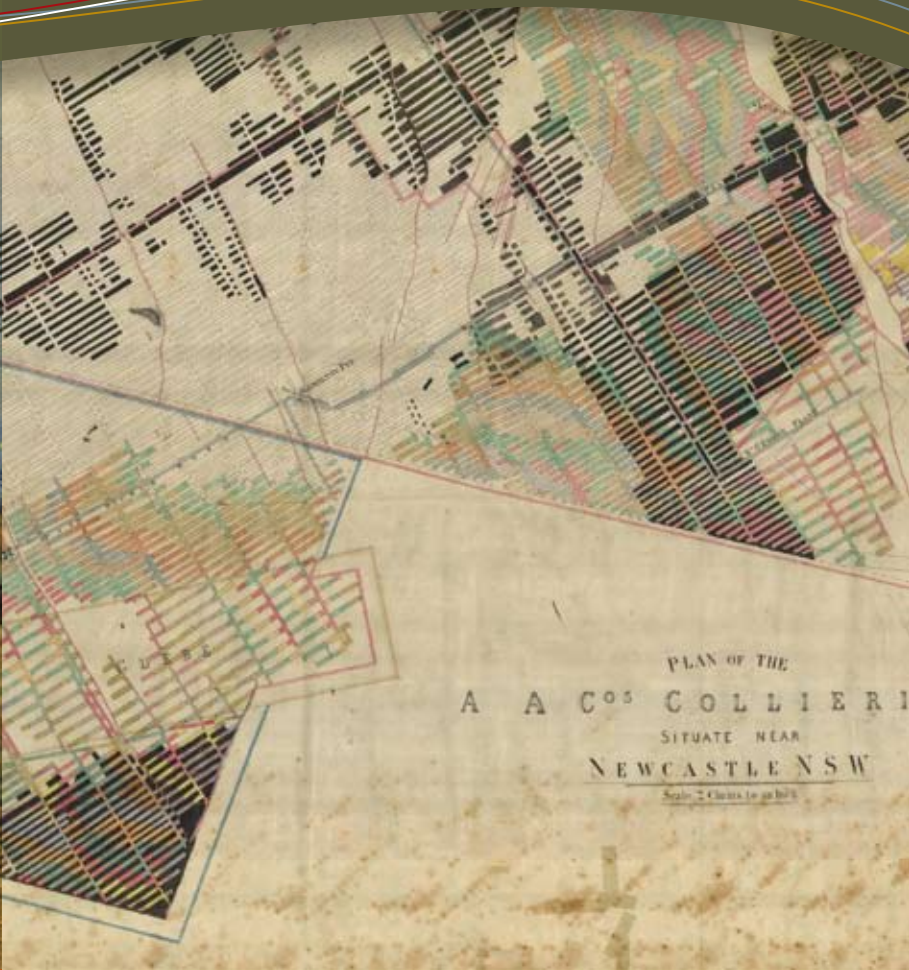
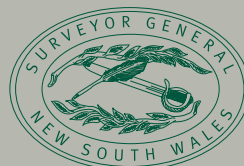


Survey and Drafting Directions for Mine Surveyors 2007 (Coal)



Department of Lands



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

**SURVEY AND DRAFTING
DIRECTIONS
FOR
MINE SURVEYORS
(NSW - COAL)**

Issued by the Surveyor-General on the advice of the Board of Surveying and Spatial Information pursuant to clause 4 of the Surveying Regulation 2006

These Directions are for coal mines in New South Wales. Refer to the document entitled *Survey and Drafting Directions for Mining Surveyors*, published in December 2001 by the Department of Mineral Resources, in respect to mining surveys carried out for the purposes of the *Mine Health and Safety Act 2004*.

These Directions replace the *Survey and Drafting Directions for Mine Surveyors Issued Pursuant to Part 7, Clause 64, Of the Coal Mines (General) Regulation 1999* published in March 2000.

SURVEY AND DRAFTING DIRECTIONS FOR MINE SURVEYORS

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SURVEY AND DRAFTING DIRECTIONS FOR MINE SURVEYORS 2007 (NSW - COAL)

1. GENERAL

1.1 Authorisation

The surveys, plans and digital data standards detailed in these Directions are required by the Surveying Act 2002 and clause 4 of the Surveying Regulation 2006. Specifically the Mine Workings Plan (MWP) is required to be kept in satisfaction of Clause 138 of the Coal Mine Health and Safety Regulation 2006 *Survey and Plan Arrangements*.

1.2 Preparation

These Directions provide principally for the conduct of surveys and preparation of plans for coal mines in New South Wales. They provide guidance for preparation of the Hard Copy and the digital recording, storage and preparation of the Mine Workings Plan and Mine Workings Spatial Information for the whole of the mine. They also provide some guidance to the preparation of other plans based on the Mine Workings Spatial Information that are required by the Coal Mine Health and Safety Regulation 2006 and various Departmental guidelines. In particular preparation of plans required in support of various applications that may be required from time to time for the conduct of coal mining operations in New South Wales.

1.3 Compilation

- 1.3.1 The Mine Workings Plan and Mine Workings Spatial Information shall be surveyed and compiled on the Map Grid of Australia 1994 (MGA94) based on the Geocentric Datum of Australia 1994 (GDA94) values. The Mine Workings Plan shall be sectionalised into sheets as a best fit for individual Collieries. In determining the best fit for the sheet layout the surveyor should be mindful of the need to provide for expansion of the mine and to fit with adjoining mine workings. If in doubt the surveyor should consult with the Department and with neighbouring mines.
- 1.3.2 The Surveyor-General may request of the Department copies of all or any Mine Workings Spatial Information to be lodged with the Central Plan Register in accordance with the Surveying Act 2002.
- 1.3.3 Where old workings exist it shall be assumed, for the purpose of marking the Mine Workings Plan, that they constitute a danger until the contrary is proven. In this situation, all plans should be regarded with suspicion until their accuracy has been verified. Reasonable effort should be made to obtain all existing information about old workings and, once obtained, to ensure that they are recorded on the Mine Workings Plan in accordance with these Directions.

Note. Clause 28 of the Regulation prescribes for the purposes of section 32 of the Act hazards arising from inrush into underground parts of a coal operation as a major hazard to which subdivision 2 of Division 2 of Part 5 of the Act applies. Clause 33 of the Regulation prescribes for the purposes of section 36 of the Act contents of an inrush management plan. Clause 49 of the Regulation prescribes working within an inrush control zone as a high risk activity to which Subdivision 6 of Division 2 of Part 5 of the Act applies.

1.4 Transfer to MGA94

- 1.4.1 When Seam Workings Sheets or Void Sheets of the Mine Workings Plan are being prepared to comply with these Directions and the workings of any part of the Mine were completed prior to 31st March 2000, it shall be acceptable to draw an outline of such

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workings and to endorse the new sheet(s) to refer to any previously prepared Record Tracing held by the Department for detail.

1.4.2 Unless otherwise specified in writing by the Chief Inspector, should the workings on a Seam Workings Sheet or Void Sheet prepared under the direction of the Chief Inspector, other than in accordance with these Directions, become active in an area previously shown in outline, then the relevant workings shall be reproduced in full on the Seam Workings Sheet or Void Sheet of the Mine Workings Plan in accordance with these Directions.

1.4.3 Nothing shall prevent the transfer of Mine workings in full to the Mine Workings Plan.

1.5 Symbols

The technical symbols, sign conventions and definitions for strata to be shown on the Mine Workings Plan and the Mine Workings Spatial Information shall be in accordance with these Directions, and shall conform to those illustrated in the Australian Standard for Mine Plans – Preparation and Symbols (AS-4368), the Australian Standard for Geological Symbols (AS-2916). If a symbol is not provided for in AS4368 or AS2916 the Mining Surveyor may create a suitable symbol to be also shown in the legend.

1.6 Duties of a Mining Surveyor

A mining surveyor must ensure that:

- (a) any variation of the coal operation workings from a mine workings plan of which the surveyor becomes aware, or
 - (b) any interference with or obstruction to the performance of his or her functions, or
 - (c) any doubt about the accuracy of any plans,
- is brought to the attention of the relevant operator.

Note: Clause 143 of the Regulation prescribes this requirement.

1.7 Liability of a Mining Surveyor

The liability of a Mining Surveyor in complying with these Directions for a Mine shall be limited to the period of time of nomination as the Mining Surveyor for that Mine.

Note. Subdivision 3 of Division 2 of Part 5 of the Act applies to the Management Structure for a Coal Operation.

2. DEFINITIONS

In these Directions the following words and terms have the meanings indicated:

Abandoned

A Mine or a Seam shall be deemed to be Abandoned where the workings of the Mine or Seam, as the case may be, have been Discontinued and there is no Care and Maintenance in place.

Note. Clause 64 and paragraph 2 of Schedule 1 of the Regulation provide further information regarding abandonment.

Attribute:

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A database field attached to a feature object in a theme used to describe spatial data and is also known as “object data”.

Australian Height Datum (AHD)

AHD is the datum surface approximating mean sea level that was adopted by the National Mapping Council of Australia in May 1971.

Bench Marks

Marks established at or in a Mine from which the levels (heights) of the Mine workings are determined.

Borehole

A Borehole includes any hole (whether vertical, horizontal, inclined, or a combination of these), that may affect the safety of the Mine, drilled for: -

- (a) exploration,
- (b) gas drainage,
- (c) outburst relief,
- (d) Services (e.g. power, water and other services)
- (e) or any other purpose,

but does not include blast holes or shallow holes from the Working Section that do not intersect another Seam.

Borehole Plan

A plan or plans prepared in accordance with these Directions as an addition to the Mine Workings Plan where density of boreholes affects the clarity of the Mine Workings Plan.

BOSSI

Board of Surveying and Spatial Information as Constituted by the Surveying Act 2002 No 83.

Care and Maintenance

Discontinued Mine workings are said to be under Care and Maintenance where mining is suspended and when the Mine workings are maintained in a generally safe and accessible condition so as to allow for recommencement of mining activities without sterilisation of reserves.

Note. Clause 64 (1)(b) of the Regulation provides further information.

Certification

A written statement or a schedule signed by the Registered Mining Surveyor attesting that the surveying procedures and plan preparation for the period certified, have been carried out pursuant to the standards required by these Directions, the Surveying Regulation 2006, the Act and the Regulation.

Chief Inspector

Chief Inspector of Coal Mines, New South Wales Department of Primary Industries, Mineral Resources. The same meaning as defined in the Act.

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Control Surveys

Substantially marked surveys completed in accordance with ICSM SP1, developed from a Mine Baseline to define the direction and position of the workings of a Mine.

Department

New South Wales Department of Primary Industries, Mineral Resources (DPI,MR).

Director-General

Director-General of the Department. The same meaning as defined in the Act.

Discontinued (Discontinuance, refer to clause 64(1)(b) of the Regulation)

Any discontinuance of all work at the coal operation (where mining is suspended but the operation is kept on a care and maintenance basis),

Note. Clause 64 (1)(b) of the Regulation provides further information.

Escape and Rescue Plan

Plan required by clause 47 of the Regulation.

Endorsement

A notation created, initialled and dated by the certifying Mining Surveyor, drawing attention to any aspect of the compilation of the Mine Workings Plan or Mine Workings Spatial Information that is considered necessary or informative that may or may not be a requirement under these Directions or any legislation.

ESRI Geodatabase

A Database created through *ESRI ArcGIS* software containing digital themes and their attribute information, allowing access to large volumes of geographic data. (See **SECTION 9** of these Directions)

Feature Type

Description on how spatial data should be defined, for example, a point, line, or polygon.

Fire Fighting Plan

Plan required by clause 48 of the Regulation.

Geocentric Datum of Australia (GDA)

Datum surface approximating the shape of the earth's surface that was adopted by the Inter-Governmental Committee for Surveying and Mapping in May 1990.

Note. The datum surface is described in a notice published by the Surveyor-General in NSW Government Gazette No 88 of 8 August 1997 and designated in that notice as "The Geocentric Datum of Australia (GDA)".

Hard Copy

In regard to paragraphs 3.1.8, 3.4.2, 7.2.1 and 7.2.2 of these Directions Hard Copy means plans prepared on 0.4mm/72 Micron double matt transparent drafting film with permanent inks, for all

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other cases coated paper Hard Copy with durable inks is acceptable. Whenever Hard Copy plans are submitted to the Director-General they shall be backed-up in PDF (Portable Document Format) on CD-R which shall accompany any such plans submitted.

Height Datum

All levels shown on the Mine Workings Plan, and all other plans prepared under these Directions, shall be reduced to Australian Height Datum (AHD).

ICSM SP1

The Inter-Governmental Committee on Surveying and Mapping Special Publication 1 "Standards and Practices for Control Surveys".

Inrush

Under the provisions of clause 28 of the Regulation, hazards arising from inrush into underground parts of the coal operations is a prescribed major hazard for the purposes of section 32 of the Act to which Subdivision 2 of Division 2 of Part 5 of the Act applies.

Integrated Survey Grid and Co-ordinate System (ISG)

A system of co-ordinate surveys previously used for the State of New South Wales. This grid is a Transverse Mercator projection of the Australian National Spheroid of 1966.

Map Grid of Australia 1994 (MGA94)

Has the same meaning as defined in the Surveying Regulation 2006.

Metadata:

"Information about data" and is used to inform the user of the lineage, accuracy and limitations that may exist within the data. The aim of metadata is to enable the end-user to work with the data with a known level of confidence.

Mine

Has the same meaning as defined in the Coal Mine Health and Safety Act 2002 No 129.

Mine Baseline

A permanently marked survey line established as part of the State Survey Control Network.

Mine Record Tracing (MRT)

Any certified Hard Copy of the Mine Workings Plan (MWP) submitted to the Department by a Registered Mining Surveyor.

Note. Clause 139 of the Regulation requires mine record tracings to be sent to the Director-General in accordance with these Directions.

Mine Workings Plan (MWP)

The plan required to be kept under Clause 138 of the Regulation *Survey and Plan Arrangements* to accurately show the position of the Mine workings and compiled in accordance with these Directions.

Mine Workings Digital Themes

Any spatial data that is required to be compiled in the mapping area of the Mine Workings Plan (i.e. Seam Workings Sheets or Void Sheets) or is required to be submitted, as Mine Workings Spatial Information under these Directions. Compilation of the digital themes will be in accordance with Part 9 of these Directions. See also *ESRI Geodatabase*.

Mine Workings Spatial Information

Digital files containing Mine Workings Plan data in the form of digital themes prepared in accordance with these Directions.

Mines Rescue Plan

See Escape and Rescue Plan.

Mining Surveyor (Mine Surveyor)

The person registered as a Mining Surveyor under the Surveying Act 2002 No. 83. A mining surveyor in accordance with Part 4, Division 6 of the Regulation. A Mining Surveyor nominated under Section 37 of the Act.

Potential Sources of Inrush

Potential sources of inrush include tidal waters, impounded waters, rivers, streams, dams, reservoirs, aquifers, unconsolidated surface deposits, adjacent Mine workings, bulk sample locations or other natural or man made feature whether the same or of a different kind which, if disturbed by mining operations, may put the Mine or persons at the Mine at risk. This definition includes any material that flows when wet or flammable or noxious gases.

Note. Clause 33 of the Regulation provides further information.

Precision

Coordinate precision refers to the mathematical exactness of a coordinate and is based on the possible number of significant digits that can be stored for each coordinate.

Reporting Period

The Reporting Period shall be:-

- For supply of the Mine Workings Spatial Information to the Director-General as a Digital file in accordance with paragraph 5.3.1 – Three (3) monthly,
- For supply of a copy of the Mine Workings Record Plan in Hard Copy to the Director-General (the Mine Record Tracing) – Six (6) monthly.

Seam Workings Plan

A compilation of Mine Workings Spatial Information and other digital themes that when combined show the Mine workings for a Seam of an underground Mine, necessary for the Mine Workings Plan.

Seam Workings Sheet

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The sectionalised sheets, derived from the *Seam Workings Plan*, formatted for the mapping area of the Mine Workings Plan sheets, that when re-combined, cover the total area worked in an underground Mine. (See Void Sheet for open cut Mines)

Seam

Any coal bearing stratum or combination thereof mined as a discrete entity. Refer to the Department for correct naming of coal seams.

Secondary Surveys

A survey based on Control Surveys or Subsidiary Surveys utilised by the Mining Surveyor to accurately locate all of the workings of the Mine that are not included in Control Surveys or Subsidiary Surveys.

Subsidiary Survey

A survey based on Control Surveys to develop the workings of a Mine or to locate the position of the workings of a Mine.

Supervision

When a survey is carried out in accordance with these Directions the Mining Surveyor must exercise such personal oversight and direction of the work as is necessary to ensure that the Mining Surveyor has the knowledge to certify all aspects of the survey and that the survey has been carried out in accordance with sound professional practice and these Directions.

Surface Plan

The Plan prepared in accordance with these Directions showing surface features, infrastructure and services subject to Mine operations, whether open cut or underground, and includes coal preparation and handling facilities located on a Mine site.

Note. Clause 138 of the Regulation sets out this requirement.

Survey Records

For the purpose of these Directions, survey records shall be taken to mean any plan, survey or spatial information required under these Directions and includes field books, level books, co-ordinate books, calculations and any other note books, sheets or plans used for recording relevant survey data, all survey observations, and compilations whether recorded or stored in written, photographic, digital or electronic form.

Surveyor-General

Has the same meaning as defined in the Surveying Act 2002 No 83.

the Act

means the Coal Mine Health and Safety Act 2002 No 129.

the Regulation

means the Coal Mine Health and Safety Regulation 2006.

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Underground Baseline

A permanently marked survey line established in underground workings from which underground surveys are developed. The Underground Baseline shall be connected by Control Survey to the Mine Baseline.

Ventilation Plan

Plan prepared in accordance with these Directions showing all ventilation appliances and airflow.

Note. Clause 138 of the Regulation sets out this requirement.

Void Plan

A compilation of Mine Workings Spatial Information and other digital themes that when combined show the position of all excavations, ramps, disturbed areas and highwall mining within an open cut Mine, necessary for the Mine Workings Plan.

Void Sheets

The sectionalised sheets derived from the Void Plan, formatted for the mapping area of the Mine Workings Plan sheets, that when re-combined, cover the total area worked in an open cut Mine.

Working Section

The Seam or part of a seam that is normally mined in an underground or open cut Mine and which may include out of seam strata.

3. SURVEY PROCEDURES

3.1 Origin of Co-ordinates

- 3.1.1 All surface and underground surveys made and carried out in accordance with these Directions shall be calculated and plotted by using the Map Grid of Australia (MGA94).
- 3.1.2 All surveys are to originate from the Mine Baseline or may originate from any other mark included in the State Survey Control Network having a standard of accuracy consistent with that of the Mine Baseline.
- 3.1.3 The horizontal survey of the Mine Baseline should be planned and surveyed to Class "B" standards of accuracy as defined in ICSM SP1. The geometry of the network should be consistent with this standard of accuracy.
- 3.1.4 Each end of the Mine Baseline should be assigned an AHD Reduced Level surveyed to ICSM SP1 Class "LD" spirit levelling or Class "B" from Trigonometric or GPS heighting.
- 3.1.5 At each end of the Mine Baseline there shall also be established a reference mark of durable nature connected by bearing and distance to the baseline permanent marks.
- 3.1.6 Should the position or co-ordinate values of the Mine Baseline change, this information shall be reported in accordance with the Surveying Regulation 2006, Clause 41.

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- 3.1.7 Surface Baseline terminals shall be approved Permanent Marks as described in Surveyor-Generals Direction No1.
- 3.1.8 Where Permanent Marks are placed for a Baseline, a Hard Copy plan and an electronic record with digital survey data shall be forwarded to the Director-General who in turn shall forward the information to the Surveyor-General for approval to be included in the State Control Network.
- 3.1.9 The Mine Baseline shall not be less than 250 metres in length

3.2 Underground Baseline

- 3.2.1 Each underground Mine shall have established a baseline in the underground workings of each seam. The Underground Baseline shall be in a suitable position and of at least 250 metres in length or as long as practicable. The terminal marks shall be stable and durable. Underground Baseline details shall be recorded on the Mine Workings Plan.
- 3.2.2 Sufficient subsidiary baselines shall be established by control survey to confirm orientation of the Mine workings. The baseline details shall be recorded on the Mine Workings Plan

3.3 Control Surveys and Subsidiary Surveys

- 3.3.1 Accuracy: Each control survey and subsidiary survey must be planned and surveyed to ensure these surveys satisfy the conditions to achieve a standard of accuracy as prescribed in ICSM, SP1 to achieve Class D or better. All control surveys and subsidiary surveys observed survey data must be analysed to ensure all control surveys and subsidiary surveys achieve a standard of accuracy as prescribed in ICSM SP1 to a minimum standard of Class D. When calculating compliance to ICSM SP1 Class D via the formula $r = c(d + 0.2)$ this Direction specifically defines d as the following:

d = distance to any station in km, with a minimum value of 1(km).

- 3.3.2 Marking: Each control survey station shall be adequately referenced and substantially marked. As far as practicable the marks shall be placed in a position least likely to be disturbed.
- 3.3.3 Secondary surveys shall be employed by the Mining Surveyor where necessary to accurately locate all of the Mine workings on the Mine Workings Plan to within 1mm at 1:2000 Scale. Such surveys shall be completed to the highest appropriate standards of accuracy.

3.4 Correlation of Surface and Underground Surveys

- 3.4.1 Correlation between surface and underground surveys shall be consistent with a Class D survey as prescribed in ICSM SP1.
- 3.4.2 In correlation of surface and underground surveys where methods other than direct traverse are employed for azimuth or co-ordinate transfer, the surveys shall be shown on a plan separate from the Mine Workings Plan and shall disclose the special survey

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methods employed. The plan shall be submitted to the Director-General and the Mining Surveyor shall certify that the survey shown on the plan is accurate and meets the requirements of these Directions.

3.5 Levelling Surveys

3.5.1 Order of accuracy of benchmarks:

Such levelling shall be completed to ICSM SP1 Class "LD" or Class "B" standards of accuracy.

3.5.2 Accuracy of Mine workings:

Such levelling shall be completed to ICSM SP1 Class LE standard of accuracy or to within 0.1 metre. Where vertical measurement is necessary for transference of the value of the surface bench mark to a nominated underground bench mark, the maximum permissible error should not exceed 0.05 metre.

3.6 Survey Records and Supply of Survey Information

3.6.1 Systematic and reasonable care shall be taken by the Mining Surveyor for the safe preservation of all survey records required under these Directions.

3.6.2 Survey records for each of the following purposes shall be kept at the survey office for the Mine:-

- (a) control surveys
- (b) subsidiary surveys
- (c) secondary surveys
- (d) levelling surveys
- (e) surface movement and subsidence surveys

3.6.3 Such survey records shall be maintained manually on either field book or other stable material, electronic text or image or other means not visually perceptible without the aid of a machine or other device. Where a machine or other device is required to access the stored data the Mining Surveyor shall ensure the data is regularly updated to a media and format that is currently available.

3.6.4 Survey records are to be permanently recorded and maintained in accordance with ICSM SP1 and these Directions.

- (a) All survey books shall be maintained in good order and shall have the following description clearly and permanently marked on the cover and inside title page:
 - (i) the Mine name,
 - (ii) for underground mines, the seam name, and (RT) catalogue number to which the book refers,
 - (iii) consecutive index number

(b) The following procedures shall be adopted for entries into survey books:-

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- (i) all survey observations and measurements shall be recorded at the time of survey;
- (ii) in the event of alteration of a mistake there shall be no erasure. The erroneous entry should be struck through and the correction written above;
- (iii) the datum line of the survey and the azimuth adopted shall be clearly indicated;
- (iv) lengths shall be entered at the time they are measured. Where appropriate, corrections shall be noted and the lengths deduced therefrom shall be clearly indicated;
- (v) bearing and distance from reference marks must be clearly shown;
- (vi) reference marks and Bench Marks placed by the surveyor shall be so noted and the positions and descriptions thereof shall be shown by a sketch in the appropriate book;
- (vii) lines remeasured shall be so specified and original distances and bearings shown;
- (viii) The Mining Surveyor shall sign the field book that the work shown therein was performed by him or under his supervision and indicate the date on which the work was performed.

3.6.5 Where surveys are recorded in electronic form the information to be recorded shall be consistent with that required for survey books (see 3.6.4 (b)). A complete and separate duplicate of such records shall be preserved on paper or disc or other permanent electronic medium. Where a machine or other device is required to access the stored data the Mining Surveyor shall ensure the data is regularly updated to a media and format that is currently available

3.6.6 The nominated Mining Surveyor of any Mine, upon the request of the Chief Inspector, shall make available, in a format specified by the Chief Inspector all or any survey records or certified copies thereof.

3.6.7 Upon Discontinuance of a Mine all survey records relevant to the preparation of the Mine Workings Plan shall be prepared by the Mining Surveyor for submission to the Department. On abandonment these records shall be submitted to the Department for retention unless otherwise directed in writing by the Chief Inspector.

3.7 Requirements where workings are to become inaccessible

3.7.1 Before any part of the workings of a Mine becomes inaccessible, where reasonable, practical and safe to do so, the position of all points of the workings shall be established from a control, subsidiary, or secondary survey.

3.7.2 Sufficient levels shall be taken to enable contours of the floor of the working section to be calculated and shown on the Mine Workings Plan. (see 3.5.2)

3.7.3 Where inaccessible workings are not surveyed in accordance with these Directions, the Mining Surveyor may draw upon any available resources of the Mine to best locate the inaccessible workings for the purpose of completion of the Mine Workings Plan, with suitable Endorsement.

3.8 Surface Movement and Subsidence

- 3.8.1 Where the Chief Inspector directs, surveys are to be undertaken to record surface movement, including subsidence induced by mining.
- 3.8.2 Such surveys shall be carried out in accordance with the standards set out in these Directions, or as otherwise directed by the Chief Inspector.
- 3.8.3 Such surveys shall be carried out under the supervision of, and certified by, a Registered Mining Surveyor.
- 3.8.4 All subsidence survey data including field notes is to be kept at the Mine in accordance with Clause 3.6 of these Directions.

3.9 Survey of Boreholes

Boreholes are to be identified by unique name or number and are to be shown on the Mine Workings Plan. Collar and/or commencement locations of Boreholes, are to be established from a control or subsidiary survey, with both MGA coordinates and AHD levels in accordance with these Directions. The following information will also be recorded, wherever possible, whether from direct survey or other source (i.e.: drillers log, geophysical survey): -

- (a) total length (or depth);
- (b) inclination (or declination), and
- (c) plan projection (bearing or azimuth) when other than near vertical.

In regard to MRD or STIS holes, the Mining Surveyor shall satisfy himself that the holes are accurately recorded and represented on the Mine Workings Plan with regard to mine safety.

4. MINE WORKINGS PLAN

4.1 General

4.1.1 Direction

The Mine Workings Plan (MWP) shall be prepared by or under the direct supervision of the nominated Mining Surveyor within three months of commencement of the Coal Operation or such other time as the Chief Inspector may direct by notice in writing served on the Operator of the Mine.

4.1.2 Updating the Mine Workings Plan

Except where the Mine is considered Discontinued or Abandoned the Mine Workings Plan must be updated at the end of each Reporting Period. Sufficient surveys must be undertaken to ensure that the mine workings or voids are accurately represented on the Mine Workings Plan in accordance with these Directions.

4.1.3 Composition

- (a) The Mine Workings Plan is prepared from the Seam Workings Sheet information and other layout data required under these Directions. It is compiled by digital

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methods and produced in Hard Copy and electronic form for presentation, supply, and archiving.

- (b) The Mine Workings Plan shall comprise sheets for each Seam Workings Sheet or Void Sheet, and other layout data, for the whole of the Mine as required by these Directions.
- (c) In the case of an underground Mine, a Mine Workings Plan shall be compiled on the Seam Workings Sheets for each Seam being worked.
- (d) In the case of an open cut Mine, the Mine Workings Plan shall be compiled on the Void Sheets.
- (e) The Mine Workings Plan sheets shall be AO size International Standards Organisation and may be orientated in either portrait or landscape direction. A standard (recommended) layout is available from the Department.

4.1.4 Presentation and Archiving – Hard Copy

- (a) A Hard Copy of the Mine Workings Plan should be produced on stable paper or other stable and durable material depending on the requirements of these Directions.
- (b) The Hard Copy will comprise all sheets on which workings have occurred.

4.2 Seam Workings Plans and Void Plans

- (a) The underground Mine workings or open cut voids shall be mapped on Seam Workings Plans or Void Plans, respectively, for the whole of the Mine workings area of a Mine.
- (b) The Seam Workings Plans and Void Plans shall be compiled from the Mine Workings Spatial Information and other digital themes as necessary to truly represent the survey of the mine as required by these Directions.

4.3 Seam Workings Sheets and Void Sheets

- (a) The Seam Workings Sheets and Void Sheets shall be compiled from the Seam Workings Plan and Void Plan, respectively, at a reduction ratio of 1:4000 with sufficient sheets to cover the extent of the Mine workings and necessary adjacent workings. In the case where such a scale limits the clarity, sheets at a reduction ratio of 1:2000 may be used.
- (b) The Seam Working Sheets and the Void Sheets shall be sized to fit the mapping area of the Mine Workings Plan sheets. The mapping area will be 750 mm x 625 mm with grid lines at 125 mm x 125 mm intervals.
- (c) Full lines are to be shown for the Map Grid of Australia commencing at the lower left corner of the mapping area. The extremities of each grid line shall be annotated with the grid value.

4.4 Preparation of Mine Workings Plan

4.4.1 Mine Workings Spatial Information.

For the preparation of the Mine Workings Spatial Information the following, unless otherwise required by these Directions, shall be compiled, as a minimum information in the form of digital themes, for each Seam Workings Plan or Void Plan.

4.4.1.1 Themes – General (NB: polygons are preferred see Table 9.2)

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- (a) **Adjacent Mine Workings** - an outline of all workings in any seam in any direction within 100 metres of the current seam being worked.
- (b) **Adjacent Seam Workings** - all Mine workings (including other mines) in the seam being mined within 100 metres of the current workings.
- (c) **Barriers and Restricted Zones**
- (d) **Borehole Locations**
- (e) **Boundary Control Marks**
- (f) **Cadastral Parcels** - (State if LPI DCDB is used).
- (g) **Colliery Holding Boundary**
- (h) **County Boundary**
- (i) **Emplacement Areas**
- (j) **Grid Lines**
- (k) **Highwall Mining/ Auger Mining**
- (l) **Coal Operation Boundary** – as nominated by the colliery holder in accordance with clause 7(1)(b) of the Regulation.
- (m) **Mining Approvals/ Acceptances** (extent to be shown in red)
- (n) **Mining Lease Boundaries.**
- (o) **Parish Boundaries**
- (p) **Potential Sources of Inrush** (to be shown outlined in green)
- (q) **Prescribed Dams**
- (r) **Survey Control Stations** including Bench Marks
- (s) **Surveyed Geofeatures** - all known outcrops, subcrops, faults, dykes, cinder belts, and other significant dislocations to the seam, as surveyed.

4.4.1.2 Themes – Underground Mines (Seam Workings Plans)

- (a) **First workings**
- (b) **Mine Underground Access** - mine shafts, staple shafts, adits, and drifts
- (c) **Second workings**
- (d) **Date Lines** (dashed) indicating the extent of workings for each survey Reporting Period
- (e) **Mine Workings Outline** – an outline of the Mine workings.
- (f) **Underground Auger Areas**
- (g) **Working Section Floor Contours** (as calculated from spot heights and shown in blue)

4.4.1.3 Themes – Open Cut Mines (Void Plans)

- (a) **Void Contour**
- (b) **Void detail area**

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(c) **Void detail line**

4.4.2 Mine Workings Plan layout information

4.4.2.1 In the sheet heading area:-

- (a) The name of the Mine.
- (b) The Mine Workings Plan Catalogue Number (RT catalogue number).
- (c) The Parish and County names.
- (d) The LPI 1:25000 sheet map identification name(s) and number(s).
- (e) The name of the Seam or Seams being represented.
- (f) The name of other seams known to have been worked in that sheet area, together with the RT catalogue number for those workings (see 4.10).
- (g) The number of the sheet and the number of sheets that make up the coal operation.

4.4.2.2 In the map surround area:-

- (a) The reduction ratio and a graphical (bar) scale together with a statement that all measurements are in metres,
- (b) A north point indicating grid north,
- (c) A schedule of symbols used on the particular sheet,
- (d) A sheet index showing:-
 - (i) All the sheets necessary to cover the colliery holding
 - (ii) The number of each sheet
 - (iii) An outline of the Colliery Holding
 - (iv) The particular sheet shown by a heavy outline
 - (v) Outline of Mine workings
- (e) For underground Mines, a section of the seam identifying the Working Section appropriately symbolised, named and the section location identified by coordinates. Additional sections may be shown if the Seam thickness or Working Section varies significantly or the Seam is affected by intrusions, sills or stone bands,
- (f) A section of the stratum from the surface to the basal seam, appropriately symbolised, seams named and section location identified by coordinates,
- (g) A schedule of Endorsements made by the Mining Surveyor,
- (h) A schedule of second working, barrier penetration or open cut approvals granted by the Minister, Mining Operations Plans (MOP's) accepted by the Department.
- (i) A statement or schedule certifying the accuracy of the sheet, including:

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- (i) The name and signature of the certifying Mining Surveyor
- (ii) The certifying surveyor's Registration Number
- (iii) The date of Certification
- (j) The origin of levels and the grid bearing and terminal survey stations of the Mine Baseline or survey control marks used for surveys within the sheet,
- (k) For underground Mines, a schedule or schedules of survey marks and Bench Marks containing their identification, coordinates and height,
- (l) For underground Mines, a schedule of shafts, drifts, Boreholes, staple shafts and bins, with coordinates and heights of the commencing and finishing locations.
- (m) A schedule of Boreholes showing coordinates and heights of the collar or starting location together with the general direction, inclination and length.

4.4.2.3 In the mapping area

The Mine Workings Digital Themes and sufficient detail in the form of annotation to identify the characteristics of type, name, dislocation or status should be shown together with the following detail:-

- (a) For underground Mines panel names and sufficient heading and cut through numbers (or letters) to identify the numbering system.
- (b) The position of all Boreholes within that sheet or
 - (i) Where it is not practical to show all Boreholes on the seam workings sheet, a separate "Borehole Plan", which shall become part of the Mine Workings Plan, shall be produced as an overlay.
 - (ii) a reference on the Seam Workings Sheet is required to indicate the existence of any Borehole Plan sheet.
 - (iii) All Boreholes should be identified as to type and name and their current status (e.g. open, sealed, capped).
 - (iv) Where Boreholes are drilled in adjacent strata sufficient reduced levels should be shown to indicate their position.
 - (v) Any Borehole that is removed by the mining process or is in the void is not required to be shown. Remnant stubs of these holes, however, which may present a hazard to future mining operations, must be shown.
- (c) The date and the initial of the Mining Surveyor in the location corresponding to the position of the workings or void at the end of the survey Reporting Period in the format provided by AS4368.
- (d) For underground Mines, contour lines of the floor of the working section are to be at each one (1) metre, two (2) metre or five (5) metre interval whichever predominantly provides contour representation on the Seam Workings Sheet.
- (e) Outline of limits of highwall mining and augering. The maximum extent of this mining in the seam is to be shown and identified. Approximate levels into the extremity of highwall mining and augering are to be shown every fifty (50) metres.

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- (f) The position of:-
 - (i) the top water level of any dam containment prescribed under The Dams Safety Act, 1978
 - (ii) the restricted zone of the prescribed dam as notified under The Dams Safety Act, 1978
- (g) Emplacement areas.
- (h) The position of any barriers, protective pillars or restrictive zones to be left in the seam pursuant to:-
 - (i) the provisions of the Coal Mine Health and Safety Act, 2002,
 - (ii) any leases in force granted or deemed to have been granted under the Mining Act, 1992
 - (iii) a condition of any approval, consent direction or concurrence given in accordance with the provision of the aforesaid Acts or Leases.
- (i) Coal operation boundaries with corner co-ordinate values annotated
Note: Coal operation as nominated by the colliery holder in accordance with clause 7(1)(b) of the Regulation.
- (j) Cadastral information in background line type.
- (k) For open cut Mines Contour lines at five (5) metre vertical intervals of the void.

4.5 Additional Information

- 4.5.1 Nothing in these Directions shall prevent the inclusion of any additional information on the Mine Workings Plan providing it is shown in a manner consistent with these Directions.
- 4.5.2 The Mining Surveyor shall show on the Mine Workings Plan any additional information as directed in writing by the Chief Inspector.
- 4.5.3 Any additional information discovered by or indicated to the Mining Surveyor which may present a hazard either to the Mine, adjacent mines or persons in those mines should be recorded on the Mine Workings Plan.

4.6 Endorsement

Where any information shown on the Mine Workings Plan is considered to be in doubt or any other information that the Mining Surveyor considers requires Endorsement, the Mine Workings Plan shall be suitably endorsed.

4.7 Old Workings/Surveys

Where old surveys or old workings are converted to GDA 94/MGA94 such conversion shall be suitably endorsed on the Mine Workings Plan.

4.8 Certification

- 4.8.1 The Hard Copy of the Mine Workings Plan shall be certified by the Mining Surveyor in the Certification of Accuracy schedule after the most recent Reporting Period has been charted.

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- 4.8.2 The Mining Surveyor shall, by signing and dating the Certification of Accuracy schedule declare for that Reporting Period that: -
- (a) the Mine Workings Plan has been prepared in accordance with these Directions, and,
 - (b) the surveys shown on the Mine Workings Plan have been completed to an accuracy as prescribed in these Directions.

4.9 Certification History

The Mine Workings Plan shall have recorded digitally in the Certification of Accuracy schedule the certification details for each Reporting Period.

4.10 Catalogue Number

The Department's Record Tracing cataloguing system shall continue for each Mine according to a unique number identification system prefixed by the letters 'RT'. This unique number is to be clearly identified on the Mine Workings Plan or any copy thereof.

5. MINE WORKINGS SPATIAL INFORMATION

This section refers to the preparation, composition and supply of the Mine Workings Spatial Information as a digital file.

5.1 Preparation

- 5.1.1 The Mine Workings Spatial Information shall be prepared by or under the supervision of the Mining Surveyor.
- 5.1.2 The Mine Workings Digital Themes shall be prepared to the standards required by **Section 9** of these Directions.
- 5.1.3 All Mine Workings Digital Themes shall be kept at the survey office for the Mine.

5.2 Composition

The Mine Workings Spatial Information shall be digital files of the Mine Workings Digital Themes for the whole of the Mine. Digital files may be in 2D or 3D format that are compatible with the Departments ESRI GEODATABASE.

5.3 Supply

- 5.3.1 The Digital File shall be supplied on a CD-R (Compact Disc – Read only) and shall be submitted to the Director-General at the end of each Reporting Period to coincide with the preparation of the Hard Copy to be kept at the mine.
- 5.3.2 The following Mine Workings Digital Themes are the minimum number of themes to be supplied, as appropriate to each Mine:-
 - (a) Coal Operation Boundary
 - (b) Date Lines
 - (c) First Workings
 - (d) Second workings
 - (e) Highwall/Auger mining

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- (f) Mining Lease boundaries
- (g) Mine Underground Access
- (h) Mine Workings Outline
- (i) Underground Auger Areas
- (j) Void Contours
- (k) Void detail
- (l) Working Section Floor Contours

5.3.3 The Surveyor-General may from time to time vary or amend the requirements for the lodgement of Digital Mine Workings Spatial Information or require additional Mine Workings Digital themes to be supplied.

5.3.4 The following information will be recorded on the label of the CD-R with a permanent marking pen:

- (a) The name of the Coal Operation
- (b) The RT catalogue number for the associated MWP
- (c) The name and signature of the certifying Mining Surveyor
- (d) The certifying Mining Surveyor's Registration Number
- (e) The date of Certification

5.4 Certification

The Mining Surveyor shall, by signing and dating the CD-R, declare that the Mine Workings Digital Themes contained on the CD-R, were used in the preparation of the Mine Working Record Plan for that Reporting Period.

6. CLOSING PLANS

6.1 Authorisation

Clauses 64(1)(b) and (c) of the Regulation as required by section 79 of the Act.

6.2 Discontinuance

Where a Mine or Seam therein has not been worked for a period of 2 months the owner of the Mine shall have the Mine Workings Plan charted and shall send a copy to the Chief Inspector in accordance with these Directions.

6.3 Charting for Discontinuance

These procedures are to be followed in the case of the discontinuance of a Mine or Seam:-

- 6.3.1 The Mine Workings Plan shall be charted, dated and signed by the Mining Surveyor to the date of discontinuance. The Mining Surveyor shall place a broken line around the extent of the workings, which shall be dated and initialled.
- 6.3.2 The note "Charted to date of Discontinuance" is to be shown in the "Schedule of Certification of Accuracy" above the date and the Mining Surveyor's signature.

6.4 Cessation of Duties of the Mining Surveyor

- 6.4.1 Upon permanent cessation of duties of the nominated Mining Surveyor the Mine Workings Plan shall be charted, dated and signed by the Mining Surveyor. The Mining Surveyor shall show the date of the workings at the time of cessation in a similar manner to that of the normal survey Reporting Period.
- 6.4.2 The note 'Charted to date of Cessation of duties of the Mining Surveyor' is to be shown in the 'Schedule of Accuracy' above the date and the Mining Surveyor's signature.
- 6.4.3 The Mining Surveyor shall by signing and dating the Certification of Accuracy schedule declare for that period from the last Reporting Period until the date of cessation of duty that:
- (a) The Mine Workings Plan has been prepared in accordance with these Directions; and
 - (b) The surveys shown on the Mine Workings Plan have been completed to an accuracy prescribed in these Directions.

6.5 Replacement of Operator

- 6.5.1 When an operator is to cease to operate a coal operation and is to be replaced by another operator, the outgoing operator must update the mine workings plan and provide the updated plan to the incoming operator.

Note. Clause 140 of the Regulation sets out this requirement.

7. SUPPLY OF MINE WORKINGS PLAN AND MINE RECORD TRACING

7.1 Period Supply

- (a) The Mine Record Tracing (a Certified copy of the Mine Workings Plan) shall be supplied to the Director-General in Hard Copy form for each Reporting Period (within 1 month of the end of each Reporting Period).

Note: Clause 139 of the Regulation sets out this requirement .

- (b) The Mining Surveyor shall advise the Director-General that the Mine Record Tracing has been sent from the Mine and by what means of transport.
- (c) The Director-General shall advise the Mining Surveyor within 7 days of receipt that the Mine Record Tracing has been received.
- (d) Hard Copies of the Mine Record Tracing shall be kept safe and secure by the Director-General and made available for examination as required.

Note: Clause 141 of the Regulation sets out this requirement.

- (e) The Mining Surveyor shall archive the current copy as Hard Copy, plotfile, or electronic image.

7.2 Supply on Discontinuance and Abandonment

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- 7.2.1 Where a Mine or Seam has been Discontinued, the Mine Workings Plan shall after charting be supplied to the Director-General, in Hard Copy form, within one (1) month of such discontinuance, unless otherwise advised by the Director-General
- 7.2.2 Where a Mine or Seam has been Abandoned, the Mine Workings Plan shall after charting be supplied to the Director-General, in Hard Copy form, within one (1) month of such abandonment, unless otherwise advised by the Director-General
- 7.2.3 After the Director-General is satisfied that the charting requirements have been met the Mine Workings Plan, the Mine Workings Spatial Information and all survey records required to be kept under these Directions, are to be forwarded, by a date specified by the Director-General, to the Department for preservation

7.3 Supply on Cessation of Duties of a Mining Surveyor

At the time of cessation of duties, and after Certification has taken place, the Mining Surveyor shall produce, a Hard Copy of the Mine Workings Plan and a copy of the Mine Workings Spatial Information on CD-R for retention at the office for the Mine.

The outgoing Mining Surveyor, with the consent of the Mine owner, should take a Hard Copy of the sheets for his own record.

The incoming Mining Surveyor should make a Hard Copy of the sheets for a record of commencement of work.

7.4 Exemption

Under special circumstances, the operator of a Mine may apply to the Director-General for an exemption from the requirement to supply the Mine Workings Plan or Mine Record Tracing in accordance with these Directions. In granting exemption the Director-General may direct in writing any other requirement for the supply of the Mine Workings Plan.

7.5 Extension of Time

The Director-General may, should the circumstances so warrant, grant an extension of time for the preparation of the Mine Workings Plan and supply of the Mine Record Tracing.

8. OTHER PLANS REQUIRED

Nothing shall prevent the Mining Surveyor from combining one or more of the following plans provided legibility of the combined plan is retained. All such plans should be prepared generally in accordance with these Directions and should be certified and endorsed, as required, by the Mining Surveyor or appropriate mine official as described in paragraph 8.13 of these Directions.

8.1 Plans required under clause 88 of the Regulation

Clause 88 of the regulation requires plans to be lodged as part of the written report for Minister's approval for all mining methods other than the bord and pillar system in underground coal mines. These plans should be prepared in accordance with the current guidance notes. Plans prepared under the guidance notes shall be prepared in accordance with the standards required by these

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Directions. All such plans will be Certified by the Mining Surveyor and suitably Endorsed where necessary.

Note. The Department publishes guidance notes for applications under clause 88 of the Regulation and the Subsidence Management Plan process.

8.2 Subsidence Management Plans

These plans are required by Mining Lease conditions and are prepared in accordance with the Departments guideline. Plans prepared under the guideline shall be prepared in accordance with the standards required by these Directions. All such plans will be Certified by the Mining Surveyor and suitably Endorsed where necessary.

Note. The Department publishes guidance notes for applications under clause 88 of the Regulation and the Subsidence Management Plan process.

8.3 Plans Required for Approval for Highwall/ Auger Mining

These plans should be prepared in accordance with the Departments guideline and generally in accordance with the standards required by these Directions. All such plans will be Certified by the Mining Surveyor and suitably Endorsed where necessary.

Note. The Department publishes guidance notes for highwall mining applications.

8.4 Ventilation Plan (Underground Mines)

The ventilation plan shall be compiled generally in accordance with these Directions at a scale of not less than 1:5000. Ventilation appliances will be symbolised in accordance with AS 4368.

The plan shall show stoppings, trapdoors, regulators, seals, prepared seal sites, overcasts, air crossings, ventilation doors, the direction and nature of ventilation, auxiliary fans, booster fans and air reading stations with air quantity, in relation to the mine workings. The plan will also show the locations of fixed gas monitoring plant as required by clause 18(1)(a) of the Regulation (Monitoring Arrangements).

A legend will be shown on the plan depicting symbols used together with a graphical representation of the scale.

This plan is to be updated monthly.

Note. Clause 138 of the Regulation (Survey and Plan Arrangements) includes provision in paragraph (1)(ii) for a ventilation plan for underground mines.

8.5 Fire Fighting Plan (Underground Mines)

A Fire fighting Plan is to be prepared for all underground parts of an operation. The Fire fighting Plan shall be compiled generally in accordance with these Directions at a scale not less than 1:10,000. Fire fighting appliances will be symbolised in accordance with AS 4368.

The plan shall show positions in which pipe mains, hydrants, isolation valves, fire substations and fire depots are situated. This plan will also show the position of stoppings, trapdoors, regulators, seals, prepared seal sites, overcasts, air crossings, ventilation doors, belt conveyors, main electric supply cables, fixed electrical apparatus, high voltage cables and switchgear, telephones and the direction of ventilation in the roadways.

The plan is to be updated in accordance with the Regulation, not greater than three monthly.

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Note. Clause 48 of the Regulation sets out this requirement.

8.6 Escape and Rescue Plan (Underground Operations)

The Escape and Rescue Plan shall be compiled generally in accordance with these Directions at a scale not less than 1:10,000. Symbols used will be in accordance with AS 4368 and AS2916. This plan shall show main roads, the means of egress from each part of the Mine to the surface, all self escape systems and all underground telephone stations, in relation to the mine workings. This plan shall also show main access roads, the means of egress from each part of the Mine to the surface, all self escape systems, the positions of First Aid Stations, underground telephone stations, belt conveyors, any gas drainage mains and branches, known falls, accumulations of water, stowage identified as non-passable. The plan shall also show any information from the fire fighting plan and the ventilation plan or any additional information identified as necessary for the dealing with an emergency at the operation. The plan is to be displayed and updated in accordance with the Regulation, not greater than three monthly.

Note. In accordance with the clause 47 of the Regulation, an Escape and Rescue Plan is to be prepared for all underground parts of an operation.

8.7 Emergency Management System

A plan shall be kept at the Mine for the purpose of an emergency management system as determined by the Mine. The plan may be a duplicate of another plan or a compilation of more than one plan. The emergency plan shall be compiled generally in accordance with these Directions and produced in Hard Copy at a suitable scale

This plan shall be kept up-to-date.

Note. Section 47(1) of Subdivision 5 of Division 2 of Part 5 of the Act prescribes this requirement.

8.8 Surface Plan

A surface plan is to be kept at the Mine. The Surface plan shall be of a scale of not less than 1:4000 and shall cover the areas where mining operations have been or are being carried out and construction zones as required by clause 87 of the Regulation. Symbols used will be in accordance with AS 4368. Topography may be shown if it adds to the interpretation of the plan. Compilation shall be generally in accordance with these Directions and the plan may be maintained as spatial information.

In the case of an Underground Mine, the Surface Plan shall show all streets, roads, reservoirs, swamps, water bodies, unconsolidated surface deposits, railways, main pipelines and any other feature whether of the same or of a different kind which, if disturbed by mining operations, is likely to cause damage to or danger in the Mine.

In the case of an Open Cut Mine, the Surface Plan shall show all streets, roads, reservoirs, swamps, water bodies and any other permanent feature whether of the same or of a different kind which, if disturbed by mining operations, is likely to cause damage to or danger in the open cut workings.

This plan shall be updated as often as it becomes necessary.

Note. Clause 138 of the Regulation sets out this requirement.

8.9 Site Services Plan (Underground and Open Cut Mines)

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The site services plan shall be at a suitable scale. Symbols used will be in accordance with AS 4368. Compilation shall be generally in accordance with these Directions and the plan may be maintained as spatial information.

This plan should show only surface improvements and infrastructure that are part of the Mine, including but not limited to: buildings including administration, bathhouse and workshops, mine access points (portals, shafts, ramps); mine access roads including parking areas; coal preparation plants and stockpiles; power reticulation including sub stations; water reticulation; compressors and compressed air reticulation; gas reticulation; sewer mains, treatment plants and transpiration areas; telephone and other communications lines; magazines including buffer zones; fire fighting equipment including fire stations, hydrants, extinguishers, depots; hazardous materials locations; dams and surface drainage; , Boreholes which can be used for gas testing, and any information which may assist in the case of an emergency. Topography may be shown if it adds to the clarity and understanding of the plan.

This plan shall be updated as often as it becomes necessary.

8.10 Emplacement Areas

Section 100 of the Act requires the approval of the Minister prior to establishment of any emplacement area. Plans prepared in support of any such application to the Minister shall be prepared in accordance with the current guidance note and comply with the standards required by these Directions. The plan shall be certified and suitably endorsed by a Registered Mining Surveyor.

Note. The MREMP process captures ongoing management of emplacement areas

8.11 Mining Rehabilitation and Environmental Management Process (MREMP)

The MREMP guidelines are published by the Department and include both the Mining Operations Plan (MOP) guideline and the Annual Environmental Management Report (AEMR) guideline. Plans prepared under these guidelines shall be prepared in accordance with the standards required by these Directions. All such plans will be Certified by the Mining Surveyor and suitably Endorsed where necessary.

8.12 Plan Standards - General

Any plan (including, where appropriate, plans subject to these Directions) required to be drafted by the Mining Surveyor for purposes of the Mine, should be prepared in accordance with the relevant Australian Standard -in particular, but not limited to, AS 4368 and AS 2916.

8.13 Declaration

A plan referred to in Section 8 of these Directions shall have an appropriate area on the plan allocated for Certification by the manager of mining engineering and/or Mining Surveyor as appropriate for information on that plan. Such Certification shall indicate the origin of the information and that the information shown on the plan is truly represented.

9. STANDARDS FOR THE PREPARATION OF MINE WORKINGS DIGITAL THEMES

9.1 General

These Directions require that the Mine Workings Plan be prepared using the Mine Workings Digital Themes as described in Section 4.4 of these Directions.

The aim of this Section 9 is to provide standard methods for the construction and preparation of the Mine Workings Digital Themes. This section identifies how each theme should be represented graphically and the attribute information that should be included to describe each featured object in the theme.

This section also identifies other supporting information that is required to be submitted to the Director-General on the CD-R as provided for in Section 5.2 of these Directions.

The Department also requires digital data submission for other reporting requirements. Many of the Mine Workings Digital Themes required by these Directions are common with those other reports. The provisions of this Section 9 in these Directions will assist in the preparation of digital data in support of such requirements for Subsidence Management Plans, Mining Operations Plans, Annual Environmental Management Reports and periodic geological reporting.

9.2 Theme Attribute Names and Definitions

Table 9.2 identifies attribute names and definitions that must be used for all Mine Workings Digital Themes.

Attribute names are not to exceed ten characters in length. All theme names and attribute names can be in either title case or lowercase, and individual attribute values may be expressed in upper or lower case. Underscores must be used to join multiple words as gaps are not permissible. Attribute names and format must be consistent with those shown in **Table 9.2**.

9.3 Theme Attribute Allocation and Feature Type

All objects in a theme must have attributes attached and be of the same feature type (e.g. point, line, or polygon). Each theme required is listed in **Table 9.3** with corresponding attributes and feature types that must be used to represent the theme spatially.

In some instances a Mine Workings Digital Theme may need to be represented by more than one theme. For example, Borehole Locations would normally be points for vertical boreholes and lines for horizontal or inclined boreholes. Where multiple shapes are to be used to represent a theme, and a separate theme is created, attribute fields must be consistent with that particular Mine Workings Digital Theme.

9.4 Theme Attribute Categories

Mine Workings Digital Themes attributes are divided into three categories. The attribute categories are as follows and the attribute names for each category are identified in **Table 9.3**.

- 9.4.1 Core attributes** are those attributes that are common to all the themes and include such attributes as mine name, RT number (catalogue number), date the theme data was charted to, and the person charting the theme data to the Mine Workings Plan.

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9.4.2 Additional attributes are those attributes that are unique to a particular theme or maybe common to several themes. Attributes that are common to several themes may include seam name, type of workings and when the workings were driven or mined.

9.4.3 Metadata attributes are attributes that are required to be attached to the themes only when they are written to the CD-R for submission to the Director-General in accordance with these Directions. These attributes include the theme name, the identifying name of the CD-R from which the theme originates, the file name of the theme on the CD-R, the date on which the CD-R was provided to the Department and the name of the Mining Surveyor providing the CD-R.

9.5 Attribute Values

It is required, where possible, to use standard attribute values. This will allow the Department and other users of the themes to develop standard enquiries through their GIS software. Values for all attributes are required to be attached for all objects in the theme.

All themes are to be prepared using the database format specified in **Table 9.2**. Numbers with decimal values should be stored as floating number. All other numbers should be stored as integers or characters.

9.6 File Format

All Mine Workings Digital Themes that are to be submitted to the Director-General in accordance with these Directions shall be submitted as ESRI shapefiles (.shp).

9.7 Date

Date attributes are to be in database format 'character' and be in the form "dd/mm/yyyy" where date of workings are accurately known, general format "month year" (May 2006) or as a time period (1950-2000 or pre 2000) when the charted period cannot be accurately shown.

9.8 File Naming Convention

Table 9.8 identifies the specific filename that must be used for each Mine Workings Digital Theme that is to be written to the CD-R for submission to the Director-General in accordance with these Directions.

9.9 Metadata Statements

A metadata statement for the Mine Workings Digital Themes must be included and written onto the CD-R when it is submitted to the Director-General in accordance with these Directions. The metadata statement must be in Adobe Acrobat (.pdf) format and in the form identified in **Table 9.9**. Metadata statements must be given a filename indicating mine name, RT number and date.

The metadata statement should include information such as version date, custodian name, coordinate system, accuracy, potential limitations for data use, definitions of any codes used within the dataset and any other information about the data that is not evident in the attributes attached to the theme.

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The completed metadata statement must be disseminated with the dataset that it describes. It may be one document sectionalised for each Mine Working Digital Theme or a separate document for each theme. Where two or more themes or a group of themes have the same metadata, a single metadata statement may be prepared that clearly lists all themes relating to the statement.

9.10 Precision

Spatial themes should be provided in the best available precision.

9.11 Seam abbreviations

The Department maintains a list of official seam name abbreviations. Dataset seam names must be consistent with this list.

9.12 Preparation of Additional Themes

In the event that additional themes are to be submitted with those required by these Directions the attributes, the attribute names and formats should be consistent with this Section 9 of the Directions.

9.13 Preparation of Additional Attributes

In the event that additional attributes are required for a theme, the attributes and their formats should be developed consistent with this Section 9 of the Directions.

Mining Surveyors are encouraged to create additional attributes that will assist in the preparation and supply of the Hard Copy and in support of safe mining operations.

Table 9.2 (Continued)
Theme Attribute Names and Definitions

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Accuracy	Class of survey	Character	50	Chartor determined		
Adj_RT_No	MWP Catalogue Number for the adjacent mine relating to the feature	Character	10	Chartor determined	RT76	
Adjustment	reference to adjustment file	Character	20	Chartor determined		
App_date	Date of approval or acceptance	Character	10	Chartor determined		
App_id	Name of approval	Character	30	Chartor determined		
App_type	Type of approval	Character	30	Chartor determined		
Azimuth	Not used if borehole is vertical	Character	20	Chartor determined		
Barr_date	Date the barrier originated	Character	10	Chartor determined	23/05/1974	
Barr_type	Type of barrier	Character	100	Chartor determined	Colliery holding	
Bdy_name	Name of the coal operation boundary	Character	50	Chartor determined		
Bdy_type	Type of boundary	Character	50	Chartor determined		
Bhole_diam	Borehole diameter in millimetres	Character	10	Chartor determined		
Bhole_name	Name of borehole	Character	20	Chartor determined		
Caution	Warning on use of theme	Character	254	Compulsory and must be in the form described in the options list.	This theme should not be read in isolation. It is one of many themes that comprise the Mine Workings Plan. The Mine Record Tracing held by the Director-General is the true record of the mine workings.	
Chart_date	Date the feature was inserted into the theme	Character	10	Chartor determined	30/11/2005	

Table 9.2 (Continued)
Theme Attribute Names and Definitions

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Chartor	Surveyor inserting the feature into the theme	Character	50	Chartor determined	Joe Bloggs	
Code_no	AS 4368 code number	Character	20	Chartor determined		
Collar_rl	Height of the collar of the borehole (AHD)	Character	20	Chartor determined		
Cont_type	Contour type	Character	30	Select from Options List		Seam floor, Void floor
County_id	Name of county	Character	50	Chartor determined		
Dam_name	Name of prescribed dam	Character	100	Chartor determined		
Date_work	Date of workings	Character	10	Chartor determined	30/11/2005	
Dept_file	Department file number	Character	20	Chartor determined		
Depth	Total depth or length of the borehole (metres)	Character	10	Chartor determined		
Descript	Description of feature and/or theme.	Character	100	Chartor determined		
Dip	Overall dip of the feature	Character	10	Chartor determined		
Direction	Direction expressed as a bearing and in decimal degrees	Character	20	Chartor determined		
Disk_name	CD-R identifier	Character	50	Provider determined		
Displace	Displacement of Fault (metres) and direction of Down Throw (dec. degrees)	Character	20	Chartor determined		
Easting	Easting in MGA 94	Floating Integer	10.3	Chartor determined		

Table 9.2 (Continued)
Theme Attribute Names and Definitions

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Emplc_id	Emplacement area name	Character	50	Chartor determined		
Emplc_type	Emplacement area type	Character	50	Chartor determined		
End_date	End date of approval - if applicable	Character	10	Chartor determined		
Endorse	Feature status	Character	254	Chartor determined		
Entry_dim	Diameter or width by height of entry (metres)	Character	20	Chartor determined		
Entry_name	Name of entry	Character	50	Chartor determined		
Entry_type	Type of entry	Character	50	Select from Options List		Drift portal, Shaft, Tunnel, Ventilation shaft – Upcast, Ventilation Shaft - Downcast, Adit, other
Feat_type	Type of geological feature	Character	50	Chartor determined		
Field_note	Reference to Field Book	Character	50	Chartor determined		
File_date	CD-R date	Character	10	Provider determined		
File_name	Theme file name	Character	50	Provider determined		
Finish_rl	Height of the finish of the borehole (AHD)	Character	20	Chartor determined		
Grid_value	Easting or northing value of the grid line	Character	20	Chartor determined		
Height	Height (AHD)	Character	20	Chartor determined		
Holding	Colliery holding name	Character	50	Chartor determined		
Initials	Surveyor's initials	Character	10	Chartor determined		

Table 9.2 (Continued)
Theme Attribute Names and Definitions

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Inrush_id	Name to identify inrush control zone	Character	100	Chartor determined		
Inrush_type	Inrush risk type	Character	100	Chartor determined		
Land_tag	Cadastre parcel identifier - LPI format	Character	50	Chartor determined		
Mark_id	Boundary corner mark identifier	Character	20	Chartor determined		
Mark_type	Type of boundary corner mark	Character	50	Chartor determined		
Mine_name	Name of the coal operation relating to the MWP	Character	50	Chartor determined	Acme Colliery	
Northing	Northing in MGA 94	Floating Integer	11.3	Chartor determined		
Parish_id	Name of Parish	Character	50	Chartor determined		
Plan_catno	Survey plan catalogue	Character	20	Chartor determined		
Plantype	Type of cadastre parcel - LPI format	Integer	10	Select from Options List		Refer to LPI metadata accompanying DCDB.
Portion_no	Mining portion	Character	30	Chartor determined		
Pres_date	Date that dam was prescribed	Character	10	Chartor determined		
Provider	Mining Surveyor signing the CD-R	Character	50	Provider determined		
RT_No	RT Number (MWP Catalogue Number)	Character	10	Chartor determined	RT123	
Seam_name	Name of the seam relating to the feature	Character	30	Select from DPI,MR list	Bayswater	

Table 9.2 (Continued)
Theme Attribute Names and Definitions

Attribute Name	Description	Database Format	Max Length	Input Value	Example	Options List
Source	Feature status	Character	50	Select from Options List		Mine survey, Other survey, Digitised, CAD drawn, Calculated, Coordinate entry, Mine records, Department records, Mining lease, Planning Approval, Mining Approval, other
Station_id	Name of survey station	Character	20	Chartor determined		
Status	Feature status	Character	50	Select from Options List		Working, Discontinued, Abandoned, Current, Final, Destroyed, In progress, Temporary, Sealed, Open, Adopted by mine, Adopted by DPI,MR, Flooded, Indicated, Inferred
Surv_date	date of survey	Character	10	Chartor determined		
Theme_name	MWDT name	Character	50	Provider determined		
Title_name	Mining lease identifier	Character	30	Chartor determined		
Type	Type of control station	Character	50	Chartor determined		
Width	Width of feature	Character	20	Chartor determined		
Work	Type of mine workings	Character	50	Select from Options List	First workings	First workings, Second workings, Workings outline, Void detail, Void outline, Adjacent workings outline, Adjacent first workings, Adjacent second workings, Surface highwall workings, Surface auger workings, Underground auger workings

Table 9.3 (Continued)
Theme Attribute Allocation and Feature Type

Theme Name	Sub Theme	Feature Type	Attribute Category		
			* Core Attributes	Additional Attributes	** Metadata Attributes
* Core Attributes are: Mine_name, RT_No, Chart_date, Status, Source, Endorse, Chartor and Descript					
** Metadata Attributes are: Theme_name, Disk_name, File_name, File_date, Caution and Provider					
Adjacent Mine Workings	Partial Outline	Line	All	Seam_name, Work	All
	Full Outline	Polygon			
Adjacent Seam Workings	First Workings	Line	All	Seam_name, Work	All
	Second Workings	Polygon		Seam_name, Work	
Barriers & Restricted Zones		Polygon	All	Seam_name, DPI,MR_file, Barr_type, Barr_Date	All
Borehole Locations	Vertical Boreholes	Point	All	Seam_name, Easting, Northing, Azimuth, Bhole_date, Bhole_name, Code_no, Collar_rl, Finish_rl, Depth,	All
	Horizontal/Inclined Boreholes	Line	All	Seam_name, Easting, Northing, Azimuth, Dip, Bhole_date, Bhole_name, Code_no, Collar_rl, Finish_rl, Depth	All
Boundary Control Marks		Point	All	Easting, Northing, Mark_id, Mark_type	All
Cadastral Parcels		Polygon	All	Land_tag, Plan_type	All
Colliery Holding Boundary		Polygon	All	Seam_name, Holding	All
County Boundary		Polygon	All	County_id	All
Date lines		Polygon	All	Seam_name, Date_work, Initials	All

Table 9.3 (Continued)
Theme Attribute Allocation and Feature Type

Theme Name	Sub Theme	Feature Type	Attribute Category		
			* Core Attributes	Additional Attributes	** Metadata Attributes
Emplacement Areas		Polygon	All	Emplc_id, Emplc_type	All
First Workings		Line	All	Seam_name, Date_Work, Work,	All
Grid Lines		Line	All	Grid_value	All
Highwall/ Auger Mining		Polygon	All	Seam_name, Date_Work, Work	All
Mine Boundary		Polygon	All	Seam_name, Holding	All
Mining Approvals		Polygon	All	Seam_name, DMR_file, App_id, App_type, App_date, End_date	All
Mining Lease Boundaries		Polygon	All	Seam_name, Holding, Portion_no, Title_name, Plan_catno	All
Mine Underground Access		Polygon	All	Seam_name, Easting, Northing, Azimuth, Dip, Entry_type	All
Mine Workings Outline	Workings extents	Polygon	All	Seam_name,	All
	Void extents				
Parish Boundaries		Polygon	All	Parish_id, Bdy_type	All
Potential Sources of Inrush		Polygon	All	Seam_name, Inrush_id, Inrush_type	All
Prescribed Dams		Polygon	All	Dam_name, Pres_date, Bdy_type	All
Survey Control Stations		Point	All	Seam_name, Easting, Northing, Height, Station_id, Type, Field_note, Adjustment, Surv_date	All

Table 9.3 (Continued)
Theme Attribute Allocation and Feature Type

Theme Name	Sub Theme	Feature Type	Attribute Category		
			* Core Attributes	Additional Attributes	** Metadata Attributes
Second Workings		Polygon	All	Seam_name, Date_Work, Work, Initials	All
Surveyed Geofeatures		Line	All	Seam_name, Azimuth, Feat_id, Feat_type, Code_no, Direction, Displacement, Width	All
		Polygon	All	Seam_name, Azimuth, Feat_id, Feat_type, Code_no, Direction, Displacement, Width	All
Underground Auger Areas		Polygon	All	Seam_name, Date_work, Work, Initials	All
Void Contours		Line	All	Height	All
Void Detail		Polygon	All	Date_Work, Work, Initials	All
		Line			
Working Section Floor Contours		Line	All	Seam_name, Height	All

* **Core Attributes** are: Mine_name, RT_No, Chart_date, Status, Source, Endorse, Chartor and Descript

** **Metadata Attributes** are: Theme_name, Disk_name, File_name, File_date, Caution and Provider

Table 9.8 (Continued)
File Naming Convention

Theme name	Filename definition	Example
Adjacent Mine Workings	<i>adjmine_[RT number]_ [Chart_date]</i>	adjmine_rt701_March2006 (outline - adjacent mines in all other seams)
Adjacent Seam workings	<i>adjseam1_[RT number]_ [Chart_date]</i>	adjseam1_rt701_March2006 (1st workings for adjacent mines in same seam as RT701)
	<i>adjseam2_[RT number]_ [Chart_date]</i>	adjseam2_rt701_March2006 (2nd workings for adjacent mines in same seam as RT701)
Barriers & Restricted Zones	<i>barrier_[RT number]_ [Chart_date]</i>	barrier_rt701_March2006
Borehole Locations	<i>boreholes_vert_[RT number]_ [Chart_date]</i>	boreholes_vert_rt701_March2006
	<i>boreholes_horiz_[RT number]_ [Chart_date]</i>	boreholes_horiz_rt701_March2006
Boundary Control Marks	<i>bdy_control_[RT number]_ [Chart_date]</i>	bdy_control_rt701_March2006
Cadastral Parcels	<i>lcl_cadastre_[RT number]_ [Chart_date]</i>	lcl_cadastre_rt701_March2006
Colliery Holding Boundary	<i>holding_[RT number]_ [Chart_date]</i>	holdingrt701_March2006
County Boundary	<i>county_[RT number]_ [Chart_date]</i>	county_rt701_March2006
Date lines	<i>dateline_[RT number]_ [Chart_date]</i>	dateline_rt701_March2006
Emplacement Areas	<i>emplacement_[RT number]_ [Chart_date]</i>	emplacement_rt701_March2006
First Workings	<i>work1_[RT number]_ [Chart_date]</i>	work1_rt701_March2006
Grid Lines	<i>grid_[MGA zone]_[RT number]_ [Chart_date]</i>	grid_m56_rt701_March2006
Highwall/ Auger Mining	<i>highwall_auger_[RT number]_ [Chart_date]</i>	highwall_auger_rt701_March2006
Mine Boundary	<i>mine_bdy_[RT number]_ [Chart_date]</i>	mine_bdy_rt701_March2006
Mining Approvals	<i>mining_approval_[RT number]_ [Chart_date]</i>	mining_approval_rt701_March2006

Table 9.8 (Continued)
File Naming Convention

Theme name	Filename definition	Example
Mining Lease Boundaries	title_ <i>[RT number]</i> _ <i>[Chart_date]</i>	title_rt701_March2006
Mine Underground Access	minfra_ <i>[RT number]</i> _ <i>[Chart_date]</i>	minfra_rt701_March2006
Mine Workings Outline underground	extents_ <i>[RT number]</i> _ <i>[Chart_date]</i>	extents_rt701_March2006
Mine Workings Outline open cut	extents_void_ <i>[RT number]</i> _ <i>[Chart_date]</i>	extents_void_rt701_March2006
Parish Boundaries	parish_ <i>[RT number]</i> _ <i>[Chart_date]</i>	parish_rt701_March2006
Potential Sources of Inrush	pot_inrush_ <i>[RT number]</i> _ <i>[Chart_date]</i>	pot_inrush_rt701_March2006
Prescribed Dams	dam_ <i>[RT number]</i> _ <i>[Chart_date]</i>	dam_rt701_March2006
Survey Control Stations	survey_ <i>[RT number]</i> _ <i>[Chart_date]</i>	survey_rt701_March2006
Surveyed Geofeatures	geology_ <i>[RT number]</i> _ <i>[Chart_date]</i>	geology_rt701_March2006
	geology_area_ <i>[RT number]</i> _ <i>[Chart_date]</i>	geology_area_rt701_March2006
Second Workings	work2_ <i>[RT number]</i> _ <i>[Chart_date]</i>	work2_rt701_March2006
Underground Auger Areas	UG_auger_ <i>[RT number]</i> _ <i>[Chart_date]</i>	UG_auger_rt701_March2006
Void Contours	void_cont_ <i>[RT number]</i> _ <i>[Chart_date]</i>	void_cont_rt701_March2006
Void Detail	void_detail_area_ <i>[RT number]</i> _ <i>[Chart_date]</i>	void_detail_area_rt701_March2006
	void_detail_lines_ <i>[RT number]</i> _ <i>[Chart_date]</i>	void_detail_lines_rt701_March2006
Working Section Floor Contours	contour_ <i>[RT number]</i> _ <i>[Chart_date]</i>	contour_rt701_March2006

Table 9.9 (Continued)
Metadata Statement

Category	Element	Definition
Theme	Theme name (user input)	Theme file name. (user input)
Features	Feature Type	Point, line or closed polygon. (user input)
Department Reference	MWP Catalogue Number	Mine Workings Plan catalogue number. (user input)
Custodian	Mine Operator	Corporation or individual person that operates the mine. (user input)
	Mine Name and Address	The name and postal address of the mine. (user input)
Description	Abstract	Brief summary description of the content of the theme. (user input)
Data Currency	Date of First Version	When the theme was first created. (user input)
	Date of this Version	Date of this version of the theme. (user input)
Theme Status	Progress	The status of the process of theme creation. (user input)
	Maintenance and update frequency	Frequency of changes or additions made to the theme. (user input)
Access	Stored data format	The format in which the theme is stored by the Mine Surveyor. (user input)
	Available format type	The format in which the theme is available. (user input)
	Access constraints	Restrictions or legal prerequisites that may apply to the access and use of the theme including licensing, liability, and copyright. (user input)
Data Quality	Lineage	A brief history of the source or production the theme. (user input)
	Data Quality (Cont'd) Accuracy Statement	A brief assessment of the closeness of the location of objects in the theme in relation to their true position on the Earth.

Table 9.9 (Continued)
Metadata Statement

Category	Element	Definition
	Accuracy Attribute	A ranking that best determines the positional accuracy for a particular feature in the theme. 1: Error ellipse no greater than 100mm 2: 100mm - 500mm 3: 500mm - 2m 4: 2m - 10m 5: Greater than 10m
	Logical Consistency	A brief description of the degree of adherence of logical rules of data structure, attribution, and relationships. (user input)
	Completeness	An assessment of the extent and range in regard to completeness of coverage, attributions and verification. (user input)
Attributes (All)	Attributes attached to each feature object in the theme.	List each attribute attached as a data field to the features in the theme.
Core Attributes (Attributes that are attached to all Mine Workings Digital Themes)	Mine_name	Name of the colliery relating to the Mine Workings Plan.
	RT_No	Department Catalogue Number
	Chart_date	The date the feature object was recorded on the Mine Workings Plan.
	Status	The status of the feature object in the Mine Workings Plan.
	Source	Where the feature object was sourced from.
	Endorse	Reference to a field book or other appropriate notation
	Chartor	Person recording feature object onto the Mine Workings Plan.
	Descript	Description of feature object.
Additional Attributes (Attributes unique to a particular theme or may	Seam_name	Seam that was mined or relates to the feature object.
	Date_work	Date the workings were driven or extracted.

Table 9.9 (Continued)
Metadata Statement

Category	Element	Definition
be common to other themes) (Examples only – see Table 9.2)		
	Work	Type of mine workings.
Metadata Attributes (Attributes that are attached to all Mine Workings Digital Themes at the time of submission to the Department)	Theme_name Disk_name File_name File_Date Provider Caution	The name of the theme. The name of the CD-R submitted for the Reporting Period. Theme file name. The date the theme was supplied to the Department. Surveyor providing the theme to the Department. Warning as to use of the theme.
Miscellaneous	No. of features: Source Pathname: Application Environment:	Number of individual features, for example, 500 boreholes Data location. This not required for submission but may support internal data management . Development environment.
Projection:	Name : Zone: Units : Datum: Ellipsoid:	Map Grid Australia (MGA 94) MGA [zone] (user input) Metres Geocentric Datum of Australia 1994 (GDA94) GRS80
Metadata date	Metadata date	Date on which the metadata record was created or modified. (user input)