a bulk log shift has been applied to the logs to make the digital logs line up with the lithological units, following the log images in the ODP reports. Even in these cases, however, lithologies from cores do not always line up with changes in log character and it is possible that there are remaining errors in the wireline log to core correlations and that further log shifts and corrections may be required, for example in the Leg 80 Site 548A borehole. In some instances, it has been necessary to shift particular logs to match others and to match the log image in the ODP report, for example in hole DSDP Leg 80 Site 549 borehole. Merlin has kept an audit trail of all log shifts that have been applied in each hole and the reasons for each.

WELL LITHOLOGICAL DATABASE

The lithology column on the summary logs is based primarily on the lithology from the original operator's composite (or completion) log. This has, however, been corrected where we consider the original to be in error, for example, in cases where samples taken for biostratigraphic analysis from particular intervals suggest a different lithological interpretation to that on the composite log. There are several wells in which the lithologies indicated by the available samples differ quite markedly from those depicted on the operator's composite log. Furthermore, it is worth noting that routine well biostratigraphic reports typically contain quite detailed lithological descriptions of intervals studied, including sidewall cores and core chips. Such descriptions have generally been found to be reliable, and often provide greater detail than the original composite log or mud log. These contractor reports in some cases differ from the operator's interpretation.

In addition, there are instances where lithological boundaries have been adjusted in this project in line with wireline log signatures. Although we have made modifications and corrections to the original composite log lithologies in accordance with these observations, it is beyond the remit of this study to carry out comprehensive lithological checks of all intervals in all wells. These observations imply that the lithologies shown on the composite logs, and on the summary logs in this study, ought not be taken as being definitive and should be used therefore as a guide only.