PETROLEUM INDUSTRY DATA EXCHANGE

Conventions and Implementation Guidelines for EDI

WELLSITE INFORMATION TRANSFER SPECIFICATION

(WITS)

Version 1.1 July 1991

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SECTION 1 : INTRODUCTION

The WELLSITE INFORMATION TRANSFER SPECIFICATION (WITS) is a communications format used for the transfer of a wide variety of wellsite data from one computer system to another. It is presented as a recommended format by which Operating and Service companies involved in the Exploration and Production areas of the Petroleum Industry may exchange data in either an online or batch transfer mode.

WITS is a multi-level format which offers an easily achieved entry point with increasingly flexible higher levels. At the lower levels, a fixed format data stream is employed, while, at higher levels, a self-defining customizable data stream is available.

A WITS data stream consists of discrete data records. Each data record type is generated independently of other data record types and each has a unique trigger variable and sampling interval. The rig activity usually determines which records are applicable at any given time such that only appropriate data is transmitted.

WITS also incorporates the means for a remote computer system to send instructions to the sending system in order to set or change certain parameters, including the type of data transmitted and the interval for transmission.

As well as specifying a format for data transmission, WITS also defines a basic set of record types to which user-defined record types may be added.

Background

Over the years many Operating and Service companies have developed proprietary formats for electronic data exchange. When a new working relationship is established between a Service company and an Operator, new software may need to be written, followed by extensive testing and debugging before the data collection and analysis systems of the two entities can communicate with one another correctly. This often leads to problem start-ups with the resulting loss of time and data. The ongoing development and maintenance of these formats represents a significant expenditure.

The cost and complexity of format matching and modification has often led to a reluctance on the part of some Operators to get involved in this type of service, and a great deal of rig data, which could be extremely useful in rig performance evaluation, drilling monitoring and control, and formation evaluation while drilling, is often not collected or readily available to decision makers.

In an attempt to resolve this information transfer problem, the Rig Instrumentation and Measurement (RIM) subcommittee of the International Association of Drilling Contractors (IADC) formed a task group, the Information Transfer subcommittee.

Information Transfer subcommittee

The Information Transfer subcommittee consisted of Operating and Service company representatives working in the areas of computer software system development, geology and drilling engineering. All were familiar with the problems associated with the profusion and mismatch of rig data formats.

To ensure that any format proposed was both complete and acceptable to the industry as a whole, a vigorous effort was made to involve representatives from as many Operating and Service companies as possible. This effort included correspondence with companies operating in Europe and Asia as well as the United States.

The goal of the work group was broad but concrete:

> *"To define the format and information content of the data stream transmitted from a wellsite to a central site by telecommunications facilities or hard media".*

To minimize omissions in the format, a major effort was made to obtain an inventory of data items monitored or collected at the wellsite in the following areas:

- Geology
- Drilling and Engineering
- Measurement-While-Drilling (MWD)
- Rig Parameters
- Cementing
- Drill Stem Testing

Companies providing data collection services in these areas were polled for data items and formats currently in use. Concurrent with the effort, the group's members familiarized themselves with the major existing formats and data transmission systems in use in the industry. A seminar, widely attended by an excellent cross-section of the industry, presented information on general methods of data transmission and formatting, different hardware/software systems currently in use, and the nature and content of several specific formats. The seminar was reinforced by site visits and presentations at data centers operated by Amoco, Arco, Mobil, and Tenneco.

With a comprehensive data dictionary established and with representatives on the subcommittee familiar with existing formats, careful consideration led to a set of requirements which, it was hoped, would satisfy the present and future needs of both Operating and Service companies.

Among these requirements were:

- achievable by both small and large companies
- adaptable to the needs of the industry over the course of time as technology changes
- offer a simple, low cost entry point
- limit long term software support costs
- employ an efficient mode of transmission
- be capable of use in both online and in batch modes
- be capable of implementation on a wide range of computer platforms
- meet the needs of both the single remote user and the multi-rig data center
- encompass existing standards (official or "de facto") where possible
- address international as well as domestic needs

With these requirements in mind, the subcommittee adopted the Log Information Standard (LIS) as the basic framework for WITS and set about formulating the specific components of the format. LIS was chosen since it met many of the requirements set out for WITS and is a well established and familiar method of data exchange (a "de facto" standard in the wireline industry). The result of this work is the WITS data communications format described in this document.

The Information Transfer subcommittee evolved into the Wellsite Information Transfer Steering Group and, in addition to it's status as a subcommittee of IADC, the WITS Steering Group is also an active member of the API Petroleum Information Data Exchange (PIDX). The API-PIDX WITS User Group exists to promote the format, respond to questions of interpretation, and to investigate ways of enhancing the format to meet new requirements in the future.

Wellsite Information Transfer Specification

A major feature of WITS is its multi-level approach in providing communications functionality. There are four currently defined levels with level 0 based on an ASCII format and levels 1 through 3 based on LIS, each representing an increase in complexity and flexibility. A fifth level (WITS Level 4) is currently under consideration by the subcommittee and will likely take advantage of the newly approved API RP-66 (DLIS) format as it's framework. This will allow for a very high degree of flexibility but with an accompanying degree of complexity. This document confines itself to discussion of the WITS levels 0 through 3 and leaves Level 4 for a future revision.

The basic unit of transfer in WITS (as in LIS) is the "physical record" (Figure 1.1). In turn, the physical record envelopes a "logical record". While LIS consists of many types of logical record, only a few are used in WITS, with different levels of implementation employing specific types.

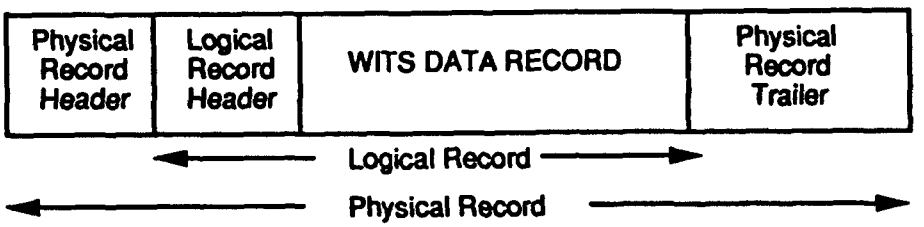

Fig. 1.1 : Structure of a WITS Data Record

The basic logical record type used in WITS is the Data Record. Each Data Record consists of a group of related Data Items (fields or channels). While LIS is a self defining format, using Data Format Specification (DFS) records to describe the content of subsequent data records, the subcommittee felt that a basic set of "Pre-Defined Data Records" would serve as a good entry point into the format and meet the needs of a large number of Operators, as well as cut down the development time which would be required for a more complex system. Level 3 allows the user to employ custom record types through the use of DFS records.

The WITS Levels currently specified (from simple to complex) are:

WITS Level 0

Level 0 of WITS consists of the unidirectional transfer of ASCII format data values from one computer system to another. The primary intent of this level is to provide a simple method for Service companies to exchange data at the wellsite. This might be desirable if, for example, there is only one communications channel available for data transfer off the wellsite, but where data from more than one vendor is required. This also provides an easy entry point for less demanding remote transmission requirements.

WITS Level 1

Level 1 consists of the unidirectional transmission of Data Records made up of a fixed format and content. These records are termed WITS Pre-Defined Data Records and their content is described in Appendix A. This level comprises LIS Data Records only. No other LIS logical record types are used and no bidirectional dialogue takes place.

The only permitted modification to the Pre-Defined Records is the replacement of designated SPARE channels with other data items. The records to be sent and their transmission intervals must be agreed upon in advance and can only be changed by the SENDER.

WITS Level 2

Level 2 of WITS also uses Pre-Defined Data Records but incorporates bidirectional dialogue which permits the remote system (RECEIVER) to control various aspects of the communication session. These commands are sent within LIS Comment (type 232) logical records. Thus, at this level, LIS Data and Comment records are used. As with Level 1, data record modification is limited to the replacement of SPARE channels with other data items. The buffering of data records by the SENDER and their subsequent availability for retransmission or batch transfer, is optional at this level.

WITS Level 3

Level 3 provides for Custom Data Records in addition to Pre-Defined Data Records. Such records must be identified in advance of their use through the transmission by the SENDER of a Data Format Specification Record (LIS Logical Record type 64) for each Data Record giving details of the record's content. This level represents a very flexible format for data transfer. It does, however, mean added complexity, especially for the RECEIVER who must be able to read the Data Format Specification Record in order to interpret the content of custom data records if they are being used. The Pre-Defined Data Records are records 1 through 25 (LIS Logical Record type 151 though 175). WITS Data Records 26 through 49 (type 176-199) are reserved for future definition by the Steering Group, while custom WITS Data Records may be 50 through 80 (type 200 through 230). The buffering of data records by the SENDER is mandatory at this level.