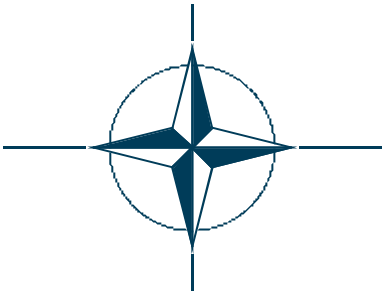
NORTH ATLANTIC TREATY ORGANISATION



(NATO)

ADDITIONAL MILITARY LAYERS

SMALL BOTTOM OBJECTS

PRODUCT SPECIFICATION

Version 2.1, 1 November 2005

Produced and issued by the United Kingdom Hydrographic Office under the direction of the Geo-spatial Maritime Working Group of the NATO Geographic Conference.

Document Control

ISSUE

Date	Author	Issue	Summary of Changes
1/11/01	AML	1.0	No prior version
31/07/04	B Parish	2.0	Includes amendments to AML SBO Product Specification approved by AHHWG-9 & AHHWG-10
1/11/05	B Parish	2.1	Amended in response to industry review & GMWG-3 approval

APPROVALS

Approver and Title	Signature	Date
Chairman Geo-spatial Maritime Working Group		21/10/05

VERSION CONTROL

Version	Review Date	Reviewed By

FILE DETAILS

Component	Name & Location	Tool
Document text	J:\AML\Specification\Specifications\ SBO \ SBO PS 2.1	MS Word
Correspondence and hard copy	HA/351/002/011	N/A

Contents

1 INTRODUCTION

1.1 SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the AML Small Bottom Objects (SBO) 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).

It has been prepared in accordance with NATO STANAG 7170, Additional Military Layers and the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products. It is based on the proposed Common Product Specification Framework (CPSF) which is contained as Annex B to the draft STANAG 4564.

The SBO 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 small bottom objects whose greatest dimension is less than five metres.

AML SMALL BOTTOM OBJECTS MUST NOT BE USED IN ISOLATION FOR NAVIGATIONAL PURPOSES

1.2 GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

1.2.1 Version Number

2.1

1.2.2 Date of Issue

1 November 2005

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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E-mail: aml@ukho.gov.uk

1.2.4 Relevant STANAG Number

NATO STANAG No.7170 Additional Military Layers (AML).

1.3 STATUS OF THE PRODUCT SPECIFICATION

This product specification has been endorsed by the Geo-spatial Maritime 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 SBO can be issued at various security classification levels according to content. AML SBO products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'Caveat' details) are physically partitioned.

The table at section 5.3 contains details of how AML SBO security classification information must be described in this product.

1.4.3 Copyright Statement

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 is 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 SBO Product Specification defines the real-world features, attributes and metadata required for the production and use of the product. It is laid out as described in the table of contents.

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 SBO S-57 Implementation (ANNEX A)
- AML SBO DIGEST-C Implementation (ANNEX B)

A cross-reference in the text will be included for instances when there are relevant details in one or more of the implementation annexes.

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 7170	Additional Military Layers.
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 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)
S-57	IHO Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000 Annex A - IHO Codes for Producing Agencies Annex B - Attributes/Object Classes Cross Reference Appendix A: Chapter 1, Object Classes Chapter 2, Attributes
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	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 3.1 Appendix B.1: ENC Product Specification

1.6.3 Other References

AML	Feature 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
SBO
Small 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 SBO Product specification (version 2.0) 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.

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.

2 GENERAL PRODUCT DESCRIPTION

PRODUCT TITLE
Additional Military Layers – Small Bottom Objects.

SHORT TITLE
SBO

REFERENCE
NATO STANAG No.7170 (Additional Military Layers).

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.

2.2 SUPPORT FOR MULTIPLE MODES OF OPERATION

AML SBO data is compiled for the purpose of depicting all known small bottom objects whose greatest dimension is less than five metres and will therefore be made available at the scale band shown in the following table.

SCALE BAND	SCALE RANGE
0	Unscaled data

2.3 GEOGRAPHIC ORGANISATION

2.3.1 Regional Scheme

AML products will be partitioned by geographic region. This will vary widely depending upon the density of the data.

2.3.2 Tiling Scheme

See appropriate annex.

2.4 LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own internal 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 SBO contains spatial objects as vector data.

2.5.2 Level of Topology

See appropriate annex.

2.5.3 Relationship with Layering

See appropriate annex.

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.
Below are examples of potential formats.

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

2.6 SIZING REQUIREMENTS

Data producers should partition datasets such that the screen refresh time in the receiving display system is acceptable to users. This will vary between data types and receiving systems. At present 5Mb is a recommended file size maximum for vector data in WECDIS type display systems.

2.7 GENERAL SOURCE DESCRIPTION

2.7.1 Minimum Source Requirements

Sources for any real-world feature detailed in section 5.5.1 meet the following requirements

- the data capture point-density fulfils the data capture requirements appropriate to the scale bands specified in section 2.2
- mandatory features specified in section 5.5.1.1 are included
- the mandatory attribution levels for each object, specified in section 5.5.1, are met

2.7.2 Applicable Sources

All sources used must meet the minimum requirements. Wherever available, sources which provide exact definitions of entities e.g. geographical co-ordinates should be used in preference to digitising from graphical representations.

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 SBO is the World Geodetic System 1984 (WGS 84).

3.1.2 Vertical Datums

3.1.2.1 Height Datum

The default height datum for the AML SBO is specified in the metadata of the dataset. The default height datum can be varied by the use of lower level metadata or feature level attribution.

3.1.2.2 Sounding Datum

The default sounding datum for AML SBO is specified in the metadata of the dataset. The default sounding datum can be varied by the use of lower level metadata or feature level attribution.

3.2 UNITS

The default units to be used in AML SBO 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 SBO 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 SBO 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 SBO is English.

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 SBO 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
- Completeness for the Product Specification

Data quality information defined for AML SBO can be encoded in the dataset as:

- dataset metadata
- meta information features[2]
- feature attributes

See section 5.3

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 date[3]

[2] Only applicable if supported by the exchange standard implementation
[3] Only applicable if supported by the exchange standard implementation

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 Completeness for the Product Specification

AML products may be produced to fulfil operational requirements, and therefore, may not contain all the meta data, features or attributes included in this Product Specification.

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 SBO must be validated for geometric anomalies.

4 DATA STRUCTURE

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

5 DATA DICTIONARY

5.1 GENERAL GUIDELINES

This section provides real-world descriptions for the metadata and features contained within the AML SBO 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 annexes.

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.

5.3 USE OF META INFORMATION

AML datasets contain the following meta-information, the information may be encoded at the levels in the dataset indicated in the following table depending upon the capability of the exchange standard used. Column four indicates the requirement for a feature whose sole purpose is the encoding of meta information. Column five indicates the nature of the meta attribute, where they exist. Meta attributes are either Generic or Specific as indicated.

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

All meta information encoded at **Dataset** and or **Meta feature** levels in the following table are mandatory.

Meta info	Description	Dataset	Meta feature	Attribute type
Production Agency	The agency responsible for the production of the AML data (IHO Codes for Producing Agencies)	Yes	Yes	Generic
Dataset Name	The name of the dataset	Yes	No	No
Edition Number	The edition number of the dataset	Yes	No	No
Date of Release	The date of the dataset was made available by the AML data producer (e.g. edition or revision date)	Yes	No	No
Product Specification Description	The name of the AML Product Specification to which the dataset conforms (see section 2)	Yes	No	No
Product Specification Version Number	The version number of the AML Product Specification to which the dataset conforms (section 1.2.1)	Yes	No	No
Product Scale Band	The usage application scale-band of the AML dataset (see section 2.2)	Yes	No	No
Compilation Scale	The scale at which the AML data was compiled (see compilation scale band table in section 2.2)	Yes	Yes	Generic

Meta info	Description	Dataset	Meta feature	Attribute type
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)	Yes	Yes	Generic
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	Yes	Yes	Generic
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level	Yes	Yes	Generic
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	Yes	Yes	Generic
Update Application Date	The date for which all previous updates (dated on or before) must have been applied	Yes	No	No
Update Number	The update number of the dataset	Yes	No	No
Horizontal Geodetic Datum	The horizontal geodetic datum of the dataset	Yes	No	No
Vertical Datum	The vertical datum of the dataset	Yes	Yes	No
Sounding	The horizontal plane to which the	Yes	Yes	Specific

Meta info	Description	Dataset	Meta feature	Attribute type
Datum	soundings on a hydrographic survey are reduced. (IHO SP32: 1225)			
Co-ordinate Units	The co-ordinate units of the dataset	Yes	No	No
Height/Length Units	The height and length units of the dataset	Yes	No	No
Depth Units	The depth units of the dataset	Yes	No	No
Positional Accuracy Units	The positional accuracy units of the dataset	Yes	No	No
Capture Date	The date when the specific object was captured, edited or deleted.	No	No	Generic
Producing Country	The country responsible for the production of the AML data (IHO Codes for Producing Agencies)	No	Yes	Generic
Data Coverage	The geographical area that describes the coverage and extent of spatial objects	No	Yes	Specific (Boolean)
Source Country	The country responsible for the production of the source (IHO Codes for Producing Agencies)	No	No	Generic
Source Agency	The agency responsible for the production of the source (IHO Codes for Producing Agencies)	No	No	Generic
Source Date	The date of issue of the source information (if applicable)	No	No	Generic
Source ID	ID of the data source (e.g. chart number)	No	No	Generic
Source Type	The type of data source (e.g. chart, report, etc.)	No	No	Generic
Source Scale	The scale at which the source data has been compiled	No	No	Generic
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system	No	No	Generic
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system	No	No	Generic
Quality of Position	An indication of the reliability of a quoted position	No	No	Generic
Quality of Sounding	An indication of the reliability of a sounding	No	No	Specific

Meta info	Description	Dataset	Meta feature	Attribute type
Measurement				
Technique of sounding measurement	Indicates the method or equipment used to obtain the object's depth	No	No	Specific
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation of the major axis.	No	No	Generic
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	No	No	Generic
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	No	No	Generic
Completeness for the Product Specification	An indication of how complete the data-set is, with reference to the full range of meta data, features and attributes included in the product specification	No	Yes	Specific (Boolean)
Supporting textual information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	No	No	Generic
Supporting textual information (in national language characters)	Supporting (free text) information (in national language) relevant to the object that cannot be explicitly encoded by any other attribute	No	No	Generic
Copyright Statement	Indicates any copyright or releaseability restrictions on the data	Yes	Yes	Generic

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.

NOTE:

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

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.

5.4 EXTERNAL REFERENCING

External Reference Information	**Description**	**Dataset**	**Meta feature**	**Attribute**
Image File Link	A reference to an image file containing a pictorial representation of the object	No	No	Generic
Text File Reference	The file name relating to an external text file	No	No	Generic
Text File Reference (in national language characters)	The file name (in national language) relating to an external text file	No	No	Generic
Reference to a publication	Reference to a specific location of any relevant information within an external publication	No	No	Generic

5.5 SCHEMA

The following tables (5.5.1 & 5.5.2) provide the descriptions of meta information, real-world features, and associated attributes required for an AML SBO data-set to be attributed as complete for 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.

The terms 'specific' and 'generic' are used to indicate an attribute's association to a feature. Attributes that are 'generic' apply to all features listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Features table in section 5.5.1, when included in the 'Associated Attributes' column.

NOTE:

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

5.5.1 Features

The following table contains the information described below:

- Feature – gives the name of the feature
- Description – describes the feature
- Associated Attributes – indicates allowable attributes relevant to each feature. (see section 5.5.2 for attribute descriptions and values.)
- M – denotes that export of the attribute field is mandatory
- Form – indicates the geometric form that the feature can take (i.e. **P**oint, **L**ine, or **A**rea)

In addition to the 'associated attributes' listed for individual real-world features '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 SBO are described in section 5.3

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

Feature	**Description**	**Associated Attributes**		**Form**		
		Description	**M**	**P**	**L**	**A**
Completeness for the Product Specification	An indication of how complete the data-set is, with reference to the full range of meta data, features and attributes included in the product specification *(AML)*	**Category of completeness**	✔			✔
Small Bottom Object	Underwater feature appearing mine-like on a sonar image *(AML)*	-Blind Zone -Burial Percentage -Burial Mechanism -Colour -Command System -Object Shape -Object Reference Number -Current Scour Dimensions -Depth of water over feature -Depth Units -First Detection Year -First Sensor -General Water Depth -Height/Length Units -Horizontal Length -Horizontal Width -Inclination - Lay Platform - Lay Reference Number - Lay Time -Last Detection		✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		Year -Last Sensor -Magnetic Anomaly Detector (MAD) Signature -Magnetic Intensity -Mine Reference Number -Mission Classification - Mine Index Mine Case - Mine Index Mine Type -Minesweeping System -Mission Comments -Mission Date -Mission Name -Minehunting System -Multiple Contacts -MWDC Reference Number -Nature of Construction -Navigation System -Not Found -Number of Previous Observations -On Sonar -Orientation of best Observation -Origin of Data -Originator -Orientation -Quality of Sounding Measurement -Sonar Reflectivity -Sounding Datum -**Status of Small Bottom Object** -Strength of Magnetic Anomaly -Survey Date and Time -Survey Date - End -Target Strength -Technique of sounding measurement	✔			

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		-Underwater Reference Mark -Vertical Length				
Contact History	Details of a previous occasion when an object was found. *(AML)*	**-Originator** **-Survey Date - End** -Survey Date and Time	✔ ✔	✔		
Data Coverage	A geographical area that describes the coverage and extent of spatial objects	**-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	 ✔ 			✔
Survey Area *(only include feature and associated attributes in specifications that need to encode survey data)*	An area within which the reliability of source survey information is assessed to be uniform. *(AML)*	**-Survey authority** -Survey type **-Survey date start** **-Survey date end** -Minimum distance between survey lines -Maximum distance between survey lines -Quality of sounding measurement -Technique of sounding measurement -The largest scale of survey information -The smallest scale of survey information	✔ ✔ ✔			✔
Viewpoint	Position from which an image has been obtained *(AML)*	-Bearing -Depth Units -Distance from Small Bottom Object -Ship's Speed -Sonar Frequency -Sonar Range Scale -Towed Body Depth		✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
User Defined	A feature not otherwise permissible within the AML content model	Textual description		✔	✔	✔

5.5.1.1 Mandatory Features

There are no mandatory features in SBO AML.

5.5.2 Attributes

The table below 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 attribute may take.

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

Attribute & definition	Values & definitions
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)
Bearing The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction. *(IHO Dictionary, S-32, 5th Edition, 435.)*	Value: 0.00 - 359.9 Unit: degree Resolution: 0.1
Blind Zone Pair(s) of bearings that define the blind zone *(AML)*	Value: 0.00 - 359.9 Unit: degree Resolution: 0.1 **Note:** Multiple blind zones will be represented by repeated pairs of these values
Burial Mechanism The method by which the object has or could become buried. *(AML)*	**-Impact:** The object has become buried by the force of the object hitting the sediment. *(AML)* **-Scour:** The object has become buried by the action of current or flow of water around the object. *(AML)* **-Sandwave Migration:** The object has become buried by the movement of sandwaves. *(AML)* **-Sediment Migration:** The object has become buried by the movement of sediment. *(AML)* **-Unknown:** The mechanism of burial is unknown. *(AML)* **-Liquefaction:** The object has become buried by the

Attribute & definition	Values & definitions
	process whereby under certain conditions, a solid seafloor sediment behaves as a liquid. *(AML)* **- Multiple** **- Not Applicable** **- Other**
Burial Percentage The percentage of the mine that has become buried. *(AML)*	Value: 0 - 100 Unit: Percentage (%) Resolution: 1
Capture date Gives the date when the object was captured, edited or deleted *(AML)*	**CCYYMMDD** 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Category of completeness Indicates the inclusion criteria and completeness regarding the feature content of the dataset *(AML)*	**complete:** The area specified has been populated for all known features. Absence of features indicates that there are no such entities available to the data producer **partial:** Certain features have not been included (or only partially included) within the specified area. Details **must** be provided in supporting textual information
Category of coverage The availability of coverage *(AML)*	**coverage available:** Continuous coverage of spatial objects is available within this area **no coverage available:** An area containing no spatial objects
Caveat A component of a security classification used for authorising a specific group to have access rights *(AML)*	Text string
Colour Colour of the object. *(AML)*	**-White** **-Black** **-Red** **-Green** **-Blue** **-Yellow** **-Grey** **-Brown** **-Amber** **-Violet** **-Orange** **-Magenta** **-Pink** **-Unknown** **-Multiple** **-Not Applicable** **-Other**
Command System The command system in use by the vessel that found the object. *(AML)*	Text string
Copyright Statement Indicates any copyright or releaseability restrictions on the data. *(AML)*	Text string

Attribute & definition	Values & definitions
Object Reference Number Reference number given to the object. *(AML)*	Text string
Object Shape Geometric form, appearance or configuration of the feature. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	Text string
Current Scour Dimensions The length, width, depth and orientation of the longest dimension of a scour that is associated with the object and that is caused by the action of currents. *(AML)*	**Encodes in quadruplets:** The length, width, depth and orientation of the longest dimension 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 these 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 or feet (units must be defined) Resolution: 0.1 (metres or feet)
Depth units Unit of measurement for depths *(AML)*	**Metres** **Fathoms and Feet** **Feet** **Fathoms and Fractions** **Unknown** **Not Applicable** **Other**
Distance from Small Bottom Object Distance from the object of the position from which the image was obtained. *(AML)*	Value: min 0 Units: metres 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 of the major axis. *(AML)*	**Encodes in triplets**: The semi-major, semi-minor and orientation of the error ellipse. Orientation is expressed as the true bearing of the major axis.
First Detection Year The year in which the object was originally reported. *(Adapted from STANAG 3715)*	Indication: 4 digits for the calendar year (CCYY).
First Sensor Indicates by the use of which sensor the object was originally reported. *(Adapted from STANAG 3715)*	-**Acoustic Sensor:** The object was reported as a result of a sound signal being returned from the object. *(AML)* -**Magnetic Sensor**: The object was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* -**Video Sensor:** The object was reported as a result of a sighting through electronic visual equipment. *(AML)* -**Diver Sighting:** The object was reported as a result of a visual sighting made by a diver. *(AML)* **-Other:** The object was reported as a result of another method. *(AML)* -**Physical Snag:** The object was reported as a result

Attribute & definition	Values & definitions
	of the object fouling lines, anchors or fishing nets. *(AML)* -**None Reported:** The method by which the object was found was not reported. *(AML)* -**Reported Sinking**: The object was reported as a result of a report made by a third party or from published information. *(AML)* -**Observed Sinking:** The object was reported as a result of a first hand observation of the object sinking. *(AML)* **- Unknown** **- Not Applicable**
General Water Depth The general depth of the water in the vicinity of the object. *(AML)*	Value: min 0 Units: metres or feet (units must be defined in dataset metadata) Resolution: 1 (metres or feet)
Height/Length Units Unit of measurement for heights and lengths.	-Metres -Feet
Horizontal Length A measurement of the longer of the two linear axes. *(Digital Geographic Information Working Group – DGIWG, Oct 87.)*	Value: min 0 Units: metres or feet (units must be defined) Resolution 1 (metres or feet)
Horizontal Width A measurement of the shorter of the two linear axes. *(Digital Geographic Information Working Group – DGIWG, Oct 87.)*	Value: min 0 Units: metres or feet (units must be defined) Resolution 1 (metres or feet)
Image file link Indicates an external file containing a pictorial representation of the object *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	Text string
Inclination The angle, measured from the horizontal, at which the object rests on the sea floor *(AML)*	Value: 0.00- 90.00 Unit: degree Resolution: 0.01
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)** **-Unknown** **-Multiple** **-Not Applicable** **-Other**
Last Detection Year The year in which the object was subsequently confirmed. *(Adapted from STANAG 3715)*	Indication: 4 digits for the calendar year (CCYY).
Last Sensor Indicates by the use of which sensor the object was subsequently confirmed. *(Adapted from STANAG 3715)*	-**Acoustic Sensor:** The object was reported as a result of a sound signal being returned from the SBO. *(AML)* -**Magnetic Sensor**: The object was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* -**Video Sensor:** The object was reported as a result of a sighting through electronic visual equipment.

Attribute & definition	Values & definitions
	(AML) -**Diver Sighting:** The object was reported as a result of a visual sighting made by a diver. *(AML)* -**Other:** The object was reported as a result of another method. *(AML)* -**Physical Snag:** The object was reported as a result of the object fouling lines, anchors or fishing nets. *(AML)* -**None Reported:** The method by which the object was found was not reported. *(AML)* -**Reported Sinking**: The object was reported as a result of a report made by a third party or from published information. *(AML)* -**Observed Sinking:** The object was reported as a result of a first hand observation of the object sinking. *(AML)* **- Unknown** **- Not Applicable**
Lay Platform The type of unit that laid the mine. *(AML)*	-**Vessel:** A craft or structure for transport by water. *(Adapted from Chambers Concise Dictionary)* -**Aircraft:** Any structure or machine for travelling in the air. *(Chambers Concise Dictionary)*
Lay Reference Number A number allocated to an individual mine by the minefield planning authority. *(AML)*	Text string
Lay Time Date and time a mine has been laid. *(AML)*	Indication: The 'lay time' will consist of a date and a time separated by a capital "T". The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD). The time should be encoded using 2 digits for the hour (hh) and 2 digits for the minutes (mm).
Magnetic Anomaly Detector (MAD) Signature Indication of the strength of the Magnetic Anomaly Detector reading caused by the object. *(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)* **- Unknown** **- Not Applicable** **- Other**
Magnetic Intensity Magnetic intensity generated by the object. *(AML)*	Value: 0 - 999 Unit: nanoTesla Resolution: 1
Maximum distance between survey lines The maximum spacing of the principal sounding lines of a survey *(AML)*	Units: metres or feet (units must be defined) Resolution: 1
Mine Index Mine Case Information on the mine body. *(AML)*	-**0:** No information on the mine body. -**1**: Moored mine -**2**: Shallow moored mine

Attribute & definition	Values & definitions
	-**3**: Deep moored mine -**4**: Ground Mine -**5:** Ground Mine – explosive charge of less than 500 kg -**6**: Ground Mine – explosive charge of 500 kg or greater -**7**: Object classified as 'mine-like' -**8**: Obstructors -**9**: Moving mines - **Unknown** - **Multiple** - **Not Applicable** - **Other**
Mine Index Mine Type Information on the type of mine. *(AML)*	-**A:** Contact - requires physical contact with the target to trigger actuation - *AML* -**B**: Antenna - generally takes the form of a special section in the mooring cable, and/or special cable suspended above the mine by float. When touched by a ferrous object sets up galvanic action to fire the mine. *ATP-6(C) VOL 1 Glossary* -**C**: Influence - actuated the effect of a target on some physical condition in the vicinity of the mine, or on radiations emanating from the mine - *ATP-6(C) VOL 1 Glossary* -**D**: Acoustic - responds to the acoustic field of a ship or sweep - *ATP-6(C) VOL 1 Glossary* -**E**: Acoustic Audio Frequency - responds to the acoustic field of a ship or sweep between 30 Hz and 1500 Hz - *ATP-6(C) VOL 1 Glossary* -**F**: Acoustic Low Frequency - responds to the low frequency (as defined by NSA) acoustic field of a ship or sweep - *AML* -**G**: Acoustic High Frequency - responds to the high frequency (as defined by NSA) acoustic field of a ship or sweep - *AML* -**H**: Passive - does not emit a signal to detect the presence of a target - *ATP-6(C) VOL 1 Glossary* -**I:** Pressure - responds to the hydrodynamic pressure field of a target - *ATP-6(C) VOL 1 Glossary* -**J:** Magnetic - responds to the magnetic field of a ship, submarine, or sweep - *ATP-6(C) VOL 1 Glossary* -**K**: Magnetic H (Horizontal component) - responds to horizontal component of the magnetic field of a ship, submarine, or sweep- *AML* -**L**: Magnetic V (Vertical component) - responds to the vertical component of the magnetic field of a ship, submarine, or sweep – *AML* -**M**: Magnetic T (Total component) - responds to the total magnetic field of a ship, submarine, or sweep – *AML* -**N**: Sensitive for normal target - sensitive to the normal run of shipping - *AML* -**O**: -**P**: Very sensitive (anti sweeper) - requires a relatively small magnitude of influence (as from a

Attribute & definition	Values & definitions
	slow, small, quiet and degaussed vessel) to actuate - ATP-6(C) VOL 1 Glossary. An Anti-Mine Sweeper Mine is a mine which is laid or whose mechanism is specifically designed or adjusted with the object of sinking or damaging Mine Sweepers - *ATP-6(C) VOL 1 Glossary* -**Q**: Coarse (anti sweep) - requires a relatively large magnitude of influence (as from a fast, large, noisy vessel, with strong magnetic signature) to actuate - AML. More difficult for Mine Hunters to safely actuate with sweeping gear designed to influence mines - *AML* -**R**: Multi-look mines - requires to look at a target more than once to calculate its firing or navigation solution - AML. A look is a period during which a mine circuit is receptive of an influence - *ATP-6(C) VOL 1 Glossary* -**S**: Sequence - sequence of triggers – *AML*. Requires actuation by a predetermined sequence of influences of predetermined magnitudes - *ATP-6(C) VOL 1 Glossary* -**T**: Combination (overlap) - combination of triggers – AML. Requires actuation by two or more influences, either simultaneously or at a predetermined interval, before the circuit can function. Also called a 'Comb ined Circuit' - *ATP-6(C) VOL 1 Glossary* -**U**: Fitted with ship Counter - will trigger actuation at a specific ship count - AML. Prevents the mine from detonating until a preset number of actuations has taken place (a ship count of ONE means that the mine will fire at the next actuation) - *ATP-6(C) VOL 1 Glossary* **-V:** Fitted with delayed arming or rising mechanism - a rising mechanism releases a buoyant mine from a sinker by target influence or by a timing device - *ATP-6(C) VOL 1 Glossary* -**W:** Active - actuated by the reflection from a target of a signal emitted by the mine - *ATP-6(C) VOL 1 Glossary* -**X**: No information on firing system -**Y:** -**Z:** Minehunting sonar decoy - an object designed to have the sonar signature attributes of a mine - *AML* **- Unknown** **- Multiple** **- Not Applicable** **- Other**
Mine Reference Number Reference number of object classified as a mine, consisting of the last two or three letters of the ship's international call sign followed by a two figure number allocated by the ship. *(AML)*	Indication: The mine reference number consists of the last two or three letter's of the ship's international call sign (c3) followed by a two figure number (i2) allocated by the ship
Minehunting System The method of minehunting employed by the vessel that found the object.	Text string

Attribute & definition	Values & definitions
(AML)	
Minesweeping System The method of minesweeping employed by the vessel that found the object. *(AML)*	Text string
Minimum distance between survey lines The minimum spacing of the principal sounding lines of a survey *(AML)*	Units: metres or feet (units must be defined) Resolution: 1
Mission Classification Classification of the mission that found the object. *(AML)*	**-Nato Secret** **-Nato Confidential** **-Nato Restricted** **-Unclassified** **-Unknown** **-Not Applicable** **-Other**
Mission Comments Textual information relating to the mission that found the object. *(AML)*	Text string
Mission Date Dates of mission that found the object. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Mission Name Name of exercise or operation taking place when the object was found. *(AML)*	Text string
Multiple Contacts Where a object consists of multiple contacts on a small area. *(AML)*	Value: 0 - 99 Unit: none Resolution: 1
MWDC Reference Number Reference number used by the Minewarfare Data Centre. *(AML)*	Text string
Nature of Construction The material(s) used to make the object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	**-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)* -**Masonry:** Constructed from brick or stone. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **-Metal:** Constructed from metal. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **-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)* **-Glass Reinforced Plastic (GRP):** Constructed from a plastic material strengthened with fibres of glass. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **- Wooden:** Constructed from wood. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **- Unknown**

Attribute & definition	Values & definitions
	- Multiple **- Not Applicable** **- Other**
Navigation System Navigation system used by the vessel that found the object. *(AML)*	Text String
Not found Occasions when area has been surveyed and the object not found *(AML)*	Encoded as repeating value pairs of name of vessel and date of survey. The survey 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).
Number of Previous Observations Number of times the object has been reported. *(AML)*	Integer value
On Sonar Indicates whether the object is visible on sonar *(AML)*	-**Yes:** The object is visible on sonar *(AML)* -**No:** The object is not visible on sonar *(AML)*
Orientation The angular distance measured from true north to the major axis of the object. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	Value: 0.00- 359.99 Unit: degree Resolution: 0.01
Orientation of Best Observation The bearing from which the object can be best observed. *(AML)*	Value: 0- 359 Unit: degree Resolution: 1
Origin of Data The method by which the data was determined. *(AML)*	**-Derived:** **-Measured:** **-Statistical:** **-Raw:** **-Foundation:** **-Unknown** **-Not Applicable** **-Other**
Originator Name of vessel or unit from which the information originated *(AML)*	Text string
Owner authority Denotes the 'owner' that is responsible for establishing and setting the protective marking level *(AML)*	The NATO country code *(NATO STANAG 1059)*
Producing country The country responsible for the production of the data *(AML)*	IHO code for producing agencies
Production agency The agency responsible for the production of the data *(AML)*	IHO code for producing agencies
Protective marking	**- COSMIC TOP SECRET**

Attribute & definition	Values & definitions
A marking indicating the minimum standards of protection required of the data *(AML)*	- **FOCAL TOP SECRET** - **TOP SECRET** - **SECRET** - **CONFIDENTIAL** - **RESTRICTED** - **UNCLASSIFIED** - **Unknown** - **Not Applicable** - **Other**
Quality of position An indication of the reliability of a quoted position *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) 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)* - **Position doubtful:** An object whose position has been reported but which is considered to be doubtful. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Unreliable:** An object's position obtained from questionable or unreliable data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **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, IHO Object Catalogue)* - **Reported (not confirmed):** An object whose position has been reported and its position has not been confirmed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **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, IHO Object Catalogue)* - **Calculated:** A position that is computed from data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*

Attribute & definition	Values & definitions
	- Unknown **- Multiple** **- Not Applicable** **- Other**
Quality of sounding measurement Indicates the reliability of the value of the sounding *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	**Depth Known:** The depth from chart datum to the bottom is a known value. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Depth Unknown:** The depth from chart datum to the bottom is unknown. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **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, IHO Object Catalogue)* **No Bottom Found at Value Shown:** Upon investigation the bottom was not found at this depth. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4848)* **Not regularly maintained:** Depths may be altered by human influence, but will not be routinely maintained. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Maintained Depth:** The depth at which a channel is kept by human influence, usually be dredging. *(IHO Dictionary, S-32, 5th Edition, 3057)* **Least Depth Known:** The shoalest depth over an object is of known value. *(Adapted from IHO Dictionary, S-32, 5th Edition, 2705)* **Least Depth Unknown, Safe Clearance at Depth Shown:** The least depth over an object is unknown, but there is considered to be safe clearance at this depth. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Value Reported (Not Surveyed):** Depth value obtained from a report, but not fully surveyed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Value Reported (Not Confirmed):** Depth Value obtained from a report, which it has not been possible to confirm. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Not Applicable** **Other**
Reference to a publication Reference to a specific location of any relevant information within an external publication *(AML)*	Text string
Relative Horizontal Accuracy	Text string

Attribute & definition	Values & definitions
The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	
Relative Vertical Accuracy The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	Text string
Ship's Speed Speed of ship when image was obtained *(AML)*	Unit: knots Resolution: 0.1
Sonar Frequency Frequency of the sonar that obtained the image. *(AML)*	**-VLF: Very low frequency** **-LF: Low frequency** **-HF: High frequency** **-VHF: Very high frequency** **-Unknown** **-Not Applicable** **-Other**
Sonar Range Scale The specified range of the sonar *(AML)*	Value: min 0 Unit: metres Resolution: 1
Sonar Reflectivity Measure of sonar reflectivity returned by the object. *(AML)*	-**H:** A high level of reflectivity is returned by the object. *(AML)* -**M:** A medium level of reflectivity is returned by the object. *(AML)* **-L:** A low level of reflectivity is returned by the object. *(AML)* **- Unknown** **- Multiple** **- Not Applicable** **- Other**
Sounding datum Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	**Approximate Lowest Astronomical Tide:** An arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(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)* **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)* **Approximate Mean Sea Level:** An arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* **Equinoctial Spring Low Water:** The level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*

Attribute & definition	Values & definitions
	High Water Springs: An arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* **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)* **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, IHO Object Catalogue)* **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)* **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)* **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, IHO Object Catalogue)* **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, IHO Object Catalogue)* **Low Water Springs:** An arbitrary level, approximating that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* **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, IHO Object Catalogue)* **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, IHO Object Catalogue)* **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)* **Lowest Low Water:** An arbitrary level conforming to the lowest tide observed at a place, or

Attribute & definition	Values & definitions
	somewhat lower. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **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)* **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)* **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)* **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)* **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 (MLLW):** The average height of the lower low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3145)* **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 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)* **Mean Water Level:** The average of all hourly water levels over the available period of record. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **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, IHO*

Attribute & definition	Values & definitions
	Object Catalogue) **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)* **Unknown** **Not Applicable** **Other**
Source agency The agency responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies
Source country The country responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies
Source date The date of issue of the source information, if applicable. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Source ID Any ID of the source (e.g. chart number). *(AML)*	Text string
Source scale The scale at which the source data has been compiled. *(AML)*	Unit: None Resolution: 1
Source type The type of the source (e.g. chart or report). *(AML)*	Text string
Status of Small Bottom Object Current minehunting status of the object. *(AML)*	-**Detected (MILEC):** Minelike echoes have been selected from within the sonar clutter. *(AML)* -**Classified (MILCO):** The object has been classified as a minelike object. *(AML)* -**Classified (NON-MILCO):** The object has been classified as a non-minelike object. *(AML)* -**Identified (NOMBO):** The object has been positively identified as a non mine minelike bottom object. *(AML)* -**Identified (Mine):** The object has been positively identified as a mine. *(AML)* -**Identified (UXO):** The object has been positively identified as an Unexploded Ordnance. *(AML)* -**Countermined:** The mine has been exploded by an explosive charge placed close to the mine. *(AML)* -**Neutralised:** The mine has been rendered incapable of firing though may still remain dangerous to handle. *(AML)* -**Removed:** The mine has been taken out of an area where its detonation would be unacceptable. *(AML)* -**Swept:** The object has been removed or destroyed by minesweepers using explosive or mechanical gear. *(AML)* - **Unknown** - **Multiple**

Attribute & definition	Values & definitions
	- Not Applicable **- Other**
Strength of Magnetic Anomaly Indication of the strength of the magnetic anomaly caused by the object. *(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)* **- Unknown** **- Not Applicable** **- Other**
Supporting textual information Supporting (free text) information relevant to the object that cannot be explicitly encoded in any other attribute	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 in any other attribute	Text string
Survey authority The Authority which was responsible for the survey	Text string
Survey Date and Time Date of minehunting survey and time that the object was found. *(AML)*	Indication: The date and time 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). The time should be encoded using four digits for the time in hours and minutes (hhmm). The date and time should be separated by a capital "T"

Attribute & definition	Values & definitions
Survey date end The end date of the Survey	**Indication:** 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD)
Survey date start The start date of the Survey	**Indication:** 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD)
Survey type The method used in acquiring survey data	**Reconnaissance/sketch survey:** A survey made to a lower degree of accuracy and detail than the chosen scale would normally indicate. *(IHO Dictionary, S-32, 5th Edition, 5219)* **Controlled survey:** A thorough survey usually conducted with reference to guidelines **Examination survey:** A survey principally aimed at the investigation of underwater obstructions and dangers **Passage survey:** A survey where soundings are acquired by vessels on passage **Remotely sensed:** A survey where features have been positioned and delimited using remote sensing techniques **Unknown** **Not Applicable** **Other**
Target Strength The strength of the returning signal from the target. *(AML)*	Units: dB

Attribute & definition	Values & definitions
Technique of sounding measurement Indicates the method or equipment used to obtain the object's depth. *(S-57 AnnexA, Appendix A, IHO Object Catalogue)*	**Found by Echo-Sounder/ Precision depth recorder:** The depth was determined by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultra-sonic 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)* **Found by Multi-Beam/Sonarray:** 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)* **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)* **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)* **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, IHO Object Catalogue)* **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)*

Attribute & definition	Values & definitions
	Found by Levelling: The depth was determined by using levelling techniques to find the elevation of the point relative to the datum. *(Adapted from IHO Dictionary, S-32, 2741)* **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)* **Satellite Imagery:** The depth was determined by using instruments placed aboard an artificial satellite. *(Adapted from IHO Dictionary, S-32, 4509)* **Computer Generated:** The sounding was determined from a bottom model constructed using a computer. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **Unknown** **Not Applicable** **Other**
Text file reference The file name relating to an external text file	Text string
Text file reference (in national language characters) The file name (in national language characters) relating to an external text file	Text string
Textual description The actual words used to define a particular thing, for the capture of information related to the feature "User Defined" *(adapted from SOED)*	Text string
The largest scale of survey information The largest scale for the range of survey scale as used in source diagram information	Units: none Resolution: 1
The smallest scale of survey information The smallest scale for the range of survey scale as used in source diagram information	Units: none Resolution: 1
Towed Body Depth Depth of towed body that obtained the image. *(AML)*	Unit: Metres Resolution: 0.1
Underwater Reference Mark Indication that the object can be used as a reference mark to confirm the vessel's position. *(AML)*	-**Yes**: The object is suitable as an underwater reference mark. *(AML)* -**No:** The object is not suitable as an underwater reference mark. *(AML)*
Vertical Length The effective vertical length of an object, measured from the highest (lowest) point of the object to either the seabed or ground (if fixed), or the water level (if floating) *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)

5.5.3 Relationships Between Features

5.5.3.1 Feature Dependency

The following table lists the parent-child relationships that exist in AML SBO

Parent Feature	Child Feature
Small Bottom Object	Contact History

5.5.3.2 Feature Association

The following table lists the features in AML Small Bottom Objects that have an association (i.e. not dependent but linked to provide additional information) with other features.

Feature 1	Feature 2
Small Bottom Object	Viewpoint

6 DATA CAPTURE GUIDELINES

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.

6.2 GUIDANCE ON FEATURE CODING

The 'AML SBO Guidance on Feature Coding and Attribution' section of the carrier format annex 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 SBO product is at the discretion of the producing authority, provided that the conventions described in the 'AML SBO Guidance on Feature Coding and Attribution' section of the carrier format annex are followed.

7 DATA PRESENTATION

7.1 SCOPE

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

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

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

8 PROVISION OF DATA

8.1 GENERAL

8.1.1 File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

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(s):

- **CD-ROM**
- **DVD**

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. See appropriate implementation annex.

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. See appropriate implementation annex.

8.6 ERROR DETECTION

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

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

N/A.

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.