NORTH ATLANTIC TREATY ORGANISATION

(NATO)

ADDITIONAL MILITARY LAYERS

LARGE BOTTOM OBJECTS
PRODUCT SPECIFICATION

Version 1.0, 1 November 2001

Produced and issued by the United Kingdom Hydrographic Office
under the direction of the Ad Hoc Hydrographic Working Group of
the NATO Geographic Conference.

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1 INTRODUCTION

1.1 SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the AML Large Bottom Objects product, independent of any exchange standard data format. The schema and data format imposed by the chosen exchange standard implementation are defined in separate Annexes (where provided).

The Specification has been prepared in accordance with the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products, and is based on the proposed Common Product Specification Framework which is contained as Annex B to the draft STANAG.

The Large Bottom Objects Product Specification is designed to facilitate the encoding of the AML component of the same name. The purpose of this product is to depict all known bottom contacts for which at least one component of height, width or length is a minimum of 5 metres. The product is scaleless, so consequently all objects contained therein are captured as point geometry.

This type of information is of general use during normal surface navigation. It is of particular use during submarine operations, from a tactical and navigational point of view, for both submerged submarines and hunter / killer surface vessels or aircraft. Additionally, it can be used for amphibious and mine warfare applications, particularly when used in conjunction with the ESB AML or SBO AML respectively. Therefore, although not actually scaled, the product is most suitable for use in planning (small scale) and operational (medium scale) applications.

Further more, where additional data about a contact is known, beyond that depicted on a standard navigational product , the information will be included in the Large Bottom Objects product.

AML LARGE BOTTOM OBJECTS MUST NOT BE USED FOR NAVIGATIONAL PURPOSES

1.2 GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

1.2.1 Version Number

Version 1.0.

1.2.2 Date of Issue

31st August 2001.

1.2.3 Custodian of the Product Specification

The Custodian of this specification is the United Kingdom Hydrographic Office:

United Kingdom Hydrographic Office
Admiralty Way
Taunton
Somerset
TA1 2DN

Telephone: +44(0) 1823 337900
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1.2.4 Relevant STANAG Numbers

To be assigned.

1.3 STATUS OF THE PRODUCT SPECIFICATION

This product specification has been endorsed by the Ad Hoc Hydrographic Working Group of the NATO Geographic Conference and is subject to the change control procedures implemented by that group.

1.4 SECURITY

1.4.1 Security Classification of the Specification

The Product Specification is UNCLASSIFIED.

1.4.2 Security Classification of the Product

AML Large Bottom Objects can be issued at various security classification levels according to content. AML Large Bottom Objects products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'Caveat(s)' details) are physically partitioned.

The table below defines how AML Large Bottom Objects security classification information must be described at a dataset level (see Section 5.3.1 of this Product Specification).

Dataset Security Classification Information	Values
International Defence Organisation (IDO) status (see note)	- North Atlantic Treaty Organisation (NATO) - North Atlantic Co-operation Council (NACC) - Partnership for Peace (PfP) - Western European Union (WEU)

Dataset Security Classification Information	Values
Protective Marking	- COSMIC TOP SECRET - FOCAL TOP SECRET - TOP SECRET - SECRET - CONFIDENTIAL - RESTRICTED - UNCLASSIFIED
Owner Authority	e.g. UK, US
Caveat(s)	e.g. UK/US Eyes only

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

AML Large Bottom Objects security information may also be encoded at the following levels in a dataset:

- Meta information (see Section 5.5.1 of this Product Specification).
- Feature attributes (see Section 5.5.3 of this Product Specification).

1.4.3 Copyright Statements

Producers of AML datasets must ensure that:

- The Intellectual Property Rights of those owning the information that has been used for production of the AML product are not compromised.
- Sufficient mechanisms are put in place to ensure that material is not copied either in whole or part, except as specifically required within the host system, without prior agreement of the data producer and any other copyright holders

Copyright statements should be shown at the following locations:

- On the product label.
- On the product packaging.
- Within the product.

1.5 CONTENTS OF THE DOCUMENT

The AML Large Bottom Objects Product Specification conforms to the Common Product Specification Framework (CPSF) specified in NATO STANAG No. 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

In accordance with the CPSF, the AML Large Bottom Objects Product Specification defines the real-world entities and metadata required for the production and use of the product.

This Product Specification is divided into the following sections:

- Introduction (Section 1)
- General Product Description (Section 2)
- General Data Description (Section 3)
- Data Structure (Section 4)
- Data Dictionary (Section 5)
- Data Capture Guidelines (Section 6)
- Data Presentation (Section 7)
- Provision of Data (Section 8)
- Testing Method (Section 9)

Also included, as Annexes to the Product Specification, are details of the implementation using the relevant exchange standard(s).

Each Annex (if included) is identified as follows:

- AML Large Bottom Objects S-57 Implementation (ANNEX A)
- AML Large Bottom Objects DIGEST-C Implementation (ANNEX B)

Note: The DIGEST-C Implementation Annex is not currently available.

A cross-reference box (an example of which is shown below) will be included for instances when there are relevant details in one or more of the implementation Annexes.

ANNEX A	A.EXAMPLE

1.6 REFERENCES

The following standards and specifications affect the content of this Product Specification.

1.6.1 Standards

NATO STANAG 1059 (Edition 6)	Distinguishing Letters for Geographical Entities for use in NATO
NATO STANAG 2211	Geodetic Datums, Ellipsoids, Grids & Grid References
NATO STANAG 4564	Standard for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products
NATO STANAG 7074	Digital Geographic Information Exchange Standard (DIGEST), Edition 2.1, September 2000 Part 1: General Description

NATO STANAG 7074	Part 2: Theoretical Model, Exchange Structure and Encapsulation Specifications, Annex C – Vector Relational Format (VRF) Encapsulation Specification. Part 3: Codes, Parameters and Tags Part 4: Feature and Attribute Coding Catalogue (FACC)
NATO STANAG 3715	Specification for filing and charting of Non-Sub Contacts (NSC) information
S-57	IHO Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000 Appendix A: Chapter 1, Object Classes Chapter 2, Attributes Annex A - IHO Codes for Producing Agencies Annex B - Attributes/Object Classes Cross Reference
S-52	Specifications for Chart Content and Display Aspects of ECDIS, 5th Edition, dated December 1996 (amended March 1999) Appendix 1 Guidance on Updating the Electronic Navigational Chart
ISO 8859	Information processing - 8-bit single-byte coded graphic character sets Part 1: Latin Alphabet No.1
ISO 9660	Information Processing - Volume and File Structure of CD-ROM for Information Interchange
ANSI/IEEE 802.3	IEEE Standards for Local Area Networks, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
ISO/IEC 8211	Information processing - Specification for a data descriptive file for information interchange
ISO/IEC 10646	Information technology - Universal Multiple-Octet Coded Character Set (UCS) Part 1: Architecture and Basic Multilingual Plane

1.6.2 Specifications

MIL-PRF-0089049 (NIMA)	General Performance Specification, Vector Product Format (VPF) Products, dated 24 November 1998
MIL-STD-2407	Interface Standard for Vector Product Format, dated 28 June 1996
The Open GIS Abstract Specification	Open GIS Consortium. Topic 9: Quality Version 4 1999
S-57, Edition 2.0, 11/2000	Appendix B.1: ENC Product Specification

1.6.3 Other References

AML Object and Attribute Catalogue

1.7 DEFINITIONS

AML AML is a unified range of digital geospatial data products designed to satisfy the totality of NATO non-navigational maritime defence requirements.

1.8 KEY WORDS

AML
Additional Military Layers
LBO
Large Bottom Objects
Product Specification

1.9 MAINTENANCE AND SUPPORT OF THE PRODUCT SPECIFICATION

Specific processes and mechanisms that are established for the maintenance of AML Product Specifications are described in the Sections 1.9.1 to 1.9.6 below.

1.9.1 Frequency of Review

The AML Large Bottom Objects Product Specification (version 1.0) will be frozen for a period of 2 years following endorsement.

1.9.2 Method of Maintenance

Corrections, clarifications and requests for change will be administered by the custodian. Discussion regarding proposed changes will be carried out by correspondence with national Points of Contact. Consolidated maintenance documents will be issued periodically containing published corrections and clarifications together with details of agreed extensions to the object catalogue (these will be formally incorporated into the Product Specification and become live at its next revision).

Changes to the Product Specification beyond extensions to the object catalogue will be reviewed by committee[1] during preparatory work for production of the next edition of the specification.

1.9.3 Method of Promulgation

Maintenance documents, new editions of specifications, and related documentation will be sent to nations through their appointed AML Point of Contact.

1.9.4 Authority Responsible for Maintenance

AML Product Specifications will be maintained by the Custodian specified in Section 1.2.3 of this Product Specification.

1.9.5 Error Reporting / Change Request Procedure

Comments concerning the content of the AML Product Specifications and requests for change should be addressed to the Custodian.

1.9.6 Available Support

Contact the Custodian for guidance and advice relating to this product specification.

[1] Will be a specific group reporting to the AHHWG or its successor.

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2 GENERAL PRODUCT DESCRIPTION

PRODUCT TITLE

Additional Military Layers – Large Bottom Objects

SHORT TITLE

LBO

REFERENCE

NATO STANAG No. 4564 (Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

2.1 MAINTENANCE OF THE DATA PRODUCT

The frequency and method of provision of update or replacement data will be defined by each AML producing agency.

ANNEX A	A.1.1.8

2.2 SUPPORT FOR MULTIPLE MODES OF OPERATION

AML Large Bottom Objects data is compiled for a variety of purposes.

It is of general use during normal surface operation and of particular use during submarine operations, for both submerged submarines and hunter / killer surface vessels or aircraft. Additionally, in conjunction with other AML products, it can be used for amphibious and mine warfare applications. It may therefore be made available at the scale bands shown in the following table.

SCALE BAND	SCALE RANGE
0	Unscaled data

ANNEX A	A.1.2.7.1.1 and A.1.2.8.1.1

2.3 GEOGRAPHIC ORGANISATION

2.3.1 Regional Scheme

AML products will be partitioned by geographic region. This will vary widely depending upon the scale band of the product.

2.3.2 Tiling Scheme

ANNEX A	A.1.1.1

2.4 LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own layering requirements.

2.5 EXCHANGE STANDARD IMPLEMENTATION

This product specification has been written to be independent of the exchange standard used. Details of exchange standard implementations are given in the relevant Annex.

2.5.1 Spatial Data Type

AML Large Bottom Objects contains spatial objects as vector data.

2.5.2 Level of Topology

The topological level of the product may be influenced by the exchange standard and so this is defined in the relevant Annex.

2.5.3 Relationship with Layering

Not applicable.

2.5.4 Textual Information

Attributes that contain free text must not be used when it is possible to encode the information by means of any other attribute.

2.5.5 Reference to External Files

Text and picture files may also be included in the AML product to provide additional information.

ANNEX A	A.1.1.5.1.2 and A.1.1.7.4

Below are examples of some potential formats.

- ASCII
- TIFF
- PDF
- HTML
- JPEG
- AVI
- MPEG

2.6 SIZING REQUIREMENTS

This will be dependent upon the exchange standard implementation being used.

2.7 GENERAL SOURCE DESCRIPTION

2.7.1 Minimum Source Requirements

Sources for any real-world feature detailed in Section 5.5.2 of this Specification meet the following requirements.

- The data capture point-density fulfils the data capture requirements specified in Section 2.2 of this Specification.
- Mandatory features specified in Section 5.5.2.1 of this Specification are included.
- The mandatory attribution levels for each feature, specified in Section 5.5.2 of this Specification, are met.

2.7.2 Applicable Sources

All sources used must meet the minimum requirements. Wherever available, sources that provide exact definitions of entities (e.g. a maintained database) should be used in preference to digitising from graphical representations.

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3 GENERAL DATA DESCRIPTION

3.1 DATUMS

Please refer to NATO STANAG 2211 – Geodetic Datums, Ellipsoids, Grids & Grid References, which establishes the NATO guidelines to the use of horizontal and vertical datums.

3.1.1 Horizontal Datum

The horizontal datum for the AML Large Bottom Objects is the World Geodetic System 1984 (WGS 84).

ANNEX A	A.1.2.7.1.3

3.1.2 Vertical Datum

3.1.2.1 *Height Datum*

The default height datum for the AML Large Bottom Objects is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default height datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.1.2.2 *Sounding Datum*

The default sounding datum for AML Large Bottom Objects is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default sounding datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.2 UNITS

Units to be used in AML Large Bottom Objects are:

- Position: latitude and longitude in decimal degrees.
- Depth: metres.
- Height: metres.
- Length / Width: metres.
- Positional accuracy: metres.
- Distance: nautical miles or metres.

The default units can be varied by the use of lower level metadata or feature level attribution.

3.2.1 Time

AML may contain attributes used to encode time e.g. the beginning and end of an active period for an object. When using these attributes all times should be encoded as Coordinated Universal Time (UTC). ISO 8601 states that the format for UTC time should be CCYYMMDDThhmmssZ (where 'T' is a separator). However, AML attributes that encode time using the ISO 8601 format DO NOT include the 'Z' and they should all be interpreted as UTC.

3.3 CO-ORDINATE SYSTEM

The co-ordinate system used by AML Large Bottom Objects is Latitude and Longitude. These will be recorded as:

Positive values: Used for latitudes **north** of the equator and longitudes **east** of the Greenwich Meridian.

Negative values: are used for latitudes **south** of the equator and longitudes **west** of the Greenwich Meridian.

3.4 PROJECTION

AML Large Bottom Objects is based upon geographical co-ordinates and is not projected.

3.5 LANGUAGE AND CHARACTER SETS

3.5.1 Language

The exchange language used by AML Large Bottom Objects is English.

ANNEX A	A.1.1.4

3.5.2 Character Sets

ISO 8859-1 supports English and most European languages. For those languages that it does not support, ISO/IEC 10646 shall be used.

3.6 DATA QUALITY

AML Large Bottom Objects data quality information should be encoded at an appropriate level, as specified by the exchange standard implementation.

AML data quality information encompasses the following categories:

- Accuracy.
- Up-to-dateness / currency.
- Source(s) of the data.
- Conformance to the Product Specification.

Data quality information defined for AML Large Bottom Objects can be encoded in the dataset as:

- Dataset metadata (see Section 5.3.1of this Product Specification).
- Meta information features[1] (see Section 5.5.1 of this Product Specification).
- Feature attributes (see Section 5.5.3 of this Product Specification).

3.6.1 Accuracy

Where applicable, the maximum two-dimensional error of AML data should be stated. All positional accuracy figures are cumulative and allow for:

- The accuracy of the original data
- Additional errors introduced by the AML production process

If applicable, the cumulative error should be stated for the following:

- Horizontal Accuracy
- Sounding Accuracy
- Vertical (Height) Accuracy

3.6.2 Up-to-Dateness / Currency

Where applicable, currency information should specify the up-to-dateness of the AML dataset(s). This information should include:

- Issue date
- Update[2] date

3.6.3 Source(s) of the Data

Where available, AML source information should include the following details:

- Authority (e.g. data provider).
- Source type (e.g. graphic or report).
- Source ID.
- Source date.

3.6.4 Conformance to the Product Specification

AML products may be produced to fulfil operational requirements, and therefore may not conform fully to this Product Specification.

[1] Only applicable if supported by the exchange standard implementation.

[2] Only applicable if updating is supported by the exchange standard implementation.

All AML datasets must specify instances when:

- All available data/information has been encoded. Missing data means that the information is not available.
- Only specified/required data/information is encoded.

3.6.5 Geometric Validation

All data produced for AML Large Bottom Objects must be validated for geometric anomalies.

4 DATA STRUCTURE

Refer to the appropriate implementation Annex for details of specific implementation, format and structure.

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5 DATA DICTIONARY

5.1 GENERAL GUIDELINES

This section provides real-world descriptions for the metadata and features contained within the AML Large Bottom Objects dataset. Details of how this information is to be encoded (e.g. using the chosen Exchange Standard) can be found in the tables contained in the relevant implementation annex.

5.2 UNKNOWN/MISSING ATTRIBUTE VALUES

The way in which an unknown or missing attribute value is handled is dependent upon the exchange standard implemented.

ANNEX A	A.2.2

5.3 USE OF META INFORMATION

AML datasets contain meta-information as follows.

5.3.1 Dataset Metadata

The following table provides the descriptions of dataset meta information required by AML Large Bottom Objects to conform to this Product Specification.

For details of how to represent the dataset metadata described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.3.1

General / Production Information	Description
Production Agency	The agency responsible for the production of the data.
Dataset Name	The name of the dataset.
Edition Number	The edition number of the dataset.
Date of Release	The date of the dataset was made available by the data producer (e.g. edition or revision date).
Product Specification Description	The name of the AML Product Specification to which the dataset conforms (see Section 2).
Product Specification Edition Number	The edition number of the AML Product Specification to which the dataset conforms (see Section 1.2.1).
Product Application	The usage application scale-band of the dataset (see Section 2.2).
Compilation Scale	The scale at which the data was compiled (it is recommended that this should be within the defined ranges of the 'Product Application' scale bands).

Security Classification Information	Description
International Defence Organisation (IDO) Status (see note)	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking. - North Atlantic Treaty Organisation (NATO) - North Atlantic Co-operation Council (NACC) - Partnership for Peace (PfP) - Western European Union (WEU)
Protective Marking	A marking indicating the minimum standards of protection required of the data. - COSMIC TOP SECRET - FOCAL TOP SECRET - TOP SECRET - SECRET - CONFIDENTIAL - RESTRICTED - UNCLASSIFIED
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level.
Caveat (see note)	A component of a security clearance and/or security class used for computing access rights and controlling information flow by authorising a specific group of subjects to have access to the information.

Note:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

Update Information	Description
Update Application Date	The date for which all previous updates (dated on or before) must have been applied.
Update Number	The update number of the dataset.

Note:

Update information is only applicable if updating is supported by the exchange standard implementation.

Datums & Units	Description
Horizontal Geodetic Datum	The horizontal geodetic datum of the dataset.
Vertical Datum	The vertical datum of the dataset.
Sounding Datum	The sounding datum of the dataset.
Co-ordinate Units	The co-ordinate units of the dataset.
Height / Length Units	The height and length units of the dataset.
Depth Units	The depth units of the dataset.
Positional Accuracy Units	The positional accuracy units of the dataset.

5.4 MANDATORY META INFORMATION

All dataset meta information stated in section 5.3.1, including Conformance to the Product Specification and Data Coverage (stated in section 5.5.1) are mandatory.

5.5 SCHEMA

The tables which follow in Sections 5.5.1, 5.5.2 and 5.5.3 provide the descriptions of meta information, real-world features, and associated attributes required by AML Large Bottom Objects to conform to this Product Specification.

For details of how to represent the real-world features and associated attributes described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.1, A.2.4.2 and A.2.4.3

5.5.1 Meta Information

In the following tables, details of allowable meta information for AML Large Bottom Objects are described.

The column ‘Encoding Details’ provides additional details of how meta information can be encoded, either as meta information features, or as attributes. The terms ‘specific’ and ‘generic’ are used to indicate an attribute’s association to a feature class. Attributes that are ‘generic’ apply to all feature classes listed in this Product Specification. Attributes listed as ‘specific’ relate only to those in the Features Class table in Section 5.5.2 of this Product Specification, when included in the ‘Associated Attributes’ column.

Production Information	Description	Encoding Details
Capture Date	The date when the specific object was captured, edited or deleted.	Generic Attribute
Production Agency	The agency responsible for the production of the data. (IHO Codes for Producing Agencies)	Generic Attribute
Producing Country	The country responsible for the production of the data. (IHO Codes for Producing Agencies)	Generic Attribute
Data Coverage	The geographical area that describes the coverage and extent of spatial objects.	Feature Class

Security Classification Information	Description	Encoding Details
International Defence Organisation (IDO) Status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking.	Generic Attribute
Protective Marking	A marking indicating the minimum standards of protection required of the data.	Generic Attribute
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the ‘owner’ that is responsible for establishing and setting the protective marking level.	Generic Attribute
Caveat	A component of a security classification used for authorising a specific group to have access rights.	Generic Attribute

Geo-Reference Information	Description	Encoding Details
Vertical Datum	Any level surface taken as a surface of reference from which to reference elevations (IHO SP32: 1227).	Specific Attribute
Sounding Datum	The horizontal plane to which the soundings on a hydrographic survey are reduced. (IHO SP32: 1225)	Specific Attribute
Vertical Datum Shift Area	An area within which a uniform shift exists between a specific vertical datum and the datum of the data within this area.	Feature Class
Height / Length Units (see note)	Unit of measurement for heights and lengths.	Specific Attribute
Depth Units (see note)	Unit of measurement for depths.	Specific Attribute

Note:
Any feature class with attribute(s) used to encode values for; depth, height, length or width must include an attribute for the unit of measurement.

Source Information	Description	Encoding Details
Source Date	The date of issue of the source information (if applicable).	Area Feature and Generic Attribute
Source Country	The country responsible for the production of the source. (IHO Codes for Producing Agencies)	Area Feature and Generic Attribute
Source Agency	The agency responsible for the production of the source. (IHO Codes for Producing Agencies)	Area Feature and Generic Attribute
Source ID	ID of the data source (e.g. chart number).	Area Feature and Generic Attribute
Source Type	The type of data source (e.g. chart, report, etc.).	Area Feature and Generic Attribute
Source Scale	The scale at which the source data has been compiled.	Area Feature and Generic Attribute

NOTE:
The 'Source Agency' refers to the originators of the data and not the agency responsible for producing AML. If the source agency is not listed in IHO Codes for Producing

Agencies, then the agency name should prefix any details provided in the attribute 'Source ID' using a solidus (forward slash) to separate it from the ID.

Data Quality Information	Description	Encoding Details
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system.	Generic Attribute (may be encoded on the spatial object)
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation.	Generic Attribute (may be encoded on the spatial object)
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system	Generic Attribute
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another.	Generic Attribute
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another.	Generic Attribute
Sounding Accuracy	The error estimate for soundings relative to the specified spatial reference system.	Specific Attribute
Quality of Position	An indication of the reliability of a quoted position.	Generic Attribute (may be encoded on the spatial object)
Quality of Sounding Measurement	An indication of the reliability of a sounding.	Specific Attribute
Technique of Sounding Measurement	Indicates the method or equipment used to obtain the object's depth.	Specific Attribute
Conformance to the Product Specification	An indication of how well the data conforms to the product specification.	Feature Class

External Reference Information	Description	Encoding Details
Image File Link	A reference to an image file containing a pictorial representation of the object.	Generic Attribute
Text File Reference	The file name relating to an external text file.	Generic Attribute
Text File Reference (in national language)	The file name relating to an external text file.	Generic Attribute
Reference to a Publication	Reference to a specific location of any relevant information within an external publication.	Generic Attribute

Other Supporting Information	Description	Encoding Details
Supporting Textual Information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute.	Generic Attribute
Supporting Textual Information (in national language)	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute.	Generic Attribute

5.5.2 Feature Classes

The table which follows displays the following information:

- Feature Class – gives the name of the feature / object class.
- Description – describes the feature class.
- Associated Attributes – Description – indicates allowable attributes relevant to each feature class. (see Section 5.5.3 of this Product Specification for attribute descriptions and values).
- Associated Attributes –M – denotes that export of the attribute field is mandatory.
- Form – indicates the geometric form that the feature / object class can take (i.e. **P**oint, **L**ine, or **A**rea).

In addition to the 'associated attributes' listed for individual real-world feature classes 'generic attributes' are used at the feature level. These encode meta and supporting information that may exist on any feature. Generic attributes used in AML Large Bottom Objects are described in Section 5.5.1 of this Product Specification.

For details of how to encode the feature classes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.2

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Conformance to the Product Specification	An area in which data is of a specified conformance to the product specification. *(AML)*	• Category of Conformance	✓			✓
Data Coverage	A geographical area that describes the coverage and extent of spatial objects. *(AML)*	• Category of Coverage	✓			✓
Data Source Area *(This feature uses the generic source information attributes to encode source information which is applicable to an area. Features within the area need not be individually attributed)*	A geographical area that describes the spatial extent of a data source. *(AML)*	• *Source Agency* • *Source Country* • *Source Date* • *Source ID* • *Source Scale* • *Source Type*				✓
Impact Scour	A scour, being a clearing away of mud or other seabed deposits by the action of an object impacting and/or traversing along the seabed before settling. *(AML)*	• Cardinal Point Orientation • Depth of Water Over Feature • Depth Units • Exposition of Sounding • First Detection Year • First Sensor • First Source • General Water Depth • Height/Length Units • Horizontal Length • Horizontal Width • Last Detection Year • Last Sensor	✓	✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Impact Scour *(continued)*	A scour, being a clearing away of mud or other seabed deposits by the action of an object impacting and/or traversing along the seabed before settling. *(AML)*	• Last Source • Name • Name (in national language characters) • Orientation • Quality of Sounding Measurement • Sonar Signal Strength • Sounding Datum • Sounding Accuracy • Status • Surface Composition • Surface Composition – qualifying terms • Technique of Sounding Measurement • Vertical Length • Water Level Effect		✓		
Obstruction	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. *(IHO Dictionary, S-32, 5th Edition, 3503)*	• Abandonment Date • Cardinal Point Orientation • Category of Obstruction • Condition • Conspicuous, Radar • Conspicuous, Visually • Controlling Authority • Current Scour Dimensions • Date Sunk • Depth Units • Depth of Water Over Feature • Existence of Restricted Area • Exposition of Sounding • Field Name • First Detection Year	✓ ✓	✓		

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Obstruction *(continued)*	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. *(IHO Dictionary, S-32, 5th Edition, 3503)*	• First Sensor • First Source • General Water Depth • Height • Height/Length Units • Horizontal Length • Horizontal Width • Last Detection Year • Last Sensor • Last Source • Magnetic Anomaly Detector (MAD) Signature • Magnetic Intensity • Name • Name (in national language characters) • Nationality • Nature of Construction • Operator • Orientation • Product • Quality of Sounding Measurement • Re-entered Date • Re-suspended Date • Sonar Signal Strength • Sounding Accuracy • Sounding Datum • Spudded Date • Status • Strength of Magnetic Anomaly		✓		

Obstruction *(continued)*	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation. *(IHO Dictionary, S-32, 5th Edition, 3503)*	• Surface Composition • Suspension Date • Technique of Sounding Measurement • Vertical Datum • Vertical Length • Water Level Effect	✓			

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Sensor Anomaly	A contact on the sea floor which has been detected by means of acoustic and/or magnetic sensors, but for which any other means of identification or classification cannot be made. (More commonly known as a non-sub contact.) *(AML)*	• Cardinal Point Orientation • Current Scour Dimensions • Depth of Water Over Feature • Depth Units • Exposition of Sounding • First Detection Year • First Sensor • First Source • General Water Depth • Height/Length Units • Last Detection Year • Last Sensor • Last Source • Magnetic Anomaly Detector (MAD) Signature • Magnetic Intensity • Name • Name (in national language characters) • Orientation • Quality of Sounding Measurement • Sonar Signal Strength • Sounding Datum • Sounding Accuracy • Status • Strength of Magnetic Anomaly • Technique of Sounding Measurement • Water Level Effect	✓			

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Underwater / Awash Rock	A concentrated mass of stony material or coral which dries, is awash or is below the water surface. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	• Current Scour Dimensions		√		
		• Depth Units				
		• Depth of Water Over Feature	√			
		• Exposition of Sounding				
		• First Detection Year				
		• First Sensor				
		• First Source				
		• General Water Depth				
		• Height/Length Units				
		• Horizontal Length				
		• Horizontal Width				
		• Last Detection Year				
		• Last Sensor				
		• Last Source				
		• Magnetic Anomaly Detector (MAD) Signature				
		• Magnetic Intensity				
		• Name				
		• Name (in national language characters)				
		• Quality of Sounding Measurement				
		• Sonar Signal Strength				
		• Sounding Accuracy				
		• Sounding Datum				
		• Status				
		• Technique of Sounding Measurement				
		• Strength of Magnetic Anomaly				
		• Surface Composition				
		• Surface Composition – qualifying terms				
		• Vertical Length				
		• Water Level Effect	√			

Feature Class	Description	Associated Attributes Description	M	Form P	Form L	Form A
Wreck	The ruined remains of a stranded or sunken vessel which has been rendered useless. *(IHO Dictionary, S-32, 5th Edition, 6027)*	• Beam of Vessel		√		
		• Cardinal Point Orientation				
		• Category of Wreck	√			
		• Condition				
		• Conspicuous, Radar				
		• Conspicuous, Visually				
		• Current Scour Dimensions				
		• Date Sunk				
		• Debris Field				
		• Depth of Water Over Feature	√			
		• Depth Units				
		• Draught of Vessel				
		• Existence of Restricted Area				
		• Exposition of Sounding				
		• First Detection Year				
		• First Sensor				
		• First Source				
		• General Water Depth				
		• Height				
		• Height/Length Units				
		• Horizontal Length				
		• Horizontal Width				
		• Last Detection Year				
		• Magnetic Intensity				
		• Last Sensor				
		• Last Source				
		• Length of Vessel				
		• Magnetic Anomaly Detector (MAD) Signature				
		• Name				
		• Name (in national language characters)				
		• Nationality				

Feature Class	Description	Associated Attributes		Form		
		Description	M	P	L	A
Wreck *(continued)*	The ruined remains of a stranded or sunken vessel which has been rendered useless. *(IHO Dictionary, S-32, 5th Edition, 6027)*	• Nature of Construction • Orientation • Product • Quality of Sounding Measurement • Sonar Signal Strength • Sounding Accuracy • Sounding Datum • Status • Strength of Magnetic Anomaly • Surface Composition • Technique of Sounding Measurement • Tonnage • Type of Tonnage • Type of Wreck • Underwater Reference Mark • Vertical Datum • Vertical Length • Water Level Effect	 ✓ 	✓		

5.5.2.1 Mandatory Features

There are no mandatory features in Large Bottom Objects.

5.5.3 Attributes

The table which follows displays the following information:

- Attribute – gives the name of attribute.
- Definition – gives a more detailed description of the attribute, if required.
- Values – specifies the possible values the attributes may take, if appropriate.

For details of how to encode the attributes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.3

Attribute	Definition	Values
Abandonment Date	The date on which a borehole is sealed. All well-head equipment is removed and the hole plugged with cement and a steel plate cemented over the top. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)*	Indication: CCYYMMDD The "abandonment date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system. *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system. *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Beam of Vessel	The beam of the vessel, being the widest part of its hull, in its operational state. *(Adapted from Webster's 3rd New International Dictionary)*	Value: 0 - 99.9 Units: metres or feet (units must be defined) Resolution: 0.1
Capture Date	Gives the date when the object was captured, edited or deleted. *(Adapted from S-57 , Annex A, Appendix A, Chapter 2 Attributes)*	Indication: CCYYMMDD The "capture date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Cardinal Point Orientation	The angle of the major axis of the object expressed to the nearest 45 degrees using cardinal compass point notation. *(Adapted from STANAG 3715)*	• **north / south:** the object is orientated on average along a north-south axis. *(AML)* • **east/ west:** the object is orientated on average along a east-west axis. *(AML)* • **northeast / southwest:** the object is orientated on average along a northeast-southwest axis. *(AML)* • **northwest / southeast:** the object is orientated on average along a northwest-southeast axis. *(AML)* • **unknown:** the object's orientation was not reported. *(AML)*
Category of Conformance	Indicates the inclusion criteria and completeness regarding the feature class content of the dataset. *(AML)*	• **complete:** the area specified has been populated for all feature classes. Absence of features from any class indicates that there are no such entities. *(AML)* • **partial:** certain feature classes have not been included (or only partially included) within the specified area. Details **must** be provided in supporting textual information. *(AML)*

Attribute	Definition	Values
Category of Coverage	Indicates the inclusion criteria and completeness regarding the feature class content of the dataset. (AML)	• **coverage available:** continuous coverage of spatial objects is available within this area. *(AML)* • **no coverage available:** an area containing no spatial objects. *(AML)*
Category of Obstruction	Description of the type of obstruction. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **wellhead:** a submarine structure projecting some distance above the seabed and capping a temporarily abandoned or suspended oil or gas well. *(IHO Dictionary, S-32, 5th Edition, 5976.)* • **diffuser:** a structure on an outfall through which liquids are discharged. The structure will usually project above the level of the outfall and can be an obstruction to navigation. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **crib:** a permanent structure set in the water, framed with wooden beams and filled with rocks or boulders. They are used to anchor log booms or support other constructions, e.g. submerged outfalls, diffusers etc. They may always be dry, submerged or cover and uncover. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fish haven:** areas established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk in areas which may be of very small extent or may stretch a considerable distance along a depth contour. Also called fishery reefs. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **foul ground:** areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. *(IHO Chart Specifications, M-4, 442.8.)* • **ground tackle:** equipment such as anchors, concrete blocks, chains and cables, etc., used to position floating structures such as trot and mooring buoys etc. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **well protection structure:** a structure, typically a dome or cube, erected over a wellhead or equipment attached to it (a tree) to lessen the danger of vessels snagging gear. *(AML)*

Attribute	Definition	Values
Category of Obstruction *(continued)*	Description of the type of obstruction. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **subsea installation:** any oil or gas related installation or structure on, or projecting from, the seabed, for example a submerged platform or concrete foundations. *(AML)* • **pipeline obstruction:** any pipeline related structure which projects above the seabed, for example a joint, T-piece, valve or sleeve, or a crossing where one pipeline is raised over another by means of a supporting structure. *(AML)* • **free standing conductor pipe:** lengths of large diameter casing pipe projecting from a wellhead which may extend only a short distance above the seabed, or rise to project above the sea surface. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* • **manifold:** a complex of pipes forming the junction of several incoming lines with one or more outlets, incorporating valves and instruments where necessary to monitor fluids flowing in individual lines. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* • **storage tank:** large seabed structures, typically made of concrete, capable of storing oil or gas and usually found attached or adjacent to a rig, or marked by a single point mooring buoy. *(AML)* • **template:** a guide frame incorporating a guide base that is lowered to the sea bed to align with an exploration well-head, through which a series of development well are drilled. *(An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* • **pontoon:** a floating structure, usually rectangular in shape, which serves as landing, pier head or bridge support which has been caused to permanently sink. *(Adapted from IHO Dictionary, S-32, 5th Edition, 3947)* • **sundry objects:** miscellaneous items and objects, most of which have been lost overboard or otherwise abandoned to the sea, for example cargo containers or vehicles. *(AML)*

Attribute	Definition	Values
Category of Wreck	Description of the type of wreck. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* *See also attribute 'Type of Wreck' for indication of the vessel type before it became a wreck.*	• **non dangerous wreck:** a wreck which is not considered to be dangerous to surface navigation. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **dangerous wreck:** a wreck which is considered to be dangerous to surface navigation. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **distributed remains of wreck:** (foul ground) an area over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. *(IHO Chart Specifications, M-4)* • **wreck showing mast(s):** wreck of which only the mast(s) is visible at the sounding datum indicated. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **wreck showing any portion of hull or superstructure:** wreck of which any portion of the hull or superstructure is visible at the sounding datum indicated. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Caveat	A component of a security classification used for authorising a specific group to have access rights (AML)	Text string separated from associated values by a comma.
Condition	The state of the object where it is not considered to be normal i.e. completed, undamaged or working normally. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **under construction:** a structure that is in the process of being built. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Wreck. • **ruined:** a structure in a decayed or deteriorated condition resulting from neglect or disuse, or a damaged structure in need of repair. *(IHO Dictionary, S-32, 5th Edition, 4456.)* • **planned construction:** an area where a future construction is planned. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Wreck.
Conspicuous, Radar	Indicates if the object returns a radar echo. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **radar conspicuous:** an object which returns a strong radar echo. *(IHO Dictionary, S-32, 5th Edition, 4142.)* • **not radar conspicuous:** an object which does not return a particularly strong radar echo. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*

Attribute	Definition	Values
Conspicuous, Radar		• **radar conspicuous (has radar reflector):** an object which returns a strong radar echo, having a radar reflector. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Conspicuous, Visually	Indicates if the object is distinctly visible from seaward. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **visually conspicuous:** term applied to an object either natural or artificial which is distinctly and notably visible from seaward. *(IHO Dictionary, S-32, 5th Edition, 984)* • **not visually conspicuous:** an object which is visible from seaward, but is not conspicuous. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Controlling Authority	The recognised authority responsible for establishing and maintaining the administrative affairs of all matters relating to a particular field or subject. *(AML)*	Text string.
Current Scour Dimensions	The length, width, depth and orientation of a scour that is associated with the object and that is caused by the action of currents. *(AML)*	**Encoded in quadruplets:** the length, width, depth and orientation of the current scour. (*AML*) **Note:** where no value is available for one or more elements, a null value should be used to preserve integrity of the quadruplet **Note:** multiple current scours will be represented by repeated groups of this attribute. **Note:** not allowable for object Impact Scour.
Date Sunk	Date on which the object sank or was abandoned to the sea. *(AML)*	**Indication:** CCYYMMDD The "date of sinking" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Debris Field	The length and orientation of a debris field associated with the object. *(AML)*	**Encoded in pairs:** the length of the material along the sea floor and the orientation of the material from true north. **Note:** where no value is available for one or more elements, a null value should be used to preserve integrity of the pair. **Note:** multiple debris fields will be represented by repeated groups of this attribute. **Note:** not allowable for objects Impact Scour; Obstruction; Sensor Anomaly; Underwater/Awash Rock.

Attribute	Definition	Values
Depth of Water Over Feature	Average depth of water over the feature relative to the specified vertical datum. *(AML)*	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1
Depth Units	Unit of measurement for depths. *(AML)*	• **metres:** depths are specified in metres (SI units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms and feet:** depths are specified in fathoms (units of six feet of depth) and feet. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **feet:** depths are specified in feet (imperial units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms and fractions:** depths are specified in fathoms (units of six feet of depth) and fractions of fathoms. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **fathoms:** a unit of length equal to 6 feet or 1.83 metres. *(AML)*
Draught of Vessel	The draught of the vessel, being the depth of water the ship draws especially when loaded, in its operational state. *(Adapted from Webster's 3rd New International Dictionary)*	Value: 0 - 99.9 Units: metres or feet (units must be defined) Resolution: 0.1
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation. *(AML)*	**Encoded in triplets:** the semi-major and semi-minor axes and the orientation of the error ellipse.
Existence of Restricted Area	Indication that a restricted area exists around the object. *(AML)*	• **yes:** a restricted area exists around the object. *(AML)* • **no:** a restricted area does not exist around the object. *(AML)*
Exposition of Sounding	Indicates whether the value of a sounding is shoaler than, deeper than or within the range depth of the surrounding depth area. *(FACC)*	• **within the range of depth of the surrounding depth area:** the depth corresponds to the depth range of the surrounding depth area. i.e. the depth is not shoaler than the minimum depth of the surrounding depth area or deeper than the maximum depth of the surrounding depth area. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*

Attribute	Definition	Values
Exposition of Sounding *(continued)*	Indicates whether the value of a sounding is shoaler than, deeper than or within the range depth of the surrounding depth area. *(FACC)*	• **shoaler than the range of depth of the surrounding depth area:** the depth is shoaler than the minimum depth of the surrounding depth area. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Impact Scour. • **deeper than the range of depth of the surrounding depth area: t**he depth is deeper than the minimum depth of the surrounding depth area. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for objects Sensor Anomaly, Underwater/awash Rock.
Field Name	The name given to a group of reservoirs yielding oil or gas, which the installation is involved in extracting. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)*	Text string.
First Detection Year	The year in which the contact was originally reported. *(Adapted from STANAG 3715)*	**Indication**: CCYY The "first detection year" should be encoded using 4 digits for the calendar year (CCYY).
First Sensor	Indicates by the use of which sensor the contact was originally reported. *(Adapted from STANAG 3715)*	• **acoustic sensor:** the contact was reported as a result of a sound signal being returned from the object. *(AML)* • **magnetic sensor:** the contact was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* • **video sensor:** the contact was reported as a result of a sighting through electronic visual equipment. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **diver sighting:** the contact was reported as a result of a visual sighting made by a diver. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **other:** the contact was reported as a result of another method. *(AML)* • **physical snag:** the contact was reported as a result of the object fouling lines, anchors or fishing nets. *(AML)* **Note:** not allowable for object Sensor Anomaly.

Attribute	Definition	Values
First Sensor *(continued)*	Indicates by the use of which sensor the contact was originally reported. *(Adapted from STANAG 3715)*	• **observed sinking:** the contact was reported as a result of a first hand observation of the object sinking. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **reported sinking:** the contact was reported as a result of a report made by a third party or from published information. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **none reported:** the method by which the contact was found was not reported. *(AML)* **Note:** not allowable for object Sensor Anomaly.
First Source	Indicates the source of the original report of the contact. *(Adapted from STANAG 3715)*	• **naval vessel:** the contact was reported by a vessel operated by a recognised national Naval authority. *(AML)* • **merchant ship:** the contact was reported by a vessel operated by a merchant marine organisation, engaged in the transport of goods for payment. • **fishing vessel:** the contact was reported by a vessel engaged in harvesting fish or other products from the sea for commercial gain. *(Partly adapted from Webster's 3rd New International Dictionary)* • **research vessel:** the contact was reported by a vessel engaged in the business of conducting research into the sea and its environs. *(AML)* • **yacht:** the contact was reported by a yacht, being a privately owned sailing or power boat used for pleasure. *(Partly adapted from Webster's 3rd New International Dictionary)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **diver:** the contact was reported as a result of a visual sighting made by a diver. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **national HO/authority charts:** the contact was sourced from information given on a chart published by a recognised Hydrographic Office or national authority. *(AML)*

Attribute	Definition	Values
First Source *(continued)*	Indicates the source of the original report of the contact. *(Adapted from STANAG 3715)*	• **national HO/authority notice to mariners:** the contact was sourced from information given in a Notice to Mariners published by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority radio navigation warning:** the contact was sourced from information given in a Radio Navigational Warning issued by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority files:** the contact was sourced from information held in files maintained by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority wreck information:** the contact was sourced from information held in wreck records maintained by a recognised Hydrographic Office or national authority. *(AML)* • **Lloyds and marine underwriter's reports:** the contact was sourced from reports published by Lloyds or another marine underwriter. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly • **owner/operator:** the contact was sourced from information or reports issued by the vessel or object's owner or operator. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **national coast guard or patrol:** the contact was sourced from information provided by a recognised national Coast Guard or Patrol. *(AML)* • **ship visit/hydrographic note report:** the contact was sourced from information provided by a third party as a result of receipt of a ship visit or hydrographic note report by a recognised Hydrographic Office or national authority. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **aerial photography or satellite imagery:** the contact was sourced from information obtained from aerial photography or satellite imagery. *(AML)*

Attribute	Definition	Values
First Source *(continued)*	Indicates the source of the original report of the contact. *(Adapted from STANAG 3715)*	• **geodetic survey reports or charts:** the contact was sourced from information obtained from geodetic survey reports or charts. *(AML)* • **published World War 1 losses:** the contact was sourced from information published in books or lists of vessels sunk during world war one. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **published World War 2 losses:** the contact was sourced from information published in books or lists of vessels sunk during world war two. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **published other losses: t**he contact was sourced from information published in books or lists of vessels sunk during periods outside world wars one and two. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **other:** the contact was reported by another source. *(AML)* • **unknown: t**he source of the original report is unknown. *(AML)* • **survey vessel:** the contact was reported by a vessel engaged in the business of determining and recording data relating to bodies of water and the nature of the sea bed. *(Adapted from IHO Dictionary, S-32, 5th Edition, 5206.)*
General Water Depth	The general depth of the water in the vicinity of the object *(AML)*	Integer.
Height	Value of the vertical distance to the highest point of the object, measured from a specified vertical datum. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1
Height / Length Units	Unit of measurement for heights and lengths. *(AML)*	• **metres:** depths are specified in metres (SI units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **feet:** depths are specified in feet (imperial units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Horizontal Length	A measurement of the longer of two linear axis. *(Digital Geographic Information Working Group - DGIWG, Oct 87)*	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1

Attribute	Definition	Values
Horizontal Width	A measurement of the shorter of two linear axis. *(Digital Geographic Information Working Group - DGIWG, Oct 87)*	Value: 0 - 99.9 Units: metres or feet (units must be defined) Resolution: 0.1
Image File Link	Indicates an external file containing a pictorial representation of the object *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Text String.
International Defence Organisation (IDO) status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking. *(AML)*	• **North Atlantic Treaty Organisation (NATO)** • **North Atlantic Co-operation Council (NACC)** • **Partnership for Peace (PfP)** • **Western European Union (WEU)**
Last Detection Year	The year in which the contact was subsequently confirmed. *(Adapted from STANAG 3715)*	**Indication**: CCYY The "last detection year" should be encoded using 4 digits for the calendar year (CCYY).
Last Sensor	Indicates by the use of which sensor the contact was subsequently confirmed. *(Adapted from STANAG 3715)*	• **acoustic sensor:** the contact was reported as a result of a sound signal being returned from the object. *(AML)* • **magnetic sensor:** the contact was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* • **video sensor:** the contact was reported as a result of a sighting through electronic visual equipment. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **diver sighting:** the contact was reported as a result of a visual sighting made by a diver. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **other:** the contact was reported as a result of another method. *(AML)* • **physical snag:** the contact was reported as a result of the object fouling lines, anchors or fishing nets. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **observed sinking:** the contact was reported as a result of a first hand observation of the object sinking. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly.

Attribute	Definition	Values
Last Sensor *(continued)*	Indicates by the use of which sensor the contact was subsequently confirmed. *(Adapted from STANAG 3715)*	• **reported sinking:** the contact was reported as a result of a report made by a third party or from published information. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **none reported:** the method by which the contact was found was not reported. *(AML)* **Note:** not allowable for object Sensor Anomaly.
Last Source	Indicates the source which subsequently confirmed the contact. *(Adapted from STANAG 3715)*	• **naval vessel:** the contact was reported by a vessel operated by a recognised national Naval authority. *(AML)* • **survey vessel:** the contact was reported by a vessel engaged in the business of determining and recording data relating to bodies of water and the nature of the sea bed. *(Adapted from IHO Dictionary, S-32, 5th Edition, 5206)* • **merchant ship:** the contact was reported by a vessel operated by a merchant marine organisation, engaged in the transport of goods for payment. *(AML)* • **fishing vessel:** the contact was reported by a vessel engaged in harvesting fish or other products from the sea for commercial gain. *(Partly adapted from Webster's 3rd New International Dictionary)* • **research vessel:** the contact was reported by a vessel engaged in the business of conducting research into the sea and its environs. *(AML)* • **yacht:** the contact was reported by a yacht, being a privately owned sailing or power boat used for pleasure. *(Partly adapted from Webster's 3rd New International Dictionary)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **diver:** the contact was reported as a result of a visual sighting made by a diver. *(AML)* **Note:** not allowable for object Sensor Anomaly. • **national HO/authority charts:** the contact was sourced from information given on a chart published by a recognised Hydrographic Office or national authority. *(AML)*

Attribute	Definition	Values
Last Source *(continued)*	Indicates the source which subsequently confirmed the contact. *(Adapted from STANAG 3715)*	• **national HO/authority notice to mariners:** the contact was sourced from information given in a Notice to Mariners published by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority radio navigation warning:** the contact was sourced from information given in a Radio Navigational Warning issued by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority files:** the contact was sourced from information held in files maintained by a recognised Hydrographic Office or national authority. *(AML)* • **national HO/authority wreck information:** the contact was sourced from information held in wreck records maintained by a recognised Hydrographic Office or national authority. *(AML)* • **Lloyds and marine underwriter's reports:** the contact was sourced from reports published by Lloyds or another marine underwriter. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly • **owner/operator:** the contact was sourced from information or reports issued by the vessel or object's owner or operator. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **national coast guard or patrol:** the contact was sourced from information provided by a recognised national Coast Guard or Patrol. *(AML)* • **ship visit/hydrographic note report:** the contact was sourced from information provided by a third party as a result of receipt of a ship visit or hydrographic note report by a recognised Hydrographic Office or national authority. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **aerial photography or satellite imagery:** the contact was sourced from information obtained from aerial photography or satellite imagery. *(AML)*

Attribute	Definition	Values
Last Source *(continued)*	Indicates the source which subsequently confirmed the contact. *(Adapted from STANAG 3715)*	• **geodetic survey reports or charts:** the contact was sourced from information obtained from geodetic survey reports or charts. *(AML)* • **published World War 1 losses:** the contact was sourced from information published in books or lists of vessels sunk during world war one. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **published World War 2 losses: t**he contact was sourced from information published in books or lists of vessels sunk during world war two. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **published other losses: t**he contact was sourced from information published in books or lists of vessels sunk during periods outside world war one and two. *(AML)* **Note:** not allowable for objects Impact Scour, Sensor Anomaly. • **other:** the contact was reported by another source. *(AML)* • **unknown:** the source of the original report is unknown. *(AML)*
Length of Vessel	The length of the vessel, being its total extent from end to end, in its operational state. *(Adapted from Webster's 3rd New International Dictionary)*	Value: 0 – 999.9 Units: metres or feet (units must be defined) Resolution: 0.1
Magnetic Anomaly Detector (MAD) Signature	Indication of the strength of the Magnetic Anomaly Detector reading caused by the contact. *(AML)*	• **nil:** The object has no magnetic anomaly detector reading. *(AML)* • **slight:** The object has a slight magnetic anomaly detector reading. *(AML)* • **moderate:** The object has a moderate magnetic anomaly detector reading. *(AML)* • **strong:** The object has a strong magnetic anomaly detector reading. *(AML)*
Magnetic Intensity	Magnetic intensity generated by the contact. *(AML)*	Value: 0 – 999 Units: nanoteslas/metre Resolution: 1
Name	The principal name or identifier of an object in English. *(AML)*	Text string.

Attribute	Definition	Values
Name (in national language characters)	The principal name or identifier of an object in national language characters. *(AML)*	Text string.
Nationality	Indicates the nationality of the specified object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Coded string.
Nature of Construction	The material(s) used to make the object. *(S-57 Annex A, Appendix A,Chapter 2 Attributes)*	• **masonry:** Constructed from brick or stone. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Wreck. • **wooden:** Constructed from wood. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Nature of Construction	The material(s) used to make the object. *(S-57 Annex A, Appendix A,Chapter 2 Attributes)*	• **loose boulders:** Constructed from large stones or blocks of concrete, often placed loosely for protection against waves or water turbulence. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Wreck. • **concreted:** Constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for foundations etc. *(Adapted from the Illustrated Contemporary Dictionary, Encyclopaedic Edition, 1978)* **Note:** not allowable for object Wreck. • **metal:** Constructed from metal. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **glass reinforced plastic (GRP):** Constructed from a plastic material strengthened with fibres of glass. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Operator	Name of the company operating the installation. *(AML)*	Text string.
Orientation	The angular distance measured from true north to the major axis of the object. *(Digital Geographic Information Working Group -DGIWG, Oct.87)*	Value: 0- 359.99 Unit: degree (°) Resolution: 0.01

Attribute	Definition	Values
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level. (AML)	Coded string separated from associated values by a comma.
Producing Country	The country responsible for the production of the data. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Coded String.
Product	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **oil: crude and refined:** crude; petroleum as it occurs naturally, as it comes from the well after extraneous substances (eg water) have been removed; oil that has not been refined. Refined; oil that has undergone one or more manufacturing process to make it suitable for a particular purpose. *(Webster's 3rd New International Dictionary and AML)* **Specific examples include:** Diesel Oil: heavy mineral oil used as fuel in diesel engines. *(Webster's 3rd New International Dictionary)* Gasoil: oil comprised of various hydrocarbons used especially for making oil gas or carbureted water gas used for oils, feedstock and certain cracking processes. *(Webster's 3rd New International Dictionary)* Industrial oil: Oil in a range of specific gravity that facilitates its use in a variety of manufacturing and operating processes. *(AML)* Light Oil: an oil of low specific gravity or relatively low boiling point, mostly used as lubricants. *(Webster's 3rd New International Dictionary)* Paraffin/Kerosene: a liquid distilled from petroleum or shale oil used as a fuel or solvent; a complex mixture of hydrocarbons. *(Adapted from Webster's 3rd New International Dictionary)* Petrol/Gasoline: flammable liquid obtained from petroleum, used as fuel in internal-combustion engines. *(AML)* • **solid fuel:** material wherein the particles firmly cohere; is hard and compact; and is burnt as a source of heat or power. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Note:** not allowable for object Obstruction. **Specific examples include:** Coal: a firm, brittle and generally black combustible carbonaceous rock derived from vegetable matter. *(Chambers English Dictionary)* Coke: a form of fuel obtained by the heating of coal, whereby its more volatile constituents are driven off. *(Chambers English Dictionary)* • **flammable liquids and gases:** a substance which is either; in a state where molecules move freely about one another but do not fly apart; or in a condition in which it has no definite boundaries or fixed volume; but which is combustible under normal atmospheric conditions. *(Adapted from Chambers Concise Dictionary)* **Specific examples include:** Benzene: a colourless, flammable, toxic liquid hydrocarbon obtained from the carbonisation of coal or certain petroleum fractions. Used for organic synthesis, solvent and motor fuel. *(Webster's 3rd New International Dictionary)* Butane: easily flammable, liquefiable gaseous paraffin hydrocarbon obtained from petroleum or natural gas. *(Webster's 3rd New International Dictionary)* Gas: esp. coal gas, or other gas used for lighting or heating. *(Chambers Concise Dictionary)* Liquefied Natural Gas (LNG): a compressed gas consisting of flammable light hydrocarbons and derived from natural gas. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* Liquefied Petroleum Gas (LPG): a compressed gas consisting of flammable light hydrocarbons and derived from petroleum (*Adapted from the Webster's New World Dictionary)* Propylene: a flammable gaseous olefin hydrocarbon obtained by cracking petroleum hydrocarbons and used chiefly in organic synthesis of compounds. *(Webster's 3rd New International Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **chemicals:** a substance used in or resulting from a reaction involving changes to atoms or molecules. *(Adapted from Collins English Dictionary)* **Specific examples include:** Acid: a compound capable of reacting with a base to form a salt, evolving hydrogen on reaction with certain metals. Mostly held as a water based solution. *(Webster's 3rd New International Dictionary)* Aluminium Nitrate: a salt of nitric acid containing aluminium. *(AML)* Calcium Carbide: a compound of calcium and carbon *(Adapted from Chambers Concise Dictionary)* Naphthalene: a white crystalline aromatic substance produced by the distillation of coal tar and used in mothballs and the manufacture of dyes etc. *(Concise Oxford Dictionary Ninth Edition)* Potassium Carbide: a compound of potassium and carbon. *(Adapted from Chambers Concise Dictionary)* • **water:** a clear, colourless liquid, devoid of taste or smell, that is a compound of hydrogen and oxygen, specifically when used or stored for the purposes of industrial and/or manufacturing processes. *(AML)* • **ferrous elements and ores: unrefined and refined:** a chemically inseparable substance or solid naturally occurring mineral aggregate, from which one or more valuable constituents may be recovered by treatment or a manufacturing process, and which does contain iron in its trivalent form. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Ferro-Magnesium: an alloy of iron and magnesium. *(AML)* Ferro- Manganese: alloy of iron and manganese. *(AML)* Iron: a heavy metallic element, silvery-white when pure, extracted from ore by smelting which readily rusts in moist air. *(Webster's 3rd New International Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Steel: any of various grey or greyish-blue alloys of iron with carbon and usually other elements, much used as structural materials and in manufacturing. *(Adapted from Concise Oxford Dictionary Ninth Edition)* • **non ferrous elements and ores: unrefined and refined:** a chemically inseparable substance or solid naturally occurring mineral aggregate, from which one or more valuable constituents may be recovered by treatment or a manufacturing process, and which does not contain iron in its trivalent form. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Aluminium: a silvery light and malleable metallic element resistant to tarnishing by air. *(Concise Oxford Dictionary Ninth Edition)* Blende: any naturally occurring metal sulphide, esp. zinc blende. *(Concise Oxford Dictionary Ninth Edition)* Brass: an alloy of copper and zinc. *(Chambers Concise Dictionary)* Caesium: a rare soft silver-white element of the alkali metal group, occurring in certain minerals, and used in photoelectric cells and atomic clocks. *(Concise Oxford Dictionary Ninth Edition)* Chrome: grey metallic element used in steel alloys and for electroplating. *(Collins English Dictionary)* Copper: a malleable red-brown metallic element of the transition series occurring naturally especially in cuprite and malachite, and used especially for electrical wiring. *(Concise Oxford Dictionary Ninth Edition)* Ilmenite: a black ore of titanium. *(Concise Oxford Dictionary Ninth Edition)* Lead: a heavy bluish-grey soft ductile metallic element occurring naturally in galena and used in building and the manufacture of alloys, both the metal and its compounds being toxic. *(Concise Oxford Dictionary Ninth Edition)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Magnesium: a metallic element of a bright silver-white colour which burns with a dazzling white light. *(Chambers Concise Dictionary)* Magnesite: a white or grey mineral form of magnesium carbonate. *(Concise Oxford Dictionary Ninth Edition)* Manganese: a grey brittle metallic transition element used with steel to make alloys. *(Concise Oxford Dictionary Ninth Edition)* Magnesium Oxide: a basic magnesium carbonate, used as a medicine. *(Chambers Concise Dictionary)* Mercury: a silvery-white heavy liquid metallic element occurring naturally in cinnabar and used in barometers, thermometers, and amalgams. *(Concise Oxford Dictionary Ninth Edition*) Nickel: a malleable ductile silver-white metallic transition element, occurring naturally in various minerals and used in special steels, in magnetic alloys, and as a catalyst. *(Concise Oxford Dictionary Ninth Edition)* Sodium: a soft silver-white reactive metallic element, occurring naturally in soda, salt, etc., that is important in industry and is an essential element in living organisms. *(Concise Oxford Dictionary Ninth Edition)* Sulphur: a pale yellow non-metallic element having crystalline and amorphous forms, burning with a blue flame and a suffocating smell, and used in making gunpowder, matches, and sulphuric acid, in the vulcanising of rubber, and in the treatment of skin diseases. *(Concise Oxford Dictionary Ninth Edition)* Tin: a silvery-white malleable metallic element resisting corrosion, occurring naturally in cassiterite and other ores, and used esp. in alloys and for plating thin iron or steel sheets to form tin plate. (Concise Oxford Dictionary Ninth Edition) Titanium: a grey metallic element occurring naturally in many clays etc., and used to make strong light alloys that are resistant to corrosion. *(Concise Oxford Dictionary Ninth Edition)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Zinc: a bluish-white metallic element resistant to atmospheric corrosion, it is a constituent of several alloys and is used in galvanising, battery electrodes, etc. *(Chambers Concise Dictionary*) • **metal: concentrate and products:** an opaque elementary substance, which has a lustre, is fusible and conducts heat and electricity. In concentrated form, the metallic substance has been extracted from the original ore but has not undergone change by a method of manufacture into products; being the manufacture of goods or commodities from metal. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Ingots: a mass of metal cast into a convenient shape for storage or transportation, to be later re-melted for casting and finishing. *(Adapted from Webster's 3rd New International Dictionary)* Plate: Metal in the form of sheets. *(Adapted from Chambers Concise Dictionary)* Scrap Metal: discarded pieces of metal, of use only for re-melting and re-processing. *(AML)* • **minerals:** substances produced by a process of in-organic nature; a substance neither animal nor vegetable. Normally obtained by mining. (Chambers Concise Dictionary) **Note:** not allowable for object Obstruction. **Specific examples include:** Bauxite: a clay like mineral that is the chief source of aluminium. *(AML)* Salt: chloride of sodium, occurring naturally as a mineral (rock-salt) and in solution in sea water, salt water springs etc. *(Chambers Concise Dictionary)* • **fertiliser: natural and chemical:** a substance added to the soil to increase its productivity. It may be produced by or pertaining to nature; not the work of man; or which may be formed from a substance or resulting from a reaction involving changes to atoms or molecules. *(AML)* **Note:** not allowable for object Obstruction.

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Bonemeal: ground bones used as fertiliser. *(Chambers Concise Dictionary)* Nitrate: a salt of nitric acid, often used as a fertiliser. *(Adapted from Chambers Concise Dictionary)* Nitrate Potash: potassium nitrate, used as a fertiliser. *(Adapted from Chambers Concise Dictionary)* Phosphate: any salt or ester of phosphoric acid, especially used as a fertiliser. *(Concise Oxford Dictionary Ninth Edition)* Urea: fertiliser; specifically being derived from mammalian urine. *(Chambers Concise Dictionary)* • **wood: unprocessed and products:** the substance of trees. In unprocessed form, the wood has not undergone change by a method of manufacture into products, being the manufacture of goods or commodities from wood. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Cork: the buoyant light brown material obtained from beneath the bark of the cork oak. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Logs: an un-hewn piece of a felled tree, or a similar rough mass of wood, especially cut for firewood. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Pallets: platforms or trays for lifting and stacking goods, used with a forklift truck, and having a double base into which the fork can be thrust. *(Adapted from Chambers Concise Dictionary)* Plywood: boarding made of thin layers of wood glued together, the grain of each at right angles to that of the next. *(Adapted from Chambers Concise Dictionary)* Sawdust/Wood Chip: dust or small particles of wood etc, detached in sawing; a small fragment detached by breaking, chopping etc. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Timber: wood suitable for building or carpentry, whether growing or cut; a beam or large piece of wood in a framework. *(Chambers Concise Dictionary)* • **rubber:** unprocessed and products: Strong waterproof elastic material, originally made from the dried sap of a tropical tree, now usually synthetic. In unprocessed form, the rubber has not undergone change by a method of manufacture into products, being the manufacture of goods or commodities from rubber. *(Adapted from Collins English Dictionary)* **Note:** not allowable for object Obstruction. **Specific examples include:** Tyres: rubber ring, usually inflated, over the rim of a vehicle's wheel to grip the road. (Collins English Dictionary) • **clay products:** clay, mixed with water, which has been formed into a specific shape either by hand, or by a method of manufacture, then dried by heat, in order to produce goods or commodities. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Bricks: a small, usually rectangular, block of fired or sun-dried clay, used in building. (Concise Oxford Dictionary Ninth Edition) China / Porcelain / Pottery / Earthenware: vessels, etc. made of clay fired to a porous state which can be made impervious to liquids by the use of a glaze. (Concise Oxford Dictionary Ninth Edition) Tiles: slabs of baked clay for covering roofs, floors etc. (Chambers Concise Dictionary) • **natural fibres and materials in general: unprocessed and products:** that out of which anything is or may be made, produced by or pertaining to nature; not the work of man. A fibre being a filament or thread like cell of animal, vegetable or mineral. In unprocessed form, the fibre or material has not undergone change by a method of manufacture into products, being the manufacture of goods or commodities from fibre or material. (AML) **Note:** not allowable for object Obstruction.

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Animal Skins: natural outer covering of tissue from an animal. *(Adapted from Chambers Concise Dictionary)* Bamboo: a gigantic tropical and sub-tropical grass with hollow-jointed woody stem. *(Adapted from Chambers Concise Dictionary)* Cellulose: a carbohydrate forming the main constituent of plant cell walls, used in the production of textile fibres. *(Concise Oxford Dictionary Ninth Edition)* Copra: the dried kernel of the coconut, yielding coconut oil. *(Chambers Concise Dictionary)* Cloth / Textiles / Clothing: goods made from woven fabrics. *(Adapted from Chambers Concise Dictionary)* Cotton; raw: white downy fibre covering the seeds of the cotton-plant. *(Adapted from Collins English Dictionary)* Esparto Grass: a strong grass grown in Spain, N Africa etc, used to make paper, baskets, cordage etc. *(Adapted from Chambers Concise Dictionary)* Hemp: plant with tough fibres used to make canvas and rope. *(Adapted from Collins English Dictionary)* Paper: a material made in thin sheets as an aqueous deposit from linen rags, esparto, wood pulp, or other form of cellulose, used for writing, printing, wrapping and other purposes. *(Adapted from Chambers Concise Dictionary)* Wool; fleeces: soft hair of goat or sheep, fleece being the wool shorn from an animal at one time. *(Adapted from Chambers Concise Dictionary)* • f**oodstuffs: solid:** any substance that a living thing feeds on, that nourishes the body; sustains or promotes growth, wherein the particles firmly cohere. Some foodstuffs may be consumed unprocessed, while others may undergo one or more manufacturing processes to make it palatable, or to allow mixing with other foodstuffs. *(AML)* **Note:** not allowable for object Obstruction.

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Animal Feed: substances used as nourishment for livestock. *(Adapted from Chambers Concise Dictionary)* Beans: the name of several kinds of leguminous plants and their seeds, applied also to the seeds of other plants eg coffee. *(Adapted from Chambers Concise Dictionary)* Bran: the inner husks of corn sifted from the flour. *(Chambers Concise Dictionary)* Cereals: grains used as food, such as wheat, barley etc. *(Adapted from Collins English Dictionary)* Cocoa: a powder made from crushed cacao seeds, often with other ingredients. *(Concise Oxford Dictionary Ninth Edition)* Coffee: powder made by roasting and grinding the seeds of a tree of the madder family. *(Adapted from Chambers Concise Dictionary)* Flour: the finely ground meal of wheat or other grain. *(Chambers Concise Dictionary)* Grain: a small hard seed, especially that of any cereal plant such as wheat, rice, corn, rye etc. (Adapted from the Webster's New World Dictionary) Maize: a cereal plant, native to North America, yielding large grains set in rows on a cob. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Nuts: any fruit with an edible seed in a hard shell. *(Chambers Concise Dictionary)* Oilcake: the solid residue that remains after expressing or extracting most of the oil from various seeds and is often ground to make oil meal. *(Webster's 3rd New International Dictionary)* Rape: a plant related to the turnip, brilliantly yellow-flowered, and cultivated for its herbage and oil-producing seeds. *(Chambers Concise Dictionary)* Seed: a multi-cellular structure by which flowering plants reproduce, consisting of embryo, stored food and seed-coat. *(Chambers Concise Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Sugar: a sweet substance obtained chiefly from cane and beet. *(Chambers Concise Dictionary)* Tea: dried leaves of an Asian bush used to make a drink by infusing in hot water. *(Adapted from Collins English Dictionary)* Tobacco: the prepared leaves of an American plant used for smoking, chewing or snuffing. *(Adapted from Chambers Concise Dictionary)* Vegetables: plants or parts of plants used for food. *(Adapted from Chambers Concise Dictionary)* • **foodstuffs: liquid:** any substance that a living thing feeds on, that nourishes the body; sustains or promotes growth, which is in a state where molecules move freely about one another but do not fly apart. Some foodstuffs may be consumed unprocessed, while others may undergo one or more manufacturing processes to make it palatable, or to allow mixing with other foodstuffs. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Alcohol: an intoxicating drink formed by fermenting or distilling hydrocarbons with various fruits or grains, in water. *(Adapted from Webster's 3rd New International Dictionary)* Edible Oil (vegetable): any of various oils extracted from plants typically used in cooking. *(Adapted from Chambers Concise Dictionary)* Milk: a white fluid secreted by female mammals as food for their young. *(Adapted from the Oxford Minidictionary, Third Edition)* Water: Drinking: a clear, colourless liquid, devoid of taste or smell, that is a compound of hydrogen and oxygen, which is intended for human consumption. *(AML)* • **foodstuffs: preserved:** any substance that a living thing feeds on, that nourishes the body; sustains or promotes growth which has been subjected to a process which prevents it from decaying. *(AML)* **Note:** not allowable for object Obstruction.

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Tinned Food: edible substances preserved by being sealed in a tin. *(Adapted from Collins English Dictionary)* Refrigerated/Frozen Cargo: perishables that have been subjected to a degree of cold, either chilled or subjected to a temperature below freezing, in order to facilitate storage or preservation. *(Adapted from Webster's 3rd New International Dictionary)* • **general and mixed goods:** general; items relating to the whole or most; not specialised; of broad overall character. Mixed; characterised by scope or variety; items combined or associated. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Furniture: movable items, either for use or ornament, with which a house is equipped. *(Chambers Concise Dictionary)* Government Stores: articles for a particular purpose, accumulated for use, owned by the state. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Hardware: domestic goods (esp. tools etc) made of baser metals; equipment, mechanical or electrical. *(Chambers Concise Dictionary)* Luxury Goods: items beyond the indispensable minimum; non essential items that contribute to luxurious living; an indulgence in convenience or ornament. *(Adapted from Webster's 3rd New International Dictionary)* Mail: letters and / or packages transported and / or delivered by or on behalf of a recognised postal or other carrier service. *(AML)* Medical Supplies: goods relating to the science of medicine. *(AML)* • **stone:** a detached piece of rock. The material may consist of either large pieces, un-hewn, or shaped or carved for a particular purpose; or the material may be broken down into smaller pieces. *(AML)* **Note:** not allowable for object Obstruction.

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **granular or powdery material:** physical matter consisting of relatively small and hard, but usually separate particles; or in a form which is dusty or easily crumbled into tiny, loose particles. *(AML)* **Note:** not allowable for object Obstruction. **Specific examples include:** Ash: the powdery residue left after the burning of any substance. *(Concise Oxford Dictionary Ninth Edition)* Cement: a fine grey powder consisting of lime and clay. When mixed with water, sand and sometimes small stones, it forms a binding or filling material commonly used for building. *(AML)* Chalk: a white soft earthy limestone (calcium carbonate) formed from the skeletal remains of sea creatures, ground into small grains. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Clay (inc. china): fine-grained earth, soft when moist and hardening when baked, used to make bricks and pottery. *(Collins English Dictionary)* Sand: a mass of tiny rounded grains of rock. *(Chambers Concise Dictionary)* Soil: the upper layer of earth in which plants grow, consisting of disintegrated rock usually with a mixture of organic remains. *(Concise Oxford Dictionary Ninth Edition)* • **machinery and mechanical parts:** machinery; apparatus usually powered by electricity designed to perform a specific task. Mechanical Parts; components of vehicles or machines. *(Adapted from Collins English Dictionary)* **Specific examples include:** Expellers: screw presses for expressing vegetable oil from soy beans or other seeds. *(Adapted from Webster's 3rd New International Dictionary)* Drilling Equipment: Apparatus used for mining or boring operations. *(Adapted from Chambers Concise Dictionary)* • **construction materials:** that out of which anything is, or may be made; equipment or implements. Parts that may be put together. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Coils: products wound in circles or spirals. *(Adapted from Concise Oxford Dictionary Ninth Edition)* Cylinders: solid or hollow bodies with straight sides and circular ends. *(Adapted from Collins English Dictionary)* Pipes / Tubes: long hollow bodies for the conveyance of water, gas, etc. *(Adapted from Chambers Concise Dictionary)* Rods: slender bars of metal or other material. *(Adapted from Chambers Concise Dictionary)* Wire (inc. barbed): a thin flexible strand of metal, barbed wire having protruding sharp points. *(Adapted from Collins English Dictionary)* • **vehicles:** a means of conveyance or transport especially a structure with wheels in or on which people or things are transported by land. *(Adapted from Chambers Concise Dictionary)* **Specific examples include:** Crawler Vehicle(s): a tractor moving on an endless caterpillar track. *(Concise Oxford Dictionary 9th Edition)* Military Vehicle(s): a means of transport used specifically for the purposes of conducting warfare. *(AML)* • **aircraft:** any structure or machine for travelling in the air. *(Chambers Concise Dictionary)* • **railway: stock and construction materials:** stock; engines, carriages, goods wagons or any other wheeled vehicle that can run on a track with rails. Construction materials; that out of which a railway may be made; parts that may be put together to build a railway e.g. rails; sleepers. *(Adapted from Chambers Concise Dictionary)* • **electronics:** devices based on the technology of the conduction of electricity in a vacuum, gas or a semiconductor. *(Adapted from Chambers Concise Dictionary)* **Note:** not allowable for object Obstruction. • **portable buildings:** movable structures for giving shelter, normally prefabricated. *(AML)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **containers:** large box-like receptacles of standard shape and size in which goods are enclosed for transport on a lorry, train or ship. *(Adapted from Chambers Concise Dictionary)* • **plastic:** a large number of polymeric substances, mostly synthetic, mouldable at some stage under heat or pressure, used to make domestic articles and many engineering products. *(Chambers Concise Dictionary)* **Note:** not allowable for object Obstruction. • **paint:** colouring matter, especially in liquid form, for imparting colour to a surface. Normally stored in small metal containers. *(AML)* **Note:** not allowable for object Obstruction. • **refuse (also known as rubbish/garbage/trash) and waste: refuse;** matter or materials rejected as fit only to be thrown out or away. Waste; material produced during, or left over from, a manufacturing process and which is not usable for the main purpose of manufacture, but may be usable for some other purpose or in another operation. *(Adapted from Webster's 3rd New International Dictionary)* **Note:** not allowable for object Obstruction. **Specific examples include:** Clinker: the incombustible residue of fused ash raked out of furnaces. *(Chambers Concise Dictionary)* Burnt Ore: solid naturally occurring mineral aggregate from which the valuable constituents have been recovered by a heat process. *(Adapted from Chambers Concise Dictionary)* • **radioactive material:** physical matter which relates to, is caused by or exhibits radioactivity, being the emission of radiant energy elements capable of spontaneously emitting alpha, beta or sometimes gamma rays by the disintegration of the nuclei of atoms. *(Adapted form Webster's 3rd New International Dictionary)* • **armament:** military weapons. a total means of making war; defensive equipment. *(AML)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Specific examples include:** Ammunition: a supply of projectiles, especially bullets, shells, and grenades. (Adapted from Concise Oxford Dictionary Ninth Edition) Bomb / Torpedo: a hollow case containing explosive, incendiary, smoke-producing, poisonous or other offensive material. A Torpedo is specifically a self-propelled submarine weapon. *(Adapted from Chambers Concise Dictionary)* Explosives: substances specifically created to blow up with violence. *(Adapted from Chambers Concise Dictionary)* Munitions / Military Stores: military weapons, ammunition, equipment, and stores. *(Concise Oxford Dictionary Ninth Edition)* Small Arms: weapons that can be carried by a person, especially handguns or short weapons. *(Adapted from Chambers Concise Dictionary)* • **personnel:** people in general. *(Chambers Concise Dictionary)* **Note:** not allowable for object Obstruction. **Specific examples include:** Military Personnel: persons employed in the business of warfare. *(Adapted from Chambers Concise Dictionary)* Passengers: persons travelling in a means of transport operated by others. *(AML)* • **animals (land & sea) and birds:** animals; organisms having life, sensation and voluntary movement, which require predominantly land or sea conditions for survival. Birds; warm blooded, egg laying, feathered vertebrates of the class Aves. *(Adapted from Chambers Concise Dictionary)* **Note:** not allowable for object Obstruction. **Specific examples include:** Livestock / Animals: organisms having life, sensation and voluntary motion. Livestock typically being domestic animals eg. horses, cattle, sheep and pigs. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Product *(continued)*	Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Shark: large elasmobranch fish with lateral gill slits and mouth on the under side. *(Adapted from Chambers Concise Dictionary)* Whale: large cetaceous aquatic mammal. *(Adapted from Chambers Concise Dictionary)* Seal: amphibious mammal with flippers as limbs. *(Collins English Dictionary)* • **fish:** a vertebrate cold-blooded animal with gills and fins living wholly in water. *(Concise Oxford Dictionary Ninth Edition)* • **shellfish and crustaceans:** shelled aquatic invertebrates. *(Chambers Concise Dictionary)* **Specific examples include:** Scallops: a bivalve having a sub-circular shell with radiating ridges and eared hinge-line. *(Chambers Concise Dictionary)* • **ballast:** heavy material used to weigh down and steady a ship. *(Adapted from Chambers Concise Dictionary)* **Note:** not allowable for object Obstruction. • **other:** the product is of a type which will not readily fall into another value. *(AML)* • **unknown:** the product is unknown or unreported. *(AML)*
Production Agency	The agency responsible for the production of the data. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Coded String.
Protective Marking	A marking indicating the minimum standards of protection required of the data. *(AML)*	• **COSMIC TOP SECRET** • **FOCAL TOP SECRET** • **TOP SECRET** • **SECRET** • **CONFIDENTIAL** • **RESTRICTED** • **UNCLASSIFIED**

Attribute	Definition	Values
Quality of Position	An indication of the reliability of a quoted position. *(AML)* *Note: the value 'Approximate', when applied to the attribute 'Quality of Position' is prohibited for use in AML. In circumstances where the term 'Position Approximate' would normally be applied to an object in a standard navigational charting sense, the value 'estimated' should be used.*	• **surveyed:** the position(s) was(were) determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date. *(Adapted from IHO Dictionary, S-32, 5195, & IHO Chart Specifications, M-4, 175.2)* • **unsurveyed:** survey data does not exist or is very poor. *(Adapted from IHO Dictionary, S-32, 5732)* • **inadequately surveyed:** position data is of a very poor quality. *(Adapted from IHO Dictionary, S-32, 5732)* • **unreliable:** an object's position obtained from questionable or unreliable data. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **position doubtful:** an object whose position has been reported but which is considered to be doubtful. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **reported (not surveyed):** an object whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **reported (not confirmed):** an object whose position has been reported and its position has not been confirmed. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **estimated:** the most probable position of an object determined from incomplete data or data of questionable accuracy. *(Adapted from IHO Dictionary, S-32, 3960)* • **precisely known:** a position that is of a known value, such as the position of an anchor berth or other defined object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **calculated:** a position that is computed from data. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*

Attribute	Definition	Values
Quality of Sounding Measurement	Indicates the reliability of the value of the sounding. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **depth known:** the depth from chart datum to the bottom is a known value. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **least depth unknown, safe clearance at depth shown:** the least depth over a object is unknown, but there is considered to be safe clearance at this depth. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **depth unknown:** the depth from chart datum to the bottom is unknown. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **doubtful sounding:** a depth that may be less than indicated. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4840)* • **unreliable sounding:** a depth that is considered to be an unreliable value. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **least depth known:** the shoalest depth over a object is of known value. *(Adapted from IHO Dictionary, S-32, 5th Edition, 2705)* • **value reported (not surveyed):** depth value obtained from a report, but not fully surveyed. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **value reported (not confirmed):** depth value obtained from a report, which it has not been possible to confirm. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Re-entered Date	The date on which activity at a well site resumed, either to enable further exploration or development work, or to initiate production of oil or gas. *(AML)*	**Indication:** CCYYMMDD The "re-entered date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Re-suspended Date	The date on which a well is suspended for a second or subsequent time, meaning it has again been temporarily abandoned *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)*	**Indication:** CCYYMMDD The "re-suspended date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Reference to a Publication	Reference to a specific location of any relevant information within an external publication. *(AML)*	Text string.

Attribute	Definition	Values
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another. *(AML)*	Floating point numeric.
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another. *(AML)*	Floating point numeric.
Sonar Signal Strength	An indication of the strength of the echo of a sonic signal returned from a contact. *(Adapted from IHO Dictionary, S-32, 4819)*	• **nil:** the object returns no sonar signal. *(AML)* • **poor:** the object returns a poor sonar signal. *(AML)* • **moderate:** the object returns a moderate sonar signal. *(AML)* • **strong:** the object returns a strong sonar signal. *(AML)*
Sounding Accuracy	The best estimate of the accuracy of the sounding data. The error is assumed to be positive and negative. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Value: 0 - 99.9 Units: metres, fathoms or feet (units must be defined) Resolution: 0.1
Sounding Datum	Indicates the datum to which soundings are referred. *(AML)*	• **mean low water springs (MLWS):** the average height of the low waters of spring tides. Also called spring low water. *(IHO Dictionary, S-32, 5th Edition, 3150)* • **mean lower low water springs (MLLWS):** the average height of lower low water springs at a place. *(IHO Dictionary, S-32, 5th Edition, 3146)* • **mean sea level (MSL):** the average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. *(IHO Dictionary, S-32, 5th Edition, 3156)* • **mean low water (MLW):** the average height of all low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3147)* • **low water springs:** an arbitrary level, approximating that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(AML)*	• **lowest low water:** an arbitrary level conforming to the lowest tide observed at a place, or some what lower. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **lowest low water springs:** an arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. *(Hydrographic Service, Royal Australian Navy)* • **Indian spring low water (ISLW):** an arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian Tidal Plane. *(IHO Dictionary, S-32, 5th Edition, 2427)* • **approximate mean low water springs:** an arbitrary level, usually within ± 0.3m from that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* • **approximate lowest astronomical tide:** an arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(Hydrographic Service, Royal Australian Navy)* • **nearly lowest low water:** an arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian Spring Low Water (ISLW). *(Hydrographic Service, Royal Australian Navy)* • **mean lower low water (MLLW):** the average height of the lower low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3145)* • **low water:** an approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **approximate mean low water:** an arbitrary level, usually within ± 0.3m from that of Mean Low Water (MLW). *(Hydrographic Service, Royal Australian Navy)* • **approximate mean lower low water:** an arbitrary level, usually within ± 0.3m from that of Mean Lower Low Water (MLLW). *(Hydrographic Service, Royal Australian Navy)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(AML)*	• **mean high water (MHW):** the average height of all high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3141)* • **mean high water springs (MHWS):** the average height of the high waters of spring tides. Also called spring high water. (IHO Dictionary, S-32, 5th Edition, 3144) • **high water:** the highest level reached at a place by the water surface in one tidal cycle. Also called high tide. *(IHO Dictionary, S-32, 5th Edition, 2251)* • **approximate mean sea level:** an arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* • **high water springs:** an arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* • **mean higher high water (MHHW):** the average height of higher high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3140)* • **equinoctial spring low water:** the level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **lowest astronomical tide (LAT):** the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(IHO Dictionary, S-32, 5th Edition, 2936)* • **local datum:** an arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **International Great Lakes Datum 1985 (IGLD 1985):** A vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(AML)*	• **highest astronomical tide (HAT) :** the highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. (Adapted from Admiralty Tide Tables.) • **mean water level:** the average of all hourly water levels over the available period of record. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **lower low water large tide (LLWLT):** the average of the lowest low waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **higher high water large tide (HHWLT):** the average of the highest high waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **nearly highest high water:** an arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **mean tide level (MTL) :** the level mid-way between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. *(UKHO Tidal Branch.)*
Source Agency	The agency responsible for the production of the source. *(AML)*	Coded string separated from associated values by a comma.
Source Country	The country responsible for the production of the source. *(AML)*	Coded string separated from associated values by a comma.
Source Date	The date of issue of the source information, if applicable. *(AML)*	Coded string separated from associated values by a comma.
Source ID	Any ID of the source (e.g. chart number). *(AML)*	Coded string separated from associated values by a comma.
Source Scale	The scale at which the source data has been compiled. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Integer.

Attribute	Definition	Values
Source Type	The type of the source (e.g. chart or report). *(AML)*	Coded string separated from associated values by a comma.
Spudded Date	The date on which a new well is spudded, meaning to start drilling a new borehole. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)*	**Indication:** CCYYMMDD The "spudded date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Status	Indicates the condition of the object in terms of permanency or usage. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **not in use:** no longer used for the purpose intended; disused. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock; Wreck. • **historic:** famous in history; of historic interest. *(The Concise Oxford Dictionary, 7th Edition)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock. • **existence doubtful:** an object that has been reported but has not been definitely determined to exist. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **dead:** not detected by repeated surveys, leading to doubts about the object's existence. *(AML)* • **lifted:** an object that has been salvaged or removed. *(AML)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock. • **mass grave:** where a significant number of persons have perished as a direct result of a vessel or structure sinking and their remains cannot be recovered, the wreck and immediate area may be declared as a Mass Grave or more specifically, a War Grave. Such sites are protected from disturbance by International Law. *(AML)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly, Underwater/Awash Rock

Attribute	Definition	Values
Status *(continued)*	Indicates the condition of the object in terms of permanency or usage. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **production:** a borehole that is actively engaged in the extraction of oil or gas from the seabed. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock; Wreck. • **exploration:** a borehole drilled in the search for a new source of oil or gas. *(An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock; Wreck. • **suspended:** a well where the extraction of oil or gas has been temporarily abandoned. When suspended, a well is either plugged (filled with concrete and topped with a steel plate) or capped (well-head equipment is installed over the well). *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock; Wreck. • **injection:** a borehole drilled for the purpose of injecting a secondary substance, for example water, into the pore spaces in a reservoir rock to encourage oil or gas to flow into adjacent producing wells. *(An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly; Underwater/Awash Rock; Wreck. • **unspecified:** the status of the object is unspecified. *(AML)*
Strength of Magnetic Anomaly	Indication of the strength of the magnetic anomaly caused by the contact. *(AML)*	• **nil:** the object generates no magnetic anomaly. *(AML)* • **slight:** the object generates a slight magnetic anomaly. *(AML)* • **moderate:** the object generates a moderate magnetic anomaly. *(AML)* • **strong:** the object generates a strong magnetic anomaly. *(AML)*

Attribute	Definition	Values
Supporting Textual Information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute. *(AML)*	Text string.
Supporting Textual Information (in national language characters)	Supporting (free text) information in national language characters relevant to the object that cannot be explicitly encoded by any other attribute *(AML)*	Text string.
Surface Composition	The general nature of the material of which the land surface or the sea bed is composed. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **mud:** soft, wet earth. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **clay:** (particles of less than 0.002 mm); stiff, sticky earth that becomes hard when baked. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **silt:** (particles of 0.002 – 0.0625 mm); when dried on hand will rub off easily. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **sand:** (particles of 0.0625 – 2.0 mm); tiny grains of crushed or worn rock. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **stone:** a general term for rock fragments ranging in size from pebbles and gravel to boulders or a large rock mass. *(IHO Dictionary, S-32, 5th Edition, 5059)* • **gravel:** (particles of 2.0 – 4.0 mm); small stones with coarse sand. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **pebbles:** (particles of 4.0 – 64.0 mm); small stones made small and round by being rolled in water. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock.

Attribute	Definition	Values
Surface Composition *(continued)*	The general nature of the material of which the land surface or the sea bed is composed. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **cobbles:** (particles of 64.0 - 256.0 mm); stones worn round and smooth by water and used for paving. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Underwater/Awash Rock. • **rock:** any formation of natural origin that constitutes an integral part of the lithosphere. The natural occurring material that forms firm, hard, and solid masses. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4415)* • **lava:** the fluid or semi-fluid matter flowing from a volcano. The substance that results from the cooling of the molten rock. Part of the ocean bed is composed of lava. *(IHO Dictionary, S-32, 5th Edition, 2680)* • **coral:** hard calcareous skeletons of many tribes of marine polyps. *(IHO Dictionary, S-32, 5th Edition, 1061)* • **shells:** exoskeletons of various water dwelling animals. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4680)* **Note:** not allowable for object Underwater/Awash Rock. • **boulder:** a rounded rock with diameter of 256 mm or larger. *(Adapted from IHO Dictionary, S-32, 5th Edition, 527)*
Surface Composition - qualifying terms	Physical characteristics of the natural surface composition in terms of their size, morphology and consistency. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **fine:** falls within the smallest size continuum for a particular nature of surface term. *(M-4 425.6)* **Note:** not allowable for object Underwater/Awash Rock. • **medium:** falls within the moderate size continuum for a particular nature of surface term. *(M-4 425.6)* **Note:** not allowable for object Underwater/Awash Rock. • **coarse:** falls within the largest size continuum for a particular nature of surface term. *(M-4 425.6)* **Note:** not allowable for object Underwater/Awash Rock. • **broken:** Fractured or in pieces. *(Adapted from Webster's II New Riverside Dictionary, 1984)* **Note:** not allowable for object Underwater/Awash Rock.

Attribute	Definition	Values
Surface Composition - qualifying terms	Physical characteristics of the natural surface composition in terms of their size, morphology and consistency. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **sticky:** having an adhesive or glue like property. *(Adapted from Webster's II New Riverside Dictionary, 1984)* **Note:** not allowable for object Underwater/Awash Rock. • **soft:** not hard or firm. *(Adapted from Webster's II New Riverside Dictionary, 1984)* **Note:** not allowable for object Underwater/Awash Rock. • **stiff:** not pliant; thick, resistant to flow. *(Adapted from Webster's II New Riverside Dictionary, 1984)* **Note:** not allowable for object Underwater/Awash Rock. • **volcanic:** composed of or containing material ejected from a volcano. *(Adapted from Webster's II New Riverside Dictionary, 1984)* • **calcareous:** composed of or containing calcium or calcium carbonate. *(IHO Dictionary, S-32, 5th Edition, 603)* • **hard:** firm; usually refers to an area of the sea floor not covered by unconsolidated sediment. *(IHO Dictionary, S-32, 5th Edition, 2194 and adapted from Webster's II New Riverside Dictionary, 1984)*
Suspension Date	The date on which a well is suspended, meaning it has been temporarily abandoned. *(Adapted from An A-Z of Offshore Oil & Gas by Harry Whitehead, 2nd Ed, 1983, Gulf Publishing Company)*	**Indication:** CCYYMMDD The "suspension date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Technique of Sounding Measurement	Indicates the method or equipment used to obtain the object's depth. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **found by echo-sounder:** the depth was determined by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultrasonic signal and return of its echo from the bottom. *(Adapted from IHO Dictionary, S-32, 1547)* • **found by side-scan sonar:** The depth was computed from a record produced by active sonar in which fixed acoustic beams are directed into the water perpendicularly to the direction of travel to scan the bottom and generate a record of the bottom configuration. *(Adapted from IHO Dictionary, S-32, 4710)*

Attribute	Definition	Values
Technique of Sounding Measurement *(continued)*	Indicates the method or equipment used to obtain the object's depth. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **found by multi-beam:** the depth was determined by using a wide swath echo sounder that uses multiple beams to measure depths directly below and transverse to the ship's track. *(Adapted from IHO Dictionary, S-32, 3339)* • **found by diver:** the depth was determined by a person skilled in the practice of diving. *(Adapted from IHO Dictionary, S-32, 1422)* **Note:** not allowable for object Sensor Anomaly. • **found by lead line:** the depth was determined by using a line, graduated with attached marks and fastened to a sounding lead. *(Adapted from IHO Dictionary, S-32, 2698)* **Note:** not allowable for object Sensor Anomaly. • **swept by wire-drag:** the given area was determined to be free from navigational dangers to a certain depth by towing a buoyed wire at the desired depth by two launches, or a least depth was identified using the same technique. *(Adapted from IHO Dictionary, S-32, 5248, 6013)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly. • **found by laser:** the depth was determined by using an instrument that measures distance by emitting timed pulses of laser light and measuring the time between emission and reception of the reflected pulses. *(Adapted from IHO Dictionary, S-32, 2763)* • **swept by vertical acoustic system:** the given area has been swept using a system comprised of multiple echo sounder transducers attached to booms deployed from the survey vessel. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Impact Scour.

Attribute	Definition	Values
Technique of Sounding Measurement *(continued)*	Indicates the method or equipment used to obtain the object's depth. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **found by electromagnetic sensor:** the depth was determined by using an instrument that compares electromagnetic signals. *(Adapted from IHO Dictionary, S-32, 1571)* • **photogrammetry:** the depth was determined by applying mathematical techniques to photographs. *(Adapted from IHO Dictionary, S-32, 3791)* **Note:** not allowable for object Sensor Anomaly. • **satellite imagery:** the depth was determined by using instruments placed aboard an artificial satellite. *(Adapted from IHO Dictionary, S-32, 4509)* **Note:** not allowable for object Sensor Anomaly. • **found by levelling:** the depth was determined by using levelling techniques to find the elevation of the point relative to a datum. *(Adapted from IHO Dictionary, S-32, 2741)* **Note:** not allowable for object Sensor Anomaly. • **swept by side-scan-sonar:** the given area was determined to be free from navigational dangers to a certain depth by towing a side-scan-sonar. *(Adapted from IHO Dictionary, S-32, 5248, 4710)* **Note:** not allowable for objects Impact Scour. • **computer generated:** the sounding was determined from a bottom model constructed using a computer. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for object Sensor Anomaly.
Text File Reference	The file name relating to an external text file. *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Text String.
Text File Reference (in national language characters)	The file name (in national language characters) relating to an external text file *(Adapted from S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Text String.
Tonnage	The operational tonnage of the vessel. *(AML)*	Value: 0 - 999999 Units: tonnes Resolution: 1

Attribute	Definition	Values
Type of Tonnage	The method used to derive the operational tonnage of the vessel. *(AML)*	• **builders' measurement:** figure supplied by the builders of the vessel. *(AML)* • **displacement:** figure derived from the volume or weight of water displaced by a ship of equal weight. *(Webster's 3rd New International Dictionary).* • **gross:** tonnage of the vessel including cargo. *(AML)* • **net:** tonnage of the vessel excluding cargo. *(AML)* • **not applicable:** the tonnage of the vessel is unknown, therefore the method of measurement cannot be given. *(AML)*
Type of Wreck	An indication of the type and/or usage of the vessel before it became a wreck. *(AML)*	• **steam ship:** a vessel driven by water in the form of gas or vapour. *(Adapted from Chambers Concise Dictionary)* • **motor vessel:** a craft or structure for transport by water, driven by an engine. *(Adapted from Chambers Concise Dictionary)* • **twin motor vessel:** a craft or structure for transport by water, driven by two engines. *(Adapted from Chambers Concise Dictionary)* • **diesel electric vessel:** a vessel driven by the electric current produced by a diesel-engined generator. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **turbo electric vessel:** a vessel using a form of electric drive in which turbine-driven generators supply electric power to motors coupled to the propeller. *(Adapted from Chambers Concise Dictionary)* • **gas turbine vessel:** a vessel driven by a rotary motor in which a wheel or drum with curved vanes is driven by expanding hot air admitted to it and allowed to escape. *(Adapted from Chambers Concise Dictionary)* • **merchant vessel:** vessel operated by a merchant marine organisation, engaged in the transport of goods for payment. *(AML)* • **fishing vessel:** a vessel engaged in harvesting fish or other products from the sea for commercial gain. *(Partly adapted from Webster's 3rd New International Dictionary)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and / or usage of the vessel before it became a wreck. *(AML)*	• **military vessel:** a vessel used by a countries armed forces, sometimes engaged in the pursuit of warfare. *(AML)* • **coaster:** a ship that travels along the coast from port to port. *(Concise Oxford Dictionary 9th Edition)* • **inshore vessel:** a vessel that operates close to the shore. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **sailing vessel:** a vessel driven by sails, being pieces of material (originally canvas, now usually nylon etc.) extended on rigging to catch the wind. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **tanker:** a vessel for carrying liquids in bulk, especially mineral oils. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **carrier:** in general, a vessel engaged in the transport of goods or passengers for payment. Specifically, a boat that takes the catch from a fishing fleet to market. *(Adapted from Webster's 3rd New International Dictionary)* • **bulk carrier:** a vessel designed to carry (large) quantities of cargo, such as grain, that is not in the form of separate packages. *(Adapted from Chambers Concise Dictionary)* • **container ship:** a ship designed to carry goods stored in containers. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **freighter:** a vessel carrying cargo. *(Adapted from Chambers Concise Dictionary)* • **East Indiaman:** a large ship engaged in trade with the East Indies. *(Concise Oxford Dictionary 9th Edition)* • **liberty ship:** a prefabricated US-built freighter of the Second World War. *(Concise Oxford Dictionary 9th Edition)* • **smack:** a single-masted sailing boat for coasting or fishing. *(Concise Oxford Dictionary 9th Edition)* • **drifter:** a boat used for drift-net fishing. *(Concise Oxford Dictionary 9th Edition)* • **trawler:** a vessel that fishes by dragging an open-mouthed bag-net along the sea-bed. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and / or usage of the vessel before it became a wreck. *(AML)*	• **stern trawler:** a fishing vessel that drags its trawl from the rear of the vessel. *(AML)* • **beam trawler:** a fishing vessel equipped with a trawl net with its mouth held apart by a beam. *(Adapted from Webster's 3rd New International Dictionary)* • **factory ship:** a fishing vessel with facilities for immediate processing of the catch. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **tug:** a small powerful boat for towing larger boats and ships. *(Concise Oxford Dictionary 9th Edition)* • **ocean tug:** a small powerful boat for towing larger boats and ships that can operate in ocean conditions. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **supply vessel:** a vessel carrying provisions and/or equipment. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **lighter:** a boat, usually flat-bottomed, for transferring goods from a ship to a wharf or another ship. *(Concise Oxford Dictionary 9th Edition)* • **tender:** a vessel attending a larger one to supply stores, convey passengers or orders, etc. *(Concise Oxford Dictionary 9th Edition)* • **barge:** a usually flat bottomed boat, used principally in harbours and inland waterways though is often seagoing, for the transport of goods or sometimes passengers and usually propelled by towing. *(Webster's 3rd New International Dictionary)* • **derrick/lifting barge:** a barge upon which is mounted a mechanism for hoisting materials by a boom hung from a central post. *(Adapted from Chambers Concise Dictionary)* • **mobile crane:** a machine for moving heavy objects, usually by suspending them from a projecting arm or beam, mounted on a floating platform. *(Adapted from Concise Oxford Dictionary 9th Edition)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and/or usage of the vessel before it became a wreck. *(AML)*	• **drill vessel/rig***:* a floating offshore vessel or platform supporting the complete apparatus and structure required for drilling an oil or gas well. *(Adapted from Chambers Concise Dictionary)* • **collier:** a vessel that carries coal. *(Adapted from Chambers Concise Dictionary)* • **sloop:** a small one-masted fore-and-aft rigged vessel with mainsail and jib. *(Concise Oxford Dictionary 9th Edition)* • **brigantine:** a two-masted sailing ship with a square-rigged foremast and a fore-and-aft-rigged mainmast. *(Concise Oxford Dictionary 9th Edition)* • **ketch:** a two-masted fore-and-aft rigged sailing boat with a mizzen-mast stepped forward of the rudder and smaller than its foremast. *(Concise Oxford Dictionary 9th Edition)* • **cutter:** a small fast sailing ship or a small boat carried by a large ship. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **schooner:** a fore-and-aft rigged ship with two or more masts, the foremast being smaller than the other masts. *(Concise Oxford Dictionary 9th Edition)* • **dredger:** a vessel equipped for extracting underwater sediment by means of a bucket or suction, to deepen a harbour, canal or river. *(Adapted from Chambers Concise Dictionary)* • **barque:** a small square sterned ship without head rails. Technically a three masted vessel whose mizzen mast is fore and aft rigged. *(Chambers Concise Dictionary)* • **yacht:** a light sailing vessel, especially equipped for racing or a larger, usually power-driven vessel equipped for cruising. *(Concise Oxford Dictionary 9th Edition)* • **junk:** a Chinese flat bottomed sailing vessel, with high forecastle and poop, sometimes large and three masted. *(Chambers Concise Dictionary)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and/or usage of the vessel before it became a wreck. *(AML)*	• **mailboat:** a vessel carrying letters and parcels. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **ferry:** a vessel for conveying passengers and goods, especially as a regular service. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **hovercraft:** a craft that travels over water on a cushion of air provided by a downward blast. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **hydrofoil:** a boat equipped with a device consisting of planes for lifting its hull out of the water to increase its speed. *(Concise Oxford Dictionary 9th Edition)* • **roll on-roll off:** a vessel on which vehicles are driven directly on at the start of the voyage and off at the end of it. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **non propelled roll on-roll off:** a vessel with no means of self-propulsion on which vehicles are driven directly on at the start of the voyage and off at the end of it. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **liner:** a ship carrying passengers on a regular line. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **cruiser (merchant):** a vessel used to sail about from port to port as distinguished from voyaging to a set destination. *(Webster's 3rd New International Dictionary)* • **cabin cruiser:** a large motor boat with living accommodation. *(Concise Oxford Dictionary 9th Edition)* • **catamaran:** a boat with twin hulls in parallel. *(Concise Oxford Dictionary 9th Edition)* • **pinnace:** a warship's or other ship's small boat, usually motor-driven, originally schooner-rigged or eight-oared. *(Concise Oxford Dictionary 9th Edition)* • **launch:** a large motor boat, used especially for pleasure. *(Concise Oxford Dictionary 9th Edition)* • **pleasure craft:** a boat used for pleasure or amusement. *(Chambers Concise Dictionary)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and / or usage of the vessel before it became a wreck. *(AML)*	• **speed boat:** a motor boat designed for high speed. *(Concise Oxford Dictionary 9th Edition)* • **dinghy:** a small open boat, propelled by oars, sails or an outboard motor. *(Chambers Concise Dictionary)* • **ship's lifeboat:** a ship's small boat for use in emergency. *(Concise Oxford Dictionary 9th Edition)* • **rescue boat:** a vessel used for the purpose of saving people from danger. *(AML)* • **pilot boat:** a vessel used by a person qualified to take charge of a ship entering or leaving harbour. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **boarding vessel:** generally, a vessel used to convey passengers to another vessel for embarkation. Specifically, used by a military force to enter a ship for the purposes of providing information or inspection of the ship, its crew or contents.*(AML)* • **auxiliary vessel**: a vessel functioning in a subsidiary capacity; supplementary. In naval terms, not a fighting ship. *(Webster's 3rd New International Dictionary)* • **light ship:** a distinctively marked vessel anchored or moored at a charted point, to serve as an aid to navigation. *(IHO Dictionary, S-32, 5th Edition, 2828)* • **ice breaker:** a vessel specially strengthened for the specific purpose of breaking ice to facilitate passage. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **salvage vessel:** a vessel used in the business of raising sunken or wrecked ships or their contents. *(Adapted from Chambers Concise Dictionary)* • **exploration vessel:** a vessel engaged in visiting undiscovered or un-investigated territory, especially to get scientific information. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **research vessel:** a vessel engaged in the business of conducting investigation into the sea and its environs to increase the sum of knowledge. *(Adapted from Chambers Concise Dictionary)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and/or usage of the vessel before it became a wreck. *(AML)*	• **survey vessel:** a ship or vessel specially equipped for carrying out hydrographic and/or oceanographic surveys. *(IHO Dictionary, S-32, 5th Edition, 5235)* • **hospital ship:** a ship fitted out exclusively for the treatment and transport of the sick and wounded. *(Chambers Concise Dictionary)* • **hulk:** the body of a dismantled ship, used as a store vessel etc. *(Concise Oxford Dictionary 9th Edition)* • **ancient military vessel:** a vessel from long ago used by an armed force. *(AML)* • **ancient merchant vessel:** a vessel from long ago engaged in the transport of goods for payment. *(AML)* • **aircraft:** a machine capable of flight, especially an aeroplane or helicopter. *(Concise Oxford Dictionary 9th Edition)* • **helicopter:** a type of aircraft obtaining lift and propulsion from horizontally revolving overhead blades or rotors, and capable of moving vertically and horizontally. *(Concise Oxford Dictionary 9th Edition)* • **coast guard vessel:** a vessel used by a military or naval force to guard a coastline and specified area of water and to police the regulations, safety, order and effective operation of marine traffic in its jurisdiction. *(Adapted from Webster's 3rd New International Dictionary)* • **battleship:** the largest and most heavily armoured class of warship, having at least 10 inches of armour and carrying a main battery of 12 inch guns or larger. *(Webster's 3rd New International Dictionary)* • **dreadnought battleship:** a type of battleship greatly superior in armament to all its predecessors (from the name of the first, launched in 1906). *(Concise Oxford Dictionary 9th Edition)* • **battlecruiser:** a heavy-gunned ship faster and more lightly armoured than a battleship. *(Concise Oxford Dictionary 9th Edition)* • **aircraft carrier:** a warship that carries and serves as a base for aeroplanes. *(Concise Oxford Dictionary 9th Edition)* • **cruiser (military):** a warship of high speed and medium armament. *(Concise Oxford Dictionary 9th Edition)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and / or usage of the vessel before it became a wreck. *(AML)*	• **heavy cruiser:** large naval cruiser whose principal armament usually consists of 8" guns. *(Webster's 3rd New International Dictionary)* • **light cruiser:** large naval cruiser whose principal armament usually consists of 6" guns. *(Webster's 3rd New International Dictionary)* • **corvette:** a small naval escort vessel. *(Concise Oxford Dictionary 9th Edition)* • **destroyer:** a fast warship with guns and torpedoes used to protect other ships. *(Concise Oxford Dictionary 9th Edition)* • **frigate:** a naval escort vessel between a corvette and a destroyer in size. *(Concise Oxford Dictionary 9th Edition)* • **submarine hunter / chaser:** vessel used for the detection and pursuit of submarines. *(AML)* • **minesweeper:** a ship for clearing away floating and submarine mines. *(Concise Oxford Dictionary 9th Edition)* • **minelayer:** a ship or aircraft for laying mines. *(Concise Oxford Dictionary 9th Edition)* • **torpedo boat:** a small, fast and lightly armed warship for carrying or discharging torpedoes. *(Concise Oxford Dictionary 9th Edition)* • **patrol boat:** a vessel which moves systematically around an area for the purposes of watching, repressing, protecting, inspecting etc. *(Chambers Concise Dictionary)* • **gunboat:** a small vessel of light draught fitted to carry one or more guns. *(Chambers Concise Dictionary)* • **small defence vessel:** a small vessel used for military purposes. *(AML)* • **armed vessel:** vessel carrying weapons. *(AML)* • **escort vessel:** vessel accompanying another vessel for security or protection. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **transport vessel:** ship used to carry troops, stores, etc. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **landing craft:** any of several types of craft especially designed for putting troops and equipment ashore. *(Concise Oxford Dictionary 9th Edition)*

Attribute	Definition	Values
Type of Wreck *(continued)*	An indication of the type and / or usage of the vessel before it became a wreck. *(AML)*	• **blockship:** a ship used to block a channel. *(Concise Oxford Dictionary 9th Edition)* • **bombardon:** floating breakwater used to make a man-made harbour. *(AML)* • **landing stage:** a platform, often floating, on which goods and passengers are disembarked. *(Concise Oxford Dictionary 9th Edition)* • **mulberry unit:** concrete caisson used to make a man-made harbour *(AML)* • **anti-submarine barrier:** a man-made obstacle that bars advance or access to submarines. *(Adapted from Concise Oxford Dictionary 9th Edition)* • **target:** an object, normally an obsolete vessel, providing a mark to shoot at for practice; an object to aim at. *(Adapted from Chambers Concise Dictionary)* • **submarine:** a vessel, especially a warship, capable of operating under water and usually equipped with torpedoes, missiles, and a periscope. *(Concise Oxford Dictionary 9th Edition)* • **unknown:** the type of wreck is unknown or unreported. *(AML)* • **other:** the wreck is not of a type defined in the preceding list. *(AML)* • **victory ship:** general term applied to vessels of the Second World War, built under the direction of the US War Shipping Administration. *(AML)* • **trimaran:** a boat with three hulls in parallel. *(Adapted from Concise Oxford Dictionary 9th Edition)*
Underwater Reference Mark	Indication that the contact can be used as a reference mark to confirm the vessel's position. *(AML)*	• **yes:** the contact is suitable as an underwater reference mark. *(AML)* • **no:** the contact is not suitable as an underwater reference mark. *(AML)*
Vertical Datum	Indicates the datum to which both heights and soundings are referred. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **mean low water springs (MLWS):** the average height of the low waters of spring tides. Also called spring low water. *(IHO Dictionary, S-32, 5th Edition, 3150)* • **mean lower low water springs (MLLWS):** the average height of lower low water springs at a place. *(IHO Dictionary, S-32, 5th Edition, 3146)*

Attribute	Definition	Values
Vertical Datum *(continued)*	Indicates the datum to which both heights and soundings are referred. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **mean sea level (MSL):** the average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. *(IHO Dictionary, S-32, 5th Edition, 3156)* • **lowest low water:** an arbitrary level conforming to the lowest tide observed at a place, or some what lower. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **mean low water (MLW):** the average height of all low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3147)* • **lowest low water springs:** an arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. *(Hydrographic Service, Royal Australian Navy)* • **approximate mean low water springs:** an arbitrary level, usually within ± 0.3m from that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* • **Indian spring low water (ISLW):** an arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian Tidal Plane. *(IHO Dictionary, S-32, 5th Edition, 2427)* • **low water springs:** an arbitrary level, approximating that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* • **approximate lowest astronomical tide:** an arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(Hydrographic Service, Royal Australian Navy)* • **nearly lowest low water:** an arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian Spring Low Water (ISLW). *(Hydrographic Service, Royal Australian Navy)* • **mean lower low water (MLLW):** the average height of the lower low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3145)*

Attribute	Definition	Values
Vertical Datum *(continued)*	Indicates the datum to which both heights are referred. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **low water:** an approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **approximate mean low water:** an arbitrary level, usually within ± 0.3m from that of Mean Low Water (MLW). *(Hydrographic Service, Royal Australian Navy)* • **approximate mean lower low water:** an arbitrary level, usually within ± 0.3m from that of Mean Lower Low Water (MLLW). *(Hydrographic Service, Royal Australian Navy)* • **mean high water (MHW):** the average height of all high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3141)* • **mean high water springs (MHWS):** the average height of the high waters of spring tides. Also called spring high water. (IHO Dictionary, S-32, 5th Edition, 3144) • **high water:** the highest level reached at a place by the water surface in one tidal cycle. Also called high tide. *(IHO Dictionary, S-32, 5th Edition, 2251)* • **approximate mean sea level:** an arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* • **high water springs:** an arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* • **mean higher high water (MHHW):** the average height of higher high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3140)* • **equinoctial spring low water:** the level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **lowest astronomical tide (LAT):** the lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(IHO Dictionary, S-32, 5th Edition, 2936)*

Attribute	Definition	Values
Vertical Datum *(continued)*	Indicates the datum to which both heights and soundings are referred. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **local datum:** an arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **International Great Lakes Datum 1985 (IGLD 1985):** a vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **mean water level:** the average of all hourly water levels over the available period of record. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **lower low water large tide (LLWLT):** the average of the lowest low waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **higher high water large tide (HHWLT):** the average of the highest high waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **nearly highest high water:** an arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **highest astronomical tide (HAT) :** the highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(Adapted from Admiralty Tide Tables.)* • **mean tide level (MTL) :** the level mid-way between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. *(UKHO Tidal Branch.)*
Vertical Length	The effective vertical length of an object, measured from the highest (lowest) point of the object to either the seabed or the ground (if fixed), or the water level (if floating). *(AML)*	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1

Attribute	Definition	Values
Water Level Effect	Indicates the effect of the surrounding water on the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **partly submerged at high water:** partially covered and partially dry at high water. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly: Underwater/awash Rock. • **always dry:** not covered at high water under normal meteorological conditions. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly: Underwater/awash Rock. • **always under water / submerged:** remains covered by water at all times under average meteorological conditions. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **covers and uncovers:** expression intended to indicate an area of a reef or other projection from the bottom of a body of water which periodically extends above and is submerged below the surface. Also referred to as dries or uncovers. *(IHO Dictionary, S-32, 5th Edition, 1111)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly. • **awash:** flush with, or washed by the waves at low water under average meteorological conditions. *(Adapted from IHO Dictionary, S-32, 5th Edition, 308)* **Note:** not allowable for objects Impact Scour; Sensor Anomaly.

5.5.4 Relationships Between Features

5.5.4.1 Feature Dependency

The following table lists the parent-child relationships that exist in AML Large Bottom Objects.

Parent Feature Class	Child Feature Class
N/A	N/A

5.5.4.2 Feature Association

There are no feature classes in AML Large Bottom Objects which have an association (i.e. not dependent but linked to provide additional information) with other feature classes.

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6 DATA CAPTURE GUIDELINES

The “AML Large Bottom Objects Guidance on Feature Coding and Attribution” provides guidance on the conventions that are to be used to encode features, their geometry, and associated attribution, using a relevant implementation standard.

The content of the AML Large Bottom Objects product is at the discretion of the producing authority, provided that the conventions described in the “AML Large Bottom Objects Guidance on Feature Coding and Attribution” are followed.

6.1 CONTINUITY

Features crossing the boundaries of digital source files or other media should be continuous whenever possible. Datasets consisting of multiple digital source files should also aim to be contiguous for consistency of display.

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7 DATA PRESENTATION

7.1 SCOPE

The way in which AML Large Bottom Objects is displayed is dependent upon an individual customer's requirement. How their systems are developed to display AML Large Bottom Objects data will largely be governed by the:

- Environment in which the data is to be viewed.
- The types of products that are to be displayed with the AML product.

This Product Specification is designed to support the production and supply of Large Bottom Objects. It does not address data presentation.

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8 PROVISION OF DATA

8.1 GENERAL

8.1.1 File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

ANNEX A	A.1.1.5

8.1.2 Auxiliary Information

All media containing AML products will contain cataloguing information regarding the coverage of the products contained within it. A complete AML catalogue is planned for future development.

8.2 DISTRIBUTION MEDIA

AML is available in the following format:

- **CD-ROM**

Other approved means of distribution will be promulgated in due course. While data must be available to users on standard media, other media / transmission means may be agreed directly between producers and recipients.

8.3 VOLUME NAMING

AML volumes (defined as packages) may contain several datasets, each from a different product specification. The volume naming convention for AML 'Packages' is not defined by AML Product Specifications.

8.4 FILE NAMING

CD-ROM AML file naming conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

8.5 DIRECTORY STRUCTURE

CD-ROM The directory structure conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange.

8.6 ERROR DETECTION

Datasets will undergo file integrity checks that are dependent upon the exchange standard implemented.

ANNEX A	A.1.1.9

8.7 COMPRESSION

AML products do not use compression techniques.

8.8 ENCRYPTION

All AML products are unencrypted, irrespective of security classification.

8.9 HARDWARE AND SOFTWARE REQUIREMENTS

Not applicable.

9 TESTING METHOD

This product specification has been designed to achieve interoperability of AML data products and other digital data products. This is achieved by the separation of the data dictionary from the standard used to encode the data and by the use of internationally recognised standards for the transfer of the data..

It is the responsibility of the data producer to ensure that AML data products fully conform to this Product Specification and to the chosen transfer standard.

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ANNEX A S-57 IMPLEMENTATION OF LARGE BOTTOM OBJECTS PRODUCT SPECIFICATION

A.1 AML S-57 FORMAT TABLE AND FILE STRUCTURE

A.1.1 GENERAL INFORMATION

The binary implementation of S-57 must be used for AML Large Bottom Objects using the Chain-Node vector model described in S-57, part 2, Theoretical Data Model.

The application profiles define the structure and content of the catalogue file and data set files in an exchange set.

A.1.1.1 Cells

In order to facilitate the efficient processing of AML data the geographic coverage of a given usage must be split into cells. Each cell of data must be contained in a physically separate, uniquely identified file on the transfer medium, known as a data set file (see Sections A.1.1.6 and A.1.1.7.3 of this Annex).

Cells must be rectangular (i.e. defined by 2 meridians and 2 parallels). It is recommended that the geographic extent of the cell be chosen by the AML producer to ensure that the resulting data set file contains no more than 5 Megabytes of data. Subject to this consideration, the cell size must not be too small in order to avoid the creation of an excessive number of cells.

The co-ordinates of the borders of the cell are encoded in decimal degrees in the catalogue file.

The area within the cell which contains data must be indicated by a meta object M_COVR with CATCOV = 1 (see Section A.2.3.1 of this Annex). Any other area not containing data must be indicated by a meta object M_COVR with CATCOV = 2.

Cells of the same scale band (see Section 2.3 of the Product Specification) may overlap. However, data within the cells must not overlap unless the cells are of different security classifications (see Section 1.4.2 or the Product Specification).

Point feature objects which are at the border of two cells with the same intended usage must be part of only one cell. They are put in the south or west cell (i.e. the north and east borders of a cell are part of the cell, whereas the south and west borders are not).

When a feature object exists in several cells its geometry must be split at the cell boundaries and its complete attribute description must be repeated in each cell.

A.1.1.2 Geometry

Edges must be encoded using SG2D fields.

In certain circumstances, the symbolisation of an edge may need to be suppressed. This is done using the value {1} in the “Masking Indicator” [MASK] subfield of the “Feature Record to Spatial Record Pointer” [FSPT] field. If the value in the “Usage Indicator” [USAG] subfield is set to {3} (exterior boundary truncated by the data limit), the MASK subfield must be set to {255} (null).

A.1.1.3 Groups

The group (GRUP) sub-field is not used for AML products and the value must be set to {255}null.

A.1.1.4 Language and Alphabet

A.1.1.4.1 Language

The exchange language must be English. Other languages may be used as a supplementary option.

In general this means that, when a national language is used in textual national attributes (NINFOM and NOBJNM), the English translation must exist in the international attributes (INFORM and OBJNAM). However, national geographic names do not need to be translated in the international attributes, they may be left in their original national language form or may be transliterated or transcribed.

A.1.1.4.2 Use of Lexical Level 2

If the national language cannot be expressed in lexical levels 0 or 1, the following rules apply:

- The exact spelling in the national language is encoded in the "National Attributes" [NATF] field (see Sections A.1.2.7.3.4 and A.1.2.8.3.4 of this Annex) using lexical level 2.
- Translated text, including transliterated or transcribed national geographic names is encoded in the "International Attributes" [ATTF] field (see Sections A.1.2.7.3.3 and A.1.2.8.3.3 of this Annex) using lexical level 0 or 1.

Where possible, international standards should be used for the transliteration of non-Latin alphabets.

A.1.1.5 Exchange Set

The AML Large Bottom Objects implements the international standard ISO/IEC 8211 as a means of encapsulating S-57 structured data. The ISO/IEC 8211 standard provides a file based mechanism for the transfer of data from one computer system to another, independent of make. In addition, it is independent of the medium used to establish such a transfer. It permits the transfer of data and the description of how such data is organised.

For a summary of the S-57 implementation of ISO/IEC 8211, refer to S-57 - Part 3: Annex A.

A.1.1.5.1 Content of the Exchange Set

An exchange set is composed of one and only one catalogue file and at least one data set file. Additional files can also be included in the AML exchange set. These files may be included to provide additional information within an AML product, e.g. beach intelligence information in the case of the Environment, Seabed and Beach (ESB) product.

An exchange set may also contain an optional README file.

Exchange set

|
|--<1>-- README file (see Section A.1.1.7.1 of this Annex)
|
|--<1>-- Catalogue file (see Section A.1.2.6 of this Annex)
|
|--<R>-- Data set file (see Section A.1.1.6 of this Annex)
|
|--<R>-- Text file (see Section A.1.1.7.4 of this Annex)
|
|--<R>-- Picture file (see Section A.1.1.7.4 of this Annex)

In the tables in Sections A.1.1.5.1.1 and A.1.1.5.1.2 below, all files contained in an Exchange Set (shown in the File Type columns) must be in the formats given in column two of the tables (File Format/Extension). The IMPL subfield values, defined in AML Product Specifications, for the Catalogue Directory field (CATD) are given in the third column (Subfield Value).

A.1.1.5.1.1 Mandatory Exchange Set File Types

The table below provides details of the file types and formats that are mandatory in an AML Exchange Set.

File Type	Implementation	Subfield Value
Catalogue	ASCII	ASC
Data Set	Binary	BIN

A.1.1.5.1.2 Additional Exchange Set File Types

The table below provides examples of the file contents and formats that may be included within an AML Exchange Set.

File Type	File Format / Extension	Subfield Value
Text	TXT	TXT
Picture	TIFF	TIF
Document	PDF	PDF
Document	HTML	HTM
Photo	JPEG	JPG
Video	AVI	AVI
Video	MPEG	MPG

A.1.1.5.2 Exchange Set Naming

All AML products will follow the exchange set naming convention specified in this section.

Format

XXLbcDDD

Where

XX = The two-letter NATO country code of the producer (NATO STANAG 1059).

L = The first character of the three-letter AML product identifier.

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)

b = Identifies whether the exchange set is a base or update exchange set.

B – Base. A base exchange set may contain original base cells, new editions and re-issues. All three are base cell files as defined in Section NO TAGNO TAG of this Annex.

U – Update. An update exchange set will contain update cell files as defined in Section A.1.2.8 of this Annex, but may also contain new editions and new base cells.

c = The security classification code:

N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

DDD = The mandatory alphanumeric geographic area identification code. Codes for use in AML are product specific have yet to be defined. Update exchange sets may not require geographical identification in which case this field will be populated with XXX.

A.1.1.5.3 Directory Structure

The following is an example directory structure for an AML Large Bottom Objects exchange set in MS-DOS format.

Directory of D:\UKLBUDDD

	<DIR>		09-15-96	12:40p
	<DIR>		09-15-96	12:40p
CATALOG[4]	031	1,584	09-15-96	12:46p CATALOG.031
UKL0U123[1]000		45,584	09-15-96	12:50p UKL0U123.000[3]
UKL0U123[1]001		1,095	09-15-96	12:54p UKL0U123.001
UKL0U123[1]002		1,722	09-15-96	12:54p UKL0U123.002
README[2]TXT		504	09-15-96	12:44p README.TXT
		5 file(s)	49,489 bytes	
		2 dir(s)	1,405,952 bytes free	

Notes:

1. UKL0c123 follows the file naming convention specified in Section A.1.1.7 of this Annex.

2. The Exchange set directory may also contain a general README file containing ASCII text.

3. For each file in the exchange set the catalogue file must contain the name of the volume on which it is held and the full path name relative to the exchange set directory in that volume. The full path name relative to the exchange set directory must be encoded in the FILE subfield of the “Catalogue Directory” [CATD] field. The LFIL subfield of the CATD field may be used for other purposes. The full path name of the UKUL0U123 file shown in the example is UKL0U123.000.

4. The catalogue file must be in the root directory of the exchange set.

A.1.1.6 Data Sets

For each individual AML product, four kinds of data sets may be produced:

- New data set: no AML data has previously been produced for this area for the same purpose, or, at the same security classification.
- Update: changing some information in an existing data set.
- Re-issue of a data set: including all the updates applied to the original data set up to the date of the re-issue. A re-issue does not contain any new information additional to that previously issued by updates.
- New edition of a data set: including new information which has not been previously distributed by updates.

Each new data set, re-issue, or new edition is called a base cell file.

A data set containing updates to one base cell file is called an update cell file.

A.1.1.7 File Naming

AML Large Bottom Objects will follow the file naming convention specified below.

Format

XXL0c123.eee

Where

XX = The two-letter NATO country code of the producer (NATO STANAG 1059)

L = The first character of the three-letter AML product identifier. As defined, the overall basic AML service would be made up of seven S-57 products:

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)

0 = 'Usage Band'. Values and scale ranges for AML. Potential values are given below .

0 - Non-Scaled Information only
1 - < 1:40,000,000
2 - 1: 10,000,000 - 1:62,500,000
3 - 1: 2,000,000 - 1:12,500,000
4 - 1:400,000 - 1: 2,500,000
5 - 1:100,000 - 1:625,000
6 - 1:20,000 - 1:125,000
7 - 1:4,000 - 1:25,000
8 - 1:1,000 - 1:6,250
9 - > 1:1,500

c = The security classification code:

N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

123 = Product specific identification. This is dependent upon the geographical partitioning of the product and has yet to be fully defined.

eee = Extension where 000 is base cell and 001, 002 etc are successive updates.

A.1.1.7.1 README File

The README file is an optional ASCII file of general information.

README.TXT is the mandatory name for this file.

A.1.1.7.2 Catalogue File

The catalogue file acts as the table of contents for the exchange set (see Section A.1.1.5.3 of this Annex).

The catalogue file of the exchange set must be named CATALOG.EEE.

Where EEE is the edition number of S-57 used for this exchange set, i.e. 031 for this edition (3.1). No other file may be named CATALOG.

A.1.1.7.3 Data Set File

Each data set file contains data for one cell (see section A.1.1.1 of this Annex). This includes:

- Data set descriptive information that is specific to the data set.
- The description and location of the real-world features.

A.1.1.7.4 Text and Picture Files

Text and picture files do not conform to ISO/IEC 8211 and are not described in the main body of S-57. These files are specific to this Product Specification (see Section 2.5.5 of the Product Specification and Section A.1.1.5.1.2 of this Annex).

A.1.1.8 Updating

In order to ensure that updates are incorporated in the correct sequence without any omission, the file extension and a number of subfields in the "Data Set Identification" [DSID] field are used in the following way:

file extension Every new data set, re-issue or new edition must have a "000" extension. For update cell files the extension is the number of the update, ranging from "001" to "999". These numbers must be used sequentially, without omission. Number "001" is the first update after a new data set or a new edition, but not after a re-issue. The update sequence is not interrupted by a re-issue. After a re-issue, subsequent updates may be incorporated into the display system created from this re-issue or to the display system created from the original data and kept continuously updated.

edition number When a data set is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. Edition number remains the same for a re-issue.

update number Update number 0 is assigned to a new data set. The first update cell file associated with this new data set must have update number 1. The update number must be increased by one for each consecutive update, until a new edition is released. The new edition must have update number 0. A re-issue of a data set must have the update number of the last update applied to the data set. In the case of an update cell file the file extension is the same as the update number.

update application date This date is only used for the base cell files (i.e. new data sets, re-issue, and new edition), not update cell files. All updates dated on or before this date must have been applied by the producer.

issue date Date on which the data was made available by the data producer.

The table in Section A.1.1.8.1 of this Annex gives examples of the way to manage the file extension, the "Edition Number" [EDTN], the "Update Number" [UPDN], the "Update Application Date" [UADT] and the "Issue Date" [ISDT] subfields.

A.1.1.8.1 File Extension and Sub-field Examples

Event	File extension	EDTN	UPDN	UADT	ISDT
New data set	.000	1	0	19950104	19950104
Update 1	.001	1	1	prohibited	19950121
Update 2	.002	1	2	prohibited	19950225
...					
Update 31	.031	1	31	prohibited	19950905
Re-issue of a data set	.000	1	31	19950905	19950910
Update 32	.032	1	32	prohibited	19951023
...					
Update 45	.045	1	45	prohibited	19951112
New edition	.000	2	0	19951201	19951201
Update 1 to edition 2	.001	2	1	prohibited	19960429
...					

This example table relates to the specifications given in S-52 Appendix 1, "Guidance on Updating the Electronic Navigational Chart", in the following way:

- The update information encoded in each individual cell file is called a sequential update.
- The collection of the update information encoded in the update cell files which have been issued since the last new data set, the last re-issue of a data set or since the last update was applied to the display system is called a cumulative update. In the example, the cumulative update for the new data set starts with update number 1. The cumulative update for the re-issue of a data set starts with update number 32. The cumulative update for a data set to which update number n has been applied starts with update number n+1.
- The update information which has been incorporated in a re-issue of a data set is called a compilation update.

Each re-issue or new edition of a data set must have the same name as the base cell file which it replaces.

The update mechanism is described in S-57 Part 3, clause 8.

In order to delete a data set, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must be set to 0. This message is only used to cancel a base cell file.

To inform the user that a new edition is available, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must contain a value one higher than the current edition number.

In order to modify a text, picture or application file, a new file with the same name is created.

When an object pointing to a text, picture or application file is deleted or updated so that it no longer references the file, the display system software should check to see whether any other object reference the same file, before that file is deleted.

An exchange set may contain base cell files and update cell files for the same cells. Under these circumstances the update cell files must follow on in the correct sequential order from the last update applied to the base cell file.

The record version of each feature or vector record is indicated in the "Record Version" [RVER] subfield of the "Feature Record Identifier" [FRID] field or the "Vector Record Identifier" [VRID] field. At each update of a record, this version number is incremented by 1.

A.1.1.9 Error Detection

File integrity checks are based on the CRC-32 algorithm (a 32 bit Cyclic Redundancy Check algorithm) as defined in ANSI/IEEE Standard 802.3 (Section 1.6.1 of the Product Specification refers).

A.1.1.9.1 Implementation

The checksums for each data set are held in the "CRC" [CRCS] subfield of the "Catalogue Directory" [CATD] field. They allow the integrity of each file in the exchange set to be checked on receipt. The CRC value computed on the received file must the same as the CRC value transmitted.

The CRC values are recorded in ASCII as a hexadecimal number most significant byte first.

A.1.1.9.2 Processing

Encoding is defined by the following generating polynomial:

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

Processing is applied to relevant files as they appear in the exchange set.

The CRC value of the file is defined by the following process:

1. The first 32 bits of the data are complemented.
2. The n bits of the data are then considered to be the coefficients of a polynomial M(x) of degree n-1.
3. M(x) is multiplied by x^{32} and divided by G(x), producing a remainder R(x) of degree <31.
4. The coefficients of R(x) are considered to be a 32-bit sequence.
5. The bit sequence is complemented and the result is the CRC.

The hexadecimal format of CRCs are converted to ASCII characters and stored in the "Catalogue Directory" [CATD] field.

A.1.2 APPLICATION PROFILES

A.1.2.1 General

The binary implementation of S-57 must be used for AML. Therefore, the "Implementation" [IMPL] subfield of the "Catalogue Directory" [CATD] field must be set to "BIN" for the data set files (see Section A.1.2.6.1.1 of this Annex).

A.1.2.2 Catalogue and Data Set Files

These files are composed of the records and fields defined in the following tree structure diagrams (see Sections A.1.2.6.1, A.1.2.7 and A.1.2.8 of this Annex).

The order of data in each base or update cell file is described below:

Data set file

- Data set general information record
- Data set geographic reference record (for Base application profile)
- Vector records
  - Isolated nodes (SG2D)
  - Connected nodes
  - Edges
- Feature records
  - Meta features
  - Geo features (ordered from slave to master)
  - Collection features

This order of records will enable the import software to check that the child record exists each time the parent record references it (i.e. it will already have read the child record so it will know if it exists or not).

A.1.2.3 Records

Records and fields that do not appear in the following tree structure diagrams are prohibited. The order of records in the files must be the same as that described in the tree structure diagrams. The combination of the file name and the "Name" of the record must provide a unique world-wide identifier of the record.

A.1.2.4 Fields

For base cell files, some fields may be repeated (indicated by <R>) and all of their content may be repeated (indicated by *). In order to reduce the volume of data, the encoder should repeat the sequence of subfields, in preference to creating several fields.

A.1.2.5 Subfields

Mandatory subfields must be filled by a non-null value.

Prohibited subfields must be encoded as missing subfields values (see S-57 Part 3, clause 2.1). The exact meaning of missing attribute values is defined in Section A.2.2 of this Annex.

In the tables following the tree structure diagrams, mandatory subfields are shown by “M” in the “use” column and prohibited subfields by “P” in the same column. If there is nothing in this column, it means that the use of this subfield is optional. When a subfield value is prescribed, it is indicated in the “value” column. The “comment” column contains general comments and an indication of whether the subfield is ASCII or binary coded.

A.1.2.6 Catalogue File

The catalogue has the same structure for base and update cell application profiles.

A.1.2.6.1 Catalogue File Structure

Catalogue File
|
|--<R>--**Catalogue Directory Record**
|
|--0001-- ISO/IEC 8211 Record identifier
|
|--<1>-- CATD - Catalogue directory field

A.1.2.6.1.1 Catalogue Directory Field (CATD)

NB: All subfield values are encoded as ASCII.

tag	subfield name	use	value	comment
RCNM	Record name	M	CD	
RCID	Record identification number	M		
FILE	File name	M		full path name
LFIL	File long name			
VOLM	Volume	M		name of volume on which file appears
IMPL	Implementation	M	ASC BIN TXT TIF PDF HTM JPG AVI MPG	Examples for the catalogue file for the data set files for ASCII text files (including the README.TXT file) for picture files for document files for document files for photo files for video/film files for video files
SLAT	Southernmost latitude			mandatory for data set files
WLON	Westernmost longitude			mandatory for data set files
NLAT	Northernmost latitude			mandatory for data set files
ELON	Easternmost longitude			mandatory for data set files
CRCS	CRC	M		except for README and catalogue files
COMT	Comment			

A.1.2.7 AML (Base Cell) File Structure

The two letter identifier for AML Large Bottom Objects base cell application profiles is LN and applies to new data sets, re-issues and new editions of a data set.

Base Cell File

```
|
|--<1>--Data Set General Information Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>-- DSID - Data Set Identification field
|                       |
|                       |--<1>--DSSI - Data Set Structure Information field
|
|--<1>--Data Set Geographic Reference Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--DSPM - Data Set Parameter field
|
|--<R>--Vector Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--VRID - Vector Record Identifier field
|                 |
|                 |--<R>--ATTV* - Vector Record Attribute field
|                 |
|                 |--<R>--VRPT* - Vector Record Pointer field
|                 |
|                 |       |--<R>--SG2D* - 2-D Coordinate field
|
|--<R>--Feature Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--FRID - Feature Record Identifier field
|                 |
```

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|--<1>--FRID – Feature Record Identifier field

|--<1>--FOID – Feature Object Identifier field

|--<R>--ATTF*– Feature Record Attribute field

|--<R>--NATF* – Feature Record National Attribute field

|--<R>--FFPT* – Feature Record to Feature Object Pointer field

|--<R>--FSPT* – Feature Record to Spatial Record Pointer field

A.1.2.7.1 Data Set Descriptive (META) Field Content

A.1.2.7.1.1 Data Set Identification Field Structure (DSID

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{1}	data set is new, binary
INTU	Intended usage	M	100	= Unscaled data
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to Section A.1.1.8 of this Annex
UPDN	Update number	M		ASCII
UADT	Update application date	M		ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	53	= Large Bottom Objects
PSDN	Product specification description	M	Additional Military Layers Large Bot-tom Objects	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	10	= Large Bottom Objects
AGEN	Producing agency	M		binary
COMT	Comment	M		Protective marking Owner authority National caveat (Refer to Section 5.3.1 of the Product Specification)

A.1.2.7.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0}, {1} or {2}	
NOMR	Number of meta records	M		
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo record	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.7.1.3 Data Set Parameter Field Structure (DSPM)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{20}	= DP, binary
RCID	Record identification number	M		binary
HDAT	Horizontal geodetic datum	M	{2}	= WGS 84, binary
VDAT	Vertical datum	M		binary
SDAT	Sounding datum	M		binary
CSCL	Compilation scale of data	M		binary
DUNI	Units of depth measurement	M	{1} or {2}	1 =metres, binary 2 = fathoms and feet
HUNI	Units of height measurement	M	{1} or {2}	1 = metres, binary 2 = feet, binary
PUNI	Units of positional accuracy	M	{1}	=metres, binary
COUN	Coordinate units	M	{1}	= lat/long, binary
COMF	Coordinate multiplication factor	M		binary, see S-57 Appendix B.1 clause 4.4
SOMF	3-D (sounding) multiplication factor	M	{10}	binary, see S-57 Appendix B.1 clause 4.4
COMT	Comment	M		ASCII

A.1.2.7.2 Spatial Field Content

A.1.2.7.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.2.2 Vector Record Attribute Field Structure (ATTV)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value	M		ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.2.3 Vector Record Pointer Field Structure (VRPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.7.2.4 2-D Co-ordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.7.3 Feature Field Content

A.1.2.7.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2} or {3} or {255}	= point = line = area = no geometry
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.7.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown

A.1.2.7.3.5 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.7.3.6 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	Usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior =exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

A.1.2.8 AML (Update) File Structure

The two letter identifier for AML Large Bottom Objects update cell application profiles is LR and applies to updates to a data set.

Update Cell File

```
|
|--<1>--Data Set General Information Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--DSID - Data Set Identification field
|                       |
|                       |--<1>--DSSI - Data Set Structure Information field
|
|
|     (continued on following page)
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Vector Record

- 0001 - ISO/IEC 8211 Record identifier
- <1> VRID - Vector Record Identifier field
  - <R> ATTV* - Vector Record Attribute field
  - <1> VRPC - Vector Record Pointer Control field
  - <R> VRPT* - Vector Record Pointer field
  - <1> SGCC - Coordinate Control field
    - <R> SG2D* - 2-D Coordinate field

Feature Record

- 0001 - ISO/IEC 8211 Record identifier
- <1> FRID - Feature Record Identifier field
  - <1> FOID - Feature Object Identifier field
  - <R> ATTF* - Feature Record Attribute field
  - <R> NATF* - Feature Record National Attribute field
  - <1> FFPC - Feature Record to Feature Object Pointer Control field
  - <R> FFPT* - Feature Record to Feature Object Pointer field
  - <1> FSPC - Feature Record to Spatial Record Pointer Control field
  - <R> FSPT* - Feature Record to Spatial Record Pointer field

A.1.2.8.1 Data Set Descriptive (META) Field Content

A.1.2.8.1.1 Data Set Identification Field Structure (DSID)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{2}	data set is a revision, binary
INTU	Intended usage	M	100	= Unscaled data
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to section A.1.1.8 of this Annex
UPDN	Update number	M		ASCII
UADT	Update application date	P		empty, ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	53	= Large Bottom Objects
PSDN	Product specification description	M	Additional Military Layers Large Bottom Objects	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	11	= Large Bottom Objects
AGEN	Producing agency	M		binary
COMT	Comment	M		Protective marking Owner authority National caveat (Refer to section NO TAG)

A.1.2.8.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0} or {1} or {2}	
NOMR	Number of meta records	M		

tag	subfield name	use	value	comment
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo records	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.8.2 Spatial Field Content

A.1.2.8.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.2.2 Vector Record Attribute Field Structure (ATTV)

NB : Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value, missing attribute value = attribute value is deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.2.3 Vector Record Pointer Control Field Structure (VRPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
VPUI	Vector record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
VPIX	Vector record pointer index	M		
NVPT	Number of vector record pointers	M		

A.1.2.8.2.4 Vector Record Pointer Field Structure (VRPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.8.2.5 Co-ordinate Control Field Structure (SGCC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
CCUI	Coordinate update instruction	M	{1} or {2} or {3}	= insert = delete = modify
CCIX	Coordinate index	M		
CCNC	Number of coordinates	M		

A.1.2.8.2.6 2-D Co-ordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.8.3 Feature Field Content

A.1.2.8.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2} or {3} or {255}	= point = line = area = no geometry

tag	subfield name	use	value	comment
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.8.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute value is deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute value is deleted.

A.1.2.8.3.5 Feature Record to Feature Object Pointer Control Field Structure (FFPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FFUI	Feature object pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FFIX	Feature object pointer index	M		
NOPT	Number of feature object pointers	M		

A.1.2.8.3.6 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.8.3.7 Feature Record to Spatial Record Pointer Control Field Structure (FSPC0

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FSUI	Feature to spatial record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FSIX	Feature to spatial record pointer index	M		
NSPT	Number of feature to spatial record pointers	M		

A.1.2.8.3.8 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	name	M		
ORNT	orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior = exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

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A.2 AML S-57 DATA DICTIONARY

A.2.1 GENERAL GUIDELINES

A.2.1.1 Feature Object Identifiers

Each feature object must have a unique world-wide identifier. This identifier, called the feature object identifier, is formed by the binary concatenation of the contents of the subfields of the ”Feature Object Identifier” [FOID] field.

The feature object identifier may be used to identify multiple instances of the same object. For example, the same object may appear in different scale bands, or an object may be split by the cell structure. In these circumstances, each instance of this object may have the same identifier.

Feature object identifiers must not be reused, even when a feature has been deleted

A.2.1.2 Cartographic Objects

The use of cartographic objects is prohibited.

A.2.1.3 Time Varying Objects

Specific AML products may contain information about magnetic variation, tides, tidal streams and currents. However, depth information should only be displayed as it has been provided in the AML product and not adjusted by tidal height.

A.2.1.4 Prohibited Attributes

Attributes not included in this Product Specification are prohibited.

A.2.1.5 Numeric Attribute Values

Floating point or integer attribute values must not be padded by non-significant zeros (e.g. 2.5 and not 02.500) unless they are required to specify units of resolution where trailing zeros will become significant in order to distinguish between values (e.g. 3.2 may need to be differentiated from 3.200).

A.2.1.6 Text Attribute Values

The lexical level used for the “Feature Record Attribute” [ATTF] field must be 1 (ISO 8859-1) (see Sections A.1.2.7.3.3 and A.1.2.8.3.3 of this Annex). Lexical level 1 or 2 may be used for the “Feature Record National Attribute” [NATF] field (see Sections A.1.2.7.3.4 and A.1.2.8.3.4 of this Annex). Format effecting (C0) characters, as defined in S-57 Part 3, Annex B, are prohibited. The delete character is only used in the update mechanism (see S-57 part 3, clause 8.4.2.2.a and 8.4.3.2.a).

A.2.2 UNKNOWN ATTRIBUTE VALUES

In a base data set (LN application profile), when an attribute code is present but the attribute value is missing, it means that the producer wishes to indicate that this attribute value is unknown.

In a revision data set (LR application profile), when an attribute code is present but the attribute value is missing it means:

- That the value of this attribute is to be replaced by an unknown value if it was present in the original data set
- That an unknown value is to be inserted if the attribute was not present in the original data set

In both cases the missing attribute value is encoded by the means described in S-57 Part 3, clause 2.1.

A.2.3 USE OF META INFORMATION

A.2.3.1 AML Data Set Metadata

For all AML Products, the Data Set Descriptive records (defined in the application profile structures - Sections A.1.2.7.1 and A.1.2.8.1 of this Annex) are used to contain the metadata of the dataset. The mandatory meta information specified in Section 5.3.1 of the Product Specification is encoded in S-57 as indicated in the table below.

General/Production Information	Field	Sub-field
Production Agency	DSID	AGEN
Dataset Name	DSID	DSNM
Edition Number	DSID	EDTN
Date of Release	DSID	ISDT
Product Specification Description	DSID DSID	PRSP PSDN
Product Specification Edition Number	DSID	PRED
Product Application	DSID	INTU
Compilation Scale	DSPM	CSCL

Security Classification Information	Field	Sub-field
International Defence Organisation (IDO) Status	DSID	COMT (stored as comma-separated values in free- text subfield)
Protective Marking	DSID	
Owner Authority	DSID	
Caveat	DSID	

Update Information	Field	Sub-field
Update Application Date	DSID	UADT
Update Number	DSID	UPDN

Datums & Units	Field	Sub-field
Horizontal Geodetic Datum	DSPM	HDAT
Vertical Datum	DSPM	VDAT
Sounding Datum	DSPM	SDAT
Co-ordinate Units	DSPM	COUN
Height / Length Units	DSPM	HUNI
Depth Units	DSPM	DUNI
Positional Accuracy Units	DSPM	PUNI

A.2.3.2 Hierarchy of Meta Data

Any meta data stored as attributes of Meta Objects, or, Geo or Spatial features will override meta information stored in the Data Set Descriptive records. The table below indicates which AML meta objects and associated attributes supersede information stored in the data set subfields (see Sections A.2.3.1, A.1.2.7.1 and A.1.2.8.1 of this Annex).

Notes:

In the following tables, acronyms shown in upper-case type, are those approved by the IHO for use in the S-57 data schema. However, additional acronyms have been created for use in the AML data schema. These are shown in lower-case type.

Additionally, the terms 'specific' and 'generic' are used in the tables to indicate an attribute's association to an object class. Attributes that are 'generic' apply to all object classes listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Real-World Features table in Section 5.5.2 of the Product Specification, when included in the 'Associated Attributes' column.

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSID	AGEN	M_PROD	AGENCY	generic	AGENCY
DSPM	CSCL	M_CSCL	CSCALE	generic	CSCALE
DSID	COMT (stored as comma-separated values in free- text subfield)	m_clas	secido	generic	secido
			secpmk	generic	secpmk
			secown	generic	secown
			seccvt	generic	seccvt

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSPM	VDAT	M_VDAT	VERDAT	specific	VERDAT
DSPM	SDAT	M_SDAT	soudat	specific	soudat
DSPM	DUNI	M_UNIT	DUNITS	specific	DUNITS

A.2.4 SCHEMA

A.2.4.1 AML Large Bottom Objects Meta Information Table

The meta information specified in Section 5.5.1 of the Product Specification is encoded in S-57 as indicated in the table below.

Production Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Capture Date	M_PROD	RECDAT	generic	RECDAT
Production Agency	M_PROD	AGENCY	generic	AGENCY
Producing Country	M_PROD	PRCTRY	generic	PRCTRY
Data Coverage	M_COVR	CATCOV	N/A	N/A

Security Classification Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
International Defence Organisation (IDO) Status	m_clas	secido	generic	secido
Protective Marking	m_clas	secpmk	generic	secpmk
Owner Authority	m_clas	secown	generic	secown
Caveat	m_clas	seccav	generic	seccvt

Geo-Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Vertical Datum	M_VDAT	VERDAT	specific	VERDAT
Sounding Datum	M_SDAT	soudat	specific	soudat
Vertical Datum Shift Area	m_vers	vershf	N/A	N/A
Height / Length Units	M_UNIT	HUNITS	specific	HUNITS
Depth Units	M_UNIT	DUNITS	specific	DUNITS

Source Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Source Date	M_CSCL	SORDAT	generic	SORDAT
Source Country	M_CSCL	SORIND	generic	SORIND
Source Agency	M_CSCL	SORIND	generic	SORIND
Source ID	M_CSCL	SORIND	generic	SORIND
Source Type	M_CSCL	SORIND	generic	SORIND
Source Scale	M_CSCL	CSCALE	generic	CSCALE

Data Quality Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Absolute Horizontal Accuracy	M_ACCY (non-bathymetric data) M_QUAL (bathymetric data)	POSACC POSACC	generic generic	POSACC (spatial object) POSACC (spatial object)
Error Ellipse	M_ACCY (non-bathymetric data)	errell	generic	errell (spatial object)
Absolute Vertical Accuracy	M_ACCY	elvacc	generic	elvacc
Relative Horizontal Accuracy	M_ACCY	HORACC	generic	HORACC
Relative Vertical Accuracy	M_ACCY	VERACC	generic	VERACC
Sounding Accuracy	M_QUAL	SOUACC	specific	SOUACC
Quality of Position	M_SREL	QUAPOS	generic	QUAPOS (spatial object)
Quality of Sounding Measurement	M_SREL	QUASOU	specific	QUASOU
Technique of Sounding Measurement	M_SREL	TECSOU	specific	TECSOU
Conformance to the Product Specification	m_conf	catcnf	N/A	N/A

External Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Image File Link	M_NPUB	PICREP	generic	PICREP
Text File Reference	generic	TXTDSC	generic	TXTDSC
Text File Reference (in national language)	generic	NTXTDS	generic	NTXTDS
Reference to a Publication	M_NPUB	PUBREF	generic	PUBREF

Other Supporting Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Supporting Textual Information	generic	INFORM	generic	INFORM
Supporting Textual Information (in national language)	generic	NINFOM	generic	NINFOM

Notes:

1. When there is no meta object attribute, an individual attribute can supersede a data set subfield.
2. It is prohibited to use an attribute on an individual object, if this attribute has the same value as the general value defined by the meta object or the equivalent data set subfield.
3. It is prohibited to use a meta object, if the information given by this meta object is the same as the value given by the equivalent data set subfield.

A.2.4.2 AML Large Bottom Objects Object Table

The tables below define the S-57 / AML six-letter acronym for each of the features / objects described in Section 5.5.2 of the Product Specification.

The tables provide the following details:

- Geo Object – gives the feature class name.
- Acronym – gives the six-character code for the object class.

Allowable attributes for all the features / objects listed in the following tables are given in Section A.2.4.3 below.

Geo Object	Acronym
Impact Scour	iscour
Obstruction	OBSTRN
Sensor Anomaly	senanm
Underwater / Awash Rock	UWTROC
Wreck	WRECKS

Collection & Meta Object	Acronym
Conformance to the Product Specification	m_conf
Data Coverage	M_COVR
Data source area	M_CSCL
Vertical Datum Shift Area	m_vers

A.2.4.3 AML Large Bottom Objects Attribute Table

The table below defines the S-57 / AML six-letter acronym for each of the attributes described in Section 5.5.3 in the Product Specification.

The table provides the following details:

- Attribute - gives the attribute name.
- Acronym - gives the six-character alpha-numeric code.

Allowable attribute values for all the attributes listed are given in Section 5.5 - Schema, of the Product Specification.

Attribute	Acronym
Abandonment Date	databa
Absolute Horizontal Accuracy	POSACC
Absolute Vertical Accuracy	elvacc
Beam of Vessel	vesbem
Capture Date	RECDAT
Cardinal Point Orientation	orcard
Category of Conformance	catcnf
Category of Coverage	CATCOV
Category of Obstruction	CATOBS
Category of Wreck	CATWRK
Caveat	seccvt
Condition	CONDTN
Conspicuous, Radar	CONRAD
Conspicuous, Visually	CONVIS
Controlling Authority	authty
Current Scour Dimensions	scrdim
Date Sunk	datsnk
Debris Field	debfld
Depth Units	DUNITS
Depth of Water Over Feature	depwat
Draught of Vessel	vesdgh

Attribute	Acronym
Error Ellipse	errell
Existence of Restricted Area	exzres
Exposition of Sounding	EXPSOU
Field Name	fldnam
First Detection Year	datfir
First Sensor	senfir
First Source	sorfir
General Water Depth	gendep
Height	HEIGHT
Height / Length Units	HUNITS
Horizontal Length	HORLEN
Horizontal Width	HORWID
Image File Link	PICREP
International Defence Organisation (IDO) Status	secido
Last Detection Year	datlst
Last Sensor	senlst
Last Source	sorlst
Length of Vessel	veslen
Magnetic Anomaly Detector (MAD) Signature	madsig
Magnetic Intensity	magint
Name	OBJNAM
Name (in national language characters)	NOBJNM
Nationality	NATION
Nature of Construction	NATCON
Operator	oprtor
Orientation	ORIENT
Owner Authority	secown
Producing Country	PRCTRY
Product	PRODCT
Production Agency	AGENCY
Protective Marking	secpmk
Quality of Position	QUAPOS
Quality of Sounding Measurement	QUASOU
Re-entered Date	datren
Re-suspended Date	datres
Reference to a Publication	PUBREF

Attribute	Acronym
Relative Horizontal Accuracy	HORACC
Relative Vertical Accuracy	VERACC
Sonar Signal Strength	sonsig
Sounding Datum	soudat
Sounding Accuracy	SOUACC
Source Agency	SORIND (comma separated value)
Source Country	SORIND (comma separated value)
Source Date	SORDAT
Source ID	SORIND (comma separated value)
Source Scale	CSCALE
Source Type	SORIND (comma separated value)
Spudded Date	datspd
Status	STATUS
Strength of Magnetic Anomaly	magany
Supporting Textual Information	INFORM
Supporting Textual Information (in national language characters)	NINFOM
Surface Composition	NATSUR
Surface Composition – Qualifying Terms	NATQUA
Suspension Date	datsus
Technique of Sounding Measurement	TECSOU
Text File Reference	TXTDSC
Text File Reference (in national language characters)	NTXTDS
Tonnage	tonage
Type of Tonnage	typton
Type of Wreck	typewk
Underwater Reference Mark	unwrfm
Vertical Datum	VERDAT
Vertical Length	VERLEN
Water Level Effect	WATLEV

A.2.4.4 Mandatory Attributes

The table below specifies attributes that are mandatory to specific feature / object classes in Large Bottom Objects. Feature / object classes not included in this table have no mandatory attributes.

Object Class	Attributes					
iscour	depwat					
OBSTRN	CATOBS	at least one of:		depwat	WATLEV	
senanm	depwat					
UWTROC	at least one of:		depwat	WATLEV		
WRECKS	CATWRK	at least one of:		depwat	WATLEV	
M_ACCY	POSACC					
m_clas	secpmk	secown	at least one of:		secido	seccvt
m_conf	catcnf					
M_COVR	CATCOV					
M_CSCL	CSCALE					
M_PROD	at least one of:		AGENCY	PRCTRY		
M_QUAL	at least one of:		SOUACC	VERDAT		
M_NPUB	at least one of:		PICREF	PUBREF		
M_SDAT	soudat					
M_VDAT	VERDAT					

A.2.4.5 Mandatory Features / Objects

There are no mandatory features in AML Large Bottom Objects.

A.2.4.6 Attribute Definitions

AML attribute definitions, permissible values and formats, together with details of S-57 encoding, are given in the AML Object & Attribute Catalogue.

A.2.4.7 Relationships Between Features

AML Large Bottom Objects does not contain any relationships between features.

A.2.4.8 Dependency Between Attributes

AML Large Bottom Objects does not contain any dependencies between features.

A.3 AML LARGE BOTTOM OBJECTS GUIDANCE ON FEATURE CODING AND ATTRIBUTION

A.3.1 SCOPE

The following clauses specify the conventions that are to be used to encode the geometry and semantic description of objects in AML Large Bottom Objects.

This document describes how to encode information that the cartographer considers relevant to a specific purpose. The content of AML Large Bottom Objects is at the discretion of the producing authority provided that the conventions described below are followed.

A.3.2 GENERAL RULES

Generally, the conventions extant in S-57 APPENDIX B.1, Annex A, Use of the Object Catalogue for ENC will also apply to the AML Large Bottom Objects product. However, there may be some cases where the range of allowable attribute values may differ, or where additional attributes apply. The following guide-lines seek to clarify such amendments or additions for use in AML Large Bottom Objects.

This document must be used in conjunction with the AML Large Bottom Objects product specification.

Note:
Only the object primitive point is allowable for any feature in AML Large Bottom Objects. Therefore any S-57 conventions applying to area or line primitives of an object/feature can be disregarded.

A.3.2.1 SOUNDING DATUM

The default value for the entire data set is given in the 'Sounding Datum' [SDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the sounding datum is different to the value given in the SDAT subfield for some part of the data set, it may be encoded as meta object M_SDAT.

The areas covered by meta objects M_SDAT must be mutually exclusive.

Meta object : Sounding datum (M_SDAT)
Attributes : soudat INFORM NINFOM
The sounding datum attribute 'soudat' can also apply on an individual object (see note).

NOTE:
When using the attributes **depwat** and **gendep** on an individual object the following criteria apply:

1. The 'soudat' attribute must be populated if the sounding datum:

- differs from the sounding datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the sounding datum attribute 'soudat' specified by a M_SDAT meta-object

A.3.2.2 VERTICAL DATUM

The default value for the entire data set is given in the 'Vertical Datum' [VDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the vertical datum is different to the value given in the VDAT subfield for some part of the data set, it may be encoded as meta object M_VDAT.

The areas covered by meta objects M_VDAT must be mutually exclusive.

Meta object : Vertical datum (M_VDAT)
Attributes : VERDAT INFORM NINFOM

The vertical datum attribute VERDAT can also apply on an individual object (see note).

NOTE:
When using the attribute height on an individual object the following criteria apply:

1. The VERDAT attribute must be populated if the vertical datum:

- differs from the vertical datum specified in the VDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the vertical datum attribute VERDAT specified by a M_VDAT meta-object

A.3.2.3 UNITS

Units are specified in the 'Units of Depth Measurement' [DUNI] subfield and 'Units of Height Measurement' [HUNI] subfield of the 'Data Set Parameter' [DSPM] field. If the units for objects in some part of the data set are different to either of the values given in the DUNI or HUNI subfields, it may be encoded as meta object M_UNIT.

The areas covered by meta objects M_UNIT must be mutually exclusive.

Meta object : Units of measurement of data (M_UNIT)
Attributes : HUNITS INFORM NINFOM
or
DUNITS INFORM NINFOM

The unit attributes 'HUNITS' and 'DUNITS' can also apply on an individual object (see note).

NOTE:
When using the attributes **debfld; depwat; gendep; HEIGHT; HORLEN; HORWID; scrdim; VERLEN; vesbem; vesdgh; veslen** on an individual object the following criteria apply:

1. The measurement units must be set to the appropriate units using the HUNITS or DUNITS attribute if they:

- differ from the units specified in the HUNI subfield of the Data Set Parameter (DSPM) field structure

or,

- differ from the attributes 'HUNITS' or 'DUNITS' specified by a M_UNIT meta-object

A.3.3 LARGE BOTTOM OBJECTS

A.3.3.1 DANGERS

A.3.3.1.1 Rocks which may cover

Geo object: Underwater / Awash Rock (UWTROC)

Attributes:		
	NATQUA	any of the following values may be used in LBO
		8 - volcanic
		9 - calcareous
		10 - hard
	NATSUR	any of the following values may be used in LBO
		5 - stone
		9 - rock
		11 - lava
		14 - coral
		19 - boulder
	STATUS	any of the following values may be used in LBO
		18 - existence doubtful
		- dead *(AML value)*
		- unspecified *(AML value)*
	soudat	is allowable in LBO

Remarks:

- The attribute **scrdim** (current scour dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the list in Section A.2.4.2 of this Annex.

A.3.3.2 WRECKS, FOUL AREAS AND OBSTRUCTIONS

A.3.3.2.1 Wrecks

Geo object: Wreck (WRECKS)

Attributes:		
	STATUS	any of the following values may be used in LBO
		13 - historic
		18 - existence doubtful
		- dead *(AML value)*
		- lifted *(AML value)*
		- mass grave *(AML value)*
		- unspecified *(AML value)*
	NATSUR	is allowable in LBO
	VERACC	is allowable in LBO
	VERDAT	is allowable in LBO
	VERLEN	is allowable in LBO

Remarks:

- The use of HEIGHT and VERLEN should not be confused. HEIGHT should only be used to indicated the measurement of an object above a specified datum, whereas VERLEN should be used to indicate the overall vertical measurement of an object regardless of its relationship to a datum.
- Information on the cargo of a wreck should be encoded using the values in the attribute PRODCT. In many cases the definition of a value will in fact encompass a grouping of similar elements, materials or items under a single heading. If a producer feels that there is value in describing the exact nature of the product, then the attribute INFORM / NINFOM may be used to encode relevant data.
- INFORM / NINFOM may be used to encode relevant details from circumstances of loss or surveying reports.
- The flag under which the vessel was operating should be encoded under NATION.
- The attribute scrdim (current scour dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the list in Section A.2.4.2 of this Annex.

A.3.3.2.2 Obstructions and Foul Areas

Note:

- Snags, stumps, foul areas and ice booms will not be captured for LBO.
- For the purposes of LBO, a number of structures related to the oil and gas industry have been added as obstructions, refer to CATOBS.

Geo object:	Obstruction (OBSTRN)	
Attributes:	CATOBS	one of the following values may be used in LBO
		2 - wellhead
		3 - diffuser
		4 - crib
		5 - fish haven
		7 - foul ground
		9 - ground tackle
		501 - well protection structure *(AML value)*
		502 - subsea installation *(AML value)*
		503 - pipeline obstruction *(AML value)*
		504 - free standing conductor pipe *(AML value)*
		505 - manifold *(AML value)*
		506 - storage tank *(AML value)*
		507 - template *(AML value)*
		508 - pontoon *(AML value)*
		509 - sundry objects *(AML value)*
	CONDTN	one of the following values may be used in LBO
		1 - under construction
		2 - ruined
		5 - planned construction
	NATCON	any of the following values may be used in LBO
		1 - masonry
		2 - concreted
		3 - loose boulders
		6 - wooden
		7 - metal
		8 - glass reinforced plastic
	NATQUA	prohibited for use in LBO
	STATUS	any of the following values may be used in LBO
		4 - not in use
		13 - historic
		18 - existence doubtful
		505 - dead *(AML value)*
		506 - lifted *(AML value)*

507 - mass grave *(AML value)*
508 - exploration *(AML value)*
509 - production *(AML value)*
510 - suspended *(AML value)*
511 - injection *(AML value)*
518 - unspecified *(AML value)*

Remarks:

- Information on the product of an obstruction should be encoded using the values in the attribute PRODCT. In many cases the definition of a value will in fact encompass a grouping of similar elements, materials or items under a single heading. If a producer feels that there is value in describing the exact nature of the product, then the attribute INFORM / NINFOM may be used to encode relevant data.
- The attribute scrdim (current scour dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the list in Section A.2.4.2 of this Annex.

A.3.3.3 OIL AND GAS FIELDS

A.3.3.3.1 Wellheads

Note:

- For the purposes of LBO, a number of structures related to the oil and gas industry have been added as obstructions, refer to CATOBS.

Geo object: Obstruction (OBSTRN)
Attributes: CATOBS one of the following values may be used in LBO
2 - wellhead
501- well protection structure *(AML value)*
502 - subsea installation *(AML value)*
503 - pipeline obstruction *(AML value)*
504 - free standing conductor pipe *(AML value)*
505 - manifold *(AML value)*
506 - storage tank *(AML value)*
507 - template *(AML value)*
STATUS any of the following values may be used in LBO
4 - not in use
18 - existence doubtful
505 - dead *(AML value)*

506 - lifted *(AML value)*
508 - exploration *(AML value)*
509 - production *(AML value)*
510 - suspended *(AML value)*
511 - injection *(AML value)*
512 - unspecified *(AML value)*

Remarks:

- INFORM / NINFOM may be used to encode relevant details from the installations history or other remarks.
- The country for which the installation operates / produces should be encoded under NATION.
- The attribute scrdim (Current Scour Dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by the impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the list in Section A.2.4.2 of this Annex.

A.3.4 NEW LBO OBJECT / FEATURES

A.3.4.1 Sensor Anomaly

Geo object: Sensor Anomaly (senamn)

Attributes:

STATUS	18 - existence doubtful
	505 - dead *(AML value)*
	518 - unspecified *(AML value)*
TECSOU	1 - found by echo-sounder
	2 - found by side-scan sonar
	3 - found by multi-beam
	7 - found by laser
	8 - swept by vertical acoustic system
	9 - found by electromagnetic sensor
	13 - swept by side-scan sonar
WATLEV	3 - always underwater / submerged

datfir	datlst	depwat	DUNITS	EXPSOU
gendep	HUNITS	madsig	magany	magint
NOBJNM	OBJNAM	orcard	ORIENT	QUAPOS
QUASOU	scrdim	senfir	senlst	sonsig
sorfir	sorlst	soudat	SOUACC	

A.3.4.2 Impact Scour

Geo object: Impact Scour (iscour)

Attributes:

STATUS	18 - existence doubtful
	505 - dead *(AML value)*
	506 - unspecified *(AML value)*
TECSOU	1 - found by echo-sounder
	2 - found by side-scan sonar
	3 - found by multi-beam
	4 - found by diver
	5 - found by lead-line
	7 - found by laser
	9 - found by electromagnetic sensor
	10 - photogrammetry
	11 - satellite imagery
	12 - found by levelling
	14 - computer generated
WATLEV	3 - always underwater / submerged

datfir	datlst	depwat	DUNITS	EXPSOU
gendep	HORLEN	HORWID	HUNITS	NATQUA
NATSUR	NOBJNM	OBJNAM	orcard	ORIENT
QUAPOS	QUASOU	senfir	senlst	sonsig
sorfir	sorlst	SOUACC	soudat	VERLEN

Remarks:

- The object/feature class Impact Scours (iscour) should only be used to capture a geographic object/feature when the scour cannot be directly associated with an object/feature of the class Obstruction, Sensor Anomaly, Underwater / Awash Rock or Wreck.
- The AML Large Bottom Objects product will only include Impact Scours where there is a possibility of confusion with a potential target.