PPDM Association

Seismic Reference Guide

Last updated for PPDM 3.6
Version 1.2

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About This Document

This reference guide has been prepared to help managers, analysts, database administrators, programmers, data managers, and users understand how to use the Seismic Data Module in PPDM 3.6. Readers at many levels, from managerial to technical implementers will benefit from reading various sections of this document. General, high-level business information is contained at the beginning of the document, with each section becoming progressively more technical and detailed.

Sometimes the terms we use in this and other PPDM documents need to be defined. We provide definitions in a separate Glossary, which you can obtain from PPDM.

This reference guide contains the following sections:

- Introduction

  Provides an executive overview of the PPDM Model as it pertains to Seismic.

- Business Process Overview

  Summarizes Seismic and provides examples of related business processes.

- Integration

  Discusses how seismic is integrated with the other PPDM Business Modules and provides information about related references guides.

- Model Overview

  Includes the entity relationship diagram and discusses the use of Seismic Module tables in the Data Model.

- Tables and Columns – Seismic

  Identifies the data model tables for the Seismic Module, how they should be used, what they contain, and recommends how they should be used. This section should be used in conjunction with the PPDM Table Report available for download from the PPDM Web Site (www.ppdm.org).

- Implementation Considerations

  Discusses issues related to implementing the PPDM model, architectural methodologies used in design, or special considerations for implementation that are not related to a specific table.

- Frequently Asked Questions

  Addresses technical and business questions about the Seismic Module.

- Appendix A – Sample Queries

  Provides example queries with the appropriate SQL scripts that illustrate uses of the model based on the Business Requirements Document.

- Appendix B – Changes to the Model

  Identifies the changes in the Seismic Module from the latest version to the newest release version of the PPDM model.

Introduction

Geophysical business processes deal primarily with data and information created through seismic acquisition, processing and interpretation. Unexplored geographic areas are often targeted for preliminary stratigraphic evaluation using seismic data because seismic data provides reasonably broad coverage at a relatively low cost. Certain types of seismic data may also be used to support detailed delineation of hydrocarbon reservoirs.

Seismic exploration programs are developed to evaluate and test geological hypothesis about stratigraphic structures in a project area. Once a geologist has developed a model for hydrocarbon entrapment in the project area, the geophysicist develops a program for acquiring seismic data that will further evaluate the trap. By measuring, recording and analyzing data generated during acquisition, the geophysicist can determine the depth and thickness of each relevant rock sequence.

Specialized contractors are hired to record seismic in the prospective area. Surface access permits are acquired from landowners; these permits detail rights to shoot seismic on the owner's land and obligations that are incurred for compensation or reclamation. Survey teams lay out seismic surveys using the design plans specified by the geophysicist. Each plan is designed to provide optimal data quality in the area to be explored. Seismic exploration may be conducted on land, in transition zones, offshore or within well bores.

Land exploration is conducted using an energy source such as dynamite (in which shallow holes are drilled to accommodate dynamite charges that are detonated) or vibroseis (vibrator trucks are used to shake the ground and send sound waves into the subsurface). Marine seismic operations use specialized vessels that tow an energy source (air gun) and one or more marine cables (streamers) with water receivers (hydrophones).

Reflected and refracted energy signals are captured using geophone arrays laid out in geometric arrays called patches; a permanent record is created on digital media such as magnetic tape. Data reduction transforms the raw data into usable formats for subsequent processing. Analysis of reflection data yields estimates of transit time, velocity and elevation corrections; this information is used to improve the coherency and resolution of recordings.

Processed seismic trace data is given to the geophysicist who interprets the data in conjunction with other available data such as well logs, synthetics, gravity and magnetic data or velocity surveys. Based on these results, the geophysicist may choose to apply additional processing steps to the data or create an interpretation dataset consisting of time, amplitude or depth picks.

Interpreted results for many seismic sets are combined to create three-dimensional representations of specific stratigraphic units; these results can be shown as isopach or isochron maps, or displayed using special three dimensional interpretation tools or even visualized using state of the art visualization tools.

If suitable stratigraphic structures are identified, expenditures may be authorized to acquire mineral and surface land rights, drill wells and continue the exploration cycle.

Each phase of the exploration life cycle is intensively data driven. Permanent records detailing the processes and technology applied, observations and results are retained. Suitable cataloguing practices must be employed to ensure that this data asset is managed for the future. Seismic data that is no longer useful to the originating company may ultimately be used as a negotiable asset and made available to other interested parties through a series of transactions and agreements.

Business Process Overview

Purpose

The Seismic Module provides a means of describing and managing information about seismic data. This data is created throughout its life cycle, from acquisition, processing and interpretation through disposition by sales or trades.

Description

The life cycle of seismic data, from inception to final disposition through destruction or disposition, is lengthy. Seismic data is often processed and reprocessed many times in order to extract maximum value from the data; it is treated as a valuable asset in data sales and trades and provides important information for the design of new seismic surveys. Each step in the life cycle is data intensive. Product generation and use of archived information at every stage mean that integration between seismic data and a records management store is a critical component of effective seismic data management.

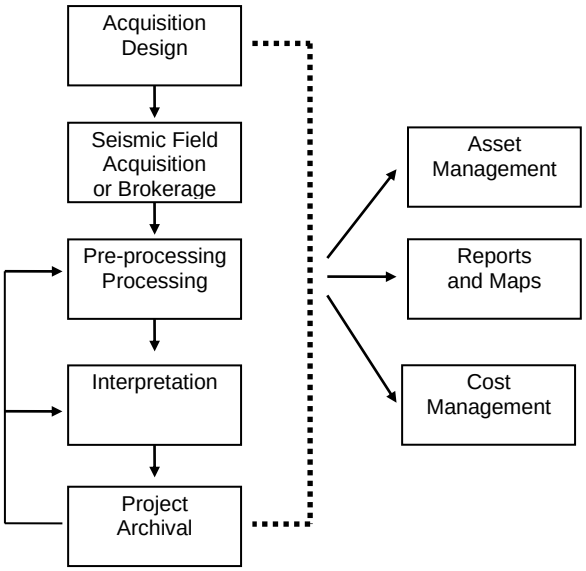

Figure 2: *The life cycle of a seismic line. Good data management practices are critical to successful implementation of this workflow.*

Key Business Processes

Seismic Acquisition and Processing

Designing an effective seismic acquisition survey involves a great deal of research. Typically, it is necessary to gather samples of work previously done in the area to evaluate the success of historic surveys and determine whether a new survey is likely to produce useful results. An examination of existing corporate land positions, availability of new land rights, infrastructure support (such as pipelines, roads and processing facilities), budget considerations and environmental or cultural considerations will help managers and geophysicists determine how (or if) a survey should be conducted.

One or more recording crews will conduct the field survey. The field crew will create positional information for all field locations (shot and receiver), set up energy source locations and receiver positions and record the energy signatures generated by the seismic source. Detailed records are kept at each stage of this process. The field survey information, usually captured as bearings, azimuths and offsets, is converted to geographic locations (latitude and longitude) for mapping and calculating mis-ties.

Driller records contain detailed information about the condition of the subsurface where shot holes are drilled for use in near surface corrections. Shooter's logs record details about the creation of the energy source and the observer's logs capture information about where the actual acquisition varies from the nominal design parameters. These records would include details about offsets or skids created to avoid some environmental hazard, such as a creek, list test records and corrective action taken in the field. The location of each digital recording for each geophone group for each source is captured to assist in processing.

Pre-processing involves the preparation of data for input into a processing system. Quality control of field data, geometry, survey locations, and tape indexes are often included. Generally, this step is only done once, and the results stored for future use. Figure 3 illustrates the conversion of raw recorded data to usable processing traces.

Processing is an iterative process that may involve all or a portion of a line or 3D survey and which may combine 3D and 2D data or multiple 3D surveys. Pre-stack and post-stack processing may be repeated as many times as necessary or desired. The parameters, filters, and processes that may be applied are varied and complex. It is important for processors and interpreters to know exactly what was done to the data in what sequence. Figure 4 illustrates the sequence of processing events.

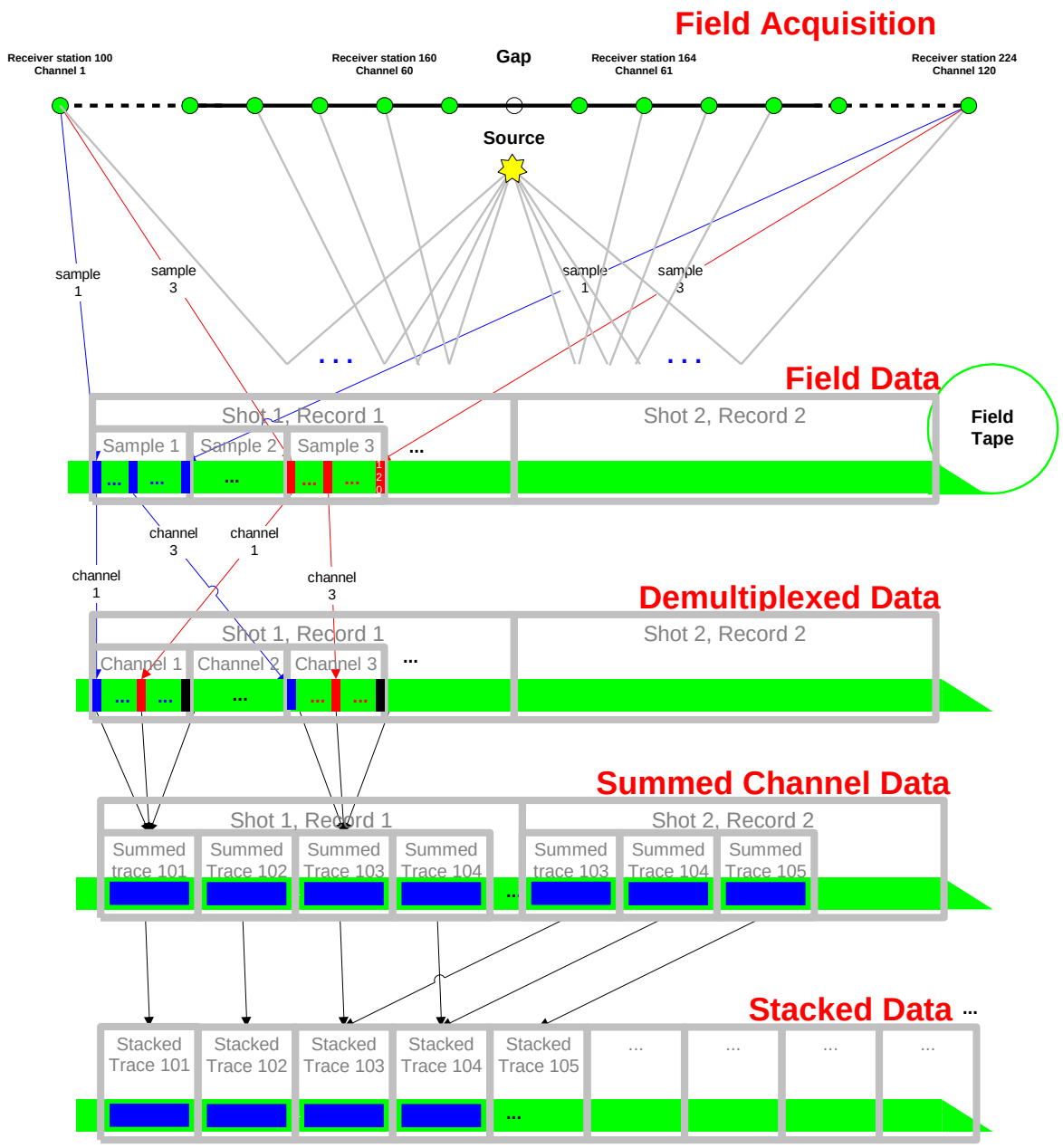

Figure 3: *This diagram shows how field data is created, recorded, demultiplexed, summed and stacked for seismic processing.*

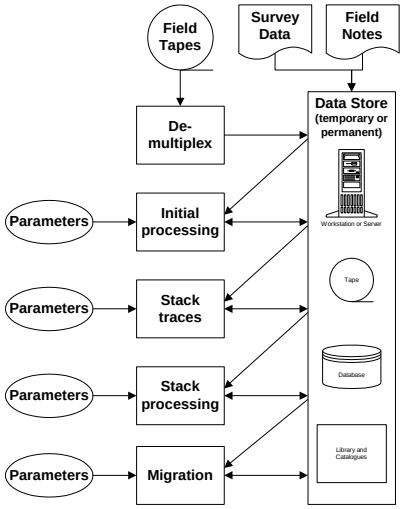

Figure 4: *Processing steps are applied in sequence to trace data until the desired result is achieved. Tight integration with a records management system is crucial.*

3D Seismic Data

Three-dimensional (3D) seismic recording is conducted in areas where it is desirable to obtain detailed subsurface horizon imagery, such as for reservoir analysis or marine exploration. Through specialized methods of acquisition, processing, and interpretation, a three dimensional image can be constructed in an area of interest according to detailed specifications.

Land based 3D acquisition employs a pattern of source lines and receiver lines, which are commonly either perpendicular or parallel to each other. As each energy source is activated, the seismic response is recorded by groups of geophones on several receiver lines, called a *patch*, as shown in Figure 5.

Marine based 3D acquisition may use one or more vessels; the primary or controlling vessel is called the *master* and subordinate vessels the *slaves*. The master vessel detonates the energy source and controls the recording of signal from streamers towed by all vessels. Typically each vessel tows between 2 and 10 steamer cables; each cable contains between 50 and 150 groups of geophones. Each shot is recorded simultaneously on all cables as the boat moves.

During pre-processing, positional data gathered in the field is used to compute a theoretical grid network called a binning grid. Every individual recorded seismic trace is assigned to one or more bins; the number of traces summed together at each bin is called the fold or coverage for that bin. The nominal average fold for the survey is part of the descriptive information for the survey. Summing all the traces assigned to each bin creates a single multi-fold trace that is used as input to subsequent seismic processing steps.

Other descriptive acquisition information includes details about the source and receiver setup, layout of source and receiver lines and navigation information such as master-slave vessel relationships and streamer layout for marine data.

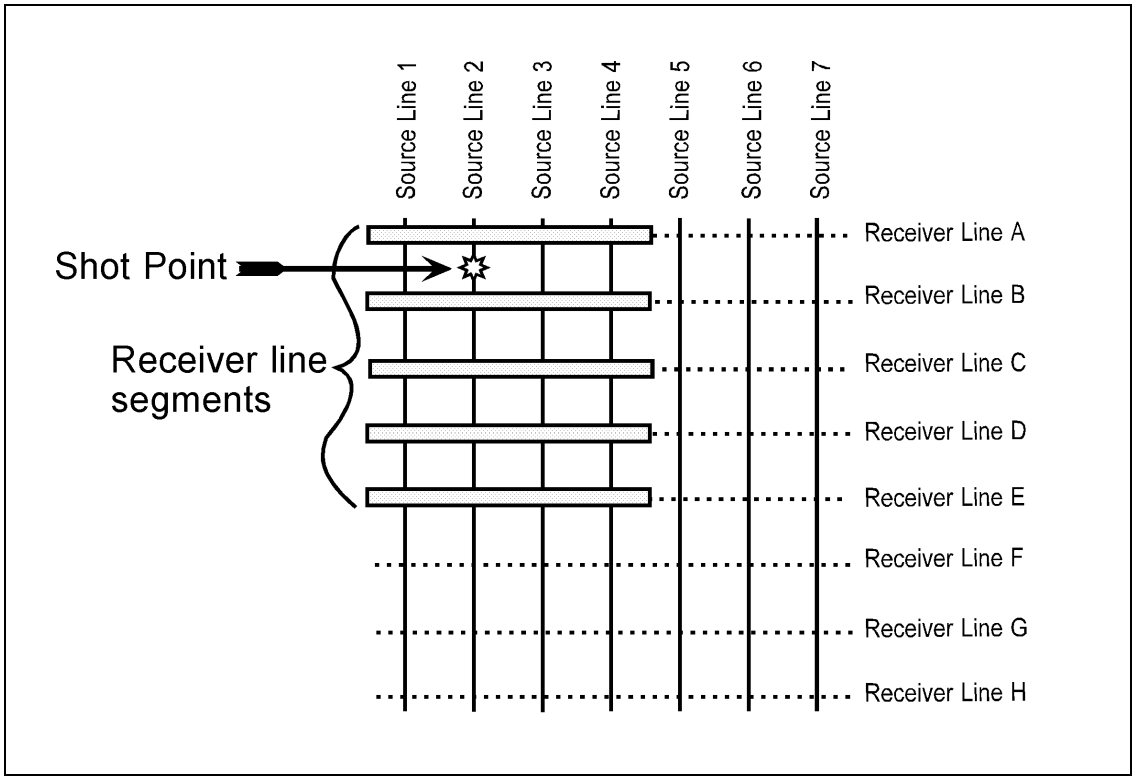

***Figure 5**: During Land Three-D seismic recording, a rectangular array of receiver groups called a patch is active for each shot. As each subsequent shot is made, the receivers active in the recording array are changed based on the acquisition design for the survey.*

Mapping and reporting for a 3D survey may relate to either the surface (field) positions or the subsurface bin grid and points. Regional maps may only show the perimeter of a 3D bin grid. Except for the three dimensional aspect and the large data volumes created, interpretation information for 3D surveys is similar in content to conventional 2D interpretation.

Bin coordinate data sets for 3D surveys can be extremely large if each bin center coordinate is explicitly stored. Various strategies for managing the data volume have been developed; data thinning, online bin calculation (using starting points, azimuth, and incremental distances) and off- or near-line data storage are some common methods.

Activities such as interpretation, processing, brokerage, or partnerships may involve only a portion of a 3D survey; a clear definition of which portion(s) of the survey are included is necessary to properly administer projects and agreements. The maps, reports, and other information or data that results from these activities will only pertain to the relevant portion of the survey.

Transactions, Agreements and Partnerships

Seismic data is an expensive and valuable asset; naturally a large industry has evolved that exploits this resource. Seismic brokers act as a liaison for buying and selling (or licensing) data. Companies that specialize in seismic acquisition create spec surveys and sell them to many buyers. Data management companies store and manage the paper and digital data that is created during the seismic life cycle.

Business agreements provide the foundation for cooperative ventures between E&P companies, software vendors and data providers. Most business agreements establish mechanisms for sharing costs, labor, responsibility, and profits for various aspects of the business. In the E&P industry, a single agreement can affect the disposition of land ownership, well or seismic rights, and production.

The business of Seismic Transactions in the E&P industry generates hundreds of millions of dollars every year. Seismic lines are bought, sold, traded, farmed in or out, or acquired through mergers and takeovers on a daily basis. Any E&P company can determine what data is available for purchase through information provided by data vendors in trade journals, public information sources, or through online or dial-up data access services provided by vendors. Many large companies also provide their own data sales services.

Agreements that affect seismic data may be set out before, during, or even years after the actual seismic acquisition. They may exist in perpetuity or for a defined length of time and may affect all or portions of a group of seismic lines. Depending on the terms of an individual agreement, parts of seismic lines may be included or excluded specifically or based on geographic area, a specified date interval, or by project, AFE, or processed or field data product.

Prior to a seismic data transaction (often called a *sale*), authorization from all data owners and partners must be obtained. For older data, obtaining authorization can be a very difficult task unless a good tracking system has been in place for many years; determining the current and past owners of seismic data can be difficult and complex.

With suitable authorization, data samples are made available for inspection. The data broker will provide the geophysicist with information about the seismic line, including nominal field parameters and a sample of a processed product. Based on the results of a quality inspection (called a *QI*), the requesting company may make an offer to purchase or license the seismic line.

Licensing agreements may define exactly what the licensee is permitted to do with the data acquired. Post stack processing may be allowed, but pre-stack processing prohibited. Many licensing agreements specify the disposition of licensed products after the primary term has expired; often these products must be returned to the owner or certified as destroyed.

Model Overview

Integration

Integration is the key to managing the Seismic Module and its components properly. Information critical to managing seismic data throughout its life cycle is managed in many support and business modules in PPDM version 3.6:

Support Modules

AFE: Application for Expenditure or Cost Center. Capture information about the cost centers or AFE's used through the life cycle.

Areas: business, regional or project areas associated with a seismic set

Business Associates: track detailed information about partners, service providers and other people, companies and regulatory agencies that you do business with.

Entitlements: information about the rights that you have to any type of data and what you are able to do with it.

PPDM Units of Measure: capture the default stored unit of measure for any measured value in the database.

Work Order: captures requests for work to be completed with some summary information about what was done and the data affected by the work order.

Business Modules

BA Interest Sets: describe partnership information for the ownership of seismic sets or products of those sets.

Contracts: contracts formed to support acquisition, processing, interpretation, data storage etc.

Geodetic and spatial: use this module to reference any positional information to geodetic or cartographic information.

Land Rights: capture surface access rights for seismic field acquisition.

Stratigraphy: make use of subsurface stratigraphic definitions that can be shared among all modules.

Obligations: especially useful to ensure that surface access requirements or conditions are met.

Projects: track work projects, such as for field acquisition, interpretation, or processing.

- Records Management: track the physical location of digital and hard copy products, circulation, retention, etc.
- Restriction: capture details about environmentally sensitive areas where access is limited.

- Support facility: describe marine vessels used for marine acquisition.
- Wells: describe in details wells that are used for VSP recording.

Contact PPDM to inquire about the status and availability of reference guides for these modules.

Data Diagrams

The diagram on this page is the legend for the tables discussed later in this document. Note that some or all of these elements may be present in data diagrams provided by the Association. Some elements are removed from final products to reduce file size:

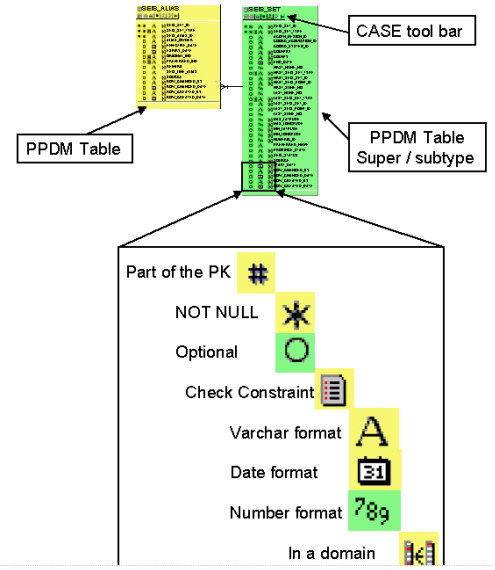

Figure 6: *This illustration shows the functions of each icon used in the data diagrams provided with PPDM version 3.6.*

The data diagrams for the Seismic Module are not provided in this reference guide because of their very large file size. Data diagrams can be obtained from the PPDM Association as part of the final model documentation or as a set of PowerPoint diagrams. The PowerPoint diagrams will provide the best resolution for printed quality.

Tables and Columns: Seismic

The following tables exist in the Seismic module of PPDM version 3.6. Each table is described in the following section; you can jump to a table description by clicking on the hyperlinked table name below. Note that for detailed content descriptions for each table, you should refer to the PPDM version 3.6 table documentation.

Seismic sets

SEIS_SET

A seismic set is a set of seismic information that has been grouped together to support a business objective. Some sets describe linear sets, 3D sets or well-related sets. Others support groups of seismic data processed or interpreted together.

The super type SEIS_SET contains a two part primary key, SEIS_SET_ID and SEIS_SET_TYPE. While SEIS_SET_ID may be any value, SEIS_SET_TYPE must be equal to the name of one of the valid subtype tables.

In SEIS_SET, the value of SEIS_SET_TYPE must equal one of

- SEIS_3D
- SEIS_ACQTN_SURVEY
- SEIS_INTERP_SET
- SEIS_LINE
- SEIS_PROC_SET
- SEIS_SEGMENT
- SEIS_SET_PLAN
- SEIS_WELL

Each of the 8 valid subtypes has been projected as a physical table in PPDM version 3.6; all have the same Primary Key structure as the super type table. However, each of the subtype tables must use its own name in the column SEIS_SET_TYPE; this requirement is enforced through a check constraint.

Back to the list of table names

SEIS_3D

SEIS_3D is used to support three-dimensional seismic sets, usually as an acquisition set. Each row in the table may represent a complete 3D survey or a portion of one, that is created to support a business objective. Use the table SEIS_GROUP_COMP to create associations between a 3D survey and an acquisition survey, processing set or interpretation set.

In this table, SEIS_SET_TYPE must equal ‘SEIS_3D’.

Back to the list of table names

SEIS_ACQTN_SURVEY

SEIS_ACQTN_SURVEY is used to group sets of seismic data in a field acquisition program. Generally, it describes when the survey was acquired, who owned the original acquisition data and who did the fieldwork. Associate the 2D, 3D or well components with the survey using SEIS_GROUP_COMP.

In this table, SEIS_SET_TYPE must equal ‘SEIS_ACQTN_SURVEY’.

Back to the list of table names

SEIS_INTERP_SET

Interpretation sets are created to group together sets of seismic data for concurrent interpretation. Associations with the seismic sets that comprise this SEIS_INTERP_SET are captured in SEIS_GROUP_COMP.

Summary information about the interpretation set is provided, such as who interpreted the set, the objective for interpretation, the application and version used and the pick method used. Additional detail about interpretation projects may be captured using the Project module.

In this table, SEIS_SET_TYPE must equal 'SEIS_INTERP_SET'.

Back to the list of table names

SEIS_LINE

SEIS_LINE is used to support two-dimensional seismic sets, usually as an acquisition set. Each row in the table may represent a complete 2D line or a portion of one that is created to support a business objective. Use the table SEIS_GROUP_COMP to create associations between a line and an acquisition survey, processing set or interpretation set.

In this table, SEIS_SET_TYPE must equal 'SEIS_LINE'.

Back to the list of table names

SEIS_PROC_SET

Processing sets are created to group portions of 2D, 3D or well related seismic that have been gathered together for concurrent processing. The set can be associated with each of these portions using SEIS_GROUP_COMP. Summary details about the processing activity, such as whom the processing was done by and for, when the project was done and the processing objectives are captured here.

In this table, SEIS_SET_TYPE must equal 'SEIS_PROC_SET'.

Back to the list of table names

SEIS_SEGMENT

For migrations from earlier versions of PPDM, the table SEIS_SEGMENT may be used to represent portions of a 2D line; however, SEIS_SEGMENT is not recommended for new implementations.

In this table, SEIS_SET_TYPE must equal 'SEIS_SEGMENT'.

Back to the list of table names

SEIS_SET_PLAN

Use this sub-type to design a planned seismic set and use the rest of the seismic acquisition module to describe the intended acquisition design, geometry, field locations, processing plans and interpretation plans.

In this table, SEIS_SET_TYPE must equal 'SEIS_SET_PLAN'.

Back to the list of table names

SEIS_WELL

Well related seismic occurs when either the source positions or receiver positions (or sometimes both) are located in a well bore. Seismic acquired this way is often used to generate velocity information for use in processing and interpretation.

The detail in PPDM version 3.5 WELL_CHECKSHOT_SURVEY and WELL_CHECKSHOT_SURVEY_DETAIL have been replaced by SEIS_WELL, which is fully integrated with the seismic module. This integration permits well related seismic to be fully described using the same tables used for other seismic data. A foreign key from WELL_DIR_SURVEY has been added to support a common functional relationship between the two types of surveys.

In this table, SEIS_SET_TYPE must equal 'SEIS_WELL'.

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Seismic Set Descriptions

SEIS_ALIAS

An alias for a seismic set may be any name, code or other identifier that was assigned by a partner, regulatory agency, brokerage company etc. This table should provide a complete list of all aliases in use for a seismic set. If you wish, the preferred name may be denormalized into SEIS_SET or one of its subtypes for query performance.

The alias table allows you to indicate the owner of the alias name, the date it was created, the date that the alias ceased to be used, which alias is the "preferred" version and whether an alias represents the original identifier for the line.

Back to the list of table names

SEIS_BA_SERVICE

Services of a specific nature that are most commonly queried are modeled explicitly in PPDM version 3.6. However, organizations often wish to track other types of services. For example, this table may be used to capture the

operator for a joint seismic operation, the name of the field survey company or the name of the company that handled environmental cleanup.

Back to the list of table names

SEIS_GROUP_COMP

Commonly, a Seismic set is comprised of other Seismic sets. For example, an acquisition survey may be constructed from several two dimensional lines and a 3D survey; alternatively, a processing set may be constructed from segments of two or more marine 3D surveys.

This table captures business relationships between seismic sets, and is intended to replace the explicit table relationships (constraints) that have been retained from earlier versions of PPDM. If possible, new implementations of PPDM version 3.6 should use this table instead of the explicit relationships between subtypes.

In the event that only a portion of the input Seismic Set is included in the new set, the corners of the polygon that describe that portion can be captured.

Back to the list of table names

SEIS_POINT_FLOW

Capturing full details about flowing holes has been delegated to the surface and environmental work groups. However, summary information about a flowing hole has been defined to capture flow information and remedial actions.

A FK to OBLIGATION via OBLIGATION_COMPONENT has been provided so that payment information, details about notifications or other task based obligations can be tracked.

Back to the list of table names

SEIS_SET_AREA

Use this table to indicate special areas that the seismic set is associated with. For example, you can use SEIS_SET_AREA to associate the set with project areas, organizational areas, special environmental areas, special interest group boundaries and so on.

Back to the list of table names

SEIS_SET_COST

A brief summary of costs associated with any seismic set can be captured here; detailed information should be obtained by using the pointer into your accounting system provided in the AFE module. Costs can be broken down from summary to detail costs via the recursive relationship. The REPORT_IND is used to prevent double reporting of values.

Back to the list of table names

SEIS_SET_JURISDICTION

Each Seismic Set may be associated with one or more jurisdictions – and is consequently subject to their legislation. Note that these associations are not always geographic in nature; in some circumstances a seismic set may be subject to legislation created by a jurisdiction in which the seismic set is not located. For example, a Canadian company may acquire seismic data located in Venezuela; some aspects of this acquisition may be subject to one or both jurisdictions.

Back to the list of table names

SEIS_SET_STATUS

Organizations may be interested in several types of seismic status; the column STATUS_TYPE can be used to discern between these types of status.

Operational status may indicate whether a seismic set is in the planning stages, in processing or interpretation or complete. Ownership status can be used to mark lines as wholly owned or acquired through purchase or lease. Processing status may indicate lines that are in pre-processing, final processing, and waiting for approval or complete.

Each status is defined by an effective and expiry date, allowing historic status information to be retained. A preferred indicator is used to highlight the status that should most commonly be used. The Active Indicator marks a status that is currently in effect.

Back to the list of table names

Seismic Acquisition

SEIS_ACQTN_DESIGN

Field design parameters are captured in this table; these designs may be flagged as nominal using the NOMINAL_IND column or as actual via the ACTUAL_IND column. Layout specifications for the energy source and recording set up are in this table; recording parameters are captured in the receiver layout table.

An acquisition design may be associated with any type of seismic set. The contents of this table have been enhanced to support acquisition details for all types of seismic surveys. Use it to capture a planned design by associating it with a SEIS SET PLAN, or to capture the field layout for a SEIS LINE, SEIS 3D or SEIS WELL survey.

Back to the list of table names

SEIS_ACQTN_SPECTRUM

During acquisition, additional spectra of data, such as multiple component, gravity or magnetic readings may be acquired simultaneously with the conventional acquisition. Capture these spectra here.

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SEIS_ACQTN_SURVEY

See Seismic Set Section

SEIS_CHANNEL

For those with an interest in minutiae, this table can be used to capture details about each channel on the record. It can capture details about which receiver group contributed to a channel's data or which vessel was towing the receiver that created a specific record. Channel offsets (offsets of a receiver array during the recording for a specific shot) may be captured in this table.

If you simply wish to keep track of which auxiliary channels were employed to record uphole times, file numbers and so on, use RM_AUX_CHANNEL and its association with the field tape.

Back to the list of table names

SEIS_PATCH

The seismic patch describes recording geometry by describing the relative positions of the shot and receiver layout. These layouts may be linear for land-based 2D recording or rectangular for 3D or marine recording. This table captures general information about the type of patch and how it is propagated. Each SEIS RECORD can be associated with an appropriate patch description.

Back to the list of table names

SEIS_PATCH_DESC

This table is used to describe each linear segment of the patch array, and is often populated based on the cable layout of the receiver groups. The first and last live positions on each cable, together with any relevant offsets (X, Y or Z) for each linear segment are represented as a row in the table. For example, in the following case, four rows will be created in SEIS PATCH DESC, one for each of the four receiver rows included in the patch.

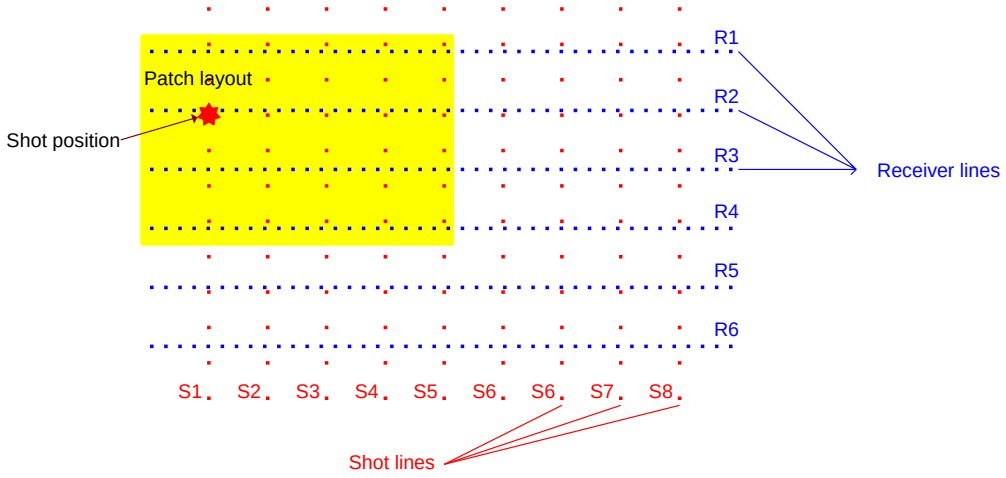

Figure 7: *The patch layout, shown in yellow, is represented by one row in the table SEIS_PATCH and 4 rows in SEIS_ PATCH_DESC, one for each of the receiver lines R1, R2, R3 and R4.*

Back to the list of table names

SEIS_RECORD

Each record, which is created as an energy source is generated and the resultant returned energy recorded on a tape (or other digital media), is described here in detail. If desired, you can provide a pointer to the actual acquisition design used for that record. A direct association with the recording tape is also supported through a foreign key to RM_INFORMATION_ITEM. The RECORD_TYPE column allows test records to be enumerated.

Recording details such as the field file number, the logical record number and actual tape record number, the patch used, number of recorded channels and record quality are supported. Uphole times and time delays are included.

The vessel that captured this record is captured for marine seismic; this allows correct correlation and processing of marine data from multiple recording vessels.

Back to the list of table names

SEIS_RECVR_MAKE

Previous versions of PPDM included this table as a simple reference table. PPDM version 3.6 supplements the list of valid receiver model names with additional information about the receiver, such as its base horizontal and vertical resonating frequency and the type of receiver device.

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SEIS_RECVR_SETUP

Details about the setup of the receiver arrays are captured in this table. Land and marine based arrays can be described. If desired, a simple spread description of the setup can be captured here instead of using the patch layout tables.

Back to the list of table names

SEIS_VESSEL

General vessel information is captured in SF_VESSEL. This table is part of the Support Facilities module and captures the vessel name, registration and overall dimensions.

SEIS_VESSEL records vessel configuration during recording; its bearing and offset and the role it plays as a master or slave vessel can be associated with the seismic acquisition.

Back to the list of table names

SEIS_STREAMER

Seismic streamers are used to tow receiver arrays behind a marine vessel during seismic recording. Each streamer contains many sets of receiver groups, buoyancy and depth controllers, navigational antennae, stretch sections and so on. A vessel may tow one or more streamers, and may or may not also produce the energy source. General information about the streamer is captured in SEIS STREAMER, with its subordinate tables (SEIS_STREAMER_BUILD and SEIS_STREAMER_COMP) capturing more detailed information if it is needed.

Back to the list of table names

SEIS_STREAMER_BUILD

This table allows you to track the components on each streamer and the relative position of each component on the streamer.

Back to the list of table names

SEIS_STREAMER_COMP

This table allows you to capture the number of each component type on the streamer. It does not allow you to describe where each component is located on the streamer.

Back to the list of table names

Seismic Locations

SEIS_BIN_GRID

Bin grids are created during seismic trace processing by calculating the theoretical common mid point (usually called CMP) locations for each shot – receiver pair and then summing the traces together based on a mathematical gridding algorithm.

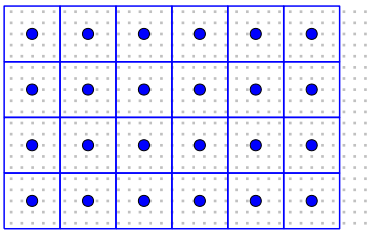

Figure 8: *the small dots represent common mid points (10 meters apart). The blue rectangles represent the binning algorithm; for this example they are 60 meters long on each side. All traces whose CDP falls within the bin are summed together for processing. Note that the bins may not be square and that they may overlap in some cases. The bin centers are shown as blue dots – these are the points that are typically shown on a bin map.*

General information about the bin grid can be stored in SEIS_BIN_GRID. Each bin grid can be related to any type of set (acquisition, processing or interpretation).

Since bin grids may contain millions of bin centers, storing explicit location information for each bin center may require a great deal of space. Alternatively, an evenly spaced bin grid can be extrapolated mathematically. SEIS_BIN_GRID supports two methods of deriving bin points.

- Start point, angle of rotation, azimuth and inline / xline increments, spacing etc.
- Start point, 3 corner points and increments, spacing etc.

Back to the list of table names

SEIS_BIN_ORIGIN

Creating new bin grids is an important step in many processing projects. Often, the new grid is generated from all or portions of other bin grids. Details about these combinations are captured in this table.

Back to the list of table names

SEIS_BIN_OUTLINE

The sheer size of many bin grids makes plotting them on maps difficult; the bin center (bin point) locations may obscure or obliterate other important information. Plotting the outline of the bin grid helps solve this problem. Outlines may be captured in two ways.

- Geographic (latitude and longitude) polygon nodes are used for mapping applications. These polygons are captured through the foreign key from SEIS_BIN_GRID into LAND_LEGAL_DESCRIPTION.
- Locally referenced polygons (X and Y coordinates) may be used in a processing or interpretation application. These outlines are stored in SEIS_BIN_OUTLINE.

Back to the list of table names

SEIS_BIN_POINT

Individual bin point locations can be captured in this table as simple eastings and northings from a local reference. While it is usually preferable to calculate bin locations on the fly using parameters stored in SEIS_BIN_GRID, you can store actual bin center locations here.

Back to the list of table names

SEIS_BIN_POINT_VERSION

Any type of alternate location for a bin point may be captured in this table. Geographic (latitude and longitude) and mapping coordinates are both supported. Locally referenced coordinates are stored in SEIS_BIN_POINT.

Back to the list of table names

SEIS_POINT

Any point of long-term relevance to a seismic line may be captured in this table. Source locations (often called shot points), receiver locations (actually the center of the receiver group array) and common mid points (CDPs) are all handled by setting SEIS_STATION_TYPE to the appropriate value. Location information may be stored as latitude / longitude pairs or as XY references. Depth information has been added to support well related seismic and depth datum information to support marine acquisition.

The ACQUISITION_SEQ_NO and SPATIAL_SEQ_NO allow points in a set to be ordered for processing or mapping, as appropriate. The MAPPING_CODE is provided to help resolve over-posting problems on maps. A flag, FLOWING_HOLE_IND, has been added to indicate that the position was drilled into an aquifer; cleanup information can be found in the table SEIS_POINT_FLOW.

Interpretation data may be associated with either a seismic point or a bin point; when populating this table consider how you want to associate interpreted picks and how you want to map them. If you will map them in a system that requires geographic coordinates, consider loading the data into SEIS_POINT.

Back to the list of table names

SEIS_POINT_VERSION

Alternate survey locations for each point can be stored here; these locations may be original field locations (later modified by resurveying the line), other mapping system coordinates, referenced to another datum etc. Preferred locations are stored in SEIS POINT.

Back to the list of table names

SEIS_SET_GEOMETRY

This table associates each SEIS SET with one or more geometry files in a spatial engine such as SDE or SDC. PPDM has released reference manuals on how this works.

Back to the list of table names

SEIS_SP_SURVEY

The SEIS_SP_SURVEY table captures raw survey information as angles, offsets and reference points. Information in this table can be used to re-compute survey locations based on alternate survey systems without distortion within local survey system references.

Back to the list of table names

Brokerage and Transactions

SEIS_INSPECTION

Inspections of seismic data are a common precursor to a purchase. This table captures details about the inspection, such as when it occurred and who was involved. Details about exactly which products have been inspected are captured in the SEIS INSP COMPONENT table. Note that the products inspected may not be the same products that are involved in a final transaction; in fact, sometimes the product inspected may not even be related to the seismic set that a client is interested in.

Work associated with the inspection can be tracked using the PROJECT module. Work orders that request data to be pulled for the inspection are tracked in the WORK ORDER module.

Back to the list of table names

SEIS_INSP_COMPONENT

Associations between the inspection and the products inspected, any contracts that are drawn up and related projects are tracked in the component tables.

Back to the list of table names

SEIS_SET_AUTHORIZE

Authorization from the company who owns seismic data must be obtained before it can be involved in any transactions or inspections. Each seismic set can have multiple authorizations associated with it. You can use this capability to track the history of authorizations or to track different types of authorizations (such as one for inspections and one for sales or one for each partner that owns the data).

The authorization allows you to capture the asking price for the data, any limitations to the authorization or explanations of why the authorization exists.

Back to the list of table names

SEIS_TRANSACTION

Transactions are created when data or information actually changes hands. Transactions may be conducted with money or through trades for other rights or through leases or rentals of data. Details about the transaction are stored in this table. Each transaction can be associated with an AFE and a resulting entitlement.

The process of fulfilling the requirements of the transaction (such as providing your client with copies of all processed tapes, field notes and survey data) can be tracked in the PROJECTS module. A connection between circulation information and the project module (at the project step level) allows integration between the project and normal records management processes. The actual seismic sets and products associated with the transaction are captured in SEIS_TRANS_COMPONENT. Work orders requesting work done for copying data involved in the transaction are tracked in the WORK ORDER module.

Back to the list of table names

SEIS_TRANS_COMPONENT

Associate the transaction with the seismic sets, contracts, physical or information items, inspection details etc using this table.

Back to the list of table names

Interpretation

SEIS_INTERP_SET

Back to the list of table names

SEIS_INTERP_COMP

Inputs and outputs from the interpretation can be tracked here. If only a part of a product is loaded into the system, you can use the latitude and longitude corners

to indicate which geographic portion has been loaded. If desired, you can create a new bin set for the interpreted data and associate that with the interpretation set.

Back to the list of table names

SEIS_INTERP_LOAD

Certain types of data processing or manipulation steps may be undertaken during the load into an interpretation system. These can include filtering, extracting a time slice of the data etc. SEIS_INTERP_LOAD captures these steps. The parameters that are applied can be described in SEIS_INTERP_LOAD_PARM.

Back to the list of table names

SEIS_INTERP_LOAD_PARM

Use this table to describe the parameters associated with manipulation or processing steps applied to data loaded into an interpretation system.

Back to the list of table names

SEIS_INTERP_SURFACE

Seismic interpretations are made on a surface, which is in turn defined by a stratigraphic unit. These surfaces are defined here, and then associated with the interpretation picks created in an interpretation software package. Concepts such as repeat occurrences of Stratigraphy (in a new surface), overturned formations, ordinal sequencing of surfaces for an interpretation etc. provide some of the functionality that is supported for other types of stratigraphic interpretation.

Back to the list of table names

SEIS_PICK

A seismic pick may be referenced to a SEIS_POINT or a SEIS_BIN_POINT; consider how you will want to access and view pick data before deciding where to load your reference points. If you reference your data to SEIS_BIN_POINT, your mapping capability will be based on local references and your data set may be very large.

Many supporting details about the pick itself have been added to allow users to provide additional detail about picks, including

- Pick quality (confident, poor)
- Pick qualifiers (indicate a missing pick here)
- Pick qualifier reason (the pick was missing because of poor data quality, erosion etc.)
- The identifier of the trace that was picked
- Pick versions (working, final)

- Preferred pick indicator.

Back to the list of table names

Processing

SEIS_PROC_SET

Back to the list of table names

SEIS_PROC_COMPONENT

Inputs and outputs from a processing or reprocessing flow are captured here. These can be velocity surveys, well data, well logs, the processing plan, products stored in the RM system etc. Interpretation has been integrated with seismic processing by allowing any output from a processing series (or step) to be associated with the interpretation set.

Back to the list of table names

SEIS_PROC_PARM

Parameters associated with processing steps are stored in this table. Each parameter can be fully described, its origin defined and parameter values (upper and lower) captured.

Back to the list of table names

SEIS_PROC_PLAN

Processing plans have been supported so that they can be re-used as often as necessary. This allows an organization to create a set of standard processing templates that can be consistently applied to multiple processing sets. Deviations from the plan can be captured in the actual SEIS_PROC_STEP and SEIS_PROC_PARM tables.

The processing plan consists of a series of steps (SEIS_PROC_PLAN_STEP), each of which can be associated with one or more parameters (SEIS_PROC PLAN_PARM). This processing plan can be associated with a project, or with the contract that governs the relationship with a processing contractor.

Back to the list of table names

SEIS_PROC_PLAN_PARM

Specific parameters settings to be applied at each step of the processing plan, such as upper and lower filter settings, can be defined here. Deviations from the plan can be captured in SEIS_PROC_PARM if desired.

Back to the list of table names

SEIS_PROC_PLAN_STEP

Planned processing steps and their sequence are defined in this table. Deviations from the plan can be captured in SEIS_PROC_STEP if desired.

Back to the list of table names

SEIS_PROC_STEP

The actual processing steps applied to this processing set are tracked in this table. The order of steps, the date that each step was applied and the status of each step can be tracked.

Back to the list of table names

SEIS_PROC_STEP_COMPONENT

If you need to, you can associate any of the inputs or outputs from processing with individual steps in the processing flow. This is useful if the product from a processing step is passed to the records management system for retention, or a product is loaded into an interpretation system.

Back to the list of table names

Velocities

SEIS_VELOCITY

This table can be used to store individual velocities as time / depth pairs or as velocities. A velocity can be derived from a seismic point, a bin point, a well survey or simply associated with a pair of geographic (latitude / longitude) coordinates.

This table was constructed using the well checkshot module in PPDM version 3.5.

Back to the list of table names

SEIS_VELOCITY_INTERVAL

Velocity intervals, often calculated during processing or interpretation, are described in this table. An interval velocity is essentially an average velocity as a function of depth usually obtained from the sonic log, a density log or through calibration of the check shot velocities. The method used to compute the velocity, the type of velocity, its value and your confidence in the quality of the value obtained can all be captured.

Describe the interval in terms of the top and base stratigraphic units, measured depths or true vertical depths. The associated well can be linked through the UWI column.

Back to the list of table names

SEIS_VELOCITY_VOLUME

Because of their size, velocity details may not be explicitly stored in a relational model such as PPDM. Instead, some general Meta data about the volume can be defined and a pointer to the actual file provided via the Records Management module. The velocity volume can be associated with processed seismic data (SEIS_BIN_GRID) or well related seismic (SEIS_WELL) or neither.

Back to the list of table names

Implementation Considerations

Constraints in PPDM

It is essential that anyone who is considering using PPDM version 3.6 review the Constraints Reference Guide first. Improper use or population of constrained columns in PPDM can compromise the quality of your data and the reliability of your queries. This document may be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Check Constraints

PPDM Version 3.6 makes use of check constraints in rare cases where the values that may be input for a column are known at design time and will not change over time. Two types of uses are observed in PPDM 3.6.

- Where the column name is %_IND, the column is an indicator field, and the values may only be Y, N, or null.
- Super-sub type implementations use check constraints to enforce the integrity of the super-sub type relationship. Currently these relationships are in use for Seismic, Business Associates, Records Management, Support Facilities, Production Entities and Land Rights.

  Let's use Seismic Sets as an example. This structure consists of a parent table (SEIS_SET) and eight sub-type tables (SEIS_3D, SEIS_ACQTN_SURVEY, SEIS_INTERP_SET, SEIS_LINE, SEIS_PROC_SET, SEIS_SEGMENT, SEIS_SET_PLAN and SEIS_WELL). Each of the tables has a two-part primary key: SEIS_SET_ID and SEIS_SET_TYPE.

  SEIS_SET_ID is assigned by the user and can have any value as long as it is unique for that type of seismic set. SEIS_SET_TYPE was designed to maintain the integrity of the super-sub type structure and can only have the values assigned to it by check constraints; these values are the table names of the eight valid sub-types. In SEIS_SET, the SEIS_SET _TYPE can have any of the table names, but in each of the sub-types, it can only have the name of the table it is owned by.

Currencies in PPDM

Costs in PPDM may originate in any valid Unit of Measure (UOM), such as USD, $CDN, YEN, etc. However, to ensure that queries for retrieval and reporting are efficient, it is desirable to convert all original currencies to a standard unit of measure for storage in the database. PPDM supports the requirement to restore the original value in the following way:

- Convert all stored currencies to a single currency type, such as US dollars.

- CURRENCY_OUOM stores the currency in which the funds were initially received. When the stored currency is multiplied by the CURRENCY_CONVERSION, the value of the transaction in the original currency is obtained.

- CURRENCY_CONVERSION stores the rate applied to convert the currency to its original monetary UOM from the stored UOM. This value is valid for this row in this table at the time of conversion only. When this value is multiplied by the stored currency value, the original value of the transaction in the original currency is restored.

Units of Measure

Relational databases, powerful as they are, are not good at certain types of query and retrieval. Any time a query is developed that requires the database to retrieve all the rows in a large table and perform some calculations on the data before returning results to a user is likely to perform very poorly. This assumes, of course, that the person constructing the query is aware that a calculation is necessary when writing the query. Data management strategies for such tables recommend that requirements for on-line conversions such as this be eliminated if at all possible. The PPDM strategy for handling units of measure falls into this category.

Every column in the data model that references a Unit of Measure (such as a depth, temperature, length etc.) should be stored using a single, common unit of measure. For example, in one PPDM instance, all the total well depths should be stores as meters or as feet. Storing some depths as meters and the rest as feet creates problems for the data base and adds confusion to the user (who may not be aware that the numbers in the depth column are not all meters).

The original unit of measure (the unit in which the data was originally received) can be stored in the data table. For example, the WELL table captures FINAL_TD and FINAL_TD_OUOM. These columns capture the value of the final total depth of the well and the units that the depth was originally captured in.

The ***stored unit of measure*** is captured in the PPDM meta model, PPDM_COLUMN. This table captures the default unit of measure for a column and the name of the column where the original unit of measure is stored. The following illustration provides an example:

WELL

UWI	DRILL_TD	DRILL_TD_OUOM
SMITH12F	1250	FEET
JONES44	1560	METERS
12345	1400	FEET

PPDM_COLUMN

TABLE_ NAME	COLUMN_ NAME	UOM_ COLUMN	OUOM_ COLUMN	DEFAULT _ OUM_ SYMBOL
WELL	UWI			
WELL	DRILL_TD		DRILL_TD_OUOM	M
WELL	DRILL_TD_OUOM			
WELL_CEMENT	CEMENT_AMOUNT	CEMENT_AMOUNT_UOM	CEMENT_AMOUNT_OUOM	

Figure 9: *The method for storing and tracking units of measure is illustrated here..*

Note that in the example, the Drilling TD is stored in meters, but was originally received as feet. In some cases, it is not possible to ensure that all the rows in a column are stored as a single unit of measure – this is common in cases where the unit of measure is dependent on some other factor. For example, substance measurements may depend on the substance being measured; gases are stored as MCF, liquids as BBL etc. In these cases, the unit of measure is stored directly in the business table.

Audit Columns

Each table contains five columns: SOURCE, ROW_CHANGED_BY, ROW_CHANGED_DATE, ROW_CREATED_BY, and ROW_CHANGED_DATE. These columns satisfy a data-auditing requirement to identify the user and date of database transactions.

Use the “CREATED” columns when you are inserting new data rows and the “CHANGED” columns when you are updating a data row. The ROW_CHANGED / CREATED_BY columns are usually populated using the system login id in use. ROW_CHANGED / CREATED_DATE is usually set to the system date of the insert or update operation.

To populate the SOURCE column, specify where you obtained the data. If you receive the data from Vendor A, and Vendor A received the data from Regulatory B, you should set the SOURCE to Vendor A. In some cases (such as for interpreted picks), data is created by an application. In this case, the source may be set to identify the application that created the data.

Identifying Rows Of Data That Are Active

Maintaining information about how a business object has changed over time is an important business requirement for all these modules. To support this, mechanisms for allowing versioning have been added to many tables.

Many tables in PPDM version 3.6 contain a column called ACTIVE_IND. The values for this column may be one of Y, N, or null. When more than one row of data (such as a spatial description or a status) has been created for a business object, use the ACTIVE_IND to indicate which row is currently active (note that in some cases, more than one row may be active simultaneously).

This provides implementers with two benefits. First, when populating EFFECTIVE_DATE and EXPIRY_DATE it will not be necessary to populate EXPIRY_DATE with a false future date to indicate that the row of data has not expired yet. Second, queries can explicitly search only for rows that are active.

If this column is used for queries, as recommended (such as "find me the currently active status for this land right"), you should implement procedures to ensure that this column is always populated as either Y or N and maintained appropriately. If the column is left blank (NULL), the query will not be consistent or reliable.

For example, you could default the value to N if the expiry date is filled in and has already happened. Make it Y if the expiry date is empty *or* if the expiry date contains a future date.

Modifying the Seismic Module

Subsetting PPDM

The PPDM data model is designed to allow users to implement portions that support their business without needing to manage modules that are not required. Good data management practices are also supported; this means that data redundancy is reduced in the Model whenever possible.

All information about Seismic will be found in the seismic module; information about contracts is stored in the Contracts module, details about objects that are retained for long term use are stored in the Records Management module and so on. Depending on your business requirements, you can implement all or some of the modules.

In general, it is usually simplest to install the entire PPDM data model and simply restrict usage to the portions that are useful to you. Additional tables can be implemented as your business requirements expand, or as your data and processes are able to support capture in a data model. Architectural guidelines for subsetting PPDM are contained in the PPDM Architectural Principles Document. This document can be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Expanding PPDM

As a consequence of the PPDM Design process, which actively solicits and incorporates business requirements from Industry, many users find that the model is quite complete. However, individual implementations may find that additional columns are needed, or that some denormalization will help their performance.

The Association provides documentation about how to expand the data model to accommodate your specific requirements. This document can be obtained from the PPDM Association or downloaded from the PPDM web site at www.ppdm.org.

Feedback to PPDM

Much of the growth of the PPDM model can be attributed to Industry feedback. All implementers are requested and encouraged to provide feedback to the Association about changes they have made for implementation. Feedback can be submitted to changes@ppdm.org.

Frequently Asked Questions (FAQ)

Acquisition

My seismic acquisition program did not follow the planned program because of some environmental problems we encountered. Can I track the planned acquisition and the actual acquisition parameters?

PPDM Version 3.6 allows you to track field acquisition parameters at many levels. First, you can create a SEIS_SET_PLAN for a planned acquisition. Once you have created the SEIS_SET in this way, the rest of the acquisition model is available for you to track your entire acquisition plan, including layouts for sources and receivers and the recording setup. The planned seismic set can be associated with actual acquisitions through the table SEIS_GROUP_COMP.

Acquisition designs can be captured for an entire SEIS_ACQTN_SURVEY, for a 2D line (SEIS_LINE), part of a 2D line (SEIS_SEGMENT), a 3D survey (SEIS_3D) or a checkshot or VSP (SEIS_WELL). These designs may be nominal or actual – flags in the table SEIS_ACQTN_DESIGN allow you to discern between the two types.

Finally, for every record created during acquisition (SEIS_RECORD), you can enter a foreign key from SEIS_ACQTN_DESIGN to track the actual layout used for creating that particular record.

I used a standard acquisition patch when I recorded this 3D survey. How do I describe the patch?

The recording patch is described in SEIS_PATCH and SEIS_PATCH_DESC. Create the patch and then associate it with each record created during recording.

Each row in the table SEIS_PATCH describes a complete patch in general terms; the symmetry any layout of the patch, how roll-along was applied during recording and the number of stations in the gap are all described. SEIS_PATCH_DESC is used to describe each logical row in a 3D patch; the first and last positions on that row, and its relative position in the patch are all captured. See the detailed description in the Tables and Columns Section of this guide for more information.

How should I describe the marine vessels and cables used during acquisition?

Vessel information is captured in two places. Static descriptions of the vessel itself, such as its size (draft, beam, displacement and length) and the navigational array are captured in the SF_VESSEL table. This table is part of the ***Support Facilities*** module that tracks objects that are used to assist with key business activities; roads, transmission towers, railroads and docks are other examples of support facility.

Dynamic details, such as the vessel configuration for a seismic acquisition are captured in the SEIS_VESSEL table; use this table to describe the shot layout, streamer set up and other variable descriptions.

Streamer information is captured in the SEIS_STREAMER table; this describes the streamer layout in general terms. Specific information about the configuration of a streamer is captured in SEIS_STREAMER_COMP (the number of each type of component on the streamer) and SEIS_STREAMER_BUILD (the type and position of each component). Each implementation can capture the level of detail that is most meaningful.

Processing

I have a set of ten processing plans that I use for most processing in this basin. How can I keep track of those processing plans and which one was used in each processing or re-processing project?

Processing plans are tracked in the SEIS_PROC_PLAN table and its subordinates (SEIS_PROC_PLAN_STEP and SEIS_PROC_PLAN_PARM). You can use these three tables to develop a detailed processing plan, including all steps, the order in which they should be applied and any parameters that should be used at each step. Apply the processing plan to the SEIS_PROC_SET using the table SEIS_PROC_COMPONENT.

How do I keep track of which processing products are sent to the archival system for permanent retention? Can I associate those products with this processing flow?

SEIS_PROC_COMPONENT is used to track all inputs and outputs from a processing project. You can associate output seismic sections here, with a pointer to the RM module. If you wish, you can also associate each product with a specific step in the processing flow by using the table SEIS_PROC_COMP_STEP.

Can I keep track of velocities that were used or created during this processing project?

SEIS_PROC_COMPONENT is used to track all inputs and outputs from a processing project. You can associate velocities here with a pointer to SEIS_VELOCITY_VOLUME. If you wish, you can also associate each volume with a specific step in the processing flow by using the table SEIS_PROC_COMP_STEP.

Interpretation

How can I keep track of the processing steps I applied when I was loading this interpretation project?

The tables SEIS_INTERP_LOAD, SEIS_INTERP_LOAD_PARM are used to track any details about additional processing applied during the load into your interpretation application.

How Can I keep track of the tapes in my records system that holds the final project data?

The final products can be catalogued into the RM module and then associated with the SEIS_SET using the foreign key in RM_INFO_ITEM_CONTENT.

I want to keep track of the processing history for a specific seismic product that was loaded into my interpretation set.

Outputs from processing (defined in SEIS_PROC_COMPONENT) are captured as inputs to the interpretation load (SEIS_INTERP_COMP).

I want to extract my final picks from the interpretation project and store them in the database. How do I do that?

Final picks are stored in the table SEIS_PICK and SEIS_INTERP_SURFACE. This allows you to integrate picks from many projects without having to load the projects back into the original application system.

Brokerage and Transactions

How do I know whether I have authorized a particular seismic set for use in a sale, inspection or other transaction?

The table SEIS_SET_AUTHORIZE tracks the levels and types of authorization granted to a seismic set, together with any conditions and the dates that the authorization is valid.

Can I keep track of the authorization to data that I have obtained from this lease agreement?

Yes, authorizations, also called entitlements, are tracked in the ***Entitlement*** module.

Partnerships

How do I keep track of my partners for a set of seismic data?

Partnerships are described in a shared module called ***Interest Sets***. A reference guide has been developed for this module; it is available from the PPDM web site at www.ppdm.org. Create your partnership information using the interest set module – you can describe working interests, royalty interests, and divided or undivided interests.

Associate that interest set with all the business objects that you need to through the table BA_INT_SET_COMPONENT. Typically, the interest set will be governed by a CONTRACT, and will relate to one or more SEIS_SET rows and may involve a LAND_RIGHT. The partnership can be for an acquisition seismic set, a processed set or even an interpreted set.

My partners have changed for this AMI (Area of Mutual Interest). How do I track this change?

If you had created an interest set for the original interest set (using the I***nterest Set*** module), you will start by setting that interest set as inactive and expired. Change the EXPIRY_DATE to the date that the old interest set expired, and the ACTIVE_IND to 'N'.

Now, create a new interest set. You have a choice here, depending on what you mean by the change. If the partner interest levels have changed, you may simply want to create a new version of the same interest set (use the INTEREST_SET_SEQ_NO for this option). If this is a completely new interest set, create a new INTEREST_SET_ID and populate it. You can associate the old and the new interest sets using the BA_INT_SET_XREF table if you need to.

Appendix A: Sample Queries

These sample queries have been developed using a subset of the requirements defined in the Business Requirements Document. Note that there are many ways to address the questions posed here, but we have tried to provide useful examples that illustrate the use of the data model. The PPDM Association does not provide any guarantee that these queries will satisfy your business requirements; they are for illustration only.

- **Spatial or GIS queries:** Spatial queries are not thoroughly addressed in this section of the reference guide; how you deal with these queries depends on the spatial engine you are using. In many cases, we have avoided using spatial queries because the number of query lines needed obscures the rest of the query and makes it more difficult to read. Sometimes, we have provided a connection to a NAMED AREA, rather than a lat/long box.

- **Versioning over time:** Many aspects of the oil and gas business have a strong time component. Users require information about how a business object was configured in the past, what it looks like now, and what it is expected to look like in the future (i.e., if a project is not active now, when was it in the past). If your queries need to address the situation as it is now, use the ACTIVE_IND you will find in many versioned tables. Using this flag helps ensure that you do not return data that is out of date.

- **Units of Measure:** Several examples have been provided to show how units of measure should be queried in PPDM. As these queries are nearly always handled the same way, this guide does not show the method every time it is needed; the authors felt that this would create confusion and obscure the main intent of the query.

Seismic Brokerage and Ownership

What jurisdictions is seismic line AAA in?

```
select      SJ.JURISDICTION
 from       SEIS_SET SS, SEIS_SET_JURISDICTION SJ
where       SS.SEIS_SET_ID = 'AAA'
   and      SS.SEIS_SET_TYPE = 'SEIS_LINE'
   and      SJ.SEIS_SET_ID = SS.SEIS_SET_ID
   and      SJ.SEIS_SET_TYPE = SS.SEIS_SET_TYPE
```

Who authorized seis line AAA for sale? When and why are sales authorized and what limitations have been placed on sales?

```
select      SA.AUTHORIZED_BY, SA.AUTHORIZE_TYPE, SA.EFFECTIVE_DATE,
```

```
            SA.EXPIRY_DATE, SA.REASON_TYPE, SA.LIMIT_TYPE
  from      SEIS_SET_AUTHORIZE SA, SEIS_SET SS
 where      SS.SEIS_SET_ID = 'AAA'
   and      SS.SEIS_SET_TYPE = 'SEIS_LINE'
   and      SS.SEIS_SET_ID = SA.SEIS_SET_ID
   and      SS.SEIS_SET_TYPE = SA.SEIS_SET_TYPE
```

What Quality Inspections have been completed on seis line AAA since July 2000? Who did the inspections and what date was the inspection completed?

```
Select      SI.INSPECTION_DATE, SI.INSPECTING_BA
 From       SEIS_INSPECTION SI, SEIS_SET SS, SEIS_INSP_COMPONENT SIC
  Where     SS.SEIS_SET_ID = 'AAA'
   And      SS.SEIS_SET_TYPE = 'SEIS_LINE'
   And      SS.SEIS_SET_ID = SIC.SEIS_SET_ID
   And      SS.SEIS_SET_TYPE = SIC.SEIS_SET_TYPE
   And      SIC.INSPECTION_ID = SI.INSPECTION_ID
   And      SI.INSPECTION_DATE >= '01-JUL-2000'
```

What products were used for quality inspection BBB?

```
Select      SIC.INFORMATION_ITEM_ID, SIC.INFO_ITEM_TYPE
  From      SEIS_INSP_COMPONENT SIC, SEIS_INSPECTION SI
 Where      SIC.INSPECTION_ID = 'BBB'
```

Have I sold line AAA in since July 2000? What was the price per km for each transaction? What was the total price for each transaction

```
select   ST.PRICE_PER_LENGTH, ST.TRANSACTION_DATE, ST.TOTAL_PRICE
 from    SEIS_TRANSACTION ST, SEIS_SET SS,
         SEIS_TRANS_COMPONENT STC
Where    SS.SEIS_SET_ID = 'AAA'
   and    SS.SEIS_SET_TYPE = 'SEIS_LINE'
   and    SS.SEIS_SET_ID = STC.SEIS_SET_ID
   and    SS.SEIS_SET_TYPE = STC.SEIS_SET_TYPE
   and    STC.SEIS_TRANSACTION_ID = ST.SEIS_TRANSACTION_ID
   and    ST.TRANSACTION_DATE >= '01-JUL-2000'
```

Does ABC Oil have the right to re-process the seismic data for line AAA?

```
Select      E.ENTITLEMENT_TYPE, EG.ACCESS_TYPE, EG.RESTRICTION_DESC
  From      ENTITLEMENT E, ENT_COMPONENT EC, ENT_GROUP EG,
```

```
            ENT_SECURITY_GROUP ESG, ENT_SECURITY_BA ESB
 Where      EC.ACTIVE_IND = 'Y'
   And      E.ACTIVE_IND = 'Y'
   And      EC.SEIS_SET_ID = 'AAA'
   And      EC.SEIS_SET_TYPE = 'SEIS_LINE'
   and      EC.ENTITLEMENT_ID = E.ENTITLEMENT_ID
   and      E.ENTITLEMENT_ID = EG.ENTITLEMENT_ID
   and      EG.SECURITY_GROUP_ID = ESG.SECURITY_GROUP_ID
   and      ESG.SECURITY_GROUP_ID = ESB.SECURITY_GROUP_ID
   and      ESB.BUSINESS_ASSOCIATE = 'ABC OIL'
```

Who are my partners in the SMITH MILLS seismic acquisition survey and what is their net working interest in the survey?

```
Select      BISP.BUSINESS_ASSOCIATE, BISP.NET_PERCENT_INTEREST
  from      BA_INT_SET_PARTNER BISP, BA_INTEREST_SET BIS,
            BA_INT_SET_COMPONENT BISC
 where      BISC.SEIS_SET_ID = 'SMITH MILLS'
   And      BISC.SEIS_SET_TYPE = 'SEIS_ACQTN_SURVEY'
   And      BISC.INTEREST_SET_ID = BIS.INTEREST_SET_ID
   And      BISC.INTEREST_SET_SEQ_NO = BIS.INTEREST_SET_SEQ_NO
   And      BISP.INTEREST_SET_ID = BIS.INTEREST_SET_ID
   And      BISP.INTEREST_SET_SEQ_NO = BIS.INTEREST_SET_SEQ_NO
   And      BIS.INTEREST_SET_TYPE = 'WORKING'
```

What is net and gross working interest for each partner in the SMITH MILLS seismic acquisition survey?

```
Select      BISP.BUSINESS_ASSOCIATE, BISP.GROSS_PERCENT_INTEREST,
            BISP.NET_PERCENT_INTEREST
  From      BA_INT_SET_PARTNER BISP, BA_INTEREST_SET BIS,
            BA_INT_SET_COMPONENT BISC
 Where      BISC.SEIS_SET_ID = 'SMITH MILLS'
   And      BISC.SEIS_SET_TYPE = 'SEIS_ACQTN_SURVEY'
   And      BIS.INTEREST_SET_TYPE = 'WORKING'
   And      BISC.INTEREST_SET_ID = BIS.INTEREST_SET_ID
   And      BISC.INTEREST_SET_SEQ_NO = BIS.INTEREST_SET_SEQ_NO
   And      BISP.INTEREST_SET_ID = BIS.INTEREST_SET_ID
   And      BISP.INTEREST_SET_SEQ_NO = BIS.INTEREST_SET_SEQ_NO
```

Seismic Acquisition

When was the Pangman project acquired?

```
select      SAS.START_DATE, SAS.COMPLETED_DATE
  from      SEIS_ACQTN_SURVEY SAS
 where      SAS.ACQTN_SURVEY_NAME = 'PANGMAN'
```

List the basic acquisition design for surveys in the database.

```
select      ss.SEIS_SET_ID, ss.SEIS_SET_TYPE, ss.FIRST_NLINE_NO,
            ss.FIRST_SEIS_POINT_ID,  ss.LAST_NLINE_NO,
            ss.LAST_SEIS_POINT_ID, ss.PREFERRED_NAME, ss.COUNTRY,
            ss.START_DATE, ss.END_DATE, sad.ACQTN_DIMENSION,
            sad.ACQTN_SHOTPT_INTERVAL, sad.ACQTN_SHOT_LINE_SPACING,
            sad.CDP_COVERAGE, sad.ENERGY_TYPE, sad.ENVIRONMENT,
            sad.SHOT_BY, sad.SHOT_FOR, srs.GROUP_SPACING
  from      seis_set ss, seis_acqtn_design sad, seis_recvr_setup srs
 where      sad.acqtn_design_id(+) = ss.ACQTN_DESIGN_ID
   and      sad.acqtn_design_id = srs.ACQTN_DESIGN_ID(+)
order by    ss.seis_set_id, ss.seis_set_type, sad.acqtn_design_id
```

What energy source was used to record seismic line AAA?

```
Select      SAD.ENERGY_TYPE
  From      SEIS_SET SS, SEIS_ACQTN_DESIGN SAD
 Where      SS.SEIS_SET_ID = 'AAA'
   And      SS.SEIS_SET_TYPE = 'SEIS_LINE'
   And      SS.ACQTN_DESIGN_ID = SAD.ACQTN_DESIGN_ID
```

What were the planned dynamite energy source acquisition parameters for seismic line AAA?

```
Select      ACQTN_DIMENSION, ACQTN_SHOTPT_INTERVAL,
            ENERGY_CHARGE_SIZE, ENERGY_CHARGE_SIZE_OUOM,
            ENERGY_SHOT_DEPTH, ENERGY_SHOT_DEPTH_OUOM,
            ENERGY_SRC_ARRAY_SPC, ENERGY_SRC_ARRAY_TYPE,
            ENERGY_SRC_PER_SHOT
 From       SEIS_ACQTN_DESIGN SAD, SEIS_GROUP_COMP SGC, SEIS_SET SS,
            SEIS_SET SS1
 Where      SS.SEIS_SET_ID = 'AAA'
   And      SS.SEIS_SET_TYPE = 'SEIS_LINE'
   and      SGC.INPUT_SEIS_SET_ID = SS.SEIS_SET_ID
   and      SGC.INPUT_SEIS_SET_TYPE = SS.SEIS_SET_TYPE
   and      SGC.SEIS_GROUP_SET_TYPE = 'SEIS_PLAN'
   and      SGC.SEIS_GROUP_ID = SS1.SEIS_SET_ID
   and      SGC.SEIS_GROUP_SET_TYPE = SS1.SEIS_SET_TYPE
   and      SS1.ACQTN_DESIGN_ID = SAD.ACQTN_DESIGN_ID
```

What field data was created when recording line AAA?

```
Select      RMII.INFORMATION_ITEM_ID,  RMII.INFO_ITEM_TYPE,
            RMII.ITEM_CATEGORY, RMII.ITEM_SUB_CATEGORY
 From       RM_INFORMATION_ITEM RMII, RM_INFO_ITEM_CONTENT RIIC
Where       RIIC.SEIS_SET_ID = 'AAA'
   And      RIIC.SEIS_SET_TYPE = 'SEIS_LINE'
   and      RIIC.INFORMATION_ITEM_ID = RMII.INFORMATION_ITEM_ID
   and      RIIC.INFO_ITEM_TYPE = RMII.INFO_ITEM_TYPE
```

```
   and      RMII.ITEM_CATEGORY = 'FIELD DATA'
```

Describe the cable layout for marine survey DEEP BLUE; list the types of components and how many of each component was on a cable.

```
Select      SST.STREAMER_ID, SST.CABLE_MAKE, SST.STREAMER_LENGTH,
            SST.STREAMER_POSITION, SSC.COMPONENT_TYPE,
            SSC.COMPONENT_COUNT
  From      SEIS_ACQTN_DESIGN SAD, SEIS_SET SS, SEIS_STREAMER SST,
            SEIS_STREAMER_COMP SSC
 Where      SS.SEIS_SET_ID = 'DEEP BLUE'
   And      SS.SEIS_SET_TYPE = 'SEIS_ACQTN_SURVEY'
   And      SS.ACQTN_DESIGN_ID = SAD.ACQTN_DESIGN_ID
   And      SAD.ACQTN_DESIGN_ID = SST.ACQTN_DESIGN_ID
   And      SST.STREAMER_ID = SSC.STREAMER_ID
```

Describe the general source and receiver layout for the marine survey DEEP BLUE. Also report the stored unit of measure for each measured column.

```
Select      sad.ACQTN_DESIGN_ID, ACQTN_DIMENSION,
ACQTN_SHOTPT_INTERVAL,
            PC.DEFAULT_UOM_SYMBOL, ENERGY_SHOT_DEPTH,
            PC2.DEFAULT_UOM_SYMBOL, ENERGY_OPRG_PSR,
            PC3.DEFAULT_UOM_SYMBOL, ENERGY_OPRG_VOLUME,
            PC4.DEFAULT_UOM_SYMBOL, REP_WATER_ACOUSTIC_VEL,
            PC5.DEFAULT_UOM_SYMBOL
  From      SEIS_ACQTN_DESIGN SAD, SEIS_SET SS, PPDM_COLUMN PC,
            PPDM_COLUMN PC2, PPDM_COLUMN PC3, PPDM_COLUMN PC4,
            PPDM_COLUMN PC5
 Where      SS.SEIS_SET_ID = 'DEEP BLUE'
   And      SS.SEIS_SET_TYPE = 'SEIS_ACQTN_SURVEY'
   And      SS.ACQTN_DESIGN_ID = SAD.ACQTN_DESIGN_ID
   And      PC.TABLE_NAME = 'SEIS_ACQTN_DESIGN'
   And      PC.COLUMN_NAME = 'ACQTN_SHOTPT_INTERVAL'
   And      PC2.TABLE_NAME = 'SEIS_ACQTN_DESIGN'
   And      PC2.COLUMN_NAME = 'ENERGY_SHOT_DEPTH'
   And      PC3.TABLE_NAME = 'SEIS_ACQTN_DESIGN'
   And      PC3.COLUMN_NAME = 'ENERGY_OPRG_PSR'
   And      PC4.TABLE_NAME = 'SEIS_ACQTN_DESIGN'
   And      PC4.COLUMN_NAME = 'ENERGY_OPRG_VOLUME'
   And      PC5.TABLE_NAME = 'SEIS_ACQTN_DESIGN'
   And      PC5.COLUMN_NAME = 'REP_WATER_ACOUSTIC_VEL'
```

Seismic Locations

What are the corner locations that I can use to reconstruct the processed bin grids for the 3D survey JONES HALL?

```
Select      COORD_SYSTEM_ID, CORNER1_LAT, CORNER1_LONG, CORNER2_LAT,
            CORNER2_LONG, CORNER3_LAT,CORNER3_LONG,
```

```
            NLINE_COUNT, NLINE_MIN_NO, NLINE_MAX_NO,
            NLINE_SPACING, XLINE_COUNT, XLINE_MIN_NO,
            XLINE_MAX_NO, XLINE_SPACING
  from      SEIS_BIN_GRID SBG
 where      SBG.SEIS_SET_ID = 'JONES HALL'
   and      SBG.SEIS_SET_TYPE = 'SEIS_ACQTN_SURVEY'
```

Which set of processed bin locations was used for processing this seismic section?

```
Select      SBG.BIN_GRID_ID
  From      RM_INFORMATION_ITEM RMII, RM_INFO_ITEM_CONTENT RIC,
            SEIS_PROC_SET SPS, SEIS_BIN_GRID SBG
 Where      RIC.SEIS_SET_ID = SPS.SEIS_PROC_SET_ID
   And      RIC.SEIS_SET_TYPE = SPS.SEIS_SET_TYPE
   And      RMII.INFORMATION_ITEM_ID = '12345'
   And      RMII.INFO_ITEM_TYPE = 'RM_SEIS_TRACE'
   And      RMII.INFORMATION_ITEM_ID = RIC.INFORMATION_ITEM_ID
   And      RMII.INFO_ITEM_TYPE = RIC.INFO_ITEM_TYPE
   And      SPS.SEIS_PROC_SET_ID = SBG.SEIS_SET_ID
   And      SPS.SEIS_SET_TYPE = SBG.SEIS_SET_TYPE
```

Seismic Processing

What was the processing plan for the JONES HALL survey in the 1987 reprocessing?

```
Select      SPP.SEIS_PROC_PLAN_ID, SPPS.PROC_PLAN_STEP_ID,
            SPPS.STEP_SEQ_NO, SPPS.STEP_NAME
  from      SEIS_PROC_PLAN SPP, SEIS_PROC_PLAN_STEP SPPS,
            SEIS_PROC_SET SPS, SEIS_PROC_COMPONENT SPC
 Where      SPS.SEIS_PROC_SET_ID = 'JONES HALL'
   And      SPS.SEIS_SET_TYPE = 'SEIS_PROC_SET'
   And      SPC.SEIS_PROC_SET_ID = SPS.SEIS_PROC_SET_ID
   and      SPC.SEIS_SET_TYPE = SPS.SEIS_SET_TYPE
   and      SPC.SEIS_PROC_PLAN_ID = SPP.SEIS_PROC_PLAN_ID
   and      SPP.SEIS_PROC_PLAN_ID = SPPS.SEIS_PROC_PLAN_ID
   and      SPP.EFFECTIVE_DATE >= 'JAN-01-1987'
   and      SPP.EFFECTIVE_DATE <= 'DEC-31-1987'
```

List the shots for seismic line AAA together with the time delay, uphole time, tape and file number for each record.

```
Select      SR.TAPE_NUMBER, SR.FIELD_FILE_NUMBER,
            SR.TIME_DELAY, PC.DEFAULT_UOM_SYMBOL,
            SR.UPHOLE_TIME, PC1.DEFAULT_UOM_SYMBOL
  from      SEIS_RECORD SR, PPDM_COLUMN PC, PPDM_COLUMN PC1
 where      SR.SEIS_SET_ID = 'AAA'
   and      SR.SEIS_SET_TYPE = 'SEIS_LINE'
   and      PC.TABLE_NAME = 'SEIS_RECORD'
   and      PC.COLUMN_NAME = 'TIME_DELAY'
   and      PC1.TABLE_NAME = 'SEIS_RECORD'
```

```
   and      PC1.COLUMN_NAME = 'UPHOLE_TIME'
```

Who was the processing contractor for this seismic section?

```
Select      SPS.PROCESSING_COMPANY
  From      RM_INFORMATION_ITEM RMII, RM_INFO_ITEM_CONTENT RIC,
            SEIS_PROC_SET SPS
 Where      RIC.SEIS_SET_ID = SPS.SEIS_PROC_SET_ID
   And      RIC.SEIS_SET_TYPE = SPS.SEIS_SET_TYPE
   And      RMII.INFORMATION_ITEM_ID = '12345'
   And      RMII.INFO_ITEM_TYPE = 'RM_SEIS_TRACE'
   And      RMII.INFORMATION_ITEM_ID = RIC.INFORMATION_ITEM_ID
   And      RMII.INFO_ITEM_TYPE = RIC.INFO_ITEM_TYPE
```

What velocities were used as input to reprocessing for the JONES HALL survey in 1987? What velocities were created as output from reprocessing for the JONES HALL survey in 1987?

```
Select      SPC.VELOCITY_VOLUME_ID, SPC.INPUT_IND, SPC.OUTPUT_IND
  From      SEIS_PROC_SET SPS, SEIS_PROC_COMPONENT SPC
 Where      SPS.SEIS_PROC_SET_ID = 'JONES HALL'
   And      SPS.SEIS_SET_TYPE = 'SEIS_PROC_SET'
   And      SPC.SEIS_PROC_SET_ID = SPS.SEIS_PROC_SET_ID
   And      SPC.SEIS_SET_TYPE = SPS.SEIS_SET_TYPE
```

Seismic Interpretation

When was seismic line AAA interpreted? Who did the interpretation and what application was used?

```
Select      SIS.INTERP_DATE, SIS.APPLICATION_NAME, SIS.INTERPRETER
  From      SEIS_LINE SL, SEIS_GROUP_COMP SGC, SEIS_INTERP_SET SIS
 Where      SL.SEIS_LINE_ID = 'AAA'
   And      SL.SEIS_SET_TYPE = 'SEIS_LINE'
   And      SGC.INPUT_SEIS_SET_ID = SL.SEIS_LINE_ID
   And      SGC.INPUT_SEIS_SET_TYPE = 'SEIS_LINE'
   And      SGC.SEIS_GROUP_ID = SIS.INTERP_SET_ID
   And      SGC.SEIS_GROUP_SET_TYPE = 'SEIS_INTERP_SET'
```

What picks have been made for the Bluesky formation for seismic line AAA?

```
Select      SP.SEIS_PICK_ID, SP.SEIS_PICK_VALUE,
SP.SEIS_PICK_VALUE_UOM,
            SP.PICK_QUALIFIER, SP.PICK_QUALIF_REASON, SP.PICK_QUALITY,
            SP.PICK_METHOD
  From      SEIS_LINE SL, SEIS_GROUP_COMP SGC, SEIS_INTERP_SET SIS,
            SEIS_INTERP_SURFACE SIF,      SEIS_PICK  SP
 Where      SL.SEIS_LINE_ID = 'AAA'
```

```
   And      SL.SEIS_SET_TYPE = 'SEIS_LINE'
   And      SGC.INPUT_SEIS_SET_ID = SL.SEIS_LINE_ID
   And      SGC.INPUT_SEIS_SET_TYPE = 'SEIS_LINE'
   And      SGC.SEIS_GROUP_ID = SIS.INTERP_SET_ID
   And      SGC.SEIS_GROUP_SET_TYPE = 'SEIS_INTERP_SET'
   And      SIF.SURFACE_ID = SP.SURFACE_ID
   And      SIF.STRAT_UNIT_ID = 'BLUESKY'
   And      SIF.STRAT_NAME_SET_ID = 'GSC'
   And      SP.INTERP_SET_ID = SIS.INTERP_SET_ID
   And      SP.SEIS_SET_TYPE = 'SEIS_INTERP_SET'
   And      SP.PREFERRED_PICK_IND = 'Y'
```

What products were used as input to this interpretation project?

```
Select      SIC.INFORMATION_ITEM_ID, SIC.INFO_ITEM_TYPE,
            SIC.PROC_SET_ID, SIC.PROC_SET_TYPE ,
            SIC.PROC_COMPONENT_ID, SIC.UWI
  From      SEIS_INTERP_COMP SIC, SEIS_INTERP_SET SIS, SEIS_ALIAS SA
 Where      SA.SEIS_SET_ALIAS = 'JONES HALL'
   And      SA.SEIS_SET_TYPE = 'SEIS_INTERP_SET'
   And      SA.SEIS_SET_ID = SIS.INTERP_SET_ID
   And      SIS.INTERP_SET_ID = SIC.INTERP_SET_ID
   And      SIC.INPUT_IND = 'Y'
```

What loading steps were done when I loaded this interpretation project?

```
Select      SIL.PROCESS_STEP_ID, SIL.STEP_SEQ_NO, SIL.DESCRIPTION,
            SIL.START_DATE, SIL.END_DATE, SIL.PROCESS_STATUS,
            SILP.PARAMETER_ID, SILP.PARAMETER_TYPE,
            SILP.PARAMETER_VALUE_1, SILP.PARAMETER_VALUE_2,
            SILP.PARAMETER_UOM
  From      SEIS_INTERP_LOAD SIL, SEIS_INTERP_LOAD_PARM SILP
 Where      SIL.INTERP_SET_ID = 'JONES HALL'
   And      SIL.SEIS_SET_TYPE = 'SEIS_INTERP_SET'
   And      SIL.INTERP_SET_ID = SILP.INTERP_SET_ID
   And      SILP.SEIS_SET_TYPE = 'SEIS_INTERP_SET'
ORDER BY    SIL.STEP_SEQ_NO
```

Who was involved with interpreting the Smith Mills interpretation project?

```
select      P.PROJECT_NAME, BA.BA_NAME, PB.EFFECTIVE_DATE,
            PB.EXPIRY_DATE, PBR.ROLE
  from      PROJECT P, PROJECT_BA PB, PROJECT_BA_ROLE PBR,
            BUSINESS_ASSOCIATE BA
 where      P.PROJECT_NAME = 'SMITH MILLS INTERPRETATION'
   and      P.PROJECT_ID = PB.PROJECT_ID
   and      PB.PROJECT_ID = PBR.PROJECT_ID
```

```
   and      PB.BUSINESS_ASSOCIATE = PBR.BUSINESS_ASSOCIATE
   and      PB.BUSINESS_ASSOCIATE = BA.BUSINESS_ASSOCIATE
```

Records Management

What seismic trace products do I have on record for line AAA?

```
Select      RII.ITEM_CATEGORY, RII.ITEM_SUB_CATEGORY,
            RST.HORIZONTAL_SCALE, RST.VERTICAL_SCALE,
            RST.SAMPLE_RATE, RST.POLARITY, RST.PHASE
  From      RM_SEIS_TRACE RST, RM_INFO_ITEM_CONTENT RIIC,
            RM_INFORMATION_ITEM RII
 Where      RIIC.SEIS_SET_ID = 'AAA'
   And      RIIC.SEIS_SET_TYPE = 'SEIS_LINE'
   And      RIIC.INFORMATION_ITEM_ID = RII.INFORMATION_ITEM_ID
   And      RIIC.INFO_ITEM_TYPE = 'RM_SEIS_TRACE'
   And      RII.INFO_ITEM_TYPE = 'RM_SEIS_TRACE'
   And      RST.INFORMATION_ITEM_ID = RIIC.INFORMATION_ITEM_ID
   And      RST.INFO_ITEM_TYPE  = 'RM_SEIS_TRACE'
```

What is the file location for tape XYZ?

```
Select      RPIS.STORE_ID
  From      RM_PHYSICAL_ITEM RPI, RM_PHYS_ITEM_STORE RPIS
 Where      RPI.PHYSICAL_ITEM_ID = 'XYZ'
   And      RPI.PHYSICAL_ITEM_ID = RPIS.PHYSICAL_ITEM_ID
   And      PREFERRED_LOCATION_IND = 'Y'
```

Has the data on tape ABC been encrypted? If so, what is the decryption method or key?

```
Select      PHYSICAL_ITEM_ID, ENCODING_SEQ_NO, ENCODING_TYPE,
            APPLICATION_NAME, ENCODING_VERSION, DECRYPT_KEY_ID
  From      RM_ENCODING RE
 Where      PHYSICAL_ITEM_ID = 'ABC'
```

Were any errors encountered during the copy of tape ABC? How were these errors resolved?

```
Select      RPIO.PHYSICAL_ITEM_ID, RPIO.ORIGIN_SEQ_NO,
            RPIO.PHYSICAL_PROCESS, RPIC.CONDITION_ID,
            RPIC.CONDITION_TYPE, RPIC.ERROR_COUNT,
            RPIC.CORRECTION_METHOD
  From      RM_PHYS_ITEM_ORIGIN RPIO, RM_PHYS_ITEM_CONDITION RPIC
 Where      RPIO.PARENT_PHYSICAL_ITEM_ID = 'ABC'
   And      RPIO.PHYSICAL_ITEM_ID = RPIC.PHYSICAL_ITEM_ID
```

```
   And      RPIO.ORIGIN_SEQ_NO = RPIC.ORIGIN_SEQ_NO
```

Has tape ABC been checked out by anyone since 2001?

```
Select      CIRC_ID, CHECKED_OUT_BY, CIRC_OUT_DATE, CIRC_IN_DATE,
            DATA_CIRC_STATUS
  From      RM_CIRCULATION RC
 Where      RC.PHYSICAL_ITEM_ID = 'ABC'
   And      CIRC_OUT_DATE >=  'JAN-01-2001'
```

A digital file has been stored in the FILE CONTENT table. What application do I use to open that file?

```
Select      FILE_ID, APPLICATION_NAME
  From      RM_FILE_CONTENT
 Where      FILE_CONTENT IS NOT NULL
```

Projects

Is there a seismic processing plan associated with the JOHNSON project? If so, what is it?

```
Select      PP.PROJECT_PLAN_ID, PPS.PLAN_STEP_ID, PPS.STEP_NAME,
            PPS.STEP_TYPE
  From      PROJECT_PLAN PP, PROJECT_PLAN_STEP PPS,
            PROJECT_COMPONENT PC
 where      PP.PROJECT_TYPE = 'SEIS PROC'
   and      PC.PCOM_PROJECT_PLAN_ID = PP.PROJECT_PLAN_ID
   and      PC.SEIS_SET_ID = 'JOHNSON'
   and      PC.SEIS_SET_TYPE = 'SEIS_PROC_SET'
   and      PP.PROJECT_PLAN_ID = PPS.PROJECT_PLAN_ID
```

What steps have been completed during this project, who completed them and when?

```
select      PS.STEP_TYPE, PS.ACTUAL_START_DATE, PS.ACTUAL_END_DATE,
            PSB.BUSINESS_ASSOCIATE
  From      PROJECT P, PROJECT_STEP PS, PROJECT_STEP_BA PSB
 Where      P.PROJECT_NAME = 'JONES RIVER'
   And      P.PROJECT_ID = PS.PROJECT_ID
   And      PS.PROJECT_ID = PSB.PROJECT_ID
   And      PS.STEP_ID = PSB.STEP_ID
   And      PS.STATUS = 'COMPLETE'
```

What are the due dates for this project?

```
Select      STEP_TYPE, DUE_DATE, CRITICAL_DATE
  From      PROJECT_STEP PS
 Where      PROJECT_ID = '123456'
```

Entitlements

What entitlement does Unicorn Oil I have to the seismic trace products related to seismic line ABC?

```
Select      E.ENTITLEMENT_ID, E.DESCRIPTION, EG.ACCESS_TYPE,
            EG.RESTRICTION_DESC
  From      ENTITLEMENT E,  ENT_COMPONENT EC,
            RM_INFORMATION_ITEM RII,
            RM_INFO_ITEM_CONTENT RIIC, ENT_GROUP EG,
            ENT_SECURITY_GROUP ESG, ENT_SECURITY_BA ESB
 Where      RIIC.SEIS_SET_ID = 'ABC'
   And      RIIC.SEIS_SET_TYPE = 'SEIS_LINE'
   And      RIIC.INFO_ITEM_TYPE = 'RM_SEIS_TRACE'
   And      RIIC.INFORMATION_ITEM_ID = EC.INFORMATION_ITEM_ID
   And      RIIC.INFO_ITEM_TYPE = EC.INFO_ITEM_TYPE
   And      EC.ENTITLEMENT_ID = E.ENTITLEMENT_ID
   And      E.ACTIVE_IND = 'Y'
   And      E.ENTITLEMENT_ID = EG.ENTITLEMENT_ID
   And      EG.SECURITY_GROUP_ID = ESG.SECURITY_GROUP_ID
   And      ESG.SECURITY_GROUP_ID = ESB.SECURITY_GROUP_ID
   And      ESB.BUSINESS_ASSOCIATE = 'UNICORN OIL'
```

What must I do when my entitlement expires?

```
Select      E.ENTITLEMENT_ID, E.DESCRIPTION, E.EXPIRY_ACTION,
            E.EXPIRY_DATE
  From      ENTITLEMENT E
 Where      E.ENTITLEMENT_ID = 'GHIJK'
```

Work Orders

Who requested this work order?

```
Select      REQUESTOR_BA
  From      WORK_ORDER
 Where      WORK_ORDER_ID = '12345432'
```

Who am I billing for the work done?

```
Select      BILLING_BA
  From      WORK_ORDER
 Where      WORK_ORDER_ID = '12345432'
```

What products are associated with the work order?

```
Select      WOC.COMPONENT_TYPE, WOC.CONTRACT_ID,
            WOC.INFORMATION_ITEM_ID, WOC.INFO_ITEM_TYPE,
            WOC.INSPECTION_ID, WOC.PHYSICAL_ITEM_ID,
            WOC.SEIS_SET_ID, WOC.SEIS_SET_TYPE,
            WOC.SEIS_TRANSACTION_ID, WOC.TRANSACTION_TYPE
  From      WORK_ORDER WO, WORK_ORDER_COMPONENT WOC
 Where      WO.WORK_ORDER_ID = '12345432'
   And      WOC.WORK_ORDER_ID = WO.WORK_ORDER_ID
```

What project did I start to track completion of this work order?

```
Select      P.PROJECT_NAME, P.PROJECT_ID
  From      PROJECT P, PROJECT_COMPONENT PC
 Where      PC.WORK_ORDER_ID = '1234565432'
   And      PC.PROJECT_ID = P.PROJECT_ID
```

AFE and Cost Center

What AFE was used for the payment of the surface rights agreement made on land during seismic acquisition, as documented in contract 1234?

```
Select      AFE.AFE_NUMBER,  AFE.AFE_TYPE, O.OBLIGATION_TYPE
  From      OBLIGATION_COMPONENT OC, OBLIGATION O,  AFE,
            AFE_COMPONENT AC
 Where      OC.CONTRACT_ID = '1234'
   And      OC.OBLIGATION_ID = O.OBLIGATION_ID
   And      AC.OBLIGATION_ID = O.OBLIGATION_ID
   And      AC.OBLIGATION_SEQ_NO = O.OBLIGATION_SEQ_NO
   And      AC.AFE_ID = AFE.AFE_ID
```

Appendix B: Changes to the Model

The PPDM Association has made a concerted effort to reduce the impact of new model development on members who are using other versions of PPDM. However, any new development is accompanied by some changes. Arriving at a model that is sufficiently detailed to meet the business needs of every member and yet flexible or abstract enough to be shielded from corporate or regulatory variations is complex, but achievable. Every attempt is made to ensure the model complies with, but is relatively independent of, specific jurisdictional requirements, changes in government policy, regulations or structure that may at times invalidate portions of the model. Internal re-engineering of business processes in industry companies may affect business requirements, which drive the data model. Rapid technological changes may also affect the model structure.

This section identifies all applicable changes from the latest version to the newest release version, to help members implement the latest version of the PPDM model.

Changes Between Versions 3.5 and 3.6

Numerous changes have been made to all tables in the Seismic module version 3.6. For complete documentation and a mapping between versions, please refer to the model mapping, available from the PPDM Association.