MINERAL & COAL DIGITAL DATA SUBMISSION STANDARDS

April 2008

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1 BACKGROUND

The minerals exploration industry in New Zealand generates a vast amount of geo scientific and resource information each year. Crown Minerals, as a unit within the Business Services Branch, Ministry of Economic Development is responsible for the collection, preservation and dissemination of all statutory information submitted by permit holders and this duty makes a significant contribution to promoting effective and efficient mineral exploration.

Acknowledgement: Much of the technical information in this document is sourced from guidelines produced by the Australian Government Geoscience Information Committee (GGIC, formerly GGIPAC) for use in Australian Federal and State reporting guidelines. The Chief Government Geologists through GGIC have developed a National standard in regards to mineral and petroleum exploration reporting. These standards include guidelines in relation to the submission of digital data.

2 LEGISLATION

The statutory information is submitted under the Section 90 of the Crown Minerals Act 1991 and the Crown Minerals (Minerals & Coal) Regulations 2007.

These Regulations establish format requirements (Part One, 8 to 11) by specifying that ***Documents must be provided to the Secretary electronically*** thus achieving three broad objectives:

- to maximise the amount of digital data submitted to Crown Minerals
- to maximise usefulness of statutory digital data released to open file.
- to minimise costs associated with acceptance, storage and release of digital information.

The intention of this document is to define the statement "*acceptable to the Secretary"* by detailing the preferred formats and compilation process to ensure that all critical metadata is captured and supporting data is included.

It is anticipated that the document will be reviewed annually by Crown Minerals and therefore provide an opportunity to amend and update formats/media to encompass the impact of any new and relevant technologies.

3 TECHNICAL REPORT AVAILABILITY

All information supplied by a permit holder under the Crown Minerals Act 1991 and relevant regulations is held confidential by Crown Minerals until:

- the expiry of 5 years after the date on which the information was obtained by the permit holder; or
- the permit in respect of which the information was obtained and every subsequent permit in respect of that permit ceases to be in force

"Which ever first occurs".

We have implemented stringent processes to ensure the security of all confidential data.

At the end of the period of confidentiality all material becomes publicly available and can be freely accessed by explorers thus ensuring that exploration efforts are not duplicated and new models can be developed on the basis of earlier data.

Currently the existing collections are being scanned and made available for free downloading via the Crown Minerals Website. We anticipate this will be greatly enhanced by the uptake of Digital Lodgement.

4 ARCHIVAL PRACTICE

Paper: stored and preserved by Ministry of Economic Development in accordance with the Public Records Act 2002 and as designated by the Chief Archivist.

Digital: managed by Crown Minerals using recognised digital archiving principles:

- Monitoring the condition of the media upon which the data is stored to ensure long term integrity is maintained;
- Transcribing to new high density media before the old media deteriorate and reading equipment/drives become obsolete;
- Maintaining backup and disaster recovery strategies for digital data and applications;
- Providing environmental storage conditions as recommended by global standards.

5 SUBMISSION REQUIREMENTS

5.1 Acceptable media

Choice should be appropriate to the volume of data submitted

E-mail (files less than 3Mb)
CD-ROM, no multisession, read only
DVD-ROM, no multisession, read only
5.0 GB 8mm Exabyte Cartridge
DAT, Digital Audio Tape
DLT Tape
LTO Tape
AIT Tape
External Hard Drive
USB Memory stick

A digital copy of the digital data submitted should be kept by the permit operator for at least one year to cover the possibility of data corruption in transferring the data to the Crown.

5.2 Media labelling

The media (disc/tapes) submitted must be labelled with the following information both on the disc/tape itself and on the cover:

- Company name
- Project/survey name
- Permit number
- Type of report
- Year
- Table of content if space permits

5.3 Submission contents

All data submissions are to include a list of all the files included in the submission. This should take the form of a table of contents in ASCII format listing the contents of each data submission and should be included either on the media along with the data or supplied on separate media with the submission. For every file or folder (where a directory structure is used to aggregate common data types) the listing should contain:

- Filename or Folder name

- short description of file or folder content
- data format

Where space permits the listing should be included on or inside the media cover.

5.4 File naming convention

Report data loaded into the Ministry's data management system are assigned a Mineral or Coal report number. Files are given names according to this convention, e.g. MR3203.pdf, MR3203_1.tif, CR1002 etc. As report numbers are not known to operators at the time of submission there is no formal file naming convention.

However in order to easily associate submissions with work programme obligations and enclosures with reports file names should follow a logical pattern. For example:

Permit Number_YYYY_##. eee

Permit Number is the 5 digit identifier as per the Crown Minerals grant
YYYY is four-digits representing year,
is a two digit sequential integer for each file submitted,
.eee is the file suffix as per the following Digital Format Table.

Examples:
39111_2004_01.pdf
39111_2004_02.pdf
39111_2004_03.jpg
39111_2004_04.tif
39111_2004_05.txt
39111_2004_06.ecw

5.5 Technical report content

All digital text based reports of any kind should retain the well established structure and sequence of hardcopy (paper) reporting and must include the following information:

A title page that contains
- the permit number
- the name of the permit holder (operator)
- reference to Work Programme Obligation
- the Title of the report
- the Author of the report
- the Date of the report
- the File name

A detailed contents page listing
- all figures, tables and plates
- all plans, maps, figures and any other attachments
- any appendices such as additional reports and tabular data

Digital documents must be bookmarked.

Copies of journal extracts or any published items should only be included if the author owns the Copyright for the work. Otherwise copyright-protected material should be fully referenced with standard bibliographic information.

5.6 Data types

Table 1. Acceptable formats for digital reporting

Data Type	Description (examples only)	Format	Suffix	Parameter
Report text	Documents, figures etc.	Portable Document Format (PDF)	.pdf	Converted to PDF from original digital version where possible. Document security method to be set to "No Security" and bookmarked.
Maps, plans, figures not embodied in report text (enclosures)	Files of maps, plans, figures, exceeding A3	PDF (preferred) TIFF (colour) JPEG	.pdf .tif .jpg	 Reproducible at 300 dpi, 24 bit Q>95
Photographs and images not embodied in report text	Core photographs,	PDF (preferred) GIF PNG JPEG TIFF (colour) CGM	.pdf .gif .png .jpg .tif .cgm	Document security method to be set to "No Security" Q>95 Reproducible at 300 dpi, 24 bit
	aerial photographs etc.	GEOTIFF/TIFF (colour) GEOTIFF/TIFF (grayscale) JPEG	.tif (.tfw[1]) .tif (.tfw[1]) .jpg (.jgw[1])	Reproducible at 300 dpi, 24 bit Reproducible at 300 dpi, 8 bit Q>95.
Tabular Data	Point locations, geochemistry, heavy mineral, petrochemical, diamond indicator , uphole data, velocity data, drilling data	Delimited ASCII	.txt	Preferably TAB delimited.
GIS data	GIS vector data	MapInfo tables ESRI shapefiles XML/GML	.tab + support files .shp + support files .xml	Must be accompanied by metadata describing the spatial reference system (Datum and projection if applicable). Only include data to which the Author owns copyright.
	GIS raster data (see also remotely sensed image formats)	ASCII grid ER Mapper JPEG GEOTIFF/TIFF	.asc .ecw / .ers .jpg (jgw[1]) .tif (.tfw[1])	
GIS projects	GIS project files	ESRI map documents MapInfo World	.mxd .pmf .wor	Data included in same directory as project file, or organised into logical subdirectories. Links to data

[1] Include World file if images are georeferenced and georeferencing is not embedded in the image format.

Data Type	Description (examples only)	Format	Suffix	Parameter
		files		based on relative pathnames. Only include data to which the author owns copyright.
Geophysics (other than seismic and log data)	Raw binary data. For example multibeam bathymetry, Sidescan sonar.	Proprietary formats accepted.		For raw binary data proprietary formats are accepted until such time as industry or international standards are developed.
	Raw and Processed (corrected and levelled), located data. Gridded data, magnetics, radiometrics, DTM and gravity data	ASCII tab delimited XML (including schema)	.txt	Raw data should be accompanied by any observation logs and any ancillary data such as sound velocity profiles, calibration data etc
Geophysical processing and other remotely sensed images	Images derived from geophysical/remote sensing surveys, e.g. TMI, Bouguer radiometrics, Landsat 5 or 7	GEOTIFF/TIFF (colour) TIFF (greyscale) Compressed ER Mapper JPEG GIF PDF PNG CGM, CGM+		Reproducible at 300 dpi, 24 bit Reproducible at 300 dpi, 8 bit Beat quality (least lost) Quality as above 8 bit
Seismic data	Raw and Processed data	SEG Y	.sgy	
	Navigation data	UKOOA P1/90 3D Bin Grid	.uka	
	Stacking velocities	Western format	.wgf	
	Processed sections	CGM, CGM+ format with metadata (line number, shotpoint number, …) Geophysical Image formats as above	.cmg .tif, .jpg, .gif, .pdf, .png	
Petrophysical and geophysical	Raw and processed wireline and	DLIS LIS LAS	.dlis .lis .las	

Data Type	Description (examples only)	Format	Suffix	Parameter
log data	MWD or LWD log displays	Delimited ASCII (format must be explained) WELLOGML (POSC standard)	.asc	
	Log plots	TIFF (colour) TIFF (greyscale) JPEG GIF PNG PDS	.tif .tif .jpg .gif .png .pds	 Quality as above Quality as above Quality as above 8 bit
	Processed down-hole velocity data	SEG Y, preferably Rev.1	.sgy	
3D mine models	3D mine model data	Proprietary formats accepted until such time as industry or international formats adopted	.asc .grd, .ers .xml, .xsd	
Video clips	Fly-throughs, ground truthing etc	Video standards MPEG AVI	 .mpg .avi	Preferred format MPEG, proprietary formats accepted until such time as industry or international standards are developed.

5.6.1 Technical report text

The digital format for text reports and any appendices is Portable Document Format (PDF) in a version compatible with currently supported versions of Adobe Acrobat. In most cases operators will need to convert the text from the native format (WORD, EXCEL etc) to PDF format. The report text (including table of contents) and any figures, tables, graphs, small maps or plans (up to A3, 420 x 297mm) that form part of the report should be embedded into a single PDF.

The report must be bookmarked to reflect the contents page/pages and to assist navigation through the document. Links and references inside reports to external plans and images must clearly identify the title of the external reference. Supporting maps, plans and figures too large to include in the body of the main report must be referenced inside the report and must be submitted along with the report in the same directory as the PDF. The document security method must be set to “No Security” so that a Bibliographic reference with the assigned report number can be inserted at the front of the document by the Crown.

5.6.2 Maps, Plans, figures not embodied in Technical Report

Where it is not practical to include maps, plans and figures within a report they should be included in separate PDF or supported image format. This includes items greater than A3 where embedding in the report PDF is not considered appropriate and therefore should be submitted as separate high quality image files at their original scale. Where possible general plans (excluding logs) should not exceed A0 size (1189 x 841mm).

PDF's should be created from the original plot file. Where this is not possible due to PDF format limitations images could be left in their native form as either GEOTIFF/TIFF (colour) or JPEG (colour and greyscale).

5.6.3 Photographs and images not embodied in report text

Minimum resolution for photographs and images is 300dpi at their original scale. PDF is the preferred format for non-spatial images whilst geotiff is the preferred format for spatially referenced images.

Spatially referenced aerial photographs should be accompanied by spatial referencing information (see 5.6.7 below) either embedded in the image format or provided separately in the form of a world file. In all cases metadata describing the spatial reference system used must be supplied.

5.6.4 Tabular data

These data include magnetic, gravity, and other quantitative geophysical data; geological data including station locations, collection/storage locations, preliminary descriptions of seafloor samples recovered, and all descriptions and analytical data, including geochemistry, derived from sediment and rock samples and drilling data.

The required file format for tabular data is a "flat file" rather than a "relational" file system. This allows more flexibility in the format and also reduces the need for relational keys between files. However, some datasets (particularly drill logs incorporating lithological, geochemical, structural and other data such as authority/lookup tables) may have to be submitted as a series of "linked" flat files, appropriately documented.

This format has been chosen because of its wide acceptance in industry as a standard format, the ease of creation from other formats, the availability of free software to read the files and its ability to be searched for words or phrases.

Where industry standards exist such as SDTS, UKOOA and ANZLIC they should be adhered to.

Where a local grid has been used, nationally recognised coordinates must be included in the data as well as the local grid coordinates (refer 5.6.7 below).

Tabular data must be accompanied by metadata describing the column headings, units and explanation of any abbreviations. For instance a file of surface sampling data should contain both location and assay data and will therefore require metadata on both the spatial and analytical components.

5.6.5 Geophysical, geological and geochemical data

Raw data must include that originally recorded, and be a direct copy of the data supplied by the contracting company to the operator. Processed tabular and gridded data should be in an ASCII format and accompanied by any ancillary data used in correcting the raw data, e.g. sound velocity profiles for bathymetry.

Raw and processed wireline and MWD data should be submitted in DLIS, LIS, LAS or delimited ASCII formats. Composite logs, mudlogs and wireline plots should not be paginated, but submitted as a continuous plot in PDS, PDF or TIFF format.

5.6.6 GIS data and projects

Currently, no one international standard exists for data in GIS format. However, the preferred

formats for vector data are ESRI shape files (SHP), XML and MapInfo tab files (TAB). Where practical the symbology of the GIS displayed data should be provided (e.g. ESRI's layer files (LYR) or legend file (AVI) or for MapInfo's workspace file (WOR)).

GIS data must be accompanied by metadata (refer 5.6.7 below). Metadata are defined as "data about data" and should provide sufficient information about a dataset for it to be used properly. The standard recommended by ANZLIC for metadata should be used where appropriate. However, some data require more information for intelligent use, and some data require specific metadata covered under other international standards. NZ spatial standards are currently being developed and the requirements will adhere with these standards in the future.
http://www.linz.govt.nz/rcs/linz/pub/web/root/core/Topography/ProjectsAndProgrammes/geospatialmetadata/index.jsp

GIS project files enable spatial data layers to be displayed in context to one another and constitute valuable tools for analysing the spatial relationship of information helping with the assessment of activities against work programme obligations. Where projects are submitted data must be included in the same directory as the project file, or organised into logical subdirectories. Links to the data must be based on relative pathnames so that they function even when the entire project and data are copied to another location.

Data submissions and projects must only include data to which the author owns copyright.

5.6.7 Datum's and projections

GIS and location based data must be accompanied by metadata including a description of the spatial reference system used (datum and projection if applicable). The spatial reference system used must be in terms of an official datum or projection approved by the surveyor general and not in terms of a local exploration or mine grid.

Approved datum's include NZGD2000 and WGS84. NZGD49 will be accepted until such time as NZGD2000 is widely established as the industry standard.

Approved projections include New Zealand Transverse Mercator and New Zealand Geodetic Datum 2000 Meridional Circuits or a recognised international standard projection based on an approved datum. New Zealand Map Grid and NZGD49 Meridional Circuit projections will be accepted until such time as they are no longer established as an industry standard.

5.6.8 Video clips

Until such time as there are industry or international standards, proprietary formats will be accepted. Preferred formats are MPEG and AVI.

5.6.9 3D mine models

Proprietary formats will be accepted until such time as industry or international formats adopted.

6 DATA DELIVERY ADDRESS

Data submissions are to be delivered to:

Data Submission
Crown Minerals
PO Box1473
Wellington

Or if the total files size of the data submission is less than 3 Mb it can be emailed as an attachment to:

crown.minerals@med.govt.nz
Subject: Data Submission

7 CHECK LIST

Technical Reports:

- ☐ A title page that contains
  - the permit number
  - the name of the permit holder (operator)
  - the Work Programme Obligation Number
  - the Title of the activity
  - the Author of the activity
  - the Date of the report
  - the File name

- ☐ A detailed contents page listing:
  - all figures, tables and plates
  - all plans, maps, figures and any other attachments
  - any appendices such as additional reports and tabular data

Media Contains:

- ☐ Data successfully transferred to media
- ☐ Annotated on media label
  - Company name
  - Project/survey name
  - Permit number
  - Type of report
  - Year
  - Table of content if space permits

Meta Data:

- ☐ Data submissions and projects must only include data to which the author owns copyright.

- ☐ The spatial reference system used must be in terms of an official datum or projection approved by the surveyor general and not in terms of a local exploration or mine grid.

- ☐ Tabular data:
  - Metadata describing the column headings, units and explanation of any abbreviations, e.g. surface sampling data contains both location and assay data and will require metadata on both the spatial and analytical components.
- ☐ GIS Data:
  - Must be accompanied by metadata describing the spatial reference system (Datum and projection if applicable);and
  - Data included in same directory as project file, or organised into logical subdirectories.
- ☐ Geophysical Data:
  - Raw data should be accompanied by any observation logs and any ancillary data such as sound velocity profiles, calibration data etc.

8 GLOSSARY

Abbreviation	Description	Used as
ALF	Airborne Laser Fluorescence	Geophysical technique
ANZLIC	Australia & New Zealand Land Information Committee	Organisation (see http://www.anzlic.org.au/)
ASCII	American Standard Code for Information Interchange	International Standard
AVO	Amplitude Versus Offset	Seismic technique
CDP	Common Depth Point	Seismic expression
CGM	Concatenated Graphics Metafile	File type
CMP	Common Mid Point	Seismic expression
DLIS	Digital Logging International Standard	International standard
EDCDIC	Extended Binary Coded Decimal Interchange Code	International standard
GDF2	General Data Format (Version 2)	National Standard
GEOTIFF	Geo-referenced Tagged Image File Format	File type
GIF	Graphics Interchange Format	File type
GML	Geography Markup Language	International standard
GXF	Grid Exchange Format	International standard
IP	Induced Potential	Geophysical technique
JPG, JPEG	Joint Photographic Experts Group	File type
LAS	Log ASCII Standard	International industry standard
LIS	Logging International Standard (binary format)	International industry standard
MWD	Measurement While Drilling	Logging technique
OGC	Open GIS Consortium	Organisation (see http://www.opengis.org)
P1/90	Navigation data standard format	International standard
PDF	Portable Document Format	File type
PDS	Schlumberger log file	File type
PNG	Portable Network Graphics	File type
POSC	Petrotechnical Open Software Consortium	Organisation (see http://www.posc.org)
PPDM	Public Petroleum Data Model	International standard database Model

Abbreviation	Description	Used as
SAR	Side Aperture Radar	Geophysical technique
SDTS	Spatial Data Transfer System	International standard
SEG	Society of Exploration Geophysicists	Organisation
SGML	Standard Generalized Markup Language	International standard
SP	Spontaneous Potential	Geophysical technique
TEM	Transient ElectoMagnetics	Geophysical technique
TIF, TIFF	Tagged Image File Format	File Type
TMI	Total Magnetic Intensity	Geophysical measurement
TWT	Two Way Time	Geophysical measurement
UKOOA	United Kingdom Offshore Operators Association	International organisation
UTM	Universal Transverse Mercator	/ map projection
VSP	Vertical Seismic Profile	Geophysical technique
XML	Extensible Markup Language	International standard
XMML	Exploration and Mining Markup Language	Standard under development by CSIRO