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Specification

Formats and Protocols for Messages

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Summary

This document describes the International Monitoring System 2.0 (IMS2.0) version of the formats and protocols used for discrete message exchange, including requests for subscriptions and data messages.

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1. ABOUT THIS DOCUMENT

1.1. Purpose

This document describes the International Monitoring System 2.0 (IMS2.0) version of the formats and protocols used for discrete message exchange, including requests for subscriptions and data messages.

1.2. Scope

This document describes message exchange formats, some of which have not been implemented in International Data Centre (IDC) software. Formats that are not used at the IDC are included in Appendix D.

Software for receiving or generating messages or the formats and protocols for continuous data exchange are not described. These topics are described in sources cited below.

1.3. Audience

This document is intended for users, and software developers and engineers of the IDC Verification Data Messaging System (VDMS) Request and Subscription modules.

1.4. Related Information

The following documents complement this document:

- IDC/ENG/SPC/100/Rev.1 (2002). Formats and Protocols for Continuous Data CD-1.0. Provisional Technical Secretariat of the CTBTO Preparatory Commission, Vienna, Austria.
- IDC/ENG/SPC/101/Rev.3 (2002). Formats and Protocols for Continuous Data CD-1.1. Provisional Technical Secretariat of the CTBTO Preparatory Commission, Vienna, Austria.

See “References” on page 253 for a listing of all the sources of information consulted in preparing this document.

1.5. Using this Document

This document is part of the overall documentation architecture for the IDC and provides descriptions of IDC products and their formats.

This document is organized as follows:

- OVERVIEW

  This chapter provides a high-level description of the protocol and formats for messages.

- MESSAGE STRUCTURE

  This chapter provides a high-level description of the structure of messages used to exchange data.

- REQUEST MESSAGES

  This chapter describes the formats for messages that are used to make requests for data and data products.

- SUBSCRIPTION MESSAGES

  This chapter describes the formats for messages that are used to establish and manipulate subscriptions.

- S/H/I DATA MESSAGES

  This chapter describes the formats for messages that contain seismic, hydroacoustic, and infrasonic (S/H/I) data and data products.

- RADIONUCLIDE MESSAGES

  This chapter describes the formats for messages that contain radionuclide data and data products within the Radionuclide Monitoring System (RMS).

- COMMAND REQUEST AND RESPONSE MESSAGES

  This chapter describes the formats for messages that contain command request and command response messages.

- SUMMARY MESSAGES

  This chapter describes the formats for messages that contain summary data and data products.

- STATION AUTODRM BASICS

  This chapter describes the formats that must be supported by auxiliary seismic stations of the International Monitoring System (IMS).

- References

  This section lists the sources cited in this document.

- Appendix I: History of Formats and Protocols for Messages

  This appendix contains an outline of the development of tbhe formats and protocols for messages.

- Appendix II: Country Codes

  This appendix contains codes such as country codes used in IDC AutoDRM messages.

- Appendix III: Data Message Examples

  This appendix contains examples of formatted data messages.

- Appendix IV: Unsupported Commands at the IDC

  This appendix contains a list of unsupported commands at the IDC.

1.6. Conventions

This document uses a variety of conventions, which are described in the following tables. Table 1 shows the typographical conventions. Table 2 explains certain technical terms that are not part of the standard Glossary, which is located at the end of this document.

Table 1. Typographical Conventions

Element	Font	Example
required environments	***bold***	***time***
processes and software units user-defined arguments	*italics*	*AutoDRM* *`msg_id id_string`* *[source]*
computer code and output text that should be typed in exactly as shown	`courier`	`msg_type data` `begin ims1.0`
key words of control lines, environment lines, request lines, data lines, and specific data message types when used in text	CAPITALS	E-MAIL, TIME, ARR, BULLETIN, LOG, UNASSOCIATED, SHORT

Table 2. Terminology

Term	Description
*	(asterisk) symbol indicating that any ASCII character(s) may be substituted
[ ]	(square brackets) symbols delineating optional parameters in a syntax description
…	(ellipsis) symbol indicating that lines of an example have been intentionally omitted
|	(vertical bar) symbol indicating “or” in a syntax or environment description
block	group of lines in a data message that constitutes a cohesive unit of information
compressed data	data that have been reduced significantly in size to make transmission more efficient
control lines	request or subscription message lines that specify how/when the response to the request or subscription will be sent
data message	message that contains data, usually sent in response to a request message or a subscription
data products	reports, bulletins, and other products that contain the results of processing
environment lines	request or subscription message lines that establish an environment within which requests or subscriptions are made
identification lines	AutoDRM message lines that identify the AutoDRM version, message type, and reference numbers
logical line	AutoDRM instruction or data line that is a complete unit as defined in this document. A logical line may consist of one or more physical lines.
physical line	line terminated by a Line Feed or by a Line Feed followed by a Carriage Return

Term	Description
request lines	request or subscription message lines that specify the data or data product being requested
request message	AutoDRM message that requests data or data products
subscription message	AutoDRM message that establishes or alters regular delivery of data or data products

Formats in this document represent either American Standard Code for Information Interchange (ASCII) characters or binary fields, depending on the type of data being described. The conventions for ASCII formats include the following format types:

- "a" alphanumeric character strings
- "i" integers
- "f" floating point numbers
- "e" exponential numbers

Depending on the format type indicator (a, i, f, e), each is followed by either an integer or a decimal number. For alphanumeric character strings and integer numbers, the number following the format type is an integer that describes the maximum number of characters or digits allowed in a field. For example, the format "a5" indicates that the field is represented by five alphanumeric characters (for example, `SE001`), and the format "i4" indicates an integer number with four positions (for example, `4321`). For floating point and exponential numbers, the type indicator is followed by two numbers separated by a period as in "n.m". In both formats, "n" describes the maximum number of characters that may be used to represent the number, including decimal points, exponential indicators, plus or minus signs, and so on. For floating point numbers, "m" is the recommended number of digits that follow the decimal point. The number of digits after the decimal point is allowed to "float" to accommodate anomalous data. For example, "f5.2" accommodates numbers from `.0001` to `99999`, but the preferred representation is two digits after the decimal point. For exponential number formats, "m" is the exact number of digits to the right of the decimal. For example, "e11.4" accommodates numbers like `-1.2345E+03`.

Some fixed formats allow combinations of the format types. Time and date formats combine the a, f, and i format types. A typical format for a date (such as `1998/04/15`) is "i4,a1,i2,a1,i2".

Where binary data are part of a format description, the numbers and characters are expressed as the number of bytes that are used to store them along with the convention that is used for ordering the bytes. The Institute for Electrical and Electronic Engineers (IEEE) byte order convention is used throughout this document.

2. OVERVIEW

This chapter provides an overview of the IMS2.0 formats and protocols for messages. It includes the following topics:

- Introduction
- Message Exchange
- Message Protocols
- Message Authentication

2.1. Introduction

The International Data Centre (IDC) is the international repository of data monitored under the Comprehensive Nuclear-Test-Ban Treaty (CTBT). It processes and provides the following to State Signatories of the CTBT:

- Data

  Seismic, hydroacoustic, infrasonic (S/H/I) and radionuclide data produced by International Monitoring System (IMS) stations and certified radionuclide laboratories.

- Products

  Reports, such as event lists and bulletins, produced by the IDC through the processing of S/H/I and radionuclide data received from IMS stations and certified radionuclide laboratories.

2.2. Message Exchange

The IDC, National Data Centres (NDCs), IMS stations, and certified radionuclide laboratories can communicate with each other via e-mail messages.

The following types of messages are exchanged:

- Request

  This message type contains a request for S/H/I data, radionuclide data, or IDC products.

- Subscription

  This message type establishes (or alters) standing requests for S/H/I data, radionuclide data, or IDC products.

- Data

  This message type contains S/H/I data, radionuclide data, or IDC products. When a request or subscription message is sent, the response consists of a data message. However, not all data messages are prompted by a request or subscription message. For example, data messages sent from an IMS radionuclide station to the IDC are not prompted by request or subscription messages.

- Command Request

This message contains a series of free-format command lines that provide information about the return message (E-MAIL), set the environment for the requested command (TIME_STAMP) and specify the type of command that is requested.

- Command Response

  This message is sent by the station in response to a command request. The response may include arguments and command parameters. More than one response may result from a single command request; for example an acknowledgement followed later by some required information or results. An acknowledgement of a command request is expected within one working day.

These message types are described in subsequent chapters.

2.3. Message Protocols

Two standard low-level protocols are used for the exchange of messages: electronic mail (email) and HTTP. Differences exist, however, in the circumstances under which these protocols are used for transmitting radionuclide and S/H/I data messages.

For S/H/I-related messages, the use of the available message protocols depends on the message length and content. For example, email is used for exchanging shorter S/H/I-related messages. HTTP is used for exchanging longer S/H/I-related messages.

In contrast, all radionuclide-related messages are exchanged via email. HTTP is used only in extremely limited cases where large radionuclide data files are sent from, for example, the IDC to a National Data Centre (NDC).

At the application level, the message protocol requires that request and subscription messages be answered with data messages. Information controlling the format, low-level protocol, and destination for the data message are included in request and subscription messages.

2.4. Message Authentication

IMS2.0 messages are sent via email using the Secure Multipurpose Internet Mail Extensions (S/MIME) protocol (see Request for Comments Cryptographic Message Syntax (RFC 3369), Cryptographic Message Syntax (CMS) Algorithms (RFC 3370), S/MIME Version 3 Message Specification (RFC 2633), S/MIME Version 3 Certificate Handling (RFC 2632), Diffie-Hellman Key Agreement Method (RFC 2631)). S/MIME is based on the Internet MIME standard (see Crocker, S., Freed, N., Galvin, J., and Murphy, S., 1995). It provides a consistent method of sending and receiving secure MIME mail by adding authentication and privacy. S/MIME can be used by traditional mail user agents to add cryptographic security services to mail that is sent, or to interpret cryptographic security services to mail that is received.

Data and request messages in IMS2.0 may be authenticated using multipart/signed S/MIME format, also known as clear-signing format, without altering the IMS2.0 format. The authentication mechanism encapsulates the message body and the digital signature within MIME boundaries. The multipart/signed S/MIME format has the advantage that the message can always be viewed by the receiver, whether the receiver software can authenticate the signature or not. The current industry standard for cryptographic format is the PKCS #7 (see PKCS #7: Cryptographic Message Syntax, Cryptographic Message Syntax (RFC2630)). This is a flexible message format for representing the results of cryptographic operations on messages.

Standard mail agents and open source applications have the capability to interpret or create digital signatures. With the appropriate digital certificate installed in sender equipment, a user can manually create a valid signed message. With the sender public key installed in the receiver equipment, the user can authenticate a digitally signed message.

The signature of the originating parties may be retained when data or products are forwarded from one site to another. In this case, any subsequent signatures would encapsulate the entire previously signed message including the signature into a message body with an additional signature.

3. MESSAGE STRUCTURE

This chapter describes the structure of messages and includes the following topics:

- Introduction
- Message Preface
- Message Body
- Message Conclusion
- Message Conventions

3.1. Introduction

A message consists of a preface, body, and conclusion. A HELP message is the exception to this rule.

The message preface contains the first four lines of all messages. These are the BEGIN, MSG_TYPE, MSG_ID, and, optionally, either the REF_ID, ACK or PROD_ID lines. Respectively, they provide information on

- the message format version number,
- the message type,
- the message identification,
- the message identification of the referenced message, if any
- whether user wants to receive acknowledgement of receipt of request
- the product identification number and sequence number for the product subscribed to, if any.

The message preface is followed by a body containing requests, subscriptions or data specific to the message type.

Finally, the message conclusion ends the message. It consists of the STOP line.

The syntax of a message is as follows:

`begin` *version_identifier*
`msg_type request | subscription | data | labdata | command_request | command_response`
`msg_id id_string` [*source*]
[`ref_id` *ref_str* [*ref_src*] [`part` *seq_num* [`of` *tot_num*]]] |
[ack true|false ||]
[`prod_id` *product_id delivery_id*]
…
`stop`

For example, the syntax of a subscription message is described line by line in the table below:

Table 3. General Structure of a Subscription Message

Line #	Syntax	Example of contents	Description
1	`begin` message_format	`begin ims2.0`	message version number
2	fixed (for subscription message)	`msg_type subscription`	specifies the type of message
3	`msg_id` id_string [source]	`msg_id abc23 any_ndc`	assigns an identification code to the message for tracking
4	`e-mail address`	`e-mail name@domain_name`	the e-mail address to which the answer should be sent
5 to (N-1)	customizable	environmental lines and request lines	specifies how often responses will be sent, and what data or products will be sent
N	stop	stop	end of message

3.2. Message Preface

3.2.1. ***BEGIN***

The BEGIN line is the first line of a message. The BEGIN line contains the version identifier of the command syntax.

3.2.1.1. *Syntax*

```
begin IMS2.0
```

The argument in the BEGIN line of a request message is the default format of the body of the message. If a specific format string is given on a message line, that format specification will override the default.

3.2.2. ***MSG_TYPE***

The MSG_TYPE line is the second line of a message. A message type is required for a distinction to be made between different types of messages. Only one MSG_TYPE is allowed per message. Combining different message types in the same message is prohibited.

3.2.2.1. *Syntax*

```
msg_type request | subscription | data | labdata |
command_request | command_response
```

3.2.3. ***MSG_ID***

The MSG_ID line is the third line of a message. A message identification code is required for tracking and identifying messages. The MSG_ID line contains the MSG_ID keyword followed by an *id_string* code and a *source* code separated by a blank.

The sender is responsible for providing a unique *id_string*, as well as a descriptive *source* code. The *id_string* may contain up to 20 alphanumeric characters[1]. The *source* code is optional and may contain up to 16 alphanumeric characters. Blanks or backslash (\) characters are not allowed in either the *id_string* or the *source* codes.

3.2.3.1. *Syntax*

`msg_id` *id_string* [*source*]

id_string	unique identification code (up to 20 characters)
source	message source code (up to 16 characters)

The *source* of a message can be an IMS station, a certified radionuclide laboratory, an NDC, a Contributing National Facility (CNF), or the IDC. For radionuclide facilities, the radionuclide station or laboratory code must be used as the *source*. For S/H/I stations and data centres (NDC and the IDC) the source is the network code.

3.2.4. ***REF_ID***

The REF_ID line is included in a message in two cases:

- when a message is generated and transmitted to a party in response to a message received from (sent by) the same party, and/or
- when a very large message is split into several separate, smaller messages.[2]

Like the MSG_ID, the REF_ID also serves to track and identify messages. If the REF_ID line function is not required in a message, it is omitted. Otherwise, it occurs as the fourth message line.

The REF_ID line is comprised of the REF_ID command followed by a ref_str code and a ref_src code, separated by a blank. The *ref_str* and *ref_src* are, respectively, the *id_string* and *source* in the MSG_ID line of the original message received. Like the source, the ref_src is not a required field.

For multiple messages that must be recombined to form a complete message, the REF_ID line contains additional commands and attributes. Following the *ref_src*, the commands part and of are added with their respective attributes *seq_num* and *tot_num*. The tot_num is the total number of separate messages that comprise the complete message unit. The order in which the messages should be recombined is indicated in the *seq_num*.

---

[1] For tracking purposes, it is recommended to use sequential numbering for the id_string.
[2] At the IDC, splitting messages is not implemented for outgoing messages.

3.2.4.1. *Syntax*

`ref_id` *ref_str* [*ref_src*] [`part` *seq_num* [`of` *tot_num*]]

ref_str	the *id_string* from the MSG_ID line of the request message
ref_src	the message source code from the MSG_ID line of the request message
seq_num	sequence number beginning with 1
tot_num	total number of parts for this response

3.2.5. *ACK*

The ACK line is included in a message when the user decides whether to receive acknowledgement that the request has been received by the AutoDRM. The default is to send back an acknowledgement to the user.

3.2.6. *PROD_ID*

The PROD_ID line is the fourth line of a data message that is generated for a subscription. The PROD_ID line is comprised of the PROD_ID keyword followed by a *product_id* code and a *delivery_id* code, separated by a blank. These numbers help users receiving the subscription know if a delivery has been omitted.

3.2.6.1. *Syntax*

`prod_id` *product_id delivery_id*

product_id	product identification code
delivery_id	delivery identification

3.3. Message Body

The body of a message depends on its type:

3.3.1. *REQUEST*

The body of a request message contains a series of free-format command lines that provide information about the return message (request control lines), set the environment for subsequent request lines (request environment lines), and specify the type of data that are to be returned within the limits of the environment (request lines). Some request lines must be preceded by environment lines that, by constraining the request, limit the size of the response. For details, see “Request Messages” on page 3636.

3.3.2. *SUBSCRIPTION*

The body of a subscription message is formatted much the same way as a request message, but because subscription messages provide data on a scheduled basis rather than as a response to an individual request, they are given a separate message type and have additional capabilities that are not found in request messages.

A subscription message contains information about where to send the subscribed data, how often the subscribed data should be sent, and what data (or data products) to send. Like request messages, subscriptions are defined through environment variables that constrain the data to be sent and request lines that specify which data to send. Separate subscriptions are delimited by separate subscription request lines. In other words, each time a subscription request line is encountered, a corresponding subscription will be initiated for the user. For details, see "Subscription Messages" on page 88.

3.3.3. *DATA*

The body of a data message contains the data generated at an IMS station, CNF or radionuclide laboratory. Data sections must begin with a DATA_TYPE line. The arguments to `DATA_TYPE` are the type of data that follows (for example, WAVEFORM or BULLETIN) and the format (IMS2.0) and can include subformat depending on the format the requestor wants (for example SC3XML or MS_ST2_512 for miniseed formats. For details, see "S/H/I Data Messages" on page 117 and "Radionuclide Messages" on page 160.

3.3.4. *LABDATA*

The body of a laboratory data message contains additional data required for the analysis at radionuclide laboratories. For details, see "Radionuclide Messages" on page 160.

3.3.5. *COMMAND_REQUEST*

The body of a command request message contains a series of free-format command lines that provide information about the return message (E-MAIL), set the environment for the requested command and specify the type of command that is requested.

3.3.6. *COMMAND_RESPONSE*

The body of a command response contains the message sent by the station in response to a command request. The response may include arguments and command parameters. More than one response may result from a single command request; for example an acknowledgement followed later by some required information or results. An acknowledgement of a command request is expected within one working day. The requestor can decide not to receive an acknowledgment by setting the ACQ environment to FALSE.

3.4. Message Conclusion

3.4.1. *STOP*

The STOP line is the last line of an IMS2.0 message. Commands found on the same line after the STOP are ignored. If two or more messages with different MSG_ID `id_strings` are included in one e-mail or file, all lines between the STOP and subsequent BEGIN lines are ignored. A message without a STOP line is considered incomplete and is ignored.

3.5. Message Conventions

Basic message conventions are used for both radionuclide- and S/H/I-related messages. However, some differences in conventions exist between the radionuclide- and S/H/I-related messages, including:

- fixed-format field justification
- case sensitivity
- blank lines
- missing data
- station naming
- comment conventions
- version format number

The basic message conventions are as follows:

3.5.1. *Message Size*

The maximum size of a message is 100 MB[3]. The maximum message size depends on the bandwidth of the connection between the message source and recipient, as well as the space available on computers for storing messages.

Although certain sites may be constrained by system limitations to sending e-mail messages smaller than 400 KB, Transmission Control Protocol/Internet Protocol-based (TCP/IP) e-mail systems are generally reliable up to at least 1 MB. To accommodate data messages larger than these limits, a mechanism is provided for a single data message to be split into several parts that can be reconstructed by the recipient (see “Message Preface” on page 24).

Radionuclide-related messages larger than 1 MB should be broken into several smaller e-mails using the methods described in “Message Preface”. For S/H/I-related messages, the message size determines the protocol that is most appropriate for message transmission. Messages larger than 1 MB should be transferred via HTTP.

[3] This maximum size can vary from one organization to the other

3.5.2. *Line Length*

A line may be up to 1,024 characters long, excluding the special characters Line Feed (LF) and Carriage Return (CR). An ASCII message line may be terminated by a `LF` or by a `CR` followed by a `LF`.

The format for a message line determines its logical line length. In S/H/I messages, a logical line may be broken into several physical lines. To break a logical line into several physical lines, a backslash (\)[4] is inserted at the desired break point. The logical line is then continued on the next physical line. The backslash may occur in any character position of the line and is counted as one of the physical line characters. The backslash does not hold the place of a blank or any other character. The character preceding the backslash is concatenated with the character in position one of the next physical line. If the logical line length for an ASCII line is longer than 1,024 (such as with ASCII waveform data), then the line break character (\) is not used. Data are simply continued on the next line. Breaking logical lines with backslashes is not allowed in radionuclide-related messages.

3.5.3. *Free-format Lines*

Message lines that are not in fixed format are known as free-format lines. A free-format line may consist of a keyword followed by an argument list or it may contain unformatted free text. Free-format lines are left justified and case insensitive. Free-format lines must have one or more blank spaces between fields. All lines in request and subscription messages are free-format lines.

3.5.4. *Fixed-format Lines*

Fixed-format lines differ from free-format lines in that they have explicitly defined character fields. Most data message lines are in fixed format (header and data lines are examples).

Although many fixed-format lines are case insensitive, some are not. Fixed-format lines that are case sensitive include message lines in waveform data messages after compression by the CM6 compression scheme (see “Subformat CM6” on page 131). No fixed-format lines in radionuclide data messages are case sensitive.

Field contents in radionuclide data messages that are parsed into the IDC database are left justified. Otherwise, field contents are right or left justified according to the field and line formatting. Alphanumeric character fields in fixed-format lines (such as a field with format a12) must be left justified. Numeric fields and numeric/alphanumeric character combination fields (such as f10.4; or i4,a1,i2) must be right justified.

3.5.5. *Blank Lines*

Blank lines are not permitted in radionuclide data messages. Blank lines are allowed in free text fields such as those found in a `#Comment` block and an ALERT data message (see Table 59 and “Alerts” on page 205).

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[4] The line break character (\) is not implemented at the IDC.

In all other message types, blank lines may be added to improve legibility where they do not cause ambiguity.

3.5.6. *Splitting Data Messages*[5]

In data messages, the identification (ID) fields from the MSG_ID line of the request message are placed in the REF_ID line. If a data message must be split into smaller messages, the split(s) must occur only at DATA_TYPE boundaries. This method has the following advantages:

- data sections are never broken in the middle; and
- each message split is headed by BEGIN, MSG_TYPE, MSG_ID, and REF_ID lines, and terminated by a STOP line.

Each id_string in the MSG_ID lines of the individual split messages must be unique. The REF_ID lines, however, will have identical *ref_str* and *ref_src* codes. The `part` *seq_num* command is needed only when a message is split into parts. The `of` *tot_num* coding is optional for all but the last section of the split message.

3.5.6.1. *Examples*

To illustrate the use of REF_ID, suppose the following request for waveform data is sent from the NDC in country ABC to the IDC:

```
begin ims2.0
msg_type request
msg_id 2002/05/21_0001 ABC_NDC
…
stop
```

The IDC’s response to the request will have a REF_ID from the IDC and will use the request message MSG_ID string in the REF_ID line:

```
begin ims2.0
msg_type data
msg_id 00567023 ctbto_idc
ref_id 2002/05/21_0001 ABC_NDC
…
stop
```

The following example shows a data message with four distinct `DATA_TYPES`:

```
begin ims2.0
msg_type data
msg_id 54965 ctbto_idc
ref_id 0002324 ANY_NDC
data_type type1 ims2.0
…
```

[5] At the IDC, splitting messages is not implemented for outgoing messages.

```
data_type type2 ims2.0
…
data_type type3 ims2.0
…
data_type type4 ims2.0
…
stop
```

The following example shows how a data message can be split. The single message in the previous example is split into two distinct messages using the `part` *seq_num* [`of` *tot_num*] referencing mechanism.

```
begin ims2.0
msg_type data
msg_id 54965 ctbto_idc
ref_id 0002324 ANY_NDC part 1 of 2
data_type type1 ims2.0
…
data_type type2 ims2.0
…
stop
begin ims2.0
msg_type data
msg_id 54966 ctbto_idc
ref_id 0002324 ANY_NDC part 2 of 2
data_type type3 ims2.0
…
data_type type4 ims2.0
…
Stop
```

3.5.7. ***Missing Data***

Some fields in a message are required, while others are not. Blank characters can be used for missing data in S/H/I data message but not in radionuclide data messages. For proper data parsing during automatic input processing, radionuclide fields that are not required and are missing data must be filled. Missing radionuclide numerical data (that is, floating point, integer, and exponential numbers) are indicated by a negative sign followed by as many nines as the field formatting will allow. Missing radionuclide character data with formats such as a50 are designated with a single zero (0).

3.5.8. ***Comments***

Comments for S/H/I-related messages are used primarily in LOG and ERROR_LOG data messages. In these messages the comments are free-format lines in which the first character is blank.

Some ISC extensions of the IMS2.0 formats use comment lines to include additional information for some data types. These comment lines are formatted, always including a left parenthesis in the second column, and either a hash (#) or plus (+) in the third column, depending on the usage (see International Seismological Centre, 1999).

Comments in radionuclide-related messages use a free-format line structure that begins with a `#Comment` line. The lines following the `#Comment` line contain the comment text. The end of the comment is designated by a `STOP` line or another line beginning with a #. The STOP line is interpreted as the end of the message. Comments may appear in all radionuclide data messages, however, only one `#Comment` block is allowed per message. `#Comment` blocks cannot occur within other data blocks, but instead must precede or follow a data block.

3.5.9. ***Date and Time Formats***

The standard format for specifying the date and time contains two fields: one for the date and one for the time, with a blank separating the two fields. The date must always be present, but the time field may be omitted. When no time is specified, the field defaults to 00:00:00.000. Missing date fields are specified with a single zero.

The time field may have varying degrees of precision (that is, decimal places in the seconds attribute). The time format with the highest precision follows:

3.5.9.1. *Syntax*

yyyy/mm/dd hh:mm:ss.sss

yyyy	year
mm	month number
dd	day of the month
hh	hour in universal coordinated time (UTC)
mm	minute
ss.sss	seconds

The range of time over a day is from 00:00:00.000 up to (but not including) 00:00:00.000 of the next day. Leading zeros in any of the number fields may be dropped in free-format lines, but they must be present in fixed-format lines. In addition, some of the values may be dropped from the time field in free-format lines. If the seconds, or the minutes and seconds, are dropped, then they are assumed to be “0” (for example, `21:03` is interpreted as 21:03:00.000 and 9 is interpreted as 09:00:00.000).

The following date-time formats are acceptable for free-format lines:

```
1994/01/01 13:04:12.003
1994/12/23
1995/07/14   01:05
1995/09/10 2:15:3
```

3.5.10. *Radionuclide Station and Laboratory Codes*

Radionuclide station codes must contain five characters. The first two characters are the country code for the country in which the site resides (see APPENDIX II). The next character identifies the system type installed at the station. System types include P for particulate monitoring, `X` for xenon monitoring, and `L` for radionuclilde laboratories. The last two characters are the two-digit numbers assigned to the station or laboratory in the text of the CTBT.

3.5.11. *Radionuclide Detector Codes*

The detector code enables easy identification of a unique detector and its location. Radionuclide detector codes contain nine characters. The first five characters are the site code. This code is followed by a '_' (underscore) and a three-digit integer identifier assigned to a specific detector setup.

3.5.12. *S/H/I Network Codes*

With the large number of S/H/I stations distributed globally, unique station names cannot be guaranteed. The S/H/I network naming format supports the concept of duplicate station names and thus requires that stations be affiliated with a network.

The network identifier can be up to nine characters in length and consists of two parts separated by an underscore. The first part is three or four characters in length and is the "domain" of the network. This code is either an internationally recognized affiliation (such as IDC) or a three-letter ISO standard country code, as shown in APPENDIX II. The second part of the network identifier is the network code (1–4 characters) within that domain. An NDC sending data to the IDC may use the network code NDC. For example, the three-letter ISO code for the Czech Republic is `CZE`, so the default network code for the NDC of the Czech Republic is `CZE_NDC`.

3.5.13. *S/H/I Station Codes*

To guarantee that station names are unique and follow international naming conventions, S/H/I station codes should be registered with the ISC in the United Kingdom/the National Earthquake Information Center (NEIC) in the United States.

All station codes must be three to five characters. Array stations have unique station codes for each element of the array as well as a unique array code that refers to the entire array. The code referencing the array should not be the same as the station code of any of the array elements.

3.5.14. *S/H/I Channel Codes*

The format for channel designators of S/H/I stations expands upon the format used by the Federation of Digital Seismic Networks (FDSN). Three characters are used to designate a channel. The first specifies the general sampling rate and the response band of the instrument, as shown in Table 4. The second character specifies the instrument code, as shown in Table 5.

The third character specifies the physical configuration of the members of a multiple axis instrument package or other parameters as specified for each instrument, as shown in Table 6.

Table 4. S/H/I Channel Band Codes

Band Code	Band Type	Sample rate (Hz)	Corner period (seconds)
E	extremely short period	≥ 80	< 10
S	short period	≥ 10 to < 80	< 10
H	high broadband	≥ 80	≥ 10
B	broadband	≥ 10 to < 80	≥ 10
M	mid period	> 1 to < 10	
L	long period	= 1	
V	very long period	= 0.1	
U	ultra long period	= 0.01	
R	extremely long period	= 0.001	
W	weather/environmental		
X	experimental		

Table 5. S/H/I Channel Instrument Codes

Instrument Code	Description
H	high-gain seismometer
L	low-gain seismometer
G	gravimeter/accelerometer seismometer
M	mass position seismometer
D	pressure sensor
C	composite trace

Table 6. S/H/I Channel Orientation Codes

Orientation Code	Description
Z, N, or E	traditional (vertical, north-south, east-west)
A, B, or C	tri-axial (along the edges of a cube turned up on a corner)
T or R	for transverse and radial rotations
1, 2, or 3	orthogonal components but nontraditional orientations
U, V, or W	optional components
H	hydrophone

Orientation Code	Description
F	infrasonic pressure
C	coherent beam
I	incoherent beam
O	origin beam

3.5.15. *S/H/I Auxiliary Codes*

The auxiliary designator is used to distinguish between different instruments or data streams that have the same station and channel codes. This four-letter designator is used only when a conflict exists. When not needed, this field is left blank.

3.5.16. *Latitude/Longitude Conventions*

All latitudes and longitudes are written as floating point numbers. Latitudes in the Southern Hemisphere have negative values. Longitudes in the Western Hemisphere have negative values.

4. REQUEST MESSAGES

This chapter describes the request message formats and includes the following topics:

- Introduction
- Help Line
- Request Format
- Request Control Lines
- Request Environment Lines
- Request Lines

4.1. Introduction

The request message format provides a framework in which data or products can be requested from the IDC. The data and products available include radionuclide pulse height data and analysis reports, S/H/I waveforms and bulletin products, and more.

Within a single request message, several types of data and products may be requested. For example, requests may be made for a bulletin and associated waveforms or for specific event information from several different regions. The order of the requests in the request message is preserved in the response (data) message.

The data and products that can be received will vary from site to site and will depend on the type of messages and information that is available from the site. The minimum required configuration for a station or NDC *AutoDRM* is outlined in “Station AutoDRM Basics” on page 249.

4.2. Help Line

The HELP line is considered a request message because it is used to request an *AutoDRM* User’s Guide by email. Only the *AutoDRM* email address is required for this protocol to work properly. No other message lines are required in a HELP line message. The same result may be achieved by sending the *AutoDRM* an empty message with the word "`help`" as the email subject (see “HELP” on page 313).

4.3. Request Format

With the exception of the HELP request, all request messages require the basic message structure described in “Message Preface” on page 24. If a message is a request message, the MSG_TYPE is set to `request`.

The body of a request message contains a series of free-format command lines that provide information about the return message (request control lines), set the environment for subsequent request lines (request environment lines), and specify the type of data that are to be returned within the limits of the environment (request lines). Some request lines must be preceded by environment lines that, by constraining the request, limit the size of the response.

The response to a request is contained in a data message. In the response data message, the identification (ID) fields from the MSG_ID line of the request message are placed in the REF_ID line.

4.4. Request Control Lines

Request control lines are commands that specify the protocol of the response data message. The existing options for the response message protocol are only email. This option should be used in accordance with the guidelines described in “Message Protocols” on page 213 and “Message Conventions” on page 28.

If no E-MAIL line is included in the request message, the reply is sent to the address obtained from the mail header. Because the return address from an email header may not be reliable, it is highly recommended to specify the return email address using an E-MAIL line.

The syntax for the E-MAIL request control line is described in the following sections.

4.4.1. *E-MAIL*

The E-MAIL line indicates that the response message protocol is email. The argument for the E-MAIL command is the email address to which the response message should be sent.

4.4.1.1. *Syntax*

`e-mail` *address*

address email address to send reply

If no E-MAIL line is included in the request message, the reply is sent to the address obtained from the mail header. Because the return address from an email header may not be reliable, it is highly recommended to specify the return email address using an E-MAIL line.

4.5. Request Environment Lines

Environment lines identify the variables to which the response to the request line is constrained (for example, TIME or STATION). An environment variable is set by arguments that follow a predetermined keyword and is reset with another environment line including the same keyword. An environment keyword with no arguments resets the constraint on that environmental parameter to the default value. Environment variables may be specified using either ranges or lists.

An environment range constrains the variable to limits specified by two values. The two range limits are separated by the word “ `to` ” (including blank spaces).

4.5.1.1. *Syntax*

environment_keyword [[*low_limit*] `to` [*high_limit*]]

Open-ended ranges are specified by omitting the *low_limit* or the *high_limit*. A blank may also be used in the *low_limit* or the *high_limit* when a TIME environment is being specified.

4.5.1.2. *Examples*

All times from 23 February, 1999 at 00:00:00 up to (but not including) 10 March, 1999 at 14:37:02 are specified with the following environment line:

```
time 1999/02/23 to 1999/03/10 14:37:02
```

The following example specifies all magnitudes of 5.0 and above:

```
mag 5.0 to
```

List environment lines contain lists of comma-delimited parameters that specify discrete constraints, such as station names and channels. Some list environments are allowed only one parameter (for example, BULL_TYPE); others may have an unlimited number. Spaces after the commas are optional. The general syntax for a list environment follows.

4.5.1.3. *Syntax*

environment_keyword [*arg1*[, *arg2*[, *arg3*[, …]]]]

Lists can be long, so a wild card character (*) may be used as a substitute for any string of characters in some list environments.

4.5.1.4. *Examples*

The following environment line specifies all IMS stations:

```
sta_list *
```

The following environment line specifies all IMS stations beginning with “A”:

```
sta_list a*
```

The following environment line specifies all IMS channels ending with “Z”:

```
chan_list *Z
```

The following sections describe specific environment variables. Default settings and examples are given for each variable. Although many environment variables are listed, only certain ones may be applicable to a particular IMS2.0 implementation. Those variables that have been implemented are described in the *AutoDRM* User’s Guide available through the HELP request line (see Help Line).

The STA_LIST, TIME, and TIME_STAMP environments can be used in requesting either radionuclide or S/H/I data. All other environment variables are used exclusively for requesting S/H/I data.

4.5.2. *ARRIVAL_LIST*

A unique arrival identification code is assigned to each waveform arrival. This arrival identification number appears in the data types for arrivals and bulletins and may be used to obtain arrival information.

4.5.2.1. *Syntax*

`arrival_list` [*arid* [, *arid* [, …]]]

arid arrival identification code

4.5.2.2. *Default*

```
arrival_list *
```

4.5.2.3. *Example*

The following environment line limits the arrivals to those with arids `8971234` or `90814`:

```
arrival_list 8971234,90814
```

4.5.3. *AUX_LIST*

Station and channel are not always adequate to completely describe a specific data stream for some seismic stations. An auxiliary identification is supplied for completeness in handling these special cases. The instances in which the auxiliary identifications are necessary should be rare. The wildcard character (*) is allowed in specifying auxiliary codes.

4.5.3.1. *Syntax*

`aux_list` [*aux* [, *aux* [, …]]]

aux auxiliary code

4.5.3.2. *Default*

```
aux_list *
```

4.5.3.3. *Example*

The following environment line limits the auxiliary code to `chi` and `med`:

```
aux_list chi,med
```

4.5.4. ***BEAM_LIST***

Array station data may be delayed and summed (with weights) to form beams. The BEAM_LIST environment specifies which beams are being requested.

4.5.4.1. *Syntax*

`beam_list` [*beam* [`,` *beam* [`,` …]]]

beam beam code

4.5.4.2. *Default*

none

4.5.4.3. *Example*

The following line limits the beams to the frequency-wavenumber (fk) beam:

```
beam_list fkb
```

4.5.5. ***BULL_TYPE***

The BULL_TYPE environment provides a means to specify the type of S/H/I bulletin to retrieve. Only one bulletin type may be specified in any BULL_TYPE line. The bulletin types include SEL1 (Standard Event List 1), SEL2 (Standard Event List 2), SEL3 (Standard Event List 3), REB (Reviewed Event Bulletin), SEB (Standard Event Bulletin), SSEB (Standard Screened Event Bulletin), NEB (National Event Bulletin), and NSEB (National Screened Event Bulletin). In addition, BULL_TYPE is used in a different context to specify an IDC_NEB (one-time NEB produced at the IDC) or an IDC_NSEB (one-time NSEB produced at the IDC).

4.5.5.1. *Syntax*

`bull_type` [*bulletin*]

bulletin bulletin code (`sel1`, `sel2`, `sel3`, `reb`, `seb`, `sseb`, `neb/nseb` bulletin types), `idc_neb`, or `idc_nseb`.

4.5.5.2. *Default*

none

4.5.5.3. *Example*

The following environment line limits the bulletin type to `sel1`:

```
bull_type sel1
```

4.5.6. ***CHAN_LIST***

The S/H/I channel search list is given in the CHAN_LIST environment. The wildcard character (*) is allowed for specifying channel codes.

4.5.6.1. *Syntax*

`chan_list` [*chan* [`,` *chan* [`,` …]]]

chan channel code

4.5.6.2. *Default*

```
chan_list *z
```

4.5.6.3. *Example*

The following environment line limits the channels to three short-period channels:

```
chan_list shz, shn, she
```

The following environment line limits the channels to all short-period channels:

```
chan_list s*
```

4.5.7. ***COMM_LIST***

The communications list is a list of communication links to include in status reports. Links are defined by the end of the link closest to the station. Thus, for the link between station `ABC` and the data centre collecting data from that station, the communications link would be designated as `ABC`.

4.5.7.1. *Syntax*

`comm_list` [*comm* [`,` *comm* [`,` …]]]

comm communications link code

4.5.7.2. *Default*

```
comm_list *
```

4.5.7.3. *Example*

The following environment line limits the communications links to those links from stations ABC and DEF to the data centre:

```
comm_list ABC, DEF
```

4.5.8. ***DEPTH***

S/H/I events may be constrained by their depth using the DEPTH environment. Depth is given in kilometers from the surface.

4.5.8.1. *Syntax*

`depth` [[*shallow*] `to` [*deep*]]

shallow	low depth range
deep	high depth range

4.5.8.2. *Default*

no constraint

4.5.8.3. *Example*

The following environment line limits depths to a range from 0 to 10 km depth:

```
depth 0.0 to 10.0
```

4.5.9. ***DEPTH_CONF***

The DEPTH_CONF environment defines the confidence level for the seismic depth screening criterion, given as a number between 0.0 and 2.0. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.9.1. *Syntax*

`depth_conf` [*conf*]

conf	confidence level of depth screening criterion

4.5.9.2. *Default*

```
depth_conf 0.975
```

4.5.9.3. *Example*

The following environment line sets the confidence level for the depth screening criterion at 99 percent:

```
depth_conf 0.990
```

4.5.10. ***DEPTH_KVALUE***

The DEPTH_KVALUE environment defines the depth model uncertainty (km). This value is added to the uncertainty used in the screening criterion for free-depth solutions. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.10.1. *Syntax*

`depth_kvalue` [*kvalue*]

kvalue depth model uncertainty

4.5.10.2. *Default*

```
depth_kvalue 20.0
```

4.5.10.3. *Example*

The following environment line sets the depth model uncertainty to 30 km:

```
depth_kvalue 30.0
```

4.5.11. ***DEPTH_MINUS_ERROR***

The DEPTH_MINUS_ERROR environment is used to obtain all S/H/I events that have a 90 percent probability of being within a certain depth range. The ranges must be given in kilometers of depth from the surface.

4.5.11.1. *Syntax*

`depth_minus_error` [[*shallow*] `to` [*deep*]]

shallow low depth range

deep high depth range

4.5.11.2. *Default*

no constraint

4.5.11.3. *Example*

The following environment line limits the depth of events to a 90 percent probability of being within 10 km of the surface:

```
depth_minus_error 0.0 to 10.0
```

4.5.12. ***DEPTH_THRESH***

The DEPTH_THRESH environment defines the depth screening threshold in kilometers of depth from the surface. The value of DEPTH_THRESH must be non-negative. S/H/I events with depth confidence intervals deeper than this threshold are screened out. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.12.1. *Syntax*

`depth_thresh` [*threshold*]

threshold depth threshold

4.5.12.2. *Default*

```
depth_thresh 10.0
```

4.5.12.3. *Example*

The following environment line sets the depth screening threshold at 20.0 km:

```
depth_thresh 20.0
```

4.5.13. ***EVENT_LIST***

A unique event identification code is assigned to each S/H/I event. This number appears in S/H/I bulletins and may be used subsequently to request waveforms or comments associated with a specific event.

4.5.13.1. *Syntax*

`event_list` [*evid* [`,` *evid* [`,` …]]]

evid event identification code

4.5.13.2. *Default*

```
event_list *
```

4.5.13.3. *Example*

The following environment line limits the event number to `87623495` and `87`:

```
event_list 87623495, 87
```

4.5.14. *EVENT_STA_DIST*

The EVENT_STA_DIST environment is the distance in degrees between the S/H/I event and the S/H/I station. The environment is applied in context to the request. When requesting waveform data associated with specific S/H/I events, EVENT_STA_DIST helps determine the stations from which the data will be retrieved. When requesting bulletin-type information (bulletins, events, origins, or arrivals), EVENT_STA_DIST helps determine the S/H/I events for which the data will be retrieved.

4.5.14.1. *Syntax*

`event_sta_dist` [[*low_dist*] `to` [*high_dist*]]

low_dist low-distance range

high_dist high-distance range

4.5.14.2. *Default*

no constraint

4.5.14.3. *Examples*

The following example limits the request for S/H/I bulletin information to events within 20 degrees of stations `ABC` or `DEF`:

```
sta_list ABC, DEF
event_sta_dist 0 to 20
bull_type REB
bulletin ims2.0
```

The following example limits the request for waveform data to stations within 20 degrees of an event:

```
event_sta_dist 0 to 20
bull_type REB
relative_to bulletin
waveform ims2.0
```

4.5.15. *GROUP_BULL_LIST*

S/H/I events are often common between bulletins. Sometimes it is desirable to list the various solutions (origins) together. GROUP_BULL_LIST is a list of the bulletins that should be combined with the S/H/I bulletin specified in the BULL_TYPE environment. Origin information from these other bulletins will be included in the combined bulletin that is returned. The arrival information will be for the BULL_TYPE bulletin.

Events in the GROUP_BULL_LIST will be grouped with at most one S/H/I event in the BULL_TYPE bulletin. To be grouped, events must have locations within three degrees and origin times within 60 seconds. If the initial criteria are met for more than one S/H/I event, all events within the range are reported.

4.5.15.1. *Syntax*

`group_bull_list` [*bulletin* [, *bulletin* [, …]]]

bulletin bulletin code

4.5.15.2. *Default*

none (no grouping)

4.5.15.3. *Example*

The following environment lines group `SEL3` origins with the `SEL1`:

```
bull_type SEL1
group_bull_list SEL3
```

4.5.16. ***HYDRO_CP_THRESH***

The HYDRO_CP_THRESH environment defines the hydroacoustic cepstral peak screening threshold. An S/H/I event with a hydroacoustic cepstral peak value greater than this threshold is not screened out, regardless of the other hydroacoustic screening criteria. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.16.1. *Syntax*

`hydro_cp_thresh` [*threshold*]

threshold hydroacoustic total energy threshold

4.5.16.2. *Default*

```
hydro_cp_thresh 8.0
```

4.5.16.3. *Example*

The following environment line sets the hydroacoustic cepstral peak threshold to 7:

```
hydro_cp_thresh 7.0
```

4.5.17. ***HYDRO_TE_THRESH***

The HYDRO_TE_THRESH environment defines the hydroacoustic total energy screening threshold, in decibels (dB). An S/H/I event with hydroacoustic total energy less than this threshold is screened out, provided it also satisfies additional criteria that the entire location error ellipse is offshore, with minimum water depth greater than the value of the MIN_WDEPTH_THRESH environment, and has a clear path to at least one IMS hydrophone. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.17.1. *Syntax*

`hydro_te_thresh` [*threshold*]

threshold hydroacoustic total energy threshold

4.5.17.2. *Default*

```
hydro_te_thresh 10.0
```

4.5.17.3. *Example*

The following environment line sets the hydroacoustic total energy threshold to 15.0:

```
hydro_te_thresh 15.0
```

4.5.18. ***LAT***

The LAT environment specifies the range of latitude in degrees. Southern latitudes are negative. The low-range value must be smaller than the high-range value.

In cases where LAT can apply to origins or stations (for example, when requesting a S/H/I bulletin), the constraint will be applied to origins.

4.5.18.1. *Syntax*

`lat` [[*low_lat*] `to` [*high_lat*]]

low_lat low-range latitude

high_lat high-range latitude

4.5.18.2. *Default*

no constraint

4.5.18.3. *Example*

The following environment line limits latitudes to a range from 12 south up to (and including) 17 north:

```
lat -12 to 17
```

4.5.19. ***LOC_CONF***

The LOC_CONF environment sets the confidence level of location error ellipses, as a number between 0.0 and 1.0, used to (1) assess whether the error ellipse for an S/H/I event was onshore, offshore, or mixed (in other words, partially onshore and offshore); (2) estimate the minimum water depth within the error ellipse; and (3) assess whether or not a hydroacoustic signal from any point within the error ellipse has a clear path to at least one IMS hydrophone. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.19.1. *Syntax*

`loc_conf` [*conf*]

conf confidence level for location error ellipses

4.5.19.2. *Default*

```
loc_conf 0.90
```

4.5.19.3. *Example*

The following environment line sets the confidence level for location error ellipses at 99 percent:

```
loc_conf 0.99
```

4.5.20. ***LON***

The LON environment specifies the range of longitude in degrees. Western longitudes are negative, and the range is interpreted from west to east. Either both or neither (to return to the default values) of the longitudes must be provided in the LON environment.

In cases where LON can apply to S/H/I origins or stations (for example, when requesting a S/H/I bulletin), the constraint will be applied to origins.

4.5.20.1. *Syntax*

`lon` [*west_lon* `to` *east_lon*]

west_lon western longitude

east_lon eastern longitude

4.5.20.2. *Default*

no constraint

4.5.20.3. *Examples*

The following environment line limits the longitude range to the 350 degree swath from 175 degrees west up to (and including) 175 degrees east:

```
lon -175 to 175
```

The following environment line limits the longitude range to a 10-degree range spanning the international date line:

```
lon 175 to -175
```

4.5.21. *MAG*

The MAG environment specifies the range of magnitudes to include in the search for seismic events. The type of magnitude (m_b, M_s, and so on) is specified in the MAG_TYPE environment.

4.5.21.1. *Syntax*

`mag` [[*low_mag*] `to` [*high_mag*]]

low_mag low-magnitude range

high_mag high-magnitude range

4.5.21.2. *Default*

no constraint

4.5.21.3. *Example*

The following environment line limits magnitudes to those with magnitudes 4.5 and above:

```
mag 4.5 to
```

4.5.22. *MAG_TYPE*

The MAG_TYPE list environment specifies the type of magnitude to search when the MAG environment is provided. Standard accepted magnitude codes are `mb` (body wave magnitude), `Ms` (surface wave magnitude), and `ML` (local magnitude). Data centres may report other types of magnitudes, provided an explanation is given in the HELP message.

4.5.22.1. *Syntax*

`mag_type` [*mag_type* [`,` *mag_type* [`,` …]]]

mag_type `mb` | `Ms` | `ML`

4.5.22.2. *Default*

no constraint

4.5.22.3. *Example*

The following environment line limits the magnitude types to m_b and M_s:

```
mag_type mb, Ms
```

4.5.23. ***MAGPREF_MB***

The MAGPREF_MB environment specifies the type of m_b magnitude measurement to use for screening. Valid settings are defined by the **netmag**.*magtype* database attribute. The most common m_b *magtype* are `mb`, `mb_ave` (average m_b), and `mb_mle` (maximum likelihood estimate). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.23.1. *Syntax*

`magpref_mb` [*magpref_mb*]

magpref_mb type of m_b measurement to consider for screening

4.5.23.2. *Default*

```
magpref_mb mb_ave
```

4.5.23.3. *Example*

The following environment line sets the type of m_b measurement to use for screening to be the maximum likelihood estimate of m_b:

```
magpref_mb mb_mle
```

4.5.24. ***MAGPREF_MS***

The `magpref_ms` environment specifies the type of M_s magnitude measurement to use for screening. Valid settings are defined by the **netmag**.*magtype* database attribute. The most common M_s *magtype* are `ms_ave` (average M_s) and `ms_mle` (maximum likelihood estimate). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.24.1. *Syntax*

`magpref_ms` [*magpref_ms*]

magpref_ms type of M_s measurement to consider for screening

4.5.24.2. *Default*

```
magpref_ms ms_ave
```

4.5.24.3. *Example*

The following environment line sets the type of M_s measurement to use for screening to be the maximum likelihood estimate of M_s:

```
magpref_ms ms_mle
```

4.5.25. ***MB_ERR***

The MB_ERR environment defines the uncertainty term (standard deviation) for single-station m_b magnitude estimates, used in the computation of the confidence interval of the network estimate of m_b minus M_s. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.25.1. *Syntax*

`mb_err` [*err*]

err m_b uncertainty

4.5.25.2. *Default*

```
mb_err 0.34
```

4.5.25.3. *Example*

The following environment line sets the m_b uncertainty to 0.35:

```
mb_err 0.35
```

4.5.26. ***MB_MINUS_MS***

This difference between m_b and M_s magnitude values specifies the range of magnitude differences to include in the search.

4.5.26.1. *Syntax*

`mb_minus_ms` [[*low_mag_diff*] `to` [*high_mag_diff*]]

low_mag_diff low-magnitude difference

high_mag_diff high-magnitude difference

4.5.26.2. *Default*

no constraint

4.5.26.3. *Example*

The following environment line limits the difference of magnitudes to the range from 1 up to (and including) 2:

```
mb_minus_ms 1.0 to 2.0
```

4.5.27. ***MBMS_CONF***

The MBMS_CONF environment defines the confidence level for the $A\mathrm{m_b}$–$\mathrm{M_s}$ screening criterion, given as a number between 0.0 and 1.0, where A is the slope. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.27.1. *Syntax*

`mbms_conf` [*conf*]

conf confidence level of the $A\mathrm{m_b}$–$\mathrm{M_s}$ screening criterion

4.5.27.2. *Default*

```
mbms_conf 0.975
```

4.5.27.3. *Example*

The following environment line sets the confidence level of the $A\mathrm{m_b}$–$\mathrm{M_s}$ screening criterion at 99 percent:

```
mbms_conf 0.99
```

4.5.28. ***MBMS_SLOPE***

The MBMS_SLOPE environment defines the slope (*A*) of the $A\mathrm{m_b}$–$\mathrm{M_s}$ relation. The value should be a positive number (typically between 1.0 and 1.5). This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.28.1. *Syntax*

`mbms_slope` [*slope*]

slope the slope (*A*) of the $A\mathrm{m_b}$–$\mathrm{M_s}$ relation

4.5.28.2. *Default*

```
mbms_slope 1.25
```

4.5.28.3. *Example*

The following environment line sets the slope of the Am_b–M_s relation at 1.50:

```
mbms_slope 1.50
```

4.5.29. ***MBMS_THRESH***

The MBMS_THRESH environment defines the Am_b–M_s screening threshold in units of magnitude. S/H/I events with confidence intervals for Am_b–M_ss less than this threshold are screened out. The value of MBMS_THRESH is not restricted. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.29.1. *Syntax*

`mbms_thresh` [*threshold*]

threshold threshold of the Am_b–M_s screening criterion

4.5.29.2. *Default*

```
mbms_thresh 2.20
```

4.5.29.3. *Example*

The following environment line sets the Am_b–M_s screening threshold at 3.5:

```
mbms_thresh 3.50
```

4.5.30. ***MIN_DP_SNR_PP***

The MIN_DP_SNR_PP environment sets the minimum snr required for pP depth phases to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.30.1. *Syntax*

`min_dp_snr_pp` [*dp_snr_pp*]

dp_snr_pp pP depth phase snr

4.5.30.2. *Default*

```
min_dp_snr_pp 2.0
```

4.5.30.3. *Example*

The following environment line sets the minimum pP depth phase snr to 1.5:

```
min_dp_snr_pp 1.5
```

4.5.31. ***MIN_DP_SNR_SP***

The MIN_DP_SNR_SP environment sets the minimum snr required for sP depth phases to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.31.1. *Syntax*

`min_dp_snr_sp` [*dp_snr_sp*]

dp_snr_sp sP depth phase snr

4.5.31.2. *Default*

```
min_dp_snr_sp 2.0
```

4.5.31.3. *Example*

The following environment line sets the minimum sP depth phase snr to 1.5:

```
min_dp_snr_sp 1.5
```

4.5.32. ***MIN_MB***

The MIN_MB environment sets the minimum mb magnitude cutoff for an event to be considered for application of the S/H/I event-screening criteria. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.32.1. *Syntax*

`min_mb` [*mb*]

mb event screening magnitude cutoff

4.5.32.2. *Default*

```
min_mb 3.5
```

4.5.32.3. *Example*

The following environment line sets the event screening magnitude cutoff to 4.0:

```
min_mb 4.0
```

4.5.33. ***MIN_MOVEOUT_PP***

The MIN_MOVEOUT_PP environment sets the minimum depth phase moveout of pP–P (in seconds) in the distance range from 25 to 100 degrees required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.33.1. *Syntax*

`min_moveout_pp` [*moveout_pp*]

moveout_pp minimum moveout of pP–P travel times

4.5.33.2. *Default*

```
min_moveout_pp 1.5
```

4.5.33.3. *Example*

The following environment line sets the minimum pP–P moveout to 2.0 seconds:

```
min_moveout_pp 2.0
```

4.5.34. ***MIN_MOVEOUT_SP***

The MIN_MOVEOUT_SP environment sets the minimum depth phase moveout of sP–P (in seconds) in the distance range from 25 to 100 degrees required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.34.1. *Syntax*

`min_moveout_sp` [*moveout_sp*]

moveout_sp minimum moveout of sP–P travel times

4.5.34.2. *Default*

```
min_moveout_sp 1.5
```

4.5.34.3. *Example*

The following environment line sets the minimum sP–P moveout to 2.0 seconds:

```
min_moveout_sp 2.0
```

4.5.35. ***MIN_NDEF***

The MIN_NDEF environment sets the minimum number of defining phases required for an event to be considered for event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.35.1. *Syntax*

`min_ndef` [*integer*]

integer minimum number of time-defining phases

4.5.35.2. *Default*

```
min_ndef 3
```

4.5.35.3. *Example*

The following environment line sets the minimum number of time-defining phases to 6:

```
min_ndef 6
```

4.5.36. ***MIN_NDP_PP***

The MIN_NDP_PP environment sets the minimum number of pP phases required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.36.1. *Syntax*

`min_ndp_pp` [*integer*]

integer minimum number of pP depth phases

4.5.36.2. *Default*

```
min_ndp_pp 3
```

4.5.36.3. *Example*

The following environment line sets the minimum number of pP depth phases to 4:

```
min_ndp_pp 4
```

4.5.37. ***MIN_NDP_SP***

The MIN_NDP_SP environment sets the minimum number of sP phases required for a depth-phase solution to be acceptable for use in event screening. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.37.1. *Syntax*

`min_ndp_sp` [*integer*]

integer minimum number of sP depth phases

4.5.37.2. *Default*

```
min_ndp_sp 3
```

4.5.37.3. *Example*

The following environment line sets the minimum number of sP depth phases to 4:

```
min_ndp_sp 4
```

4.5.38. ***MIN_NSTA_MS***

The MIN_NSTA_MS environment sets the minimum required number of seismic stations with M_s measurements for the Am_b–M_s screening criterion to be applied. The value of MIN_NSTA_MS must be a positive integer. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.38.1. *Syntax*

`min_nsta_ms` [*integer*]

integer minimum number of seismic stations required with M_s measurements

4.5.38.2. *Default*

```
min_nsta_ms 1
```

4.5.38.3. *Example*

The following environment line sets the minimum number of seismic stations required with M_s measurements at 2:

```
min_nsta_ms 2
```

4.5.39. ***MIN_WDEPTH_THRESH***

The MIN_WDEPTH_THRESH environment sets the minimum water depth threshold, in kilometers. The hydroacoustic screening algorithm will only be executed for S/H/I events with the minimum water depth within the location error ellipse greater than this value. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.39.1. *Syntax*

`min_wdepth_thresh` [*threshold*]

threshold minimum water depth threshold, in kilometers

4.5.39.2. *Default*

```
min_wdepth_thresh 0.5
```

4.5.39.3. *Example*

The following environment line sets the minimum water depth threshold to 1.0:

```
min_wdepth_thresh 1.0
```

4.5.40. ***MS_ERR***

The MS_ERR environment defines the uncertainty term (standard deviation) for single-station M_s magnitude estimates, used in the computation of the confidence interval of the network estimate of m_b minus M_s. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.40.1. *Syntax*

`ms_err` [*err*]

err M_s uncertainty

4.5.40.2. *Default*

```
ms_err 0.23
```

4.5.40.3. *Example*

The following environment line sets the M_s uncertainty to 0.35:

```
ms_err 0.35
```

4.5.41. *ORIGIN_LIST*

A unique origin identification code is assigned to each origin. This origin identification code appears in S/H/I bulletins and may be used subsequently to request waveforms or comments associated with a specific origin.

4.5.41.1. *Syntax*

`origin_list` [*orid* [`,` *orid* [`,` …]]]

orid origin identification code

4.5.41.2. *Default*

```
origin_list *
```

4.5.41.3. *Example*

The following environment line limits the origins to those with orids `132456` or `190672`:

```
origin_list 132456,190672
```

4.5.42. *REG_CONF*

The REG_CONF environment defines the confidence level for the regional P/S screening criterion, given as a number between 0.0 and 1.0. This environment applies only when the BULL_TYPE is an NEB or an NSEB.

4.5.42.1. *Syntax*

`reg_conf` [*conf*]

conf confidence level of the regional screening criterion

4.5.42.2. *Default*

```
reg_conf 0.995
```

4.5.42.3. *Example*

The following environment line sets the confidence level of the regional P/S screening criterion at 99.0 percent:

```
reg_conf 0.990
```

4.5.43. ***RELATIVE_TO***

The concept of association provides the ability to tie or associate one S/H/I data type with another. The most common association is between waveforms and events and allows a user to request waveforms associated with a particular set of origins. Note that the current version of AutoDRM does not support this data_type.

RELATIVE_TO has all of the characteristics of a list environment, except that it is active only for the subsequent request line, and the arguments are request keywords.

4.5.43.1. *Syntax*

```
relative_to origin | event | bulletin
```

The data type given in the RELATIVE_TO environment line is not returned in the response. That data type must be explicitly requested on another line, which typically precedes the RELATIVE_TO environment line.

4.5.43.2. *Example*

The following message requests the associated waveforms in `CM6` subformat for events found in the bulletin between 1:00 and 1:15 on 9 January, 1999:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/1/9 1:00 to 1999/1/9 1:15
bull_type reb
relative_to bulletin
waveform ims2.0:cm6
stop
```

To also request the REB bulletin for the time period in the example given above, the line `bulletin ims2.0` must be added:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/1/9 1:00 to 1999/1/9 1:15
bull_type reb
bulletin ims2.0
relative_to bulletin
waveform ims2.0:cm6
stop
```

4.5.44. ***STA_LIST***

The STA_LIST environment provides the station search list. This variable may be used for specifying radionuclide and/or S/H/I stations. Radionuclide stations are identified by site codes (see “Radionuclide Detector Codes” on page 33). If a S/H/I array station is specified, then all elements of the array are implied. Specific array elements may be referenced individually. The wildcard character (*) is allowed in specifying station codes.

When S/H/I bulletins are requested, STA_LIST can be used to specify the events to be included. If an event in the S/H/I bulletin contains at least one of the stations in the STA_LIST, that event, and all arrivals available for that event, will be included in the bulletin.

4.5.44.1. *Syntax*

`sta_list` [*sta* [`,` *sta* [`,` …]]]

sta station or array code

4.5.44.2. *Default*

```
sta_list *
```

4.5.44.3. *Example*

The following environment line limits the station list to four specific S/H/I stations:

```
sta_list WRA,YKA,BOSA,LPAZ
```

The following environment line limits the returned data to that from radionuclide station CAP17:

```
sta_list CAP17
```

The following environment line limits the stations to those beginning with the character “A”:

```
sta_list A*
```

4.5.45. ***TIME***

The TIME environment is expressed as a range with date and decimal time entries. The time entries are optional. Unlike most range environments, a space is allowed between the date and time entries of the limits. In addition, this environment variable is translated according to the context of the requested data product. For example, TIME applies to the collection start date and time for Standard Screened Radionuclide Event Bulletins (SSREBs), Sample Pulse Height Data (SAMPLEPHD), Automatic Radionuclide Reports (ARRs), and Reviewed Radionuclide Reports (RRRs), but applies to acquisition date and time for Gas Background Pulse Height Data (GASBKPHD), Blank Pulse Height Data (BLANKPHD), Meteorological Data (MET), Calibration Pulse Height Data (CALIBPHD), Detector Background Pulse Height Data (DETBKPHD), and Quality Control Pulse Height Data (QCPHD). TIME also applies to the creation date for the Radionuclide Network Product Summary (RNPS), the Radionuclide Laboratory Report (RLR), and ALERT messages, and the period date for Radionuclide Monitoring System State of Health (RMSSOH) messages. This convention is used only for request messages.

In requests for S/H/I data, only the date and time fields that are necessary to obtain the resolution must be specified; all other fields are assumed to be 0 or 1 as appropriate (1 for month and day, 0 for hour, minute, and second).

4.5.45.1. *Syntax*

`time` [*date1* [*time1*]] `to` [*date2* [*time2*]]

date1 time1	low-range date and time
date2 time2	high-range date and time

4.5.45.2. *Default*

`time` *(current date and time)* `to` *(current date and time)*

4.5.45.3. *Examples*

The following environment line limits the time to a range from 1999/02/01 00:00:00.0 up to (but not including) 1999/03/01 00:00:00.0:

```
time 1999/02/01 to 1999/03/01
```

Either of the following environment lines limits the time to a range from 1999/02/01 23:14:19.7 up to (but not including) 1999/03/01 12:00:00.0:

```
time 1999/02/01 23:14:19.7 to 1999/03/01 12
time 1999/2/1 23:14:19.7 to 1999/3/1 12
```

4.5.46. ***TIME_STAMP***

The TIME_STAMP environment is used to request that data messages be time stamped. If requested, time stamps will appear at the beginning and end of each data type. Time stamps record the start time and end time that the message entered and exited the processing system.

4.5.46.1. *Syntax*

```
time_stamp
```

4.5.46.2. *Default*

none (do not time stamp the returned message)

4.5.46.3. *Example*

The following environment line turns on the time stamp utility:

```
time_stamp
```

4.6. Request Lines

Request lines specify the type of information to be retrieved from the IMS2.0 implementation. All arguments in a request line are optional and include the format for the return message. The format is specified as a generic term, such as `ims2.0`. The arguments *subtype* and *sub_format* are used only in requests for S/H/I data. Radionuclide data are returned in the format specified on the BEGIN line.

Syntax

request_keyword [**:** *subtype*] [*format* [**:** *sub_format*]]

request_keyword
: The *request_keyword* specifies the requested data type.

subtype
: The S/H/I *subtype* specifies which subtype to use with this data type. The *subtype* allows a more precise data selection. The *subtype* is used primarily for arrival requests.

format
: The *format* specifies the data format to use in the return message (for example, `ims2.0`).

sub_format
: The S/H/I *sub_format* further specifies the precise format to use with this data type.

If the format of the S/H/I return data is not specified, the default format in the BEGIN line will be used.

The *subtype* argument is concatenated to the *request_keyword* with a colon (:) (for example, `arrival:automatic`). In addition, *sub_format* is concatenated to the *format* with a colon (for example, `ims2.0:cm6`).

For each request, a subset of the environments described in Request Environment Lines must be specified (see Table 7 and Table 8). All required environments are enforced for each request. If an environment is not specified explicitly, then the default is used. Because the default values for some environments specify a zero length range (for example, `time`), a request made without explicitly defining these environments will result in no data being returned. Descriptions of the request lines include the applicable environment variables.

The order of the request lines is significant because the environment established prior to the request line is used to constrain the request. The environment can be changed between request lines to allow multiple requests for the same type of information within the same request message.

Example

The following message requests S/H/I bulletin information for all events in January 1999 within the areas defined by 10 to 20 degrees north and 120 to 160 degrees east and 55 to 45 degrees south and 25 to 15 degrees west:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/01/01 to 1999/02/01
lat 10.0 to 20.0
lon 120.0 to 160.0
bull_type reb
bulletin ims2.0
lat -55.0 to -45.0
lon -25.0 to -15.0
bulletin ims2.0
stop
```

Table 7. S/H/I Data Request Environment Variables

	REQUEST LINES															
ENVIRONMENTS[1]	ARRIVAL/SLSD	BULLETIN	BULLETIN[2]	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM
arrival_list	o	o	o			o										
aux_list				o	o							o	o		o	o
beam_list	o															o
bull_type	r	r	r					r			r					
chan_list	o			o	o[3]							o	o			o
comm_list							o									
depth		o	o					o	o		o					
depth_conf			o													
depth_kvalue			o													

REQUEST LINES

ENVIRONMENTS[1]	ARRIVAL/SLSD	BULLETIN	BULLETIN[2]	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM
depth_thresh			o													
depth_minus_error		o	o					o	o		o					
event_list		o	o			o		o	o							
event_sta_dist		o	o					o	o		o					
group_bull_list		o						o								
hydro_cp_thresh			o													
hydro_te_thresh			o													
lat		o	o	o[3]				o	o		o			o[3]		
loc_conf			o													
lon		o	o	o[3]				o	o		o			o[3]		
mag		o	o					o	o		o					
mag_type		o	o					o	o		o					
magpref_mb			o													
magpref_ms			o													
mb_err			o													
mb_minus_ms		o	o					o			o					
mbms_conf			o													
mbms_slope			o													
mbms_thresh			o													
min_dp_snr_pp			o													
min_dp_snr_sp			o													
min_mb			o													
min_moveout_pp			**o**													
min_moveout_sp			o													
min_ndef			o													
min_ndp_pp			o													
min_ndp_sp			o													

REQUEST LINES

ENVIRONMENTS[1]	ARRIVAL/SLSD	BULLETIN	BULLETIN[2]	CHANNEL	CHAN_STATUS	COMMENT	COMM_STATUS	EVENT	EXECSUM	NETWORK	ORIGIN	OUTAGE	RESPONSE	STATION	STA_STATUS	WAVEFORM
min_nsta_ms			o													
min_wdepth_thresh			o													
ms_err			o													
origin_list		o	o			o			o		o					
reg_conf			o													
relative_to																o
sta_list	o	o	o	o	o[3]	o		o	o	o	o	o	o	o	o	r
time	r	r	r		r[3]	o	r	r	r		r	r	o		r[3]	r
time_stamp	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

r = required, o = optional

2 Custom event screening bulletins IDC_NEB and IDC_NSEB

3 Minimum precision is days at the IDC.

Table 8. Radionuclide Data Request Environment Variables

REQUEST LINES

ENVIRONMENTS[1]	ALERT_*	ARR	BLANKPHD	CALIBPHD	DETBKPHD	GASBKPHD	MET	QCPHD	RLR	RMSSOH	RNPS	RRR	SPHDF	SPHDP	SSREB
sta_list	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
time	r	r	r	r	r	r	r	r	r	r	r	r	r	r	r
time_stamp	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

r = required, o = optional

The following sections describe the possible request lines and include the applicable environment variables. The variables that must be explicitly specified to obtain a result are in **bold** type.

4.6.1. *ALERT_FLOW*

This data type is one of several radionuclide data products available from the IDC. The ALERT_FLOW indicates that a sampler flow rate is above or below a specified threshold. See “Alerts” on page 205 for a complete description and “ALERT_FLOW” on page 264 for an example.

4.6.1.1. *Environment*

time, sta_list, time_stamp

4.6.1.2. *Example*

The following example requests time-stamped ALERT_FLOW messages for all radionuclide stations during the year 1999. Because the STA_LIST environment is not specified, the default (all stations) is used.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 1999/01/01 to 2000/01/01
alert_flow
stop
```

4.6.2. *ALERT_SYSTEM*

This data type is one of several radionuclide data products available from the IDC. The ALERT_SYSTEM indicates a problem with major equipment. See “Alerts” on page 205 for a complete description and “ALERT_SYSTEM” on page 264 for an example.

4.6.2.1. *Environment*

time, sta_list, time_stamp

4.6.2.2. *Example*

The following example requests ALERT_SYSTEM messages for all radionuclide stations in the Russian Federation from January 1996 through August 2000.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1996/01/01 to 2000/09/01
sta_list RU*
alert_system
stop
```

4.6.3. *ALERT_TEMP*

This data type is one of several radionuclide data products available from the IDC. The ALERT_TEMP indicates that a system temperature is outside the required IMS temperature range for that parameter. See “Alerts” on page 205 for a complete description and “ALERT_TEMP” for an example.

4.6.3.1. *Environment*

time, sta_list, time_stamp

4.6.3.2. *Example*

The following example requests ALERT_TEMP messages from station ARP01 from 22 November, 2000 through 31 December, 2000.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/11/22 to 2001/01/01
sta_list ARP01
alert_temp
stop
```

4.6.4. *ALERT_UPS*

This data type is one of several radionuclide data products available from the IDC. The ALERT_UPS indicates a problem with the power supply. See “Alerts” on page 205 for a complete description and “ALERT_UPS” on page 265 for an example.

4.6.4.1. *Environment*

time, sta_list, time_stamp

4.6.4.2. *Example*

The following example requests time-stamped ALERT_UPS messages from all radionuclide stations in Australia from 25 April, 1999 to 15 October, 1999.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 1999/04/25 to 1999/10/16
sta_list AU*
alert_ups
stop
```

4.6.5. ***ARR***

This data type is one of several radionuclide data products available from the IDC. The ARR includes results from the automated analysis of a radionuclide sample. See “ARR” on page 207 for a complete description and “ARR – Noble Gas Version” on page 265 and “ARR – Particulate Version” on page 275 for examples.

4.6.5.1. *Environment*

`time`, `sta_list`, `time_stamp`

4.6.5.2. *Example*

The following message requests time-stamped ARR messages from radionuclide stations `FRP27` and `RUP54` for the month of March 2001:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2001/03/01 to 2001/04/01
sta_list FRP27,RUP54
arr
stop
```

4.6.6. ***ARRIVAL/SLSD***

The ARRIVAL and SLSD (Standard List of Signal Detections) requests are synonymous. An arrival is defined by excess energy that is identified in S/H/I waveform data. The amount of information about an arrival depends on the amount of processing that has been applied to the data. The different stages of processing are expressed using subtypes to the ARRIVAL or SLSD request lines as follows:

- `arrival:automatic | slsd:automatic`

  The AUTOMATIC subtype provides the result of the automatic detection process run on waveforms.

- `arrival:reviewed | slsd:reviewed`

  The REVIEWED subtype provides the arrivals that have been automatically or manually reviewed to the extent that phase names have been assigned.

- `arrival:grouped | slsd:grouped`

  The GROUPED subtype provides the arrivals that have been assigned phase names and that have also been grouped together with the assumption that they belong to the same event.

- `arrival:associated | slsd:associated`

  The ASSOCIATED subtype provides the arrivals that have been run through a location program and are associated to an event. ASSOCIATED is the default subtype for ARRIVAL/SLSD.

- `arrival:unassociated | slsd:unassociated`

  The UNASSOCIATED subtype provides the arrivals that have been detected but not associated with any event.

A specific bulletin type must be specified through the BULL_TYPE environment for associated and unassociated arrivals.

4.6.6.1. *Environment*

`bull_type`, **`time`**, `arrival_list`, `beam_list`, `chan_list`, `sta_list`, `time_stamp`

4.6.6.2. *Example*

The following message requests automatically determined arrivals from stations `ABC` and `DEF` for the month of March 1999:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/03/01 to 1999/04/01
sta_list ABC,DEF
bull_type SEL1
arrival:automatic ims2.0
stop
```

The following message requests associated arrivals from the REB from stations `ABC` and `DEF` for the month of March 1999:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/03/01 to 1999/04/01
sta_list ABC, DEF
bull_type reb
arrival:associated ims2.0
stop
```

4.6.7. ***BLANKPHD***

BLANKPHD is one of several pulse height data (PHD) types available for particulate radionuclide samples. It contains the PHD of an unexposed air filter as well as other important information. See “Pulse Height Data” on page 162 for a description of the various PHD types and “BLANKPHD” on page 287 for an example.

4.6.7.1. *Environment*

time, sta_list, time_stamp

4.6.7.2. *Example*

The following message requests time-stamped BLANKPHD messages from all radionuclide stations acquired during the year 2000. Note that the STA_LIST environment is not explicitly specified and therefore defaults to all stations.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2001/01/01
blankphd
stop
```

4.6.8. ***BULLETIN***

Bulletins are composed of S/H/I origin, event, and associated arrival information. The SSREB cannot be obtained using BULLETIN; it is requested using a SSREB request line.

The IMS2.0 format bulletins, as implemented by the IDC, have two subformats: `ims2.0:short` and `ims2.0:long`. If the subformat is not specified, the SHORT subformat is used.

The environment for BULLETIN is also used to constrain waveforms when the RELATIVE_TO environment is used.

4.6.8.1. *Environment*

bull_type, **time**, arrival_list, depth, depth_minus_error, event_list, event_sta_dist, group_bull_list, lat, lon, mag, mag_type, mb_minus_ms, sta_list, time_stamp

When requesting a custom screened event bulletin, the BULL_TYPE environment defines the contents of the results (IDC_NEB or IDC_NSEB) and not the source of the bulletin information (REB). The following event screening environments are valid when BULL_TYPE is IDC_NEB or IDC_NSEB:

bull_type, **time**, arrival_list, depth, depth_conf, depth_kvalue, depth_minus_error, depth_thresh, event_list, event_sta_dist, hydro_cp_thresh, hydro_te_thresh, lat, loc_conf, lon, mag, mag_type, magpref_mb, magpref_ms, mb_err, mb_minus_ms, mbms_conf, mbms_slope, mbms_thresh, min_dp_snr_pp, min_dp_snr_sp, min_mb, min_moveout_pp, min_moveout_sp, min_ndef, min_ndp_pp, min_ndp_sp,

```
min_nsta_ms, min_wdepth_thresh, ms_err, reg_conf, sta_list,
time_stamp
```

4.6.8.2. *Example*

The following message requests the REB for 25 December, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
bull_type reb
bulletin ims2.0
stop
```

The following message requests the REB and associated SEL2 origins for 25 December, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
bull_type reb
group_bull_list sel2
bulletin ims2.0
stop
```

The following message requests the REB and associated SEL2 origins whose DEPTH_MINUS_ERROR is less than 10 km in the LONG subformat for 25 December, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
depth_minus_error to 10
bull_type reb
group_bull_list sel2
bulletin ims2.0:long
stop
```

The following message requests the REB and associated SEL2 origins for 25 December, 1998 with DEPTH_MINUS_ERROR less than 10 km and MB_MINUS_MS 0.5 or greater:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/12/25 to 1998/12/26
```

```
depth_minus_error to 10
mb_minus_ms 0.5 to
bull_type reb
group_bull_list sel2
bulletin ims2.0
stop
```

The following message requests a custom screened event bulletin (IDC_NEB) for events in the REB on 10 June 1998, between magnitudes 4.0 and 6.0, within an area defined by latitude and longitude ranges, and using custom depth and m_b minus M_s screening criteria:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/06/10 to 1998/06/11
bull_type idc_neb
mag_type mb
mag 4.0 to 6.0
lat 60 to 90
lon 45 to 75
depth_thresh 20.0
depth_conf 0.99
mbms_slope 1.5
mbms_thresh 3.5
mbms_conf 0.99
min_nsta_ms 2
bulletin ims2.0
stop
```

4.6.9. *CALIBPHD*

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of a standard calibration source, as well as other important information. See "Pulse Height Data" on page 162 for a description of the various PHD types and "CALIBPHD" on page 295 for an example.

4.6.9.1. *Environment*

time, sta_list, time_stamp

4.6.9.2. *Example*

The following message requests time-stamped CALIBPHD messages from all radionuclide stations acquired during the year 2000. Because the STA_LIST environment is not specified the default (all stations) is used.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
```

```
time_stamp
time 2000/01/01 to 2001/01/01
calibphd
stop
```

4.6.10. *CHANNEL*

Channel is a complete set of information about the location, emplacement, and type of seismometers at a station.

4.6.10.1. *Environment*

```
aux_list, chan_list, lat, lon, sta_list, time_stamp
```

4.6.10.2. *Example*

The following message requests the short-period channel information for stations in South America using the appropriate LAT and LON environment range. Note that the STA_LIST environment is not explicitly specified; the default for this variable is all stations.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
lat -60 to 10.0
lon -81 to -34
chan_list s*
channel ims2.0
stop
```

4.6.11. *CHAN_STATUS*

Channel status is given for the channels in the CHAN_LIST environment for the stations in the STA_LIST environment. The TIME environment defines the report period. The minimum report period is one day.

4.6.11.1. *Environment*

time[6], aux_list, chan_list, sta_list, time_stamp

4.6.11.2. *Example*

The following message requests the channel status reports over a four-day period:

[6] The minimum precision of the TIME environment for CHAN_STATUS requests is days.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/11/14 to 1998/11/18
chan_status ims2.0
stop
```

4.6.12. *COMMENT*

Comments may be associated with a S/H/I station, a S/H/I event, an origin, or an arrival. To retrieve comments, the station code or the identifications (IDs) of the arrival, origin, or event can be used. These codes or IDs are listed in the bulletins and are obtained with a request (or subscription to) a bulletin or event list.

4.6.12.1. *Environment*

arrival_list | **event_list** | **origin_list** | **sta_list**,
time, time_stamp

4.6.12.2. *Example*

The following message requests the comments for events 510 and 512:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
event_list 510, 512
comment ims2.0
stop
```

4.6.13. *COMM_STATUS*

Communications status is given for the communications links listed in the COMM_LIST environment. The TIME environment defines the report period. The minimum report period is one day. The *sub_format* field is used to indicate a verbose communications status report.

4.6.13.1. *Syntax*

```
comm_status [ims2.0[:verbose]]
```

4.6.13.2. *Environment*

time, comm_list, time_stamp

4.6.13.3. *Example*

The following message requests the verbose communications status reports for the link from `any_ndc` over a one-week period:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/11/14 to 1998/11/21
comm_list any_ndc
comm_status ims2.0:verbose
stop
```

4.6.14. ***DETBKPHD***

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of an empty detector chamber as well as other important information. See “Pulse Height Data” on page 162 for a description of the various PHD types and “DETBKPHD” on page 304 for an example.

4.6.14.1. *Environment*

`time``, sta_list, time_stamp`

4.6.14.2. *Example*

The following message requests time-stamped DETBKPHD messages acquired during the year 2000 from radionuclide stations `DEP33`, `SEP63`, and `GBP66`:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/01/01 to 2001/01/01
sta_list DEP33,SEP63,GBP66
detbkphd
stop
```

4.6.15. ***EVENT***

An S/H/I event is the physical occurrence that was detected through the network of S/H/I sensors. S/H/I events can have many estimates of their time and location; these estimates are known as origins. Only those estimates given in the BULL_TYPE and GROUP_BULL_LIST environments are provided. The origin estimates in BULL_TYPE provide the basis for associating the origins in the GROUP_BULL_LIST.

4.6.15.1. *Environment*

bull_type, **time**, depth, depth_minus_error, event_list, event_sta_dist, group_bull_list, lat, lon, mag, mag_type, mb_minus_ms, sta_list, time_stamp

4.6.15.2. *Example*

The following message requests all of the March 1998 REB events within regional distance (20 degrees) of stations ABC and/or DEF. The list is also requested to include the SEL2 events that can be grouped with the REB events.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 to 1998/04/01
bull_type reb
group_bull_list sel2
sta_list abc,def
event_sta_dist 0.0 to 20.0
event ims2.0
stop
```

4.6.16. *EXECSUM*

The executive summary (EXECSUM) contains summary statistics of the number of events in the SEB and those in the various event-screening categories, the number of radionuclide detections and those categorized as Level 4 or Level 5, and the number of events with cross-referenced radionuclide and seismic-acoustic data. It also contains status metrics regarding the IMS network.

4.6.16.1. *Environment*

time, depth, depth_minus_error, event_list, event_sta_dist, lat, lon, mag, mag_type, origin_list, sta_list, time_stamp

4.6.16.2. *Example*

The following message requests the EXECSUM for 25 December, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time 1998/12/25 to 1998/12/26
execsum ims2.0
stop
```

4.6.17. *GASBKPHD*

This data type is one of several radionuclide data products available from the IDC. The GASBKPHD contains the pulse height data of an empty plastic scintillation gas cell from stations that observe a memory effect. At present, only noble gas monitoring systems that utilize beta-gamma coincidence counting have plastic scintillation gas cells. The GASBKPHD is acquired after a sample has been evacuated from the gas cell and before the next sample acquisition. The purpose of the GASBKPHD is to enable the quantification of radioxenon atoms that are adsorbed onto the walls of the plastic scintillation gas cell. See “Pulse Height Data” on page 162 for a complete description and “GASBKPHD” on page 308 for an example.

4.6.17.1. *Environment*

time, sta_list, time_stamp

4.6.17.2. *Example*

The following example requests GASBKPHD messages for station DEG33 for 22 January, 2001.

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time 2001/01/22 to 2001/01/23
sta_list DEG33
gasbkphd
stop
```

4.6.18. *MET*

This data type is one of several radionuclide data products available from the IDC. The MET message contains meteorological data recorded at a radionuclide station. See “Meteorological Data” on page 202 for a complete description and “MET” on page 314 for an example.

4.6.18.1. *Environment*

time, sta_list, time_stamp

4.6.18.2. *Example*

The following example requests time-stamped MET messages for station CAP14 for the month of January 2000.

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time_stamp
```

```
time 2000/01/01 to 2000/02/01
sta_list CAP14
met
stop
```

4.6.19. *NETWORK*

The NETWORK request line is used to obtain network information for stations in the STA_LIST environment.

4.6.19.1. *Environment*

```
sta_list, time_stamp
```

4.6.19.2. *Example*

The following example requests time-stamped network information for station ARCES:

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time_stamp
sta_list ARCES
network
stop
```

4.6.20. *ORIGIN*

Origins are solutions to the location and time of a S/H/I event. Several origins may be determined for any one S/H/I event.

4.6.20.1. *Environment*

```
bull_type, time, depth, depth_minus_error, event_sta_dist,
lat, lon, mag, mag_type, mb_minus_ms, origin_list, sta_list,
time_stamp
```

4.6.20.2. *Example*

The following message requests origin information for the REB origins for 8 August-, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/08/08 to 1998/08/09
bull_type reb
origin ims2.0
stop
```

The following message limits the previous request to a specific magnitude and depth range by including more environment lines:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/08/08 to 1998/08/09
mag_type mb
mag 4.5 to 5.5
depth 0 to 10
bull_type reb
origin ims2.0
stop
```

4.6.21. ***OUTAGE***

OUTAGE requests reports on S/H/I data that are not available for the specified time range.

4.6.21.1. *Environment*

time, chan_list, sta_list, time_stamp

4.6.21.2. *Example*

The following message requests the outage reports for all S/H/I stations and channels for the month of March 1998. If the station and channels of interest are not explicitly specified, then the default station list (*) and channel list (*z) are used.

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 to 1998/04/01
outage ims2.0
stop
```

4.6.22. ***QCPHD***

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of the daily quality control measurement as well as other important information. See “Pulse Height Data” on page 162 for a description of the various PHD types and “QCPHD” on page 316 for an example.

4.6.22.1. *Environment*

time, sta_list, time_stamp

4.6.22.2. *Example*

The following message requests QCPHD messages from KWP40 acquired on 14 December, 1999:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/12/14 to 1999/12/15
sta_list KWP40
qcphd
stop
```

4.6.23. ***RESPONSE***

The response is the instrument response of the specified S/H/I network/station/channel identification code. Responses are valid at any given time and may change through time.

4.6.23.1. *Environment*

`chan_list, sta_list, time, time_stamp`

4.6.23.2. *Example*

The following message requests all the instrument responses for the broadband vertical channel of station `ABC` used in January 1999:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1999/01/01 to 1999/02/01
sta_list abc
chan_list bhz
response ims2.0
stop
```

4.6.24. ***RLR***

This data type is one of several radionuclide data products available from the IDC. The RLR contains sample analysis results from a certified radionuclide laboratory. See "Radionuclide Laboratory Reports" on page 180 for a complete description and "RLR" on page 319 for an example.

4.6.24.1. *Environment*

`**time**, sta_list, time_stamp`

4.6.24.2. *Example*

The following example requests time-stamped RLR messages for the month of September 2001 from radionuclide lab AUL02.

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time_stamp
time 2001/09/01 to 2001/10/01
sta_list AUL02
rlr
stop
```

4.6.25. ***RMSSOH***

This data type is one of several radionuclide data products available from the IDC. The RMSSOH message describes the state of health of the collection, processing, and acquisition equipment at the IMS radionuclide stations. See “State of Health Data” on page 193 for a complete description and “RMSSOH” on page 334 for an example.

4.6.25.1. *Environment*

```
time, sta_list, time_stamp
```

4.6.25.2. *Example*

The following example requests RMSSOH messages from all radionuclide stations in the United Kingdom of Great Britain and Northern Ireland for the period 6 February, 2001 to 5 March, 2001.

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time 2001/02/06 to 2001/03/06
sta_list GB*
rmssoh
stop
```

4.6.26. ***RNPS***

This data type is one of several radionuclide data products available from the IDC. The RNPS is “a compilation of the status of collection, processing, and analysis of particulate and noble gas data from all radionuclide stations,” (Working Group B, 2000). The RNPS is produced daily and summarizes the results for each station over the past three days. See “RNPS” on page 227 for a complete description and “RNPS” on page 337 for an example.

4.6.26.1. *Environment*

`time``, sta_list, time_stamp`

4.6.26.2. *Example*

The following example requests time-stamped RNPSs from all radionuclide stations from January 2001 through June 2001. Because the STA_LIST environment is not specified, the default (all stations) is used.

```
begin ims2.0
msg_type request
msg_id example any_ndc
email name@my.computer
time_stamp
time 2001/01/01 to 2001/07/01
rnps
stop
```

4.6.27. ***RRR***

This data type is one of several radionuclide data products available from the IDC. The RRR, or Reviewed Radionuclide Report, is a revised version of the ARR, or Automated Radionuclide Report, and is generated after manual review of a radionuclide sample is complete. See “RRR” on page 224 for a complete description and “RRR – Noble Gas Version” on page 345 and “RRR – Particulate Version” on page 356 for examples.

4.6.27.1. *Environment*

`time``, sta_list, time_stamp`

4.6.27.2. *Example*

The following message requests time-stamped RRR messages from all U.S. radionuclide stations for the month of June 2000:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
time 2000/06/01 to 2000/07/01
sta_list US*
rrr
stop
```

4.6.28. ***SAMPLEPHD***

The Sample Pulse Height Data is one of several PHD types available for radionuclide samples and has two different qualifiers, e.g. FULL or PREL. The PREL SAMPLEPHD contains PHD from a sample acquired for a time shorter than that of the full acquisition time. The FULL SAMPLEPHD contains PHD from a sample acquired for the IDC-defined full acquisition time. Like the other PHD types, the PREL and FULL SAMPLEPHDs also include other important information. See “Pulse Height Data” on page 162 for a description of the various PHD types and “SAMPLEPHD –Beta-Gamma Coincidence Data Version” on page 369, and “SAMPLEPHD – Particulate Version” on page 374 for examples.

4.6.28.1. *Environment*

time, sta_list, time_stamp

4.6.28.2. *Example*

The following message requests SPHDP messages and SPHDF messages from all Australian radionuclide stations for 22 June, 2000:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/06/22 to 2000/06/23
sta_list AU*
sphdp
sphdf
stop
```

4.6.29. ***SAMPML***

This data type is one of several radionuclide data products available from the IDC. The SAMPML contains the sample PHDs as well as IDC analysis results in XML format. There are two types of SAMPML reports, e.g. SAMPML_A and SAMPML_R regarding to the Automated and Reviewed Radionuclide Report, respectively.

4.6.29.1. *Environment*

time, sta_list, time_stamp

4.6.29.2. *Example*

The following message requests time-stamped SAMPML_R messages from all U.S. radionuclide stations for the month of June 2000:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time_stamp
```

```
time 2000/06/01 to 2000/07/01
sta_list US*
sampml_r
stop
```

4.6.30. ***SLSD***

SLSD is a synonym for arrival. See ARR.

4.6.31. ***SSREB***

This data type is one of several radionuclide data products available from the IDC. The SSREB, or Standard Screened Radionuclide Event Bulletin, is generated by the IDC when fission or activation products are detected at a radionuclide station above normal limits. An SSREB contains RRR messages from the samples in which fission products were detected, information identifying the fission product(s), an estimate of the source location and time, as well as any sample analysis results from certified laboratories. See “SSREB” on page 225 for a description of the SSREB and “SSREB” on page 377 for an example.

4.6.31.1. *Environment*

time, sta_list, time_stamp

4.6.31.2. *Example*

The following message requests all SSREB messages generated by the IDC during the first quarter of 2000:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 2000/01/01 to 2000/04/01
ssreb
stop
```

4.6.32. ***STATION***

S/H/I station information includes station codes, locations, elevations, station type (array, 3-C), and dates for which waveform or arrival data are available from an IMS2.0 implementation. Additional station codes may be reported for which neither waveform nor arrival data are available, but this can present problems.

4.6.32.1. *Environment*

lat, lon, sta_list, time_stamp

4.6.32.2. *Example*

The following message requests station information for all S/H/I stations serviced by this IMS2.0 implementation:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
station ims2.0
stop
```

The following message requests station information for S/H/I stations in the southern hemisphere:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
lat -90 to 0.0
station ims2.0
stop
```

4.6.33. ***STA_STATUS***

Station status is given for the S/H/I stations in the STA_LIST environment. The TIME environment defines the report period. The minimum report period is one day.

4.6.33.1. *Environment*

time[7], aux_list, sta_list, time_stamp

4.6.33.2. *Example*

The following message requests the S/H/I station status reports for all stations over a one-week period:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/11/14 to 1998/11/21
sta_status ims2.0
stop
```

7 The minimum precision of the TIME environment for STA_STATUS requests is days.

4.6.34. *WAVEFORM*

Waveforms are digital timeseries data (S/H/I). The WAVEFORM request format will typically accept subformats that specify how the digital data are formatted within the general format of the waveform data type. The subformats include `int`, `cm6`, `cm8`, and `csf` for IMS2.0 data.

4.6.34.1. *Environment*

`time`, `aux_list`, `beam_list`, `chan_list`, `sta_list`, `time_stamp`

4.6.34.2. *Example*

The following message requests data in six-bit compressed subformat from all channels of station `ABC` from 03:25 up to (but not including) 03:40 on 1 March, 1998:

```
begin ims2.0
msg_type request
msg_id example any_ndc
e-mail name@my.computer
time 1998/03/01 03:25 to 1998/03/01 03:40
sta_list abc
chan_list *
waveform ims2.0:CM6
stop
```

5. SUBSCRIPTION MESSAGES

This chapter describes the formats for subscription messages and includes the following topics:

- Introduction
- Subscription Procedures
- Subscription Format
- Subscription Control Lines
- Subscription Environment Lines
- Subscription Request Lines

5.1. Introduction

Subscription messages can be used as follows:

- to initiate a subscription,
- to change a subscription,
- to request an inventory of personal subscriptions,
- to request that an issue(s) of a subscription be resent,
- to terminate a subscription, or
- to establish national bulletin products (NEBs and NSEBs).

The messages containing the subscription data are sent as data messages.

Subscriptions allow authorized users to have IMS data and IDC products automatically forwarded to them on a regular basis. The S/H/I products available through subscriptions include continuous data from primary S/H/I stations. The radionuclide products available through subscriptions include all those available by request: ALERT_FLOW, ALERT_SYSTEM, ALERT_TEMP, ALERT_UPS, ARR, BLANKPHD, CALIBPHD, DETBKPHD, GASBKPHD, MET, QCPHD, RLR, RMSSOH, RNPS, RRR, SPHDF, SPHDP, and SSREB.

Subscriptions may be established for continuous delivery (for continuous data), when immediately available at the IDC (for example, discrete waveform or radionuclide data and data products), on a daily basis (for example, daily S/H/I bulletins and status reports or radionuclide data and data products), or at a user-specified frequency/time.

5.2. Subscription Procedures

A subscription is made by sending a subscription message to the IDC AutoDRM. Upon receipt, the source of a subscription message is first validated for its authenticity. Next the volume of data to be generated by the request is checked. Subscription messages that are not sent by an authorized user are rejected. After validation, the new subscription is added to the existing subscriptions for that user, and notification of the new subscription is sent to the subscriber in the form of a LOG data message. (See "Logs" on page 159 for a description of the LOG message and "Log" on page 313 for an example.) Each subscription is assigned a unique identification number at the IDC for internal tracking purposes.

Examples

A subscription message is sent to the IDC requesting the daily REB:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
bulletin ims2.0
stop
```

The subscriber receives the following LOG data message as confirmation of the subscription. The subscription ID and product ID numbers are included in the message.

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
subscription id: 52
 product id: 74
   added at 1997/01/12 19:36:00
   freq daily
   bull_type reb
   bulletin ims2.0
  stop
```

After the subscription begins, data messages sent to the subscriber include the PROD_ID line that includes the product identification (ID) and a delivery ID number along with the subscription data.

5.3. Subscription Format

All subscription messages require the basic message structure described in "Message Preface" on page 24. If a message is a request for subscription, the MSG_TYPE must be set to `subscription`.

A subscription message contains information about where to send the subscribed data, how often the subscribed data should be sent, and what data (or products) to send. Like request messages, subscriptions are defined through environment variables that constrain the data to be sent and request lines that specify which data to send. Separate subscriptions are delimited by separate subscription request lines. In other words, each time a subscription request line is encountered, a corresponding subscription will be initiated for the user.

5.4. Subscription Control Lines

Subscription control lines specify:

- the protocol of the response data message,
- the time duration and frequency of the subscription, and
- whether or not a message should be sent if there are no data to send.

Like request messages, the existing options for the response message protocol is email . This option should be used in accordance with the guidelines described in “Message Protocols” on page 21 and “Message Size” on page 28. The formats for E-MAIL control line is identical to that in Request messages and can be found in “Request Control Lines” on page 37.

As in request messages, only one response message protocol can be specified in a subscription message. If different protocols are desired for the response data, separate subscription messages must be submitted. A subscription message that does not specify a response message protocol will be answered by email using the return address of the sender.

Control lines that are unique to subscription messages are described below.

5.4.1. *FREQ*

The FREQ control line specifies how often the data or products should be sent to the subscriber. The FREQ line may appear only once in a subscription message.

Four frequencies are allowed: `continuous`, `immediate`, `daily`. When requesting continuous waveform data, FREQ is set to `continuous`[8]. If it is desired for data or products to be delivered as soon as they become available, FREQ is set to `immediate`. When FREQ is set to `daily`, data and products are delivered once every day.

5.4.1.1. *Syntax*

```
freq [ continuous | immediate | daily
```

5.4.1.2. *Default*

```
freq daily
```

8 Special arrangements between Member States and the IDC are required due to the hardware and communications requirements of continuous data transmission.

5.4.2. *TIME*

In a subscription message, the TIME control line refers to the active time of a subscription. The active time is given as a range. The format of TIME is similar to that in the request environment line (see “TIME” on page 61). In a subscription control line, however, the start time may have the value `now` (the current date and time), and the end time may have the value `forever` (the subscription will run indefinitely). These time limits are not valid for use in request messages.

5.4.2.1. *Default*

```
time now to forever
```

In the event that a subscription includes a start time before `now`, a request message will be generated for the data or product from `time` *start time* `to now`, and the actual subscription will run from `now` to the specified end date.

5.5. Subscription Environment Lines

Subscription environment lines are used to define and limit the response to subscription request lines (see Subscription Request Lines) and to establish national bulletin products such as an NEB or NSEB. Many of the request environment variables in “Request Environment Lines” on page 37 are also used as general subscription environment variables. These environment lines include:

```
BULL_TYPE, CHAN_LIST, DEPTH, DEPTH_MINUS_ERROR,
EVENT_STA_DIST, LAT, LON, MAG, MAG_TYPE, MB_MINUS_MS,
RELATIVE_TO, and STA_LIST
```

Environment variables that define screening criteria for national bulletins (NEBs and NSEBs) and national executive summaries include:

```
DEPTH_CONF, DEPTH_KVALUE, DEPTH_THRESH,
HYDRO_CP_THRESH, HYDRO_TE_THRESH, LOC_CONF,
MAGPREF_MB, MAGPREF_MS, MB_ERR, MBMS_CONF,
MBMS_SLOPE, MBMS_THRESH, MIN_DP_SNR_PP, MIN_DP_SNR_SP,
MIN_MB, MIN_MOVEOUT_PP, MIN_MOVEOUT_SP, MIN_NDEF,
MIN_NDP_PP, MIN_NDP_SP, MIN_NSTA_MS,
MIN_WDEPTH_THRESH,
MS_ERR, and REG_CONF
```

Some environment variables for request messages are not used in subscription messages. These include ARRIVAL_LIST, BEAM_LIST, EVENT_LIST, ORIGIN_LIST, and TIME (for subscriptions, TIME is a control line). Still other environment variables are unique to subscription messages, and the formats for these environment variables are provided in the following sections. Environment variables used in both request and subscription messages are not repeated in this chapter. See “Request Environment Lines” on page 37 for descriptions of these environment variables.

Of the environment variables unique to subscriptions, four are used when manipulating existing subscriptions or establishing subscriptions to standard products (DELIVID_LIST, SUBSCR_LIST, SUBSCR_NAME, and PRODID_LIST). The other environment variable unique to subscriptions is the BULL_TYPE environment, which has a dual nature for subscriptions. BULL_TYPE either defines the bulletin to use in constraining data, or it is used to establish the name of the NEB or NSEB that is being created.

5.5.1. *DELIVID_LIST*

The DELIVID_LIST environment is a list of delivery identifiers. The delivery identifier is a number that appears as the third argument in the PROD_ID line for each message sent to a user for a given subscription. The second argument in the PROD_ID line is the product identifier, which denotes a specific product. These numbers are consecutive. This feature allows a user to identify a missing issue to a subscription. This environment is used only with the command SUBSCR_RESEND.

5.5.1.1. *Syntax*

`delivid_list` [*deliv_id* [`,` *deliv_id* [`,` …]]]

deliv_id delivery identification number

5.5.1.2. *Default*

none

5.5.1.3. *Example*

The following subscription example demonstrates how delivery identification numbers are provided through the PROD_ID line.

Three consecutive messages received by a subscriber over three days contain sequential delivery identification numbers: 30, 31, and 32.

```
begin ims2.0
msg_type data
msg_id example_a ctbo_idc
prod_id 74 30
data_type bulletin ims2.0:short
…
(bulletin information)
…
stop
begin ims2.0
msg_type data
msg_id example_b ctbo_idc
prod_id 74 31
data_type bulletin ims2.0:short
…
(bulletin information)
…
stop
```

```
begin ims2.0
msg_type data
msg_id example_c ctbo_idc
prod_id 74 32
data_type bulletin ims2.0:short
…
(bulletin information)
…
stop
```

5.5.2. *PRODID_LIST*

The PRODID_LIST environment is a list of product ID numbers. A product ID number is a unique identifier for a certain IDC product and may be shared by multiple subscribers. All of the products identified in the PRODID_LIST will be processed for a subscription when the subscription request line is reached.

5.5.2.1. *Syntax*

`prodid_list` [*prod_id* [, *prod_id* [, …]]]

prod_id identification number of the product

5.5.2.2. *Default*

The default values for this subscription environment variable depends on the subscription request line. The subscription request lines are as follows:

- none for `unsubscribe` (see UNSUBSCRIBE)
- all for `subscr_prod` (see SUB)
- all for `subscr_log` (see SUB)

5.5.3. *SUBSCR_LIST*

The SUBSCR_LIST environment lists subscription ID numbers. A subscription ID is a unique identifier for a particular subscription. All of the subscriptions specified in the SUBSCR_LIST will be processed for a subscription when the subscription request line is reached.

5.5.3.1. *Syntax*

`subscr_list` [*subscr_id* [, *subscr_id* [, …]]]

subscr_id identification number of the subscription

5.5.3.2. *Default*

The default values for this subscription environment variable depends on the subscription request line. The subscription request lines are as follows:

- none for `unsubscribe` (see UNSUBSCRIBE)
- all for `subscr_prod` (see SUB)
- all for `subscr_log` (see SUB)

5.5.4. ***SUBSCR_NAME***

The SUBSCR_NAME environment lists the names of certain IDC data products. All IDC data products specified in the SUBSCR_NAME line will be processed for a subscription when the subscription request line is reached. These names may be used instead of subscription identifiers or product identifiers.

5.5.4.1. *Syntax*

`subscr_name` [*name* [`,` *name* [`,` …]]]

name name of the subscription

5.5.4.2. *Default*

none

5.5.5. ***BULL_TYPE***

The BULL_TYPE environment provides a means to specify the name of a bulletin. In the context of subscribing to a bulletin product, BULL_TYPE is the name of the bulletin and can be the name of any standard bulletin (for example, `sel1`, `sel2`, `sel3`, `reb`, `seb`, or `sseb`) or a previously established NEB or NSEB. In the context of establishing a national bulletin, BULL_TYPE sets the name for the new national bulletin product. NEB and NSEB bulletin types must include either `neb_` (for National Event Bulletin) or `nseb_` (for National Screened Event Bulletin) as the first characters of the bulletin code. Only one name may be specified in the BULL_TYPE line.

5.5.5.1. *Syntax*

The following syntax is used to subscribe to an existing bulletin product:

`bull_type` [*bulletin*]

bulletin bulletin code (`sel1`, `sel2`, `sel3`, `reb`, `seb`, `sseb`, `neb_`*identifier*, `nseb_`*identifier*)

identifier NEB or NSEB identifier

The following syntax is used to establish a NEB or NSEB:

`bull_type n[s]eb_`*identifier*

identifier two-letter country code
(see “Country Codes” on page 257) and number (for example, `FR01` for a national bulletin of France)

5.5.5.2. *Default*

none

5.5.5.3. *Example*

The following environment line sets the bulletin name to `NSEB_FR03`:

```
bull_type NSEB_FR03
```

5.6. Subscription Request Lines

Subscription message request lines specify the information to send in the return data message. The general formats used for request lines are described in “Request Format” on page 36.

Some subscription request lines are the same as those used in request messages. NETWORK, STATION, CHANNEL, BEAM, RESPONSE, OUTAGE, and COMMENT are not used at all in subscriptions. SUBSCRIBE, UNSUBSCRIBE, SUBSCR_PROD, CHANGE, SUBSCR_RESEND, and SUBSCR_LOG are unique to subscriptions. Table 9 and Table 10 give the applicable environments for the subscription request lines.

Table 9. S/H/I Subscription Request Environments

	REQUEST LINES													
ENVIRONMENTS[1]	ARRIVAL	BULLETIN	CHANGE	CHAN_STATUS	COMM_STATUS	EVENT	ORIGIN	STA_STATUS	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE	WAVEFORM
BULL_TYPE	r	r				r	r							
CHAN_LIST														o
DELIVID_LIST												r		
DEPTH		o[2]				o	o							
DEPTH_CONF		o[3]												
DEPTH_KVALUE		o[3]												
DEPTH_MINUS_ERROR		o[2]				o	o							
DEPTH_THRESH		o[3]												
EVENT_STA_DIST		o[2]				o	o							

REQUEST LINES

ENVIRONMENTS[1]	ARRIVAL	BULLETIN	CHANGE	CHAN_STATUS	COMM_STATUS	EVENT	ORIGIN	STA_STATUS	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE	WAVEFORM
HYDRO_CP_THRESH		o[3]												
HYDRO_TE_THRESH		o[3]												
LAT		o[2]				o	o							
LOC_CONF		o[3]												
LON		o[2]				o	o							
MAG		o[2]				o	o							
MAG_TYPE		o[2]				o	o							
MAGPREF_MB		o[3]												
MAGPREF_MS		o[3]												
MB_ERR		o[3]												
MB_MINUS_MS		o[2]				o	o							
MBMS_CONF		o[3]												
MBMS_SLOPE		o[3]												
MBMS_THRESH		o[3]												
MIN_DP_SNR_PP		o[3]												
MIN_DP_SNR_SP		o[3]												
MIN_MB		o[3]												
MIN_MOVEOUT_PP		o[3]												
MIN_MOVEOUT_SP		o[3]												
MIN_NDEF		o[3]												
MIN_NDP_PP		o[3]												
MIN_NDP_SP		o[3]												
MIN_NSTA_MS		o[3]												
MIN_WDEPTH_THRESH		o[3]												
MS_ERR		o[3]												
PRODID_LIST			*							o	o	*	*	
REG_CONF		o[3]												
RELATIVE_TO														o
STA_LIST	r	o[2]				o	o	o						r
SUBSCR_LIST			*							o	o	*	*	
SUBSCR_NAME			*						r	o	o	*	*	

r = required, * = one required, o = optional

[2] Not used for subscribing to NEB or NSEB products.

[3] Used only to establish a NEB or NSEB.

Table 10. Radionuclide-related Subscription Request Environments

ENVIRONMENTS[1]	ALERT_*	ARR	BLANKPHD	CALIBPHD	CHANGE	DETBKPHD	GASBKPHD	QCPHD	RMSSOH	RNPS	RLR	RRR	SPHDF	SPHDP	SSREB	SUBSCRIBE	SUBSCR_LOG	SUBSCR_PROD	SUBSCR_RESEND	UNSUBSCRIBE
	REQUEST LINES																			
DELIVID_LIST																			r	
PRODID_LIST					*												o	o	*	*
STA_LIST	o	o	o	o		o	o	o	o	o	o	o	o	o	o					
SUBSCR_LIST					*												o	o	*	*
SUBSCR_NAME					*											r	o	o	*	*

r = required, * = one required, o = optional

The following sections describe the possible request lines and the applicable environment variables. The environment variables that must be explicitly specified to obtain a result are in **bold** type.

5.6.1. ***ALERT_FLOW***

This data type is one of several radionuclide products available from the IDC. The ALERT_FLOW indicates that a sampler flow rate is above or below a specified threshold. See “Alerts” on page 205 for a complete description and “ALERT_FLOW” on page 264 for an example.

5.6.1.1. *Environment*

```
sta_list
```

5.6.1.2. *Example*

The following example requests ALERT_FLOW messages for all radionuclide stations. Because the STA_LIST environment is not specified, the default (all stations) is used.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
alert_flow
stop
```

5.6.2. ***ALERT_SYSTEM***

This data type is one of several radionuclide products available from the IDC. The ALERT_SYSTEM indicates a problem with major equipment. See “Alerts” on page 205 for a complete description and “ALERT_FLOW” on page 264 for an example.

5.6.2.1. *Environment*

```
sta_list
```

5.6.2.2. *Example*

The following example requests ALERT_SYSTEM messages for all radionuclide stations in the Russian Federation.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list RU*
alert_system
stop
```

5.6.3. ***ALERT_TEMP***

This data type is one of several radionuclide products available from the IDC. The ALERT_TEMP indicates that a system temperature is outside the required IMS temperature range for that parameter. See “Alerts” on page 205 for a complete description and “ALERT_TEMP” for an example.

5.6.3.1. *Environment*

```
sta_list
```

5.6.3.2. *Example*

The following example requests ALERT_TEMP messages from station ARP01.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list ARP01
alert_temp
stop
```

5.6.4. *ALERT_UPS*

This data type is one of several radionuclide products available from the IDC. The ALERT_UPS indicates a problem with the power supply. See “Alerts” on page 205 for a complete description and “ALERT_UPS” on page 265 for an example.

5.6.4.1. *Environment*

```
sta_list
```

5.6.4.2. *Example*

The following example requests time-stamped ALERT_UPS messages from all radionuclide stations in Australia.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list AU*
alert_ups
stop
```

5.6.5. *ARR*

This data type is one of several radionuclide products available from the IDC. The ARR, or Automated Radionuclide Report, includes results from the automated analysis of a radionuclide sample. See “ARR” on page 207 for a complete description and “ARR – Noble Gas Version” on page 265 and “ARR – Particulate Version” on page 275 for examples.

5.6.5.1. *Environment*

```
sta_list
```

5.6.5.2. *Example*

The following message requests ARR messages with no restraints:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
ARR
stop
```

5.6.6. *ARRIVAL*

An ARRIVAL line requests arrival information from specific S/H/I stations relative to events in a S/H/I bulletin. The amount of information that is returned depends on the amount of processing that has been applied to the data. The different stages of processing are expressed using subtypes to the arrival request lines as follows: `arrival:automatic`, `arrival:reviewed`, `arrival:associated`, `arrival:grouped`, and `arrival:unassociated` (see “ARRIVAL/SLSD” on page 69 for definitions).

5.6.6.1. *Environment*

bull_type, **sta_list**

5.6.6.2. *Example*

The following subscription message requests automatic arrivals from S/H/I stations `ABC` and `DEF` from the SEL1 bulletin each day:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
sta_list ABC,DEF
bull_type sel1
arrival:automatic ims2.0
stop
```

5.6.7. *BULLETIN*

A BULLETIN request line in a subscription message can either request bulletin information for S/H/I events satisfying the environmental conditions or establish the screening parameters for an NEB or NSEB.

5.6.7.1. *Environment*

When subscribing to an existing bulletin product (with the exception of NEBs and NSEBs), the following environments are valid:

bull_type, depth, depth_minus_error, event_sta_dist, lat, lon, mag, mag_type, mb_minus_ms, sta_list

When subscribing to a NEB or NSEB, only the BULL_TYPE environment is valid:

bull_type

When establishing an NEB or NSEB bulletin product, the following environments are valid:

bull_type, depth, depth_conf, depth_kvalue, depth_minus_error, depth_thresh, event_sta_dist, hydro_cp_thresh, hydro_te_thresh, lat, loc_conf, lon, mag, mag_type, magpref_mb, magpref_ms, mb_err, mb_minus_ms, mbms_conf, mbms_slope, mbms_thresh, min_dp_snr_pp, min_dp_snr_sp, min_mb, min_moveout_pp, min_moveout_sp, min_ndef, min_ndp_pp, min_ndp_sp, min_nsta_ms, min_wdepth_thresh, ms_err, reg_conf, sta_list

5.6.7.2. *Example*

The following subscription message requests the daily REB with no constraints:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
bulletin ims2.0
stop
```

The following subscription message requests the immediate SEL1 and SEL2. Soon after an event has been located (about two hours after real time for the SEL1 and about six hours after real time for the SEL2), the subscription software forwards the results to the user. In the example, messages would be sent to the user as often as once every 20 minutes, because the request has no constraints. This arrangement would be appropriate for a Member State that processes the data automatically.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
bull_type sel1
bulletin ims2.0
bull_type sel2
bulletin ims2.0
stop
```

The following subscription message requests the daily REB for events with depths less than 30 km, between magnitudes 3.5 and 4.5, and within the two areas defined by the latitude and longitude ranges:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
```

```
mag 3.5 to 4.5
depth to 30
lat -30 to -20
lon -180 to -140
bulletin ims2.0
lat 75 to 79
lon 110 to 140
bulletin ims2.0
stop
```

The following subscription message establishes a national event bulletin for France (NEB_FR01). Event characterization parameters will be based on the environments given in this message and the default values of the environments not listed.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
depth_conf 0.990
depth_kvalue 30.0
depth_thresh 20.0
loc_conf 0.99
mb_err 0.35
mbms_conf 0.99
mbms_slope 1.50
mbms_thresh 3.50
min_dp_snr 1.5
min_mb 4.0
min_moveout 2.5
min_ndef 1
min_ndp 1
min_nsta_ms 2
min_wdepth_thresh 0.7
ms_err 0.35
reg_conf 0.990
reg_min_psnr 1.5
reg_min_ssnr 1.5
time_stamp
bull_type NEB_FR01
bulletin ims2.0
stop
```

5.6.8. *CALIBPHD*

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of a standard calibration source as well as other information. See “Pulse Height Data” on page 162 for a description of the PHD types and “CALIBPHD” on page 295 for an example.

5.6.8.1. *Environment*

```
sta_list
```

5.6.8.2. *Example*

The following message requests CALIBPHD messages from all radionuclide stations to be sent as they become available:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
calibphd
stop
```

5.6.9. ***CHANGE***

After a subscription is established, it can be modified through the CHANGE request line. The subscription being changed is specified in the SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME environment. This line is followed by the CHANGE request line, then a listing of the changed environments and new values, and finally the applicable product. After the change, the subscription identifier will remain the same, but the product identifier and the delivery identifier will change.

5.6.9.1. *Environment*

```
prodid_list | subscr_list | subscr_name
```

5.6.9.2. *Example*

The following subscription message requests a change to the LAT and LON environments for the BULLETIN subscription number 52:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52
change
lat 12 to 22
lon 18 to 28
bulletin ims2.0
stop
```

5.6.10. ***CHAN_STATUS***

CHAN_STATUS requests channel status information.

5.6.10.1. *Environment*

```
chan_list, freq, sta_list
```

5.6.10.2. *Example*

The following subscription message requests the daily channel status reports:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
chan_status ims2.0
stop
```

5.6.11. ***COMM_STATUS***

COMM_STATUS requests communications status information for the S/H/I communications links. A verbose communications status report listing individual circuit dropouts is obtained by using the `verbose` subformat.

5.6.11.1. *Environment*

```
freq, sta_list
```

5.6.11.2. *Example*

The following subscription message requests the verbose communications status reports for all links:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
comm_status ims2.0:verbose
stop
```

5.6.12. ***DETBKPHD***

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of an empty detector chamber as well as other important information. See “Pulse Height Data” on page 162 for a description of the various PHD types and “DETBKPHD” on page 304 for an example.

5.6.12.1. *Environment*

```
sta_list
```

5.6.12.2. *Example*

The following message requests DETBKPHDs from all Russian stations to be sent as they become available:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list RU*
detbkphd
stop
```

5.6.13. ***EVENT***

EVENT requests S/H/I event information for preferred origins satisfying the environmental constraints.

5.6.13.1. *Environment*

```
bull_type, depth, depth_minus_error, event_sta_dist, lat,
lon, mag, mag_type, mb_minus_ms, sta_list
```

5.6.13.2. *Example*

The following subscription message requests all of the REB events within regional distance (20 degrees) of stations `ABC` and `DEF`:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
sta_list ABC,DEF
event_sta_dist 0.0 to 20.0
event ims2.0
stop
```

5.6.14. ***GASBKPHD***

This data type is one of several radionuclide products available from the IDC. The GASBKPHD contains the pulse height data of an empty plastic scintillation gas cell from a station that observes a memory effect. At present, only noble gas monitoring systems that utilize beta-gamma coincidence counting have plastic scintillation gas cells. The GASBKPHD is acquired after a sample has been evacuated from the gas cell and before the next sample acquisition. The purpose of the GASBKPHD is to enable the quantification of radioxenon atoms that are adsorbed onto the walls of the plastic scintillation gas cell. See "Pulse Height

Data" on page 162 for a complete description and "GASBKPHD" on page 308 for an example.

5.6.14.1. *Environment*

```
sta_list
```

5.6.14.2. *Example*

The following example requests GASBKPHD messages for station DEG33.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list DEG33
gasbkphd
stop
```

5.6.15. ***MET***

This data type is one of several radionuclide products available from the IDC. The MET message contains meteorological data recorded at a radionuclide station. See "Meteorological Data" on page 202 for a complete description and "MET" on page 314 for an example.

5.6.15.1. *Environment*

```
sta_list
```

5.6.15.2. *Example*

The following example requests MET messages for station CAP14.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list CAP14
met
stop
```

5.6.16. ***ORIGIN***

Origins are solutions to the location and time of a S/H/I source. Several origins may be determined for any one source. The ORIGIN line requests information for those origins that satisfy the environment constraints.

5.6.16.1. *Environment*

```
bull_type, depth, depth_minus_error, event_sta_dist, lat,
lon, mag, mag_type, mb_minus_ms, sta_list
```

5.6.16.2. *Example*

The following subscription message requests origin information for the daily REB delivered when the REB is ready for distribution:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
bull_type reb
origin ims2.0
stop
```

The following subscription message requests origin information for events in the daily REB limited to a specific geographic region:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
lat -60 to 10.0
lon -81 to -34
bull_type reb
origin ims2.0
stop
```

5.6.17. ***QCPHD***

This data type is one of several PHD types available for radionuclide samples. It contains the PHD of a 15 minute sample acquisition as well as other important information. See “Pulse Height Data” on page 162 for a description of the PHD types and “QCPHD” on page 316 for an example.

5.6.17.1. *Environment*

```
sta_list
```

5.6.17.2. *Example*

The following message requests QCPHD messages from TZP64 to be sent as they become available:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list TZP64
qcphd
stop
```

5.6.18. ***RLR***

This data type is one of several radionuclide products available from the IDC. The RLR contains sample analysis results from a certified radionuclide laboratory. See “Radionuclide Laboratory Reports” on page 180 for a complete description and “RLR” on page 319 for an example.

5.6.18.1. *Environment*

```
sta_list
```

5.6.18.2. *Example*

The following example requests time-stamped RLR messages from radionuclide lab AUL02.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
email name@my.computer
sta_list AUL02
rlr
stop
```

5.6.19. ***RMSSOH***

This data type is one of several radionuclide products available from the IDC. The RMSSOH message describes the state of health of the collection, processing, and acquisition equipment at the IMS radionuclide stations. See “State of Health Data” on page 193 for a complete description and “RMSSOH” on page 334 for an example.

5.6.19.1. *Environment*

```
sta_list
```

5.6.19.2. *Example*

The following example requests RMSSOH messages from all radionuclide stations in the United Kingdom of Great Britain and Northern Ireland.

```
begin ims2.0
msg_type subscription
```

```
msg_id example any_ndc
email name@my.computer
sta_list GB*
rmssoh
stop
```

5.6.20. ***RNPS***

This data type is one of several radionuclide products available from the IDC. The RNPS is "a compilation of the status of collection, processing, and analysis of particulate and noble gas data from all radionuclide stations" (Working Group B, 2000). The RNPS is produced daily and summarizes the results for each station over the past three days. See "RNPS" on page 227 for a complete description and "RNPS" on page 337 for an example.

5.6.20.1. *Environment*

```
sta_list
```

5.6.20.2. *Example*

The following example requests RNPSs from all radionuclide stations. Because the STA_LIST environment is not specified, the default (all stations) is used.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
email name@my.computer
rnps
stop
```

5.6.21. ***RRR***

This data type is one of several radionuclide products available from the IDC. The RRR, or Reviewed Radionuclide Report, is a revised version of the ARR, or Automated Radionuclide Report, and is generated after manual review of a radionuclide sample is complete. See "RRR" on page 224 for a complete description and "RRR – Noble Gas Version" on page 345 and "RRR – Particulate Version" on page 356 for examples.

5.6.21.1. *Environment*

```
sta_list
```

5.6.21.2. *Example*

The following subscription message requests daily RRR messages from stations in New Zealand. The frequency is not specifically identified because the default transmittal rate is daily.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
sta_list NZ*
RRR
stop
```

5.6.22. *SAMPLEPHD*

The Sample Pulse Height Data is one of several PHD types available for radionuclide samples and has two different qualifiers, e.g. FULL or PREL. The PREL SPHD contains PHD from a sample acquired for a time shorter than that of the full acquisition time. The FULL SPHD contains PHD from a sample acquired for the IDC-defined full acquisition time. Like the other PHD types, the FULL and PREL SAMPLEPHDs also include other important information. See "Pulse Height Data" on page 162 for a description of the PHD types and "SAMPLEPHD –Beta-Gamma Coincidence Data Version" on page 369, and "SAMPLEPHD – Particulate Version" on page 374 for examples.

5.6.22.1. *Environment*

```
sta_list
```

5.6.22.2. *Example*

The following message requests SPHDF messages from radionuclide stations located in Australia:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list AU*
sphdf
stop
```

5.6.23. *SAMPML*

This data type is one of several radionuclide data products available from the IDC. The SAMPML contains the sample PHDs as well as IDC analysis results in XML format. There are two types of SAMPML reports, e.g. SAMPML_A and SAMPML_R regarding to the Automated and Reviewed Radionuclide Report, respectively.

5.6.23.1. *Environment*

```
sta_list
```

5.6.23.2. *Example*

The following subscription message requests daily SAMPML_A messages from stations in New Zealand. The frequency is not specifically identified because the default transmittal rate is daily.

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
sta_list NZ*
SAMPML_A
stop
```

5.6.24. ***SSREB***

This data type is one of several radionuclide products available from the IDC. The SSREB, or Standard Screened Radionuclide Event Bulletin, is generated by the IDC when fission or activation products are detected at a radionuclide station above normal limits. An SSREB contains RRRs from the stations that detect the fission product(s), information identifying the fission product(s), an estimate of the source location and time, as well as any sample analysis results from certified laboratories. See “SSREB” on page 225 for a description of the SSREB and “SSREB” on page 377 for an example.

5.6.24.1. *Environment*

```
sta_list
```

5.6.24.2. *Example*

The following message requests all SSREB messages to be sent immediately:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
ssreb
stop
```

5.6.25. ***STA_STATUS***

STA_STATUS requests the station status for the S/H/I stations in the STA_LIST environment.

5.6.25.1. *Environment*

```
sta_list
```

5.6.25.2. *Example*

The following subscription message requests the daily station status report for all S/H/I stations:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq daily
sta_list *
sta_status ims2.0
stop
```

5.6.26. ***SUBSCRIBE***

SUBSCRIBE is a request to initiate a new subscription for each standard product given by the SUBSCR_NAME environment.

5.6.26.1. *Environment*

```
subscr_name
```

5.6.26.2. *Example*

The following subscription message requests a subscription to the standard product SEB:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_name seb
subscribe
stop
```

5.6.27. ***SUBSCR_LOG***

SUBSCR_LOG requests a log of all of the user's changes to the subscriptions. The subscriber's email address determines the subscriptions to which a user is subscribed. Based on the email address, a log of all changes is sent out. The SUBSCR_LOG can be further constrained by use of the environments SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME.

5.6.27.1. *Environment*

```
subscr_list | prodid_list | subscr_name
```

5.6.27.2. *Example*

The following subscription message requests a log of subscription 74:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
subscr_list 74
e-mail name@my.computer
subscr_log
stop
```

The response to the preceding message is as follows:

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
  subscription id: 74
  product id: 52
      was added at 1997/01/09 19:36:00
      freq immediate
      bull_type reb
      bulletin ims2.0
  subscription id: 74
  product id: 94
      was changed at 1997/01/21 15:24:13
      the new product constraints are:
      freq immediate
      lat 12.00 to 22.00
      lon 18.00 to 28.00
      bull_type reb
      bulletin ims2.0
stop
```

5.6.28. ***SUBSCR_PROD***

SUBSCR_PROD requests a list of the products currently subscribed to by the user. The response to this request includes the subscription identifier, product identifier, subscription name (where applicable), and a listing of the environment and request lines that define the specific product. The response is sent as a LOG data message. If SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME environments are not specified, then all products currently subscribed to by the user are provided.

5.6.28.1. *Environment*

```
subscr_list | prodid_list | subscr_name
```

5.6.28.2. *Example*

The following subscription message requests the current list of subscriptions that are in effect for the user:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_prod
stop
```

The response to this message is a LOG data message from the IDC:

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
 the following data products are subscribed
 to by name@my.computer:
 subscription id: 52
 product id: 74
   freq daily
   bull_type reb
   bulletin ims2.0
 subscription id: 57
 product id: 78
   freq immediate
   lat 0.0 to 10.0
   lon 120.0 to 140.0
   bull_type sel2
   bulletin ims2.0
stop
```

5.6.29. ***SUBSCR_RESEND***

The SUBSCR_RESEND request causes a subscribed product to be re-delivered. This command gives the subscriber the ability to re-request delivery of a product.

5.6.29.1. *Environment*

```
delivid_list, prodid_list | subscr_list | subscr_name
```

5.6.29.2. *Example*

The following subscription message requests that delivery 32 of subscription 52 be resent to the user:

```
begin ims2.0
msg_type subscription
```

```
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52
delivid_list 32
subscr_resend
stop
```

5.6.30. ***UNSUBSCRIBE***

The UNSUBSCRIBE request informs the IDC that the user wishes to remove the subscriptions referenced by the SUBSCR_LIST, PRODID_LIST, or SUBSCR_NAME environments. A LOG data message is sent confirming that the subscription has been cancelled.

5.6.30.1. *Environment*

```
subscr_list | prodid_list | subscr_name
```

5.6.30.2. *Example*

The following subscription message requests that subscriptions 52 and 57 be discontinued:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
subscr_list 52, 57
unsubscribe
stop
```

A confirming LOG data message from the IDC to the subscription user will be sent verifying that the subscription has been terminated:

```
begin ims2.0
msg_type data
msg_id response_example ctbo_idc
ref_id example any_ndc
data_type log ims2.0
 the following data products have been removed
 by name@my.computer:
 subscription id: 52
 product id: 94
   freq daily
   bull_type reb
   bulletin ims2.0
 subscription id: 57
 product id: 101
   freq immediate
   bull_type sel2
   bulletin ims2.0
stop
```

5.6.31. ***WAVEFORM***

Waveforms are digital timeseries data. WAVEFORM requests will typically accept subformats that specify the format of digital data within the general format of the waveform data type. The available formats for waveform data from the IDC subscription service are continuous data format for continuous data and IMS2.0 format for all other waveform data. The available subformats are `int`, `cm6`, `cm8`, and `csf`.

5.6.31.1. *Environment*

```
chan_list, sta_list, relative_to
```

5.6.31.2. *Examples*

The following subscription message requests continuous data[9] from the short-period, high-gain, vertical channels of the `ABAR` array and from the central site (`CDA0`) of the `CDAR` array:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq continuous
sta_list ABAR,CDA0
chan_list shz
waveform ims2.0
stop
```

The following subscription message requests any waveform segments from auxiliary station `ABC` as soon as they are received by the IDC:

```
begin ims2.0
msg_type subscription
msg_id example any_ndc
e-mail name@my.computer
freq immediate
sta_list ABC
waveform ims2.0
stop
```

9 Special arrangements between Member States and the IDC are required due to the hardware and communications requirements of continuous data transmission.

6. S/H/I DATA MESSAGES

This chapter describes the request message formats and includes the following topics:

- Introduction
- Station Information
- Waveform Data
- Processing Products
- Status Information
- Logs

6.1. Introduction

IMS2.0 data formats provide a common format for data and data product exchange. The data formats all contain ASCII options that allow the exchange of information via email (even for waveforms). Waveforms in binary format may also be sent using the IMS2.0 message format, but the transmission of data messages with binary information must be via HTTP or as attachment to the message.

All data messages require the basic message structure described in “Message Preface” on page 24. If a message is a data message, the MSG_TYPE is set to `data`. Within the message body, several data types may be present. The type of data included in a data section is designated with a DATA_TYPE line. Each data section is com-posed of distinct data blocks that contain required and supplemental data.

6.1.1. ***DATA_TYPE***

Data sections must begin with a DATA_TYPE line. The arguments to DATA_TYPE are the type of data that follows (for example, WAVEFORM or BULLETIN) and the format (IMS2.0). The *subtype* and *sub_format* allow more precise selection of the data type and format, respectively.

6.1.1.1. *Syntax*

`data_type` *data_type*[:*subtype*] *format*[:*sub_format*]

data_type type of data that follows; typical examples are WAVEFORM, BULLETIN, and RESPONSE

subtype subtype to use with this data type. *subtype* is used primarily for ARRIVAL data types.

format general format of the data (IMS2.0)

sub_format internal format to use with this data type. *sub_format* is used primarily for BULLETIN and WAVEFORM data types. Supported subformats are MS_ST2_512 form WAVEFORM in miniseed format and SC3XML for STA_INFO and BULLETIN.

6.1.1.2. *Example*

```
data_type waveform IMS2.0:cm6
data_type waveform ims2.0:ms_st2_512
data_type bulletin IMS2.0:SC3XML
```

The end of a data section is implied by another DATA_TYPE line or a STOP line.

The following sections give the formats for data messages. Examples of these data formats are provided in “Appendix C: Data Message Examples” on page 264.

6.2. Station Information

Data types for S/H/I stations describe the stations through their locations, instrumentation, channels, and so on.

6.2.1. *CHANNEL*

The CHANNEL data type contains information describing the sensors and their emplacement. Table 11 gives the format for the CHANNEL data message, and an example is provided in “Channel” on page 301.

Table 11. Channel Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	27–34	a8	`Latitude`
	37–45	a9	`Longitude`
	47–55	a9	`Coord Sys`
	61–64	a4	`Elev`
	66–70	a5	`Depth`
	74–77	a4	`Hang`
	80–83	a4	`Vang`
	85–95	a11	`Sample_Rate`

RECORD	POSITION	FORMAT	DESCRIPTION
	97–100	a4	`Inst`
	107–113	a7	`On Date`
	118–125	a8	`Off Date`
2–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary code
	26–34	f9.5	latitude (degrees, South is negative)
	36–45	f10.5	longitude (degrees, West is negative)
	47–58	a12	coordinate system (for example, WGS-84)
	60–64	f5.3	elevation (km)
	66–70	f5.3	emplacement depth (km)
	72–77	f6.1	horizontal angle of emplacement (positive degrees clockwise from North, –1.0 if vertical)
	79–83	f5.1	vertical angle of emplacement (degrees from vertical, 90.0 if horizontal)
	85–95	f11.6	sample rate (samples/sec)
	97–102	a6	instrument type
	104–113	i4,a1,i2,a1,i2	start date of channel operation (*yyyy/mm/dd*)
	116–125	i4,a1,i2,a1,i2	end date of channel operation (*yyyy/mm/dd*)

6.2.2. ***NETWORK***

The NETWORK data type provides a descriptive name for each network code. Table 12 shows the format for the NETWORK data message. An example is provided in “Network” on page 315.

Table 12. Network Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–21	a11	`Description`
2–*n*	1–9	a9	network code

(data)	11–74	a64	descriptive network name

6.2.3. *STATION*

The STATION data type describes the site, location, and dates of operation. For arrays, the unique array code that defines a reference point (used for beam) is given along with the information from each element. Table 13 shows the format for the STATION data message. An example is provided in “Station” on page 380.

Table 13. Station Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–20	a4	`Type`
	23–30	a8	`Latitude`
	33–41	a9	`Longitude`
	43–51	a9	`Coord Sys`
	57–60	a4	`Elev`
	64–70	a7	`On Date`
	74–81	a8	`Off Date`
2–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–20	a4	`1C` = single component `3C` = three component `hfa` = high-frequency array `lpa` = long-period array
	22–30	f9.5	latitude (degrees, South is negative)
	32–41	f10.5	longitude (degrees, West is negative)
	43–54	a12	coordinate system (for example, WGS-84)
	56–60	f5.3	elevation (km)
	62–71	i4,a1,i2,a1,i2	start of station operation (*yyyy*/*mm*/*dd*)
	73–82	i4,a1,i2,a1,i2	end of station operation (*yyyy*/*mm*/*dd*)

6.3. Waveform Data

Data types for waveforms include the response of the instrumentation and the waveform data formats.

6.3.1. *RESPONSE*

The RESPONSE data type allows the complete response to be given as a series of response groups that can be cascaded. Modern instruments are composed of several different components, each with its own response. This format mimics the actual configuration of the instrumentation.

A complete response description is made up of the `CAL2` block (Table 14) plus one or more of the `PAZ2`, `FAP2`, `GEN2`, `DIG2`, and `FIR2` response blocks in any order (Table 15 – Table 19). The response blocks should be given sequential stage numbers (beginning with 1) in the order that they occur in the system response.

Each response block is comprised of a header line and sufficient occurrences of the values lines to provide all required coefficients. The `DIG2` block may occur only once per response. Comments may be inserted after the `CAL2` block and after any response section as desired, provided that they are enclosed with parenthesis beginning in column 2. Successive channel responses should also be separated by blank lines for readability.

The input of the earth to seismic stations is in nanometers of displacement (all of the responses are displacement responses). For hydroacoustic and infrasonic, the input is units=pressure=(micro-Pascal). The RESPONSE data describes the response as output units/ input units (e.g. counts/nanometer for a seismic recording system; Volts/nanometer for a seismic sensor; counts/Volts for a digitizer). Velocity or acceleration responses can be obtained by dividing the response curve by $i\omega$ or $-\omega^2$, respectively. An example of the RESPONSE data message is provided in “Response” on page C37.

The `CAL2` block gives general information about the response information that follows (see Table 14).

Table 14. Calibration Identification Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	`CAL2`
	6–10	a5	station code
	12–14	a3	FDSN channel code
	16–19	a4	auxiliary identification code
	21–26	a6	instrument type
	28–42	e15.8	system sensitivity (nm/count) at calibration reference period[1]

RECORD	POSITION	FORMAT	DESCRIPTION
	44–50	f7.3	calibration reference period (seconds)
	52–62	f11.5	system output sample rate (Hz)
	64–73	i4,a1,i2,a1,i2	effective start date (*yyyy / mm / dd*)
	75–79	i2,a1,i2	effective start time (*hh* : *mm*)
	81–90	i4,a1,i2,a1,i2	effective end date (*yyyy / mm / dd*)[2]
	92–96	i2,a1,i2	effective end time (*hh* : *mm*)

System sensitivity, calibration reference period, and sample rate should be the same as in the `wid2` block.

[2] The start/end date/times specify the time period for which the response is valid. If the response is still valid, the end date/time should be left blank.

A poles and zeros block (`PAZ2`) can be used for either an analog filter or an infinite impulse response (IIR) filter. In the data section, poles are always given first followed by zeros (see Table 15).

Table 15. Poles and Zeros Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	`PAZ2`
	6–7	i2	stage sequence number
	9	a1	output units code (`V` = volts, `A` = amps, `C` = counts)
	11–25	e15.8	scale factor
	27–30	i4	decimation (blank if analog)
	32–39	f8.3	group correction applied (seconds)
	41–43	i3	number of poles
	45–47	i3	number of zeros
	49–73	a25	description
2–*n* (data)	2–16	e15.8	real part of pole or zero
	18–32	e15.8	imaginary part of pole or zero

Like `PAZ2`, the frequency, amplitude, phase (`FAP2`) block can be used to specify the response of analog or digital filters, or some combination of them including a complete system response (see Table 16).

Table 16. Frequency, Amplitude, and Phase Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	FAP2
	6–7	i2	stage sequence number
	9	a1	output units code (V = volts, A = amps, C = counts)
	11–14	i4	decimation (blank if analog)
	16–23	f8.3	group correction applied (seconds)
	25–27	i3	number of frequency, amplitude, phase triplets
	29–53	a25	description
2–*n* (data)	2–11	f10.5	frequency (Hz)
	13–27	e15.8	amplitude (output units/input units)
	29–32	i4	phase delay (degrees)

The generic response block (GEN2) can specify the response of analog or digital filters, or some combination of them, including a complete system response (see Table 17).

Table 17. Generic Response Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	GEN2
	6–7	i2	stage sequence number
	9	a1	output units code (V = volts, A = amps, C = counts)
	11–25	e15.8	section sensitivity (input units/output units)
	27–32	f7.3	calibration reference period (seconds)
	35–38	i4	decimation (blank if analog)
	40–47	f8.3	group correction applied (seconds)
	49–51	i3	number of corners
	53–77	a25	description
2–*n* (data)	2–12	f11.5	corner frequency (Hz)
	14–19	f6.2	slope above corner (dB/decade)

The digitizer block (`DIG2`) specifies the digitizer sample rate and sensitivity. It also provides a description field to identify the model of digitizer being used (Table 18).

Table 18. Digitizer Response Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	`DIG2`
	6–7	i2	stage sequence number
	9–23	e15.8	sensitivity (counts/input unit)
	25–35	f11.5	digitizer sample rate (Hz)
	37–61	a25	description

The finite impulse response block (`FIR2`) is used to describe the response of FIR digital filters (see Table 19).

Table 19. Finite Impulse Response Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	`FIR2`
	6–7	i2	stage sequence number
	9–18	e10.2	filter gain (relative factor, not in dB)
	20–23	i4	decimation (blank if analog)
	25–32	f8.3	group correction applied (seconds)
	34	a1	symmetry flag (A = asymmetric, B = symmetric [odd], C = symmetric [even])
	36–39	i4	number of factors
	41–65	a25	description
	2–16	e15.8	factor(i)
	18–32	e15.8	factor(i+1)
2–*n* (data)	34–48	e15.8	factor(i+2)
	50–64	e15.8	factor(i+3)
	66–80	e15.8	factor(i+4)

Comments on the response of an instrument are enclosed in parentheses (Table 20).

Table 20. Response Comment Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	2	a1	`(`
	3–n	a<n–1>	`Comment`
	n+1	a1	`)`

6.3.2. *WAVEFORM*

The format for WAVEFORM data messages consists of a waveform identification (`WID2`) block (Table 21), followed by the station (`STA2`) block (Table 22), the waveform data (`DAT2`) block (Table 23), and a checksum (`CHK2`) block (Table 24). Each `DAT2` block should be followed by a `CHK2` block so that the validity (or otherwise) of the data can be verified.

Table 21. Waveform Identification Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	`WID2`
	6–15	i4,a1,i2,a1,i2	date of the first sample (*yyyy*`/`*mm*`/`*dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first sample (*hh*`:`*mm*`:`*ss*`.`*sss*)
	30–34	a5	station code
	36–38	a3	FDSN channel code
	40–43	a4	auxiliary identification code
	45–47	a3	`INT`, `CM`*n*, or `CSF` `INT` is free-format integers as ASCII characters. `CM` denotes compressed data, and *n* is either `6` (6-bit compression), or `8` (8-bit binary compression) `CSF` is a signed format
	49–56	i8	number of samples
	58–68	f11.6	data sampling rate (Hz)
	70–79	e10.2	system sensitivity (nm/count) at the calibration reference period, the ground motion in nanometers per digital count at calibration period (calper)
	81–87	f7.3	calibration reference period; the period in seconds at which the system sensitivity is valid; calper should be near the flat part of the response curve (in most cases, 1 second)

RECORD	POSITION	FORMAT	DESCRIPTION
	89–94	a6	instrument type
	96–100	f5.1	horizontal orientation of sensor, measured in positive degrees clockwise from North (`-1.0` if vertical)
	102–105	f4.1	vertical orientation of sensor, measured in degrees from vertical (`90.0` if horizontal)

Table 22. Station Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	`STA2`
	6–14	a9	network identifier
	16–24	f9.5	latitude (degrees, South is negative)
	26–35	f10.5	longitude (degrees, West is negative)
	37–48	a12	reference coordinate system (for example, WGS-84)
	50–54	f5.3	elevation (km)
	56–60	f5.3	emplacement depth (km)

Table 23. Waveform Data Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	`DAT2`
2–*n* (data)	1–1024 *variable*	i, a, or f	data values

Table 24. Checksum Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (data)	1–4	a4	`CHK2`
	6–13	i8	checksum

The `WID2` block gives the following information:

- date and time of the first data sample
- station, channel, and auxiliary codes

- subformat of the data
- number of samples and sample rate
- calibration of the instrument represented as the number of nanometers per digital count at the calibration period
- type of instrument
- horizontal and vertical orientation of the instrument

The auxiliary code will be blank in most cases; the code is only used when two data streams with the same station and channel codes conflict. Instrument response information must be obtained separately using a RESPONSE request.

Data following the `DAT2` block may be in any of four different subformats recognized in the IMS2.0 waveform format: `int`, `cm6`, `cm8`, and `csf`. `int` in a simple ASCII subformat; the `cm`- subformats are for compressed data, and the `csf` subformat is for authenticated data. All of the IMS2.0 formats represent the numbers as integers.

A checksum must be computed for the waveform data in the IMS2.0 waveform format. The checksum is computed from integer data values prior to converting them to any of the subformats. A Fortran and a C subroutines for Computing CHK2 Checksum are showln in Figure 1 and Figure 2 below. To prevent overflow, the checksum is computed modulo 100,000,000 and stored as an eight-digit integer without a sign.

The line length limits for messages are enforced for the IMS2.0 data formats; no line may be longer than 1,024 bytes. The line continuation character (\) is not used in waveform data lines.

Examples of the `cm6` and `int` subformats of the WAVEFORM data message are provided in “Station” on page 380 and “Waveform (IMS2.0:int format)” on page 383.

Using the `OUT2` and `DLY2` blocks, the WAVEFORM data type can also be used to respond that no data are available for a request or that the response to the request will be delayed. Table 25 shows how the blocks are used (see also Table 26 and Table 27). In addition, the `STA2` block contains station information. This block is mandatory and must immediately follow the `WID2`, `OUT2`, and `DLY2` blocks.

```
subroutine compute_checksum(signal_int,number_of_samples,checksum)
c*****************************************************************
c  This subroutine computes ims2.0 checksum used in the CHK2 line
c*****************************************************************
c  declarations
c
      implicit none
c
      integer*4 signal_int(*)        ! (input)  seismic signal
                                     ! (counts, integer values)
      integer*4 number_of_samples    ! (input)  number of used samples
      integer*4 checksum             ! (output) computed checksum
      integer*4 i_sample                ! index
      integer*4 sample_value            ! value of one sample after
                                        ! sample overflow check
      integer*4 modulo                  ! overflow protection value
      integer*4 MODULO_VALUE            ! overflow protection value
      parameter (MODULO_VALUE = 100 000 000)
c
c  initialize the checksum
      checksum = 0
c
c  use modulo variable besides MODULO_VALUE parameter to suppress
c  optimizing compilers to bypass local modulo division computation
      modulo = MODULO_VALUE
c
c  loop over all samples (counts, integer values)
c
      do i_sample = 1, number_of_samples
c
c  check on sample value overflow
c
          sample_value = signal_int(i_sample)
          if(abs(sample_value) .ge. modulo)then
              sample_value = sample_value-
     *        (sample_value/modulo)*modulo
          endif
```

Figure 1. FORTRAN Subroutine for Computing CHK2 Checksum

```
#include <stdlib.h>
#include <math.h>

/*
    This function computes the ims2.0 checksum used in the CHK2 line
*/
void
compute_checksum(signal_int, number_of_samples, _checksum)
        int     *signal_int;
        int     number_of_samples;
        int     *_checksum;
{
        int     i_sample;
        int     sample_value;
        int     modulo;
        int     checksum;
```

```
int     MODULO_VALUE = 100000000;

checksum = 0;

modulo = MODULO_VALUE;

for (i_sample=0; i_sample < number_of_samples; i_sample++)
{
        /* check on sample value overflow */

        sample_value = signal_int[i_sample];

        if (abs(sample_value) >= modulo)
        {
                sample_value = sample_value -
                        (sample_value/modulo)*modulo;
```

Figure 2. C Function for Computing CHK2 Checksum

Table 25. Applicable Blocks for Waveform Messages

	BLOCK[1]							
WAVEFORM MESSAGE	**WID2**	**OUT2**	**DLY2**	**STA2**	**EID2**	**BEA2**	**DAT2**	**CHK2**
waveform data message	r			r	o	o	r	r
no data message		r		r				
data delayed message			r	r				

r = required, o = optional

Table 26. Out2 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	`OUT2`
	6–15	i4,a1,i2,a1,i2	date of the first missing sample (*yyyy / mm / dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first missing sample (*hh* **:** *mm* **:** *ss* **.** *sss)*
	30–34	a5	station code
	36–38	a3	FDSN channel code
	40–43	a4	auxiliary identification code
	45–55	f11.3	duration that data are unavailable (seconds)

Table 27. Dly2 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	DLY2
	6–15	i4,a1,i2,a1,i2	date of the first delayed sample (*yyyy / mm / dd*)
	17–28	i2,a1,i2,a1,f6.3	time of the first delayed sample (*hh* : *mm* : *ss* . *sss*)
	30–34	a5	station code
	36–38	a3	FDSN channel code
	40–43	a4	auxiliary identification code
	45–55	f11.3	estimated duration of queue (seconds)

The optional EID2 block specifies to which event(s) a waveform is associated (see Table 28). This block is used when waveforms are requested from a bulletin with the RELATIVE_TO environment. The EID2 block may be repeated for each event to which a waveform is associated.

Table 28. Eid2 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	EID2
	6–13	a8	event identification of associated event
	15–23	a9	bulletin type

The optional BEA2 block specifies how a beamed waveform was formed (see Table 29). This block is only used when the waveform is the result of beaming.

Table 29. Bea2 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–4	a4	BEA2
	6–17	a12	beam identification for the waveform
	19–23	f5.1	azimuth used to steer the beam (measured in positive degrees clockwise from North)
	25–29	f5.1	slowness used to steer the beam (s/degree, –999.0 if vertical beam)

6.3.2.1. *Subformat INT*

The `INT` waveform subformat represents integer data as blank or newline delimited ASCII characters. The number of blank spaces between samples is unspecified, and an individual sample value may not be continued on the next line.

6.3.2.2. *Waveform Compression Schemes*

Two different compression schemes are used in the IMS2.0 standard: `CM6` and `CM8`. IMS2.0 waveform formats, however, include the `CM6` subformat and a subformat for signed data (`CSF`) based on the continuous data format for channel subframes.

For waveform data, the difference between data samples is usually much smaller than the instantaneous magnitudes. The difference of the differences (the second difference) is even smaller. Transmitting the second difference requires fewer significant bits. Reductions in the message length can be achieved if the number of bits to convey the information is reduced when the signal level is small and expanded when the signal level rises. Because samples will take a variable number of bits, an index is required to specify the number of bits in each sample.

Both compression schemes use second differences as a first step in reducing the number of significant bits required to convey the information in the timeseries. A first difference is computed as the difference between successive samples. A second difference is the difference between the differences. The first value in both steps keeps its absolute value (see the following sections).

The following paragraphs describe the compression schemes to reduce the number of bits and/or to make transmission easy.

6.3.2.3. *Subformat CM6*

The `CM6` compression scheme is a six-bit compression of second differences. The advantage of this method is in its conversion of binary integer data to ASCII characters that can be successfully transmitted using email. The compression algorithm converts waveforms into a set of printable ASCII characters carefully avoiding those that have been found to cause problems to either communications circuits or the computers connected to them. The algorithm uses only the 64 characters +, –, 0 – 9, A – Z and a – z.

Initially, all data samples in the packet are represented as 32-bit, 2’s complement integers, with a range of $-(2^{31})$ to $+(2^{31}-1)$. Second difference samples are encoded as the difference between the first differences and can be computed for the jth sample using the following formula:

$$D_2(j) = S(j) - 2S(j-1) + S(j-2)$$

where zero and negative indices are ignored. Thus, the second difference data for N samples are as follows:

$$S(1),\ S(2) - 2S(1),\ S(3) - 2S(2) + S(1),\ \ldots,\ S(N) - 2S(N\text{-}1) + S(N-2)$$

To compress the numbers, the second differences are converted from 2's complement to sign and magnitude. These numbers are then fit into a variable number of bytes in which only the six most significant bits (MSB) are used. The most significant usable bit of each byte is used as a flag or control bit, which, if set, signifies that the following byte also contains information relating to the same sample. The second most significant bit is used as a sign bit in the first byte pertaining to a sample and as a data bit in all following bytes of the sample. All other bits are used to represent the value of the second difference of the sample. These numbers are then fit into a variable number of bytes in which only the six most significant bits are used (see Table 30).

Table 30. Bit Positions for CM6

MOST SIGNIFICANT BIT						LEAST SIGNIFICANT BIT	
CONTROL	SIGN/DATA	DATA	DATA	DATA	DATA	UNUSED	UNUSED

These six-bit bytes are then used to refer to a lookup table (see Table 31) from which one of 64 different ASCII characters (+, –, 0–9, A–Z, a–z) is extracted.

Table 31. ASCII Representation of Bit Patterns for CM6

BIT PATTERN	CHAR[1]	BIT PATTERN	CHAR	BIT PATTERN	CHAR	BIT PATTERN	CHAR
000000	+	010000	E	100000	U	110000	k
000001	–	010001	F	100001	V	110001	l
000010	0	010010	G	100010	W	110010	m
000011	1	010011	H	100011	X	110011	n
000100	2	010100	I	100100	Y	110100	o
000101	3	010101	J	100101	Z	110101	p
000110	4	010110	K	100110	a	110110	q
000111	5	010111	L	100111	b	110111	r
001000	6	011000	M	101000	c	111000	s
001001	7	011001	N	101001	d	111001	t
001010	8	011010	O	101010	e	111010	u
001011	9	011011	P	101011	f	111011	v
001100	A	011100	Q	101100	g	111100	w
001101	B	011101	R	101101	h	111101	x
001110	C	011110	S	101110	i	111110	y
001111	D	011111	T	101111	j	111111	z

char = character

6.3.2.4. *Subformat CM8*

The `CM8` subformat is similar to the `CM6` subformat. The same algorithm is used, but the compression is more efficient than the 6-bit subformat because all bits are used. The 8-bit scheme is a binary format that cannot be transmitted using email; FTP must be used.

The second-difference integers are first converted from 2's complement to sign and magnitude. These numbers are then fit into a variable number of bytes in which all eight significant bits are used. The most significant usable bit of each byte is used as a flag or control bit, which, if set, is used to signify that the following byte also contains information relating to the same sample. The second most significant bit is used as a sign bit in the first byte pertaining to a sample and as data in all following bytes. All other bits are used to represent the value of the second difference (Table 32).

Table 32. Bit Positions for CM8

MOST SIGNIFICANT BIT					LEAST SIGNIFICANT BIT		
CONTROL	SIGN/DATA	DATA	DATA	DATA	DATA	DATA	DATA

6.3.2.5. *Subformat CSF*

Waveform data that have been signed for data verification must contain the raw data that were authenticated along with the digital signatures. To deliver the data as authenticated at the station (or sensor), the incoming continuous data format for channel subframes (see IDC/ENG/SPC/101/Rev.3) must be used. To send the channel subframes in an email message, the sequence of channel subframes are sent as base-64 representation of the binary data.

6.4. Processing Products

Data types used for the processing products include the results of the various stages of S/H/I processing from arrivals through events.

6.4.1. ***ARRIVAL***

The ARRIVAL data types are divided into five subtypes (AUTOMATIC, REVIEWED, GROUPED, ASSOCIATED, and UNASSOCIATED) to reflect the different processing stages.

6.4.1.1. *Automatic Arrivals*

The AUTOMATIC subtype provides the result of a detection process run on waveforms. The format for the AUTOMATIC data subtype are given in Table 33, and an example is provided in "Arrival:automatic" on page 285.

Table 33. Automatic Arrival Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–22	a6	`BeamID`
	33–36	a4	`Date`
	44–47	a4	`Time`
	54–58	a5	`Phase`
	64–67	a4	`Azim`
	70–73	a4	`Slow`
	77–79	a3	`SNR`
	87–89	a3	`Amp`
	93–95	a3	`Per`
	99–101	a3	`STA`
	105–107	a3	`Dur`
	109–114	a6	`Author`
	122–126	a5	`DetID`
2–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–28	a12	beam identifier
	30–39	i4,a1,i2,a1,i2	detection date (*yyyy*/*mm*/*dd*)
	41–52	i2,a1,i2,a1,f6.3	detection time (*hh*:*mm*:*ss*.*sss*)
	54–61	a8	preliminary phase code
	63–67	f5.1	observed azimuth (degrees)
	69–73	f5.1	observed slowness (seconds/degree)
	75–79	f5.1	signal-to-noise ratio
	81–89	f9.1	amplitude (nanometers)
	91–95	f5.2	period (seconds)
	97–101	f5.1	short-term average
	103–107	f5.1	detection duration (seconds)
	109–117	a9	author of the detection
	119–127	a9	detection identifier

6.4.1.2. *Reviewed Arrivals*

The REVIEWED subtype is used for arrivals that have been reviewed and assigned phase names. Phase names are not expected to have been verified by location. Table 34 gives the format for the REVIEWED data subtype, and an example is provided in “Arrival:reviewed” on page 286.

Table 34. Reviewed Arrival Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	22–24	a3	`Aux`
	30–33	a4	`Date`
	40–43	a4	`Time`
	50–54	a5	`Phase`
	60–63	a4	`Azim`
	66–69	a4	`Slow`
	73–75	a3	`SNR`
	83–85	a3	`Amp`
	89–91	a3	`Per`
	93–96	a4	`Qual`
	98–103	a6	`Author`
	110–114	a5	`ArrID`
2–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	arrival date (*yyyy*/*mm*/*dd*)
	37–48	i2,a1,i2,a1,f6.3	arrival time (*hh*:*mm*:*ss*.*sss*)
	50–57	a8	phase code
	59–63	f5.1	observed azimuth (degrees)

RECORD	POSITION	FORMAT	DESCRIPTION
	65–69	f5.1	observed slowness (seconds/degree)
	71–75	f5.1	signal-to-noise ratio
	77–85	f9.1	amplitude (nanometers)
	87–91	f5.2	period (seconds)
	93-95	a1,a1,a1	type of pick (`a` = automatic, `m` = manual) ; direction of short period motion (`c` = compression, `d` = dilatation, _ = null); detection character (`i` = impulsive, `e` = emergent, `q` = questionable, _ = null [see Table 35])
	97–105	a9	author of the arrival
	107–115	a9	arrival identification

Table 35. Detection Character from Uncertainty

DETECTION CHARACTER	UNCERTAINTY FOR LOCAL PHASES	UNCERTAINTY FOR REGIONAL/TELESEISMIC PHASES
i	< 0.05 sec	< 0.2 sec
e	< 0.25 sec	< 1.0 sec
q	> 0.25 sec	> 1.0 sec

6.4.1.3. *Grouped Arrivals*

The GROUPED subtype is used for arrivals that have phase names and have been grouped together, with the implication that they were generated by the same seismic event. Table 36 gives the format for the GROUPED data subtype, and an example is provided in "Arrival:grouped" on page 285.

Table 36. Grouped Arrival Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1-3	a3	`Net`
	11-13	a3	`Sta`
	16-19	a4	`Chan`
	21-23	a3	`Aux`
	29-32	a4	`Date`
	39-42	a4	`Time`

RECORD	POSITION	FORMAT	DESCRIPTION
	50-54	a5	`Phase`
	60-63	a4	`Azim`
	66-69	a4	`Slow`
	73-75	a3	`SNR`
	83-85	a3	`Amp`
	89-91	a3	`Per`
	93-96	a4	`Qual`
	100-104	a5	`Group`
	106	a1	`C`
	108-113	a6	`Author`
	121-125	a5	`ArrID`
2-*n* (data)	1-9	a9	network code
	11-15	a5	station code
	17-19	a3	FDSN channel code
	21-24	a4	auxiliary identification code
	26-35	i4,a1,i2,a1,i2	arrival date (*yyyy/mm/dd*)
	37-48	i2,a1,i2,a1,f6.3	arrival time (*hh:mm:ss.sss*)
	50-57	a8	phase code
	59-63	f5.1	observed azimuth (degrees)
	65-69	f5.1	observed slowness (seconds/degree)
	71-75	f5.1	signal-to-noise ratio
	77-85	f9.1	amplitude (nanometers)
	87-91	f5.2	period (seconds)
	93-95	a1,a1,a1	type of pick (`a` = automatic, `m` = manual) ; direction of short period motion (`c` = compression, `d` = dilatation, _ = null); detection quality (`i` = impulsive, `e` = emergent, `q` = questionable, _ = null)
	97-104	a8	group identification
	106	i1	conflict flag (number of times an arrival belongs to more than one group; blank if arrival only belongs to one group)
	108-116	a9	author of the arrival
	118-126	a9	arrival identification

6.4.1.4. *Associated Arrivals*

The ASSOCIATED subtype is used for arrivals that have been run through a location program and have formed a seismic event. If multiple magnitude measurements have been made on an arrival, the subsequent magnitudes will appear on lines immediately after the arrival. Table 37 gives the format for the ASSOCIATED data subtype, and an example is provided in “Arrival:automatic” on page 285.

Table 37. Associated Arrival Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	19–22	a4	`Dist`
	25–28	a4	`EvAz`
	34–38	a5	`Phase`
	41–44	a4	`Date`
	53–56	a4	`Time`
	64–67	a4	`TRes`
	70–73	a4	`Azim`
	75–79	a5	`AzRes`
	82–85	a4	`Slow`
	88–91	a4	`SRes`
	93–95	a3	`Def`
	99–101	a3	`SNR`
	109–111	a3	`Amp`
	115–117	a3	`Per`
	119–122	a4	`Qual`
	124–132	a9	`Magnitude`
	136–141	a6	`OrigID`
	143–148	a6	`Author`
	156–160	a5	`ArrID`
2–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–22	f6.2	station to event distance (degrees)

RECORD	POSITION	FORMAT	DESCRIPTION
	24–28	f5.1	event to station azimuth (degrees)
	30–37	a8	phase code
	39–48	i4,a1,i2,a1,i2	arrival date (*yyyy*/*mm*/*dd*)
	50–61	i2,a1,i2,a1,f6.3	arrival time (*hh*:*mm*:*ss*.*sss*)
	63–67	f5.1	time residual (seconds)
	69–73	f5.1	observed backazimuth (degrees)
	75–79	f5.1	azimuth residual (degrees)
	81–85	f5.1	observed slowness (seconds/degree)
	87–91	f5.1	slowness residual (seconds/degree)
	93-95	a1,a1,a1	time defining flag (`T` or _), azimuth defining flag (`A` or _), slowness defining flag (`S` or _)
	97–101	f5.1	signal-to-noise ratio
	103–111	f9.1	amplitude (nanometers)
	113–117	f5.2	period (seconds)
	119-121	a1,a1,a1	type of pick (`a` = automatic, `m` = manual) ; direction of short period motion (`c` = compression, `d` = dilatation, _ = null); onset quality (`i` = impulsive, `e` = emergent, `q` = questionable, _ = null)
	123–127	a5	magnitude type (`mb`, `Ms`, `ML`, `mbmle`, `msmle`)
	128	a1	min max indicator (<, >, or blank)
	129–132	f4.1	magnitude value
	134–141	a8	origin identification
	143–151	a9	author of the arrival
	153–161	a9	arrival identification

6.4.1.5. *Unassociated Arrivals*

The UNASSOCIATED subtype is used for arrivals that have been detected and reviewed, but have not been not associated with a seismic origin. The format of the UNASSOCIATED subtype line is the same as the format for the AUTOMATIC subtype as shown in Table 31. An example is provided in “Arrival:unassociated” on page 286.

6.4.2. *BULLETIN*

Bulletins are composed of origin and arrival information. The information is provided in a series of data blocks as shown in Table 38: bulletin title block (Table 39), event title block (Table 40), origin block (Table 41), phase block[10] (Table 42), event screening block (Table 43), and event characterization arrival block (Table 44). The verbosity of a bulletin can be controlled by specifying the subformat, which can be SHORT or LONG. The default is SHORT.

The BULL_TYPE environment and the subformat control the blocks of information that appear in a bulletin. Table 38 lists the blocks that are included for each BULL_TYPE and subformat.

A BULLETIN data message contains one bulletin title block and one set of the other block types for each event. The blocks in a BULLETIN data message appear in the order given in Table 38. Examples of the SHORT and LONG subformats for bulletins are provided in "Bulletin (IMS2.0:short Format)" on page 289 and "Bulletin (IMS2.0:long Format)" on page 292.

Table 38. Blocks Used in Bulletin Formats[11]

	SEL1, SEL2, SEL3, REB SUBFORMATS		**SEB, SSEB, NEB, NSEB SUBFORMATS**	
BLOCK NAME	SHORT	LONG	SHORT	LONG
bulletin title block	r	r	r	r
event title block	r	r	r	r
origin block	r	r	r	r
phase block	r	r	r	r
phase correction block		r		r
event screening block			r	r
event characterization arrival block				r

[10] International Seismological Centre (1999) defines a phase information subblock to compliment the phase block.

[11] International Seismological Centre (1999) defines additional block formats including effects and reference.

Table 39. Bulletin Title Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–136	a136	bulletin title

Table 40. Event Title Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–5	a5	`EVENT`
	7–15	a9	event identification
	17–80	a64	geographic region

Table 41. Origin Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
ORIGIN SUB-BLOCK			
1 (header)	4–7	a4	`Date`
	15–18	a4	`Time`
	27–29	a3	`Err`
	33–35	a3	`RMS`
	37–44	a8	`Latitude`
	46–54	a9	`Longitude`
	57–60	a4	`Smaj`
	63–66	a4	`Smin`
	69–70	a2	`Az`
	72–76	a5	`Depth`
	80–82	a3	`Err`
	84–87	a4	`Ndef`
	89–92	a4	`Nsta`
	94–96	a3	`Gap`
	99–103	a5	`mdist`
	106–110	a5	`Mdist`
	112–115	a4	`Qual`

RECORD	POSITION	FORMAT	DESCRIPTION
	119–124	a6	`Author`
	131–136	a6	`OrigID`
2–*n* (data)	1–10	i4,a1,i2,a1,i2	epicentre date (*yyyy*/*mm*/*dd*)
	12–22	i2,a1,i2,a1,f5.2	epicentre time (*hh*:*mm*:*ss*.*ss*)
	23	a1	fixed flag (`f` = fixed origin time solution, blank if not a fixed origin time)
	25–29	f5.2	origin time error (seconds; blank if fixed origin time)
	31–35	f5.2	root mean square of time residuals (seconds)
	37–44	f8.4	latitude (negative for South)
	46–54	f9.4	longitude (negative for West)
	55	a1	fixed flag (`f` = fixed epicentre solution, blank if not a fixed epicentre solution)
	57–60	f4.1	semi-major axis of 90% ellipse or its estimate (km, blank if fixed epicentre)
	62–66	f5.1	semi-minor axis of 90% ellipse or its estimate (km, blank if fixed epicentre)
	68–70	i3	strike (0 <= x <= 360) of error ellipse clockwise from North (degrees)
	72–76	f5.1	depth (km)
	77	a1	fixed flag (`f` = fixed depth station, `d` = depth phases, blank if not a fixed depth)
	79–82	f4.1	depth error 90% (km; blank if fixed depth)
	84–87	i4	number of defining phases
	89–92	i4	number of defining stations
	94–96	i3	gap in azimuth coverage (degrees)
	98–103	f6.2	distance to closest station (degrees)
	105–110	f6.2	distance to furthest station (degrees)
	112	a1	analysis type: (`a` = automatic, `m` = manual, `g` = guess)
	114	a1	location method: (`i` = inversion, `p` = pattern recognition, `g` = ground truth, `o` = other)

RECORD	POSITION	FORMAT	DESCRIPTION
	116–117	a2	event type: `uk` = unknown `ke` = known earthquake `se` = suspected earthquake `kr` = known rockburst `sr` = suspected rockburst `ki` = known induced event `si` = suspected induced event `km` = known mine explosion `sm` = suspected mine explosion `kx` = known experimental explosion `sx` = suspected experimental explosion `kn` = known nuclear explosion `sn` = suspected nuclear explosion `ls` = landslide
	119–127	a9	author of the origin
	129–136	a8	origin identification
MAGNITUDE SUB-BLOCK			
1 (header)	1–9	a9	`Magnitude`
	12–14	a3	`Err`
	16–19	a4	`Nsta`
	21–26	a6	`Author`
	33–38	a6	`OrigID`
2–*n* (data)	1–5	a5	magnitude type (`mb`, `Ms`, `ML`, `mbmle`, `msmle`, e.g.)
	6	a1	*min max* indicator (<, >, or blank)
	7–10	f4.1	magnitude value
	12–14	f3.1	standard magnitude error
	16–19	i4	number of stations used to calculate magnitude
	21–29	a9	author of the origin
	31–38	a8	origin identification
COMMENT SUB-BLOCK			
1	2	a1	`(`
	3–M	a(M–2)	comment
	M+1	a1	`)`

Table 42. Phase Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1–3	a3	`Sta`
	9–12	a4	`Dist`
	15–18	a4	`EvAz`
	20–24	a5	`Phase`
	33–36	a4	`Time`
	43–46	a4	`TRes`
	49–52	a4	`Azim`
	54–58	a5	`AzRes`
	62–65	a4	`Slow`
	69–72	a4	`SRes`
	74–76	a3	`Def`
	80–82	a3	`SNR`
	90–92	a3	`Amp`
	96–98	a3	`Per`
	100–103	a4	`Qual`
	105–113	a9	`Magnitude`
	118–122	a5	`ArrID`
2–*n* (data)	1–5	a5	station code
	7–12	f6.2	station-to-event distance (degrees)
	14–18	f5.1	event-to-station azimuth (degrees)
	20–27	a8	phase code
	29–40	i2,a1,i2,a1,f6.3	arrival time (*hh*`:`*mm*`:`*ss*`.`*sss*)
	42–46	f5.1	time residual (seconds)
	48–52	f5.1	observed azimuth (degrees)
	54–58	f5.1	azimuth residual (degrees)
	60–65	f6.1	observed slowness (seconds/degree)
	67–72	f6.1	slowness residual (seconds/degree)
	74-76	a1,a1,a1	time defining flag (`T` or _), azimuth defining flag (`A` or _), slowness defining flag (`S` or _)
	78–82	f5.1	signal-to-noise ratio

RECORD	POSITION	FORMAT	DESCRIPTION
	84–92	f9.1	amplitude (nanometers)
	94–98	f5.2	period (seconds)
	100-102	a1,a1,a1	type of pick (a = automatic, m = manual); direction of short period motion (c = compression, d = dilatation, _ = null); onset quality (i = impulsive, e = emergent, q = questionable, _ = null)
	104–108	a5	magnitude type (e.g. mb, Ms, ML, mbmle, msmle)
	109	a1	min max indicator (<, >, or blank)
	110–113	f4.1	magnitude value
	115–123	a9	arrival identification

The format of the EVENT SCREENING block follows in Table 43. The block has been extended to include station-specific hydroacoustic and regional measurements. In the table, assume *n* = number of hydro measurement stations, *m* = number of regional measurement stations.

Table 43. Event Screening Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
EVENT SCREENING SUMMARY SUB-BLOCK			
1 (title)	1–15	a15	EVENT SCREENING
2 (header)	1–8	a8	Category
	11–15	a5	Score
	17–22	a6	Dscore
	24–29	a6	Mscore
	31–36	a6	Rscore
	38–43	a6	Hscore
	45–51	a7	Smaj_sc
	53–59	a7	Smin_sc
	61–65	a5	Depth
	68–71	a4	Sdep
	74–77	a4	mbms
	79–83	a5	Smbms

RECORD	POSITION	FORMAT	DESCRIPTION
	91–96	a6	`Foffsh`
	98–102	a5	`MinWD`
	104–106	a3	`Clr`
3 (data)	1–8	a2,a1,a5	Screening Category: `NC` (Not Considered) `IS` (Insufficient Data) `NS` (Not Screened Out) `SO` (Screened Out) `/` `Offsh` (Offshore) `Onsh` (Onshore) `Mixed` (Mixed onshore and offshore)
	10–15	f6.2	combined screening score
	17–22	f6.2	depth screening score
	24–29	f6.2	A*m_b–M_s screening score
	31–36	f6.2	regional seismic score
	38–43	f6.2	hydroacoustic screening score
	45–51	f7.1	scaled semi-major axis of location error ellipse
	53–59	f7.1	scaled semi-minor axis of location error ellipse
	61–65	f5.1	depth estimate (km)
	67–71	f5.1	depth confidence interval (km)
	73–77	f5.2	A*m_b–M_s (including slope term, A)
	79–83	f5.2	A*m_b–M_s confidence interval
	93–96	f4.2	fraction of scaled location error ellipse offshore
	98–102	f5.0	minimum water depth in scaled error ellipse
	106	i1	clear path flag for hydroacoustic signal(s) (clear = `1`, not clear = `0`)
4		(blank line)	
HYDROACOUSTIC SCREENING SUB-BLOCK			
1 (title)	1–23	a23	`HYDROACOUSTIC SCREENING`
2 (header)	1–3	a3	`sta`
	8–11	a4	`cps8`
	15–18	a4	`snr7`
	22–25	a4	`noi7`

RECORD	POSITION	FORMAT	DESCRIPTION
3–*n* (data)	1–5	a5	station name
	8–13	f6.2	cepstral peak from band 8 (2–80 Hz)
	15–20	f6.2	snr of hydroacoustic total energy measurement
	22–27	f6.2	noise of hydroacoustic total energy measurement
n+1			(blank line)
REGIONAL SCREENING SUB-BLOCK			
1 (title)	1–18	a18	`REGIONAL SCREENING`
2 (header)	1–3	a3	`sta`
	8–13	a6	`pnsmax`
	17–20	a4	`corr`
	25–27	a3	`err`
3–*n* (data)	1–5	a5	station name
	8–13	f6.2	pnsmax value in the 6–8 Hz band
	15–20	f6.2	pnsmax correction value in the 6–8 Hz band
	22–27	f6.2	pnsmax error estimate in the 6–8 Hz band
n+1			(blank line)

Table 44. Event Characterization Arrival Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
CEPSTRAL PEAK ANALYSIS SUB-BLOCK			
1 (title)	1–22	a22	`CEPSTRAL PEAK ANALYSIS`
2 (header)	1–3	a3	`Sta`
	8–14	a7	`PeakAmp`
	16–23	a8	`PeakQuef`
3–*n* (data)	1–5	a5	station code
	8–14	f7.5	peak amplitude
	16–23	f8.4	peak quefrency
ENERGY RATIO SUB-BLOCK			
1 (title)	1–37	a37	`SHORT-PERIOD/LONG-PERIOD ENERGY RATIO`

RECORD	POSITION	FORMAT	DESCRIPTION
2 (header)	1–3	a3	`Sta`
	13–17	a5	`Ratio`
3–*n* (data)	1–5	a5	station code
	8–17	f10.8	short-period/long-period energy ratio
FREQUENCY DEPENDENT PHASE AMPLITUDE SUB-BLOCK			
1 (title)	1–41	a41	`FREQUENCY-DEPENDENT PHASE AMPLITUDE BLOCK`
	44–46	i3	block number (i^{th} block)
	48–49	a2	`of`
	51–53	i3	total number of Frequency Dependent Phase Amplitude Sub-blocks
2 (header)	1–3	a3	`Sta`
	7–11	a5	`Phase`
	18–20	a3	`Amp`
	28–30	a3	`SNR`
	38–40	a3	`Amp`
	48–50	a3	`SNR`
	58–60	a3	`Amp`
	68–70	a3	`SNR`
	78–80	a3	`Amp`
	88–90	a3	`SNR`
3 (header)	17–22	f6.1	min(FreqBand(i-1)*4+1)
	24–25	a2	`to`
	27–32	f6.1	max(FreqBand(i-1)*4+1)
	37–42	f6.1	min(FreqBand(i-1)*4+2)
	44–45	a2	`to`
	47–52	f6.1	max(FreqBand(i-1)*4+2)
	57–62	f6.1	min(FreqBand(i-1)*4+3)
	64–65	a2	`to`
	67–72	f6.1	max(FreqBand(i-1)*4+3)
	77–82	f6.1	min(FreqBand(n-1)*4+4)

RECORD	POSITION	FORMAT	DESCRIPTION
	84–85	a2	`to`
	87–92	f6.1	max(FreqBand(n-1)*4+4)
4–*n* (data)	1–5	a5	station code
	7–10	a8	associated phase (Note: an“!” indicates that reported values are based on predicted values instead of observed values)
	12–20	f9.1	amplitude in FreqBand(i-1)*4+1
	26–30	f5.1	snr in FreqBand(i-1)*4+1
	32–40	f9.1	amplitude FreqBand(i-1)*4+2
	46–50	f5.1	snr in FreqBand(i-1)*4+2
	52–60	f9.1	amplitude in FreqBand(i-1)*4+3
	66–70	f5.1	snr in FreqBand(i-1)*4+3
	72–80	f9.1	amplitude in FreqBand(i-1)*4+4
	86–90	f5.1	snr in FreqBand(i-1)*4+4
SPECTRAL VARIANCE SUB-BLOCK			
1 (title)	1–47	a47	`SPECTRAL VARIANCE OF THE DETRENDED LOG SPECTRUM`
2 (header)	1–3	a3	`Sta`
	7–11	a5	`Phase`
	13–19	a7	`MinFreq`
	21–27	a7	`MaxFreq`
	35–41	a7	`SpecVar`
3–*n* (data)	1–5	a5	station code
	7–11	a5	associated phase
	13–19	f7.2	minimum frequency
	21–27	f7.2	maximum frequency
	30–41	f12.6	spectral variance of detrended log spectrum
COMPLEXITY SUB-BLOCK			
1 (title)	1–10	a10	`COMPLEXITY`
2 (header)	1–3	a3	`Sta`
	7–11	a5	`Phase`
	14–23	a10	`Complexity`

RECORD	POSITION	FORMAT	DESCRIPTION
	32–34	a3	`SNR`
3–*n* (data)	1–5	a5	station code
	7–11	a5	associated phase
	13–23	f11.4	complexity
	25–34	f10.4	snr of complexity
THIRD MOMENT OF FREQUENCY SUB-BLOCK			
1 (title)	1–25	a25	`THIRD MOMENT of FREQUENCY`
2 (header)	1–3	a3	`Sta`
	12–14	a3	`TMF`
3–*n* (data)	1–5	a5	station code
	7–14	f8.1	third moment of frequency
TIME FREQUENCY SUB-BLOCK			
1 (title)	1–25	a25	`TIME FREQUENCY PARAMETERS`
2 (header)	1–3	a3	`Sta`
	9–14	a6	`zavpct`
	20–25	a6	`zavcep`
	31–36	a6	`zavcor`
3–*n* (data)	1–5	a5	station code
	9–14	f6.4	average ratio of bad points to the total of the vertical component traces
	20–25	f6.1	average maximum value of the 2-D cepstrum of the vertical component traces
	31–35	f5.3	average autocorrelation along the time axis across all frequencies excluding randomized points of the vertical component traces

6.4.3. *COMMENT*

The first line of the COMMENT data type provides a mechanism for associating the comment to a station, arrival, origin, event, and so on. If no association is needed, then this line may be left blank. The comment is written in free format and can be up to 1,024 characters. Table 45 gives the format for the COMMENT data message, and an example is provided in “Comment” on page 303.

Table 45. Comment Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–10	a10	identification type (`Station`, `Arrival`, `Origin`, `Event`)
	12–19	a8	identification string of the identification type
2	1–1024	a1024	free-format comment

6.4.4. *EVENT*

Any S/H/I event can have several estimates of the location, origin time, and size (origins). The format for events places these different origins into separate origin blocks. The bulletin title block at the beginning of the data section must include the name of the bulletin used as the basis for associating the separate origin estimates. The events data messages include:

- one bulletin title block (see Table 39)
- *n* origin blocks (see Table 41)

An example of the EVENT data message is provided in “Event” on page 306.

6.4.5. *ORIGIN*

The ORIGIN data type consists of a number of origin blocks (Table 41). Multiple magnitudes may be given for the same origin. An example of the ORIGIN data message is provided in “Origin” on page 315.

6.5. Status Information

Several data types provide status information. Status information is available for authentication, stations, channels, communications, and data availability.

6.5.1. *AUTH_STATUS*

Some data channels contain authentication signatures that are verified at the IDC. The AUTH_STATUS data type provides statistics on the authentication process over the time of the report. The first block (Table 46) of the report gives the number of packets tested (Table 47), the number that passed, and the number that failed by station. The second block contains a list of the failures grouped as intervals for each data channel that failed to verify the authentication signature. An example of the AUTH_STATUS data message is provided in “Auth_status” on page 287.

Table 46. Report Period Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-18	a18	`Report period`
	20-29	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	31-40	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
	42-43	a2	`to`
	45-54	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	56-65	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
2 (header)	1-3	a3	`Net`
	11-13	a3	`Sta`
	16-19	a4	`Chan`
	21-23	a3	`Aux`
	27-40	a14	`Packets_Tested`
	43-56	a14	`Packets_Failed`
3-*n* (data)	1-9	a9	network code
	11-15	a5	station code
	17-19	a3	FSDN channel code
	21-24	a4	auxiliary identification code
	22-40	i8	number of packets tested
	49-56	i8	number of packets failing verification

Table 47. Authentication List Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-23	a23	`Failed Packet Intervals`
2 (header)	1-3	a3	`Net`
	11-13	a3	`Sta`
	16-19	a4	`Chan`
	21-23	a3	`Aux`
	31-40	a10	`Start_Time`
	55-61	a8	`End_Time`

	71-77	a7	`Comment`
3-*n* (data)	1-9	a9	network code
	11-15	a5	station code
	17-19	a3	channel code
	21-24	a4	auxiliary identification code
	26-35	i4,a1,i2,a1,i2	start date of failure interval (*yyyy/mm/dd*)
	37-46	i2,a1,i2,a1,f4.1	start time of failure interval (*hh:mm:ss.s)*
	49-58	i4,a1,i2,a1,i2	end date of failure interval (*yyyy/mm/dd*)
	60-69	i2,a1,i2,a1,f4.1	end time of failure interval (*hh:mm:ss.s*)
	71-132	a62	comment

6.5.2. *CHAN_STATUS*

The CHAN_STATUS data type gives specific information on the data that have been received at the IDC by station and channel. Detailed statistics on data gaps and timeliness are included (see Table 48).

An example of the CHAN_STATUS data message is provided in “Chan_status” on page 302.

Table 48. CHAN_STATUS Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	date (*yyyy / mm / dd*)
	31–40	i2,a1,i2,a1,f4.1	time (*hh* **:** *mm* **:** *ss* **.** *s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	date (*yyyy / mm / dd*)
	56–65	i2,a1,i2,a1,f4.1	time (*hh* **:** *mm* **:** *ss* **.** *s*)
2 (title)	1–14	a14	`Channel Status`
3 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	17–20	a4	`Chan`
	22–28	a7	`%_Recvd`
	30–36	a7	`%_AvaUA`

RECORD	POSITION	FORMAT	DESCRIPTION
	38–44	a7	`%_Avail`
	47–50	a4	`Gaps`
	54–60	a7	`Samples`
	63–70	a8	`Constant`
	79–82	a4	`Mean`
	92–94	a3	`RMS`
4–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–20	a4	FDSN channel code
	22–28	f7.3	percent of data received
	30–36	f7.3	percent of data available (unauthenticated)
	38–44	f7.3	percent of data available that passed authentication
	46–50	i5	number of data gaps
	52–60	i9	number of samples
	62–70	i9	number of constant values
	72–82	f11.1	mean amplitude (nanometers)
	84–94	f11.1	root mean square amplitude (nanometers^2)

6.5.3. *COMM_STATUS*

Communications status is given over the time interval specified in the TIME or FREQ environments for IMS2.0 or subscription requests, respectively. The report is comprised of a communications statistics block giving the report period and a summary section in which each link is described with statistics of link performance for the reporting period (see Table 49). The next block is a list of the link outages for each link (see Table 50). The link outages block is included only in the `long` subformat. An example of the COMM_STATUS data message is provided in “Comm_status” on page 303.

Table 49. Communications Statistics Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-18	a18	`Report period from`
	20-29	i4,a1,i2,a1,i2	start date (*yyyy/mm/dd*)
	31-40	i2,a1,i2,a1,f4.1	start time (*hh:mm:ss.s*)

RECORD	POSITION	FORMAT	DESCRIPTION
	42-43	a2	`to`
	45-54	i4,a1,i2,a1,i2	end date (*yyyy/mm/dd*)
	56-65	i2,a1,i2,a1,f4.1	end time (*hh:mm:ss.s*)
2 (header)	1-4	a4	`Link`
	22-29	a8	`Nom_kbps`
	32-35	a4	`Mode`
	38-41	a4	`%_up`
	44-47	a4	`From`
	54-57	a4	`Util`
	60-63	a4	`From`
	70-73	a4	`Util`
3-*n* (data)	1-9	a9	link code (farthest from IDC)
	11	a1	–
	13-21	a9	link code (closest to IDC)
	24-29	f6.1	nominal speed of link in kbps
	32-35	a4	`full` for full-duplex or `half` for half-duplex
	37-41	f5.1	percent uptime
	44-52	a9	link code (farthest from IDC)
	54-57	f4.2	use of link (dat_rate/speed)
	60-68	a9	link code (closest to IDC)
	70-73	f4.2	use of link (dat_rate/speed)

Table 50. Communications Outage Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-9	a8	link code (farthest from IDC)
	11	a1	–
	13-21	a9	link code (closest to IDC)
	23-34	a12	`link outages`
2	10-13	a4	`From`

RECORD	POSITION	FORMAT	DESCRIPTION
(header)	30-36	a7	`Through`
	50-57	a8	`Duration`
3-*n* (data)	1-10	i4,a1,i2,a1,i2	date of beginning of outage (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	time of beginning of outage (*hh:mm:ss.s)*
	24-33	i4,a1,i2,a1,i2	date of end of outage (*yyyy/mm/dd*)
	35-44	i2,a1,i2,a1,f4.1	time of end of outage (*hh:mm:ss.s*)
	47-60	i3,a1,i2,a1,i2,a1,f4.1	duration of outage (*ddd hh:mm:ss.s*)

6.5.4. *OUTAGE*

The OUTAGE data type provides information on the dates and times of data gaps. Table 51 gives the format for the OUTAGE data message, and an example is provided in “Outage” on page 316.

Table 51. Outage Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	date (*yyyy / mm / dd*)
	31–42	i2,a1,i2,a1,f6.3	time (*hh* **:** *mm* **:** *ss* **.** *sss*)
	44–45	a2	`to`
	47–56	i4,a1,i2,a1,i2	date (*yyyy / mm / dd*)
	58–67	i2,a1,i2,a1,f6.3	time (*hh* **:** *mm* **:** *ss* **.** *sss*)
2 (header)	1–3	a3	`Net`
	11–13	a3	`Sta`
	16–19	a4	`Chan`
	21–23	a3	`Aux`
	30–44	a15	`Start Date Time`
	55–67	a13	`End Date Time`
	76–83	a8	`Duration`
	85–91	a7	`Comment`

RECORD	POSITION	FORMAT	DESCRIPTION
3–*n* (data)	1–9	a9	network code
	11–15	a5	station code
	17–19	a3	FDSN channel code
	21–24	a4	auxiliary identification code
	26–35	i4,a1,i2,a1,i2	date of last sample before outage interval or start date of report period[1]
	37–48	i2,a1,i2,a1,f6.3	time of last sample before outage interval
	50–59	i4,a1,i2,a1,i2	date of first sample after outage interval[2]
	61–72	i2,a1,i2,a1,f6.3	time of first sample after outage interval or end time of the report period
	74–83	f10.3	duration of interval (seconds)
	85–132	a48	comment

1 Time of last available sample preceding the outage or the start time of the report period.

2 Time of first available sample after the outage or the end time of the report period.

6.5.5. ***STA_STATUS***

Station status is given over the time interval specified in the TIME or FREQ environments for IMS2.0 or subscription requests, respectively. The report is comprised of statistics that can be used to evaluate the overall performance of one or more stations. The first record of the report gives the report period.

The status records give the station code, the maximum data time (the cumulative amount of time for which data are expected for this station), followed by the station capability entries for the minimum set of channels necessary to maintain mission capability as well as for the geophysical channels. Definitions for the statistics can be found in the Operational Manual for the International Data Centre (CTBT/WGB/TL-11,17/19/Rev.5). Table 52 gives the station status format, and an example is provided in “Station” on page 380.

Table 52. STA_STATUS Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1–18	a18	`Report period from`
	20–29	i4,a1,i2,a1,i2	start date (*yyyy*/*mm*/*dd*)
	31–40	i2,a1,i2,a1,f4.1	start time (*hh*:*mm*:*ss*.*s*)
	42–43	a2	`to`
	45–54	i4,a1,i2,a1,i2	end date (*yyyy*/*mm*/*dd)*
	56–65	i2,a1,i2,a1,f4.1	end time (*hh*:*mm*:*ss*.*s*)
2 (title)	1–14	a14	`Station Status`
3 (header)	1–3	a3	`Sta`
	7–18	a12	`Max_Exp_Time`
	21–67	a47	`___________ Minimum Channels ____________`
	69–115	a46	`________ Geophysical Channels _________`
4 (header)	26–63	a38	`Data          Timely Data        Mission`
	74–109	a36	`Data              Data              Data`
5 (header)	22–66	a45	`Availability   Availability   Capability (%)`
	70–113	a44	`Received (%)   Availability    Availability`
6 (header)	27–45	a19	`(%)              (%)`
	85–109	a25	`Unauthenticated       (%)`
7 (header)	91–93	a3	`(%)`
8–*n* (data)	1–5	a5	station code
	7–19	i4,a1,i2,a1,i2,a1,i2	maximum data time possible (*dddd hh*:*mm*:*ss*)
	25–31	f7.3	data availability of the minimum channels (% of report period)
	41–47	f7.3	timely data availability of the minimum channels (% of report period)
	57–63	f7.3	mission capability of the minimum channels (% of report period)
	73–79	f7.3	data received percentage of the geophysical channels (% of report period)
	89–95	f7.3	data availability (unauthenticated) of the geophysical channels (% of report period)
	105–111	f7.3	data availability of the geophysical channels (% of report period)

6.6. Logs

LOG data types are used primarily as administrative messages.

6.6.1. *ERROR_LOG*

The ERROR_LOG data type are reserved for responses to request messages that contain errors. Specific formats have not been defined at this time, although the request message can be given with the line or lines causing the error identified. The information is provided in free-format comment lines in which the first character is blank. An example of an ERROR_LOG is provided in “Error_log” on page 306.

6.6.2. *LOG*

The LOG data type includes free-format comment lines in which the first character of the line is blank. The exact content of the logs is unspecified. An example of the LOG data message is provided in “Log” on page 313.

7. RADIONUCLIDE MESSAGES

This chapter describes the radionuclide message formats and includes the following topics:

- Introduction
- Pulse Height Data
- Radionuclide Laboratory Reports
- State of Health Data
- Meteorological Data
- Other Laboratory Messages
- Alerts
- Data Products

7.1. Introduction

IMS2.0 data formats provide a common format for IMS data and IDC product exchange. Many different types of radionuclide data and products may be exchanged using the message formats described herein.

Radionuclide messages can be generated at a radionuclide station, a certified laboratory, or at the Provisional Technical Secretariat (PTS). Data types for radionuclide messages and their sources are described in Table 53, Table 54 and Table 55. Descriptions of formats for each data type are included in this chapter. Examples of each data type are located in Appendix III: Data Message Examples.

Table 53. Data Types for Radionuclide Messages from Stations

DATA TYPE	DATA MESSAGE	SECTION	MSG_TYPE[1]
ALERT_FLOW	Airflow alert	Alert	D
ALERT_SYSTEM	System alert	Alert	D
ALERT_TEMP	Temperature alert	Alert	D
ALERT_UPS	Power Supply Alert	Alert	D
BLANKPHD	Blank Spectrum	Pulse Height Data	D
CALIBPHD	Calibration Spectrum	Pulse Height Data	D
DETBKPHD	Detector Background Spectrum	Pulse Height Data	D
GASBKPHD	Noble Gas Background Spectrum	Pulse Height Data	D
MET	Metereological Data	Meteorological Data	D
QCPHD	Quality Control Spectrum	Pulse Height Data	D
RMSSOH	State of Health Data	State of Health Data	D
SAMPLEPHD	Sample Spectrum	Pulse Height Data	D

DATA TYPE	DATA MESSAGE	SECTION	MSG_TYPE[1]
SPIKEPHD	Spike Spectrum	Pulse Height Data	D

D = DATA; L = LABDATA message type

Table 54. Data Types for Radionuclide Messages from Laboratories

DATA TYPE	DATA MESSAGE	SECTION	MSG_TYPE[1]
ADDINS	Request for Additional Instructions	Other Laboratory Messages	L
BLANKPHD	Blank Spectrum	Pulse Height Data	D
CALIBPHD	Calibration Spectrum	Pulse Height Data	D
DETBKPHD	Detector Background Spectrum	Pulse Height Data	D
RLR	Radionuclide Laboratory Report	Radionuclide Laboratory Reports	D
MESACK	Message Receipt Acknowledgement	Other Laboratory Messages	L
MISC	Message does not fit any other type	Other Laboratory Messages	L
QCPHD	Quality Control Spectrum	Pulse Height Data	D
SAMACK	Sample Receipt Acknowledgement	Other Laboratory Messages	L
SAMPLEPHD	Sample Spectrum	Pulse Height Data	D
TECSDN	Sample Dispatch Notification to the PTS	Other Laboratory Messages	L

D = DATA, L = LABDATA message type

Table 55. Data Types for Radionuclide Messages from PTS

DATA TYPE	DATA MESSAGE	PRINCIPAL RECIPIENT	SECTION[1]
ADDINS	Additional instructions	Laboratory	Other Laboratory Messages [L]
ARR	Automated Radionuclide Report	States Signatories	Data Product [D]
DATREQ	Request for Missing Report or other information	Laboratory	Other Laboratory Messages [L]
LABSDN	Sample Dispatch Notification	Laboratory	Other Laboratory Messages [L]
MISC	Message does not fit any other type	Laboratory	Other Laboratory Messages [L]
PRESDN	Preliminary Sample Dispatch Notification	Laboratory	Other Laboratory Messages [L]
RNPS	Radionuclide Network Product Summary	States Signatories	Data Product [D]
RRR	Reviewed Radionuclide Report	States Signatories	Data Product [D]
SAMACK	Sample Receipt Acknowledgement	Laboratory	Other Laboratory Messages [L]
SAMPML	Sample PHDs plus Automatic or Reviewed Radionuclide Report	States Signatories	Data Product [D]

DATA TYPE	DATA MESSAGE	PRINCIPAL RECIPIENT	SECTION[1]
SSREB	Standard Screened Radionuclide Event Bulletin	States Signatories	Data Product [D]

[D] = DATA; [L] = LABDATA message

All data messages require the basic message structure described in Message Preface on page 24.

Within the message body, several data types may be present. The type of data included in a data section is designated with a DATA_TYPE line. The argument of the DATA_TYPE command designates the type of data that are included in the message section:

`data_type` *data_type*

data_type the type of IMS data that follows

Each data section is composed of distinct data blocks that contain required and supplemental data. The start of a data block is designated by a line containing the block name. All data block names begin with the pound (#) sign. Additional data can be included in a Radionuclide message through the addition of new blocks. The name of any new block must start with a pound sign, followed by any combination of characters not already used for a predefined block.

The #Header block must be the first data block in any Radionuclide message because it specifies the system type. No requirements on the order of the remaining data blocks are necessary. Data blocks may require several records for completion; for example, at least three records must be present in a #g_Energy block for it to be valid.

All uncertainties shall be reported with a coverage factor k=1 unless specified otherwise.

If a required data block is shown as having an undetermined number of possible records (denoted by, for example, 2-n), the minimum number of records is one, unless specified otherwise.

7.2. Pulse Height Data (PHD)

The seven types of pulse height data (PHD) are:

- SAMPLEPHD
  This data type contains PHD acquired by counting a noble gas or particulate sample.

- BLANKPHD
  This data type contains pulse height data acquired by counting an unexposed filter on particulate monitoring system.

- DETBKPHD

This data type contains PHD acquired by performing a background measurement of a detector system.

- GASBKPHD
  This data type is sent by a noble gas monitoring system that is subject to memory effects during sample acquisition due to nuclides from the previous sample adsorbed onto the walls of the gas cell.

- CALIBPHD
  This data type contains PHD acquired by counting a known standard source with a detector system.

- QCPHD
  This data type contains PHD acquired from a brief count of a known standard source with a detector system for quality control purposes.

- SPIKEPHD
  This data type contains PHD acquired from a spiked sample at a noble gas monitoring system.

Each PHD type is composed of a number of data blocks. Depending on the DATA_TYPE and the detector acquisition system, some data blocks are required, and some are optional.

If a data section does not contain the required data blocks, it cannot be processed. Table 56 lists the required and optional data blocks for PHD messages from particulate and noble gas systems employing high-resolution γ-spectrometry. Table 57 includes required and optional data blocks for noble gas systems reporting β-γ coincidence data.

Table 56. PHD Data Blocks from Sites Sending High-Resolution γ-Spectrometry Data

DATA BLOCKS[1]	SAMPLEPHD	BLANKPHD[2]	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD
#Header	r	r	r	r	r	r
#Comment	o	o	o	o	o	o
#Collection	r					r
#Acquisition	r	r	r	r	r	r
#Processing	r[3]					r
#Sample	o	o		o	o	
#g_Energy	r	r	r	r	r	r
#g_Resolution	r	r	r	r	r	r
#g_Efficiency	r	r	r	r	r	r

DATA BLOCKS[1]	SAMPLEPHD	BLANKPHD[2]	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD
#g_TotalEfficiency	o	o	o	o	o	o
#g_Spectrum	r	r	r	r	r	r
#Calibration	r	r	r	o	o	o
#Certificate				r	r	o

r = required, o = optional

[2] BLANKPHDs are required only from particulate systems.

[3] The #Processing block is required only in SAMPLEPHD from noble gas monitoring systems.

Table 57. PHD Data Blocks from Sites Sending β-γ Coincidence Data

DATA BLOCKS[1]	SAMPLEPHD	GASBKPHD	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD
#Header	r	r	r	r	r	r
#Comment	o	o	o	o	o	o
#Collection	r					
#Acquisition	r	r	r	r	r	r
#Processing	r					r
#Sample	o	o		o	o	
#g_Energy	r	r	r	r	r	
#b_Energy	r	r	r	r	r	r
#g_Resolution	r	r	r	r	r	r
#b_Resolution	r	r	r	r	r	r
#g_Efficiency	o	o	o	o	o	o
#ROI_Limits	r	r	r	r	r	r
#b-gEfficiency	r	r	r	r	r	r
#g_TotalEfficiency	o	o	o	o	o	o
#Ratios	r	r	r	r	r	r
#g_Spectrum[2]	r	r	r	r	r	r
#b_Spectrum[2]	r	r	r	r	r	r
#Histogram	r	r	r	r	r	r
#Calibration	r	r	o	o	o	o

DATA BLOCKS[1]	SAMPLEPHD	GASBKPHD	DETBKPHD	CALIBPHD	QCPHD	SPIKEPHD
#Certificate				r	r	o

r = required, o = optional

[2] This data block should contain a non-coincident spectrum

The formats of the data blocks listed in Table 56 and Table 57 are described in more detail in Table 58 through Table 80.

Clarifications of parameters and records are included after each table when necessary. Examples of each PHD message type are included in Appendix III: Data Message Examples.

Table 58. #Header Block Format for PHD Message Types

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	`#Header`
	9-18	a10	designator (format version identifier from the IDC)
2	1-5	a5	system code, see Chapter 3.5.10
	7-15	a9	detector code (unique for each detector)[1], see Chapter 3.5.11
	17	a1	system type: `P` for particulate; `B` for noble gas with β-γ coincidence detection; and `G` for noble gas with high-resolution γ-spectrometry
	19-35	a17	sample geometry
	37-40	a4	spectrum qualifier: preliminary (`PREL`) or full (`FULL`)
3	1-16	a16	sample reference identification
4	1-31	a31	measurement identification[2]
	33-63	a31	detector background measurement identification[3]
	65-95	a31	gas background measurement identification (memory effect)[4]
5	1-10	i4,a1,i2,a1,i2	transmit date (*yyyy*/*mm*/*dd*)
	12-21	i2,a1,i2,a1,f4.1	transmit time (*hh*:*mm*:*ss.s*)

For β-γ coincidence systems with multiple gas cells, each gas cell is considered a separate detector and should be assigned a unique detector code.

[2] The measurement identification (MID) describes the detector acquisition. The first nine characters are the detector code, the tenth character is a dash, and the remaining characters are the date and time of the acquisition start, combined by a dash.

[3] The detector background measurement identification specifies the MID of the PHD message containing the relevant background count data. If no relevant detector background count exists, this field should be filled with a zero.

[4] This field is required only for β-γ coincidence systems that have a memory effect. To account for the extra activity in the gas cell, a detector acquisition is performed upon sample evacuation and before the next sample counting. The data from this acquisition is reported in the GASBKPHD. The gas background measurement identification field contains the MID of the GASBKPHD associated with the current sample.

The Sample Reference Identification (SRID) aids in the identification of a sample. This allows the matching of a physical entity to the data that describes it. For radionuclide stations equipped with bar-coding systems, Radio-frequency identification (RFID) systems or any other coding system, the code for each sample should match the SRID reported in radionuclide messages.

The format of the SRID is a 14 or 15-character code, depending on the source of the PHD (either a particulate system, noble gas system or laboratory). The first two numbers of the SRID are the CTBT number as defined in the CTBT text. The syntax for the remaining digits differs for samples, blanks, detector background, gas background, quality control (QC) check sources, calibration sources, spike samples and special IMS samples sent to laboratories. If the PHD is collected at a noble gas system, the SRID ends with G describing noble gas systems orginally. As of 2016, G is being replaced by X for xenon noble gas systems gradually. The various SRID syntaxes are described below.

Sample Syntax (SAMPLEPHD)

ccyyyymmddhhPpT

cc	CTBT station/laboratory number
yyyymmddhh	year, month, date, and nearest full hour of collection start
Pp	split identifier: *P* = split number, *p* = total number of splits
T	system type: `X` for xenon noble gas systems, for particulate systems leave blank

The split identifier (Pp) is coded 11 for all radionuclide samples before any splitting is performed. When a sample is split into multiple parts, the split number P is the part number and p is the total number of pieces. For example, a sample split into two parts is assigned the following split identifiers: 12 for the first piece and 22 for the second piece. If all the sample splits are counted together, the split number P is assigned the number '9'. Therefore, if the two sample splits from the previous example are counted together, the split identifier reported in the SRID field is 92.

Gas Background Syntax (GASBKPHD)

ccyyyymmddhh`00X`

cc	CTBT station number
yyyymmddhh	year, month, date, and hour of acquisition start
`00X`	identifier that indicates a xenon noble gas background

Blank Filters Syntax (BLANKPHD)

cc`00000000`*xxxxT*

cc	CTBT station/laboratory number

`00000000`	identifier that indicates a blank filter
xxxx	a sequential number (`0001`, `0002`, …)
T	system type: `X` for noble gas system, otherwise leave blank

Detector Background Syntax (DETBKPHD)

cc`11111111`*xxxxT*

cc	CTBT station/laboratory number
`11111111`	identifier that indicates a detector background
xxxx	a sequential number (0001, 0002, …)
T	system type: `X` for noble gas system, otherwise leave blank

Spike Sample Syntax (SPIKEPHD)

ccyyyymmddhhPp`K`

cc	CTBT station/laboratory number
yyyymmddhh	year, month, date, and hour of collection start
Pp	split identifier; *P* = split number, *p* = total number of splits
`K`	identifier that indicates spike[12]

Special IMS Samples

cc`77777777`*xxxx*

cc	CTBT laboratory number
`77777777`	identifier that indicates a special IMS sample
xxxx	a sequential number (0001, 0002, …)

QC Check Sources Syntax (QCPHD)

cc`88888888`*xxxxT*

cc	CTBT station/laboratory number
`88888888`	identifier that indicates a QC check source
xxxx	a sequential number (`0001`, `0002`, …)
T	system type: `X` for noble gas system, otherwise leave blank

[12] The identifier for a spike sample is G drescribing noble gas originally but is being replaced gradually as K for xenon noble gas as of 2016.

Calibration Sources Syntax (CALIBPHD)

cc`99999999`*xxxxT*

cc	CTBT station/laboratory number
`99999999`	identifier that indicates a calibration source
xxxx	a sequential number (`0001`, `0002`, …)
T	system type: `X` for noble gas system, otherwise leave blank

SRID Examples

The following is a SRID for a particulate sample sampled at the IMS station in Rio de Janeiro, Brazil. The collection start time and date is 6 a.m., 1 April, 2001 at 06:00 UTC.

```
04200104010611
```

The following is a SRID for a blank filter counted at the IMS station in Quezon City, Philippines, and is the third blank counted at that station.

```
52000000000003
```

The following is a SRID for a QC check source counted by a xenon noble gas system at the IMS station in Reunion, France, and is the first unique QC check source counted at that station.

```
29888888880001X
```

The following is a SRID for a calibration source counted by a xenon noble gas system at the IMS station at Oahu, Hawaii, and is the third unique calibration source counted at that station.

```
79999999990003X
```

MID Examples

The following is a possible MID for a noble gas sample from the IMS station in Rio de Janeiro, Brazil. The sample acquisition start is 6 February, 2000 at 20:00 UTC.

```
BRX11_001-2000/02/06-20:00
```

The following is a possible MID for a calibration count performed on a HPGe detector at AWE Blacknest in Chilton, England. The acquisition start is 2 November, 2010 at 9:37:30.0 UTC.

```
GBL15_005-2010/11/02-09:37:30
```

The `#Comment` block (Table 59) is optional for all radionuclide messages.

Table 59. #Comment Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-8	a8	`#Comment`
2-*n*	1-80	a80	free text

There must be at least one record in a `#Comment` block.

Table 60. #Collection Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#Collection`
2	1-10	i4,a1,i2,a1,i2	collection start date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	collection start time (*hh:mm:ss.s*)
	23-32	i4,a1,i2,a1,i2	collection stop date (*yyyy/mm/dd*)
	34-43	i2,a1,i2,a1,f4.1	collection stop time (*hh:mm:ss.s*)
	45-54	f10	total air volume sampled (m^3 at STP)

For noble gas systems, the sample volume of stable xenon (Xe) must be used to calculate the total (effective) air volume sampled. This is because some of the collected air may be used for unit processes. The following equation determines total (effective) air volume from the sample Xe volume:

$$\mathrm{V}_{air} = \frac{\mathrm{V}_{Xe}}{0.087} \qquad (1)$$

where $\mathrm{V}_{\mathrm{air}}$ is the total air volume in standard cubic meters m^3 at STP (273.15 K and 101.325 kPa, unless otherwise specified) and V_{Xe} is the sample volume of ambient Xe in cm^3 (see `#Processing` block in Table 62 for sample volume of Xe).

Table 61. #Acquisition Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	`#Acquisition`
2	1-10	i4,a1,i2,a1,i2	acquisition start date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	acquisition start time (*hh:mm:ss.s*)
	23-36	f14	acquisition real time (s)
	38-51	f14	acquisition live time (s)

Table 62. #Processing Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	#Processing
2	1-8	f8.5	sample volume of Xe (cm^3)
	10-17	f8.5	uncertainty (cm^3)
3[1]	1-8	f8.5	Xe collection yield (Xe gas in sample/total Xe gas sampled)
	10-17	f8.5	uncertainty of the Xe collection yield
4	19-20	a2	archive bottle identification

The fields of this record are optional and may be zero-filled if the information is unavailable.

The #Sample Block (Table 63) is optional and describes the physical dimensions of the sample during measurement as instructed in Table 64. Other relevant sample information can be included in the #Comment block. Counting geometry is reported in the #Header block.

Table 63. #Sample Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	#Sample
2	1-5	f5.2	dimension 1 (cm)
	7-11	f5.2	dimension 2 (cm)

Table 64. Sample Dimension Matrix

SAMPLE GEOMETRY	DIMENSION 1	DIMENSION 2
Cylindrical filter samples	Diameter	Height
Unpressed filter samples	Width	Length
Noble gas samples	Cell inner diameter	Cell length

The #g_Energy data block (Table 65) is required for all detector systems, regardless of sample type. The “g” prefix indicates that this block contains the energy/channel pairs required to formulate a relationship between channel and γ-energy. The data contained in this block should be actual peak energies with their corresponding centroid channels or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 65. #g_Energy Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-9	a9	#g_Energy

2-*n*	1-16	f16	γ-energy (keV)
	18-33	f16	centroid channel
	35-50	f16	uncertainty (channels)

For gamma spectroscopy samples, there should be at least three records in a `#g_Energy` block. For β-γ coincidence samples, there should be at least three records in a `#g_Energy` block.

The `#b_Energy` block (Table 66) is required only for systems reporting β-γ coincidence data. Contained within the block are the energy/channel pairs needed to create a relationship between channel and β-energy.

Table 66. #b_Energy Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-9	a9	`#b_Energy`
2-*n*	1-16	f16	electron energy (keV)
	20-35	f16	channel corresponding to β energy
	37-52	f16	uncertainty (channels)

There must be at least two records in a `#b_Energy` block.

The `#g_Resolution` block (Table 67) is required for all detector systems, regardless of sample type. The “`g`” prefix indicates that this block contains the energy/FWHM pairs required to formulate a relationship between resolution and γ-energy. These must be original data pairs or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 67. #g_Resolution Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#g_Resolution`
2-*n*	1-16	f16	γ-energy (keV)
	18-33	f16	FWHM (keV)
	35-50	f16	uncertainty (keV)

There must be at least three records in a `#g_Resolution` block.

The `#b_Resolution` block (Table 68) is required only for systems reporting β-γ coincidence data. Contained within the block are the energy/FWHM pairs needed to create a relationship between resolution and β-energy. These must be original data pairs and not points from a fitted calibration equation.

Table 68. #b_Resolution Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#b_Resolution`
2-*n*	1-16	f16	electron energy (keV)
	18-33	f16	FWHM (keV)
	35-50	f16	uncertainty (keV)

There must be at least three records in a `#b_Resolution` block.

The `#g_Efficiency` block (Table 69) is required for all detector systems, regardless of sample type, except those reporting β-γ coincidence data. The "`g`" prefix indicates that this block contains the energy/efficiency pairs required to formulate a relationship between full photo peak efficiency and γ-energy. These must be original data pairs or PTS validated data points as appropriate. These may include both empirical and numerical elements.

Table 69. #g_Efficiency Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#g_Efficiency`
2-*n*	1-16	f16	γ-energy (keV)
	18-33	f16	efficiency (counts in peak/photon emitted)
	35-50	f16	uncertainty (counts in peak/photon emitted)

There must be at least six records in a `#g_Efficiency` block

The `#ROI_Limits` block in Table 70 is required only for systems reporting β-γ coincidence data. Counts from such systems are primarily recorded in the `#Histogram` block.

Table 70. #ROI_Limits[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-14	a14	`#ROI_Limits`
2-*n*	1-2	a2	ROI number
	4-13	f10	2-D ROI β-range start, x_1 (keV)
	15-24	f10	2-D ROI β-range stop, x_2 (keV)
	26-35	f10	2-D ROI γ-range start, y_1 (keV)
	37-46	f10	2-D ROI γ-range stop, y_2 (keV)

There must be 10 records for the numbered ROIs shown in Figure 4.

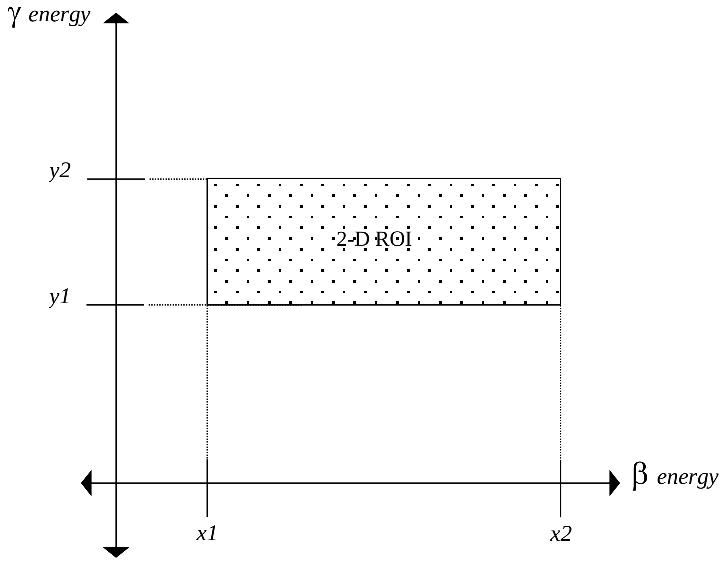


***Figure 3*. Two-Dimensional ROI in β-γ Energy Space**

The activity concentration can be determined from the net counts in a 2-D ROI. The `#ROI_Limits` block contains the 2-D coordinates that define the ROIs, that is, the equivalents of x_1, x_2, y_1, and y_2 in Figure 3.

In Table 71, the ROI number is a unique identifier for the required ROI. These numbers are assigned and illustrated in Figure 4.

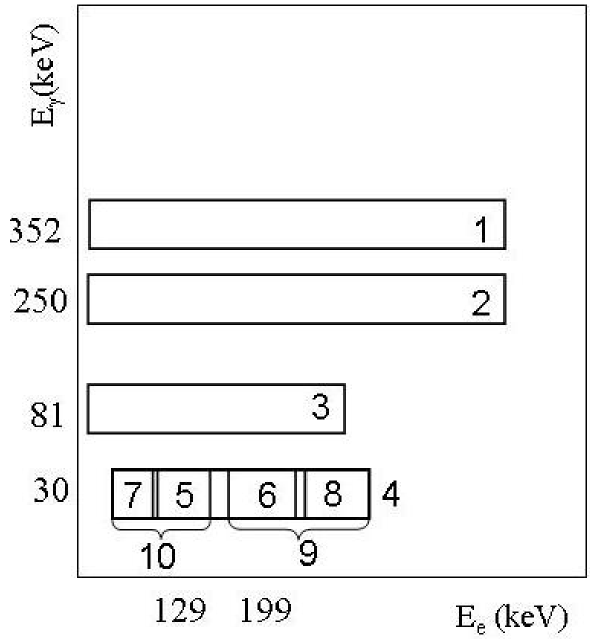


***Figure 4*. Regions of Interest with Their Unique ROI Numbers (not to scale) for β-γ coincidence systems**

Table 71 summarizes the possible nuclide signals in each ROI and the nuclides quantified by determining the net counts. The exact values for the ROI γ- and β-energy ranges are not defined explicitly in this document because they depend on each detector's calibration, capabilities and characteristics (for example, resolution). The ROI limits specified in the `#ROI_Limits` block must be the same as those used for determining the β-γ coincidence efficiencies reported in the `#b-gEfficiency` block (Table 72).

Table 71. ROI Characterization

ROI NO.	NUCLIDES POSSIBLE	QUANTIFICATION USE	CENTROID γ-ENERGY (KEV)	CENTROID β-ENERGY (KEV)
1	^{214}Pb	n/a[1]	351.9	671 (End point)
2	^{214}Pb, ^{135}Xe	^{135}Xe	249.8	901 (End point)
3	^{214}Pb, ^{133}Xe	^{133}Xe	81.0	346 (End point)
4	^{131m}Xe, ^{133m}Xe, ^{133}Xe, ^{135}Xe	none[2]	30.0	391 (End point)
5	^{131m}Xe, ^{133}Xe	^{131m}Xe	30.0	129.4
6	^{133m}Xe, ^{133}Xe	^{133m}Xe	30.0	198.7
7	^{131m}Xe, ^{133}Xe	None[3]	30.0	-
8	^{133m}Xe, ^{133}Xe	None[3]	30.0	-
9	^{133m}Xe, ^{133}Xe	None[3]	30.0	198.7
10	^{131m}Xe, ^{133}Xe	None[3]	30.0	129.4

The counts in this ROI are used only for determining interference from ^{214}Pb in ROIs 2 to 10.

[2] This ROI is probably used with ROI 3, 5 and 6 for quantification of ^{133}Xe.

[3] This ROI is probably used with ROI 3 and 5 to 10 for quantification of ^{133}Xe.

The `#b-gEfficiency` block is required only for β-γ coincidence systems. It contains system efficiency values for the detection of specific β-γ pairs within the predefined 2-D ROI energy bounds. This information is required to quantify radioxenon activity concentrations from the net 2-D ROI counts.

Table 72. #b-gEfficiency Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-14	a14	`#b-gEfficiency`
2-6	1-10	a10	nuclide name[2]
	12-19	a8	ROI number
	21-30	f10	β-γ coincidence efficiency (counts in ROI/β-γ pair emitted)
	32-41	f10	uncertainty (counts in ROI/β-γ pair emitted)

There must be 4 records in a `#b-gEfficiency` block.

[2] The nuclide name is the Xenon isotope which the activity is calculated by the ROI counts, e.g. XE-135 for ROI 2, XE-133 fro ROI 3, XE-1334 for ROI 4, XE-131m for ROI 5, XE-133m for ROI6, XE-1337 for ROI 7, XE-1338 for ROI 8, XE-1339 for ROI 9 and XE-13310 for ROI 10, see the ROI characterization in Table 71.

The #g_TotalEfficiency block (Table 73) is optional. The "total efficiency" is the ratio of the number of pulses in the entire energy spectrum due to a photon of a given energy to the number of photons emitted by a source for a specified measurement geometry. The data pairs can be the results of an empirical or non-empirical process.

Table 73. #g_TotalEfficiency Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-9	a9	#g_TotalEfficiency
2-*n*	1-16	f16	γ-energy (keV)
	18-33	f16	total efficiency (counts/photon emitted)
	35-50	f16	uncertainty (counts/photon emitted)

There must be at least six records in a #TotalEfficiency block.

The #Ratios block (Table 74) is required only for β-γ coincidence systems. It contains the information necessary for stripping counts due to interfering isotopes from the signals of interest.

Example

The number of counts in ROI 2 from ^{214}Pb $(C_{ROI\#2|_{PB-214}})$ is determined from the counts in ROI 1 ($C_{ROI\#1}$) and the *a priori* count ratio for ^{214}Pb, $\zeta_{Pb\text{-}214}$, as follows:

$$C_{ROI\#2|_{PB-214}} = C_{ROI\#1} \cdot \zeta_{PB-214} \quad (2)$$

Therefore,

$$\zeta_{PB-214} = \left(\frac{C_{ROI\#2}}{C_{ROI\#1}}\right)_{\zeta_{PB-214}} \quad (3)$$

Table 74. #Ratios Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	#Ratios
2-*n*	1-15	a15	ratio identifier (see Table 75)
	17-18	a2	ROI number for the higher γ-energy ROI
	20-21	a2	ROI number for the lower γ-energy ROI
	23-32	f10	count ratio, ζ (counts in higher γ-energy ROI/counts in lower γ-energy ROI)
	34-39	f6	count ratio uncertainty (percent)

The ratio identifier is the unique name for the count ratio, ζ, and is composed of the interfering nuclide (minus the dash character) followed by the higher γ-energy and the lower γ-energy that characterize the ROIs comprising ζ. The two γ-energies are separated by a colon while the nuclide name is separated from the γ-energies by an underscore. In cases where a nuclide has more than one count ratio for the same set of γ-energies but different β-energies (for example, ^{133}Xe interference from 80 keV to 30 keV), consecutive numbers are placed after the nuclide name to distinguish between them.

The interference ratios that are required by the calibration procedures must be listed in the `#Ratios` block (Table 74). The ROI numbers correspond to those assigned in Figure 4. The exact ratio identifiers specified in Table 75 must be used in the `#Ratios` block for the data to be parsed and stored correctly.

Table 75. Interference Ratio Identifier

RATIO IDENTIFIER	INTERFERENCE ISOTOPE	FROM ROI	TO ROI
PB214_352:242	^{214}Pb	1	2
PB214_352:80	^{214}Pb	1	3
PB214-4_352:30	^{214}Pb	1	4
PB214-5_352:30	^{214}Pb	1	5
PB214-6_352:30	^{214}Pb	1	6
PB214-7_352:30	^{214}Pb	1	7
PB214-8_352:30	^{214}Pb	1	8
PB214-9_352:30	^{214}Pb	1	9
PB214-10_352:30	^{214}Pb	1	10
XE133-4_81:30	^{133}Xe	3	4
XE133-5_81:30	^{133}Xe	3	5
XE133-6_81:30	^{133}Xe	3	6
XE133-7_81:30	^{133}Xe	3	7
XE133-8_81:30	^{133}Xe	3	8
XE133-9_81:30	^{133}Xe	3	9
XE133-10_81:30	^{133}Xe	3	10

For HPGe systems, the `#g_Spectrum` block contains the γ-spectrum acquired during counting (Table 76). For β-γ coincidence systems, this block contains the non coincident γ-spectrum.

Table 76. #g_Spectrum Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#g_Spectrum`
2	1-5	i5	number of γ channels
	7-10	i4	γ-energy span (keV)[1]
3-*n*	1-5	i5	Channel[2]
	7-16	i10	count at channel + 0
	18-27	i10	count at channel + 1
	29-38	i10	count at channel + 2
	40-49	i10	count at channel + 3
	51-60	i10	count at channel + 4

The maximum photon energy that the γ-spectrum represents.

2 The spectrum should start with channel 1 for particulate sample spectra but channel 0 for noble gas spectra.

The non coincident β-spectrum is reported in the `#b_Spectrum` data block (Table 77).

Table 77. #b_Spectrum Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#b_Spectrum`
2	1-5	i5	number of β-channels
	7-10	i4	β-energy span (keV)
3-*n*	1-5	i5	channel[1]
	7-16	i10	count at channel + 0
	18-27	i10	count at channel + 1
	29-38	i10	count at channel + 2
	40-49	i10	count at channel + 3
	51-60	i10	count at channel + 4

The spectrum must start with channel 0.

The `#Histogram` data block (Table 78) is required for systems reporting β-γ coincidence data. This block contains the counts (up to 10 characters) in each β-γ energy bin within a 2-D matrix format. Each row consists of a single γ-channel over the entire span of the β-channel axis. Each column consists of a single β-channel over the entire span of the γ-channel axis. To reduce the size of the PHD message, only one blank space is required between reported counts in consecutive energy bins (β-channels) within the same row (γ-channel). See the examples in “SAMPLEPHD Beta-Gamma Coincidence Data Version” on page 369 for reference. Do not include non coincident data in the `#Histogram` block. All non coincident data should be reported using the `#g_Spectrum` or `#b_Spectrum` data blocks (Table 76 and Table 77).

Table 78. #Histogram Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	`#Histogram`
2	1-5	i5	β-channels (= *a*)
	7-11	i5	γ-channels (= *b*)
	13-16	i4	β-energy span (keV)
	18-21	i4	γ-energy span (keV)
3	1- *variable* [2]	i1-i10	counts at channels (x,y) = (1,1)[3]
	variable	i1-i10	counts at channels (2,1)
	variable	i1-i10	counts at channels (3,1)
	variable	i1-i10	…
	variable	i1-i10	counts at channels (*a*,2)
4	1- *variable* [2]	i1-i10	counts at channels (1,2)
	variable	i1-i10	counts at channels (2,2)
	variable	i1-i10	counts at channels (3,2)
	variable	i1-i10	…
	variable	i1-i10	counts at channels (*a*,2)
	variable	i1-i10	
b+2	1- *variable* [2]	i1-i10	counts at channels (1,*b*)
	variable	i1-i10	counts at channels (2,*b*)
	variable	i1-i10	counts at channels (3,*b*)
	variable	i1-i10	…
	variable	i1-i10	counts at channels (*a*,*b*)

No requirements on the number of γ and β-channels to be reported are currently mandated.

[2] Fields are separated by at least one blank space. Records are ended with a carriage return.

[3] x = β-channel ordinate, y = γ-channel ordinate. β and γ channels should start at 1.

The `#Calibration` block (Table 79) allows the reporting of calibration references for various systems/components. Where a reference to a particular calibration measurement is possible (e.g. the CALIBPHD for gamma detectors), the MID of this measurement is to be reported as well. Possible system/components to be reported include:

- Gamma detector

- Beta-gamma detector
- Stable xenon measurement system
- Airflow meter

Table 79. #Calibration Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	`#Calibration`
2	1-10	i4,a1,i2,a1,i2	date of last calibration (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	time of last calibration (*hh:mm:ss.s*)

The `#Certificate` block (Table 80) allows the reporting of information on the standard radioactive source used in the acquisition of energy, resolution, efficiency, ratios and total efficiency calibration data. This block is required in QCPHD and CALIBPHD data messages; it is optional for SPIKEPHD data messages.

For γ-only sources, the last three fields in records 3-*n* should be zero-filled. For β-only sources, the γ-energy and γ-intensity fields in records 3-*n* should be zero-filled. For β-γ coincidence sources, all fields should be filled with data. Three records are required in this data block where before there were only two.

Table 80. #Certificate Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-15	a15	`#Certificate`
2	1-10	i10	total source activity (Bq)
	12-21	i4,a1,i2,a1,i2	assay date (*yyyy/mm/dd*)
	23-32	i2,a1,i2,a1,f4.1	assay time (*hh:mm:ss.s*)
3-*n*	1-8	a8	nuclide name
	10-22	a13	half-life of the nuclide (value and time unit) [2]
	24-31	f8.3	activity of nuclide at time of assay
	33-39	f7.3	uncertainty (%)
	41-48	f8.3	γ-energy (keV)
	50-56	f7.3	γ-intensity (percent)
	58	a1	electron decay mode descriptor: `B` for β particle or `C` for conversion electron, 0 for none (that is, γ-only source)
	60-67	f8.3	maximum β-particle energy or CE energy (keV)
	69-75	f7.3	intensity of β-particle (percent)

There must be at least three records in a `#Certificate` block.

[2] Half-lives are reported with the time value followed by the time unit (`S` for seconds, `H` for hours, `D` for days, or `Y` for years), with the two separated by a single space (i.e. 34 Y, 12.345 D, 1.89E+05 S, etc.).

The nuclide name is formed by listing the 2-character element symbol from the periodic table of the elements followed by a dash (-), and then the mass number. An M may be placed at the end to designate a metastable state. For example:

```
XE-131M
XE-133
XE-133M
XE-135
PB-214
```

7.3. Radionuclide Laboratory Reports (RLR)

The two types of radionuclide laboratory reports are:

- Preliminary Radionuclide Laboratory Report (PRE)
- Final Radionuclide Laboratory Report (FIN)

The RLR is comprised of 30 block types. The required number of blocks in an RLR is described in Table 81. Blocks marked in **bold** are provided to the laboratories by the PTS in LABSDN messages. They are sent back to the PTS in the RLRs so that those subscribed to that message type will have all of the information necessary to interpret the analysis.

Table 81. Data Blocks Required in RLR

BLOCK NAME	BLOCKS REQUIRED IN `PRE & FIN`
#Header	r[1]
#LabDataVersion	r
#Objective	r
#g_IDCActivitySummary	o
#g_IDCEventScreeningFlags	o
#Collection	r
#StationSample	r
#Split[2]	o
#SampleReceipt	r
#g_LabSample	r
#Test	r
#g_EnergyCalibrationEquation	r
#g_ResolutionCalibrationEquation	r
#g_EfficiencyCalibrationEquation	r
#g_TotalEfficiencyCalibrationEquation	r
#PeaksMethod	r

BLOCK NAME	BLOCKS REQUIRED IN PRE & FIN
#PeakSearch	r
#PeakFitPart1	r
#PeakFitPart2	r
#g_AnalysisMethods	r
#PeakAssociation	r
#References	r
#InteractiveAnalysisLog	r
#Results	r
#NuclideRatios	r
#g_CoincidenceCorrection	r
#g_UncertaintyBudget	r
#MDA	r
#Conclusions	r
#Comment	o

r = required; o = optional

[2] #Split block will only be present if the sample has been split.

Formats for the data blocks listed in Table 81 are described in Table 82 through Table 112.

Table 82. #Header Block Format for Radionuclide Laboratory Reports

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	#Header
2	1-7	a7	priority level [Urgent | Routine]
3	1-5	a5	system code of the station at which the sample was collected
	7-22	a16	sample reference identification (SRID) of the sample[1]
4	1-5	a5	system code of the laboratory selected for analysis [ARL01, …, USL16]
	7-15	a9	laboratory detector code
5	1-3	a3	report type [FIN | PRE]
	5-6	i2	report number
6	1-10	a10	Sample category (Category A, ..., Category E[2])
7	1-10	i4,a1,i2,a1,i2	message transmission date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	message transmission time (*hh:mm:ss.s*)

The SRID given in the #Header block is for the entire sample before any splitting. The SRID given by the PTS in the #Recipient block (which could be from a split sample and therefore different) must be cross-checked by the laboratory when the sample is received to ensure that the station sent the correct sample. The SRID on the sample, as actually received by the laboratory, must be reported in the #SampleReceipt block.

[2] The sample category is given by the full string (Category A, ..., Category E), and the meaning is as follows:
A - network quality control sample

B - sample from IMS network categorized by IDC as Level 5
C - proficiency test sample
D - station back-up sample (measured by a lab)
E - other (e.g. station parallels)

Table 83. #LabDataVersion Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-15	a15	`#LabDataVersion`
2	1-12	a12	format version code (`IMS2.0_IDCR7.1` for this revision)
3-*k*	1-80	a80	free text notes regarding the format version (optional)

Table 84. #Objective Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	`#Objective`
2	1-16	a16	`~AnalysisPurpose`
3-*k*	1-80	a80	free text comment describing the purpose of analysis (`Level 5`, `intercomparison`, `network QC`, etc.)
k+1	1-16	a16	`~TestsAuthorized`
k+2-*m*	1-80	a80	free text describing the tests authorized (`high resolution gamma spectrometry`, etc.)
m+1	1-20	a20	`~SpecialInstructions`
m+2-*n*	1-80	a80	free text describing any special instructions (optional)

Table 85. #g_IDCActivitySummary Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-21	a21	`#g_IDCActivitySummary`
2	1-22	a22	`~NuclidesNotQuantified`
3-*k*	1-80	a80	comma separated list of nuclides identified and not quantified
k+1	1-16	a16	`~NaturalNuclides`
k+2-*m*	1-8	a8	quantified natural nuclide name
	10-22	a13	half-life of the nuclide (value and time unit)[1]
	24-34	e11.4	concentration (Bq/m^3)
	36-40	f5.2	uncertainty (%)
m+1	1-19	a19	`~ActivationProducts`
m+2-*n*	1-8	a8	activation product name
	10-22	a13	half-life of the nuclide (value and time unit) [1]

RECORD	POSITION	FORMAT	DESCRIPTION
	24-34	e11.4	concentration (Bq/m^3)
	36-40	f5.2	uncertainty (%)
n+1	1-16	a16	`~FissionProducts`
n+2-*p*	1-8	a8	fission product name
	10-22	a13	half-life of the nuclide (value and time unit)[1]
	24-34	e11.4	concentration (Bq/m^3)
	36-40	f5.2	uncertainty (%)

Half-lives are reported with the time value followed by the time unit, with the two separated by a single space (i.e. 3.627 D, 12.345 D, 0.45623 S, etc.).

Table 86. #g_IDCEventScreeningFlags Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-25	a25	`#g_IDCEventScreeningFlags`
2	1	a1	activation products present in the sample [Y or N]
	3-12	a10	number of days since last activation product seen[1]
3	1	a1	only one fission product in the sample [Y or N]
	3-12	a10	number of days since last fission product[1]
4	1	a1	two or more fission products in the sample [Y or N]
	3-12	a10	number of days since two or more fission products last seen[1]
5	1	a1	Cs-137 present in the sample [Y or N]
	3-12	a10	number of times Cs-137 was seen in the last 30 days[1]

The number of days/number of times fields in the records above will be reported with different types of data depending on the state of the sample. A number in decimal format will be used to report the number of days or number of times and the text “Never Seen” will indicate that the product was not seen at that location previously. A “0” will indicate that this field is blank and does not apply for the sample in question.

Table 87. #Collection Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#Collection`
2	1-10	i4,a1,i2,a1,i2	collection start date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	collection start time (*hh:mm:ss.s*)
	23-32	i4,a1,i2,a1,i2	collection stop date (*yyyy/mm/dd*)
	34-43	i2,a1,i2,a1,f4.1	collection stop time (*hh:mm:ss.s*)
	45-54	f10	total air volume sampled (m^3 at STP) for particulate samples

Table 88. #StationSample Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-14	a14	`#StationSample`
2	1-30	a30	activity category of the sample (according to international shipping regulations for radiation protection pupose)
3	1-5	f5.2	diameter | length (cm)[1]
	7-11	f5.2	thickness (cm)
	13-17	f5.2	width (cm) (optional for some sample geometries)
4	1-5	f5.2	mass of the sample (g)
5	1-8	f8.4	container density (if one is used; optional for some samples)
	10-14	f5.2	container thickness (if one is used; optional for some samples)
	16-55	a40	container material (if one is used; optional for some samples)
6	1-60	a60	short text description of the sample geometry [`RASA`, `ARAME`, `compressed cylinder`]

Diameter is reported for cylindrical samples (e.g. those that have been compressed) and width is not reported. For rectangular samples (e.g. RASA and other uncompressed samples), length is reported along with the width of the sample.

Table 89. #Split Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-6	a6	`#Split`
2	1-5	f5.2	mass of the split sample (g)
	7-16	f10	calculated air volume of the split sample (m^3 at STP)
3-*m*	1-80	a80	free text description of how the sample was split

Table 90. #SampleReceipt Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#SampleReceipt`
2	1-16	a16	sample reference identification
3	1-14	a14	seal number (*nnnnnssssssssss*)
4	1-10	i4,a1,i2,a1,i2	sample receipt date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	sample receipt time (*hh:mm:ss.s*)
5	1-17	a17	`~PackageCondition`
6-*k*	1-80	a80	general free text comment describing package condition
k+1	1-14	a14	`~SealCondition`
k+2-*m*	1-80	a80	general free text comment describing seal condition
m+1-*n*	1-16	a16	`~SampleCondition`

n+1-*p*	1-80	a80	general free text comment describing sample condition

Table 91. #g_LabSample Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	`#g_LabSample`
2	1-11	e11.4	overall activity level of the sample (Bq) (for proper handling during shipment and receipt)
3	1-5	f5.2	diameter | length (cm)[2]
	7-11	f5.2	thickness (cm)
	13-17	f5.2	width (cm) (optional for some sample geometries)
4	1-5	f5.2	mass of the sample (g) repeated for each equation in the same calibration
5	1-8	f8.4	container density (if one is used) (optional for some samples)
	10-14	f5.2	container thickness (if one is used) (optional for some samples)
	16-55	a40	container material (if one is used) (optional for some samples)
6-*k*	1-80	a80	free text description of how the sample was prepared for analysis

The sample dimensions and mass here are to report the samples state after any geometry modifications at the laboratory.

[2] Diameter is reported for cylindrical samples (e.g. those that have been compressed) and width is not reported. For rectangular samples (e.g. RASA and other uncompressed samples), length is reported along with the width of the sample.

Table 92. #Test Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-5	a5	`#Test`
2	1-40	a40	type of test performed [high resolution gamma spectrometry, etc.]
3	1-10	i4,a1,i2,a1,i2	test completion date (*yyyy/mm/dd*)
4	1-40	a40	person responsible for the test
5-*k*	1-80	a80	free text describing the purpose of the test

Table 93. Codes for Calibration Equations

CODE	TYPE	DESCRIPTION
1	Interpolation	No fitting
2	Polynomial	$y(x) = a_0 + a_1x + a_2x^2 + \ldots$
3	Square root polynomial	$y(x) = a_0 + a_1x^{1/2} + a_2x + \ldots$
4	Square root of polynomial	$y(x) = \mathrm{sqrt}(a_0 + a_1x + a_2x^2)$
5	Exponential efficiency function	$\varepsilon(E) = Af_1(E)\, f_2(E)$

6	Polynomial in log(ε) against log(E_γ)	$\log(\varepsilon) = a_0 + a_1\log(E_\gamma) + a_2[\log(E_\gamma)]^2 + \ldots + a_n[\log(E_\gamma)]^n$
7	Polynomial in log(ε) against E_γ	$\log(\varepsilon) = a_1E_\gamma + a_2 + a_3E_\gamma^{-1} + a_4E_\gamma^{-2} + \ldots$
8	Polynomial in log(ε) against log(1/E_γ)	$\log(\varepsilon) = a_0 + a_1\log(c/E_\gamma) + a_2[\log(c/E_\gamma)]^2 + \ldots + a_5[\log(c/E_\gamma)]^5$
9	Inverse exponential	$\varepsilon = 1/[aE_\gamma^{-x} + bE_\gamma^{-y}]$
99	Other	Description

Table 94. #g_EnergyCalibrationEquation Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-28	a28	`#g_EnergyCalibrationEquation`
2	1	i1	number of equations used
3	1-2	i2	equation type code, see Table 93
	4-5	i2	number of parameters in equation
	7-13	f7.2	start of energy range
	15-21	f7.2	end of energy range
4-*k*	1-11	e11.4	parameter 1
	13-23	e11.4	parameter 2
	25-35	e11.4	parameter 3
	37-47	e11.4	parameter 4

Records 3 and 4-*k* are repeated for each equation used in the calibration.

Table 95. #g_ResolutionCalibrationEquation Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-27	a27	`#g_ResolutionCalibrationEquation`
2	1	i1	number of equations used
3	1-2	i2	equation type code, see Table 93
	4-5	i2	number of parameters in equation
	7-13	f7.2	start of energy range
	15-21	f7.2	end of energy range
4-*k*	1-11	e11.4	parameter 1
	13-23	e11.4	parameter 2
	25-35	e11.4	parameter 3
	37-47	e11.4	parameter 4

Records 3 and 4-*k* are repeated for each equation used in the calibration.

Table 96. #g_EfficiencyCalibrationEquation Block Format[1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-32	a32	`#g_EfficiencyCalibrationEquation`
2	1	i1	number of equations used
3	1-2	i2	equation type code, see Table 93
	4-5	i2	number of parameters in equation
	7-13	f7.2	start of energy range
	15-21	f7.2	end of energy range
4-*k*	1-11	e11.4	parameter 1
	13-23	e11.4	parameter 2
	25-35	e11.4	parameter 3
	37-47	e11.4	parameter 4

Records 3 and 4-*k* are repeated for each equation used in the calibration.

Table 97. #g_TotalEfficiencyCalibrationEquation Block Format [1]

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-32	a32	`#g_TotalEfficiencyCalibrationEquation`
2	1	i1	number of equations used
3	1-2	i2	equation type code, see Table 93
	4-5	i2	number of parameters in equation
	7-13	f7.2	start of energy range
	15-21	f7.2	end of energy range
4-*k*	1-11	e11.4	parameter 1
	13-23	e11.4	parameter 2
	25-35	e11.4	parameter 3
	37-47	e11.4	parameter 4

Records 3 and 4-*k* are repeated for each equation used in the calibration.

Table 98. #PeaksMethod Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#PeaksMethod`
2	1-30	a30	software used (`Genie-2000`, etc.)
3-*k*	1-80	a80	free text description of the peak location algorithm, peak search threshold, baseline type, etc.

Table 99. #PeakSearch Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#PeakSearch`
2-*k*	1-5	i5	peak index
	7-14	f8.3	centroid channel
	16-20	f5.2	centroid channel uncertainty (%)
	22-29	f8.3	energy (keV)
	31-41	f5.2	energy uncertainty (%)
	43-49	f7.3	peak search sensitivity (not present for inserted peaks)
	51-52	a2	peak comment [`I` for inserted, `M` for multiplet, `IM` for inserted peak in a multiplet][1]

It is acceptable to use 'M' to indicate the first peak in a multiplet and 'm' for each additional peak in that multiplet.

Table 100. #PeakFitPart1 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#PeakFitPart1`
2-*k*	1-5	i5	peak index
	7-11	f5.2	FWHM (keV)
	13-20	f8.3	start of ROI (channel number)
	22-29	f8.3	end of ROI (channel number)
	31-41	e11.4	mean baseline at the location of the peak (counts/channel)
	43-47	f5.2	uncertainty in mean baseline (%)
	49-60	a12	background type (`Detector`, `Blank`, etc.)
	62-72	e11.4	background net count rate (counts per second) (optional)[1]
	74-78	f5.2	background net count rate uncertainty (%) (optional)

The background net count rate is the peak count rate in the relevant background spectrum, which may be subtracted from the peak count rate in the sample spectrum as necessary.

Table 101. #PeakFitPart2 Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#PeakFitPart2`
2-*k*	1-5	i5	peak index
	7-17	e11.4	peak area (counts)[1]
	19-23	f5.2	peak area uncertainty (%)
	25-35	e11.4	net count rate[2]
	37-41	f5.2	net count rate uncertainty (%)

RECORD	POSITION	FORMAT	DESCRIPTION
	43-53	e11.4	critical level (L_C)
	55-60	f6.2	peak significance (area / L_C)
	62-72	e11.4	efficiency
	74-78	f5.2	efficiency uncertainty (%)

The peak area in the sample spectrum is the number of counts reported by the analysis software for use in calculating activity and is reported without background correction (subtraction).

[2] The net count rate is the peak area divided by the live time with background correction (subtraction) applied as necessary.

Table 102. #g_AnalysisMethods Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-18	a18	`#g_AnalysisMethods`
2	1-30	a30	software used (`Genie-2000`, etc.)
3	1-12	a12	`~NuclidesMethod`
4-*k*	1-80	a80	free text description of the nuclide identification algorithm, threshold, tolerance, etc.
k+1	1-15	a15	`~BaselineMethod`
k+2-*m*	1-80	a80	free text description of the mean baseline calculation method
m+1	1-9	a9	`~LcMethod`
m+2-*n*	1-80	a80	free text description of the L_C method
n+1	1-18	a18	`~CalibrationMethod`
n+2-p	1-80	a80	free text description of the calibration method

Table 103. #PeakAssociation Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-16	a16	`#PeakAssociation`
2-*k*	1-5	i5	peak index
	7-13	f7.3	percentage | fraction (peak explanation level)
	15-22	a8	nuclide name

Table 104. #References Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-8	a8	`#References`
2	1-10	a10	`~SAMPLEPHD`
3	1-31	a31	MID of the sample spectrum for this RLR[1]

4	1-9	a9	`~CALIBPHD`
5-*k*	1-31	a31	MID of the efficiency calibration spectrum or spectra (relevant spectrum or spectra for the geometry used in the test), if applicable[1]
k+1	1-18	a18	`~PhysicalConstants`
k+2-*m*	1-80	a80	physical constants reference (ENSDF-Brookhaven National Laboratory, revision number, year, etc.)

The MID fields indicate the measurement identification for the sample and calibration spectra as assigned by the laboratory. Please see (reference to) the format of the MID code.

Table 105. #InteractiveAnalysisLog Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-23	a23	`#InteractiveAnalysisLog`
2-*k*	1-80	a80	free text description of all actions taken during the interactive analysis process [list of rejected peaks, etc.]

Table 106. #Results Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-8	a8	`#Results`
2	1-10	i4,a1,i2,a1,i2	activity reference date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	activity reference time (*hh:mm:ss.s*)
	23-32	i4,a1,i2,a1,i2	concentration reference date (*yyyy/mm/dd*)
	34-43	i2,a1,i2,a1,f4.1	concentration reference time (*hh:mm:ss.s*)
3-*k*	1-8	a8	nuclide name
	10-20	e11.4	activity (Bq) (decay-corrected to acquisition)
	22-26	f5.2	activity uncertainty (%)
	28-32	f5.2	coverage factor, e.g. *k*=1, *k*=2, *k*=3
	34-38	f5.2	level of confidence, provided by the coverage factor, e.g. 68%, 95%, 99%
	40-50	e11.4	concentration (Bq/m^3) (decay-corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant concentration and deposition during sampling)
	52-56	f5.2	concentration uncertainty (%)
	58-62	f5.2	coverage factor optional, only used if the reported concentration uncertainty is an expanded uncertainty. e.g. *k*=2, *k*=3

RECORD	POSITION	FORMAT	DESCRIPTION
	64-68	f5.2	level of confidence optional, level of confidence provided by the coverage factor, e.g. 95%, 99%

Table 107. #NuclideRatios Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-14	a14	`#NuclideRatios`
2-*k*	1-8	a8	nuclide 1
	10-17	a8	nuclide 2
	19-26	f8.3	activity ratio of nuclide 2 to 1
	28-32	f5.2	activity ratio uncertainty (%)
	34-43	i4,a1,i2,a1,i2	reference date for ratio (*yyyy/mm/dd*)
	45-54	i2,a1,i2,a1,f4.1	reference time for ratio (*hh:mm:ss.s*)
	56-65	i4,a1,i2,a1,i2	zero date (*yyyy/mm/dd*) (optional in some cases)[1]
	67-76	i2,a1,i2,a1,f4.1	zero time (*hh:mm:ss.s*) (optional in some cases)

The zero date and time are the start of in-growth of the daughter nuclide when nuclide 1 and nuclide 2 are a mother-daughter pair, respectively. These data are reported only when applicable.

Table 108. #g_CoincidenceCorrection Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-24	a24	`#g_CoincidenceCorrection`
2-*k*	1-8	a8	nuclide name
	10-17	f8.3	energy
	19-26	f8.3	peak correction factor
	28-32	f5.2	peak correction factor uncertainty (%)

Table 109. #g_UncertaintyBudget Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-18	a18	`#g_UncertaintyBudget`
2	1-14	a14	`~Uncertainties`
3-*k*	1-8	a8	nuclide name (not needed for some descriptors)
	10-14	f5.2	uncertainty (%)
	16-55	a40	descriptor[1]
k+1	1-30	a30	`~UncertaintyCalculationMethods`

RECORD	POSITION	FORMAT	DESCRIPTION
k+2-*m*	1-80	a80	free text description of the methods used for calculating uncertainties and combined uncertainty, and a description of the method for determining the level of confidence

The descriptor field in records 3-k will be filled according to the categories for uncertainty, e.g. NetCountRate or “R(n)”

Table 110. #MDA Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-4	a4	`#MDA`
2-*k*	1-8	a8	nuclide name
	10-20	e11.4	MDA (Bq) (decay corrected to acquisition)
	22-32	e11.4	MDC (Bq/m^3) (decay corrected to sampling period, taking into account decay during spectral acquisition, sampling and during the period between sampling and acquisition; assume constant concentration and deposition during sampling)

Table 111. #Conclusions Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	`#Conclusions`
2	1-30	a30	name of the person responsible for the analysis
3	1-11	a11	`~IDCSummary`
4-*k*	1-80	a80	free text summary of IDC findings
k+1	1-11	a11	`~LabSummary`
k+2-*m*	1-80	a80	free text summary of lab findings and conclusions
m+1	1-17	a17	`~ResultComparison`
m+2-*n*	1-80	a80	free text comparison of IDC and laboratory results

Table 112. #Comment Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-8	a8	`#Comment`
2-*k*	1-80	a80	free text

7.4. State of Health Data (RMSSOH)

Data messages of DATA_TYPE RMSSOH contain blocks of data that describe or allow the evaluation of the state of health (SOH) of the collection, processing, and acquisition equipment at an IMS radionuclide station.

Each RMSSOH data message is composed of a number of data blocks. The start of a data block is designated by a line containing the block name. Like PHD messages, all RMSSOH data block names begin with the pound (#) sign. The specific data blocks required in an RMSSOH message depend on the configuration of the radionuclide system. RMSSOH messages that do not contain all required data blocks cannot be processed by the IDC software. Table 113 and Table 114 summarize the data blocks required in a RMSSOH message according to the equipment inventory at a site.

The `#Header` block (Table 115) should be the first data block in any RMSSOH message; however, no requirements on the order of the remaining data blocks are necessary. See RMSSOH on page 334 for an example of an RMSSOH message.

Table 113. Data Blocks for RMSSOH Messages from Sites Reporting Particulate Data

DATA BLOCKS[1]	EQUIPMENT PRESENT AT SITE		
	AIR SAMPLER	DETECTOR	AIR SAMPLER & DETECTOR
`#Header`	r	r	r
`#AirSamplerFlow`	r		r
`#AirSamplerEnv`[2]	r		r
`#Comment`	o	o	o
`#DetEnv`		r	r
`#PowerSupply`	r	r	r
`#EquipStatus`	r	r	r
`#TamperEnv`	o	o	o

r = one block required, o = optional

[2] This data block is required only for stations where air is heated at the inlet.

Table 114. Data Blocks for RMSSOH Messages from Sites Reporting Noble Gas Data

DATA BLOCKS[1]	EQUIPMENT PRESENT AT SITE	
	WITHOUT HPGE DETECTOR	WITH HPGE DETECTOR
`#Header`	r	r
`#AirSamplerFlow`	r	r
`#Comment`	o	o
`#DetEnv`	r	r
`#PowerSupply`	r	r

DATA BLOCKS[1]	EQUIPMENT PRESENT AT SITE	
	WITHOUT HPGE DETECTOR	WITH HPGE DETECTOR
#EquipStatus	r	r
#TamperEnv	o	o
#ProcessSensors	r	r
#Chromatogram	o	o

[1] r = one block required, o = optional

Table 115. #Header Block Format for State of Health Data

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	#Header
	9-18	a10	designator
2	1-5	a5	station code
	7-15	a9	detector code or NA if 1) there is more than one detector or 2) data are from the sampling site of a split station
3	1-10	i4,a1,i2,a1,i2	SOH data sampling period start date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	SOH data sampling period start time (*hh*:*mm*:*ss.s*)
	23-32	i4,a1,i2,a1,i2	SOH data sampling period end date (*yyyy/mm/dd*)
	34-43	i2,a1,i2,a1,f4.1	SOH data sampling period end time (*hh*:*mm*:*ss.s*)
	45-54	i4,a1,i2,a1,i2	transmit date (*yyyy/mm/dd*)
	56-65	i2,a1,i2,a1,f4.1	transmit time (*hh*:*mm*:*ss.s*)

An SOH data sampling period is defined as the total time duration in which the SOH data in the entire RMSSOH message are acquired. SOH is characterized by a start date and time as well as an end date and time. The SOH data sampling period consists of consecutive data sampling intervals.

Table 116. #AirSamplerFlow Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-15	a15	#AirSamplerFlow
2-*n*	1-10	f10.4	average flow rate (m^3/h at STP)
	12-22	f11.6	flow rate standard deviation (m^3/h at STP)
	24-33	i4,a1,i2,a1,i2	SOH data sampling interval start date (*yyyy/mm/dd*)
	35-44	i2,a1,i2,a1,f4.1	SOH data sampling interval start time *(hh:mm:ss.s)*
	46-51	i6	SOH data sampling interval duration (s)

The SOH data sampling period consists of consecutive SOH data sampling intervals. The interval start date and time indicates when the sampling interval begins. The interval duration describes how long the sampling interval lasts until the next one starts.

Table 117. #AirSamplerEnv Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-14	a14	`#AirSamplerEnv`
2-*n*	1-5	f5.1	average air temperature after filter (°C)
	7-13	f7.2	average static air pressure after filter (kPa)
	15-24	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	26-35	i2,a1,i2,a1,f4.1	time *(hh:mm:ss.s)*
	37-42	i6	SOH data sampling interval duration (s)

The `#AirSamplerEnv` block is not reported in RMSSOH messages from noble gas stations.

Table 118. #DetEnv Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	`#DetEnv`
2-*n*	1-5	f5.1	average room temperature (°C)
	7-12	a6	detector shield status (`OPEN` or `CLOSED`)
	14-16	i3	average room humidity (in percent relative humidity)
	18-22	i5	detector high voltage (V)[1]
	24-27	i4	average crystal temperature (°C)
	29-31	a3	electric cooler status (`ON` or `OFF`)
	33-36	f4.2	liquid nitrogen fill-fraction[2]
	38-43	f6.3	detector leakage current (nanoamperes [nA]) [3]
	45-54	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	56-65	i2,a1,i2,a1,f4.1	time *(hh:mm:ss.s)*
	67-72	i6	SOH data sampling interval duration (s)

[1] This field contains the voltage that is applied across the detector crystal by the high voltage power supply and sometimes called the bias voltage.

[2] This field contains the volume fraction of liquid nitrogen remaining (usually in a dewar) for cooling the detector crystal. For example, a full dewar would have a liquid nitrogen fill-fraction of 1.00. A half-full dewar would have a liquid nitrogen fill-fraction of 0.50.

[3] This field contains the steady-state leakage current of the detector crystal during normal operations.

Example

An IMS station writes a record in the `#DetEnv` block (Table 118) every 10 minutes or upon a change in the shield status and electric cooler status. The events in Table 119 occurred from 9:00:00 to 10:00:00 UTC on 13 December, 2000.

Table 119. Example Detector Environment Events at an IMS Station

TIME	EVENT
9:10:45	The detector shield is opened.
9:21:30	The detector shield is closed.
9:34:30	The electro cooler fails.

During this time, the average room temperature was 21.0 °C, the average room humidity was 54.0 percent, and the average crystal temperature was -196 °C. Accordingly, the following records are written in the `#DetEnv` block. To improve readability, parameter changes are in **bold** font.

```
21.0  CLOSED 54  13    -196  ON  -999 5.9    2000/12/13 9:10:45    540
21.0  OPEN   54  13    -196  ON  -999 5.9    2000/12/13 9:19:45    105
21.0  CLOSED 54  13    -196  ON  -999 5.9    2000/12/13 9:21:30    600
21.0  CLOSED 54  13    -196  ON  -999 5.9    2000/12/13 9:31:30    180
21.0  CLOSED 54  13    -196  OFF -999 6.0    2000/12/13 9:34:30    600
21.0  CLOSED 54  13    -196  OFF -999 6.0    2000/12/13 9:34:30    600
```

The liquid nitrogen fill-fraction is not applicable to a detector system that is electrically cooled. The field, however, must be filled with data or else the parsing program will fail. This scenario is considered to be a case of missing data. Because the liquid nitrogen fill fraction field is formatted as f4.2, the missing data are replaced with `-999` as described in “Missing Data” on page 31 of this document.

An IMS station should write a record in the `#PowerSupply` block (Table 120) every 10 minutes or upon a change in the status of any of the three power supplies (MAIN, AUX, UPS).

Table 120. #PowerSupply Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	`#PowerSupply`
2-*n*	1-4	a4	`MAIN` (for MAIN power supply)
	6-8	a3	status of main power supply (`ON`/`OFF`)
	10-12	a3	`AUX` (for AUXiliary power supply)
	14-16	a3	status of auxiliary power supply (`ON`/`OFF`)[1]
	18-20	a3	`UPS` (for Uninterrupted Power Supply)

	22-24	a3	status of uninterruptedly power supply (ON/ OFF)[2]
	26-35	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	37-46	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss.s*)
	48-53	i6	SOH data sampling interval duration (s)

[1] This parameter is required when an auxiliary generator is installed.

[2] A UPS status of ON indicates the internal UPS batteries are being used to power the station.

Example

An SOH data sampling interval begins at a certain station on 10 February, 2001 at 08:09:01 UTC. At this time, the MAIN power supply is ON while the AUX and UPS supplies are OFF. At 08:11:32 UTC, the MAIN power shuts off due to effects from a nearby storm. To compensate, the UPS power automatically turns ON until the AUX power supply takes over at 08:14:16 UTC. The MAIN power comes back online at 08:30:27 UTC. The IMS station writes a record in the #PowerSupply block every 10 minutes or upon a change in status of any of the MAIN, UPS or AUX power supplies. Accordingly, the following records are written in the #PowerSupply block. To improve readability, parameter changes are in **bold** font.

```
MAIN ON  AUX OFF UPS OFF 2000/02/10 08:09:01   151
MAIN OFF AUX OFF UPS ON  2000/02/10 08:11:32   164
MAIN OFF AUX ON  UPS OFF 2000/02/10 08:14:16   600
MAIN OFF AUX ON  UPS OFF 2000/02/10 08:24:16   371
MAIN ON  AUX OFF UPS OFF 2000/02/10 08:30:27   600
```

Note that only one of three power supplies can be ON at a time.

Table 121. #EquipStatus Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-12	a12	#EquipStatus
2-*n*	1-2	a2	C: (for collection/sampling system)
	4-19	a16	status of sampling system (ON/OFF) or the SRID of the sample being collected[1]
	61-70	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	72-81	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss.s*)
	83-88	i6	SOH data sampling interval duration (s)

[1] Required only for sites that have sample collection systems.

[2] Required only for sites that have detector systems.

Example

The sampling methodology at IMS radionuclide station 03 for particulate samples is 23 hours collection time, 23 hours decay time, and 23 hours count time. The SOH data at this station are recorded every 10 minutes or at a status change, and is transmitted every 2 hours. A sample is collected from 12:56:12 UTC on 24 February, 2001 to 11:56:12 UTC on 25 December, 2001. Accordingly, the following records are written in the `#EquipStatus` block (Table 121) of the RMSSOH messages indicated to specify the status changes.

The RMSSOH messages are labelled with consecutive numbers: the first RMSSOH message containing equipment status records for this sample is labelled as #1. The continuation dots indicate that the status is unchanged for the records above and below those displayed. To improve readability, parameter changes are in **bold** font.

RMSSOH message #1

Data Sampling Period Start Date and Time: 24 February, 2001 at 12:00:00 UTC

```
...
C: 03200102230111 P: 03200102220211 A: 03200102210311 2001/02/24 12:46:12   600
C: 03200102241211 P: 03200102230111 A: 03200102220211 2001/02/24 12:56:12   600
C: 03200102241211 P: 03200102230111 A: 03200102220211 2001/02/24 13:06:12   600
...
```

RMSSOH message #12

Data Sampling Period Start Date and Time: 25 December, 2001 at 10:00:00 UTC

```
...
C: 03200102241211   P: 03200102230111   A: 03200102220211   2001/02/25 11:46:12   600
C: 03200102251111   P: 03200102241211   A: 03200102230111   2001/02/25 11:56:12   600
C: 03200102251111   P: 03200102241211   A: 03200102230111   2001/02/25 12:06:12   600
...
```

RMSSOH message #24

Data Sampling Period Start Date and Time: 26 December, 2001 at 10:00:00 UTC

```
...
C: 03200102251111   P: 03200102241211   A: 03200102230111   2001/02/26 10:46:12   600
C: 03200102261011   P: 03200102251111   A: 03200102241211   2001/02/26 10:56:12   600
C: 03200102261011   P: 03200102251111   A: 03200102241211   2001/02/26 11:06:12   600
...
```

Table 122. #TamperEnv Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	`#TamperEnv`
2-*n*	1-20	a20	tamper sensor name
	22-27	a6	tamper sensor status (`OPEN` or `CLOSED`)
	29-38	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	40-49	i2,a1,i2,a1,f4.1	time (*hh*:*mm*:*ss.s*)[1]
	51-56	i6	SOH data sampling interval duration (s)

[1] Records must be time sequential.

Valid names for tamper sensors are listed in Table 123. Stations should send data for the tamper sensors they have. Some stations may have more tamper sensors than those currently recognized by the IDC. If an invalid name or extra sensor is listed in the `#TamperEnv` block (Table 122), the record will saved at the IDC but not parsed into the database tables. In the future, more sensor names may be added.

Table 123. Tamper Sensor Names Recognized by IDC Parsing Software

NAME	TAMPER SENSOR LOCATION
door1	main entrance
door2	second door
door3	third door
fence	fence entrance
aslid	air sampler lid
aspanel	air sampler panel
fscab	filter storage cabinet
decaycab	decay cabinet
equipcab	equipment cabinet - primarily for automated stations

Example

An IMS station has tamper sensors at a fence entrance, the only station door, the air sampler lid, the filter storage cabinet, a leaded cabinet containing calibration sources, an equipment cabinet and a breaker box. A maintenance person arrives at the station on 1 March, 2001 at 09:01:23 UTC to perform a monthly inventory of the station supplies. Table 124 summarizes events that the tamper sensors recorded during the visit.

Table 124. Example Tamper Sensor Events at an IMS Station

TIME	EVENT
9:05:55	The fence surrounding the IMS station is unlocked and opened.
9:06:00	The fence is shut.
9:07:37	The only door to the IMS station housing is opened.
9:07:40	The only door to the IMS station is closed.
9:13:11	The filter storage cabinet is opened.
9:20:24	The filter storage cabinet is closed.
9:25:07	The decay cabinet is opened.
9:27:50	The decay cabinet is closed.
9:31:43	The equipment cabinet is opened.
9:43:28	The equipment cabinet is closed.
9:50:51	The only door to the IMS station housing is opened.

9:50:54	The only door to the IMS station is closed.
9:52:33	The fence surrounding the IMS station is opened.
9:52:38	The fence is shut and locked.

The SOH data at this station are recorded every 10 minutes or at a status change, and is transmitted every 2 hours. Accordingly, the following records are written in the `#TamperEnv` block. To improve readability, parameter changes are in **bold** font.

```
door1                     CLOSED 2001/03/01 09:00:00   355
fence                     CLOSED 2001/03/01 09:00:00   355
aslid                     CLOSED 2001/03/01 09:00:00   355
fscab                     CLOSED 2001/03/01 09:00:00   355
decaycab                  CLOSED 2001/03/01 09:00:00   355
equipcab                  CLOSED 2001/03/01 09:00:00   355
breakerbox                CLOSED 2001/03/01 09:00:00   355
door1                     CLOSED 2001/03/01 09:05:55   5
fence                     OPEN   2001/03/01 09:05:55   5
aslid                     CLOSED 2001/03/01 09:05:55   5
fscab                     CLOSED 2001/03/01 09:05:55   5
decaycab                  CLOSED 2001/03/01 09:05:55   5
equipcab                  CLOSED 2001/03/01 09:05:55   5
breakerbox                CLOSED 2001/03/01 09:05:55   5
door1                     CLOSED 2001/03/01 09:06:00   97
fence                     CLOSED 2001/03/01 09:06:00   97
aslid                     CLOSED 2001/03/01 09:06:00   97
fscab                     CLOSED 2001/03/01 09:06:00   97
decaycab                  CLOSED 2001/03/01 09:06:00   97
equipcab                  CLOSED 2001/03/01 09:06:00   97
breakerbox                CLOSED 2001/03/01 09:06:00   97
door1                     OPEN   2001/03/01 09:07:37   3
fence                     CLOSED 2001/03/01 09:07:37   3
aslid                     CLOSED 2001/03/01 09:07:37   3
fscab                     CLOSED 2001/03/01 09:07:37   3
decaycab                  CLOSED 2001/03/01 09:07:37   3
equipcab                  CLOSED 2001/03/01 09:07:37   3
breakerbox                CLOSED 2001/03/01 09:07:37   3
door1                     CLOSED 2001/03/01 09:07:40   331
fence                     CLOSED 2001/03/01 09:07:40   331
aslid                     CLOSED 2001/03/01 09:07:40   331
fscab                     CLOSED 2001/03/01 09:07:40   331
decaycab                  CLOSED 2001/03/01 09:07:40   331
equipcab                  CLOSED 2001/03/01 09:07:40   331
breakerbox                CLOSED 2001/03/01 09:07:40   331
door1                     CLOSED 2001/03/01 09:13:11   433
fence                     CLOSED 2001/03/01 09:13:11   433
aslid                     CLOSED 2001/03/01 09:13:11   433
fscab                     OPEN   2001/03/01 09:13:11   433
decaycab                  CLOSED 2001/03/01 09:13:11   433
equipcab                  CLOSED 2001/03/01 09:13:11   433
breakerbox                CLOSED 2001/03/01 09:13:11   433
door1                     CLOSED 2001/03/01 09:20:24   283
```

```
fence                CLOSED 2001/03/01 09:20:24   283
aslid                CLOSED 2001/03/01 09:20:24   283
fscab                CLOSED 2001/03/01 09:20:24   283
decaycab             CLOSED 2001/03/01 09:20:24   283
equipcab             CLOSED 2001/03/01 09:20:24   283
breakerbox           CLOSED 2001/03/01 09:20:24   283
```

Table 125 is required for noble gas RMSSOH messages. It facilitates the reporting of SOH data from various sensors throughout the units during different processes. Each noble gas unit may report any number of sensor readings using this data block, for example, temperatures, pressures, flows, voltages and countrates. Stations report data only for those sensors they have. Unique sensor names are required to distinguish between sensors of the same type. Each station type can create its own sensor names up to 20 alphanumeric characters long. Sensor readings must be reported in the units listed. Reporting intervals are 600 seconds or less.

Table 125. #ProcessSensors Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-13	a13	`#ProcessSensors`
2-*n*	1-15	a15	sensor type (`TEMP`, `PRESSURE`, `PROCESS_FLOW`, `VOLTAGE`, `COUNTRATES`, `DEWPOINT`, `CO2VOLUME`)
	17-36	a20	sensor name
	59-68	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	70-79	i2, a1,i2, a1, f4.1	time (*hh*:*mm*:*ss.s*)
	81-86	i6	SOH duration (s)

The `#Chromatogram` block is used only for RMSSOH messages from noble gas stations with chromatograms.

Table 126. #Chromatogram Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-11	a11	`#Chromatogram`
2	1-80	a80	the SRID of the sample being counted
3	1-5	i5	total number of chromatogram readings (equal to the total number of channels)
4-*n*	1-5	i5	interval[1] number (starts at 1)
	6-15	i10	interval start channel
	16-29	f14	duration between chromatogram readings (in seconds [s])
n-*m*	1-5	i5	channel[2]
	7-16	i10	detector response at channel + 0

RECORD	POSITION	FORMAT	DESCRIPTION
	18-27	i10	detector response at channel + 1
	29-38	i10	detector response at channel + 2
	40-49	i10	detector response at channel + 3
	51-60	i10	detector response at channel + 4

[1] A group of chromatogram readings with the same time duration between each

[2] Each detector reading is assigned a sequential number that is the channel number

Example:

```
#Chromatogram
49200305011811G
1536
1    1          60
2    473        5
3    570        60
4    691        5
5    971        60
0         66         66         66         66         66
5         66         66         66         66         66
10        66         66         66         66         66
15        66         66         66         66         66
20        66         66         66         66         66

1525      0          0          0          0          0
1530      0          0          0          0          0
1535      0
```

7.5. Meteorological Data (MET)

Data messages of `DATA_TYPE MET` contain the meteorological data recorded at an IMS radionuclide station. The format for the MET data type is given in Table 127 and an example is provided in “MET” on page 314. There must be at least one record in a MET message.

Table 127. MET Data Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-5	a5	station code
2-*n*	1-10	i4,a1,i2,a1,i2	met start date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	met start time (*hh*:*mm*:*ss.s*)
	23-32	i4,a1,i2,a1,i2	met end date (*yyyy/mm/dd*)
	34-43	i2,a1,i2,a1,f4.1	met end time (*hh*:*mm*:*ss.s*)
	45-49	f5.1	average outside temperature (°C)
	51-53	i3	average wind-direction (degrees from north)

55-59	f5.1	average wind-speed (m/s)
61-67	f7.2	average barometric reading (kPa)
69-71	i3	average relative humidity (percent relative humidity)
73-77	f5.1	rainfall (mm)

7.6. Other Laboratory Messages

The eight other laboratory messages are:

- PRESDN

  Notification that a sample will be sent to laboratory from station.
- TECSDN

  Notification that a sample was sent from the laboratory to the PTS.
- LABSDN

  Notification that a sample has been sent to a laboratory.
- MESACK

  Acknowledgement that a message was received and read.
- SAMACK

  Notification that a sample was received and an indication of its condition.
- DATREQ
  Request for analysis results or any additional information.
- ADDINS
  Instructions for the laboratory or a request for additional instructions from the PTS.
- MISC
  Free format to cover any message that does not fit one of the other types.

Table 128. Data Blocks in Other Laboratory Messages

DATA BLOCKS[1]	PRESDN	TECSDN	LABSDN	MESACK	SAMACK	DATREQ	ADDINS	MISC
`#Header`	r	r	r	r	r	r	r	r
`#LabDataVersion`	r	r	r	r	r	r	r	r
`#Recipient`		r	r				o	
`#Transport`		r	r				o	
`#Collection`			r				o	
`#StationSample`			r				o	
`#g_IDCActivitySummary`			o				o	
`#g_IDCEventScreeningFlags`			o				o	

#Split			o				o	
#Objective			r				o	
#MessageReceipt				r			o	
#SampleReceipt					r		o	
#Comment	o	o	o	o	o	o	o	o

[1] r = required, o = optional

Formats for data blocks of #LabDataVersion, #Collection, #StationSample, #P_IDCActivitySummary, #P_IDCEventScreeningFlags, #Split, #Objective and #Comment are the same as those described in Chapter 7.3 Radionuclide Laboratory Reports, respectively. Formats for the other data blocks listed in Table 128 are described in Table 129 through Table 132.

Table 129. #Header Block Format for Other Laboratory Messages

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-7	a7	#Header
2	1-7	a7	priority level [Urgent | Routine]
3	1-5	a5	site code of the laboratory selected for analysis [ARL01, …, USL16]
	7-22	a16	sample reference identification (SRID) of the sample[1]
4	1-10	a10	sample category (Category A, ..., Category E)[2]
5	1-10	i4,a1,i2,a1,i2	message transmission date (*yyyy/mm/dd*)
	12-21	i2,a1,i2,a1,f4.1	message transmission time (*hh:mm:ss.s*)

1 The SRID given in the #Header block is for the entire sample before any splitting. The SRID given by the PTS in the #Recipient block (which could be from a split sample and therefore different) must be cross-checked by the laboratory when the sample is received to ensure that the station sent the correct sample. The SRID on the sample, as actually received by the laboratory, must be reported in the #SampleReceipt block.

2 The sample category is given by the full string (Category A, ..., Category E), and the meaning is as follows:
A - network quality control sample
B - sample from IMS network categorized by IDC as Level 5
C - proficiency test sample
D - station back-up sample (measured by a lab)
E - other (e.g. station parallels)

Table 130. #Recipient Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	#Recipient
2	1-16	a16	sample reference identification
3	1-60	a60	point of contact
4	1-30	a30	point of contact phone number

5	1-60	a60	organization
6-*k*	1-60	a60	address

Table 131. #Transport Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	`#Transport`
2	1-20	a20	courier company
3	1-10	i4,a1,i2,a1,i2	date of handover (*yyyy/mm/dd*)
	12-21	i2,a1,i2	time of handover (*hh:mm*)
4	1-10	i4,a1,i2,a1,i2	estimated date of arrival (*yyyy/mm/dd*)
	12-21	i2,a1,i2	estimated time of arrival (*hh:mm*)
5	1-30	a30	airway bill number
6	1-14	a14	seal number (*nnnnnssssssssss*)

Table 132. #MessageReceipt Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-10	a10	`#MessageReceipt`
2	1-10	i4,a1,i2,a1,i2	date of receipt (*yyyy/mm/dd*)
	12-21	i2,a1,i2	time of receipt (*hh:mm*)

7.7. Alerts

Currently there are four types of ALERT messages.

- ALERT_FLOW

  This type of data message indicates that the sampler flow rate is above or below a specified threshold.
- ALERT_SYSTEM

  This type of data message indicates a problem with major equipment.
- ALERT_TEMP

  This type of data message indicates that a temperature sensor is above or below a specified threshold.
- ALERT_POWER

  This type of data message indicates a problem with the power supply (e.g. loss of main power).
- ALERT_PRESSURE

This type of data message indicates that a pressure sensor reading is above or below a specified threshold.

Table 133 describes the general format of an ALERT message. Examples of ALERT messages can be found in “Appendix III: Data Message Examples” on page 264.

Table 133. General ALERT Message Format

RECORD	POSITION	FORMAT	DESCRIPTION
1	1-5	a5	station code
	7-18	a12	alert type (`ALERT_FLOW`, `ALERT_SYSTEM`, `ALERT_TEMP`, or `ALERT_UPS`)
	20-29	i4,a1,i2,a1,i2	date (*yyyy/mm/dd*)
	31-40	i2,a1,i2,a1,f4.1	time (*hh:mm:ss.s*)
2-*n*[1]	1-80	a80	free text describing alert

[1] There must be at least one line of free text describing the problem.

7.8. Data Products

The following data products are generated by the IDC and are made available to subscribers:

- ARR (Automated Radionuclide Report)

  The ARR contains results from the automated analysis of a particulate or noble gas sample.
- RRR (Reviewed Radionuclide Report)

  The RRR is a revised version of the ARR and is generated after the manual analysis of a particulate or noble gas sample is complete.
- SSREB (Standard Screened Radionuclide Event Bulletin)

  The SSREB is produced for particulate samples categorized as level 4 and level 5 and noble gas samples categorized as level C. This report contains the RRRs from stations contributing to the event, information on fission or activation products identified and an enhanced field of regard. The SSREBs may be updated as new relevant data arrive.
- RNPS (Radionuclide Network Product Summary)

  The RNPS contains a compilation of the status of collection, processing and analysis of all the data received from the IMS stations during a period.
- SAMPML (sample PHD data plus analysis results in XML format)

  The SAMPML contains Noble Gas spectra PHDs and analysis results in XML format, including the SAMPML_A and SAMPML_R for Automated and Reviewed Radionuclide Report, respectively. For β-γ coincidence samples, it includes all four kind spectra of the sample, detector background, gas background and QC PHDs. It is not a standard IDC product but can be requested from the VDMS. And it is only available for Noble Gas monitoring systems.

The DATA_TYPE of these reports is ARR, RRR, SSREB, RNPS, SAMPML_A, or SAMPML_R, respectively.

7.8.1. *ARR*

7.8.1.1. *ARR - Particulater Version*

An ARR - Particulate Version contains the following sections:

- Sample Information
- Measurement Categorization
- Activity Summary
- Minimum Detectable Concentration for Key Nuclides
- Peak Search Results
- Processing parameters
- Calibration Parameters
- Data Timelines and Availability Flags
- Data Quality Flags
- Calibration Equations.

The sample information section includes information on the sample collection and data acquisition (
Table 134).

Table 134. Sample Information Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1(title)	1-73	a73	SAMPLE INFORMATION ======================
3	1-12	a11	Station ID:
	21-26	a6	system code
	41-52	a12	Detector ID:
	61-70	a10	detector code
4	1-14	a14	Authenticated:
	21-23	a3	YES or NO
6	1-17	a17	Station Location:
	19-48	a30	place and county location of the station
7	1-21	a21	Detector Description:
	23-73	a49	detector number and location
9	1-10	a10	Sample ID:
	23-30	i8	unique number assigned to a PHD message by the IDC. This number is referenced in all data products resulting from the PHD set with that SID
	41-56	a16	Sample Geometry:
	61-70	a10	Station type and sample dimensions
10	1-16	a16	Sample Quantity:

RECORD	POSITION	FORMAT	DESCRIPTION
	23-30	f8.2	total atmospheric air volume sampled (m^3 at STP)
	32-33	a2	`m3`
	41-52	a12	`Sample Type:`
	61-71	a11	`particulate` or `gas`
13	1-17	a17	`Collection Start:`
	21-30	i4,a1,i2,a1,i2	collection start date (*yyyy/mm/dd*)
	32-36	i2, a1, i2	collection start time (*hh:mm*)
	41-54	a14	`Sampling Time:`
	63-67	f5.2	sample collection duration and is equal to the difference in the Collection Stop and Collection Start times
	69-73	a5	`hours`
14	1-16	a16	`Collection Stop:`
	21-30	i4,a1,i2,a1,i2	collection stop date (*yyyy/mm/dd*)
	32-36	i2, a1, i2	collection start time (*hh:mm*)
	41-51	a11	`Decay Time:`
	63-67	f5.2	decay time in hours
	69-73	a5	`hours`
15	1-18	a18	`Acquisition Start:`
	21-30	i4,a1,i2,a1,i2	sample start date (*yyyy/mm/dd*)
	32-36	i2, a1, i2	sample start time (*hh:mm*)
	41-57	a17	`Acquisition Time:`
	63-67	f5.2	detector count duration in hours
	69-73	a5	`hours`
16	1-17	a17	`Acquisition Stop:`
	21-30	i4,a1,i2,a1,i2	acquisition stop date (*yyyy/mm/dd*)
	32-26	i2, a1, i2	acquisition stop time (*hh:mm*)
	41-54	a14	`Avg Flow Rate:`
	62-67	f6.2	average blower flow rate in m^3/h for IMS particulate stations. For particulate IMS stations, the average flow rate is equivalent to the `Sample Quantity` divided by the `Sampling Time`.
	69-73	a5	`m3/hr`
18	1-28	a28	`Collection Station Comments:`
19-*k*	1-73	a73	free text comments

Measurement Categorization section contains a legend of categorizations levels as well as the sample category (Table 135).

Table 135. Measurement Categorization Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-73	a73	`MEASUREMENT CATEGORIZATION` `======================`
3 (header)	1-22	a22	`Categorization Legend`
	1-21	a21	`---------------------`
	1-41	a41	`Level 1 = Typical Background Rad. Meas.`
	1-43	a43	`Level 2 = Anomalous Background Rad. Meas.`
	1-44	a44	`Level 3 = Typical Anthropogenic Rad. Meas.`
	1-46	a46	`Level 4 = Anomalous Anthropogenic Rad. Meas.`
	1-52	a52	`Level 5 = Mult. Anomalous Anthropogenic Rad. Meas.`
11 (data)	1-19	a19	`Spectrum Category (`
	20	i1	Spectrum Category of the sample
	21-25	a5	) --
	26-56	a40	Short description of the spectrum category
13 (title)	1-23	a23	`Categorization Summary:`
15(header)	1-4	a4	`Name`
	12-19	a8	`Category`
	23-44	a22	`Categorization Comment`
	1-4	a4	----
17 (data)	1-6	a6	isotope name
	15	i1	isotope category
	24-45	a22	comments to the isotope cartegory

The activity summary section displays the concentrations and relative uncertainties of the radionuclides detected in the sample (Table 136). The following subsections are included: Natural Radioactivity, Activation-Products Radioactivity and Fission-Product Radioactivity. Quantified relevant and non-relevant CTBT radionuclides are listed in the Activation-Products Radioactivity and Fission-Product Radioactivity sections.

Table 136. Activity Summary Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-16	a16	`ACTIVITY SUMMARY`
3	1-22	a22	`NATURAL RADIOACTIVITY:`
5	1-45	a45	`Nuclides Identified and not Quantified:`

RECORD	POSITION	FORMAT	DESCRIPTION
7		Free text	list of nuclides present in the sample for which the concentration has not been determined
11	1-20	a20	`Nuclides Quantified:`
13 (header)	1-7	a7	`Nuclide`
	20-28	a9	`Half-Life`
	41-52	a12	`Conc(uBq/m3)`
	61-68	a8	`%%RelErr`
15-n (data)[1]	1-7	a7	nuclide name
	20-22	a13	half-life in seconds, hours, days or years
	40-50	e11.2	concentration (uBq/m^3)
	61-65	f5.2	uncertainty of concentration in percentage
n+1 (title)	1-33	a33	`ACTIVATION-PRODUCT RADIOACTIVITY:`
n+3 (header)	1-7	a7	`Nuclide`
	20-28	a9	`Half-Life`
	41-52	a12	`Conc(uBq/m3)`
	61-68	a8	`%%RelErr`
	77-87	a11	`Coincidence`
n+5-m (data)[1]	1-7	a7	nuclide name
	20-22	a13	half-life in seconds, hours, days, or years
	40-50	e11.2	concentration (uBq/m^3)
	61-65	f5.2	uncertainty of concentration in percentage
	80-82	a3	`YES` or `NO`
m+1 (title)	1-33	a33	`FISSION-PRODUCT RADIOACTIVITY:`
m+3 (header)	1-7	a7	`Nuclide`
	20-28	a9	`Half-Life`
	41-52	a12	`Conc(uBq/m3)`
	61-68	a8	`%%RelErr`
	77-87	a11	`Coincidence`
m+5-p (data)[1]	1-7	a7	nuclide name
	20-22	a13	half-life in seconds, hours, days, or years
	40-50	e11.2	concentration (uBq/m^3)
	61-65	f5.2	uncertainty of concentration in percentage
	80-82	a3	`YES` or `NO`

[1] The records in the data block are the number of the detected isotopes.

The Minimum Detectable Concentration (MDC) for Key Nuclides section (Table 137) lists the half-lives and MDCs of the CTBT relevant radionuclides specified in CTBT/WGB/TL-2/40 (2000).

Table 137. Minimum Detectable Concentration For Key Nuclides Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-45	a45	MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES
2 (header)	1-7	a7	Nuclide
	20-28	a9	Half-Life
	44-54	a11	MDC(uBq/m3)
3 (data)	1-7	a7	nuclide name
	20-32	a13	half-life in seconds, hours, days, or years
	42-52	e11.2	MDC (uBq/m^3)

The Peak Search Results section (Table 138) lists information on the peaks identified during automated analysis of high-resolution γ-spectrometry data.

Table 138. Peak Search Results Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-30	a30	PEAK SEARCH RESULTS
3	6-8	i3	number of peaks found in the spectrum by automated peak search.
	10-68	a59	peaks found in spectrum by automated peak search.
4	6-8	i3	number of peaks associated with nuclides by automated processing.
	10-68	a59	peaks associated with nuclides by automated processing.
5	6-8	i3	number of peaks not associated with nuclides by automated processing.
	10-68	a59	peaks not associated with nuclides by automated processing.
6	7-8	i2	percent of peaks were associated with nuclides.
	10-68	a59	percent of peaks were associated with nuclides.
8	2-64	a63	Note: "*" indicates that a peak was a component of a multiplet.
10 (headers)	2-7	a6	Energy
	11-18	a8	Centroid
	22-26	a5	Width
	29-32	a4	FWHM

RECORD	POSITION	FORMAT	DESCRIPTION
	36-40	a5	`%%Eff`
	46-53	a8	`Net Area`
	56-63	a8	`%%RelErr`
	69-75	a7	`Nuclide`
	78-80	a3	`Nts`
12 - n (data)	1-7	i4.2	energy at peak centroid in keV.
	10-16	i4.2	peak centroid channel
	24-25	i2	peak width (FWHM) in channel
	29-32	i3.2	FWHM in keV.
	37-40	i3.2	relative efficiency in percent.
	45-53	i7.2	peak net area in counts corrected for background
	59-63	i4.2	uncertainty of the peak net area in percentage
	69-75	a7	nuclide id
	78-		free text notes

The Processing Parameters section (Table 139) includes the settings used by the *autosaint* software unit to identify peaks and quantify peak characteristics.

Table 139. Processing Parameters Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-21	a21	`PROCESSING PARAMETERS`
3	1-32	a13	`Risk level K:`
	34-50	f5.2	risk of making an incorrect judgment that a channel represents part of a real peak when it does not
4	1-32	a19	`Baseline algorithm:`
	34-50	a17	algorithm used for estimating the shape of the background under a peak
5	1-32	a32	`Nucl Id Detectability Threshold:`
	34-50	f4.2	quality threshold for declaring a peak
6	1-32	a20	`Energy Id Tolerance:`
	34-50	a10	Maximum allowed difference in keV for automatic association of a peak to a nuclide
7	1-32	a22	`Background subtraction:`
	34-50	a3	`YES` or `NO`
8	1-32	a16	`IRF for Pb-212F:`
	34-50	a3	`YES` or `NO`

The Calibration parameters section (Table 140) includes the types of energy, resolution and efficiency calibration parameters used during automated analysis.

Table 140. Calibration Parameters Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-23	A23	`CALIBRATION PARAMETERS`
3	1-15	a15	`AreaThreshold:`
	29-31	i3	area threshold
4	1-16	a16	`Confidence Level:`
	29-31	i3	confidence level used
5	1-11	a11	`ECR updated:`
	29-31	a3	energy vs channel regression updated
6	1-11	a11	`RER updated:`
	29-31	a3	resolution vs energy regression updated
7	1-8	a8	`Used ECR:`
	29-38	a10	ECR type
8	1-9	a9	`Used RER:`
	29-38	a10	RER type

The Data Timeliness and Availability Flags section (Table 141) contains information about the presence or absence of the previous sample; the acceptability of the duration of sample collection, sample decay and sample acquisition; and the time difference between receipt of raw data and report creation.

Table 141. Data Timelines and Availability Flags Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1-38	a38	`DATA TIMELINESS AND AVAILABILITY FLAGS`
3	1-24	a24	`Previous Sample Present?`
	56-58	a3	`YES or NO`
4	1-38	a38	`Collection time within 24 hours +/- 10%?`
	56-58	a3	`YES or NO`
5	1-29	a29	`Acquisition time >= 20 hours?`
	56-58	a3	`YES or NO`
6	1-23	a23	`Decay time <= 24 hours?`
	56-58	a3	`YES or NO`
7	1-50	a50	`Sample received within 72 hours of collect start?`

	56-58	a3	YES or NO

The Data Quality Flags section lists values for SOH and data quality parameters, acceptable values for these parameters, and test results (PASS/FAIL) (Table 142).

Table 142. Data Quality Flags Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-18	a18	DATA QUALITY FLAGS
3 (header)	1-4	a4	Name
	32-40	a9	Pass/Fail
	43-47	a5	Value
	59-61	a4	Test
5 (data)	1-30	a30	Ba140_MDC
	32-35	a4	PASS or FAIL
	43-53	e11.5	parameter value
	59-74	a16	<30
6 (data)	1-30	a30	K40_LocationDifference
	32-35	a4	PASS or FAIL
	43-53	e11.5	parameter value
	59-74	a16	<3*std deviation
7 (data)	1-30	a30	NormalizedGainDifference
	32-35	a4	PASS or FAIL
	43-53	e11.5	parameter value
	59-74	a16	<0.0001
8 (data)	1-30	a30	Be7_FWHM
	32-35	a4	PASS or FAIL
	43-53	e11.5	parameter value
	59-74	a16	<1.7
9 (data)	1-30	a30	FlowRate
	32-35	a4	PASS or FAIL
	43-53	e11.5	parameter value
	59-74	a16	>500

The Calibration Equations section includes the energy, resolution, and efficiency calibration equations generated during automated analysis (Table 143).

Table 143. Calibration Equations Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-21	a21	`CALIBRATION EQUATIONS`
3	1-18	a18	`Energy vs. Channel`
5	1-42	a42	Energy Calibration equation like “E(c) = -0.1345 + 0.3415*c + 1.074E-08*c^2”
7	3-19	a16	`E = energy (keV)`
8	3-20	a18	`c = channel number`
11	1-18	a18	`Resolution vs. Energy`
13	1-42	a42	Resolution Calibration equation like “FWHM(E) = SQRT(1.00+0.00199*E+8.83e-07*E^2)”
15	3-35	a32	`FWHM = Full Width Half Max (keV)`
16	3-18	a16	`E = energy (keV)`
19	1-21	a21	`Efficiency vs. Energy`
21	2-11	a10	Type of efficiency calibration like “`VGSL pairs`”
22(header)	11-46	a36	`Energy     Efficiency    Uncertainty`
23	13-16	i4	Energy
	22-31	f10	Efficiency value
	37-46	f10	Uncertainty

The Field of Regard section contains the URL link to the field of regard associated with the sample.

An example of an Automated Radionuclide Report is provided in “ARR - Particulate Version” on page 275.

7.8.1.2. *ARR - Noble Gas Version*

An ARR - Noble Gas Version contains following sections:

- Report title
- Sample Information
- Measurement Categorization
- Activity Summary and Minimum Detectable Concentration for Xenon Isotopes
- Processing Specific Parameters and Results
- Processing Parameters
- Calibration Parameters
- Data Timelines and Availability Flags
- Data Quality Flags
- Event Screening Flags
- Calibration Equations.

ARR - Noble Gas Version reports are a HTML format version and composed of HTML tags and different contents. The tags define webpage styles. The title and section names are defined as bold letters with different font-sizes. The report contents could be displayed in a line style with two parts of a header and specific data. And they could also be displayed in a table style with headers and data rows in a few columns. The detailed description of the HTML tags is beyond this Format and Protocols. The two complete typical examples from the HPGE system DEX33 and β-γ coincidence system JPX38 with detailed HTML tags are provided on page 265. Formats of report contents are described using those two examples below.

The Title section includes the ARR title along with the date and time information about the sample spectrum and report. A screenshot of the Title section of the ARR example from the station DEX33 is shown in Figure 5. The tile block displays a bold free text of "`IDC Generated Report/Automatic Radionuclide Report/Noble Gas Version`" in three lines. The second block displays the "`Creation Date`, `Sample Arrival Time` and `Time difference from receipt of the sample spectra to the report creation`" in three lines. Each message line contains two parts, e.g. the header and the specific data. For example, the header of the first message line is the "`Creation Date:`" which will be the same for all spectra analysis and the report specific data is *"`2016-04-01 14:52:15`"*, which is the specific date and time of this report created. All message lines in the title section are centre aligned.

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2016-04-01 05:52:10
Sample Arrival Time: 2016-04-01 05:49:09
Time difference from receipt of raw data to report creation: 3 m 1.0 s

Figure 5. Title section of the ARR example from the station DEX33

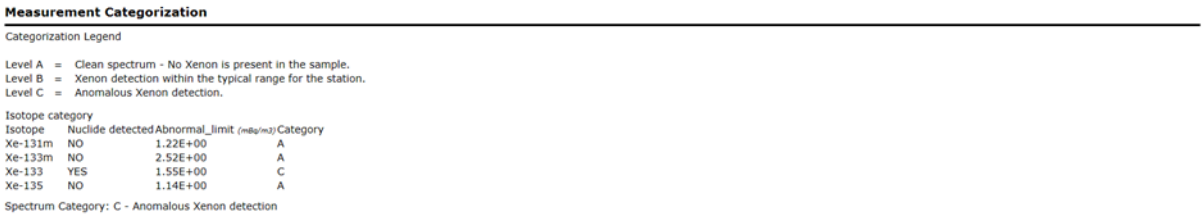
The contents of the `Sample Information` section are more or less the same as the ARR_Particulate Version, except of the stable xenon volume instead of the total sampling volume for the particulate version. It contains four blocks as shown in Figure 6. The first block lists the "`Station ID`, `Detector Code`" and "`Authenticated`" flag in four columns by two rows. The second one lists the "`Station Location`, `Detector Description`" and "`System Technology`" in two columns by three rows. The third one displays the "`Sample Reference ID`, `Sample ID`, `Stable Xenon Volume`" and "`Sample Type`" in four columns by three rows. The last block contains the time information like the "`Collection Start`" date and time, "`Sampling Time`, `Processing Time`, `Acquisition Start`" and "`Stop`" date and time and "`Acquisition Time`" in four columns by four rows. All messages are left-aligned unless otherwise noted.

Sample Information

Station ID:	DEX33	Detector Code:	DEX33_003
Authenticated:	NO		
Station Location:	Noble Gas Experim. stn.		
Detector Description:	Detector #3 in DEX33, Germany		
System Technology:	SPALAX		
Sample Reference ID:	33201603300611G		
Sample ID:	3548831		
Stable Xe Volume:	3.42 ml	Sample Type:	Gas
Collection Start:	2016-03-30 06:00:00	Sampling Time:	1 d
Collection Stop:	2016-03-31 06:00:00	Processing Time:	1 h 23 m 16 s
Acquisition Start:	2016-03-31 07:23:16	Acquisition Time:	22 h 21 m 52 s
Acquisition Stop:	2016-04-01 05:45:08		

Figure 6. Sample Information section of the ARR example from the station DEX33

The “`Measurement Categorization`” section contains three blocks as shown in Figure 7. The first block is the “`Categorization Legend`” for noble gas samples and is presented in two columns, e.g. “`Level A, B and C`” and their short descriptions, respectively. The second one is the “`Isotope Category`” for each xenon isotope in a table style. Headers of the table are shown in Table 144. The last block is a one line message about the “`Spectrum Category`”, which is dependent on the highest level of the isotope category, including the category level and its short description.


Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.22E+00	A
Xe-133m	NO	2.52E+00	A
Xe-133	YES	1.55E+00	C
Xe-135	NO	1.14E+00	A

Spectrum Category: C - Anomalous Xenon detection

Figure 7. Measurement Categorization section of the ARR example from the station DEX33

Table 144. Xenon Isotope Category Block Format

COLUMN	CONTENT	DESCRIPTION
1	`Isotopse`	Xenon isotope name
2	`Nuclide Detected`	Flags of the detected xenon isotopes, YES or NO.
3	`Abnormal_Limit`	Abnormal_Limit (in mBq/m^3).
4	`Category`	Category for each xenon isotope.

The “`Activity Summary and Minimum Detectable Concentration for Xenon Isotopes`” section displays mainly the radon counts, concentrations and relative uncertainties of four radio-Xenon isotopes detected in the sample, which has different formats for β-γ coincidence and HPGE based systems, respectively.

For HPGE stations, it contains two blocks as shown in Figure 8. The first one is the “`Radon level in Xenon sample`” listing the “`Nuclide`” (e.g. Rn-222), the “`Half-Life`” (e.g. 3.82 D), the “`Area`” (peak net area of 352 keV) and the “`%RelErr`” (relative uncertainty of the net area). The second block is the “`Xenon isotopes`” displaying the analysis results and is composed of two sub-blocks. The sub-block one is the “`Peak Fit Method`” listing the peak fitting results for Xenon isotopes in a table style as shown in Table 145. The analysis results of four Xenon isotopes are always displayed even the concentration is <Lc. The other sub-block is the “`Decay Analysis Method`” listing the concentration results with decay corrections, which has the same format with the fitting results in Table 145. The block of the “`Decay Analysis Method`” is only given when the concentration is above the Lc.

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	Half-Life	Area	%RelErr
Rn-222	3.82 D	392.46	6.28

Xenon isotopes

Peak Fit Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr
XE-131M	11.900 D	< LC	0.30	N/A
XE-133M	2.190 D	< LC	0.30	N/A
XE-133	5.243 D	1.71	0.46	7.10
XE-135	9.140 H	< LC	1.90	N/A

Decay Analysis Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr
XE-131M	11.900 D	< LC	0.30	N/A
XE-133M	2.190 D	< LC	0.30	N/A
XE-133	5.243 D	1.70	0.46	7.11
XE-135	9.140 H	< LC	1.90	N/A

Figure 8. Activity Summary section of the ARR example from the HPGE station DEX33

Table 145. Activity Summary Block Format for HPGE Spectra Anslysis

COLUMN	CONTENT	DESCRIPTION
1	`Nuclide`	xenon name
2	`Half-life`	Half-life of xenon isotopes
3	`Conc`	concentration (mBq/m^3)
4	`MDA`	MDA for each xenon isotope (mBq/m^3)
5	`%RelErr`	relative uncertainty of the concentration (%)

For β-γ coincidence stations, this section contains two blocks. A screenshot of the Activity Summary section of the ARR example from the station JPX38 is shown in Figure 9. The first block lists the "`Radon counts in Xenon sample`" which is the net counts in ROI 1. The second one displays analysis results for xenon isotopes with a sub-title of "`Xenon isotopes – Analysis Method NCC`" as shown in Table 146.

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 89.0

Xenon isotopes - Analysis Method NCC

Nuclide	Half-Life	Conc (mBq/m3)	LC	MDC	%RelErr
XE-131M	11.900 D	< LC	0.04	0.11	N/A
XE-133M	2.190 D	0.04	0.04	0.09	69.47
XE-133	5.243 D	0.08	0.07	0.15	56.91
XE-135	9.140 H	< LC	0.31	0.66	N/A

Figure 9. Activity Summary section of the ARR example from the station JPX38

Table 146. Activity Summary Block Format for β-γ Coincidence Spectra Anslysis

COLUMN	CONTENT	DESCRIPTION
1	`Nuclide`	Xenon name
2	`Half-life`	Half-life of xenon isotopes
3	`Conc`	Concentration (mBq/m^3)
4	`Lc`	Critical level of Xenon isotope measurements (mBq/m^3)
5	`MDA`	MDA for each xenon isotope (mBq/m^3)
6	`%RelErr`	Relative uncertainty of the concentration (%)

The `Processing Specific Parameters and Results` section includes information on the peaks identified during spectra analysis, which is different between β-γ coincidence and HPGE systems.

For HPGE spectra, the section contains only one block of `Xenon Peak Data` as shown in Figure 10 and Table 147. Here only the detected peaks are given.

Processing Specific Parameters and Results

Xenon Peak Data

Energy	Centroid	Width	FWHM	%Eff	Net Area	%RelErr
30.93	140.83	3.00	0.59	14.00	242.70	11.64
80.96	367.37	3.00	0.71	18.97	373.49	6.86

Figure 10. Processing Specific Parameters and Results section of the ARR example from the HPGE station DEX33

Table 147. Processing Specific Parameters Block Format for HPGE Spectra Anslysis

COLUMN	CONTENT	DESCRIPTION
1	`Energy`	Peak energy in keV
2	`Centroid`	Peak centroid in channels
3	`Width`	Peak width in channels
4	`FWHM`	FWHM in keV
5	`%Eff`	Peak relative efficiency (%)
6	`Net Area`	Peak net area in counts
7	`%RelErr`	Relative uncertainty of the peak net area (%)

For β-γ coincidence spectra, the section includes three blocks as shown Figure 11. The first one is a line message about the analysis method displayed as `Method 1 (Net Count Calculation)`. The second block is the `ROI Net Count Results` as shown in Table 148. The third block is the `ROI Limits` as shown in Table 149.

Processing Specific Parameters and Results

Method 1 (Net Count Calculation)

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	13.79	100.66	15.33	N/A	N/A
2	XE-135	-2.01	143.71	19.86	0.60	0.01
3	XE-133	6.58	69.81	13.08	0.78	0.02
4	XE-133	18.97	54.03	9.74	0.71	0.01
5	XE-131M	4.76	18.99	6.21	0.61	0.01
6	XE-133M	5.06	12.35	4.44	0.62	0.01
7	XE-133	1.69	26.52	8.20	0.19	0.00
8	XE-133	-0.17	3.76	3.26	0.04	0.00
9	XE-133	8.57	12.76	3.37	0.19	0.00
10	XE-133	11.37	38.46	8.56	0.49	0.01

ROI Limits (channels)

ROI	BetaLow (channels)	BetaHigh (channels)	GammaLow (channels)	GammaHigh (channels)
1	1	191	109	132
2	1	255	76	96
3	1	126	23	34
4	1	139	7	15
5	27	51	7	15
6	62	95	7	15
7	1	24	7	15
8	98	139	7	15
9	62	139	7	15
10	1	51	7	15

Figure 11. Processing Specific Parameters and Results section of the ARR example from the station JPX38

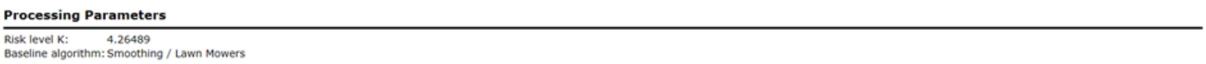
Table 148. Processing Specific Parameters Block Format for β-γ Coincidence Spectra Anslysis

COLUMN	CONTENT	DESCRIPTION
1	`ROI`	ROI number
2	`Nuclide`	Xenon isotopes like `XE-131M, XE-133M, XE-133 and XE-135`
3	`Net Counts`	Net counts in the ROI
4	`Abs Net Error`	Absolute uncertainty of the net counts
5	`Lc`	Critical level of Xenon counts
6	`Efficiency`	Peak absolute efficiency
7	`Abs Eff Error`	Absolute uncertainty of the efficiency

Table 149. Processing ROI Parameters Block Format for β-γ Coincidence Spectra Anslysis

COLUMN	CONTENT	DESCRIPTION
1	`ROI`	ROI number
2	`BetaLow`	Low beta energy limit in channels
3	`BetaHigh`	High beta energy limit in channels
4	`GammaLow`	Low gamma energy limit in channels
5	`GammaHigh`	High gamma energy limit in channels

The `Processing Parameters` section includes settings used by autosaint or bg-analyze software units to identify peaks and quantify peak characteristics. For HPGE spectra, the section lists only two parameters, e.g. `Risk Level K` and `Baseline algorithm` in two rows by two columns, as shown in Figure 12.


Processing Parameters

Risk level K: 4.26489
Baseline algorithm: Smoothing / Lawn Mowers

Figure 12. Processing Parameters section of the ARR example from the HPGE station DEX33

For β-γ coincidence spectra, the section lists five parameters, e.g. `Risk Level K`, `Gas background used` (`YES` or `NO`), `Detector background used` (`YES` or `NO`), `Interference corrections` (`YES` or `NO`) and `Analysis method` (`NCC` or `others`) in five rows by two columns, as shown in Figure 13.

Processing Parameters

Risk level k:	1.6449
Gas background used:	YES
Detector background used:	YES
Interference corrections:	YES
Analysis method:	NCC

Figure 13. Processing Parameters section of the ARR example from the station JPX38

The Calibration parameters section dispays the information about calibration parameters used during the spectra analysis. For the HPGE analysis, it is the same with the ARR_Particulate Version, including the `Area Threshold`, `Confidence Level`, `ECR updated`, `REC updated`, `Used ECR` and `Used RER` in six rows by two columns as shown in Figure 14.

Calibration Parameters

SAreaThreshold:	100
ConfidenceLevel:	95
ECR updated:	Yes
RER updated:	Yes
Used ECR:	MRPM
Used RER:	MRPM

Figure 14. Calibration Parameters section of the ARR example from the DEX33

For the β-γ coincidence spectra analysis, the section is about updating flags if calibration parameters are updated, including the `Gamma Energy calibration Updated` (YES/NO) and `Beta energy calibration updated` (YES/NO) in two rows by two columns as shown in Figure 15.

Calibration Parameters

Gamma energy calibration updated:	YES
Beta energy calibration updated:	YES

Figure 15. Calibration Parameters section of the ARR example from the station JPX38

The `Data Timeliness and Availability Flags` section is the same with the ARR_Particulate Version. It gives the information about the four flags and testing results as shown in Figure 16 and Table 150 and Table 151.

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	3547556	-1 day sample available
Collection Time	Pass	24.00	24h +- 10%
Acquisition Time	Pass	22.36	24h +- 10%
Response Time	Pass	47.82	sample received within 48h of collect start

Figure 16. Data Timeliness and Availability Flags section of the ARR example from the station DEX33

Table 150. Data Timeliness and Availability Flags Block Format_Flag Definition

ROW	CONTENT	DESCRIPTION
1	`Previous Sample Present`	Flag of Previous Sample Present, YES or NO
2	`Collection Time`	Flag if the collection time is within the requirement, YES or NO.

3	`Acquisition Time`	Flag if the acquisition time is within the requirement, YES or NO.
4	`Response Time`	Flag if the sample reporting time is within the requirement, YES or NO.

Table 151. Data Timeliness and Availability Flags Block Format_Flag Testing

COLUMN	CONTENT	DESCRIPTION
1	`Name`	Flag name
2	`Pass/Fail`	Test result, YES or NO
3	`Value`	Value of the monitoring metrics
4	`Test`	Criterion of the test

The `Data Quality Flags` section lists quality testing values for different monitoring metrics as shown in Figure 17 and Table 152 and Table 153. The testing criteria might be different for the HPGE and β-γ coincidence spectra, respectively.

Data Quality Flags

Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	3.42	greater than 0.87 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.46	less than 1 mBq/m3

Figure 17. Data Quality Flags section of the ARR example from the station DEX33

Table 152. Data Quality Flags Block Format_Flag Definition

ROW	CONTENT	DESCRIPTION
1	`Stable Xenon Volume`	
2	`SOH`	N/A
3	`Xe-133 MDA`	

Table 153. Data Quality Flags Block Format_Flag Testing

COLUMN	CONTENT	DESCRIPTION
1	`Name`	Flag name
2	`Pass/Fail`	Test result, YES or NO
3	`Value`	Value of the monitoring metrics
4	`Test`	Criterion of the test

The `Event Screening Flags` section contains the information of radio-xenon isotopes present in the spectrum and ratios between xenon isotopes as shown in Figure 18 and Table 154

Event Screening Flags

Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	YES
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	NO
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	164
Short term flag	c - Anomalous Xenon detection
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	YES
- Xe-133m/133 > 0.3	NO

Figure 18. Event Screening Flags section of the ARR example from the station DEX33

Table 154. Event Screening Flags Block Format

ROW	CONTENT	DESCRIPTION
1	`Xenon Isotopes present in this spectrum`	YES or NO
2	`Only one Xenon Isotope in spectrum`	YES or NO
3	`Number of days since last Xenon detection`	Value
4	`2 or more Xenon Isotopes present in this spectrum`	YES or NO
5	`Xe-133 present in spectrum`	YES or NO
6	`Number of times Xe-133 seen in last 365 days`	Value
7	`Short term flag`	Sample category, Anomalous Xenon detection
8	`Isotopic ratios:`	
	`- Xe-133m/131m > 2`	YES or NO
	`- Xe-135/133 > 5`	YES or NO
	`- Xe-133m/133 > 0.3`	YES or NO

The `Calibration Equations` section includes energy and resolution calibration equations generated during the spectra analysis as shown in Figure 19. The efficiency information is given in the Processing Specific Parameters and Results section.

Calibration Equations

Energy : E(C)= t0 + t1 C + t2 C² + t3 C³
t0 : -0.1673
t1 : 0.2208
t2 : 1.031e-07
t3 : 0
Resolution : R(E)= $\sqrt{(t0 + t1\,E + t2\,E^2)}$
t0 : 0.249
t1 : 0.003199
t2 : 2.228e-07

Figure 19. Event Screening Flags section of the ARR example from the HPGE station DEX33

Examples of ARR – Noble Gas Version reports are provided in “ARR - Noble Gas *β-γ coincidence* Version” on page 265, “ARR - Noble Gas HPGE Version” on page 271.

7.8.2. *RRR*

The RRR is a product of the manual review of the automated results by an IDC analyst. For the noble gas version, the items and formats are the same between ARR and RRR but the values like concentrations and catergorizations might be different due to re-processing of the spectra during the interactive review. A block of the `IDC Analysis General Comments` is included in the RRR Sample Information section, which contains the date and time and a free text of comments entered by analysts.

For the particulate version, all sections in the ARR are also found in the RRR, including the three additional sections listed below as well as a block of `IDC Analysis General Comments` added in the Sample Information section as mentioned above.

The `Spectral-Region-of-Interest Editing` section summarizes the number of peaks added, deleted, and modified by the analyst through the autosaint2 interactive analysis tool (Table 155).

Table 155. Spectral Region of Interest (SROI) Editing Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-50	a50	`SPECTRAL-REGION-OF-INTEREST (SROI) EDITING`
3	4-38	a34	`Average Concentration Differences:`
	39-42	a4	`YES` or `none`
4	3-21	a18	`Nuclides Entering:`
5 (header)	9-12	a4	`Name`
	19-30	a12	`Average Conc`
	35-42	a8	`%%RelErr`
6 (data)	9-14	a7	nuclide name
	19-30	f11.2	average concentration (uBq/m3)
	35-40	f5.2	uncertainty of the concentration in percentage
	4-20	a17	`Nuclides Leaving:`
	22-25	a4	`YES` or `none`

The `Peak Search Notes` section contains the comments associated with the sample peaks (Table 156). These are added via the autosaint2 interactive analysis tool by analysts and other reviewers.

Table 156. Peak Search Notes Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-17	a17	`PEAK SEARCH NOTES`
3	1-4	a4	`NOTE`

	6-7	i2	Number of the note
	1-13	a13	Date entered:
	15-24	i4,a1,i2,a1,i2	Entered date (*yyyy/mm/dd*)
	26-33	i2, a1, i2	Entered time (*hh:mm*)
5	1-8	a8	Analyst:
	10-	a8	Analyst information
	1-		Comment entered by analyst

The Event Screening Flags section contains the flags about the specified fission and activation products (Table 157).

Table 157. Event Screening Flags Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (header)	1-21	a21	EVENT SCREENING FLAGS
3	6-49	a44	Activation Products present in this spectrum
	67-69	a3	YES or NO
5	6-41	a36	Only one fission product in spectrum
	67-69	a3	YES or NO
7	6-43	a38	2 or more fission products in spectrum
	67-69	a3	YES or NO
9	6-31	a26	Cs-137 present in spectrum
	67-69	a3	YES or NO

Examples of RRR are provided in “RRR - Noble Gas β-γ coincidence Version” on page 345, “RRR - Noble Gas HPGE Version” on page 350 and “RRR - Particulate Version” on page 356, respectively.

7.8.3. ***SSREB***

7.8.3.1. *SSREB – Particulate Version*

The Standard Screened Radionuclide Event Bulletin (SSREB) is designated as DATA_TYPE SSREB. The SSREB is comprised of the following sections:

The Event Detection Summary section lists the station where the sample originated, the collection stop date and time, the IDC-generated sample ID, the level 4 CTBT-relevant radionuclides or Radio-Xenon isotopes that resulted in the event, and several event screening flags (Table 158).

Table 158. Event Detection Summary Block Format - Particulate Version

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	1-23	a23	`Event Detection Summary`
3 (header)	6-12	a7	`Station`
	17-28	a12	`Collect Stop`
	38-46	a9	`Sample ID`
	49-52	a4	`Name`
	60-81	a22	`Categorization Comment`
5 (data)	6-10	a5	Station code
	17-26	i4,a1,i2,a1,i2	Collection stop date*(yyyy/mm/dd)*
	28-35	i2,a1,i2,a1,a2	Collection stop time *(hh:mm:ss)*
	38-44	i7	Sample ID
	49-52	a6	Isotope name
	60-		Free text about the categorization comment
	6-49	a44	`Activation Products present in this spectrum`
	67-69	a3	`YES` or `NO`
	11-54	a44	`Number of days since last activation product`
	67-68	i2	number of days
	6-41	a36	`Only one fission product in spectrum`
	67-69	a3	`YES` or `NO`
	11-51	a41	`Number of days since last fission product`
	67-68	i2	number of days
	6-43	a38	`2 or more fission products in spectrum`
	67-69	a3	`YES` or `NO`
	6-31	a26	`Cs-137 present in spectrum`
	67-69	a3	`YES` or `NO`
	11-46	a36	`Number of times seen in last 30 days`
	67-68	a2	number of times

The `Enhanced Field of Regard` section contains the URL link to an enhanced field of regard for the event.

The `Certified Laboratory Results` section includes sample analysis results performed at a certified radionuclide laboratory. Contents include the `#Header` and `#Conclusion` block of the associated RLR.

The `Additional Information` section contains information added through the use of the SSREB editor. Appended data may contain additional information on the event as it is detected at other stations over time.

An example of an SSREB is provided in “SSREB - Particulate Version” on page 377.

7.8.3.2. *SSREB – Noble Gas Version*

The SSREB – Noble Gas Version is of html format like the ARR and RRR for noble gas samples.

The `Event Detection Summary` section contains three blocks, e.g. sample information, category and event screening flags, which are more or less the same as the sections in RRR, respectively.

The block of `Sample Information` lists the `Station ID`, `Detector Code`, `Sample Reference ID` and `Collection Stop` date and time, which is a short version of the Sample Information section in the RRR.

The block of `Measurement Categorization` is the same with the Measurement Categorization section in the RRR.

The block of `Event Screening Flags` contains all contents of the Event Screening Flags section in the RRR in addition to the values of the isotope ratios in Table 159.

Table 159. Isotopic Ratios Block Format

ISOTOPIC RATIO	VALUE	FLAG	TEST
Xe-133m/131m		YES/NO	Xe-133m/131m > 2
Xe-135/133		YES/NO	Xe-135/133> 5
Xe-133m/133		YES/NO	Xe-133m/133> 0.3
Xe-133/131m		YES/NO	Xe-133/131m> 1000

The other sections like the Enhanced Field of Regard, Certified Laboratory Results and Additional Information are all the same as the SSREB - Particulate version.

An example of SSREB is provided in “SSREB - Noble Gas Version” on page 378.

7.8.4. ***RNPS***

The Radionuclide Network Product Summary provides a summary of all the radionuclide network activity over a period. This report is produced daily and includes a listing of all of the radionuclide products received at the IDC - ARRs, RRRs, SSREBs, SAMPML_A and SAMPML_R (Table 160). An example of a RNPS is provided in “RNPS” on page 337.

Table 160. Station Block Format

RECORD	POSITION	FORMAT	DESCRIPTION
1(header)	1-7	a7	`Station`
	9-16	a8	`SID`
	18	a4	`Type`
	24-37	a12	`Cstart(GMT)`
	40-53	a11	`Cstop(GMT)`
	56-62	a8	`Category`
	65	a1	`Status`
	73-83	a8	`Products`
	84-end of line		`CTBT Relevant`
2-n (data)	1-7	a7	Station code
	9-16	i8	Sample ID
	18	a1	Type of station. P=particulate station, G=noble gas station based on gamma spectroscopy, B=noble gas station based on beta-gamma coincidence
	24-35	i2,a1,i2,a1,i2 i2,a1,i2	Collection start date and time (yy/mm/dd hh:mm)
	40-53	i2,a1,i2,a1,i2 i2,a1,i2	Collection stop date and time (yy/mm/dd hh:mm)
	56-62	a7	The level of the radionuclide report (for particulates, Level 1 to Level 5; for noble gas, from Level A to Level C
	65	a1	The sample status. It can be A=Automatic or R=Reviewed
	73-83	a11	The type of radionuclide reports available for the station. This is a comma-delimited list, with the following possible codes: A= ARR, R=RRR, S= SSREB, XA= SAMPML_A, XR=SAMPML_R
	84-end of line		The list of relevant radionuclides found at the station

8. COMMAND REQUEST AND RESPONSE MESSAGES

This chapter describes the command request and response message formats and includes the following topics:

- Introduction
- E-MAIL
- TIME_STAMP
- Command Request and Response Lines
- Operation Change S/H/I Stations
- Operation Change, Radionuclide Stations
- Operational Mode Change
- Send Sample to a Laboratory
- Update of HPGe Detector Calibration Information
- Generate New Keypair
- Start a New Keypair
- Update the CRL
- Data/Command Log
- Interactive Sessions

8.1. Introduction

All command messages require the basic message structure described in "Message Preface" on page 7. If a message is a command request or command response message, the MSG_TYPE is set to `command_request` or `command_response`, respectively.

Syntax

```
begin IMS2.0
msg_type command_request |command_response
msg_id id_string [source]
REF_ID ref_str [ref_src]
e-mail name@my.computer
time_stamp yyyy/mm/dd hh:mm:ss
cmnd_req | cmnd_resp
command parameter lines
stop
```

The body of a command request message contains a series of free-format command lines that provide information about the return message (E-MAIL), specify the type of command that is requested, and set the environment for the requested command.

The reply to a command request is contained in a command response message. In the COMMAND_RESPONSE message the identification (ID) fields from the MSG_ID line of the request message are placed in the REF_ID line.

8.2. E-MAIL

The E-MAIL line contains the address where responses to the command request should be sent.

Syntax

`e-mail` *address*

address e-mail address to send response

8.3. TIME_STAMP

The TIME_STAMP line specifies the time when the command request or response is issued. This line is mandatory for command requests and responses. Stations will use this time to determine if the command request is recent and that it is reasonable to process the request. This time is in UTC and in the yyyy/mm/dd hh:mm:ss format specified in Reference (3).

Syntax

`time_stamp` *yyyy/mm/dd hh:mm:ss*

8.4. Command Request and Response Lines

Command request lines specify the type of command to be performed at the station. Some command requests have arguments that are specified in the same line or as specific environment lines.

Command response lines provide an acknowledgement of the execution of a command and may include the information resulting from command execution.

The following table lists the command request lines and the corresponding command response lines:

Table 161. Command Types and Corresponding Responses

COMMAND REQUEST	COMMAND RESPONSE	COMMAND TYPE
CALIBRATE_START	CALIBRATE_CONFIRM CALIBRATE_RESULT	Operation change S/H/I stations

COMMAND REQUEST	COMMAND RESPONSE	COMMAND TYPE
DETBKPHD_START	DETBKPHD_CONFIRM	Operation change radionuclide stations
BLANKPHD_START	BLANKPHD_CONFIRM	Operation change radionuclide stations
CALIBPHD_START	CALIBPHD_CONFIRM	Operation change radionuclide stations
CHANGE_DECAY	DECAY_CHANGED	Operation change radionuclide stations
SEND_SAMPLE	SAMPLE_SENT SAMPLE_NOTSENT SAMPLE_RECEIVED	Operation change radionuclide stations
UPDATE_CALIBPAIRS	CALIBPAIRS_UPDATED	Operation change radionuclide stations
GENERATE_KEYPAIR	KEYPAIR_GENERATED	Key Management
START_KEYPAIR	KEYPAIR_STARTED	Key Management
UPDATE_CRL	CRL_UPDATED	Key Management

8.5. Operation Change S/H/I Stations

8.5.1. *Station Calibration*

To calibrate an IMS seismic, hydroacoustic or infrasound station the command request, CALIBRATE_START, is issued, which indicates the time of the calibration and details as to how the calibration should be conducted.

The command response is first to confirm the calibration, CALIBRATE_CONFIRM and then later the calibration results are sent, CALIBRATE_RESULT.

8.5.2. *CALIBRATE_START*

8.5.2.1. *Syntax*

```
begin IMS2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
start_time yyyy/mm/dd hh:mm:ss
stn_list station_code
chan_list channels
sensor yes | no
```

```
type random | sine
calib_param seconds [volts] | hertz seconds [volts]
calibrate_start
…
stop
```

The station_code is the station name of the station receiving the command request.
If the station has more than one site and channel, the desired channel to be calibrated can be specified in CHAN_LIST.

The requested start time for the calibration is given on a single line starting with START_TIME, for example START_TIME yyyy/mm/dd hh:mm:ss. Time is specified following Reference (3) in UTC.

Whether the sensor should be included in the calibration is given on a single line starting with SENSOR, for example SENSOR YES or SENSOR NO.

The type of calibration is either sine or random. This is given on a single line starting with TYPE, for example TYPE RANDOM or TYPE SINE.

8.5.2.2. *Random Calibration Signals*

For a calibration of the TYPE RANDOM, a duration shall be specified. This is given on a single line starting with CALIB_PARAM, for example CALIB_PARAM xx specifies the duration of the random binary signal in seconds.

Optionally, the amplitude of the calibration signal can be specified for a random calibration. The amplitude is given as a second argument to the line CALIB_PARAM, for example CALIB_PARAM xx yy specifies the amplitude (yy) in volts.

8.5.2.3. *Sine Calibration Signals*

For sine calibration signals, TYPE SINE, the command parameters field is a sequence of one or more CALIB_PARAM lines. The first of these specifies frequency in Hertz, duration in seconds and (optionally) the amplitude in volts of the calibrating signal. Any further lines specify the frequency in Hertz, duration in seconds, time in seconds after the end of the previous sine wave and (optionally) the amplitude in volts of the calibrating signal. For example:

```
CALIB_PARAM   1.0     30.0 10.0
CALIB_PARAM 5.0   30.0 120.0   10.0
CALIB_PARAM   10.0 30.0 60.0  10.0
CALIB_PARAM   25.0 30.0   20.0     10.0
```

8.5.2.4. *Pulse Calibration Signals*

For pulse calibration signals, TYPE PULSE, the command parameters field is a sequence of one or more CALIB_PARAM lines. The first of these specifies the duration of the pulse in seconds and (optionally) the amplitude in volts of the calibrating signal. Any further lines specify the duration of each subsequent pulse in seconds, time in seconds after the end of the previous pulse and (optionally) the amplitude in volts of the calibrating signal. For example:

```
CALIB_PARAM  2.0 10.0
CALIB_PARAM  2.0 20.0 -   10.0
CALIB_PARAM  2.0 20.0     10.0
CALIB_PARAM  2.0 20.0 -   10.0
```

8.5.2.5. *Sweep Calibration Signals*

For sweep calibration signals, TYPE SWEEP, the signal should be a sinusoidal sweep whose phase increases with the logarithm of time (so that the frequency decreases by a constant factor within each period). The CALIB_PARAM line specifies the initial frequency in Hertz, the duration of the sweep in seconds and (optionally) the amplitude in volts of the calibrating signal. For example:

```
CALIB_PARAM   0.5 0.02 320.0 10.0
```

IMS stations may not support all four types of calibration. If a requested calibration cannot be performed because of this, this will be indicated in the START_TIME line as a START_TIME_NOT_CONFIRMED.

8.5.3. ***CALIBRATE_CONFIRM***

8.5.3.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
start_time yyyy/mm/dd hh:mm:ss | not_confirmed
calibrate_confirm
stop
```

The station_code is the station name of the station receiving the command request.

If the station has more than one site and channel, the channel to be calibrated can be specified in CHAN_LIST.

The calibration is confirmed by providing a time that the calibrations will start. This may be the requested start time, given in the CALIBRATE_START message or a different time. This is given on a single line starting with START_TIME, for example START_TIME yyyy/mm/dd hh:mm:ss. Time is specified following Reference (3) in UTC.

If the calibration cannot be performed at the requested time and if a new time for the calibration cannot be provided, this will be indicated in the START_TIME line as START_TIME NOT_CONFIRMED.

8.5.4. *CALIBRATE_RESULT*

8.5.4.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list channel]
calibrate_result
in_spec yes | no
[calib value]
[calper value]
[system response in ims2.0]
stop
```

The station_code is the station name of the station receiving the command request.

If the station has more than one site and channel, the code for the site/channel results being provided can be specified in CHAN_LIST.

This message reports whether the calibration was within specifications or not. This is accomplished on a single line starting with IN_SPEC, for example IN_SPEC YES or IN_SPEC NO.

If the calibration was not within specifications then a new response shall be calculated. In some cases a new response may be calculated even if the calibration was within specification.

In the case of a single-frequency calibration, this consists of a pair of values for CALIB, the calibration constant, and CALPER, the period (seconds) at which the calibration constant was calculated. These are given on single lines starting with CALIB and CALPER, for example CALIB 105.0, CALPER 1.0. The units of CALIB for seismic stations are given in Reference (3); the units for hydroacoustic and infrasound stations are micropascals per count and pascals per count respectively.

For a full-frequency calibration, it consists of a full system response in IMS2.0 RESPONSE format (Reference (3)).

8.6. Operation Change, Radionuclide Stations

8.6.1. *Special Measurements*

The request for special measurements includes the three command requests, DETBKPHD_START, BLANKPHD_START, and CALIBPHD_START. The response to these commands is DETBKPHD_CONFIRM, BLANKPHD_CONFIRM, or CALIBPHD_CONFIRM respectively.

8.6.2. *DETBKPHD_START / BLANKPHD_START / CALIBPHD_START*

8.6.2.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[detbkphd_start | blankphd_start | calibphd_start]
start_time yyyy/mm/dd hh:mm:ss
duration hours
stop
```

The station_code is the station name of the station receiving the command request.
The start time in UTC of the measurement as yyyy/mm/dd hh:mm:ss is provided in the START_TIME line.

The DURATION parameter line contains length of the measurement in hours.

8.6.3. *DETBKPHD_CONFIRM / BLANKPHD_CONFIRM / CALIBPHD_CONFIRM*

8.6.3.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[detbkphd_confirm | blankphd_confirm | calibphd_confirm]
start_time yyyy/mm/dd hh:mm:ss | not_confirmed
stop
```

The station_code is the station name of the station that received the command request.

The START_TIME parameter line indicates the start time of the measurement in UTC as yyyy/mm/dd hh:mm:ss.

If the command cannot be performed at the requested time and if a new time for the measurement cannot be provided, the response will indicate this in the START_TIME line as START_TIME NOT_CONFIRMED.

8.7. Operational Mode Change

To request an operational mode change at an IMS radionuclide station the command request is CHANGE_DECAY, which indicates the time of the requested change. The command response to confirm the change is DECAY_CHANGED and some additional information.

8.7.1. *CHANGE_DECAY*

8.7.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
change_decay
[start_time yyyy/mm/dd hh:mm:ss]
decay_time hours
stop
```

The station_code is the station name of the station receiving the command request.

The start time in UTC of the decay time change can be specified in the START_TIME line as yyyy/mm/dd hh:mm:ss.

The DECAY_TIME parameter line contains the new decay time in hours.

8.7.2. *DECAY_CHANGED*

8.7.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
decay_changed
new_decay_time hours srid
stop
```

The station_code is the station name of the station that received the command request.

The NEW_DECAY_TIME line indicates the new decay time in hours and the sample reference ID (srid) separated by a space, for example xx ccyyyymmddhhPp.

8.8. Send Sample to a Laboratory

To request the dispatch of a sample for further analysis, or for quality control, the command request is SEND_SAMPLE, which identifies the sample and where it should be sent. The command response to confirm the dispatch is SAMPLE_SENT and some additional information. After arrival at the laboratory the response is SAMPLE_RECEIVED, which indicates that the Station Operator is no longer responsible for the sample. If the requested sample cannot be sent, the command response SAMPLE_NOTSENT is sent.

8.8.1. *SEND_SAMPLE*

8.8.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
send_sample
priority urgent | routine
srid ccyyyymmddhhpp
poc somebody
organization somewhere
address address1
address address2
address address3
stop
```

The station_code is the station name of the station receiving the command request.

The priority of the shipment is either urgent or routine. This is given on a single line starting with PRIORITY, for example PRIORITY URGENT or PRIORITY ROUTINE.

Which sample, or which part of the split sample, has to be shipped is indicated with the sample reference ID.

The Point-of-Contact, the Organization and the Address where to ship the sample is indicated by the lines: POC, ORGANIZATION and (if necessary multiple) ADDRESS.

8.8.2. *SAMPLE_SENT*

8.8.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_sent
srid ccyyyymmddhhpp
mass ms_full | ms_split
poc somebody
organization somewhere
address address1
address address2
address address3
courier courier company
handover yyyy/mm/dd hh:mm:ss
arrival yyyy/mm/dd/hh:mm:ss
awb airwaybillnumber
seal cccccnnnnnnnn
stop
```

The station_code is the station name of the station that received the command request.

The sample, or the split sample, that was shipped is indicated with the sample reference ID. The mass of the unsplit sample and the split mass is indicated by a line MASS followed by the numbers of the two masses (in grams).

Additional information on the courier company, handover date/time, estimated arrival date/time, airwaybill number and the stations seal number are given.

8.8.3. *SAMPLE_NOTSENT*

8.8.3.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_notsent
srid ccyyyymmddhhpp
```

[*free text describing why the sample could not be sent*]
`stop`

8.8.4. ***SAMPLE_RECEIVED***

8.8.4.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
sample_received
srid ccyyyymmddhhpp
arrival yyyy/mm/dd/hh:mm:ss
stop
```

The station_code is the station name of the station that received the command request. The sample, or the split sample, that was shipped is indicated with the sample reference ID. Additional information on the arrival date/time is given.

8.9. Update of HPGe Detector Calibration Information

To request an update of the HPGe detector calibration information sent with the PHD messages, the command request UPDATE_CALIBPAIRS is sent, which includes the updated data pairs. The command response to confirm the implementation of the new data pairs is CALIBPAIRS_UPDATED.

8.9.1. ***UPDATE_CALIBPAIRS***

8.9.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code [detector code]
update_calibpairs
#g_Energy
[...]
#g_Resolution
[...]
#g_Efficiency
```

```
[...]
[#TotalEfficiency
[...]]
stop
```

The station_code is the station name of the station receiving the command request.

The detector code may be specified if a station operates more detectors.

8.9.2. *CALIBPAIRS_UPDATED*

8.9.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code [detector code]
calibpairs_updated
stop
```

The station_code is the station name of the station that received the command request.

8.10. Generate New Keypair

To generate new keypairs at the station authenticators the command request GENERATE_KEYPAIR is sent. The response KEYPAIR_GENERATED acknowledged the successful execution of the command request along with a certificate request for the new keys.

8.10.1. *GENERATE_KEYPAIR*

8.10.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
generate_keypair
[pem dsa parameters]
stop
```

The station_code is the station name of the station receiving the command request.

If the station has more than one site and channel, the code for the site/channel results being provided can be specified in CHAN_LIST.

If the site or channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

Optionally, the values for the DSA parameters (P, Q and G) to be used for the new keys can be specified in PEM format.

8.10.2. ***KEYPAIR_GENERATED***

8.10.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
keypair_generated
[signature signature]
{certificate request}
stop
```

The station_code is the station name of the station receiving the command request.

If the station has more than one authentication unit, the channel code for the authenticator affected by the keypair change shall be specified. If the channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line. In this case multiple KEYPAIR_GENERATED messages must be sent from the station, each including the information of one authenticator.

The signature of the new key signed with the old key, in hex representation is included in the SIGNATURE line. This line can be omitted if the corresponding old key or the key of the authorized device manager is used to sign the e-mail message.

The response message includes the certificate request for the new key, in PEM format.

8.11. Start a New Keypair

To start using a new keypair at the station authenticators the command request START_KEYPAIR is sent along with the newly created certificate. The

KEYPAIR_STARTED response acknowledges the successful execution of the command request.

8.11.1. ***START_KEYPAIR***

8.11.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
[start_time yyyy/mm/dd hh:mm:ss]
start_keypair
{x509 certificate}
stop
```

The station_code is the station name of the station receiving the command request.

If the station has more than one site, the site/channel code for the desired authenticator can be specified. If the channel has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

The time to start using the new keypair can be specified in the START_TIME line. If not specified the station should start using the new keypair immediately upon reception of the command request.

The X.509 certificate (PEM) is included in the message, for reference and future use at the station.

8.11.2. ***KEYPAIR_STARTED***

8.11.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
keypair_started
stop
```

Station_code is the station name of the station where the command request was implemented.

If the station has more than one site, the site/channel code for the authenticator affected by the keypair start shall be specified. If the site has more than one authentication unit, the desired authenticator can be specified using the AUTH_ID line.

8.12. Update the CRL

To send a new Certificate Revocation List (CRL) to the station and request them to update the station copy, the command request UPDATE_CRL is sent along with the information to update the CRL. The response CRL_UPDATED acknowledges the successful execution of the command request.

8.12.1. ***UPDATE_CRL***

8.12.1.1. *Syntax*

```
begin ims2.0
msg_type command_request
msg_id id_string [source]
e-mail address
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
update_crl
{x509 crl}
stop
```

Station_code of the station receiving the command request can be specified in the command line. The station must use the latest CRL for all sites and authenticators.

The certificate revocation list in X.509 (PEM) format is included.

8.12.2. ***CRL_UPDATED***

8.12.2.1. *Syntax*

```
begin ims2.0
msg_type command_response
msg_id id_string [source]
ref_id ref_str [ref_src]
time_stamp yyyy/mm/dd hh:mm:ss
sta_list station_code
[chan_list chan]
[auth_id id]
[start_time yyyy/mm/dd hh:mm:ss]
```

```
crl_updated
stop
```

Station_code is the station name of the station receiving the command request.

If the station has more than one site and/or authenticator, the site/channel and auth_id code for the authenticator affected by the command request shall be specified.

8.13. Data/Command Log

A log of all remote command attempts, their initiators and their outcomes (successful or not) shall be kept by the station software. The command log will be protected and made available to authorized entities.

8.14. Interactive Sessions

All interactive sessions will have to be implemented via a secure mechanism, such as ssh (secure shell) and limited to authorized entities. The station shall keep log of all interactive sessions connections and disconnections. The sessions log will be protected and made available to authorized entities.

9. SUMMARY MESSAGES

This chapter describes the request message formats and includes the following topics:

- Introduction
- Executive Summary

9.1. Introduction

IMS2.0 data formats provide a common format for data and data product exchange. The data messages described in this chapter are for summary data products such as the Executive Summary.

Each data message contains the required information for all IMS2.0 messages. All data messages must contain the BEGIN line and be followed by a MSG_TYPE line and a MSG_ID line using the proper formats for the arguments. The MSG_TYPE for data messages is data. Because a data message may be a response to a request, a REF_ID line may also appear. If the data message is a response to a subscription, then a PROD_ID line will be included. Sections of data-specific information follow the identification line(s).

The data format for summary messages is IMS2.0. The type of data that is included in a data section and the format of the data are designated with a DATA_TYPE line.

9.1.1. ***DATA_TYPE***

Data sections must begin with a DATA_TYPE line. The arguments to DATA_TYPE are the type of data that follows (for example, EXECSUM) and the format (IMS2.0).

9.1.1.1. *Syntax*

`data_type` *data_type format*

data_type	type of data that follows; typical examples are EXECSUM, BULLETIN, and RESPONSE
format	general format of the data (IMS2.0)

9.1.1.2. *Example*

```
data_type execsum ims2.0
```

The end of a data section is implied by another DATA_TYPE line or a STOP line.

The following sections give the formats for data messages. Examples of these data formats are provided in “Appendix C: Data Message Examples” on page 264.

9.2. Executive Summary

The Executive Summary contains summary statistics of the number of events in the SEB and those in the various event-screening categories, the number of r-adionuclide detections and those categorized as Level 4 or Level 5, and the number of events with cross-referenced radionuclide and seismic-acoustic data. It also contains status metrics regarding the IMS network, GCI communications, IDC processing, and Radionuclide Laboratories. It includes the time interval for which the results were requested, the time at which it was generated, and the times at which the latest seismic-acoustic and radionuclide processing were performed. The format is defined in Table 162, and an example is provided in “Execsum” on page 307.

Table 162. Executive Summary Format

RECORD	POSITION	FORMAT	DESCRIPTION
1 (title)	2–22	a21	`Executive Summary for`
	24–33	i4,a1,i2,a1,i2	start date of requested interval (*yyyy/mm/dd*)
	35–42	i2,a1,i2,a1,i2	start time of requested interval (*hh:mm:ss*)
	44–45	a2	`to`
	47–56	i4,a1,i2,a1,i2	end date of requested interval (*yyyy/mm/dd*)
	58–65	i2,a1,i2,a1,i2	end time of requested interval (*hh:mm:ss*)
2 (time stamp)	2–13	a12	`generated at`
	15–24	i4,a1,i2,a1,i2	date generated (*yyyy/mm/dd*)
	26–33	i2,a1,i2,a1,i2	time generated (*hh:mm:ss*)
3	(blank line)		
4 (header)	1–48	a48	`LATEST PROCESSING TIME (for requested interval)`
5 (header)	4–19	a16	`Seismic-Acoustic`
	31–42	a12	`Radionuclide`
6 (time stamps)	1–10	i4,a1,i2,a1,i2	date of latest SHI processing (*yyyy/mm/dd*)
	12–19	i2,a1,i2,a1,i2	time of latest SHI processing (*hh:mm:ss*)
	24–33	i4,a1,i2,a1,i2	date of latest RN processing (*yyyy/mm/dd*)
	35–42	i2,a1,i2,a1,i2	time of latest RN processing (*hh:mm:ss*)
7	(blank line)		
8 (header)	1–24	a24	`SEISMIC-ACOUSTIC SUMMARY`
9	1–11	a11	`TotalEvents`

RECORD	POSITION	FORMAT	DESCRIPTION
(header)	13–22	a10	`Considered`
	24–34	a11	`InsufftData`
	36–46	a11	`NotScreened`
	48–58	a11	`ScreenedOut`
10 (data)	8–11	i4	total number of events in the SEB
	19–22	i4	number of events that were considered for screening
	31–34	i4	number of events that had insufficient data for screening
	43–46	i4	number of events that were not screened out
	55–58	i4	number of events in time block that were screened out
11	(blank line)		
12 (header)	1–20	a20	`RADIONUCLIDE SUMMARY`
13 (header)	1–10	a10	`Detections`
	13–18	a6	`Level4`
	21–26	a6	`Level5`
14 (data)	7–10	i4	total number of radionuclide detections
	15–18	i4	number of Level 4 radionuclide detections
	23–26	i4	number of Level 5 radionuclide detections
15	(blank line)		
16 (header)	1–14	a14	`FUSION SUMMARY`
17 (header)	1–11	a11	`FusedEvents`
18 (data)	8–11	i4	number of fused seismic, hydroacoustic, infrasound, radionuclide events
19	(blank line)		
20 (header)	1–22	a22	`SYSTEMS STATUS SUMMARY`
21 (header)	2–4	a3	`IMS`
	7–9	a3	`GCI`
	12–14	a3	`IDC`
	16–20	a5	`RNLab`

RECORD	POSITION	FORMAT	DESCRIPTION
22 (data)	2–4	i3	IMS network status summary
	7–9	i3	GCI communications status summary
	12–14	i3	IDC processing status summary
	18–20	i3	radionuclide laboratory status summary
23	(blank line)		
24 (header)	1–24	a24	`IMS STATUS BY TECHNOLOGY`
25 (header)	4–5	a2	`PS`
	9–10	a2	`AS`
	15	a1	`H`
	20	a1	`I`
	24–25	a2	`RN`
26 (data)	3–5	i3	primary seismic (PS) network status
	8–10	i3	auxiliary seismic (AS) network status
	13–15	i3	hydroacoustic (H) network status
	18–20	i3	infrasound (I) network status
	23–25	i3	radionuclide network status

10. STATION AUTODRM BASICS

This chapter describes the basic *AutoDRM* capabilities that are needed for auxiliary seismic stations and includes the following topics:

- Introduction
- Basic Message Support
- Environment Lines
- Request Lines
- Data Types
- AutoDRM Implementation Sa
- Help Recommendations

10.1. Introduction

Stations and NDCs providing station data must have a minimum capability to provide data to the IDC through the message system. Clearly, all of the functionality of the request and data messages cannot be supported by these stations to the full extent, and a minimal *AutoDRM* capability is all that is necessary. This chapter describes the minimal *AutoDRM* configuration necessary to fulfill the duties of an auxiliary station supplying data in IMS2.0 format.

10.2. Basic Message Support

A station/NDC providing segmented data must adhere to all of the basic message conventions on size, line length, date-time formats, station and channel naming, and use of units. The following sections describe the basic message formats that must be supported.

10.2.1. *BEGIN Line*

All messages must contain the BEGIN line and must support IMS2.0 format.

10.2.2. *MSG_TYPE*

The `request` message type must be supported for receiving requests; the `data` message type must be supported for sending data messages.

10.2.3. *MSG_ID*

The message identification string and optional source in the MSG_ID line must be recognized in request messages, and a unique message identification string must be generated for data messages.

10.2.4. *ACK*

The ACK environment is used to enable or disable the VDMS to send an acknowledgment message to the requestor. The default value is true.

10.2.5. *REF_ID*

The message identification of the request message must be used as the reference identifier of the returned data message.

10.2.6. *E-MAIL Line*

E-mail must be supported as a data return mechanism.

10.3. Environment Lines

Many of the environment lines described in the chapter on Request Messages are not applicable to a limited station capability for *AutoDRM*s. The only variable that must be explicitly specified is TIME. If STA_LIST and CHAN_LIST are not explicitly specified, the default values of all stations and all channels are assumed. The AUX_LIST environment is required only if necessary to distinguish between two different data streams. Using these environments, simple requests can be made that obtain data from a particular station and channel within a specified time interval.

10.4. Request Lines

The request lines specify the data that can be obtained from the *AutoDRM*. A simple station *AutoDRM* should be able to provide WAVEFORM, STATION, CHANNEL, RESPONSE, and OUTAGE data.

Request lines may have one or more arguments that specify subtype, formats, and subformats. A simple *AutoDRM* must support the IMS2.0 format as the main format for all requests as well as one of the ASCII subformats (INT, CM6, or CSF) for waveforms.

10.5. Data Types

Data messages are sent in response to requests sent to the *AutoDRM*. Thus, WAVEFORM, STATION, CHANNEL, RESPONSE, and radionuclide data types must be supported by a simple *AutoDRM* in the IMS2.0 format.

10.6. AutoDRM Implementation Safeguards

Responding to requests in an automatic system requires safeguards against repeated requests, excessive numbers of requests, excessively large requests, and failures of the e-mail system (for example, returned mail). Although each installation of the *AutoDRM* will be different, some general guidelines are suggested to avoid major problems.

10.6.1. *Message Size*

Messages returned by e-mail will have a maximum size of 1 MB.

10.6.2. *Request Echo*

The original request message should be echoed in the returned data message as a LOG data type.

10.6.3. *Returned Messages*

An error in the address for a data message sent out by an *AutoDRM* will result in an e-mail returned to the *AutoDRM* by the e-mail system. The sender's name (before the @ character in the mail address) for such an e-mail will be either mailer-daemon or postmaster (with any combination of upper- and lowercase letters). The *AutoDRM* will forward these messages to the local *AutoDRM*-operator; no other action is taken and no response is sent. The *AutoDRM* may also recognize returned messages by the MSG_TYPE, which will be `data`, or by the presence of a REF_ID line, which is not used in request messages.

10.6.4. *Syntax Errors*

If any syntax error is detected while processing a request message, a ERROR_LOG data message is returned. Also, if a request is made with a keyword that has not been implemented, a ERROR_LOG data message is sent.

A serious syntax error anywhere in a message should abort the entire message, but local policy can override this suggestion.

10.6.5. *AutoDRM Internal Problem Logging*

Any problem other than a syntax error revealed during processing of a request message is appropriately logged and the Processing Engineerstake appropriate action. All request messages must be answered; an ERROR_LOG data message is sent as response for these types of errors.

10.6.6. *AutoDRM Operation Logs*

All local *AutoDRM* installations should keep logs of incoming and outgoing messages, parameters of MSG_ID lines, volume of data transferred, and Universal Coordinated Times (UTC) of message receipt and dispatch.

10.7. Help Recommendations

The HELP mechanism can be used to convey a variety of information. -The following topics can be included in an *AutoDRM* HELP message. At a minimum, every HELP message contains the items shown in **bold**.

10.7.1. *Introduction*

- information about the local data centre
- **e-mail address of local contact** (in case of problems)
- recently added features
- date that the HELP message was last updated

10.7.2. *Description of message formats and protocols*

- basic message format
- sending and receiving e-mail through AutoDRM

10.7.3. *Description of commands understood by this AutoDRM*

- **supported environments**
- **supported data types**
  - **supported subtypes, default subtype**
  - **supported subformats, default subformats**
- local extensions

10.7.4. *Local limits*

- maximum size of e-mail message
- maximum size of HTTP message
- maximum size of data requests per day per user
- types of requests that will be rejected (for example, sent by root or mailer-daemon)
- repeated identical requests from the same user over a short interval

10.7.5. *Local data*

- description of what data types are available from what stations/channels
- description of local data archives
  - segmented versus continuous
  - delay in data collection (how soon after real time is data available)
  - time period during which data are available

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APPENDIX I

HISTORY OF FORMATS AND PROTOCOLS FOR MESSAGES

This appendix contains an outline of the history of the formats and protocols used to exchange messages to monitor data under the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

The first version of *AutoDRM* was developed during July 1991. The set of commands that could be sent to an *AutoDRM* was small at that time, but sufficient for basic requests for waveforms and other seismological data. This set of commands did not have a special name and was at that time just known as '*AutoDRM* request commands'. Later, when the GSE2.0 formats and protocols were defined, this first set of commands was referred to as the 'GSE1-format' and was published in 1993 (Kradolfer, U., Automating the Exchange of Earthquake Information, EOS Trans. Amer. Geophys. U., vol. 74, pp. 442,444-445, 1993.)

During 1994, the 'Group of Scientific Experts (GSE)', a group of scientists established by the 'Conference of Disarmament' in Geneva in 1976, decided to use this method of automated data exchange for its third technical test (GSETT-3). While the basic functions of *AutoDRM* were useful, it was also noted that some extensions were needed in order to use this method for international data centres. A dedicated working group created a new set of commands, allowing for data to be requested from individual channels and for requests and responses to be tracked by means of request-ID's for requests and reference-IDs for the corresponding responses. The new formats and protocols were written down in the document of the 'Conference of Disarmement, Formats and Protocols for Data Exchange, Conference Room Paper 243, Volume 2 Operations, Annex 3' in 1995.

In 1996, when the CTBT was brought into and accepted by the UN General Assembly in New York and when the establishment of a CTBT-Organisation (CTBTO) in Vienna was foreseeable, the formats for *AutoDRM*s were extended once more and the new format was changed to GSE2.1. It was published in May 1997 as 'Operations Annex 3' to the 'Conference Room Paper 243' of the 'Conference of Disarmement'.

During the establishment of the CTBTO (actually the PTS) in Vienna, the concept of *AutoDRM* was regarded as useful for other monitoring techniques as well. Therefore additional features were added to the formats and protocols, in order to include data from hydroacoustic and infrasound networks in addition to seismological data. The version of these new formats was IMS1.0, after the CTBTO division that deals with the stations of the global monitoring system: the 'International Monitoring System (IMS)'. In November 2001, after the addition of radionuclide messages, the version of the formats was changed to IMS2.0.

In 2009, the AutoDRM was redesigned to use current technologies and was renamed Verification Data Messaging System (VDMS). The current version of VDMS is 3.0.

APPENDIX II

COUNTRY CODES[1]

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Afghanistan	AFG	AF
Albania	ALB	AL
Algeria	DZA	DZ
Andorra	AND	AD
Angola	AGO	AO
Antigua and Barbuda	ATG	AG
Argentina	ARG	AR
Armenia	ARM	AM
Australia	AUS	AU
Austria	AUT	AT
Azerbaijan	AZE	AZ
Bahamas	BHS	BS
Bahrain	BHR	BH
Bangladesh	BGD	BD
Barbados	BRB	BB
Belarus	BLR	BY
Belgium	BEL	BE
Belize	BLZ	BZ
Benin	BEN	BJ
Bhutan	BTN	BT
Bolivia	BOL	BO
Bosnia and Herzegovina	BIH	BA
Botswana	BWA	BW
Brazil	BRA	BR
Brunei Darussalam	BRN	BN
Bulgaria	BGR	BG

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Burkina Faso	BFA	BF
Burundi	BDI	BI
Cambodia	KHM	KH
Cameroon	CMR	CM
Canada	CAN	CA
Cape Verde	CPV	CV
Central African Republic	CAF	CF
Chad	TCD	TD
Chile	CHL	CL
China	CHN	CN
Columbia	COL	CO
Comoros	COM	KM
Congo	COG	CG
Congo, The Democratic Republic of the	COD	CD
Cook Islands	COK	CK
Costa Rica	CRI	CR
Cote d’Ivoire	CIV	CI
Croatia	HRV	HR
Cuba	CUB	CU
Cyprus	CYP	CY
Czech Republic	CZE	CZ
Denmark	DNK	DK
Djibouti	DJI	DJ
Dominica	DMA	DM
Dominican Republic	DOM	DO
Ecuador	ECU	EC
Egypt	EGY	EG
El Salvador	SLV	SV
Equatorial Guinea	GNQ	GQ
Eritrea	ERI	ER

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Estonia	EST	EE
Ethiopia	ETH	ET
Fiji	FJI	FJ
Finland	FIN	FI
France	FRA	FR
Gabon	GAB	GA
Gambia	GMB	GM
Georgia	GEO	GE
Germany	DEU	DE
Ghana	GHA	GH
Greece	GRC	GR
Grenada	GRD	GD
Guatemala	GTM	GT
Guinea	GIN	GN
Guinea-Bissau	GNB	GW
Guyana	GUY	GY
Haiti	HTI	HT
Holy See	VAT	VA
Honduras	HND	HN
Hungary	HUN	HU
Iceland	ISL	IS
India	IND	IN
Indonesia	IDN	ID
Iran, Islamic Republic of	IRN	IR
Iraq	IRQ	IQ
Ireland	IRL	IE
Israel	ISR	IL
Italy	ITA	IT
Jamaica	JAM	JM
Japan	JPN	JP

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Jordan	JOR	JO
Kazakhstan	KAZ	KZ
Kenya	KEN	KE
Kiribati	KIR	KI
Korea, Democratic People’s Republic of	PRK	KP
Korea, Republic of	KOR	KR
Kuwait	KWT	KW
Kyrgyzstan	KGZ	KG
Lao People’s Democratic Republic	LAQ	LA
Latvia	LVA	LV
Lebanon	LBN	LB
Lesotho	LSO	LS
Liberia	LBR	LR
Libyan Arab Jamahiriya	LBY	LY
Liechtenstein	LIE	LI
Lithuania	LTU	LT
Luxembourg	LUX	LU
Macedonia, The Former Yugoslav Republic of	MKD	MK
Madagascar	MDG	MG
Malawi	MWI	MW
Malaysia	MYS	MY
Maldives	MDV	MV
Mali	MLI	ML
Malta	MLT	MT
Marshall Islands	MHL	MH
Mauritania	MRT	MR
Mauritius	MUS	MU
Mexico	MEX	MX
Micronesia, Federated States of	FSM	FM
Moldova	MDA	MD

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Monaco	MCO	MC
Mongolia	MNG	MN
Morocco	MAR	MA
Mozambique	MOZ	MZ
Myanmar	MMR	MM
Namibia	NAM	NA
Nauru	NRU	NR
Nepal	NPL	NP
Netherlands	NLD	NL
New Zealand	NZL	NZ
Nicaragua	NIC	NI
Niger	NER	NE
Nigeria	NGA	NG
Niue	NIU	NU
Norway	NOR	NO
Oman	OMN	OM
Pakistan	PAK	PK
Palau	PLW	PW
Panama	PAN	PA
Papua New Guinea	PNG	PG
Paraguay	PRY	PY
Peru	PER	PE
Philippines	PHL	PH
Poland	POL	PL
Portugal	PRT	PT
Qatar	QAT	QA
Romania	ROM	RO
Russian Federation	RUS	RU
Rwanda	RWA	RW
Saint Kitts and Nevis	KNA	KN

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Saint Lucia	LCA	LC
Saint Vincent and the Grenadines	VCT	VC
Samoa	WSM	WS
San Marino	SMR	SM
Sao Tome & Principe	STP	ST
Saudi Arabia	SAU	SA
Senegal	SEN	SN
Seychelles	SYC	SC
Sierra Leone	SLE	SL
Singapore	SGP	SG
Slovakia	SVK	SK
Slovenia	SVN	SI
Solomon Islands	SLB	SB
Somalia	SOM	SO
South Africa	ZAF	ZA
Spain	ESP	ES
Sri Lanka	LKA	LK
Sudan	SDN	SD
Suriname	SUR	SR
Swaziland	SWZ	SZ
Sweden	SWE	SE
Switzerland	CHE	CH
Syrian Arab Republic	SYR	SY
Tajikistan	TWN	TJ
Tanzania, United Republic of	TZA	TZ
Thailand	THA	TH
Togo	TGO	TG
Tonga	TON	TO
Trinidad and Tobago	TTO	TT
Tunisia	TUN	TN

COUNTRY	THREE-LETTER CODE	TWO-LETTER CODE
Turkey	TUR	TR
Turkmenistan	TKM	TM
Tuvalu	TUV	TV
Uganda	UGA	UG
Ukraine	UKR	UA
United Arab Emirates	ARE	AE
United Kingdom of Great Britain and Northern Ireland	GBR	GB
United States of America	USA	US
Uruguay	URY	UY
Uzbekistan	UZB	UZ
Vanuatu	VUT	VU
Venezuela	VEN	VE
Viet Nam	VNM	VN
Yemen	YEM	YE
Yugoslavia	YUG	YU
Zambia	ZMB	ZM
Zimbabwe	ZWE	ZW

International Organization for Standardization, (1997)

APPENDIX III

DATA MESSAGE EXAMPLES

This appendix contains examples of formatted data messages. Some of the examples wrap onto the next line and appear as they would on a computer screen.

ALERT_FLOW

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ALERT_FLOW
KWP40 ALERT_FLOW   2002/12/17 11:01:05
Air flow alarm! Flow = 0.000189 Low limit = 0.100000 Hi limit = 0.320000
STOP
```

ALERT_SYSTEM

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ALERT_SYSTEM
PGP51 ALERT_SYSTEM 2003/08/08 03:24:38
HV SHUTDOWN - CLOSING DETECTOR DOWN
STOP
```

ALERT_TEMP

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ALERT_TEMP
AUP04 ALERT_TEMP   2002/06/05 00:01:23
Temp alarm: Interior Temp: 29 Upper limit: 28 Lower limit: 15
STOP
```

ALERT_UPS

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ALERT_UPS
MXP44 ALERT_UPS    2002/12/19 20:36:11
UPS AC line power restored!
STOP
```

ARR – Noble Gas Beta-Gamma Coincidence Version

The example provided below is an HTML version of an ARR produced using data from the β-γ coincidence system JPX38 as it would appear in a web page. If one receives the HTML file, it can be copied and pasted into an HTML editor (several are available via the Web) to view the formatted contents of the file.

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2016-04-01 14:52:15
Sample Arrival Time: 2016-04-01 14:49:30
Time difference from receipt of raw data to report creation: 2 m 45.0 s

Sample Information

Station ID:	JPX38	Detector Code:	JPX38_004
Authenticated:	NO		
Station Location:	Takasaki, Gunma, Japan.		
Detector Description:	Detector #4 in Takasaki, Gunma, Japan.		
System Technology:	SAUNA		
Sample Reference ID:	38201603310811G		
Sample ID:	3549312		
Stable Xe Volume:	0.99 ml	Sample Type:	Gas
Collection Start:	2016-03-31 08:34:30	Sampling Time:	12 h 1 s
Collection Stop:	2016-03-31 20:34:31	Processing Time:	7 h 4 m 58 s
Acquisition Start:	2016-04-01 03:39:29	Acquisition Time:	11 h 9 m 58 s
Acquisition Stop:	2016-04-01 14:49:27		

Measurement Categorization

Categorization Legend

Level A	=	Clean spectrum - No Xenon is present in the sample.
Level B	=	Xenon detection within the typical range for the station.
Level C	=	Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.81E-01	A
Xe-133m	YES	1.41E-01	B
Xe-133	YES	5.06E-01	B
Xe-135	NO	9.63E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 89.0

Xenon isotopes - Analysis Method NCC

Nuclide	Half-Life	Conc (mBq/m3)	LC	MDC	%RelErr
XE-131M	11.900 D	< LC	0.04	0.11	N/A
XE-133M	2.190 D	0.04	0.04	0.09	69.47
XE-133	5.243 D	0.08	0.07	0.15	56.91
XE-135	9.140 H	< LC	0.31	0.66	N/A

Processing Specific Parameters and Results

Method 1 (Net Count Calculation)

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	13.79	100.66	15.33	N/A	N/A
2	XE-135	-2.01	143.71	19.86	0.60	0.01
3	XE-133	6.58	69.81	13.08	0.78	0.02
4	XE-133	18.97	54.03	9.74	0.71	0.01
5	XE-131M	4.76	18.99	6.21	0.61	0.01
6	XE-133M	5.06	12.35	4.44	0.62	0.01
7	XE-133	1.69	26.52	8.20	0.19	0.00
8	XE-133	-0.17	3.76	3.26	0.04	0.00
9	XE-133	8.57	12.76	3.37	0.19	0.00
10	XE-133	11.37	38.46	8.56	0.49	0.01

ROI Limits (channels)

ROI	BetaLow (channels)	BetaHigh (channels)	GammaLow (channels)	GammaHigh (channels)
1	1	191	109	132
2	1	255	76	96
3	1	126	23	34
4	1	139	7	15
5	27	51	7	15
6	62	95	7	15
7	1	24	7	15
8	98	139	7	15
9	62	139	7	15
10	1	51	7	15

Processing Parameters

Risk level k:	1.6449
Gas background used:	YES
Detector background used:	YES
Interference corrections:	YES
Analysis method:	NCC

Calibration Parameters

Gamma energy calibration updated:	YES
Beta energy calibration updated:	YES

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	3548676	-1/2 day sample available
Collection Time	Pass	12.00	12h +- 10%
Acquisition Time	Pass	11.17	12h +- 10%
Response Time	Pass	30.25	sample received within 48h of collect start

Data Quality Flags

Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	0.99	greater than 0.44 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.15	less than 1 mBq/m3

Event Screening Flags

Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	510
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

Calibration Equations

Beta Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : -5.24265918

t1 : 0.36796472

t2 : -3.239e-05

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : 0.50025203

t1 : 0.35482311

t2 : -3.658e-05

ARR – Noble Gas HPGe Version

The example provided below is an HTML version of an ARR produced using data from the DEX33 HPGe system as it would appear in a web page. If one receives the HTML file, it can be copied and pasted into an HTML editor (several are available via the Web) to view the formatted contents of the file.

IDC Generated Report
Automatic Radionuclide Report
Noble Gas Version

Creation Date: 2016-04-01 05:52:10
Sample Arrival Time: 2016-04-01 05:49:09
Time difference from receipt of raw data to report creation: 3 m 1.0 s

Sample Information

Station ID:	DEX33	Detector Code:	DEX33_003
Authenticated:	NO		

Station Location:	Noble Gas Experim. stn.		
Detector Description:	Detector #3 in DEX33, Germany		
System Technology:	SPALAX		
Sample Reference ID:	332016033300611G		
Sample ID:	3548831		
Stable Xe Volume:	3.42 ml	Sample Type:	Gas
Collection Start:	2016-03-30 06:00:00	Sampling Time:	1 d
Collection Stop:	2016-03-31 06:00:00	Processing Time:	1 h 23 m 16 s

Acquisition Start:	2016-03-31 07:23:16	Acquisition Time:	22 h 21 m 52 s
Acquisition Stop:	2016-04-01 05:45:08		

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.

Level B = Xenon detection within the typical range for the station.

Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.22E+00	A
Xe-133m	NO	2.52E+00	A
Xe-133	YES	1.55E+00	C
Xe-135	NO	1.14E+00	A

Spectrum Category: C - Anomalous Xenon detection

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	Half-Life	Area	%RelErr
Rn-222	3.82 D	392.46	6.28

Xenon isotopes

Peak Fit Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr

XE-131M	11.900 D	< LC	0.30	N/A
XE-133M	2.190 D	< LC	0.30	N/A
XE-133	5.243 D	1.71	0.46	7.10
XE-135	9.140 H	< LC	1.90	N/A

Decay Analysis Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr
XE-131M	11.900 D	< LC	0.30	N/A
XE-133M	2.190 D	< LC	0.30	N/A
XE-133	5.243 D	1.70	0.46	7.11
XE-135	9.140 H	< LC	1.90	N/A

Processing Specific Parameters and Results

Xenon Peak Data

Energy	Centroid	Width	FWHM	%Eff	Net Area	%RelErr
30.93	140.83	3.00	0.59	14.00	242.70	11.64
80.96	367.37	3.00	0.71	18.97	373.49	6.86

Processing Parameters

Risk level K: 4.26489

Baseline algorithm: Smoothing / Lawn Mowers

Calibration Parameters

SAreaThreshold: 100

ConfidenceLevel: 95

ECR updated: Yes

RER updated:	Yes
Used ECR:	MRPM
Used RER:	MRPM

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	3547556	-1 day sample available
Collection Time	Pass	24.00	24h +- 10%
Acquisition Time	Pass	22.36	24h +- 10%
Response Time	Pass	47.82	sample received within 48h of collect start

Data Quality Flags

Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	3.42	greater than 0.87 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.46	less than 1 mBq/m3

Event Screening Flags

Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	YES
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	NO
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	164

Short term flag	c - Anomalous Xenon detection
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	YES
- Xe-133m/133 > 0.3	NO

Calibration Equations

Energy : E(C)= t0 + t1 C + t2 C^2 + t3 C^3

t0 : -0.1673

t1 : 0.2208

t2 : 1.031e-07

t3 : 0

Resolution : R(E)= $\sqrt{(t0 + t1\, E + t2\, E^2)}$

t0 : 0.249

t1 : 0.003199

t2 : 2.228e-07

ARR – Particulate Version

```
                    DATA_TYPE ARR IMS2.0
                    IDC GENERATED REPORT
                AUTOMATED RADIONUCLIDE REPORT
                     Particulate Version

               Creation Date: 2012/10/03 06:07:55
         Sample Arrival Time: 2012/10/03 06:07:09
```

```
    Time difference from receipt of raw data to report creation: 0 hours

SAMPLE INFORMATION ==========================================================

Station ID:         XXP98               Detector ID:        XXP92_001
Authenticated:      NO

Station Location: Nakhon Phanom, Thailand
Detector Description: Detector #1 in Galapagos City, Galapagos.

Sample ID:             2006352          Sample Geometry:    RASA
Sample Quantity:      20484.86 m3       Sample Type:        Particulate


Collection Start:   2012/09/30 06:25    Sampling Time:        24.00 hours
Collection Stop:    2012/10/01 06:25    Decay Time:           24.00 hours
Acquisition Start:  2012/10/02 06:25    Acquisition Time:     23.58 hours
Acquisition Stop:   2012/10/03 06:00    Avg Flow Rate:       853.54 m3/hr

Collection Station Comments:
(info to writer: Free field comments) Barcode ID: 0000043161
RASA SOFTWARE VERSION 3.2.5A
Ortec 42-TP41184A 79.7 by 97.6 mm


IDC Analysis General Comments:
(info to writer: Free field comments)


ACTIVITY SUMMARY ============================================================

NATURAL RADIOACTIVITY:

Nuclides Identified and not Quantified:

AC-228, AL-27, BI-214, GE-71M, GE-73M, GE-75M, K-40, PA-234M, PB-207M, PB-210, TH-234, U-235
```

Nuclides Quantified:

Nuclide	Half-Life	Conc(uBq/m3)	%%RelErr
BE-7	53.290 D	2.3E+03	1.25
PB-212F	10.64 H	2E+04	1.10

ACTIVATION-PRODUCT RADIOACTIVITY:

Nuclide	Half-Life	Conc(uBq/m3)	%%RelErr	Coincidence
TM-168	93.100 D	14	10.13	NO

FISSION-PRODUCT RADIOACTIVITY:

Nuclide	Half-Life	Conc(uBq/m3)	%%RelErr	Coincidence
CD-109	461.4 D	2.2E+03	2.12	NO
TC-99M	6.010 H	6E+02	19.56	NO

MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES =======================

Nuclide	Half-Life	MDC(uBq/m3)
BA-140	12.752 D	13.19
CE-143	1.377 D	19.93
CS-134	2.062 Y	4.03
CS-136	13.160 D	3.99
CS-137	30.100 Y	3.44
I-131	8.040 D	4.58
I-133	20.800 H	15.41
MO-99	2.748 D	37.81
NB-95	34.970 D	3.06
RU-103	39.260 D	3.36
TE-132	3.204 D	6.20
ZR-95	64.020 D	5.24

ZR-97 16.900 H 19.37

(info to writer: list of 1-n nuclides; H=hours, D=days, Y=year; MDC = minimum detectable concentration)

PEAK SEARCH RESULTS ===

65 peaks found in spectrum by automated peak search.
60 peaks associated with nuclides by automated processing.
5 peaks not associated with nuclides by automated processing.
92 percent of peaks were associated with nuclides.

Note: "*" indicates that a peak was a component of a multiplet.

Energy	Centroid	Width	FWHM	%%Eff	Net Area	%%RelErr	Nuclide	Nts
35.52	104.43	4	1.25	0.01	1497.39	5.17		
37.24	109.46	4	1.25	0.01	809.87	9.81		
46.52	136.70	4	1.26	0.20	280.05	29.42	PB-210	
53.55	157.31	4	1.26	0.64	485.47	17.77	GE-73M	
63.49	186.46	4	1.27	1.69	689.11	14.15	TH-234	
70.30	206.45	4	1.28	2.61	587.25	16.46	PB-212F	
72.47	212.83	4	1.28	2.83	2917.34	3.59	PB-212F	
75.14	220.67	4	1.28	3.11	9370.61	1.43	PB-212F	
77.31	227.01	4	1.28	3.36	11079.33	1.27	PB-212F	
84.80	248.99	4	1.29	4.18	2021.16	4.93	PB-212F	
87.39	256.59	4	1.29	4.47	6230.30	1.86	CD-109	
87.39	256.59	4	1.29	4.47	6230.30	1.86	PB-212F	
90.33	265.23	4	1.29	4.79	1717.91	5.80	PB-212F	
90.33	265.23	4	1.29	4.79	1717.91	5.80	U-235	
92.68	272.11	4	1.29	4.96	2206.73	4.61	TH-234	
92.68	272.11	4	1.29	4.96	2206.73	4.61	U-235	
94.00	276.00	4	1.29	5.05	503.02	18.84	U-235	
115.41	338.81	4	1.31	6.34	537.03	17.70	PB-212F	
140.20	411.52	4	1.33	7.03	480.37	19.54	GE-75M	
140.20	411.52	4	1.33	7.03	480.37	19.54	TC-99M	
143.86	422.27	4	1.33	7.04	293.06	31.44	U-235	
185.86	545.49	4	1.36	7.08	2034.25	4.75	U-235	

198.42	582.33	4	1.37	7.06	885.97	10.08	GE-71M
198.42	582.33	4	1.37	7.06	885.97	10.08	TM-168
238.75	700.66	4	1.40	6.63	55187.75	0.45	PB-212F
252.65	741.44	4	1.41	6.41	338.51	20.79	PB-212F
277.43	814.16	4	1.42	6.18	2391.39	3.44	PB-212F
288.30	846.04	4	1.43	6.11	439.91	15.37	PB-212F
295.15	866.13	4	1.43	6.01	460.73	14.78	
300.16	880.83	4	1.44	5.93	3376.14	2.57	PB-212F
327.78	961.87	4	1.46	5.65	235.99	25.94	AC-228
327.78	961.87	4	1.46	5.65	235.99	25.94	PB-212F
338.51	993.35	4	1.47	5.56	351.82	17.26	AC-228
351.88	1032.57	4	1.47	5.46	886.47	7.18	PB-212F
452.93	1329.02	5	1.54	4.80	323.37	15.80	PB-212F
477.66	1401.57	5	1.56	4.67	19169.01	0.76	BE-7
510.89	1499.07	5	1.58	4.51	12455.48	0.90	PB-212F
569.41	1670.74	5	1.62	4.23	172.94	25.89	PB-207M
583.24	1711.32	5	1.63	4.16	22219.27	0.69	PB-212F
609.37	1787.98	5	1.65	4.05	1036.94	5.25	BI-214
727.33	2134.04	5	1.73	3.71	4783.65	1.63	PB-212F
763.33	2239.65	5	1.75	3.61	338.65	11.72	PB-212F
767.42	2251.63	5	1.75	3.60	134.59	27.66	BI-214
785.57	2304.90	5	1.76	3.56	727.28	5.89	PB-212F
803.03	2356.12	5	1.77	3.51	266.89	13.72	
844.19	2476.87	5	1.80	3.40	140.88	26.14	AL-27
860.54	2524.83	5	1.81	3.36	2898.75	2.18	PB-212F
893.48	2621.46	5	1.83	3.28	220.05	16.52	PB-212F
898.96	2637.53	5	1.84	3.26	99.95	34.79	
911.22	2673.49	5	1.84	3.23	688.68	5.94	AC-228
968.87	2842.62	6	1.88	3.17	351.17	10.37	AC-228
1001.14	2937.27	6	1.90	3.14	309.52	11.07	PA-234M
1014.52	2976.52	6	1.91	3.13	163.60	19.52	AL-27
1063.78	3121.04	6	1.94	3.03	119.21	26.17	PB-207M
1078.69	3164.78	6	1.95	3.00	322.70	10.54	PB-212F
1093.98	3209.62	6	1.96	2.97	431.18	8.18	PB-212F
1120.22	3286.61	6	1.98	2.92	400.09	8.79	BI-214
1238.06	3632.29	6	2.05	2.81	170.95	17.90	BI-214
1346.69	3950.93	6	2.12	2.65	88.38	29.64	PB-212F

1377.50	4041.31	6	2.14	2.62	102.46	27.40	BI-214
1460.84	4285.78	6	2.19	2.55	1367.08	3.25	K-40
1512.83	4438.28	7	2.22	2.50	192.28	14.79	PB-212F
1592.30	4671.41	7	2.27	2.37	360.38	8.53	PB-212F
1620.64	4754.52	7	2.29	2.32	778.25	4.65	PB-212F
1729.16	5072.85	7	2.35	2.23	90.21	28.31	BI-214
1764.58	5176.76	7	2.37	2.20	467.60	6.74	BI-214
1847.45	5419.82	7	2.42	2.15	104.99	23.34	BI-214
2103.22	6170.05	8	2.58	2.01	1091.36	3.61	PB-212F
2204.09	6465.90	8	2.64	1.95	188.92	14.84	BI-214
2614.52	7669.69	8	2.88	1.75	11119.24	0.96	PB-212F
2686.38	7880.44	9	2.92	1.73	83.01	22.11	PB-212F

```
(Info to writer: list of 1-n peaks; FWHM= Full width at half maximum
energy: energy at peak centroid in keV, centroid=peak centroid channel, Nts=Notes
Net area = Peak area in counts corrected for background)
PROCESSING PARAMETERS ==================================================

Risk level K:                     4.26489
Baseline algorithm:               Smoothing / Lawn Mowers
Nucl Id Detectability Threshold: 0.2
Energy Id Tolerance:              0.8 + 0 * FWHM
Background subtraction:           NO
IRF for Pb-212F:                  YES

CALIBRATION PARAMETERS ======================================================

SAreaThreshold:              100
Confidence level:            95
ECR updated:                 YES
RER updated:                 NO
Used ECR:                    INITIAL
Used RER:                    MRP A
(Info to writer: ECR=energy vs channel regression; RER=resolution vs energy regression)
DATA TIMELINESS AND AVAILABILITY FLAGS =================================

Previous Sample Present?                              YES
Collection time within 24 hours +/- 10%?              YES
```

```
Acquisition time >= 20 hours?                          YES
Decay time <= 24 hours?                                YES
Sample received within 72 hours of collect start?      YES

DATA QUALITY FLAGS =====================================================

Name                            Pass/Fail  Value           Test

Ba140_MDC                       PASS       13.1893         <30
K40_LocationDifference          PASS       0.205566        <3*std deviation
NormalizedGainDifference        PASS       7.54595e-05     <0.0001
Be7_FWHM                        PASS       1.55992         <1.7
FlowRate                        PASS       853.536         >500


CALIBRATION EQUATIONS ==================================================

Energy vs. Channel

    E(c) = -0.06858 + 0.3408*c + 7.695E-09*c^2

        E = energy (keV)
        c = channel number


Resolution vs. Energy

    FWHM(E) = SQRT(1.50+0.001811*E+3.028e-07*E^2)

        FWHM = Full Width Half Max (keV)
        E = energy (keV)


Efficiency vs. Energy

    VGSL pairs
(info to writer: pairs computed by Virtual Gamma Spectroscopy Laboratory)
```

Energy	Efficiency	Uncertainty
10	1.749e-06	1.3521e-05
20	3.496e-06	2.7041e-05
30	5.245e-06	4.0562e-05
40	0.00041959	0.00059962
50	0.0041208	0.0051955
60	0.013284	0.016798
70	0.025786	0.033298
80	0.03676	0.048927
90	0.047697	0.064616
100	0.054838	0.07601
110	0.06125	0.086257
120	0.065165	0.093725
130	0.068385	0.099944
140	0.070268	0.10464
150	0.070532	0.10756
160	0.071562	0.11074
170	0.071381	0.11283
180	0.071067	0.11514
190	0.070591	0.11627
200	0.07066	0.11783
210	0.068993	0.11745
220	0.067414	0.11749
230	0.066706	0.11832
240	0.06627	0.11987
250	0.064329	0.11887
260	0.063665	0.11954
270	0.062518	0.1196
280	0.061546	0.11993
290	0.060972	0.12097
300	0.05926	0.1198
310	0.058914	0.12023
320	0.057234	0.11921
420	0.049909	0.11788
520	0.044734	0.11598
620	0.040068	0.11353
720	0.037339	0.11202

```
                820       0.034707        0.11086
                920       0.032122        0.10675
               1020       0.031232        0.10743
               1120       0.029212        0.10337
               1220        0.02844        0.10366
               1320       0.026695        0.10156
               1420       0.025856        0.10005
               1520       0.024971       0.098586
               1620       0.023191        0.09666
               1720       0.022324       0.096214
               1820        0.02171       0.094997
               1920        0.02113       0.094177
               2020       0.020539       0.093807
               2120       0.020048       0.092602
               2220       0.019364       0.090913
               2320       0.018667       0.091221
               2420       0.018261       0.090764
(Info to writer: list of 1-n energy/efficiency pairs)
 FIELD OF REGARD =======================================================

http://kuredu.ops.ctbto.org/web-gards/FOR/XXP98/2012/275
STOP
```

Arrival:associated

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ARRIVAL:ASSOCIATED IMS2.0
Net       Sta      Dist  EvAz     Phase  Date         Time        TRes  Azim AzRes  Slow  SRes Def   SNR       Amp   Per Qual Magnitude
OrigID Author       ArrID
          SONM   24.55 303.9 P        2016/06/01 00:01:44.600  -0.4 106.5   3.8   9.2  0.10 TAS 12.30       3.1  0.62 a__  mb    3.6
13217060 IDC_SEL1  114378561
          ZALV   38.89 311.8 P        2016/06/01 00:03:49.025  -0.0  95.6   2.9   8.0 -0.20 TAS  8.30       2.2  0.34 a__  mb    3.8
13217060 IDC_SEL1  114378563
          MKAR   40.83 300.7 P        2016/06/01 00:04:03.500  -1.7  83.5   1.2  11.8  3.60 TAS 21.90       0.9  0.37 a__  mb    3.4
13217060 IDC_SEL1  114378545
          MKAR   40.83 300.7 tx       2016/06/01 00:04:14.175        88.4   6.1   6.1  -999 ___  4.80       0.4  0.42 a__
13217060 IDC_SEL1  114378546
          NRIK   41.16 335.7 P        2016/06/01 00:04:08.700   1.3 114.5   0.9   6.8 -1.40 TAS  4.80       3.1  0.52 a__  mb    3.8
13217060 IDC_SEL1  114378542
          GEYT   60.49 296.9 P        2016/06/01 00:06:35.150   3.4  45.6 -17.8  10.6  3.80 TAS  5.80       2.4  0.78 a__  mb    3.6
13217060 IDC_SEL1  114378670
          ASAR   61.23 183.4 P        2016/06/01 00:06:39.950   3.3  10.1  -4.4  12.9  0.50 TAS  7.60       1.1  0.52 a__  mb    3.5
13217060 IDC_SEL1  114378518
          FINES  66.52 330.7 P        2016/06/01 00:07:10.300  -0.3  67.5   7.0   5.8 -0.30 TAS 40.50       2.4  0.38 a__  mb    4.0
13217060 IDC_SEL1  114378532
          FINES  66.52 330.7 tx       2016/06/01 00:07:20.550        64.6   4.1   5.0  -999 ___  6.40       0.6  0.33 a__
13217060 IDC_SEL1  114378533
          FINES  66.52 330.7 tx       2016/06/01 00:07:35.675        66.9   6.4   4.2  -999 ___  5.60       0.7  0.34 a__
13217060 IDC_SEL1  114378534
STOP
```

Arrival:automatic

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA TYPE ARRIVAL:AUTOMATIC IMS2.0
Net       Sta   BeamID          Date        Time       Phase     Azim  Slow    SNR       Amp   Per   STA   Dur Author       DetID
          I32KE                2016/06/01 00:00:00.000 N        285.6 322.7    1.0       0.0 -1.00  -1.0       DFX       114378843
          CPUP                 2016/06/01 00:00:02.475 tx       316.8   1.4    3.8       2.4  0.44   3.2       DFX       114378315
          JKA                  2016/06/01 00:00:07.575 Sx       271.0  29.5    4.1      25.2  0.67  21.8       DFX       114379062
          I10CA                2016/06/01 00:00:10.000 N        176.3 332.4    0.8       0.0 -1.00  -1.0       DFX       114378769
          CMAR                 2016/06/01 00:00:17.850 P        301.2   6.4    5.3       2.1  0.44   2.7       DFX       114378326
STOP
```

Arrival:grouped

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ARRIVAL:GROUPED IMS2.0
Net       Sta  Chan Aux     Date       Time        Phase     Azim  Slow   SNR       Amp   Per Qual   Group C Author       ArrID
          CPUP  Z15      2016/06/01 00:00:02.475 tx       316.8   1.4   3.8       2.4  0.44 a__ 7801174  0 STAPRO    114378315
          MKAR  MK_      2016/06/01 00:04:03.500 P         83.5  11.8  21.9       0.6  0.33 a__ 7801177  0 STAPRO    114378545
          MKAR  MK_      2016/06/01 00:04:14.175 tx        88.4   6.1   4.8       0.3  0.33 a__ 7801177  0 STAPRO    114378546
          FINES FI_      2016/06/01 00:07:10.300 P         67.5   5.8  40.5       1.5  0.33 a__ 7801178  0 STAPRO    114378532
          FINES FI_      2016/06/01 00:07:20.550 tx        64.6   5.0   6.4       0.7  0.33 a__ 7801178  0 STAPRO    114378533
          FINES FI_      2016/06/01 00:07:35.675 tx        66.9   4.2   5.6       0.6  0.33 a__ 7801178  0 STAPRO    114378534
          ZALV  ZA_      2016/06/01 00:12:00.825 P        265.8   7.8   4.2       0.6  0.33 a__ 7801186  0 STAPRO    114378743
          ZALV  ZA_      2016/06/01 00:12:22.875 tx       296.4   6.3   6.2       1.0  0.33 a__ 7801186  0 STAPRO    114378744
          ASAR  AS_      2016/06/01 00:28:21.300 P        106.4   7.2  45.9       2.0  0.44 a__ 7801187  0 STAPRO    114378774
          ASAR  AS_      2016/06/01 00:28:34.800 tx       113.3   7.5   7.2       4.2  0.89 a__ 7801187  0 STAPRO    114378775
          ASAR  AS_      2016/06/01 00:28:43.050 tx       112.7   7.9   4.3       2.5  0.89 a__ 7801187  0 STAPRO    114378776
          KMBO  H40      2016/06/01 00:28:30.925 Pn        59.8  20.9   6.3       2.7  0.17 a__ 7801188  0 STAPRO    114378801
          KMBO  H15      2016/06/01 00:29:06.275 Lg        51.1  22.5   5.7       5.8  0.44 a__ 7801188  0 STAPRO    114378803
STOP
```

Arrival:reviewed

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA_TYPE ARRIVAL:REVIEWED IMS2.0
Net       Sta  Chan  Aux     Date       Time       Phase     Azim  Slow   SNR       Amp   Per Qual Author      ArrID
IDC_SEIS  BBB   bhz   _   1996/08/16 03:41:40.523 P        256.3  16.2  13.4     228.6  0.33 a__ IDC_REB   116183910
IDC_SEIS  BBB   bhz       1996/08/16 03:42:04.531 S        334.7  18.6   8.2     338.6  0.33 a__ IDC_REB   116183930
IDC_SEIS  DLBC  bhz       1996/08/16 03:42:58.584 P        166.7  16.5  16.5       1.5  0.33 a__ IDC_REB   116183960
IDC_SEIS  DLBC  bhz       1996/08/16 03:44:59.808 S                                          m__ IDC_REB   116210220
IDC_SEIS  NEW   bhz       1996/08/16 03:43:23.394 P        308.2   6.6   4.2       0.3  0.33 a__ IDC_REB   116147830
IDC_SEIS  NEW   bhz       1996/08/16 03:46:03.321 S        337.6  12.2   4.1       0.2  0.33 a__ IDC_REB   116147870
STOP
```

Arrival:unassociated

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 14548
DATA TYPE ARRIVAL:UNASSOCIATED IMS2.0
Net       Sta   BeamID          Date       Time       Phase     Azim  Slow    SNR       Amp   Per    STA   Dur Author        DetID
          I32KE             2016/06/01 00:00:00.000 N        285.6 322.7    1.0       0.0 -1.00   -1.0       IDC_SEL1  114378843
          CPUP              2016/06/01 00:00:02.475 tx       316.8   1.4    3.8       2.4  0.44    3.2       IDC_SEL1  114378315
          JKA               2016/06/01 00:00:07.575 Sx       271.0  29.5    4.1      25.2  0.67   21.8       IDC_SEL1  114379062
          I10CA             2016/06/01 00:00:10.000 N        176.3 332.4    0.8       0.0 -1.00   -1.0       IDC_SEL1  114378769
          CMAR              2016/06/01 00:00:17.850 P        301.2   6.4    5.3       2.1  0.44    2.7       IDC_SEL1  114378326
          I47ZA             2016/06/01 00:00:20.000 N        196.4 311.5    3.5       0.0 -1.00   -1.0       IDC_SEL1  114378603
          I53US             2016/06/01 00:00:20.000 N        184.1 324.2    1.8       0.0 -1.00   -1.0       IDC_SEL1  114378701
STOP
```

Auth_status

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE AUTH_STATUS IMS2.0
Report period from 1994/12/03 00:00:00.0 to 1994/12/04 00:00:00.0
Net       Sta  Chan Aux   Packets_Tested  Packets_Failed
IDC_SEIS  ABC   shz                 8640               3
IDC_SEIS  DEF   bhz                 8640               0
 Failed Packet Intervals
Net       Sta  Chan Aux      Start_Time           End_Time          Comment
IDC_SEIS  ABC   shz      1994/12/03 14:28:40  1994/12/03 14:29:10  Unknown cause
STOP
```

BLANKPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 202700
DATA_TYPE BLANKPHD
#Header 3
ARP01 ARP01_002 P DISK_50x5_3M      FULL
01000000000036
ARP01_002-2016/03/29-14:44:57.0 ARP01_002-2004/09/30-11:19:37.0 0
2016/04/01 15:11:00.0
#Comments
This FULL is for the BLANK asked in PR-118422
#Acquisition
2016/03/29 14:44:57.0 259337.73      259200.00
#Calibration
2007/05/14 18:14:48.0
#g_Energy
59.537           170.538          0.0050
```

```
88.040          251.887         0.0058
122.061         349.077         0.0047
136.474         390.214         0.0373
165.857         474.068         0.0066
255.050         728.643         0.0747
320.084         913.803         0.0268
391.702         1118.127        0.0095
514.008         1467.143        0.0483
661.660         1888.299        0.0073
834.843         2382.286        0.0103
898.042         2562.566        0.0140
1115.550        3182.851        0.0144
1173.240        3347.359        0.0140
1332.500        3801.497        0.0240
1836.060        5237.229        0.0247
#g_Resolution
59.537          0.7258          0.0035
88.040          0.7630          0.0039
122.061         0.7945          0.0031
136.474         0.8149          0.0279
165.857         0.8554          0.0046
255.050         0.9137          0.0592
320.084         1.0250          0.0183
391.702         1.0835          0.0069
514.008         1.1062          0.0336
661.660         1.3188          0.0049
834.843         1.4694          0.0071
898.042         1.5366          0.0098
1115.550        1.6891          0.0098
1173.240        1.7296          0.0095
1332.500        1.8708          0.0148
1836.060        2.2095          0.0167
#g_Efficiency
59.537          0.06255         0.00077
88.040          0.14915         0.00307
122.061         0.17546         0.00369
```

```
136.474          0.18083          0.00579
165.857          0.16518          0.00399
320.084          0.10869          0.00560
391.702          0.09311          0.00176
514.008          0.07724          0.00138
661.660          0.06209          0.00083
834.843          0.05196          0.00069
898.042          0.04135          0.00056
1115.550         0.04098          0.00082
1173.240         0.03340          0.00041
1332.500         0.03013          0.00037
1836.060         0.02319          0.00032
#g_Spectrum
8192  2900
0     0          0          0          0          0
5     0          0          0          0          0
10    0          0          0          0          0
15    0          0          0          0          0
20    0          0          0          0          0
25    0          0          0          0          0
30    0          0          0          0          0
35    0          0          0          0          0
40    0          0          0          0          0
45    0          0          0          0          0
50    1614       2155       2263       2211       2178
55    2059       2185       2086       2004       1885
...
STOP
```

Bulletin (IMS2.0:short Format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 310495 CTBT_IDC
REF_ID ED_TEST
DATA_TYPE BULLETIN IMS2.0:SHORT
TIME_STAMP 2016/07/20 12:36:20
```

```
Reviewed Event Bulletin of the CTBT_IDC from 2011/03/11 00:00:00 to 2011/03/11 00:30:00,  generated 2016/07/20 12:36:20
EVENT  7226544 SOUTHERN EAST PACIFIC RISE
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
2011/03/11 00:14:46.70   0.39  0.89 -53.2335 -117.8468  22.3  13.1 152   0.0f        38   35  39  33.98 166.53 m i uk IDC_REB
7252230

Magnitude  Err Nsta Author      OrigID
mb     4.5 0.1   16 IDC_REB    7252230
mbtmp  4.5 0.1   16 IDC_REB    7252230
Ms     5.3 0.1   23 IDC_REB    7252230

Sta      Dist  EvAz Phase        Time      TRes  Azim  AzRes   Slow   SRes Def   SNR       Amp   Per Qual Magnitude    ArrID
PMSA    29.05 134.6 LR       00:29:21.290 -17.9 274.0    6.6   30.1   -0.6 ___            3555.4 18.82 a__ Ms      5.1 66282118
PLCA    33.98  87.8 P        00:21:32.525   0.8 256.0   23.8   13.4    4.8 T__    3.2        3.5  1.04 ___ mbtmp   4.2 66278493
                                                                                             3.5  1.04     mb      4.2
PLCA    33.98  87.8 LR       00:32:12.324   5.6 252.0   19.8   30.8    0.2 ___            4071.0 18.71 a__ Ms      5.2 66282116
VNDA    36.67 201.0 P        00:21:55.775   1.4  82.3  -14.9   16.1    7.6 T__    1.7        1.5  0.93 ___ mbtmp   3.9 66278494
                                                                                             1.5  0.93     mb      3.9
VNDA    36.67 201.0 LR       00:32:00.353 -59.5  91.0   -6.2   28.2   -1.6 ___            1896.3 20.85 a__ Ms      4.9 66282125
PPT     43.31 313.0 LR       00:36:10.841  43.8 144.5   -8.1   29.7    1.0 ___            4188.8 20.08 a__ Ms      5.4 66282137
RPZ     46.25 251.7 P        00:23:13.822   0.5 135.0    6.9   20.0   12.1 T__    2.3        5.2  0.74 ___ mbtmp   4.5 66278507
                                                                                             5.2  0.74     mb      4.5
RAO     49.41 274.2 LR       00:41:47.792 -16.2 157.5   20.8   32.8   -0.3 ___            1227.8 18.25 a__ Ms      4.9 66282120
CPUP    51.82  83.6 P        00:23:55.825  -0.4 263.3   41.6    7.9    0.4 T__    5.3        4.4  0.72 a__ mbtmp   4.5 66075013
                                                                                             4.4  0.72     mb      4.5
CPUP    51.82  83.6 LR       00:43:12.686  19.1 230.0    8.3   32.9    0.4 ___            9004.5 18.14 a__ Ms      5.8 66282111
LPAZ    53.41  65.8 P        00:24:08.100  -0.7 212.4   -2.4    6.3   -1.0 T__   23.6       24.8  1.36 a__ mbtmp   5.0 66075029
                                                                                            24.8  1.36     mb      5.0
LPAZ    53.41  65.8 LR       00:41:35.698   5.3 191.5  -23.3   30.1    0.1 ___            2995.0 18.37 a__ Ms      5.4 66282113
SIV     57.62  72.3 LR       00:45:12.946  28.9 227.0   10.5   31.7    0.5 ___            2087.5 20.51 a__ Ms      5.2 66282138
AFI     57.69 291.8 LR       00:45:53.456 -20.6 140.0   -4.9   32.4   -0.4 ___             758.2 18.37 a__ Ms      4.8 66282106
MAW     59.48 180.3 P        00:24:50.638  -0.1 140.7  -38.8   14.4    7.4 T__    3.2        2.5  0.71 ___ mbtmp   4.3 66278495
                                                                                             2.5  0.71     mb      4.3
MAW     59.48 180.3 LR       00:48:33.781  27.8 172.0   -7.5   34.1    0.5 ___            1673.8 21.74 a__ Ms      5.1 66282114
BDFB    65.56  83.4 P        00:25:31.110  -1.1 240.0   21.7    4.7   -1.8 T__    3.9        3.0  0.78 a__ mbtmp   4.3 66075008
                                                                                             3.0  0.78     mb      4.3
BDFB    65.56  83.4 LR       00:50:56.786   2.4 204.5  -13.8   33.1    0.0 ___            5431.9 21.78 a__ Ms      5.7 66282108
ROSC    68.45  47.5 P        00:25:50.775  -0.2 114.2  -92.2    4.6   -1.7 T__   12.9        2.3  0.35 a__ mbtmp   4.6 66075047
                                                                                             2.3  0.35     mb      4.6
ROSC    68.45  47.5 LR       00:50:43.612  20.6 218.5   12.1   31.5    0.3 ___            1873.5 18.97 a__ Ms      5.3 66282122
PTGA    70.75  63.8 LR       00:52:41.838  37.7 207.0   -5.6   32.2    0.5 ___            2936.7 19.17 a__ Ms      5.5 66282119
STKA    70.96 242.2 P        00:26:06.000   0.1 122.6  -18.7    6.0   -0.1 T__   16.7        7.4  0.71 a__ mbtmp   4.8 66075056
                                                                                             7.4  0.71     mb      4.8
STKA    70.96 242.2 LR       00:50:37.190  16.2 148.7    7.4   30.3    0.2 ___            3610.4 21.78 a__ Ms      5.5 66282123
CMIG    72.79  23.0 LR       00:52:45.118 128.4 179.0  -15.2   31.3    1.8 ___             615.4 18.19 a__ Ms      4.8 66282110
```

CTA	77.60	253.2	P	00:26:44.650	-0.1	168.7	26.4	10.3	4.7	T__	3.3	11.8	1.10	___	mbtmp	4.9	66278496
												11.8	1.10		mb	4.9	
H01W1	81.32	220.9	T	01:57:36.072	23.1	150.2	-1.2	75.8		___	64.0			a__			66076594
H01W2	81.33	220.9	T	01:57:36.400	23.4	150.2	-1.2	75.8		___	75.4			a__			66076595
H01W3	81.34	220.9	T	01:57:37.276	24.3	150.2	-1.2	75.8		___	73.4			a__			66076596
ASAR	81.58	241.7	P	00:27:05.750	-0.7	156.0	11.3	5.1	-0.2	T__	33.7	5.8	0.84	a__	mbtmp	4.7	66075103
												5.8	0.84		mb	4.7	
ASAR	81.58	241.7	LR	00:57:42.803	2.3	146.0	1.2	31.6	0.0	___		3962.6	20.60	a__	Ms	5.7	66282107
TXAR	83.14	12.4	P	00:27:13.975	-0.2	184.9	2.4	8.8	1.6	T__	6.0	1.0	0.97	a__	mbtmp	3.9	66075072
												1.0	0.97		mb	3.9	
TXAR	83.14	12.4	LR	00:58:26.496	105.8	0.0		31.5	1.3	___		588.8	18.91	a__	Ms	4.9	66282124
WRA	84.38	244.2	P	00:27:19.375	-1.5	143.6	-3.7	4.3	-0.3	T__	34.2	9.3	0.93	a__	mbtmp	4.9	66075099
												9.3	0.93		mb	4.9	
WRA	84.38	244.2	LR	01:00:32.422	30.5	155.0	10.1	32.5	0.4	___		3979.4	19.28	a__	Ms	5.7	66282128
PMG	85.52	260.4	LR	01:02:15.788	-26.6	134.0	-9.1	33.3	-0.3	___		1210.0	18.04	a__	Ms	5.2	66282117
FITZ	90.49	238.3	P	00:27:49.662	-0.7	113.4	-34.1	7.3	2.7	T__	5.6	7.3	0.79	a__	mbtmp	5.0	66076075
												7.3	0.79		mb	5.0	
FITZ	90.49	238.3	LR	01:04:33.690	11.0			33.0	0.1	___		1742.7	18.36	a__	Ms	5.4	66282112
NVAR	91.29	359.6	P	00:27:55.075	1.4	180.8	3.3	6.3	-0.7	T__	2.6	0.3	0.28	___	mbtmp	4.1	66278506
												0.3	0.28		mb	4.2	
NVAR	91.29	359.8	LR	01:01:09.355	56.5	180.0	0.2	30.5	0.6	___		2909.4	18.11	a__	Ms	5.6	66282105
BOSA	92.40	148.1	LR	01:02:26.182	21.7	197.5	-3.7	30.9	0.2	___		1666.7	21.20	a__	Ms	5.3	66282109
PDAR	95.89	6.1	P	00:28:15.550	0.9	217.0	47.3	10.0	6.2	T__	2.5	0.6	0.92	___	mbtmp	4.1	66278508
												0.6	0.92		mb	4.3	
PDAR	95.89	6.1	LR	01:03:48.672	20.7	195.5	10.5	30.7	0.2	___		1245.9	20.77	a__	Ms	5.2	66282115
H11S2	96.23	292.5	T	02:15:03.105	0.0	142.9	-1.3	75.5		___	1533			a__			66076953
H11S3	96.25	292.5	T	02:15:04.499	1.4	142.9	-1.3	75.5		___	651.7			a__			66076950
H11S1	96.25	292.5	T	02:15:06.327	3.3	142.9	-1.3	75.5		___	467.9			a__			66076949
H11N3	97.11	293.4	T	02:16:04.804	-0.5	144.3	0.1	75.4		___	455.9			a__			66076951
H11N1	97.12	293.3	T	02:16:04.257	-1.0	144.3	0.1	75.4		___	459.4			a__			66076948
H11N2	97.13	293.4	T	02:16:06.159	0.9	144.3	0.1	75.4		___	328.0			a__			66076947
YKA	115.41	1.7	PKP	00:33:27.545	-1.1	177.7	-4.5	2.3	0.4	T__	4.0	0.1	0.45	___			66278505
YKA	115.41	1.7	PKKPbc	00:44:10.395	8.7	344.6	174.8	3.8	6.7	___	6.6	0.7	0.94	a__			66075522
TORD	117.99	106.3	PKP	00:33:34.628	-0.5	225.0	8.7	0.2	-1.7	T__	2.1	0.3	0.78	___			66278497
ILAR	119.79	346.1	PKP	00:33:36.250	-0.8	208.1	47.7	3.3	1.4	T__	7.1	1.0	0.85	a__			66075247
PETK	127.05	311.2	PKP	00:33:52.550	1.3	163.0	56.5	5.4	5.0	T__	3.4	2.2	0.80	___			66278498
ESDC	134.11	79.4	PKP	00:34:05.750	0.7	140.5	-93.1	2.8	2.1	T__	3.5	0.1	0.27	___			66278504
CMAR	135.11	233.7	PKP	00:34:08.800	1.3	195.8	6.2	2.8	0.5	T__	6.9	1.1	0.50	a__			66075339
KLR	137.82	293.8	PKP	00:34:11.425	-0.1	331.6	-151	7.3	5.4	T__	3.9	1.1	0.88	a__			66076536
EIL	149.19	129.0	PKPbc	00:34:37.350	1.2	333.4	121.0	4.5	1.9	T__	2.7	3.3	0.65	___			66278503
GERES	149.69	78.4	PKPbc	00:34:36.450	-0.6	222.0	-21.1	1.8	-0.8	T__	12.5	4.2	0.67	a__			66075240
WSAR	149.93	173.5	PKPbc	00:34:37.700	-0.6	250.2	66.0	2.1	-0.4	T__	5.4	12.8	1.30	a__			66076347
SPITS	150.28	17.3	PKPbc	00:34:39.638	2.1	130.6	-169	4.0	1.4	T__	5.2	6.6	0.95	___			66278502
SONM	151.73	277.1	PKPbc	00:34:41.940	-0.2	150.1	32.4	2.0	-0.4	T__	49.1	7.7	0.69	a__			66075276
NOA	151.94	53.5	PKPbc	00:34:41.450	-0.7	276.3	13.3	2.2	-0.2	T__	7.1	3.5	0.83	a__			66075373
BRTR	156.36	113.3	PKP	00:34:43.000	0.9	243.2	17.5	0.4	-0.9	T__	2.5	0.6	1.08	___			66278501

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BRTR  156.36 113.3 PKPab    00:35:11.400   0.6 190.1 -35.5    6.0    1.7 T__    7.5        3.0  0.82 a__             66075232
AKASG 159.65  83.8 PKP      00:34:45.000  -0.6 283.7  33.7    1.5    0.3 T__    6.0        0.5  0.39 a__             66075350
NRIK  160.03 333.5 PKPab    00:35:26.325   0.7  11.0 -38.0    4.0   -0.4 T__    5.9        1.0  0.34 a__             66075244
GEYT  164.44 168.0 PKPab    00:35:46.275   0.4 230.4  41.4    8.8    4.4 T__    3.8        1.5  0.75 a__             66075236
MKAR  165.56 251.6 PKP      00:34:52.850   1.1  56.3 -67.6    2.6    1.8 T__    2.9        0.2  0.80 ___             66278499
MKAR  165.56 251.6 PKPab    00:35:50.975   0.3 116.0  -7.9    4.7    0.3 T__   28.0        5.8  0.83 a__             66075297
MKAR  165.56 251.6 PP       00:39:38.900   0.2 129.5   5.6    5.3    0.2 ___    9.0        2.9  0.98 a__             66075300
ZALV  166.53 282.1 PKP      00:34:50.800  -1.4 316.5  -140    4.0    3.2 T__    3.4        0.3  0.36 ___             66278500
ZALV  166.53 282.1 PKPab    00:35:53.725  -1.0  94.8  -1.3    3.9   -0.5 T__    8.2        4.0  0.84 a__             66075372

STOP
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Bulletin (IMS2.0:long Format)

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BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 310493 CTBT_IDC
REF_ID ED_TEST
DATA_TYPE BULLETIN IMS2.0:LONG
TIME_STAMP 2016/07/20 12:33:55
Standard Event Bulletin of the CTBT_IDC from 2011/03/11 00:00:00 to 2011/03/11 00:30:00,  generated 2016/07/20 12:33:55
EVENT  7226544 SOUTHERN EAST PACIFIC RISE
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
2011/03/11 00:14:46.70   0.39  0.89 -53.2335 -117.8468  22.3  13.1 152   0.0f        38   35  39  33.98 166.53 m i uk IDC_SEB
7252230

Magnitude  Err Nsta Author      OrigID
mb     4.5 0.1   16 IDC_SEB    7252230
mbtmp  4.5 0.1   16 IDC_SEB    7252230
Ms     5.3 0.1   23 IDC_SEB    7252230

Sta     Dist  EvAz Phase        Time      TRes  Azim AzRes   Slow   SRes Def   SNR       Amp   Per Qual Magnitude    ArrID
PMSA    29.05 134.6 LR       00:29:21.290 -17.9 274.0   6.6   30.1   -0.6 ___            3555.4 18.82 a__ Ms     5.1 66282118
PLCA    33.98  87.8 P        00:21:32.525   0.8 256.0  23.8   13.4    4.8 T__    3.2        3.5  1.04 ___ mbtmp  4.2 66278493
                                                                                            3.5  1.04     mb     4.2
PLCA    33.98  87.8 LR       00:32:12.324   5.6 252.0  19.8   30.8    0.2 ___            4071.0 18.71 a__ Ms     5.2 66282116
VNDA    36.67 201.0 P        00:21:55.775   1.4  82.3 -14.9   16.1    7.6 T__    1.7        1.5  0.93 ___ mbtmp  3.9 66278494
                                                                                            1.5  0.93     mb     3.9
VNDA    36.67 201.0 LR       00:32:00.353 -59.5  91.0  -6.2   28.2   -1.6 ___            1896.3 20.85 a__ Ms     4.9 66282125
PPT     43.31 313.0 LR       00:36:10.841  43.8 144.5  -8.1   29.7    1.0 ___            4188.8 20.08 a__ Ms     5.4 66282137
RPZ     46.25 251.7 P        00:23:13.822   0.5 135.0   6.9   20.0   12.1 T__    2.3        5.2  0.74 ___ mbtmp  4.5 66278507
                                                                                            5.2  0.74     mb     4.5
RAO     49.41 274.2 LR       00:41:47.792 -16.2 157.5  20.8   32.8   -0.3 ___            1227.8 18.25 a__ Ms     4.9 66282120
CPUP    51.82  83.6 P        00:23:55.825  -0.4 263.3  41.6    7.9    0.4 T__    5.3        4.4  0.72 a__ mbtmp  4.5 66075013
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												4.4	0.72		mb	4.5	
CPUP	51.82	83.6	LR	00:43:12.686	19.1	230.0	8.3	32.9	0.4	___		9004.5	18.14	a__	Ms	5.8	66282111
LPAZ	53.41	65.8	P	00:24:08.100	-0.7	212.4	-2.4	6.3	-1.0	T__	23.6	24.8	1.36	a__	mbtmp	5.0	66075029
												24.8	1.36		mb	5.0	
LPAZ	53.41	65.8	LR	00:41:35.698	5.3	191.5	-23.3	30.1	0.1	___		2995.0	18.37	a__	Ms	5.4	66282113
SIV	57.62	72.3	LR	00:45:12.946	28.9	227.0	10.5	31.7	0.5	___		2087.5	20.51	a__	Ms	5.2	66282138
AFI	57.69	291.8	LR	00:45:53.456	-20.6	140.0	-4.9	32.4	-0.4	___		758.2	18.37	a__	Ms	4.8	66282106
MAW	59.48	180.3	P	00:24:50.638	-0.1	140.7	-38.8	14.4	7.4	T__	3.2	2.5	0.71	___	mbtmp	4.3	66278495
												2.5	0.71		mb	4.3	
MAW	59.48	180.3	LR	00:48:33.781	27.8	172.0	-7.5	34.1	0.5	___		1673.8	21.74	a__	Ms	5.1	66282114
BDFB	65.56	83.4	P	00:25:31.110	-1.1	240.0	21.7	4.7	-1.8	T__	3.9	3.0	0.78	a__	mbtmp	4.3	66075008
												3.0	0.78		mb	4.3	
BDFB	65.56	83.4	LR	00:50:56.786	2.4	204.5	-13.8	33.1	0.0	___		5431.9	21.78	a__	Ms	5.7	66282108
ROSC	68.45	47.5	P	00:25:50.775	-0.2	114.2	-92.2	4.6	-1.7	T__	12.9	2.3	0.35	a__	mbtmp	4.6	66075047
												2.3	0.35		mb	4.6	
ROSC	68.45	47.5	LR	00:50:43.612	20.6	218.5	12.1	31.5	0.3	___		1873.5	18.97	a__	Ms	5.3	66282122
PTGA	70.75	63.8	LR	00:52:41.838	37.7	207.0	-5.6	32.2	0.5	___		2936.7	19.17	a__	Ms	5.5	66282119
STKA	70.96	242.2	P	00:26:06.000	0.1	122.6	-18.7	6.0	-0.1	T__	16.7	7.4	0.71	a__	mbtmp	4.8	66075056
												7.4	0.71		mb	4.8	
STKA	70.96	242.2	LR	00:50:37.190	16.2	148.7	7.4	30.3	0.2	___		3610.4	21.78	a__	Ms	5.5	66282123
CMIG	72.79	23.0	LR	00:52:45.118	128.4	179.0	-15.2	31.3	1.8	___		615.4	18.19	a__	Ms	4.8	66282110
CTA	77.60	253.2	P	00:26:44.650	-0.1	168.7	26.4	10.3	4.7	T__	3.3	11.8	1.10	___	mbtmp	4.9	66278496
												11.8	1.10		mb	4.9	
H01W1	81.32	220.9	T	01:57:36.072	23.1	150.2	-1.2	75.8		___	64.0			a__			66076594
H01W2	81.33	220.9	T	01:57:36.400	23.4	150.2	-1.2	75.8		___	75.4			a__			66076595
H01W3	81.34	220.9	T	01:57:37.276	24.3	150.2	-1.2	75.8		___	73.4			a__			66076596
ASAR	81.58	241.7	P	00:27:05.750	-0.7	156.0	11.3	5.1	-0.2	T__	33.7	5.8	0.84	a__	mbtmp	4.7	66075103
												5.8	0.84		mb	4.7	
ASAR	81.58	241.7	LR	00:57:42.803	2.3	146.0	1.2	31.6	0.0	___		3962.6	20.60	a__	Ms	5.7	66282107
TXAR	83.14	12.4	P	00:27:13.975	-0.2	184.9	2.4	8.8	1.6	T__	6.0	1.0	0.97	a__	mbtmp	3.9	66075072
												1.0	0.97		mb	3.9	
TXAR	83.14	12.4	LR	00:58:26.496	105.8	0.0		31.5	1.3	___		588.8	18.91	a__	Ms	4.9	66282124
WRA	84.38	244.2	P	00:27:19.375	-1.5	143.6	-3.7	4.3	-0.3	T__	34.2	9.3	0.93	a__	mbtmp	4.9	66075099
												9.3	0.93		mb	4.9	
WRA	84.38	244.2	LR	01:00:32.422	30.5	155.0	10.1	32.5	0.4	___		3979.4	19.28	a__	Ms	5.7	66282128
PMG	85.52	260.4	LR	01:02:15.788	-26.6	134.0	-9.1	33.3	-0.3	___		1210.0	18.04	a__	Ms	5.2	66282117
FITZ	90.49	238.3	P	00:27:49.662	-0.7	113.4	-34.1	7.3	2.7	T__	5.6	7.3	0.79	a__	mbtmp	5.0	66076075
												7.3	0.79		mb	5.0	
FITZ	90.49	238.3	LR	01:04:33.690	11.0			33.0	0.1	___		1742.7	18.36	a__	Ms	5.4	66282112
NVAR	91.29	359.6	P	00:27:55.075	1.4	180.8	3.3	6.3	-0.7	T__	2.6	0.3	0.28	___	mbtmp	4.1	66278506
												0.3	0.28		mb	4.2	
NVAR	91.29	359.8	LR	01:01:09.355	56.5	180.0	0.2	30.5	0.6	___		2909.4	18.11	a__	Ms	5.6	66282105
BOSA	92.40	148.1	LR	01:02:26.182	21.7	197.5	-3.7	30.9	0.2	___		1666.7	21.20	a__	Ms	5.3	66282109
PDAR	95.89	6.1	P	00:28:15.550	0.9	217.0	47.3	10.0	6.2	T__	2.5	0.6	0.92	___	mbtmp	4.1	66278508
												0.6	0.92		mb	4.3	
PDAR	95.89	6.1	LR	01:03:48.672	20.7	195.5	10.5	30.7	0.2	___		1245.9	20.77	a__	Ms	5.2	66282115

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H11S2   96.23 292.5 T         02:15:03.105   0.0 142.9  -1.3   75.5         ___  1533              a__            66076953
H11S3   96.25 292.5 T         02:15:04.499   1.4 142.9  -1.3   75.5         ___ 651.7              a__            66076950
H11S1   96.25 292.5 T         02:15:06.327   3.3 142.9  -1.3   75.5         ___ 467.9              a__            66076949
H11N3   97.11 293.4 T         02:16:04.804  -0.5 144.3   0.1   75.4         ___ 455.9              a__            66076951
H11N1   97.12 293.3 T         02:16:04.257  -1.0 144.3   0.1   75.4         ___ 459.4              a__            66076948
H11N2   97.13 293.4 T         02:16:06.159   0.9 144.3   0.1   75.4         ___ 328.0              a__            66076947
YKA    115.41   1.7 PKP       00:33:27.545  -1.1 177.7  -4.5    2.3    0.4 T__   4.0        0.1  0.45 ___            66278505
YKA    115.41   1.7 PKKPbc    00:44:10.395   8.7 344.6 174.8    3.8    6.7 ___   6.6        0.7  0.94 a__            66075522
TORD   117.99 106.3 PKP       00:33:34.628  -0.5 225.0   8.7    0.2   -1.7 T__   2.1        0.3  0.78 ___            66278497
ILAR   119.79 346.1 PKP       00:33:36.250  -0.8 208.1  47.7    3.3    1.4 T__   7.1        1.0  0.85 a__            66075247
PETK   127.05 311.2 PKP       00:33:52.550   1.3 163.0  56.5    5.4    5.0 T__   3.4        2.2  0.80 ___            66278498
ESDC   134.11  79.4 PKP       00:34:05.750   0.7 140.5 -93.1    2.8    2.1 T__   3.5        0.1  0.27 ___            66278504
CMAR   135.11 233.7 PKP       00:34:08.800   1.3 195.8   6.2    2.8    0.5 T__   6.9        1.1  0.50 a__            66075339
KLR    137.82 293.8 PKP       00:34:11.425  -0.1 331.6  -151    7.3    5.4 T__   3.9        1.1  0.88 a__            66076536
EIL    149.19 129.0 PKPbc     00:34:37.350   1.2 333.4 121.0    4.5    1.9 T__   2.7        3.3  0.65 ___            66278503
GERES  149.69  78.4 PKPbc     00:34:36.450  -0.6 222.0 -21.1    1.8   -0.8 T__  12.5        4.2  0.67 a__            66075240
WSAR   149.93 173.5 PKPbc     00:34:37.700  -0.6 250.2  66.0    2.1   -0.4 T__   5.4       12.8  1.30 a__            66076347
SPITS  150.28  17.3 PKPbc     00:34:39.638   2.1 130.6  -169    4.0    1.4 T__   5.2        6.6  0.95 ___            66278502
SONM   151.73 277.1 PKPbc     00:34:41.940  -0.2 150.1  32.4    2.0   -0.4 T__  49.1        7.7  0.69 a__            66075276
NOA    151.94  53.5 PKPbc     00:34:41.450  -0.7 276.3  13.3    2.2   -0.2 T__   7.1        3.5  0.83 a__            66075373
BRTR   156.36 113.3 PKP       00:34:43.000   0.9 243.2  17.5    0.4   -0.9 T__   2.5        0.6  1.08 ___            66278501
BRTR   156.36 113.3 PKPab     00:35:11.400   0.6 190.1 -35.5    6.0    1.7 T__   7.5        3.0  0.82 a__            66075232
AKASG  159.65  83.8 PKP       00:34:45.000  -0.6 283.7  33.7    1.5    0.3 T__   6.0        0.5  0.39 a__            66075350
NRIK   160.03 333.5 PKPab     00:35:26.325   0.7  11.0 -38.0    4.0   -0.4 T__   5.9        1.0  0.34 a__            66075244
GEYT   164.44 168.0 PKPab     00:35:46.275   0.4 230.4  41.4    8.8    4.4 T__   3.8        1.5  0.75 a__            66075236
MKAR   165.56 251.6 PKP       00:34:52.850   1.1  56.3 -67.6    2.6    1.8 T__   2.9        0.2  0.80 ___            66278499
MKAR   165.56 251.6 PKPab     00:35:50.975   0.3 116.0  -7.9    4.7    0.3 T__  28.0        5.8  0.83 a__            66075297
MKAR   165.56 251.6 PP        00:39:38.900   0.2 129.5   5.6    5.3    0.2 ___   9.0        2.9  0.98 a__            66075300
ZALV   166.53 282.1 PKP       00:34:50.800  -1.4 316.5  -140    4.0    3.2 T__   3.4        0.3  0.36 ___            66278500
ZALV   166.53 282.1 PKPab     00:35:53.725  -1.0  94.8  -1.3    3.9   -0.5 T__   8.2        4.0  0.84 a__            66075372

EVENT SCREENING
Category  Score Dscore Mscore Rscore Hscore Smaj_sc Smin_sc Depth  Sdep  mbms Smbms       Foffsh MinWD Clr
SO/Offsh   6.56          6.56         -0.05    22.3    13.1   0.0       -0.81  0.19         1.00  2449   1

HYDROACOUSTIC SCREENING
sta    cps8   snr7   noi7
H01W1           5.11  96.72
H01W2           4.97  96.80
H01W3           4.99  96.75
H11N1           3.34  96.31
H11N2           8.71  96.66
H11N3          10.54  96.08

STOP
```

CALIBPHD

```
BEGIN     IMS2.0
MSG_TYPE  DATA
MSG_ID    303744  USP77
DATA_TYPE CALIBPHD
#Header 3
USP77 USP77_005 P M4               FULL
77999999990005
USP77_005-2016/06/11-04:15:55   0                               0
2016/06/13 22:22:00
#Comment
Barcode ID: USP77_X150128_10914_CAL_TEST6_EDITED
Updated Header and Cal Source Certificate Block
RASA LINUX CONTROL SOFTWARE VERSION 5.092
Canberra 10914 74.8mm D by 89.8mm L, 4500V +1.02V
#Acquisition
2016/06/11 04:15:55   68811.46       68210.48
#Calibration
2016/06/11 04:15:55
#g_Energy
59.50            180.80           0.0000
88.03            267.00           0.0000
122.06           370.10           0.0000
165.86           502.80           0.0000
391.70           1187.70          0.0000
661.66           2006.40          0.0000
834.84           2531.80          0.0000
898.04           2723.50          0.0000
1115.54          3383.30          0.0000
1173.23          3558.30          0.0000
1332.49          4041.50          0.0000
1836.05          5569.30          0.0000
#g_Resolution
59.50            1.2200           0.000000
88.03            1.2700           0.000000
```

```
122.06           1.2500           0.000000
165.86           1.2900           0.000000
391.70           1.4300           0.000000
661.66           1.5800           0.000000
834.84           1.6800           0.000000
898.04           1.7000           0.000000
1115.54          1.8200           0.000000
1173.23          1.8500           0.000000
1332.49          1.9400           0.000000
1836.05          2.1600           0.000000
#g_Efficiency
59.50            0.0323300000     0.000520000000
88.03            0.0627700000     0.001570000000
122.06           0.0714800000     0.001320000000
165.86           0.0706200000     0.001310000000
391.70           0.0484100000     0.000840000000
661.66           0.0359300000     0.000590000000
834.84           0.0312500000     0.000480000000
898.04           0.0267700000     0.000430000000
1115.54          0.0263900000     0.000430000000
1173.23          0.0229000000     0.000340000000
1332.49          0.0211600000     0.000310000000
1836.05          0.0172300000     0.000270000000
#g_Spectrum
8192  2800
1     0          0          0          0          0
6     0          0          0          0          0
...
8186  5          3          0          7          4
8191  1          0
#Certificate
5268       2015/06/01 12:00:00
Am-241   4.326E+02      Y 356.1    1.53    59.50    35.92   0 0        0
Cd-109   1.263E+00      Y 1469.0   2.34    88.03    3.63    0 0        0
Co-57    7.441E-01      Y 72.8     1.83    122.06   85.51   0 0        0
Ce-139   3.768E-01      Y 59.9     1.68    165.86   79.90   0 0        0
```

```
Cr-51    7.585E-02       Y 1092.0   1.61    320.10   9.89    0 0        0
Sn-113   3.151E-01       Y 215.5    1.61    391.70   64.97   0 0        0
Sr-85    1.775E-01       Y 201.5    1.61    514.00   98.50   0 0        0
Cs-137   3.005E+01       Y 266.3    1.61    661.66   84.99   0 0        0
Mn-54    8.546E-01       Y 262.7    1.51    834.84   99.98   0 0        0
Y-88     2.919E-01       Y 428.5    1.50    898.04   93.90   0 0        0
Zn-65    6.681E-01       Y 541.0    1.61    1115.54  50.22   0 0        0
Co-60    5.271E+00       Y 302.5    1.48    1173.23  99.85   0 0        0
Co-60    5.271E+00       Y 302.5    1.48    1332.49  99.98   0 0        0
Y-88     2.919E-01       Y 428.5    1.50    1836.05  99.32   0 0        0
STOP
```

CALIBPHD_Calibration blocks by VGSL Simulations

```
#g_Energy
40   122.111  0
50   152.44   0
60   182.769  0
70   213.098  0
80   243.427  0
90   273.756  0
100  304.085  0
110  334.414  0
120  364.743  0
130  395.072  0
140  425.401  0
150  455.73   0
160  486.059  0
170  516.388  0
180  546.717  0
190  577.046  0
200  607.375  0
210  637.704  0
220  668.033  0
```

```
230  698.362  0
240  728.691  0
250  759.02   0
260  789.349  0
270  819.678  0
280  850.007  0
290  880.336  0
300  910.665  0
310  940.994  0
320  971.323  0
420  1274.613 0
520  1577.903 0
620  1881.193 0
720  2184.483 0
820  2487.773 0
920  2791.063 0
1020 3094.353 0
1120 3397.643 0
1220 3700.933 0
1320 4004.223 0
1420 4307.513 0
1520 4610.803 0
1620 4914.093 0
1720 5217.383 0
1820 5520.673 0
1920 5823.963 0
2020 6127.253 0
2120 6430.543 0
2220 6733.833 0
2320 7037.123 0
2420 7340.413 0
#g_Resolution
40   0.936008547  0
50   0.945079362  0
60   0.954071276  0
70   0.9629865            0
```

80	0.971827145	0
90	0.980595227	0
100	0.989292677	0
110	0.99792134	0
120	1.006482985	0
130	1.01497931	0
140	1.023411941	0
150	1.031782438	0
160	1.040092304	0
170	1.048342978	0
180	1.056535849	0
190	1.06467225	0
200	1.072753467	0
210	1.080780736	0
220	1.088755253	0
230	1.096678166	0
240	1.104550587	0
250	1.112373588	0
260	1.120148204	0
270	1.127875436	0
280	1.135556251	0
290	1.143191585	0
300	1.150782343	0
310	1.1583294	0
320	1.165833607	0
420	1.238688016	0
520	1.308024465	0
620	1.374375495	0
720	1.438154373	0
820	1.499689301	0
920	1.559245972	0
1020	1.61704298	0
1120	1.673262681	0
1220	1.728059027	0
1320	1.781563358	0
1420	1.833888764	0

```
1520 1.885133417  0
1620 1.935383166  0
1720 1.984713581  0
1820 2.03319158         0
1920 2.080876738  0
2020 2.127822361  0
2120 2.174076356  0
2220 2.219681959  0
2320 2.264678344  0
2420 2.309101124  0
#g_Efficiency
  40.000000  0.000223   0.000406
  50.000000  0.002218   0.002929
  60.000000  0.008153   0.010446
  70.000000  0.016955   0.021980
  80.000000  0.025717   0.034218
  90.000000  0.034488   0.046780
 100.000000  0.040579   0.056103
 110.000000  0.045727   0.064584
 120.000000  0.049292   0.071191
 130.000000  0.052033   0.076366
 140.000000  0.054125   0.080727
 150.000000  0.054362   0.083026
 160.000000  0.054681   0.085383
 170.000000  0.054938   0.087732
 180.000000  0.054531   0.089175
 190.000000  0.054337   0.090423
 200.000000  0.054358   0.091654
 210.000000  0.052944   0.091739
 220.000000  0.051806   0.091998
 230.000000  0.051470   0.092685
 240.000000  0.050785   0.093442
 250.000000  0.049244   0.092476
 260.000000  0.048838   0.093435
 270.000000  0.047710   0.093234
 280.000000  0.046874   0.093735
```

```
 290.000000  0.046829   0.095116
 300.000000  0.044964   0.093247
 310.000000  0.044676   0.093833
 320.000000  0.043714   0.093157
 420.000000  0.037578   0.092337
 520.000000  0.033268   0.090552
 620.000000  0.030154   0.089134
 720.000000  0.027561   0.087500
 820.000000  0.025541   0.086185
 920.000000  0.023723   0.083604
1020.000000  0.022506   0.082905
1120.000000  0.021217   0.080569
1220.000000  0.020640   0.080386
1320.000000  0.019487   0.078652
1420.000000  0.018782   0.077440
1520.000000  0.017983   0.076398
1620.000000  0.016800   0.074295
1720.000000  0.016211   0.074859
1820.000000  0.015588   0.073190
1920.000000  0.015216   0.073075
2020.000000  0.014808   0.072542
2120.000000  0.014315   0.071475
2220.000000  0.013835   0.070331
2320.000000  0.013453   0.070332
2420.000000  0.013143   0.070186
```

Channel

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE CHANNEL IMS2.0
Net       Sta  Chan Aux   Latitude  Longitude Coord Sys     Elev Depth   Hang  Vang Sample_Rate Inst      On Date    Off Date
          ARA0  BHE       69.53480   25.50570              0.403 0.000   90.0  90.0   40.000000 CMG-3T 2014/09/21
          ARA0  BHN       69.53480   25.50570              0.403 0.000    0.0  90.0   40.000000 CMG-3T 2014/09/21
          ARA0  BHZ       69.53480   25.50570              0.403 0.000          0.0   40.000000 CMG-3T 2014/09/21
```

```
          ARA1  BHZ       69.53630   25.50710             0.411 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARA2  BHZ       69.53380   25.50780             0.392 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARA3  BHZ       69.53460   25.50190             0.402 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARB1  BHE       69.53790   25.50790             0.414 0.000   90.0  90.0   40.000000 CMG-3T 2014/09/21
          ARB1  BHN       69.53790   25.50790             0.414 0.000    0.0  90.0   40.000000 CMG-3T 2014/09/21
          ARB1  BHZ       69.53790   25.50790             0.414 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARB2  BHZ       69.53570   25.51330             0.397 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARB3  BHZ       69.53240   25.51060             0.376 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARB4  BHE       69.53280   25.49980             0.378 0.000   90.0  90.0   40.000000 CMG-3T 2014/09/21
          ARB4  BHN       69.53280   25.49980             0.378 0.000    0.0  90.0   40.000000 CMG-3T 2014/09/21
          ARB4  BHZ       69.53280   25.49980             0.378 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARB5  BHZ       69.53630   25.49850             0.405 0.000         0.0   40.000000 CMG-3T 2014/09/21
          ARC1  BHE       69.54110   25.50790             0.381 0.000   90.0  90.0   40.000000 CMG-3T 2014/09/21
          ARC1  BHN       69.54110   25.50790             0.381 0.000    0.0  90.0   40.000000 CMG-3T 2014/09/21
STOP
```

Chan_status

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 24078110 CTBT_IDC
REF_ID SWP_wQblQauR
DATA_TYPE CHAN_STATUS IMS2.0
Report period from 2016/06/02 00:00:00.0 to 2016/06/03 00:00:00.0
Channel Status
Net       Sta   Chan %_Recvd %_AvaUA %_Avail  Gaps   Samples  Constant         Mean        RMS
          AAK   BHZ  100.000 100.000   0.000     0    958655         0        969.8     1979.1
          AFI   BHZ  100.000 100.000   0.000     0   1031076         0       1984.3    15487.6
AKASG     AK01  BHZ  100.000 100.000 100.000     0   3456001         0     -15683.1      615.5
AKASG     AK02  BHZ  100.000 100.000 100.000     0   3456001         0     -14569.9      357.6
AKASG     AK03  BHZ  100.000 100.000 100.000     0   3456001         0     -14971.6      999.4
AKASG     AK04  BHZ  100.000 100.000 100.000     0   3456001         0     -16867.6     1144.7
AKASG     AK05  BHZ  100.000 100.000   0.000     0   3456001         0     -15825.1      322.6
AKASG     AK06  BHZ  100.000 100.000   0.000     0   3456001         0     -14131.8      327.7
AKASG     AK07  BHZ  100.000 100.000   0.000     0   3456001         0     -15677.6      321.0
AKASG     AK08  BHZ  100.000 100.000   0.000     0   3456001         0     -13679.2      530.9
AKASG     AK09  BHZ  100.000 100.000   0.000     0   3456001         0     -14885.7      758.5
```

```
AKASG     AK10  BHZ  100.000 100.000   0.000     0   3456001          0    -15589.5        408.4
AKASG     AK11  BHZ  100.000 100.000 100.000     0   3456001          0    -16571.7        456.2
AKASG     AK12  BHZ    0.000   0.000   0.000     1         0          0         0.0          0.0
AKASG     AK13  BHZ    0.000   0.000   0.000     1         0          0         0.0          0.0
…
STOP
```

Comment

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE COMMENT IMS2.0

  Almost anything may be typed into the space between the
  DATA_TYPE line and the STOP line.  No association was
  desired for this comment, so the association line was
  left blank.  Note that this comment is indented so that
  the DATA_TYPE in the second line of this paragraph is
  not interpreted as a command line.
DATA_TYPE COMMENT IMS2.0
Event      7687234
  The referenced event was felt over a wide area (300 square
  kilometers) near the epicenter.
STOP
```

Comm_status

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE COMM_STATUS IMS2.0
Report period from 1994/12/03 00:00:00.0 to 1994/12/04 00:00:00.0
Link                  Nom_kbps  Mode  %_Up   From    Util   From    Util
```

```
AUS_NDC  - CTBO_IDC     56.0  full  88.4  AUS_NDC  0.50  CTBO_IDC  0.08
NOR_NDC  - CTBO_IDC    128.0  full  99.2  NOR_NDC  0.77  CTBO_IDC  0.10
USA_NDC  - CTBO_IDC   1000.0  full 100.0  USA_NDC  0.25  CTBO_IDC  0.25

AUS_NDC  - CTBO_IDC  link outages
         From                Through             Duration
1994/12/02 20:23:14.0  1994/12/03 00:48:28.0  000 00:25:14.0
1994/12/03 02:34:31.0  1994/12/03 02:49:39.0  000 00:15:08.0
1994/12/03 19:02:27.0  1994/12/03 19:12:29.0  000 00:10:02.0

NOR_NDC  - CTBO_IDC  link outages
         From                Through             Duration
1994/12/03 04:34:31.0  1994/12/03 06:35:39.0  000 00:45:13.0
STOP
```

DETBKPHD

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID  16333
DATA_TYPE DETBKPHD
#Header 3
FRP27 FRP27_001 P FILTRE_COMPRESSE  FULL
27111111110001
FRP27_001-2003/06/05-18:11:56.0 FRP27_001-2001/07/09-17:53:58.0
2003/06/12 18:15:24.0
#Acquisition
2003/06/05 18:11:56.0 605015.46      604800.00
#g_Energy
46.540          132.400          0.04464
59.540          167.663          0.06777
88.030          244.859          0.12205
122.060         337.183          0.16886
661.660         1801.684         0.05822
834.840         2271.871         0.12451
```

```
1173.200          3191.157          0.06661
1332.500          3623.953          0.06811
2505.700          6810.917          0.15855
#g_Resolution
46.540            1.163             0.00081
59.540            1.172             0.00193
88.030            1.204             0.00566
122.060           1.222             0.01235
661.660           1.793             0.00293
834.840           1.919             0.01546
1173.200          2.270             0.00570
1332.500          2.399             0.00627
2505.700          3.254             0.04989
#g_Efficiency
46.540            0.10718           0.00268
59.540            0.12164           0.00366
88.030            0.12742           0.00409
122.060           0.12287           0.00389
165.860           0.10575           0.00428
391.690           0.05701           0.00212
661.660           0.03878           0.00117
834.840           0.03242           0.00099
898.040           0.02715           0.00097
1173.200          0.02164           0.00065
1332.500          0.01926           0.00058
1836.100          0.01495           0.00050
#g_Spectrum
8192  3020
1     0           0           0           0           0
6     0           0           0           5           4
11    1           0           0           0           4
...
8181  12          13          17          11          13
8186  12          14          19          12          18
8191  14          0           0           0           0
STOP
```

Error_log

The following example shows how the `error log` section is used to identify that the request message line in a request failed.

```
BEGIN IMS1.0
MSG_TYPE DATA
MSG_ID err_EVENT_TEST CTBT_IDC
REF_ID EVENT_TEST
DATA_TYPE LOG
 Submitted request :
 Begin ims1.0
 Msg_type request
 Msg_id EVENT_TEST
 Time 2014/03/21 to 201/03/22
 Bull_type REB
 Sta_list *
 Event ims2.0
 stop
DATA_TYPE ERROR_LOG
 Error[line=4,pos=19]: 201/03/22 is not a valid DATETIME.
STOP
```

Event

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 24847610 CTBT_IDC
REF_ID EVENT_TEST
DATA_TYPE EVENT IMS2.0
Reviewed Event Bulletin of the CTBT_IDC from 2014/03/21 00:00:00 to 2014/03/22 00:00:00,  generated 2016/07/20 12:16:26
EVENT  10622160 NEW IRELAND REGION, P.N.G.
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
2014/03/21 00:44:32.39   4.18  0.97  -4.7487  153.6974  46.0  18.0 107 118.9  28.5   11    9 202   1.72 151.14 m i uk IDC_REB
10647451

Magnitude  Err Nsta Author      OrigID
mb     3.5 0.1    6 IDC_REB   10647451
```

```
mbtmp  3.9 0.2    7 IDC_REB   10647451



EVENT  10622300 SUMBA REGION, INDONESIA
   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
2014/03/21 01:39:37.91   2.15  0.39  -9.1143  119.8058  97.2  23.4  62   0.0f         5    5 184   4.07  64.92 m i uk IDC_REB
10647455
STOP
```

Execsum

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE EXECSUM IMS2.0
 Executive Summary for 2001-03-01 00:00:00 to 2001-03-06 00:00:00
 generated at 2001-06-13 18:31:01

LATEST PROCESSING TIME (for requested interval)
   Seismic-Acoustic           Radionuclide
2001/03/13 18:39:05    2001/03/02 13:56:15

SEISMIC-ACOUSTIC SUMMARY
TotalEvents Considered InsufftData NotScreened ScreenedOut
         59         49          15           6          28

RADIONUCLIDE SUMMARY
Detections  Level4  Level5
        18       1       0

FUSION SUMMARY
FusedEvents


SYSTEM STATUS SUMMARY
```

```
 IMS  GCI  IDC RNLab
  47

IMS STATUS BY TECHNOLOGY
   PS   AS    H    I   RN
   66         39   36
STOP
```

GASBKPHD

The following example is for a noble gas β-γ coincidence system.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 21558 USX74
DATA_TYPE GASBKPHD
#Header 3
USX74 USX74_003 B GEOMETRY          FULL
74201606010600G
USX74_003-2016/06/01-06:08      USX74_003-2014/05/11-14:38      0
2016/06/01 17:18:28.1
#Comment
Using Pixie electronics v. 2.43.
Produced by SAUNA_PHDAQ with program version 1.0.7.9.
Coincidence spectrum set to zero counts where gamma or beta channel is zero.

 IMS data from the upgraded SAUNA II station in Ashland, KS, USA
 Dead volume factor 0.893.

#Acquisition
2016/06/01 06:08:27.3 40200.432000   40183.558000
#Calibration
2014/06/26 16:46:00.0
#g_Energy
```

```
32.000000        12.560000        0.006000
59.540000        22.910000        0.005000
121.780000       45.440000        0.006000
244.700000       87.700000        0.048000
344.280000       122.210000       0.013000
661.660000       228.080000       0.013000
#b_Energy
62.370000        C 20.000000        0.500000
86.670000        C 27.540000        0.500000
110.880000       C 36.580000        0.500000
135.010000       C 45.820000        0.500000
159.060000       C 54.500000        0.500000
129.400000       C 44.090000        0.500000
206.890000       C 71.810000        0.500000
230.680000       C 80.980000        0.500000
254.380000       C 89.840000        0.500000
278.000000       C 98.420000        0.500000
301.530000       C 106.620000       0.500000
324.980000       C 114.920000       0.500000
348.340000       C 122.850000       0.500000
371.620000       C 130.370000       0.500000
394.820000       C 137.660000       0.500000
417.920000       C 144.770000       0.500000
#g_Resolution
32.000000        7.770000         0.039000
59.540000        9.790000         0.025200
121.780000       13.800000        0.036800
244.700000       22.920000        0.490200
344.280000       31.110000        0.084900
661.660000       56.910000        0.076700
#b_Resolution
62.370000        11.220000        0.500000
86.670000        19.700000        0.500000
110.880000       39.770000        0.500000
135.010000       42.340000        0.500000
159.060000       49.300000        0.500000
```

```
129.400000       36.630000        0.500000
206.890000       54.800000        0.500000
230.680000       53.180000        0.500000
254.380000       53.620000        0.500000
278.000000       55.150000        0.500000
301.530000       56.850000        0.500000
324.980000       56.950000        0.500000
348.340000       52.950000        0.500000
371.620000       56.270000        0.500000
394.820000       55.900000        0.500000
417.920000       56.890000        0.500000
#g_Efficiency
31.630000        0.663000         0.005900
80.980000        0.823000         0.010100
123.000000       0.767000         0.050000
165.000000       0.723000         0.050000
208.000000       0.679000         0.050000
249.800000       0.590000         0.059200
#ROI_Limits
1  16.82870   556.97400  320.15900  387.55800
2  16.82870   779.85000  218.92600  279.47600
3  16.82870   356.34500  65.73590   96.65610
4  16.82870   391.99800  18.22860   40.54320
5  86.81190   145.32300  18.22860   40.54320
6  172.39000  255.48100  18.22860   40.54320
7  16.82870   76.32050   18.22860   40.54320
8  266.78600  391.99800  18.22860   40.54320
9  172.39000  391.99800  18.22860   40.54320
10 16.82870   145.32300  18.22860   40.54320
#b-gEfficiency
XE-135     2        0.530900   0.075200
XE-133     3        0.651400   0.009100
XE-133     4        0.664100   0.012900
XE-131m    5        0.620900   0.031500
XE-133m    6        0.625200   0.031700
XE-133     7        0.196000   0.004200
```

```
XE-133      8          0.034600   0.000900
XE-133      9          0.178600   0.003800
XE-133      10         0.427300   0.008800
#Ratios
PB214_352:242   1  2  0.639000   0.0066
PB214_352:80    1  3  0.487000   0.0055
PB214_352:30_4  1  4  0.088000   0.0020
PB214_352:30_5  1  5  0.014000   0.0008
PB214_352:30_6  1  6  0.020000   0.0009
PB214_352:30_7  1  7  0.012000   0.0007
PB214_352:30_8  1  8  0.033000   0.0012
PB214_352:30_9  1  9  0.055000   0.0016
PB214_352:30_1  1  10 0.027000   0.0011
XE133-1_81:30   3  4  0.036100   0.0029
XE133-2_81:30   3  5  0.419600   0.0039
XE133-3_81:30   3  6  0.282200   0.0030
XE133-7_81:30   3  7  0.009600   0.0015
XE133-8_81:30   3  8  0.001370   0.0006
XE133-9_81:30   3  9  0.007800   0.0013
XE133-10_81:30  3  10 0.022800   0.0023
#g_Spectrum
256   748
0     1          2761       9168       7052       4743
5     3787       3608       2975       2432       2206
10    2235       2470       2413       2251       2079
15    2271       2632       3133       3116       2805
20    2555       2844       3229       3481       3416
...
230   659        630        634        594        649
235   615        611        613        567        549
240   605        556        567        568        579
245   575        566        618        564        576
250   539        545        556        577        575
255   546
#b_Spectrum
256   783
```

```
0      2           5           31          79          70
5      63          65          65          54          74
10     66          37          48          59          52
15     24          41          36          39          29
20     25          26          36          37          32
...
230    12          20          24          16          24
235    25          22          26          21          23
240    24          22          15          16          17
245    32          17          27          17          21
250    27          20          21          18          32
255    21
#Histogram
256    256    748   783
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
...
0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
STOP
```

HELP

The following examples use the correct protocols for requesting an *AutoDRM User's Guide*.

`to:` *[AutoDRM email address]*
`from:` *[your email address]*
`subject:` *[any subject]*
`cc:`
`bcc:`
`Attached:`
[Text as follows: `help`*]*

`to:` *[AutoDRM email address]*
`from:` *[your email address]*
`subject: help`
`cc:`
`bcc:`
`Attached:`

Log

The following example is a section of a message that is sent to a data requestor or subscriber after a subscription or request message has been processed. The log section precedes the message data section and is used to state that the request command was processed.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 24847509 CTBT_IDC
REF_ID RMS_TEST
DATA_TYPE LOG
 Info - 24847509 - IMSLANGUAGE request successfully parsed
```

```
 Info - 24847509 - Job 30536185: job status has changed to: QUEUED
 Info - 24847509 - Request submitted successfully, request id 24847509
 Info - 24847509 - Job 30536185: job status has changed to: RUNNING
 Info - 24847509 - For dates between 2014-03-21 00:00:00+00:00 and 2014-03-22 00:00:00+00:00, SEL3
products have been retrieved from archives
 Info - 24847509 - The product EVENT has been generated in 0 minutes, 0 seconds and 597 milliseconds
DATA_TYPE EVENT IMS2.0
STOP
```

MET

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 36635
DATA_TYPE MET
ARP01
2003/09/02 10:00:00.0 2003/09/02 10:10:00.0 13.9  135 0.5   1022.56 89    0.0
2003/09/02 10:10:00.0 2003/09/02 10:20:00.0 14.1  112 0.6   1022.65 89    0.0
2003/09/02 10:20:00.0 2003/09/02 10:30:00.0 14.4  112 0.8   1022.67 85    0.0
2003/09/02 10:30:00.0 2003/09/02 10:40:00.0 15.0  112 0.7   1022.78 82    0.0
2003/09/02 10:40:00.0 2003/09/02 10:50:00.0 15.6  135 0.6   1022.90 78    0.0
2003/09/02 10:50:00.0 2003/09/02 11:00:00.0 16.2  112 0.6   1023.01 75    0.0
2003/09/02 11:00:00.0 2003/09/02 11:10:00.0 16.5  135 0.7   1023.10 74    0.0
2003/09/02 11:10:00.0 2003/09/02 11:20:00.0 16.3  135 0.8   1023.10 74    0.0
2003/09/02 11:20:00.0 2003/09/02 11:30:00.0 16.5  135 0.9   1023.08 73    0.0
2003/09/02 11:30:00.0 2003/09/02 11:40:00.0 16.5  135 0.9   1023.12 74    0.0
2003/09/02 11:40:00.0 2003/09/02 11:50:00.0 16.4  135 1.1   1023.22 73    0.0
2003/09/02 11:50:00.0 2003/09/02 12:00:00.0 16.2  135 1.1   1023.38 71    0.0
STOP
```

Network

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE network IMS2.0
Net        Description
IDC_SEIS   International Data Center Seismic Network
IDC_HYDR   International Data Center Hydroacoustic Network
STOP
```

Origin

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE ORIGIN IMS2.0

   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az  Depth  Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
1996/08/16 03:41:12.45   0.88  0.92  51.3300 -130.3100  16.6   7.7  63   0.0f        23   18 192   1.61  77.98 m i uk IDC_REB
  769476

Magnitude  Err Nsta Author      OrigID
ML     3.8 0.5    7 IDC_REB     769476
mb     4.0 0.2    6 IDC_REB     769476


   Date       Time        Err   RMS Latitude Longitude  Smaj  Smin  Az  Depth  Err Ndef Nsta Gap  mdist  Mdist Qual   Author
OrigID
1996/08/16 04:35:17.66   2.72  0.29   2.1300  127.8800  55.1  44.2  71   0.0f         9    9 150  22.84  92.33 m i uk IDC_REB
  769435

Magnitude  Err Nsta Author      OrigID
mb     4.1 0.4    7 IDC_REB     769435
STOP
```

Outage

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 310486 CTBT_IDC
REF_ID OUTAGE_TEST
DATA_TYPE OUTAGE IMS2.0
TIME_STAMP 2016/07/20 10:04:53
Report period from 2015/12/04 00:00:00.0 to 2015/12/05 00:00:00.0
Outage
Net       Sta   Chan     Start Date Time          End Date Time          Duration Comment
AKASG     AK04  BHZ  2015/12/04 00:00:00.000 2015/12/05 00:00:00.000  86400.000
AKASG     AK20  BHZ  2015/12/04 00:00:00.000 2015/12/05 00:00:00.000  86400.000
ASAR      AS15  SHZ  2015/12/04 00:17:55.000 2015/12/04 00:17:56.000      1.000
ASAR      AS15  SHZ  2015/12/04 00:17:57.000 2015/12/04 00:17:58.000      1.000
.
.
STOP
```

QCPHD

```
BEGIN     IMS2.0
MSG_TYPE  DATA
MSG_ID    31438  USP75
DATA_TYPE QCPHD
#Header 3
USP75 USP75_001 P POINT             FULL
75888888880001
USP75_001-2003/09/10-18:26:45.0 USP75_001-2002/01/10-18:13:14.0 0
2003/09/10 19:15:02
#Acquisition
2003/09/10 18:26:45.0 1197.64        1192.54
#Calibration
2003/06/13 19:00:00
#g_Energy
```

```
88.03            267.33           0
122.10           370.64           0
165.90           503.76           0
279.20           847.75           0
391.70           1189.03          0
514.00           1559.84          0
661.70           2007.47          0
898.00           2724.12          0
1173.20          3558.64          0
1332.50          4041.61          0
1836.10          5569.16          0
#g_Resolution
88.03            1.5500           0
122.10           1.5800           0
165.90           1.6200           0
279.20           1.6500           0
391.70           1.7400           0
514.00           1.8300           0
661.70           1.9000           0
898.00           2.0500           0
1173.20          2.2400           0
1332.50          2.3400           0
1836.10          2.6600           0
#g_Efficiency
88.03            0.012500         0
122.10           0.016800         0
159.00           0.017200         0
391.70           0.014600         0
661.70           0.009860         0
898.00           0.008283         0
1173.20          0.007045         0
1332.50          0.006500         0
1836.10          0.005410         0
#g_Spectrum
8192  2900
1     0          0          0          0          0
```

```
6     0          0          0          0          0
11    0          0          0          0          0
...
8181  0          0          0          0          0
8186  0          0          0          0          0
8191  1          0
#Certificate
30900      1999/10/15 20:00:00
CD-109   1.267       Y 8980.000 290.000 88.000   3.630   0 0        0
CO-57    0.7441      Y 288.700  9.200   122.000  85.600  0 0        0
TE-123M  0.3277      Y 407.400  13.000  159.000  84.000  0 0        0
CR-51    0.07584     Y 11430.00 340.000 320.000  9.860   0 0        0
SN-113   0.3151      Y 1551.000 48.000  392.000  64.890  0 0        0
SR-85    0.1775      Y 1989.000 62.000  514.000  98.400  0 0        0
CS-137   30.17       Y 1385.000 47.000  662.000  85.100  0 0        0
Y-88     0.2919      Y 3199.000 99.000  898.000  94.000  0 0        0
CO-60    5.272       Y 1635.000 52.000  1173.000 99.860  0 0        0
CO-60    5.272       Y 1635.000 52.000  1333.000 99.980  0 0        0
Y-88     0.2919      Y 3199.000 99.000  1836.000 99.360  0 0        0
STOP
```

Response

```
EGIN IMS2.0
MSG_TYPE DATA
MSG_ID 310485 CTBT_IDC
REF_ID I37NO_response
DATA_TYPE RESPONSE:OPERATIONAL IMS2.0
TIME_STAMP 2016/07/20 09:54:18
CAL2 I37H0 BDF      MB2005  1.43350000E-04   1.000    20.00000 2013/10/28 00:00
 (Note: the group delay is unknown and set to zero)
PAZ2  1 C  9.13948674E+10    0    0.000   4   1 microbarometer:theoretica
 -1.77700000E+02 -1.77700000E+02
 -1.77700000E+02  1.77700000E+02
 -6.28000000E-02  0.00000000E+00
```

```
 -2.07345000E+02  0.00000000E+00
  0.00000000E+00  0.00000000E+00
 (The scale factor is computed such that resp(NCALPER) = 1/NCALIB)
DIG2  2  1.00000000E+00 512000.0000 digitizer:theoretical
 (Note: the group delay is unknown and set to zero)
FIR2  3   1.00E+00    8    0.000 A   36 digitizer:theoretical
  3.05175800E-05  1.52587900E-04  4.57763700E-04  1.06811500E-03  2.13623000E-03
  3.84521500E-03  6.40869100E-03  1.00708000E-02  1.49536100E-02  2.10571300E-02
  2.82592800E-02  3.63159200E-02  4.48608400E-02  5.34057600E-02  6.13403300E-02
  6.79321300E-02  7.26318400E-02  7.50732400E-02  7.50732400E-02  7.26318400E-02
  6.79321300E-02  6.13403300E-02  5.34057600E-02  4.48608400E-02  3.63159200E-02
  2.82592800E-02  2.10571300E-02  1.49536100E-02  1.00708000E-02  6.40869100E-03
  3.84521500E-03  2.13623000E-03  1.06811500E-03  4.57763700E-04  1.52587900E-04
  3.05175800E-05
 (The scale factor is set to 1.0)
.
.
STOP
```

RLR

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 00000039 FIL07
DATA_TYPE RLR
#Header
Routine
ISP34 34200404011112
FIL07 FIL07_001
FIN 2
Category B
2004/04/21 13:00:00.0
#LabDataVersion
IMS2.0_IDCR6
```

```
0
#Objective
~AnalysisPurpose
The purpose of this analysis is Network QC.
~TestsAuthorized
High resolution gamma spectrometry is authorized for this analysis.
~SpecialInstructions
0
#g_IDCActivitySummary
~NuclidesNotQuantified
AC-228, BI-214, GE-71M, GE-75M, K-40, PB-206, PB-210, PB-214, TH-234, U-235
~NaturalNuclides
BE-7     53.29 D       3.4751E+03  1.68
PB-212F  10.64 H       3.7035E+03  2.38
~ActivationProducts
CO-60    5.27138 Y     2.6021E+00  61.99
~FissionProducts
CS-137   30.1 Y        2.2925E+00  66.05
#g_IDCEventScreeningFlags
Y   0.9995
Y 149.9974
N -9999
Y -9999
#Collection
2004/04/01 11:24:11.0 2004/04/02 11:20:31.0 12333
#Split
4.1  5681.8
Sample was split at the station.
#SampleReceipt
34200404011112
0
2004/04/07 10:00:00.0
~PackageCondition
OK
~SealCondition
OK (No Seal)
```

```
~SampleCondition
OK
#StationSample
Environmental sample
7.7   0.8   -9999
8.9
ARAME
#g_LabSample
Environmental sample
7.7   0.4   -9999
4.4
-9999 -9999 -9999
No preparation at the lab
#Test
high resolution gamma spectrometry
2004/04/21
Mikael Moring
Level 5 sample
#g_EnergyCalibrationEquation
1
2  2  0.00    2715.59
-2.9415e-01 3.3153e-01  -9999       -9999
#g_ShapeCalibrationEquation
1
4  3  0.00    2715.59
1.3649e+00  8.6516e-04  9.5788e-08  -9999
#g_EfficiencyCalibrationEquation
1
1  0  0.00    9999.99
-9999       -9999       -9999       -9999
#g_TotalEfficiencyCalibrationEquation
1
1  0  0.00    9999.99
-9999       -9999       -9999       -9999
#PeaksMethod
UniSAMPO 1.99 (31 August 2003)
```

The peak analysis software uses Mariscotti's generalized second differences method for peak search. After initial search, peak candidates are fitted and tested for their significance against Currie's detection limit and candidates below the limit are discarded from the peak list.
Peak areas are determined by fitting a Gaussian function with exponential lower and upper tails to spectrum data, with peak parameters obtained from peak shape calibration (fixed-width fitting).

```
Search start channel:    37
Search start energy:     12.0
Search end channel:      8180
Search end energy:       2711.6
Search threshold:        2.40
Peak discard parameters: 95.00 4.00 80.00
#PeakSearch
1     141.131  0.013 46.495   8.7007e-01  45.009
2     226.390  0.050 74.761   5.5488e-01  6.172   M
3     233.433  0.039 77.096   5.3918e-01  7.183   m
4     264.167  0.081 87.285   4.8046e-01  3.741
5     560.706  0.110 185.596  2.4493e-01  3.647
6     720.742  0.011 238.653  1.9832e-01  7.077   M
7     730.587  0.019 241.917  1.9613e-01  4.195   m
8     891.564  0.016 295.285  1.6700e-01  7.114
9     1021.831 0.036 338.473  1.5011e-01  3.204
10    1062.486 0.007 351.951  1.4569e-01  13.373
11    1441.616 0.001 477.643  1.1638e-01  135.432
12    1542.316 0.006 511.028  1.1100e-01  16.982
13    1684.968 0.016 558.322  1.0447e-01  5.269
14    1759.108 0.017 582.901  1.0147e-01  4.218
15    1838.770 0.005 609.312  9.8538e-02  13.085
16    1996.660 0.012 661.657  9.3399e-02  4.600
17    2422.253 0.014 802.753  8.2837e-02  2.559
18    2552.667 0.036 845.989  8.0292e-02  2.710
19    2922.850 0.016 968.716  7.4297e-02  -9999   I
20    3379.557 0.008 1120.127 6.8679e-02  4.702
21    3735.740 0.039 1238.212 6.5224e-02  -9999   I
22    4012.985 0.020 1330.127 6.2957e-02  -9999   I
```

```
23     4155.612 0.017 1377.412 6.1912e-02  3.085
24     4407.092 0.001 1460.785 6.0217e-02  37.715
25     4803.675 0.010 1592.264 5.7889e-02  2.980
26     5323.019 0.004 1764.441 5.5381e-02  6.928
27     6648.620 0.005 2203.917 5.0680e-02  4.907
28     7887.280 0.002 2614.568 4.7706e-02  10.219
#PeakFitPart1
1      0.953 124.000  160.000  4.1187e+02  4.927 Detector     -9999        -9999
2      0.977 209.000  251.000  4.1392e+02  4.915 Detector     6.8917e-04   10.76
3      0.979 209.000  251.000  4.0756e+02  4.953 Detector     -9999        -9999
4      0.988 247.000  273.000  4.0774e+02  4.952 Detector     -9999        -9999
5      1.070 543.000  582.000  4.1725e+02  4.896 Detector     -9999        -9999
6      1.115 702.000  750.000  3.6560e+02  5.230 Detector     -9999        -9999
7      1.117 702.000  750.000  3.6318e+02  5.247 Detector     2.4212e-04   13.79
8      1.161 872.000  912.000  3.6112e+02  5.262 Detector     8.2234e-04   7.385
9      1.196 1001.000 1041.000 2.3954e+02  6.461 Detector     -9999        -9999
10     1.207 1041.000 1086.000 2.1034e+02  6.895 Detector     1.1306e-03   4.161
11     1.309 1416.000 1469.000 1.1912e+02  9.163 Detector     -9999        -9999
12     1.336 1510.000 1572.000 1.2568e+02  8.920 Detector     1.6870e-02   1.346
13     1.373 1662.000 1707.000 9.0990e+01  10.48 Detector     3.8971e-04   14.13
14     1.393 1737.000 1782.000 8.9341e+01  10.58 Detector     2.4805e-04   17.46
15     1.414 1816.000 1863.000 9.1098e+01  10.48 Detector     6.9946e-04   4.789
16     1.455 1970.000 2020.000 7.6503e+01  11.43 Detector     1.6701e-04   14.31
17     1.566 2400.000 2447.000 5.9693e+01  12.94 Detector     2.5146e-04   25.20
18     1.600 2527.000 2580.000 5.7360e+01  13.20 Detector     1.9121e-04   19.83
19     1.695 2893.000 2949.000 4.9600e+01  14.20 Detector     -9999        -9999
20     1.812 3351.000 3410.000 4.1150e+01  15.59 Detector     1.5791e-04   16.52
21     1.902 3705.000 3761.000 4.0302e+01  15.75 Detector     -9999        -9999
22     1.972 3985.000 4040.000 2.7125e+01  19.20 Detector     -9999        -9999
23     2.008 4123.000 4186.000 2.3591e+01  20.59 Detector     1.0935e-04   23.46
24     2.071 4370.000 4447.000 1.9985e+01  22.37 Detector     1.2856e-03   1.520
25     2.171 4774.000 4835.000 1.6584e+01  24.56 Detector     1.1727e-04   26.53
26     2.301 5288.000 5360.000 1.2668e+01  28.10 Detector     3.4230e-04   8.075
27     2.630 6611.000 6688.000 7.0292e+00  37.72 Detector     1.5163e-04   15.84
28     2.937 7841.000 7934.000 4.9650e+00  44.88 Detector     5.4500e-04   5.548
#PeakFitPart2
```

1	8.1173e+03	1.280	1.3684e-02	1.280	1.2729e+02	63.768	1.1547e-01	6.407
2	4.8189e+02	10.76	1.0504e-04	138.2	1.2909e+02	3.733	2.3030e-01	6.403
3	6.8101e+02	7.856	1.1480e-03	7.856	1.2822e+02	5.311	2.3348e-01	6.403
4	2.0535e+02	24.84	3.4618e-04	24.84	1.2865e+02	1.596	2.4508e-01	6.403
5	3.1502e+02	16.48	5.3106e-04	16.48	1.3589e+02	2.318	1.9933e-01	5.370
6	6.1840e+02	8.648	1.0425e-03	8.648	1.2959e+02	4.772	1.6045e-01	5.000
7	3.6590e+02	13.79	3.7807e-04	44.15	1.2932e+02	2.830	1.5835e-01	5.000
8	7.4851e+02	7.385	4.4111e-04	31.89	1.3142e+02	5.696	1.3055e-01	5.000
9	1.8715e+02	22.27	3.1549e-04	22.27	1.0853e+02	1.724	1.1440e-01	5.000
10	1.2607e+03	4.161	9.9215e-04	14.55	1.0236e+02	12.316	1.1016e-01	5.000
11	6.1274e+04	0.410	1.0329e-01	0.410	8.0253e+01	763.50	8.1977e-02	5.000
12	6.3247e+03	1.346	-6.2896e-03	100.0	8.3026e+01	76.177	7.6792e-02	5.000
13	2.1566e+02	14.13	-2.7961e-05	100.0	7.1799e+01	3.004	7.0485e-02	5.000
14	1.6862e+02	17.46	3.4970e-05	230.6	7.1618e+01	2.354	6.7605e-02	5.000
15	8.5129e+02	4.789	7.3182e-04	14.56	7.2920e+01	11.674	6.4766e-02	5.000
16	2.0180e+02	14.31	1.7319e-04	39.91	6.7729e+01	2.979	5.9798e-02	5.001
17	9.9536e+01	25.20	-8.4929e-05	100.0	6.2042e+01	1.604	4.9591e-02	4.999
18	1.2787e+02	19.83	2.3500e-05	362.6	6.1535e+01	2.078	4.7136e-02	5.000
19	1.1594e+02	20.87	1.9545e-04	20.87	5.8794e+01	1.972	4.1345e-02	5.001
20	1.4878e+02	16.52	9.2523e-05	68.41	5.5441e+01	2.684	3.5926e-02	5.010
21	8.7198e+01	26.49	1.4700e-04	26.49	5.5946e+01	1.559	3.2607e-02	5.240
22	5.1169e+01	40.10	8.6260e-05	40.10	4.6953e+01	1.090	3.0425e-02	5.418
23	7.8246e+01	23.46	2.2781e-05	216.3	4.4184e+01	1.771	2.9414e-02	5.510
24	4.7166e+03	1.520	6.6697e-03	6.019	4.1378e+01	113.99	2.7789e-02	5.672
25	7.8293e+01	26.53	1.5386e-05	337.2	3.8563e+01	2.030	2.5566e-02	5.928
26	2.3585e+02	8.075	5.8218e-05	81.17	3.4663e+01	6.804	2.3149e-02	6.263
27	1.0120e+02	15.84	2.1008e-05	187.3	2.7595e+01	3.667	1.8669e-02	6.403
28	3.4974e+02	5.548	5.1680e-05	88.85	2.4516e+01	14.266	1.5826e-02	6.402

#g_AnalysisMethods
SHAMAN version 1.13 for Linux-
~NuclidesMethod
SHAMAN is an expert system for nuclide identification. It utilizes a set of some 60 rules for nuclide selection and discarding and a comprehensive nuclide library of 3648 nuclides and 80062 gamma-ray and X-ray lines.
Its methods and parameters are presented in a comprehensive manual.
The energy tolerance used in peak association is 1.20 peak sigmas.

```
The peak analysis region is set to start from 38.00 keV.
~BaselineMethod
The mean baseline at the location of the peak is the value of the baseline
function, fitted below the peak by UniSampo, evaluated at the peak centroid.
This also applies to multiplet peaks.
~LCMethod
L_C corresponds to Currie's L_C(95%). The baseline function fitted under
the peak is integrated over the mathematically optimal interval
[C-1.4*sigma,C+1.4*sigma], where C is the centroid and sigma is the width
parameter of the Gaussian peak. The integral is multiplied with 1.193.
Finally, the L_C value is multiplied with 1.33 to change the effective
integration interval to (2*1.4/2.3548*1.193*1.33^2) FWHM = 2.5 FWHM.
#PeakAssociation
1      100.000 Pb-210
2      84.833  BGDPK1
3      64.439  Pb-212
4      78.191  Pb-212
5      100.000 U-235
6      120.602 Pb-212
7      39.253  BGDPK2
8      65.171  BGDPK3
9      0.000   NO_ID
10     53.198  BGDPK4
11     100.000 Be-7
12     158.223 BGDPK5
13     107.194 BGDPK6
14     87.261  BGDPK7
15     48.740  BGDPK8
16     50.910  Cs-137
16     49.093  USRPK1
17     149.861 BGDPK9
18     88.698  BGDPK10
19     0.000   NO_ID
20     62.961  BGDPK11
21     0.000   NO_ID
22     0.000   NO_ID
```

```
23    82.897  BGDPK12
24    83.882  K-40
24    16.168  BGDPK13
25    88.849  BGDPK14
26    86.090  BGDPK15
27    88.883  BGDPK16
28    92.437  BGDPK17
#References
~SAMPLEPHD
FIL07_001-2004/04/14-11:33:44.0
~CALIBPHD
0
~PhysicalConstants
B.R. Kinsey, et al., The NUDAT/PCNUDAT Program for Nuclear Data, paper
submitted to the 9th International Symposium of Capture Gamma-Ray Spectroscopy
and Related Topics, Budapest, Hungary, October 1996. Data extracted from the
PCNUDAT database version of August 2002.
S.Y.F. Chu, L.P. Ekstrom, and R.B. Firestone,
WWW Table of Radioactive Isotopes, database version 1999-02-28
from URL http://nucleardata.nuclear.lu.se/nucleardata/toi/
>>> Shaman library version 3.1.1
#InteractiveAnalysisLog
interactive_fit 301 341 1 3 0.100000
interactive_fit 383 423 1 3 0.100000
interactive_fit 402 442 1 3 0.100000
interactive_fit 404 444 1 3 0.100000
interactive_fit 419 459 1 3 0.100000
interactive_fit 701 741 1 3 0.100000
interactive_fit 865 905 1 3 0.100000
interactive_fit 1080 1120 1 3 0.100000
interactive_fit 1421 1461 1 3 0.100000
interactive_fit 1480 1520 1 3 0.100000
interactive_fit 1579 1619 1 3 0.100000
interactive_fit 1601 1641 1 3 0.100000
interactive_fit 1977 2017 1 3 0.100000
interactive_fit 2212 2252 1 3 0.100000
```

```
interactive_fit 2263 2303 1 3 0.100000
interactive_fit 2291 2331 1 3 0.100000
interactive_fit 2404 2444 1 3 0.100000
interactive_fit 3012 3052 1 3 0.100000
interactive_fit 3336 3376 1 3 0.100000
interactive_fit 3520 3560 1 3 0.100000
interactive_fit 4000 4040 1 3 0.100000
interactive_fit 4796 4836 1 3 0.100000
interactive_fit 5520 5560 1 3 0.100000
interactive_search 50 8172 15.000000 0
interactive_search 50 8172 7.000000 0
interactive_search 1 32768 7.000000 0
interactive_search 1 32768 7.000000 0
interactive_search 1 32768 7.000000 0
interactive_fit 1 32768 1 3 7.000000
interactive_search 48 8192 2.400000 0
interactive_fit 48 8192 2 3 2.400000
interactive_discard 4.000000
interactive_fit 1 32768 1 3 2.400000
interactive_search 48 8192 2.400000 0
interactive_fit 48 8192 2 3 2.400000
interactive_discard 4.000000
interactive_fit 1 32768 1 3 2.400000
interactive_fit 48 8192 2 3 2.400000
interactive_fit 2906 2946 1 3 0.100000
interactive_add 2925.000000
interactive_fit 2915 2935 2 1 2.400000
interactive_fit 3464 3504 1 3 0.100000
interactive_add 3483.000000
interactive_fit 3473 3493 2 1 2.400000
interactive_fit 3624 3664 1 3 0.100000
interactive_add 3643.000000
interactive_fit 3633 3653 2 1 2.400000
interactive_fit 3717 3757 1 3 0.100000
interactive_add 3736.000000
interactive_fit 3726 3746 2 1 2.400000
```

```
interactive_fit 3521 3561 1 3 0.100000
interactive_add 3540.000000
interactive_fit 3530 3550 2 1 2.400000
interactive_fit 3992 4032 1 3 0.100000
interactive_add 4011.000000
interactive_fit 4001 4021 2 1 2.400000
interactive_drop 20
interactive_fit 1 32768 1 3 0.100000
interactive_fit 3530 3550 2 1 2.400000
set user peak subtract "0.6617 1.67e-04 4.83e-05 \"measured detector background\""
#Results
2004/04/14 11:33:44.0 2004/04/01 23:22:21.0
Be-7     1.2521e+01  5.049 -9999 -9999 2.5936e-03  5.049 -9999 -9999
K-40     2.2515e+00  6.137 -9999 -9999 3.9627e-04  6.137 -9999 -9999
Cs-137   3.4041e-03  39.91 -9999 -9999 5.9960e-07  39.91 -9999 -9999
Pb-210   2.7884e+00  6.601 -9999 -9999 4.9075e-04  6.601 -9999 -9999
Pb-212   1.8106e-02  10.03 -9999 -9999 3.1867e-06  10.03 -9999 -9999
U-235    4.7415e-03  17.35 -9999 -9999 8.3450e-07  17.35 -9999 -9999
#NuclideRatios
0        0        -9999    -9999 0          0          0          0
#g_CoincidenceCorrection
Be-7     477.595  1.000    0.000
K-40     1460.822 1.000    0.000
Cs-137   283.500  1.000    0.000
Cs-137   661.657  1.000    0.000
Pb-210   46.539   1.000    0.000
Pb-212   74.815   1.000    0.000
Pb-212   77.107   1.000    0.000
Pb-212   86.830   1.000    0.000
Pb-212   87.349   1.000    0.000
Pb-212   238.632  1.001    0.005
Pb-212   300.087  1.308    3.081
U-235    93.350   1.000    0.000
U-235    185.712  1.018    0.180
#g_UncertaintyBudget
~Uncertainties
```

```
Be-7      5.049 Combined uncertainty of activity (primary line)
Be-7      5.049 Combined uncertainty of concentration (primary line)
Be-7      0.410 Uncertainty of net count rate (primary line)
Be-7      0.005 Uncertainty of decay correction of activity
Be-7      0.023 Uncertainty of decay correction of concentration
Be-7      5.000 Uncertainty of efficiency (primary line)
Be-7      0.570 Uncertainty of emission prob. (primary line)
Be-7      0.000 Uncertainty of coinc. corr. (primary line)
K-40      6.137 Combined uncertainty of activity (primary line)
K-40      6.137 Combined uncertainty of concentration (primary line)
K-40      1.520 Uncertainty of net count rate (primary line)
K-40      0.000 Uncertainty of decay correction of activity
K-40      0.000 Uncertainty of decay correction of concentration
K-40      5.672 Uncertainty of efficiency (primary line)
K-40      1.782 Uncertainty of emission prob. (primary line)
K-40      0.000 Uncertainty of coinc. corr. (primary line)
Cs-137    15.16 Combined uncertainty of activity (primary line)
Cs-137    15.16 Combined uncertainty of concentration (primary line)
Cs-137    14.31 Uncertainty of net count rate (primary line)
Cs-137    0.000 Uncertainty of decay correction of activity
Cs-137    0.000 Uncertainty of decay correction of concentration
Cs-137    5.001 Uncertainty of efficiency (primary line)
Cs-137    0.235 Uncertainty of emission prob. (primary line)
Cs-137    0.000 Uncertainty of coinc. corr. (primary line)
Pb-210    6.601 Combined uncertainty of activity (primary line)
Pb-210    6.601 Combined uncertainty of concentration (primary line)
Pb-210    1.280 Uncertainty of net count rate (primary line)
Pb-210    0.000 Uncertainty of decay correction of activity
Pb-210    0.000 Uncertainty of decay correction of concentration
Pb-210    6.407 Uncertainty of efficiency (primary line)
Pb-210    0.941 Uncertainty of emission prob. (primary line)
Pb-210    0.000 Uncertainty of coinc. corr. (primary line)
Pb-212    10.03 Combined uncertainty of activity (primary line)
Pb-212    10.03 Combined uncertainty of concentration (primary line)
Pb-212    8.648 Uncertainty of net count rate (primary line)
Pb-212    0.000 Uncertainty of decay correction of activity
```

```
Pb-212   0.000 Uncertainty of decay correction of concentration
Pb-212   5.000 Uncertainty of efficiency (primary line)
Pb-212   0.924 Uncertainty of emission prob. (primary line)
Pb-212   0.005 Uncertainty of coinc. corr. (primary line)
U-235    17.35 Combined uncertainty of activity (primary line)
U-235    17.35 Combined uncertainty of concentration (primary line)
U-235    16.48 Uncertainty of net count rate (primary line)
U-235    0.000 Uncertainty of decay correction of activity
U-235    0.000 Uncertainty of decay correction of concentration
U-235    5.370 Uncertainty of efficiency (primary line)
U-235    0.874 Uncertainty of emission prob. (primary line)
U-235    0.180 Uncertainty of coinc. corr. (primary line)
~UncertaintyCalculationMethods
The activities and their uncertainties, as presented in the Results-block,
were calculated in SHAMAN as LSQ of peak-nuclide matrices (so-called
interference correction). The uncertainties of peak area (or count rate),
efficiency, and decay correction are incorporated in this calculation.
However, the uncertainties of emission probabilities and coincidence
correction factors cannot easily be incorporated.

The combined uncertainties presented in this block were obtained by summing
quadratically the individual uncertainty components. It must be noted that
the data of the primary line of each nuclide is used in this calculation,
i.e., no interference correction is applied. Due to differences between the
calculation methods, these combined uncertainty values are likely to differ
from those in the Results-block.

By default, the activity uncertainties in the Results-block are LSQ activity
uncertainties. If the primary line uncertainty is larger, however, it is shown
instead. All uncertainties in this block are primary line uncertainties.
#MDA
Be-7     3.3542e-02  6.9478e-06
K-40     4.9150e-02  8.6505e-06
Cs-137   4.6084e-03  8.1172e-07
Pb-210   8.8517e-02  1.5579e-05
Pb-212   6.3796e-03  1.1228e-06
```

U-235	4.1457e-03	7.2964e-07
Na-24	4.1368e-02	7.6039e+00
K-42	2.6866e-01	8.9893e+02
Sc-46	5.7541e-03	1.1231e-06
Sc-47	5.7043e-03	1.3340e-05
Cr-51	3.5112e-02	8.4504e-06
Mn-54	4.4642e-03	8.0783e-07
Fe-59	9.7721e-03	2.0901e-06
Co-57	2.1331e-03	3.8759e-07
Co-58	4.7273e-03	9.4029e-07
Co-60	6.7333e-03	1.1904e-06
Zn-65	1.0924e-02	1.9921e-06
Zn-69M	3.0150e-02	1.8454e+01
Ga-72	4.3182e-02	1.8406e+01
As-74	7.8634e-03	2.2541e-06
As-76	4.1286e-02	2.2251e-02
Rb-84	6.9733e-03	1.5990e-06
Rb-86	7.0712e-02	1.9813e-05
Sr-91	1.7659e-01	6.6650e+04
Y-88	6.2945e-03	1.2017e-06
Y-91	2.1420e+00	4.3721e-04
Y-93	4.6404e-01	5.5184e+04
Zr-89	9.2793e-03	2.3158e-05
Zr-95	7.9440e-03	1.6009e-06
Zr-97	3.0940e-02	1.3041e+00
Nb-95	4.5729e-03	1.0311e-06
Mo-99	9.8966e-02	4.0764e-04
Tc-99M	4.5544e-03	1.8759e-05
Ru-103	4.0208e-03	8.8252e-07
Rh-102	7.9322e-03	1.4558e-06
Rh-105	5.7467e-02	3.6020e-03
Rh-106	5.0715e-02	9.1353e-06
Ag-106M	1.5053e-02	7.5467e-06
Ag-108M	3.5848e-03	6.3096e-07
Ag-110M	6.7770e-03	1.2349e-06
Ag-111	6.4184e-02	3.6156e-05

Ag-112	4.9774e-02	1.6916e-01
Cd-115	1.7348e-02	1.4906e-04
Cd-115M	2.6334e-01	5.6303e-05
Sn-125	7.7654e-02	3.3587e-05
Sb-120B	3.3376e-03	2.6447e-06
Sb-122	1.1127e-02	4.7108e-05
Sb-124	4.9039e-03	9.9678e-07
Sb-125	1.1006e-02	1.9538e-06
Sb-126	9.7945e-03	3.4564e-06
Sb-127	1.8432e-02	3.0795e-05
Sb-128	5.3373e-02	8.7623e+04
Te-129M	1.5061e-01	3.4311e-05
Te-131M	6.4950e-02	1.1608e-02
Te-132	6.0871e-03	1.6005e-05
I-130	3.2789e-02	1.0971e+02
I-131	5.0795e-03	2.6341e-06
I-132	1.1200e-02	2.9448e-05
I-133	2.1355e-02	8.0921e-02
I-135	3.4664e-01	2.6907e+09
Cs-132	5.5427e-03	3.7169e-06
Cs-134	5.1766e-03	9.2161e-07
Cs-136	8.2265e-03	2.7976e-06
Ba-133	5.9469e-03	1.0490e-06
Ba-140	1.6597e-02	5.7645e-06
La-140	2.2480e-02	6.8864e-04
Ce-141	4.3395e-03	9.9717e-07
Ce-143	3.0724e-02	2.9079e-03
Ce-144	1.6938e-02	3.0733e-06
Nd-147	7.8737e-03	3.0517e-06
Pm-149	2.6002e-01	2.2972e-03
Pm-151	5.8599e-02	1.5458e-02
Sm-153	1.5544e-02	2.4389e-04
Sm-156	9.4565e-02	6.0206e+04
Eu-152	8.6172e-03	1.5193e-06
Eu-152M	3.1828e-01	2.4943e+05
Eu-155	6.0071e-03	1.0625e-06

```
Eu-156   3.2175e-02  1.0020e-05
Eu-157   7.1952e-02  1.0817e+01
Tm-168   4.6599e-03  9.0019e-07
W-187    6.7421e-02  7.5020e-02
Ir-190   5.6246e-03  2.0662e-06
Ir-192   4.1680e-03  8.2498e-07
Au-196   5.1859e-03  3.7075e-06
Au-196N  5.4751e-02  2.2092e+04
Au-198   7.2647e-03  3.1811e-05
Pb-203   9.7228e-03  9.4084e-05
Ra-224   7.0430e-02  1.2396e-05
U-237    1.2607e-02  8.0121e-06
Np-239   2.0000e-02  1.3893e-04
Am-241   6.5780e-03  1.1578e-06
#Conclusions
Mikael Moring
~IDCSummary
~NaturalNuclides
BE-7     53.29 D       3.4751E-03  1.68
~ActivationProducts
CO-60    5.27138 Y     2.6021E-06  61.99
~FissionProducts
CS-137   30.1 Y        2.2925E-06  66.05
~LabSummary
Be-7    2.5936e-03  5.049
Co-60   less than  1.2e-06
Cs-137  5.9960e-07  39.91
~ResultComparison
Be-7 is discrepant, but the activities in the station and laboratory
measurement are of comparable levels (station result is a factor 1.3 higher)
The lab measurement could not confirm the findings of Cs-137 and Co-60 at the
levels measured at the station. The Cs-137 finding at the laboratory is also
uncertain, because the count rates are close to the measured detector background
According to the laboratory measurement this should not be classified as a
level 5 sample, however, it is important to check also the analysis of the other
half of the sample, before making any final decisions.
```

```
#Comment
Resent with Conclusions block activities in Bq
STOP
```

RMSSOH

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 000022153 ISP34
DATA_TYPE RMSSOH
#Header 3
ISP34 ISP34_001
2003/09/03 12:00:00.0 2003/09/03 14:00:00.0 2003/09/03 14:00:00.0
#AirSamplerFlow
563.8000   -9999999999 2003/09/03 12:00:00.0 600
566.9000   -9999999999 2003/09/03 12:10:00.0 600
565.5000   -9999999999 2003/09/03 12:20:00.0 600
564.0000   -9999999999 2003/09/03 12:30:00.0 600
564.7000   -9999999999 2003/09/03 12:40:00.0 600
558.6000   -9999999999 2003/09/03 12:50:00.0 600
560.4000   -9999999999 2003/09/03 13:00:00.0 600
561.3000   -9999999999 2003/09/03 13:10:00.0 600
560.5000   -9999999999 2003/09/03 13:20:00.0 600
558.2000   -9999999999 2003/09/03 13:30:00.0 600
559.7000   -9999999999 2003/09/03 13:40:00.0 600
556.6000   -9999999999 2003/09/03 13:50:00.0 600
#DetEnv
19.2  CLOSED 56  2500  -179 ON  -999 -99999 2003/09/03 12:00:00.0 600
19.6  CLOSED 58  2500  -179 ON  -999 -99999 2003/09/03 12:10:00.0 600
19.1  CLOSED 57  2500  -179 ON  -999 -99999 2003/09/03 12:20:00.0 600
19.4  CLOSED 55  2500  -179 ON  -999 -99999 2003/09/03 12:30:00.0 600
19.3  CLOSED 58  2500  -179 ON  -999 -99999 2003/09/03 12:40:00.0 600
19.2  CLOSED 56  2500  -179 ON  -999 -99999 2003/09/03 12:50:00.0 600
19.6  CLOSED 57  2500  -179 ON  -999 -99999 2003/09/03 13:00:00.0 600
```

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19.0  CLOSED 57  2500  -179 ON  -999 -99999 2003/09/03 13:10:00.0 600
19.5  CLOSED 55  2500  -179 ON  -999 -99999 2003/09/03 13:20:00.0 600
19.3  CLOSED 58  2500  -179 ON  -999 -99999 2003/09/03 13:30:00.0 600
19.2  CLOSED 55  2500  -179 ON  -999 -99999 2003/09/03 13:40:00.0 600
19.6  CLOSED 56  2500  -179 ON  -999 -99999 2003/09/03 13:50:00.0 600
#PowerSupply
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:00:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:10:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:20:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:30:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:40:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 12:50:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:00:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:10:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:20:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:30:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:40:00.0 600
MAIN ON  AUX 0   UPS OFF 2003/09/03 13:50:00.0 600
#EquipStatus
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:00:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:10:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:20:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:30:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:40:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 12:50:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:00:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:10:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:20:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:30:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:40:00.0 600
C: 34200309031111   P: 34200309021111   A: 34200309011111   2003/09/03 13:50:00.0 600
#TamperEnv
DOOR1                CLOSED 2003/09/03 12:00:00.0 600
ASPANEL              CLOSED 2003/09/03 12:00:00.0 600
ASLID                CLOSED 2003/09/03 12:00:00.0 600
DOOR1                CLOSED 2003/09/03 12:10:00.0 600
```

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ASPANEL              CLOSED 2003/09/03 12:10:00.0 600
ASLID                CLOSED 2003/09/03 12:10:00.0 600
DOOR1                CLOSED 2003/09/03 12:20:00.0 600
ASPANEL              CLOSED 2003/09/03 12:20:00.0 600
ASLID                CLOSED 2003/09/03 12:20:00.0 600
DOOR1                CLOSED 2003/09/03 12:30:00.0 600
ASPANEL              CLOSED 2003/09/03 12:30:00.0 600
ASLID                CLOSED 2003/09/03 12:30:00.0 600
DOOR1                CLOSED 2003/09/03 12:40:00.0 600
ASPANEL              CLOSED 2003/09/03 12:40:00.0 600
ASLID                CLOSED 2003/09/03 12:40:00.0 600
DOOR1                CLOSED 2003/09/03 12:50:00.0 600
ASPANEL              CLOSED 2003/09/03 12:50:00.0 600
ASLID                CLOSED 2003/09/03 12:50:00.0 600
DOOR1                CLOSED 2003/09/03 13:00:00.0 600
ASPANEL              CLOSED 2003/09/03 13:00:00.0 600
ASLID                CLOSED 2003/09/03 13:00:00.0 600
DOOR1                CLOSED 2003/09/03 13:10:00.0 600
ASPANEL              CLOSED 2003/09/03 13:10:00.0 600
ASLID                CLOSED 2003/09/03 13:10:00.0 600
DOOR1                CLOSED 2003/09/03 13:20:00.0 600
ASPANEL              CLOSED 2003/09/03 13:20:00.0 600
ASLID                CLOSED 2003/09/03 13:20:00.0 600
DOOR1                CLOSED 2003/09/03 13:30:00.0 600
ASPANEL              CLOSED 2003/09/03 13:30:00.0 600
ASLID                CLOSED 2003/09/03 13:30:00.0 600
DOOR1                CLOSED 2003/09/03 13:40:00.0 600
ASPANEL              CLOSED 2003/09/03 13:40:00.0 600
ASLID                CLOSED 2003/09/03 13:40:00.0 600
DOOR1                CLOSED 2003/09/03 13:50:00.0 600
ASPANEL              CLOSED 2003/09/03 13:50:00.0 600
ASLID                CLOSED 2003/09/03 13:50:00.0 600
STOP
```

RNPS

Radionuclide Network Product Summary
Product created on 2016/05/25 11:17:03

This product shows the radionuclide products received at the IDC between
2011/09/01 00:00:00 and 2011/09/07 00:00:00

Station	SID	P/G/B	Cstart\(GMT\)	Cstop\(GMT\)	Category	Status	Products	CTBT Relevant
USP76	1632166	P	11/09/05 23:40	11/09/06 23:40	Level 1	R	A,R	
USP79	1632338	P	11/09/02 22:25	11/09/06 23:39	Level 0	R	A,R	
AUP04	1632145	P	11/09/05 23:46	11/09/06 23:28	Level 1	R	A,R	
CAP15	1632147	P	11/09/05 22:55	11/09/06 22:55	Level 1	R	A,R	
RUP60	1632114	P	11/09/05 23:10	11/09/06 22:42	Level 1	R	A,R	
CKP23	1632128	P	11/09/05 22:21	11/09/06 22:16	Level 2	R	A,R	
USP70	1632113	P	11/09/05 21:39	11/09/06 21:39	Level 1	R	A,R	
NZP47	1632081	P	11/09/05 21:00	11/09/06 20:57	Level 1	R	A,R	
USP71	1632063	P	11/09/05 20:34	11/09/06 20:34	Level 3	R	A,R	CS-134 CS-137
CLP18	1632007	P	11/09/05 19:05	11/09/06 19:05	Level 1	R	A,R	
USP72	1632000	P	11/09/05 18:54	11/09/06 18:54	Level 1	R	A,R	
USP73	1631989	P	11/09/05 18:29	11/09/06 18:29	Level 1	R	A,R	
GBP68	1631982	P	11/09/05 17:47	11/09/06 17:37	Level 2	R	A,R	
ARP01	1631884	P	11/09/05 17:10	11/09/06 17:10	Level 1	R	A,R	
CLP19	1631941	P	11/09/05 17:00	11/09/06 17:00	Level 2	R	A,R	
CAP17	1631909	P	11/09/05 16:33	11/09/06 16:30	Level 1	R	A,R	
CAP16	1631863	P	11/09/05 15:12	11/09/06 14:46	Level 1	R	A,R	
ISP34	1631841	P	11/09/05 13:26	11/09/06 13:22	Level 1	R	A,R	
ARP03	1631808	P	11/09/05 13:01	11/09/06 13:09	Level 2	R	A,R	
TZP64	1631819	P	11/09/05 14:07	11/09/06 13:09	Level 1	R	A,R	
BRP11	1631809	P	11/09/05 13:02	11/09/06 13:02	Level 1	R	A,R	
FRP28	1631707	P	11/09/05 11:30	11/09/06 11:20	Level 1	R	A,R	
PAP50	1631741	P	11/09/05 10:58	11/09/06 10:56	Level 1	R	A,R	
FRP31	1631663	P	11/09/05 10:03	11/09/06 10:00	Level 1	R	A,R	
MRP43	1631669	P	11/09/05 08:53	11/09/06 09:33	Level 1	R	A,R	

MYP42	1631700	P	11/09/05 09:36	11/09/06 09:33	Level 2	R	A,R	
NOP49	1631704	P	11/09/05 09:33	11/09/06 09:31	Level 1	R	A,R	
SEP63	1631671	P	11/09/05 08:49	11/09/06 08:48	Level 1	R	A,R	
CMP13	1631625	P	11/09/05 07:32	11/09/06 07:21	Level 1	R	A,R	
JPP38	1631597	P	11/09/05 06:55	11/09/06 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1631587	P	11/09/05 06:25	11/09/06 06:25	Level 1	R	A,R	
FRP30	1631513	P	11/09/05 05:19	11/09/06 05:37	Level 3	R	A,R	NA-24
RUP54	1631519	P	11/09/05 05:57	11/09/06 05:36	Level 2	R	A,R	
PHP52	1631568	P	11/09/05 05:57	11/09/06 05:30	Level 1	R	A,R	
RUP61	1631525	P	11/09/05 04:27	11/09/06 04:22	Level 1	R	A,R	
GBP66	1631501	P	11/09/05 04:05	11/09/06 04:05	Level 1	R	A,R	
MNP45	1631450	P	11/09/05 03:28	11/09/06 03:26	Level 1	R	A,R	
USP77	1631460	P	11/09/05 02:54	11/09/06 02:54	Level 1	R	A,R	
AUP06	1631440	P	11/09/05 02:37	11/09/06 02:36	Level 1	R	A,R	
USP78	1631435	P	11/09/05 02:05	11/09/06 02:05	Level 1	R	A,R	
AUP08	1631396	P	11/09/05 01:37	11/09/06 01:36	Level 1	R	A,R	
RUP59	1631335	P	11/09/05 01:39	11/09/06 01:35	Level 1	R	A,R	
RUP58	1631369	P	11/09/05 01:34	11/09/06 01:31	Level 1	R	A,R	
FJP26	1631407	P	11/09/05 01:19	11/09/06 01:12	Level 1	R	A,R	
PGP51	1631390	P	11/09/05 00:31	11/09/06 00:48	Level 1	R	A,R	
JPP37	1631382	P	11/09/05 00:23	11/09/06 00:23	Level 1	R	A,R	
AUP04	1631329	P	11/09/04 23:40	11/09/05 23:45	Level 1	R	A,R	
USP76	1631339	P	11/09/04 23:40	11/09/05 23:40	Level 1	R	A,R	
RUP60	1631258	P	11/09/04 23:43	11/09/05 23:08	Level 1	R	A,R	
CAP15	1631324	P	11/09/04 22:55	11/09/05 22:55	Level 1	R	A,R	
CKP23	1631312	P	11/09/04 22:20	11/09/05 22:19	Level 1	R	A,R	
USP70	1631263	P	11/09/04 21:39	11/09/05 21:39	Level 1	R	A,R	
NZP47	1631256	P	11/09/04 21:00	11/09/05 20:56	Level 1	R	A,R	
USP71	1631241	P	11/09/04 20:34	11/09/05 20:34	Level 3	R	A,R	CS-137
CLP18	1631182	P	11/09/04 19:05	11/09/05 19:05	Level 1	R	A,R	
USP72	1631176	P	11/09/04 18:54	11/09/05 18:54	Level 1	R	A,R	
USP75	1631174	P	11/09/04 18:49	11/09/05 18:46	Level 1	R	A,R	
USP73	1631168	P	11/09/04 18:29	11/09/05 18:29	Level 1	R	A,R	
GBP68	1631161	P	11/09/04 17:50	11/09/05 17:46	Level 1	R	A,R	
CLP19	1631114	P	11/09/04 17:00	11/09/05 17:00	Level 1	R	A,R	
ARP01	1631050	P	11/09/04 17:00	11/09/05 17:00	Level 1	R	A,R	

CAP17	1631079	P	11/09/04 16:33	11/09/05 16:30	Level 1	R	A,R	
CAP16	1631024	P	11/09/04 15:13	11/09/05 15:11	Level 1	R	A,R	
TZP64	1630991	P	11/09/04 13:33	11/09/05 14:01	Level 1	R	A,R	
ISP34	1631015	P	11/09/04 13:26	11/09/05 13:22	Level 1	R	A,R	
BRP11	1630980	P	11/09/04 13:02	11/09/05 13:02	Level 1	R	A,R	
ARP03	1631021	P	11/09/04 13:21	11/09/05 12:57	Level 1	R	A,R	
FRP28	1630879	P	11/09/04 11:30	11/09/05 11:20	Level 1	R	A,R	
PAP50	1630926	P	11/09/04 11:24	11/09/05 10:57	Level 1	R	A,R	
FRP31	1630842	P	11/09/04 10:03	11/09/05 10:01	Level 2	R	A,R	
MYP42	1630884	P	11/09/04 09:41	11/09/05 09:34	Level 2	R	A,R	
NOP49	1630882	P	11/09/04 09:33	11/09/05 09:31	Level 1	R	A,R	
MRP43	1630856	P	11/09/04 09:26	11/09/05 08:49	Level 1	R	A,R	
SEP63	1630848	P	11/09/04 08:49	11/09/05 08:48	Level 2	R	A,R	
CMP13	1630796	P	11/09/04 07:31	11/09/05 07:27	Level 1	R	A,R	
JPP38	1630773	P	11/09/04 06:55	11/09/05 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1630765	P	11/09/04 06:25	11/09/05 06:25	Level 1	R	A,R	
PHP52	1630747	P	11/09/04 05:35	11/09/05 05:54	Level 1	R	A,R	
RUP54	1630699	P	11/09/04 05:44	11/09/05 05:52	Level 1	R	A,R	
FRP30	1630703	P	11/09/04 05:29	11/09/05 05:15	Level 1	R	A,R	
RUP61	1630700	P	11/09/04 04:17	11/09/05 04:22	Level 2	R	A,R	
GBP66	1630683	P	11/09/04 04:05	11/09/05 04:05	Level 1	R	A,R	
MNP45	1630632	P	11/09/04 03:27	11/09/05 03:26	Level 1	R	A,R	
USP77	1630638	P	11/09/04 02:54	11/09/05 02:54	Level 1	R	A,R	
AUP06	1630623	P	11/09/04 02:44	11/09/05 02:37	Level 1	R	A,R	
USP78	1630616	P	11/09/04 02:05	11/09/05 02:05	Level 1	R	A,R	
AUP09	1630591	P	11/09/04 02:10	11/09/05 02:00	Level 2	R	A,R	
AUP08	1630587	P	11/09/04 02:03	11/09/05 01:36	Level 1	R	A,R	
RUP59	1630519	P	11/09/04 01:38	11/09/05 01:33	Level 1	R	A,R	
RUP58	1630562	P	11/09/04 01:33	11/09/05 01:32	Level 1	R	A,R	
FJP26	1630575	P	11/09/04 00:48	11/09/05 01:14	Level 1	R	A,R	
PGP51	1630577	P	11/09/04 00:54	11/09/05 00:31	Level 1	R	A,R	
USP76	1630525	P	11/09/03 23:40	11/09/04 23:40	Level 1	R	A,R	
AUP04	1630500	P	11/09/03 23:19	11/09/04 23:39	Level 1	R	A,R	
CAP15	1630505	P	11/09/03 22:55	11/09/04 22:55	Level 1	R	A,R	
CKP23	1630493	P	11/09/03 22:21	11/09/04 22:17	Level 2	R	A,R	
USP70	1630451	P	11/09/03 21:39	11/09/04 21:39	Level 1	R	A,R	

NZP47	1630443	P	11/09/03 21:00	11/09/04 20:57	Level 1	R	A,R	
USP71	1630427	P	11/09/03 20:34	11/09/04 20:34	Level 3	R	A,R	CS-137
CLP18	1630369	P	11/09/03 19:05	11/09/04 19:05	Level 1	R	A,R	
USP72	1630362	P	11/09/03 18:54	11/09/04 18:54	Level 1	R	A,R	
USP75	1630363	P	11/09/03 18:49	11/09/04 18:46	Level 1	R	A,R	
USP73	1630350	P	11/09/03 18:29	11/09/04 18:29	Level 2	R	A,R	
GBP68	1630341	P	11/09/03 17:47	11/09/04 17:49	Level 1	R	A,R	
CLP19	1630274	P	11/09/03 17:00	11/09/04 17:00	Level 1	R	A,R	
ARP01	1630191	P	11/09/03 17:10	11/09/04 16:50	Level 1	R	A,R	
CAP17	1630219	P	11/09/03 16:33	11/09/04 16:30	Level 1	R	A,R	
CAP16	1630178	P	11/09/03 15:15	11/09/04 15:11	Level 1	R	A,R	
TZP64	1630123	P	11/09/03 12:41	11/09/04 13:24	Level 1	R	A,R	
ISP34	1630158	P	11/09/03 13:26	11/09/04 13:22	Level 1	R	A,R	
ARP03	1630136	P	11/09/03 13:09	11/09/04 13:18	Level 1	R	A,R	
BRP11	1630126	P	11/09/03 13:02	11/09/04 13:02	Level 1	R	A,R	
PAP50	1630070	P	11/09/03 11:19	11/09/04 11:21	Level 1	R	A,R	
FRP28	1630061	P	11/09/03 11:30	11/09/04 11:20	Level 1	R	A,R	
FRP31	1629996	P	11/09/03 10:03	11/09/04 10:01	Level 1	R	A,R	
MYP42	1630035	P	11/09/03 09:41	11/09/04 09:39	Level 2	R	A,R	
NOP49	1630033	P	11/09/03 09:33	11/09/04 09:31	Level 1	R	A,R	
MRP43	1630008	P	11/09/03 09:34	11/09/04 09:23	Level 1	R	A,R	
SEP63	1630004	P	11/09/03 08:49	11/09/04 08:48	Level 1	R	A,R	
CMP13	1629946	P	11/09/03 07:26	11/09/04 07:27	Level 1	R	A,R	
JPP38	1629935	P	11/09/03 06:55	11/09/04 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1629925	P	11/09/03 06:25	11/09/04 06:25	Level 1	R	A,R	
RUP54	1629860	P	11/09/03 05:21	11/09/04 05:38	Level 1	R	A,R	
PHP52	1629907	P	11/09/03 05:35	11/09/04 05:30	Level 1	R	A,R	
FRP30	1629848	P	11/09/03 05:13	11/09/04 05:21	Level 1	R	A,R	
RUP61	1629872	P	11/09/03 04:48	11/09/04 04:11	Level 1	R	A,R	
GBP66	1629844	P	11/09/03 04:05	11/09/04 04:05	Level 1	R	A,R	
MNP45	1629796	P	11/09/03 03:28	11/09/04 03:25	Level 1	R	A,R	
USP77	1629805	P	11/09/03 02:54	11/09/04 02:54	Level 1	R	A,R	
AUP06	1629773	P	11/09/03 02:18	11/09/04 02:43	Level 2	R	A,R	
AUP09	1629784	P	11/09/03 02:57	11/09/04 02:09	Level 1	R	A,R	
USP78	1629782	P	11/09/03 02:04	11/09/04 02:05	Level 1	R	A,R	
AUP08	1629753	P	11/09/03 01:53	11/09/04 02:02	Level 1	R	A,R	

RUP59	1629693	P	11/09/03 01:37	11/09/04 01:33	Level 1	R	A,R	
RUP58	1629720	P	11/09/03 01:33	11/09/04 01:31	Level 1	R	A,R	
PGP51	1629747	P	11/09/03 00:47	11/09/04 00:54	Level 1	R	A,R	
FJP26	1629755	P	11/09/03 01:13	11/09/04 00:43	Level 2	R	A,R	
JPP37	1629732	P	11/09/03 00:23	11/09/04 00:23	Level 2	R	A,R	
AUP04	1629685	P	11/09/02 23:30	11/09/03 23:18	Level 1	R	A,R	
CAP15	1629684	P	11/09/02 22:55	11/09/03 22:55	Level 1	R	A,R	
RUP60	1629664	P	11/09/02 22:32	11/09/03 22:39	Level 1	R	A,R	
CKP23	1629666	P	11/09/02 22:18	11/09/03 22:19	Level 1	R	A,R	
USP70	1629628	P	11/09/02 21:39	11/09/03 21:39	Level 1	R	A,R	
NZP47	1629623	P	11/09/02 21:01	11/09/03 20:57	Level 1	R	A,R	
USP71	1629604	P	11/09/02 20:34	11/09/03 20:34	Level 3	R	A,R	CS-137
CLP18	1629555	P	11/09/02 19:05	11/09/03 19:05	Level 1	R	A,R	
USP72	1629546	P	11/09/02 18:54	11/09/03 18:54	Level 1	R	A,R	
USP75	1629544	P	11/09/02 18:49	11/09/03 18:46	Level 1	R	A,R	
USP73	1629529	P	11/09/02 18:29	11/09/03 18:29	Level 1	R	A,R	
GBP68	1629523	P	11/09/02 17:43	11/09/03 17:46	Level 1	R	A,R	
CLP19	1629492	P	11/09/02 17:00	11/09/03 17:00	Level 1	R	A,R	
ARP01	1629460	P	11/09/02 17:20	11/09/03 17:00	Level 1	R	A,R	
CAP17	1629458	P	11/09/02 16:33	11/09/03 16:30	Level 1	R	A,R	
CAP16	1629414	P	11/09/02 15:13	11/09/03 15:13	Level 2	R	A,R	
ISP34	1629395	P	11/09/02 13:26	11/09/03 13:22	Level 1	R	A,R	
BRP11	1629364	P	11/09/02 13:02	11/09/03 13:02	Level 1	R	A,R	
TZP64	1629371	P	11/09/02 13:08	11/09/03 12:33	Level 1	R	A,R	
FRP28	1629298	P	11/09/02 11:30	11/09/03 11:20	Level 2	R	A,R	
PAP50	1629308	P	11/09/02 10:53	11/09/03 11:18	Level 1	R	A,R	
FRP31	1629212	P	11/09/02 10:03	11/09/03 10:01	Level 1	R	A,R	
MYP42	1629261	P	11/09/02 09:39	11/09/03 09:37	Level 2	R	A,R	
NOP49	1629260	P	11/09/02 09:33	11/09/03 09:31	Level 1	R	A,R	
MRP43	1629223	P	11/09/02 09:39	11/09/03 09:31	Level 1	R	A,R	
SEP63	1629224	P	11/09/02 08:49	11/09/03 08:48	Level 2	R	A,R	
CMP13	1629177	P	11/09/02 07:25	11/09/03 07:22	Level 1	R	A,R	
JPP38	1629149	P	11/09/02 06:55	11/09/03 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1629137	P	11/09/02 06:25	11/09/03 06:25	Level 1	R	A,R	
PHP52	1629115	P	11/09/02 05:32	11/09/03 05:30	Level 1	R	A,R	
RUP54	1629075	P	11/09/02 05:38	11/09/03 05:17	Level 1	R	A,R	

FRP30	1629073	P	11/09/02 05:10	11/09/03 05:08	Level 1	R	A,R	
RUP61	1629087	P	11/09/02 04:49	11/09/03 04:41	Level 2	R	A,R	
GBP66	1629054	P	11/09/02 04:05	11/09/03 04:05	Level 1	R	A,R	
MNP45	1629013	P	11/09/02 03:28	11/09/03 03:25	Level 1	R	A,R	
AUP09	1628970	P	11/09/02 02:11	11/09/03 02:57	Level 2	R	A,R	
USP77	1629018	P	11/09/02 02:54	11/09/03 02:54	Level 1	R	A,R	
AUP06	1628995	P	11/09/02 02:44	11/09/03 02:18	Level 1	R	A,R	
USP78	1628991	P	11/09/02 02:04	11/09/03 02:04	Level 1	R	A,R	
AUP08	1628812	P	11/09/01 01:43	11/09/03 01:52	Level 1	R	A,R	
RUP59	1628900	P	11/09/02 01:38	11/09/03 01:32	Level 2	R	A,R	
RUP58	1628929	P	11/09/02 01:35	11/09/03 01:32	Level 1	R	A,R	
FJP26	1628962	P	11/09/02 01:25	11/09/03 01:09	Level 1	R	A,R	
PGP51	1628954	P	11/09/02 00:45	11/09/03 00:46	Level 1	R	A,R	
JPP37	1628944	P	11/09/02 00:23	11/09/03 00:23	Level 1	R	A,R	
USP76	1628906	P	11/09/01 23:40	11/09/02 23:40	Level 1	R	A,R	
AUP04	1628881	P	11/09/01 23:16	11/09/02 23:29	Level 1	R	A,R	
CAP15	1628892	P	11/09/01 22:55	11/09/02 22:55	Level 1	R	A,R	
USP79	1631307	P	11/09/01 22:25	11/09/02 22:25	Level 0	R	A,R	
CKP23	1628873	P	11/09/01 22:19	11/09/02 22:16	Level 1	R	A,R	
USP70	1628837	P	11/09/01 21:39	11/09/02 21:39	Level 2	R	A,R	
NZP47	1628829	P	11/09/01 20:56	11/09/02 20:59	Level 1	R	A,R	
USP71	1628811	P	11/09/01 20:34	11/09/02 20:34	Level 3	R	A,R	CS-134 CS-137
CLP18	1628754	P	11/09/01 19:05	11/09/02 19:05	Level 1	R	A,R	
USP72	1628747	P	11/09/01 18:54	11/09/02 18:54	Level 1	R	A,R	
USP75	1628744	P	11/09/01 18:49	11/09/02 18:46	Level 1	R	A,R	
USP73	1628732	P	11/09/01 18:29	11/09/02 18:29	Level 1	R	A,R	
GBP68	1628725	P	11/09/01 17:39	11/09/02 17:42	Level 1	R	A,R	
ARP01	1628637	P	11/09/01 17:20	11/09/02 17:10	Level 1	R	A,R	
CLP19	1628689	P	11/09/01 17:00	11/09/02 17:00	Level 2	R	A,R	
CAP17	1628658	P	11/09/01 17:12	11/09/02 16:30	Level 1	R	A,R	
CAP16	1628611	P	11/09/01 15:14	11/09/02 15:12	Level 1	R	A,R	
ARP03	1628566	P	11/09/01 13:02	11/09/02 13:25	Level 1	R	A,R	
ISP34	1628593	P	11/09/01 13:26	11/09/02 13:22	Level 1	R	A,R	
TZP64	1628563	P	11/09/01 13:08	11/09/02 13:05	Level 1	R	A,R	
BRP11	1628557	P	11/09/01 13:02	11/09/02 13:02	Level 1	R	A,R	
FRP28	1628469	P	11/09/01 11:30	11/09/02 11:20	Level 1	R	A,R	

PAP50	1628498	P	11/09/01 10:54	11/09/02 10:51	Level 1	R	A,R	
FRP31	1628419	P	11/09/01 10:03	11/09/02 10:01	Level 1	R	A,R	
MRP43	1628434	P	11/09/01 09:12	11/09/02 09:37	Level 1	R	A,R	
MYP42	1628461	P	11/09/01 09:39	11/09/02 09:37	Level 2	R	A,R	
NOP49	1628460	P	11/09/01 09:33	11/09/02 09:31	Level 1	R	A,R	
SEP63	1628426	P	11/09/01 08:49	11/09/02 08:48	Level 1	R	A,R	
CMP13	1628368	P	11/09/01 07:20	11/09/02 07:23	Level 1	R	A,R	
JPP38	1628353	P	11/09/01 06:55	11/09/02 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1628341	P	11/09/01 06:25	11/09/02 06:25	Level 1	R	A,R	
RUP54	1628265	P	11/09/01 05:36	11/09/02 05:33	Level 1	R	A,R	
PHP52	1628324	P	11/09/01 05:33	11/09/02 05:30	Level 1	R	A,R	
FRP30	1628271	P	11/09/01 05:31	11/09/02 05:04	Level 1	R	A,R	
RUP61	1628281	P	11/09/01 05:32	11/09/02 04:43	Level 2	R	A,R	
GBP66	1628262	P	11/09/01 04:05	11/09/02 04:05	Level 1	R	A,R	
MNP45	1628214	P	11/09/01 03:53	11/09/02 03:25	Level 1	R	A,R	
USP77	1628218	P	11/09/01 02:54	11/09/02 02:54	Level 1	R	A,R	
AUP06	1628200	P	11/09/01 02:46	11/09/02 02:43	Level 1	R	A,R	
AUP09	1628169	P	11/09/01 02:15	11/09/02 02:10	Level 1	R	R	
USP78	1628193	P	11/09/01 02:05	11/09/02 02:04	Level 1	R	A,R	
RUP59	1628099	P	11/09/01 01:39	11/09/02 01:34	Level 1	R	A,R	
RUP58	1628130	P	11/09/01 01:32	11/09/02 01:34	Level 1	R	A,R	
FJP26	1628153	P	11/09/01 01:04	11/09/02 01:21	Level 1	R	A,R	
PGP51	1628154	P	11/09/01 00:43	11/09/02 00:45	Level 1	R	A,R	
JPP37	1628143	P	11/09/01 00:23	11/09/02 00:23	Level 1	R	A,R	
USP76	1628101	P	11/08/31 23:40	11/09/01 23:40	Level 1	R	A,R	
AUP04	1628073	P	11/08/31 23:05	11/09/01 23:15	Level 1	R	A,R	
CAP15	1628084	P	11/08/31 22:55	11/09/01 22:55	Level 1	R	A,R	
RUP60	1628016	P	11/08/31 23:01	11/09/01 22:40	Level 1	R	A,R	
USP79	1628066	P	11/08/31 22:25	11/09/01 22:25	Level 1	R	A,R	
CKP23	1628071	P	11/08/31 22:18	11/09/01 22:17	Level 1	R	A,R	
USP70	1628025	P	11/08/31 21:39	11/09/01 21:39	Level 1	R	A,R	
NZP47	1628017	P	11/08/31 21:00	11/09/01 20:54	Level 1	R	A,R	
USP71	1628002	P	11/08/31 20:34	11/09/01 20:34	Level 3	R	A,R	CS-134 CS-137
USP74	1635273	P	11/08/31 20:04	11/09/01 20:04	Level 0	R	A,R	
CLP18	1627944	P	11/08/31 19:05	11/09/01 19:05	Level 2	R	A,R	
USP72	1627938	P	11/08/31 18:54	11/09/01 18:54	Level 1	R	A,R	

USP75	1627936	P	11/08/31 18:49	11/09/01 18:46	Level 1	R	A,R	
USP73	1627929	P	11/08/31 18:29	11/09/01 18:29	Level 1	R	A,R	
ARP01	1627818	P	11/08/31 17:20	11/09/01 17:10	Level 1	R	A,R	
CAP17	1627846	P	11/08/31 17:16	11/09/01 17:08	Level 1	R	A,R	
CLP19	1627875	P	11/08/31 17:00	11/09/01 17:00	Level 1	R	A,R	
CAP16	1627802	P	11/08/31 15:50	11/09/01 15:14	Level 1	R	A,R	
ISP34	1627782	P	11/08/31 13:26	11/09/01 13:22	Level 1	R	A,R	
BRP11	1627746	P	11/08/31 13:02	11/09/01 13:02	Level 1	R	A,R	
TZP64	1627744	P	11/08/31 12:38	11/09/01 13:02	Level 1	R	A,R	
ARP03	1627759	P	11/08/31 13:09	11/09/01 12:56	Level 1	R	A,R	
FRP28	1627671	P	11/08/31 11:30	11/09/01 11:20	Level 1	R	A,R	
PAP50	1627688	P	11/08/31 11:05	11/09/01 10:53	Level 1	R	A,R	
FRP31	1627603	P	11/08/31 10:03	11/09/01 10:01	Level 1	R	A,R	
MYP42	1627641	P	11/08/31 09:39	11/09/01 09:38	Level 2	R	A,R	
NOP49	1627640	P	11/08/31 09:33	11/09/01 09:31	Level 1	R	A,R	
MRP43	1627614	P	11/08/31 09:14	11/09/01 09:01	Level 1	R	A,R	
SEP63	1627607	P	11/08/31 08:49	11/09/01 08:48	Level 2	R	A,R	
CMP13	1627555	P	11/08/31 07:16	11/09/01 07:17	Level 1	R	A,R	
JPP38	1627539	P	11/08/31 06:55	11/09/01 06:55	Level 3	R	A,R	CS-134 CS-137
DEP33	1627530	P	11/08/31 06:25	11/09/01 06:25	Level 1	R	A,R	
PHP52	1627511	P	11/08/31 05:33	11/09/01 05:30	Level 1	R	A,R	
RUP54	1627461	P	11/08/31 05:43	11/09/01 05:30	Level 1	R	A,R	
FRP30	1627458	P	11/08/31 05:16	11/09/01 05:26	Level 1	R	A,R	
RUP61	1627470	P	11/08/31 04:20	11/09/01 05:20	Level 2	R	A,R	
GBP66	1627448	P	11/08/31 04:05	11/09/01 04:05	Level 1	R	A,R	
MNP45	1627402	P	11/08/31 03:28	11/09/01 03:25	Level 1	R	A,R	
USP77	1627405	P	11/08/31 02:54	11/09/01 02:54	Level 1	R	A,R	
AUP06	1627393	P	11/08/31 02:47	11/09/01 02:46	Level 2	R	A,R	
AUP09	1627354	P	11/08/31 02:03	11/09/01 02:14	Level 1	R	A,R	
USP78	1627386	P	11/08/31 02:04	11/09/01 02:05	Level 1	R	A,R	
AUP08	1627350	P	11/08/31 01:48	11/09/01 01:41	Level 1	R	A,R	
RUP59	1627288	P	11/08/31 01:40	11/09/01 01:35	Level 1	R	A,R	
RUP58	1627321	P	11/08/31 01:33	11/09/01 01:29	Level 1	R	A,R	
FJP26	1627356	P	11/08/31 01:27	11/09/01 00:59	Level 1	R	A,R	
PGP51	1627344	P	11/08/31 01:02	11/09/01 00:42	Level 1	R	A,R	

```
Products Legend:
     A: ARR
     R: RRR
     S: SSREB
     XA: SAMPML XML A
     XR: SAMPML XML R
```

RRR – Noble Gas Beta-Gamma Coincidence Version

The example provided below is an HTML version of a RRR produced using data from the JPX38 beta-gamma coincidence system as it would appear in a web page. If one receives the HTML file, it can be copied and pasted into an HTML editor (several are available via the Web) to view the formatted contents of the file.

IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2016-04-01 15:11:24
Sample Arrival Time: 2016-04-01 14:49:30
Time difference from receipt of raw data to report creation: 21 m 54.0 s

Sample Information

Station ID:	JPX38	Detector Code: JPX38_004
Authenticated:	NO	

Station Location:	Takasaki, Gunma, Japan.		
Detector Description:	Detector #4 in Takasaki, Gunma, Japan.		
System Technology:	SAUNA		
Sample Reference ID:	38201603310811G		
Sample ID:	3549312		
Stable Xe Volume:	0.99 ml	Sample Type:	Gas
Collection Start:	2016-03-31 08:34:30	Sampling Time:	12 h 1 s
Collection Stop:	2016-03-31 20:34:31	Processing Time:	7 h 4 m 58 s
Acquisition Start:	2016-04-01 03:39:29	Acquisition Time:	11 h 9 m 58 s
Acquisition Stop:	2016-04-01 14:49:27		

IDC Analysis General Comments:
2016-04-01 15:11:18

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.78E-01	A
Xe-133m	YES	1.42E-01	B
Xe-133	YES	5.04E-01	B
Xe-135	NO	9.53E-01	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon counts in Xenon sample: 89.0

Xenon isotopes - Analysis Method NCC

Nuclide	Half-Life	Conc (mBq/m3)	LC	MDC	%RelErr
XE-131M	11.900 D	< LC	0.04	0.11	N/A
XE-133M	2.190 D	0.04	0.04	0.09	69.47
XE-133	5.243 D	0.08	0.07	0.15	56.91
XE-135	9.140 H	< LC	0.31	0.66	N/A

Processing Specific Parameters and Results

Method 1 (Net Count Calculation)

ROI Net Count Results

ROI	Nuclide	Net Counts	Abs Net Error	LC	Efficiency	Abs Eff Error
1	PB-214	13.79	100.66	15.33	N/A	N/A
2	XE-135	-2.01	143.71	19.86	0.60	0.01
3	XE-133	6.58	69.81	13.08	0.78	0.02
4	XE-133	18.97	54.03	9.74	0.71	0.01
5	XE-131M	4.76	18.99	6.21	0.61	0.01
6	XE-133M	5.06	12.35	4.44	0.62	0.01
7	XE-133	1.69	26.52	8.20	0.19	0.00
8	XE-133	-0.17	3.76	3.26	0.04	0.00
9	XE-133	8.57	12.76	3.37	0.19	0.00
10	XE-133	11.37	38.46	8.56	0.49	0.01

ROI Limits (channels)

ROI	BetaLow (channels)	BetaHigh (channels)	GammaLow (channels)	GammaHigh (channels)
1	1	191	109	132
2	1	255	76	96
3	1	126	23	34
4	1	139	7	15
5	27	51	7	15
6	62	95	7	15
7	1	24	7	15
8	98	139	7	15
9	62	139	7	15
10	1	51	7	15

Processing Parameters

Risk level k: 1.6449
Gas background used: YES
Detector background used: YES
Interference corrections: YES
Analysis method: NCC

Calibration Parameters

Gamma energy calibration updated: YES
Beta energy calibration updated: YES

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	3548676	-1/2 day sample available
Collection Time	Pass	12.00	12h +- 10%
Acquisition Time	Pass	11.17	12h +- 10%
Response Time	Pass	30.25	sample received within 48h of collect start

Data Quality Flags

Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	0.99	greater than 0.44 ml
SOH	N/A	N/A	N/A
Xe-133 MDC	PASS	0.15	less than 1 mBq/m3

Event Screening Flags

Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	NO
Number of days since last Xenon detection	0
2 or more Xenon Isotopes present in this spectrum	YES
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	511
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

Calibration Equations

Beta Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : -5.24265918

t1 : 0.36796472

t2 : -3.239e-05

Gamma Energy To Channel : C(E)= t0 + t1 E + t2 E^2

t0 : 0.52989824

t1 : 0.35433759

t2 : -3.592e-05

RRR – Noble Gas HPGe Version

The example provided below is an HTML version of a RRR produced using data from the DEX33 HPGe system as it would appear in a web page. If one receives the HTML file, it can be copied and pasted into an HTML editor (several are available via the Web) to view the formatted contents of the file.

IDC Generated Report
Reviewed Radionuclide Report
Noble Gas Version

Creation Date: 2016-06-14 18:41:20
Sample Arrival Time: 2016-06-14 05:49:10
Time difference from receipt of raw data to report creation: 12 h 52 m 10.0 s

Sample Information

Station ID:	DEX33	Detector Code: DEX33_003	
Authenticated:	NO		
Station Location:	Noble Gas Experim. stn.		
Detector Description:	Detector #3 in DEX33, Germany		
System Technology:	SPALAX		
Sample Reference ID:	33201606120611G		
Sample ID:	3645107		
Stable Xe Volume:	3.59 ml	Sample Type:	Gas
Collection Start:	2016-06-12 06:00:00	Sampling Time:	1 d
Collection Stop:	2016-06-13 06:00:00	Processing Time:	1 h 23 m 16 s
Acquisition Start:	2016-06-13 07:23:16	Acquisition Time:	22 h 21 m 53 s
Acquisition Stop:	2016-06-14 05:45:09		

IDC Analysis General Comments:
2016-06-14 18:39:03
The sample is categorized at Level B due to the detection of Xe133 with activity concentration(s) within the normal range for the station

Measurement Categorization

Categorization Legend

Level A = Clean spectrum - No Xenon is present in the sample.
Level B = Xenon detection within the typical range for the station.
Level C = Anomalous Xenon detection.

Isotope category

Isotope	Nuclide detected	Abnormal_limit (mBq/m3)	Category
Xe-131m	NO	1.39E+00	A
Xe-133m	NO	2.34E+00	A
Xe-133	YES	1.70E+00	B
Xe-135	NO	1.13E+00	A

Spectrum Category: B - Xenon detection within the typical range for the station

Activity Summary and Minimum Detectable Concentration for Xenon Isotopes

Radon level in Xenon sample

Nuclide	Half-Life	Area	%RelErr
Rn-222	3.82 D	228.74	8.74

Xenon isotopes

Peak Fit Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr
XE-131M	11.900 D	< LC	0.26	N/A
XE-133M	2.190 D	< LC	0.26	N/A
XE-133	5.243 D	1.28	0.37	7.80
XE-135	9.140 H	< LC	1.67	N/A

Decay Analysis Method

Nuclide	Half-Life	Conc (mBq/m3)	MDI/MDC	%RelErr
XE-131M	11.900 D	< LC	0.26	N/A
XE-133M	2.190 D	< LC	0.26	N/A
XE-133	5.243 D	1.21	0.37	8.11

XE-135	9.140 H	< LC	1.67	N/A

Processing Specific Parameters and Results

Xenon Peak Data

Energy	Centroid	Width	FWHM	%Eff	Net Area	%RelErr
30.92	140.77	2.00	0.55	13.99	176.87	14.02
80.98	367.51	3.00	0.61	18.97	293.06	7.65

Processing Parameters

Risk level K: 4.26489

Baseline algorithm: Smoothing / Lawn Mowers

Calibration Parameters

SAreaThreshold: 100

ConfidenceLevel: 95

ECR updated: Yes

RER updated: Yes

Used ECR: CMDLINE

Used RER: CMDLINE

Data Timeliness and Availability Flags

Name	Pass/Fail	Value	Test
Previous Sample Present	Pass	3643820	-1 day sample available
Collection Time	Pass	24.00	24h +- 10%

Acquisition Time	Pass	22.36	24h +- 10%
Response Time	Pass	47.82	sample received within 48h of collect start

Data Quality Flags

Name	Pass/Fail	Value	Test
Stable Xenon Volume	Pass	3.59	greater than 0.87 ml
SOH	NA	NA	SOH evaluation flag not available
Xe-133 MDC	PASS	0.37	less than 1 mBq/m3

Event Screening Flags

Name	YES/NO/Value
Xenon Isotopes present in this spectrum	YES
Only one Xenon Isotope in spectrum	YES
Number of days since last Xenon detection	1
2 or more Xenon Isotopes present in this spectrum	NO
Xe-133 present in spectrum	YES
Number of times Xe-133 seen in last 365 days	173
Short term flag	b - Xenon detection within the typical range for the station
Isotopic ratios:	
- Xe-133m/131m > 2	NO
- Xe-135/133 > 5	NO
- Xe-133m/133 > 0.3	NO

Calibration Equations

Energy : $E(C)= t0 + t1\ C + t2\ C^2 + t3\ C^3$

t0 : -0.1496

t1 : 0.2207

t2 : 1.701e-07

t3 : 0

Resolution : R(E)= $\sqrt{(t0 + t1\ E + t2\ E^2)}$

t0 : 0.2658

t1 : 0.00095

t2 : 4e-06

RRR – Particulate Version

```
                              DATA_TYPE RRR IMS2.0
                              IDC GENERATED REPORT
                           REVIEWED RADIONUCLIDE REPORT
                               Particulate Version

                         Creation Date: 2012/10/04 15:06:03
                   Sample Arrival Time: 2012/10/03 06:07:09
    Time difference from receipt of raw data to report creation: 32 hours

SAMPLE INFORMATION ==========================================================

Station ID:         XXP98               Detector ID:        XXP92_001
Authenticated:      NO

Station Location: Nakhon Phanom, Thailand
Detector Description: Detector #1 in Galapagos City, Galapagos.

Sample ID:             2006352          Sample Geometry:    RASA
Sample Quantity:      20484.86 m3       Sample Type:        Particulate


Collection Start:   2012/09/30 06:25    Sampling Time:        24.00 hours
Collection Stop:    2012/10/01 06:25    Decay Time:           24.00 hours
Acquisition Start:  2012/10/02 06:25    Acquisition Time:     23.58 hours
Acquisition Stop:   2012/10/03 06:00    Avg Flow Rate:       853.54 m3/hr

Collection Station Comments:
Barcode ID: 0000043161
RASA SOFTWARE VERSION 3.2.5A
Ortec 42-TP41184A 79.7 by 97.6 mm


IDC Analysis General Comments:
IDC 2012/10/04 15:06:00
```

```
MEASUREMENT CATEGORIZATION ==============================================

Categorization Legend
---------------------
Level 1  =  Typical Background Rad. Meas.
Level 2  =  Anomalous Background Rad. Meas.
Level 3  =  Typical Anthropogenic Rad. Meas.
Level 4  =  Anomalous Anthropogenic Rad. Meas.
Level 5  =  Mult. Anomalous Anthropogenic Rad. Meas.

Spectrum Category (1) -- Typical Background Rad. Meas.



ACTIVITY SUMMARY ========================================================

NATURAL RADIOACTIVITY:

Nuclides Identified and not Quantified:

AC-228, AL-27, BI-214, GE-71M, GE-73M, GE-75M, K-40, PA-234M, PB-206, PB-207M, PB-210, PB-214,
TH-234, U-235


Nuclides Quantified:

Nuclide             Half-Life            Conc(uBq/m3)        %%RelErr

BE-7                53.290 D                2.3E+03          1.25
PB-212F             10.64 H                   2E+04          1.10
```

ACTIVATION-PRODUCT RADIOACTIVITY:

Nuclide	Half-Life	Conc(uBq/m3)	%%RelErr	Coincidence

None Found

FISSION-PRODUCT RADIOACTIVITY:

Nuclide	Half-Life	Conc(uBq/m3)	%%RelErr	Coincidence

None Found

MINIMUM DETECTABLE CONCENTRATION FOR KEY NUCLIDES ========================

Nuclide	Half-Life	MDC(uBq/m3)
BA-140	12.752 D	13.19
CE-143	1.377 D	19.93
CS-134	2.062 Y	4.03
CS-136	13.160 D	3.99
CS-137	30.100 Y	3.44
I-131	8.040 D	4.58
I-133	20.800 H	15.41
MO-99	2.748 D	37.81
NB-95	34.970 D	3.06
RU-103	39.260 D	3.36
TE-132	3.204 D	6.20
ZR-95	64.020 D	5.24
ZR-97	16.900 H	19.37

PEAK SEARCH RESULTS ===

65 peaks found in spectrum by automated peak search.
60 peaks associated with nuclides by automated processing.
5 peaks not associated with nuclides by automated processing.

92 percent of peaks were associated with nuclides.

Note: "*" indicates that a peak was a component of a multiplet.

Energy	Centroid	Width	FWHM	%%Eff	Net Area	%%RelErr	Nuclide	Nts
35.52	104.43	4	1.25	0.01	1497.39	5.17		1
37.24	109.46	4	1.25	0.01	809.87	9.81		2
46.52	136.70	4	1.26	0.20	280.05	29.42	PB-210	
53.55	157.31	4	1.26	0.64	485.47	17.77	GE-73M	
63.49	186.46	4	1.27	1.69	689.11	14.15	TH-234	
70.30	206.45	4	1.28	2.61	587.25	16.46	PB-212F	
72.47	212.83	4	1.28	2.83	2917.34	3.59	PB-212F	
75.14	220.67	4	1.28	3.11	9370.61	1.43	PB-212F	
77.31	227.01	4	1.28	3.36	11079.33	1.27	PB-212F	
84.80	248.99	4	1.29	4.18	2021.16	4.93	PB-212F	
87.39	256.59	4	1.29	4.47	6230.30	1.86	CD-109	3
87.39	256.59	4	1.29	4.47	6230.30	1.86	PB-212F	
90.33	265.23	4	1.29	4.79	1717.91	5.80	PB-212F	
90.33	265.23	4	1.29	4.79	1717.91	5.80	U-235	
92.68	272.11	4	1.29	4.96	2206.73	4.61	TH-234	
92.68	272.11	4	1.29	4.96	2206.73	4.61	U-235	
94.00	276.00	4	1.29	5.05	503.02	18.84	U-235	4
115.41	338.81	4	1.31	6.34	537.03	17.70	PB-212F	
140.20	411.52	4	1.33	7.03	480.37	19.54	GE-75M	
140.20	411.52	4	1.33	7.03	480.37	19.54	TC-99M	5
143.86	422.27	4	1.33	7.04	293.06	31.44	U-235	
185.86	545.49	4	1.36	7.08	2034.25	4.75	U-235	
198.42	582.33	4	1.37	7.06	885.97	10.08	GE-71M	
198.42	582.33	4	1.37	7.06	885.97	10.08	TM-168	6
238.75	700.66	4	1.40	6.63	55187.75	0.45	PB-212F	
252.65	741.44	4	1.41	6.41	338.51	20.79	PB-212F	
277.43	814.16	4	1.42	6.18	2391.39	3.44	PB-212F	
288.30	846.04	4	1.43	6.11	439.91	15.37	PB-212F	
295.15	866.13	4	1.43	6.01	460.73	14.78	PB-214	7
300.16	880.83	4	1.44	5.93	3376.14	2.57	PB-212F	

327.78	961.87	4	1.46	5.65	235.99	25.94	AC-228	
327.78	961.87	4	1.46	5.65	235.99	25.94	PB-212F	
338.51	993.35	4	1.47	5.56	351.82	17.26	AC-228	
351.88	1032.57	4	1.47	5.46	886.47	7.18	PB-212F	8
351.88	1032.57	4	1.47	5.46	886.47	7.18	PB-214	9
452.93	1329.02	5	1.54	4.80	323.37	15.80	PB-212F	
477.66	1401.57	5	1.56	4.67	19169.01	0.76	BE-7	
510.89	1499.07	5	1.58	4.51	12455.48	0.90	PB-212F	10
569.41	1670.74	5	1.62	4.23	172.94	25.89	PB-207M	
583.24	1711.32	5	1.63	4.16	22219.27	0.69	PB-212F	
609.37	1787.98	5	1.65	4.05	1036.94	5.25	BI-214	
727.33	2134.04	5	1.73	3.71	4783.65	1.63	PB-212F	
763.33	2239.65	5	1.75	3.61	338.65	11.72	PB-212F	
767.42	2251.63	5	1.75	3.60	134.59	27.66	BI-214	
785.57	2304.90	5	1.76	3.56	727.28	5.89	PB-212F	
803.03	2356.12	5	1.77	3.51	266.89	13.72	PB-206	11
844.19	2476.87	5	1.80	3.40	140.88	26.14	AL-27	
860.54	2524.83	5	1.81	3.36	2898.75	2.18	PB-212F	
893.48	2621.46	5	1.83	3.28	220.05	16.52	PB-212F	
898.96	2637.53	5	1.84	3.26	99.95	34.79		12
911.22	2673.49	5	1.84	3.23	688.68	5.94	AC-228	
968.87	2842.62	6	1.88	3.17	351.17	10.37	AC-228	
1001.14	2937.27	6	1.90	3.14	309.52	11.07	PA-234M	
1014.52	2976.52	6	1.91	3.13	163.60	19.52	AL-27	
1063.78	3121.04	6	1.94	3.03	119.21	26.17	PB-207M	
1078.69	3164.78	6	1.95	3.00	322.70	10.54	PB-212F	
1093.98	3209.62	6	1.96	2.97	431.18	8.18	PB-212F	
1120.22	3286.61	6	1.98	2.92	400.09	8.79	BI-214	
1238.06	3632.29	6	2.05	2.81	170.95	17.90	BI-214	
1346.69	3950.93	6	2.12	2.65	88.38	29.64	PB-212F	13
1377.50	4041.31	6	2.14	2.62	102.46	27.40	BI-214	
1460.84	4285.78	6	2.19	2.55	1367.08	3.25	K-40	
1512.83	4438.28	7	2.22	2.50	192.28	14.79	PB-212F	
1592.30	4671.41	7	2.27	2.37	360.38	8.53	PB-212F	
1620.64	4754.52	7	2.29	2.32	778.25	4.65	PB-212F	
1729.16	5072.85	7	2.35	2.23	90.21	28.31	BI-214	

1764.58	5176.76	7	2.37	2.20	467.60	6.74	BI-214
1847.45	5419.82	7	2.42	2.15	104.99	23.34	BI-214
2103.22	6170.05	8	2.58	2.01	1091.36	3.61	PB-212F
2204.09	6465.90	8	2.64	1.95	188.92	14.84	BI-214
2614.52	7669.69	8	2.88	1.75	11119.24	0.96	PB-212F
2686.38	7880.44	9	2.92	1.73	83.01	22.11	PB-212F

SPECTRAL-REGION-OF-INTEREST (SROI) EDITING =============================

Nuclide ID Changes:
Average Concentration Differences: none
Nuclides Entering:

Name	Average Conc	%%RelErr
AC-228	49.16	6.02
AL-27	9.63	19.55
BE-7	2303.19	1.25
BI-214	36.54	5.35
GE-71M	7.22	10.13
GE-73M	422.37	17.80
GE-75M	10.14	19.56
K-40	289.35	3.40
PA-234M	962.13	11.11
PB-206	14.00	26.73
PB-207M	2.36	25.91
PB-210	1924.37	29.43
PB-212F	20443.81	1.10
PB-214	784.49	3.57
TH-234	1043.09	4.72
U-235	28.76	4.85

Nuclides Leaving: none

PEAK SEARCH NOTES ===

```
NOTE 1:
Date Entered: 2012/10/04 14:36:47
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

NOTE 2:
Date Entered: 2012/10/04 14:36:55
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

NOTE 3:
Date Entered: 2012/10/04 14:59:56
Analyst: IDC
This nuclide was removed from the Activity Summary section because in the analyst's judgment the
nuclide was not present; some nuclides may be removed because their activity calculations are not
meaningful (they are identified, not quantified).

====================================================================

NOTE 4:
Date Entered: 2012/10/04 15:00:55
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

NOTE 5:
Date Entered: 2012/10/04 14:59:32
Analyst: IDC
This nuclide was removed from the Activity Summary section because in the analyst's judgment the
nuclide was not present; some nuclides may be removed because their activity calculations are not
meaningful (they are identified, not quantified).
```

==

NOTE 6:
Date Entered: 2012/10/04 14:58:58
Analyst: IDC
This nuclide was removed from the Activity Summary section because in the analyst's judgment the nuclide was not present; some nuclides may be removed because their activity calculations are not meaningful (they are identified, not quantified).

==

NOTE 7:
Date Entered: 2012/10/04 14:37:13
Analyst: IDC
PB-214 nuclide identity provided during review

==

NOTE 8:
Date Entered: 2012/10/04 14:37:24
Analyst: IDC
PB-214 nuclide identity provided during review

==

NOTE 9:
Date Entered: 2012/10/04 14:37:24
Analyst: IDC
PB-214 nuclide identity provided during review

==

NOTE 10:
Date Entered: 2012/10/04 15:01:20
Analyst: IDC

```
Annihilation

====================================================================

NOTE 11:
Date Entered: 2012/10/04 14:38:21
Analyst: IDC
PB-206 nuclide identity provided during review

====================================================================

NOTE 12:
Date Entered: 2012/10/04 14:52:42
Analyst: IDC
Pb-207m

====================================================================

NOTE 13:
Date Entered: 2012/10/04 15:03:32
Analyst: IDC
False peak detection; Type I error in peak processing.

====================================================================

PROCESSING PARAMETERS ==================================================

Risk level K:                     4.26489
Baseline algorithm:               Smoothing / Lawn Mowers
Nucl Id Detectability Threshold: 0.2
Energy Id Tolerance:              0.8 + 0 * FWHM
Background subtraction:           NO
IRF for Pb-212F:                  YES

CALIBRATION PARAMETERS ====================================================
```

```
SAreaThreshold:             100
Confidence level:           95
ECR updated:                YES
RER updated:                NO
Used ECR:                   INITIAL
Used RER:                   MRP A

DATA TIMELINESS AND AVAILABILITY FLAGS =================================

Previous Sample Present?                                  YES
Collection time within 24 hours +/- 10%?                  YES
Acquisition time >= 20 hours?                             YES
Decay time <= 24 hours?                                   YES
Sample received within 72 hours of collect start?         YES

DATA QUALITY FLAGS =====================================================

Name                           Pass/Fail  Value           Test

Ba140_MDC                      PASS       13.1893         <30
K40_LocationDifference         PASS       0.205566        <3*std deviation
NormalizedGainDifference       PASS       7.54595e-05     <0.0001
Be7_FWHM                       PASS       1.55992         <1.7
FlowRate                       PASS       853.536         >500

EVENT SCREENING FLAGS ==================================================

     Activation Products present in this spectrum                No

     Only one fission product in spectrum                        No

     2 or more fission products in spectrum                      No

     Cs-137 present in spectrum                                  No
```

```
CALIBRATION EQUATIONS ==================================================

Energy vs. Channel

    E(c) = -0.06858 + 0.3408*c + 7.695E-09*c^2

        E = energy (keV)
        c = channel number


Resolution vs. Energy

    FWHM(E) = SQRT(1.50+0.001811*E+3.028e-07*E^2)

        FWHM = Full Width Half Max (keV)
        E = energy (keV)


Efficiency vs. Energy

    VGSL pairs
             Energy     Efficiency    Uncertainty
                 10      1.749e-06     1.3521e-05
                 20      3.496e-06     2.7041e-05
                 30      5.245e-06     4.0562e-05
                 40     0.00041959     0.00059962
                 50      0.0041208      0.0051955
                 60       0.013284       0.016798
                 70       0.025786       0.033298
                 80        0.03676       0.048927
                 90       0.047697       0.064616
                100       0.054838        0.07601
                110        0.06125       0.086257
                120       0.065165       0.093725
                130       0.068385       0.099944
```

140	0.070268	0.10464
150	0.070532	0.10756
160	0.071562	0.11074
170	0.071381	0.11283
180	0.071067	0.11514
190	0.070591	0.11627
200	0.07066	0.11783
210	0.068993	0.11745
220	0.067414	0.11749
230	0.066706	0.11832
240	0.06627	0.11987
250	0.064329	0.11887
260	0.063665	0.11954
270	0.062518	0.1196
280	0.061546	0.11993
290	0.060972	0.12097
300	0.05926	0.1198
310	0.058914	0.12023
320	0.057234	0.11921
420	0.049909	0.11788
520	0.044734	0.11598
620	0.040068	0.11353
720	0.037339	0.11202
820	0.034707	0.11086
920	0.032122	0.10675
1020	0.031232	0.10743
1120	0.029212	0.10337
1220	0.02844	0.10366
1320	0.026695	0.10156
1420	0.025856	0.10005
1520	0.024971	0.098586
1620	0.023191	0.09666
1720	0.022324	0.096214
1820	0.02171	0.094997
1920	0.02113	0.094177
2020	0.020539	0.093807

```
                2120        0.020048        0.092602
                2220        0.019364        0.090913
                2320        0.018667        0.091221
                2420        0.018261        0.090764

 FIELD OF REGARD ======================================================

http://kuredu.ops.ctbto.org/web-gards/FOR/XXP98/2012/275
STOP
```

SAMPLEPHD –Beta-Gamma Coincidence Data Version

This is an example of a SAMPLEPHD from a noble gas system that reports β-γ coincidence data.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 27127 JPX38
DATA_TYPE SAMPLEPHD
#Header 3
JPX38 JPX38_003 B GEOMETRY         FULL
38201606011811G
JPX38_003-2016/06/02-13:58     JPX38_003-2016/05/26-06:53     JPX38_003-2016/06/02-01:58
2016/06/03 01:08:40.6
#Comment
Using Pixie electronics v. 2.43.
Produced by SAUNA_PHDAQ with program version 1.0.7.5.
Coincidence spectrum set to zero counts where gamma or beta channel is zero.

JPX38 with new Beta A May 2016. Detector dead volume factor 0.9.
New calibration installed 160531! New detector calibrations using Xeff scripts

#Collection
2016/06/01 18:51:43.2 2016/06/02 06:51:45.6 14.490178
#Acquisition
2016/06/02 13:58:43.3 40200.103000   40186.010000
#Processing
1.06357  0.10636
0.93741  0.13257
14
#Calibration
2016/05/30 02:49:09.3
#g_Energy
```

```
32.860000        12.650900        0.050000
59.541000        22.170500        0.050000
121.782000       44.253000        0.050000
344.279000       121.769000       0.050000
661.657000       228.489000       0.050000
#b_Energy
77.084000        C 27.529100        0.500000
92.102000        C 33.279300        0.500000
107.090000       C 38.943500        0.500000
122.048000       C 44.522300        0.500000
136.976000       C 50.016200        0.500000
151.875000       C 55.425600        0.500000
166.743000       C 60.751100        0.500000
181.582000       C 65.993200        0.500000
196.392000       C 71.152400        0.500000
211.173000       C 76.229100        0.500000
225.924000       C 81.223900        0.500000
240.647000       C 86.137200        0.500000
255.342000       C 90.969600        0.500000
270.007000       C 95.721300        0.500000
284.645000       C 100.393000       0.500000
299.254000       C 104.985000       0.500000
313.836000       C 109.717000       0.500000
328.390000       C 114.388000       0.500000
342.916000       C 118.998000       0.500000
357.414000       C 123.547000       0.500000
371.885000       C 128.036000       0.500000
386.330000       C 132.463000       0.500000
#g_Resolution
32.860000        7.207100         0.328800
59.541000        8.808500         0.329900
121.782000       12.653300        0.332500
344.279000       27.694900        0.342200
661.657000       52.948300        0.357000
#b_Resolution
77.084000        23.885400        0.301252
```

```
92.102000         25.860500         0.305403
107.090000        27.814900         0.309650
122.048000        29.748000         0.313997
136.976000        32.884200         0.318448
151.875000        33.547700         0.323007
166.743000        35.413200         0.327678
181.582000        37.254800         0.332464
196.392000        39.071900         0.337372
211.173000        40.863700         0.342405
225.924000        42.629400         0.347568
240.647000        44.368200         0.352867
255.342000        46.079100         0.358307
270.007000        47.761300         0.363894
284.645000        49.413700         0.369635
299.254000        51.035300         0.375535
313.836000        52.625000         0.381603
328.390000        54.181500         0.387844
342.916000        55.703700         0.394267
357.414000        57.190100         0.400881
371.885000        58.639300         0.407693
386.330000        60.049800         0.414713
#g_Efficiency
31.630000         0.723900          0.003400
80.980000         0.816500          0.008700
123.000000        0.767000          0.050000
165.000000        0.723000          0.050000
208.000000        0.679000          0.050000
249.800000        0.658100          0.003100
#ROI_Limits
1  7.97295    600.78100  321.68800  385.83500
2  7.97295    927.35500  217.86300  284.03400
3  7.97295    362.37700  67.48890   98.46280
4  7.97295    399.17700  19.85700   42.23640
5  72.46320   142.71500  19.85700   42.23640
6  170.70200  261.38800  19.85700   42.23640
7  7.97295    64.57430   19.85700   42.23640
```

```
8  270.51100  399.17700  19.85700   42.23640
9  170.70200  399.17700  19.85700   42.23640
10 7.97295    142.71500  19.85700   42.23640
#b-gEfficiency
XE-135     2        0.617600   0.004600
XE-133     3        0.752100   0.012100
XE-133     4        0.738000   0.007200
XE-131m    5        0.668200   0.006500
XE-133m    6        0.657500   0.006400
XE-1337    7        0.191200   0.002900
XE-1338    8        0.034300   0.000900
XE-1339    9        0.192900   0.002900
XE-13310   10       0.498500   0.006500
#Ratios
PB214_352:242   1  2  0.582560   0.0054
PB214_352:80    1  3  0.416440   0.0043
PB214_352:30_4  1  4  0.069430   0.0015
PB214_352:30_5  1  5  0.011810   0.0006
PB214_352:30_6  1  6  0.016140   0.0007
PB214_352:30_7  1  7  0.008370   0.0005
PB214_352:30_8  1  8  0.025000   0.0009
PB214_352:30_9  1  9  0.043120   0.0012
PB214_352:30_10 1  10 0.021660   0.0009
XE133-4_81:30   3  4  0.040690   0.0407
XE133-5_81:30   3  5  0.441050   0.0001
XE133-6_81:30   3  6  0.269010   0.0001
XE133-7_81:30   3  7  0.020690   0.0207
XE133-8_81:30   3  8  0.000920   0.0009
XE133-9_81:30   3  9  0.006210   0.0062
XE133-10_81:30  3  10 0.032530   0.0325
#g_Spectrum
256   746
0     2          3235       7058       3679       2949
5     2925       2869       2428       1782       1753
10    1866       2012       2088       2005       1949
15    2045       2337       3041       3219       2855
```

```
20    2456        2472        2878        3267        3508
...
230   762         779         766         772         815
235   745         765         723         766         705
240   752         718         718         660         758
245   740         732         727         684         681
250   693         678         711         732         668
255   711
#b_Spectrum
256   933
0     1           3           35          47          45
5     57          59          39          37          41
10    34          37          27          34          32
15    39          30          30          39          32
20    32          32          33          26          21
25    20          23          20          17          25
...
230   24          30          18          16          21
235   17          23          12          13          15
240   9           19          12          13          22
245   18          26          22          18          16
250   22          22          17          20          27
255   17
#Histogram
256   256   746  933
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
...
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
STOP
```

SAMPLEPHD – Particulate Version

This is an example of a FULL SAMPLEPHD from a particulate station.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 63054
DATA_TYPE SAMPLEPHD
#Header 3
AUP04 AUP04_001 P 0.5cmX7cm_DISK    FULL
04200309020411
AUP04_001-2003/09/05-03:21:01 AUL020008-2000/12/21-01:24:48 0
2003/09/05 03:21:01
#Collection
2003/09/02 04:47:32   2003/09/03 04:56:05   20080
#Sample
7.00  0.50
```

```
#Acquisition
2003/09/04 05:21:22   79180          79097
#Calibration
2003/05/26 08:24:00
#g_Energy
46.520000        135.778900       0.000000
59.540000        173.897400       0.000000
88.030000        257.297300       0.000000
122.070000       356.983200       0.000000
165.850000       485.293200       0.000000
356.000000       1042.713000      0.000000
661.700000       1938.302000      0.000000
834.810000       2445.839000      0.000000
898.100000       2630.945000      0.000000
1115.520000      3268.603000      0.000000
1173.230000      3437.571000      0.000000
1332.510000      3904.393000      0.000000
1836.100000      5380.577000      0.000000
#g_Resolution
46.520000        1.135435         0.000000
59.540000        1.139786         0.000000
88.030000        1.192060         0.000000
122.070000       1.243755         0.000000
165.850000       1.228428         0.000000
356.000000       1.384094         0.000000
661.700000       1.649535         0.000000
834.810000       1.738469         0.000000
898.100000       1.614569         0.000000
1115.520000      2.028782         0.000000
1173.230000      1.975550         0.000000
1332.510000      2.113136         0.000000
1836.100000      2.664756         0.000000
#g_Efficiency
46.500000        0.150345         0.000000
59.500000        0.174446         0.000000
88.000000        0.171814         0.000000
```

```
122.100000       0.161571         0.000000
165.900000       0.134845         0.000000
392.000000       0.075630         0.000000
661.700000       0.050812         0.000000
834.800000       0.043720         0.000000
898.100000       0.034697         0.000000
1115.500000      0.036106         0.000000
1173.200000      0.028987         0.000000
1332.500000      0.026128         0.000000
1836.100000      0.019503         0.000000
#g_Spectrum
8192  2795
0     0          0          0          0          0
5     0          0          0          0          0
10    0          0          0          0          0
15    0          0          0          0          0
...
8175  9          5          9          10         8
8180  7          9          15         12         11
8185  9          9          6          9          8
8190  2          0
STOP
```

SSREB – Particulate Version

```
                          DATA_TYPE SSREB IMS2.0
                             IDC GENERATED REPORT
                STANDARD SCREENED RADIONUCLIDE EVENT BULLETIN

                     Creation Date: 2012/10/01 14:26:41

    Time Difference Between Receipt of Raw Data and Creation Date: 31 hours


              Fission Product ID: 7086     Authenticated:  NO



EVENT DETECTION SUMMARY ==========================================================

     Station    Collect Stop         Sample ID  Name       Categorization Comment
     -------    ------------         ---------  ----       ----------------------
     XXP98      2012/09/28 06:51:53  2003402    CS-134     Above Statistical Range
     XXP98      2012/09/28 06:51:53  2003402    CS-137     Above Statistical Range


     Activation Products present in this spectrum                 Yes
          Number of days since last activation product            1

     Only one fission product in spectrum                         Yes
          Number of days since last fission product               1

     2 or more fission products in spectrum                       No

     Cs-137 present in spectrum                                   Yes
          Number of times seen in last 30 days                    28

ENHANCED FIELD OF REGARD =========================================================
```

```
    http://kuredu.ops.ctbto.org/web-gards/FOR/XPP98/2012/272

CERTIFIED LABORATORY RESULTS ====================================================

ADDITIONAL INFORMATION ==========================================================

STOP
```

SSREB – Noble Gas Version

IDC Generated Report
STANDARD SCREENED RADIONUCLIDE EVENT BULLETIN

Creation Date: 2016-08-10 20:19:56
Time Difference Between Receipt of Raw Data and Creation Date: 56 d 17 h 4 m 28.0 s
Fission Product ID: 362   Authenticated: NO

EVENT DETECTION SUMMARY

Sample Information

Station ID:	CNX22
Detector Code:	CNX22_002
Sample ID:	2848721
Sample Reference ID:	22201606132211G
Collection Stop:	2016-06-14 10:15:00

Measurement Categorization

Isotope category

Isotope	Nuclide detected	Abnormal threshold (mBq/m3)	Categorization comment
Xe-131m	NO	0.00E+00	Below detection threshold
Xe-133m	YES	0.00E+00	Abnormal xenon concentration
Xe-133	YES	0.00E+00	Abnormal xenon concentration
Xe-135	NO	0.00E+00	Below detection threshold

Sample Category: C - Abnormal xenon concentration

Event Screening Flags

Name	YES/NO/Value
Number of days since last xenon detection	365
2 or more xenon isotopes present in this sample	YES
Xe-133 present in this sample	YES
Number of times Xe-133 seen in last 365 days	0
Short term flag	c - Abnormal xenon concentration

Isotopic Ratio	Value	YES/NO	Test
Xe-133m/131m	0.00	NO	Xe-133m/131m > 2
Xe-135/133	0.00	NO	Xe-135/133 > 5
Xe-133m/133	0.00	NO	Xe-133m/133 > 0.3
Xe-133/131m	0.00	NO	Xe-133/131m > 1000

ENHANCED FIELD OF REGARD

CERTIFIED LABORATORY RESULTS

ADDITIONAL INFORMATION

Station

```
MSG_TYPE DATA
MSG_ID 24061165 CTBT_IDC
REF_ID SWP_fH6jjB34
DATA_TYPE STATION IMS2.0
Net       Sta   Type  Latitude  Longitude Coord Sys     Elev   On Date   Off Date
          AAK          42.63910   74.49420             1.645 2007/03/06
          ABKT         37.93040   58.11890             0.678 1993/04/25
          AFI         -13.90930 -171.77730             0.706 2004/11/29
          AK01         50.69110   29.21310             0.160 2002/03/08 2006/11/09
          AK01         50.69110   29.21310             0.160 2006/11/09
          AK02         50.65730   29.20570             0.170 2002/03/08 2006/11/09
          AK02         50.65730   29.20570             0.170 2006/11/09
          AK03         50.72630   29.22170             0.160 2002/03/08 2006/11/09
          AK03         50.72630   29.22170             0.160 2006/11/09
          AK04         50.72260   29.16600             0.160 2002/03/08 2006/11/09
          AK04         50.72260   29.16600             0.160 2006/11/09
          AK05         50.61970   29.20360             0.180 2002/03/08 2006/11/09
          AK05         50.61970   29.20360             0.180 2006/11/09
          AK06         50.58580   29.19850             0.190 2002/03/08 2006/11/09
          AK06         50.58580   29.19850             0.190 2006/11/09
          AK07         50.55070   29.20440             0.170 2002/03/08 2006/11/09
          AK07         50.55070   29.20440             0.170 2006/11/09
          AK08         50.63380   29.25480             0.122 2002/03/08 2006/11/09
          AK08         50.63380   29.25480             0.122 2006/11/09
          AK09         50.61510   29.28460             0.180 2002/03/08 2006/11/09
          AK09         50.61510   29.28460             0.180 2006/11/09
          AK10         50.59900   29.25130             0.180 2002/03/08 2006/11/09
```

```
           AK10         50.59900   29.25130                     0.180 2006/11/09
           AK11         50.67840   29.16770                     0.160 2002/03/08 2006/11/09
           AK11         50.67840   29.16770                     0.160 2006/11/09
           AK12         50.64370   29.15490                     0.180 2002/03/08 2006/11/09
           AK12         50.64370   29.15490                     0.180 2006/11/09
STOP
```

Sta_status

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE STA_STATUS IMS2.0
Report period from 2016/01/27 00:00:00.0 to 2016/01/28 00:00:00.0
Station Status
Sta   Max_Exp_Time   ______________ Minimum Channels _______________ ____________ Geophysical Channels _____________
                          Data         Timely Data       Mission         Data            Data             Data
                      Availability    Availability   Capability (%)  Received (%)    Availability     Availability
                          (%)             (%)                                      Unauthenticated        (%)
                                                                                         (%)
AKASG 0001 00:00:00       0.000           0.000           0.000          74.614          74.614           0.000
ARCES 0001 00:00:00     100.000         100.000         100.000         100.000         100.000         100.000
ASAR  0001 00:00:00       0.000           0.000           0.000          99.994          99.994           0.000
BRTR  0001 00:00:00       0.000           0.000           0.000         100.000         100.000           0.000
CMAR  0001 00:00:00       0.000           0.000           0.000         100.000         100.000           0.000
ESDC  0001 00:00:00     100.000         100.000         100.000         100.000         100.000          99.999
FINES 0001 00:00:00      81.250          81.250           0.000         100.000         100.000          80.949
GERES 0001 00:00:00       0.000           0.000           0.000          97.222          97.222           0.000
GEYT  0001 00:00:00       0.000           0.000           0.000          31.922          31.922           0.000
ILAR  0001 00:00:00     100.000          99.884          99.884         100.000         100.000         100.000
KSRS  0001 00:00:00       0.000           0.000           0.000          99.900          99.900           0.000
MJAR  0001 00:00:00       0.000           0.000           0.000          99.998          99.998           0.000
MKAR  0001 00:00:00       0.000           0.000           0.000         100.000         100.000           0.000
NOA   0001 00:00:00     100.000         100.000         100.000         100.000         100.000          99.739
NVAR  0001 00:00:00       0.441           0.441           0.000         100.000          99.993           0.529
PDAR  0001 00:00:00     100.000         100.000         100.000         100.000         100.000         100.000
PETK  0001 00:00:00       0.000           0.000           0.000         100.000          99.988           0.000
SONM  0001 00:00:00     100.000         100.000         100.000         100.000         100.000         100.000
TORD  0001 00:00:00      72.956          72.956           0.000          83.333          77.970          61.187
```

```
STOP
```

Waveform (IMS2.0:cm6 format)

The ARCES waveform has the channel code `scc`, which indicates that it is a short-period coherent beam. The `eid2` line shows that this waveform is associated with the IDC_REB event `54903285`. The `bea2` line reveals that the beam was formed with an azimuth of 127.6 degrees and slowness of 0.125 degrees/second. The *BeamID* `FICB.Pa` may be used to get more detailed beam information from the `beam` data type.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 24076708 CTBT_IDC
REF_ID SWP_fw9o6PtF
DATA_TYPE WAVEFORM IMS2.0:CM6
WID2 2016/06/01 00:00:00.019 ANMO  BHZ      CM6      399   40.000000   8.06e-02   1.000 T-120   -1.0  0.0
STA2            34.94620 -106.45670 WGS-84       1.840 0.090
DAT2
lVJVW2MK4F0+0HIDGQ+2I15J0IH2+0+H+6FO0H04J3-N-25NLAF+5NG2IH62O2-J5-J00JG+2G-3II+1
0JG1I07LKBKJ8NJ2FJ33I1++2JH1H+J7-N1-0F+-L2-N7F05OF0+103O1HJ6Q54H0P22-5+IJ0-JAOKU
FOG8LI0GG6FR7++1M-300HMF--F0-J-3GI2HI0+FL87N5NQCL+BP32Q31G0J04R06L9HMCFO2-HF2-+F
J+10FF1JF3J22H0F+2L-3J-3M11G3GJ40P05IF6FL5IF1N64J6MF6K01HHIF8-P61J2IF2M66Q32M2HI
8FGHG-+012HJ00H3+M10-AMK5K+2HJF23+HG012FQ5+01P-702-JQ10H1-0-2FLHF8GI6M82R8HJ2JH3
F44M
CHK2 305812
STOP

BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE WAVEFORM IMS2.0:CM6
WID2 1996/10/15 09:54:00.000 ARCES  scc      CM6     1200   20.000000   2.70e-01  1.0000 S-13   -1.0  0.0
STA2 IDC_SEIS    69.53489   25.50580 WGS-84       0.402 0.009
EID2 54903285 IDC_REB
BEA2 FICB.Pa      127.6  0.125
DAT2
AFkFCUHTkHUHCkRMUK-F4N+2-M1UHkGT6UHkGRUG6kQDDkEPUI7kO0UKLMUFLP6-F2R+AKkFC3OGA+kG65kEABQR
```

```
8DQIAFS+BR5UFTkFUG5SFCNH70LF7HP5BkG-AMkG6U
...
CHK2 8439546
STOP
```

The following message would be sent if data were not available from station `KAF`, channel `shz` from 15 October 1996 9:56:00.000 through 15 October 1996 9:57:00.000.

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 10000998
DATA_TYPE WAVEFORM IMS2.0:CM6
WID2 1996/10/15 09:54:00.000 KAF   shz      CM6     2400   20.000000   2.70e-01  1.0000 S-13    -1.0  0.0
STA2 IDC_SEIS    62.11270   26.30621 WGS-84       0.195 0.014
DAT2
AFkFCUHTkHUHCkRMUK-F4N+2-M1UHkGT6UHkGRUG6kQDDkEPUI7kO0UKLMUFLP6-F2R+AKkFC3OGA+kG65kEABQR
8DQIAFS+BR5UFTkFUG5SFCNH70LF7HP5BkG-AMkG6U
...
CHK2 1439544
OUT2 1996/10/15 09:56:00.000 KAF   shz           60.000
STA2 IDC_SEIS    62.11270   26.30621 WGS-84       0.195 0.014
WID2 1996/10/15 09:57:00.000 KAF   shz      CM6     1200   20.000000   2.70e-01  1.0000 S-13    -1.0  0.0
STA2 IDC_SEIS    62.11270   26.30621 WGS-84       0.195 0.014
DAT2
AFkFCUHTkHUHCkRMUK-F4N+2-M1UHkGT6UHkGRUG6kQDDkEPUI7kO0UKLMUFLP6-FH62R+AKkFC3OGA+kG65kEABQR
8DQIAFS+BR5UFTkFUG5SFCNH70LF7HP5BkG-AMkG6U
...
CHK2 8648264
STOP
```

Waveform (IMS2.0:int format)

```
BEGIN IMS2.0
MSG_TYPE DATA
MSG_ID 24076636 CTBT_IDC
REF_ID SWP_uqgwZK78
```

```
DATA_TYPE WAVEFORM IMS2.0:INT
WID2 2016/06/01 00:00:00.019 ANMO  BHZ      INT      399   40.000000   8.06e-02   1.000 T-120   -1.0  0.0
STA2            34.94620 -106.45670 WGS-84       1.840 0.090
DAT2
-1077 -1062 -1055 -1054 -1047 -1041 -1033 -1025 -1015 -1008 -1005 -987 -971
-967 -963 -955 -951 -944 -930 -921 -910 -903 -899 -891 -883 -873 -863 -856
-849 -834 -820 -816 -810 -807 -802 -791 -785 -774 -762 -759 -755 -747 -732
-726 -727 -716 -706 -696 -679 -671 -665 -655 -649 -646 -635 -620 -615 -606
-596 -591 -579 -566 -558 -548 -536 -529 -524 -519 -510 -503 -495 -482 -473
…
-1031 -1031 -1028 -1024 -1018 -1011 -1000 -990 -987 -987 -988 -979 -972 -969
-958 -955 -942 -925 -921 -907 -896 -890 -880 -875 -873 -866 -860 -848 -830
-820
CHK2 305812
STOP
```

APPENDIX IV

UNSUPPORTED COMMANDS AT THE IDC

This appendix contains a list of commands for the IMS2.0 format that are unsupported at the IDC.

- Introduction
- Request Lines in Request and Subscription Messages
- Environment Lines in Request and Subscription Messages
- Request/Environment Combination in Request and Subscription Messages

Introduction

The IMS2.0 Formats and Protocols Specification was developed to provide an extensive set of formats for exchanging seisimic data and derived parameters using e-mail messages.

However, IMS2.0 includes formats considered essential by some organizations outside the CTBT monitoring community, such as the European Mediterranean Seismological Centre (e.g., ARRIVAL:GROUPED). Thus, some of the request lines, environments, and subformats documented in subsequent chapters are not supported by the IDC's *AutoDRM*. Below are commands and environments documented in this manual but not supported at the IDC.

Request Lines in Request and Subscription Messages

- AUTH_STATUS
- ARRIVAL:GROUPED
- ARRIVAL:REVIEWED
- ARRIVAL:UNASSOCIATED
- BULLETIN IMS1.0:LONG
- COMMENT
- COMM_STATUS (with subscriptions)
- NETWORK
- WAVEFORM, subtype CM8

Environment Lines in Request and Subscription Messages

- AUX_LIST
- GROUP_BULL_LIST (with subscriptions)
- FREQ Custom (with subscriptions)

Request/Environment Combinations in Request and Subscription Messages

- STATION/LAT; STATION/LON
- CHANNEL/LAT; CHANNEL/LON
- CHAN_STATUS: Minimum TIME precision of days
- STA_STATUS: Minimum TIME precision of days