# 3.   Magnetic Data File (with Elevation) – Raw Edited

File name format: [YYYYMMDD]_P[XXXX]_[Block_ID]_magnetics_raw_edited.dat

| Field Name | Format | Units | Description |
|---|---|---|---|
| flight | I4 | - | Flight number. |
| line | I9 | - | Line number. |
| fiducial | I9 | - | Fiducial (unique regularly increasing integer). |
| date | I8 | - | Local date in format YYYYMMDD. |
| time_gps | F8.2 | seconds | Time recorded by the Global Navigation Satellite System (GNSS), i.e., GPS time. The time zone related to this field must be documented in the description (.des) file. |
| time_local | F8.2 | seconds | Local standard time in seconds past midnight (no daylight savings). The time zone related to this field must be documented in the description (.des) file. |
| longitude | F12.7 | decimal degrees | Longitude parallax corrected to the magnetometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| latitude | F12.7 | decimal degrees | Latitude parallax corrected to the magnetometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| easting | F11.2 | metres | Easting parallax corrected to the magnetometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
| northing | F11.2 | metres | Northing parallax corrected to the magnetometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
| gnss_height | F8.2 | metres | Unedited Global Navigation Satellite System (GNSS) height measurements, relative to the GRS80 ellipsoid. |

| | | | • Datum: Geodetic Reference System 1980 (GRS80) ellipsoid. |
|---|---|---|---|
| gnss_height_edited | F8.2 | metres | GNSS height measurements that have been edited and interpolated to remove dropouts and noise.<br>• Datum: Geodetic Reference System 1980 (GRS80) ellipsoid. |
| gnss_snr | XX | - | Signal to noise ratio of the GNSS. |
| gnss_sv_number | I2 | - | Number of satellites providing information to the GNSS. |
| radar_raw | F8.2 | metres | Raw radar altimeter measurements:<br>1. Parallax corrected to the magnetometer (the parallax correction must be documented in the description (.des) file.). |
| radar_calibrated | F8.2 | metres | Radar altimeter measurements:<br>1. Parallax corrected to the magnetometer,<br>2. Calibrated. |
| radar_calibrated_edited | F8.2 | metres | Radar altimeter measurements:<br>1. Parallax corrected to the magnetometer.<br>2. Calibrated.<br>3. Edited to reduce the effects of noise. Spike removal and interpolation may be applied to this field. |
| fluxgate_x | F10.3 | nanoteslas (nT) | X component of the fluxgate magnetometer. |
| fluxgate_y | F10.3 | nanoteslas (nT) | Y component of the fluxgate magnetometer. |
| fluxgate_z | F10.3 | nanoteslas (nT) | Z component of the fluxgate magnetometer. |
| magnetics_raw | F10.3 | nanoteslas (nT) | Raw magnetic intensity data recorded by the alkali vapour magnetometer. This field is uncompensated. |
| magnetics_compensated | F10.3 | nanoteslas (nT) | Magnetic intensity data recorded by the alkali vapour magnetometer.<br>1. Compensated for heading error and manoeuvre noise. |
| magnetics_compensated_edited | F10.3 | nanoteslas (nT) | Magnetic intensity data recorded by the alkali vapour magnetometer.<br>1. Compensated for heading error and manoeuvre noise.<br>2. Edited (e.g. spike removal and interpolation) to remove noise. |
| magnetic_diurnal | F10.3 | nanoteslas (nT) | The total field magnetic intensity data recorded by the base station magnetometer (i.e. magnetic diurnal) interpolated to match the aircraft alkali magnetometer sampling rate. The location(s) of the base station must be documented in the description (.des) file. |
| aircraft_flag | I1 | - | If multiple aircraft are used to acquire the data, a flag relating to the aircraft call sign must be used. The aircraft call sign and the related flag code must be documented in the description (.des) file. This field is not required when only one aircraft is used to acquire the data. |

## 4.   Magnetic Data File - Diurnal

File name format: [YYYYMMDD]_P[XXXX]_magnetic_diurnal.dat

| Field Name | Format | Units | Description |
|---|---|---|---|
| date | I8 | - | Local date in format YYYYMMDD. |
| time_gps | F8.2 | seconds | Time recorded by Global Navigation Satellite System (GNSS), i.e., GPS time. The time zone related to this field must be documented in the description (.des) file. |
| time_local | F8.2 | seconds | Local standard time in seconds past midnight (no daylight savings). The time zone related to this field must be documented in the description (.des) file. |
| magnetic_diurnal_raw | F10.2 | nanoteslas (nT) | Raw total field magnetic intensity values recorded by the base station magnetometer at its native sampling rate. This field should not be filtered or smoothed. The location(s) of the base station must be documented in the description (.des) file. |

## 5.   Magnetic Data File (with Elevation) - Reduced

File name format: [YYYYMMDD]_P[XXXX]_[Block_ID]_magnetics_reduced.dat

| Field Name | Format | Units | Description |
|---|---|---|---|
| flight | I4 | - | Flight number. |
| line | I9 | - | Line number. |
| fiducial | I9 | - | Fiducial (unique regularly increasing integer). |
| date | I8 | - | Local date in format YYYYMMDD. |
| longitude | F12.7 | decimal degrees | Longitude parallax corrected to the magnetometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| latitude | F12.7 | decimal degrees | Latitude parallax corrected to the magnetometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |

| easting | F11.2 | metres | Easting parallax corrected to the magnetometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
|---|---|---|---|
| northing | F11.2 | metres | Northing parallax corrected to the magnetometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
| gnss_height | F8.2 | metres | GNSS height measurements:<br>1. Edited and interpolated to remove drop-outs and noise.<br>2. Converted from GRS80 ellipsoidal values to geoidal values using the Australian Vertical Working Surface (AVWS). |
| radar_altimeter | F8.2 | metres | Radar altimeter measurements:<br>1. Parallax corrected to the magnetometer.<br>2. Calibrated.<br>3. Edited to reduce the effects of noise. Spike removal and interpolation may be applied to this field. |
| radar_dem | F8.2 | metres | Digital Elevation Model (DEM) derived from the radar altimeter. This is a geoidal surface derived using the Australian Vertical Working Surface (AVWS). |
| magnetics_reduced | F10.3 | nanoteslas (nT) | The magnetic intensity data recorded by the alkali vapour magnetometer that has the following corrections:<br>1. Compensated for heading error and manoeuvre noise.<br>2. Edited (e.g. spike removal and interpolation) to remove noise.<br>3. Corrected for diurnal variations (using the 'magnetic_diurnal' field).<br>4. Corrected for the Geomagnetic Reference Field (using the 'magnetic_igrf' field). |
| magnetics_reduced_tielevelled | F10.3 | nanoteslas (nT) | The 'magnetics_reduced' data field that has been tie-line levelled. |
| magnetics_reduced_microlevelled | F10.3 | nanoteslas (nT) | The 'magnetics_reduced_tielevelled' data field that has been micro-levelled. |
| magnetics_reduced_microlevelled_1vd | F10.3 | nanoteslas per metre (nT/m) | A first vertical-derivative of the 'magnetics_reduced_microlevelled' data field. |

| Field Name | Format | Units | Description |
|---|---|---|---|
| magnetic_diurnal | F10.3 | nanoteslas (nT) | The total field magnetic intensity data recorded by the base station magnetometer (i.e. magnetic diurnal) interpolated to match the aircraft alkali magnetometer sampling rate. The location(s) of the base station must be documented in the description (.des) file. |
| magnetic_igrf | F10.3 | nanoteslas (nT) | International Geomagnetic Reference Field (IGRF) values. The IGRF model version, epoch and date should be documented in the description (.des) file. |

# 6.  Radiometric Data File – Raw Edited

File name format: [YYYYMMDD]_P[XXXX]_[Block_ID]_radiometrics_raw_edited.dat

| Field Name | Format | Units | Description |
|---|---|---|---|
| flight | I4 | - | Flight number. |
| line | I9 | - | Line number. |
| fiducial | I9 | - | Fiducial (unique regularly increasing integer). |
| date | I8 | - | Local date in format YYYYMMDD. |
| time_gps | F8.2 | seconds | Time recorded by the Global Navigation Satellite System (GNSS), i.e., GPS time. The time zone related to this field must be documented in the description (.des) file. |
| time_local | F8.2 | seconds | Local standard time in seconds past midnight (no daylight savings). The time zone related to this field must be documented in the description (.des) file. |
| longitude | F12.7 | decimal degrees | Longitude parallax corrected to the gamma-ray spectrometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| latitude | F12.7 | decimal degrees | Latitude parallax corrected to the gamma-ray spectrometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| easting | F11.2 | metres | Easting parallax corrected to the gamma-ray spectrometer (half way through the sample period). Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |

| northing | F11.2 | metres | Northing parallax corrected to the gamma-ray spectrometer (half way through the sample period). Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
|---|---|---|---|
| gnss_height_edited | F8.2 | metres | GNSS height measurements that have been edited and interpolated to remove drop-outs and noise.<br>• Datum: Geodetic Reference System 1980 (GRS80) ellipsoid. |
| radar_calibrated_edited | F8.2 | metres | Radar altimeter measurements:<br>1. Parallax corrected to the gamma-ray spectrometer (half way through the sample period),<br>2. Calibrated,<br>3. Edited to reduce the effects of noise. Spike removal and interpolation may be applied to this field. |
| pressure | F8.2 | millibars (mbar) | Pressure as recorded by the barometer. |
| temperature | F6.2 | degrees Celsius (°C) | Temperature as recorded by the barometer. |
| spectrum[1-256] | F6.0 | counts per channel | Raw 256 channel spectra: the raw integer number of gamma-ray counts recorded from channels 1 through to 256 during the integration period. No corrections applied.<br><br>The K, U and Th peak channel numbers (required for energy calibration) are to be documented in the description (.des) file. |
| k_raw | F8.2 | counts per second (cps) | Raw potassium window counts: counts for the range 1370 KeV - 1570 keV (as specified by the IAEA standards) derived from the raw spectra. No corrections applied.<br><br>Uncalibrated potassium window range to be recorded in the description (.des) file. |
| u_raw | F8.2 | counts per second (cps) | Raw uranium window counts: counts for the range 1660 KeV - 1860 keV (as specified by the IAEA standards) derived from the raw spectra. No corrections applied.<br><br>Uncalibrated uranium window range to be recorded in the description (.des) file. |
| th_raw | F8.2 | counts per second (cps) | Raw thorium window counts: counts for the range 2410 KeV - 2810 keV (as specified by the IAEA standards) derived from the raw spectra. No corrections applied. |
| total_count_raw | F8.2 | counts per second (cps) | Raw total count: counts for the range 400 KeV - 2810 keV (as specified by the IAEA standards) derived from the raw spectra. No corrections applied. |
| cosmic_raw | F8.2 | counts per second (cps) | Raw cosmic window counts: counts for the range 3000 KeV - ∞ keV (as specified by the IAEA standards) derived from the raw spectra. No corrections applied. |

| | | | |
|---|---|---|---|
| k_nasvd | F8.2 | counts per second (cps) | NASVD-smoothed potassium window counts: counts for the range 1370 KeV - 1570 keV (as specified by the IAEA standards) derived from the raw spectra. No other corrections applied. |
| u_nasvd | F8.2 | counts per second (cps) | NASVD-smoothed uranium window counts: counts for the range 1660 KeV - 1860 keV (as specified by the IAEA standards) derived from the raw spectra. No other corrections applied. |
| th_nasvd | F8.2 | counts per second (cps) | NASVD-smoothed thorium window counts: counts for the range 2410 KeV - 2810 keV (as specified by the IAEA standards) derived from the raw spectra. No other corrections applied. |
| total_count_nasvd | F8.2 | counts per second (cps) | NASVD-smoothed total count: counts for the range 400 KeV - 2810 keV (as specified by the IAEA standards) derived from the raw spectra. No other corrections applied. |
| sample_integration | F8.3 | seconds | Sample integration time. |
| live_time | F8.3 | seconds | Live time for spectrum. |
| resolution | F8.1 | percent (%) | Spectrum resolution. |
| aircraft_flag | I1 | - | If multiple aircraft are used to acquire the data, a flag relating to the aircraft call sign must be used. The aircraft call sign and the related flag code must be documented in the description (.des) file. This field is not required when only one aircraft is used to acquire the data. |

Aircraft background, cosmic stripping ratios, Compton stripping ratios, height attenuation coefficients, sensitivity coefficients and window energy levels are to be recorded in description (.des) file.

## 7.    Radiometric Data File - Reduced

File name format: [YYYYMMDD]_P[XXXX]_[Block_ID]_radiometrics_reduced.dat

| Field Name | Format | Units | Description |
|---|---|---|---|
| flight | I4 | - | Flight number. |
| line | I9 | - | Line number. |
| fiducial | I9 | - | Fiducial (unique regularly increasing integer). |
| date | I8 | - | Local date in format YYYYMMDD. |
| longitude | F12.7 | decimal degrees | Longitude parallax corrected to the gamma-ray spectrometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020 |

| | | | Geodetic coordinate system |
|---|---|---|---|
| latitude | F12.7 | decimal degrees | Latitude parallax corrected to the gamma-ray spectrometer. The parallax correction must be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Geodetic coordinate system |
| easting | F11.2 | metres | Easting parallax corrected to the gamma-ray spectrometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
| northing | F11.2 | metres | Northing parallax corrected to the gamma-ray spectrometer. Parallax correction and MGA zone to be documented in the description (.des) file.<br>• Datum: GDA2020<br>• Projection: Map Grid of Australia, Zone XX (MGAXX). |
| gnss_height | F8.2 | metres | GNSS height measurements:<br>1. Edited and interpolated to remove drop-outs and noise.<br>2. Converted from GRS80 ellipsoidal values to geoidal values using the Australian Vertical Working Surface (AVWS). |
| radar_altimeter | F8.2 | metres | Radar altimeter measurements:<br>1. Parallax corrected to the gamma-ray spectrometer.<br>2. Calibrated.<br>3. Edited to reduce the effects of noise. Spike removal and interpolation may be applied to this field. |
| radar_dem | F8.2 | metres | Digital Elevation Model (DEM) derived from the radar altimeter. This is a geoidal surface derived using the Australian Vertical Working Surface (AVWS). |
| pressure | F8.2 | millibar (mbar) | Pressure as recorded by the barometer. |
| temperature | F6.2 | degrees Celsius (°C) | Temperature as recorded by the barometer. |
| dose_rate | F10.3 | nanogray per hour (nGy/hr) | Equivalent air-absorbed dose rate with no spectral smoothing.<br><br>The following corrections are applied to the raw total window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| k_percent | F9.3 | percent (%) | Calculated ground concentration of potassium with no spectral smoothing. |

| | | | The following corrections are applied to the raw potassium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
|---|---|---|---|
| u_ppm | F9.3 | parts per million (ppm) | Calculated ground concentration of uranium with no spectral smoothing. The following corrections are applied to the raw uranium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| th_ppm | F9.3 | parts per million (ppm) | Calculated ground concentration of thorium with no spectral smoothing. The following corrections are applied to the raw thorium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| dose_rate_nasvd | F10.3 | nanogray per hour (nGy/hr) | Equivalent air-absorbed dose rate with NASVD smoothing. The following corrections are applied to the NASVD-smoothed total window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| k_percent_nasvd | F9.3 | percent (%) | Calculated ground concentration of potassium with NASVD smoothing. The following corrections are applied to the NASVD-smoothed potassium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| u_ppm_nasvd | F9.3 | parts per million (ppm) | Calculated ground concentration of uranium with NASVD smoothing. The following corrections are applied to the NASVD-smoothed uranium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |
| th_ppm_nasvd | F9.3 | parts per million (ppm) | Calculated ground concentration of thorium with NASVD smoothing. The following corrections are applied to the NASVD-smoothed thorium window counts: Live time, background (cosmic, aircraft and radon) removal, stripping, height, tie line levelling and microlevelling (if required). |

Aircraft background, cosmic stripping ratios, Compton stripping ratios, height attenuation coefficients, sensitivity coefficients and window energy levels

are to be recorded in description (.des) file.

# 8.    Gridded Data Files

| Type | File Name | Relevant Point-Dataset Field to be Gridded | Units |
|---|---|---|---|
| Total Magnetic Intensity (TMI) | [YYYYMMDD]_P[XXXX]_[Block_ID]_TMI.ers | 'magnetics_reduced_microle velled' | nT |
| TMI Reduced to Pole (RTP) | [YYYYMMDD]_P[XXXX]_[Block_ID]_TMI_RTP.ers | 'magnetics_reduced_microle velled'<br>+ RTP | nT |
| TMI RTP with a First Vertical Derivative (1VD) applied | [YYYYMMDD]_P[XXXX]_[Block_ID]_TMI_RTP_1VD.ers | 'magnetics_reduced_microle velled'<br>+ RTP + 1VD | nT/m |
| Dose Rate NASVD smoothed | [YYYYMMDD]_P[XXXX]_[Block_ID]_dose_rate_nasvd.ers | 'dose_rate_nasvd' | nGy/hr |
| Potassium concentration NASVD smoothed | [YYYYMMDD]_P[XXXX]_[Block_ID]_K_percent_nasvd.ers | 'k_percent_nasvd' | % |
| Thorium concentration NASVD smoothed | [YYYYMMDD]_P[XXXX]_[Block_ID]_Th_ppm_nasvd.ers | 'th_ppm_nasvd' | ppm |
| Uranium concentration NASVD smoothed | [YYYYMMDD]_P[XXXX]_[Block_ID]_U_ppm_nasvd.ers | 'u_ppm_nasvd' | ppm |
| Radar Digital Elevation Model | [YYYYMMDD]_P[XXXX]_[Block_ID]_radar_DEM | 'radar_dem' | m (AVWS) |