WITSML Technical Reference Guide v2.1

WITSML Overview	WITSML is the upstream oil and gas data-transfer standard for specifying and exchanging data for wells and well-related operations and objects, such as drilling, logging, and mud logging.
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Abstract	This document lists and defines packages, data objects, elements, and relationships for WITSML. Its contents are produced from the energyML UML model, the same model used to produce the schemas.
Document type	Technical reference guide
Language	U.S. English
Keywords:	standards, energy, data, information, process, reservoir model, shared earth model

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Amendment History			
Standard Version	**Document Version**	**Date**	**Comment**
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1 Introduction

This document:

- Lists and defines data objects, elements, and relationships for the data object schemas in the witsml folder of the energyML download package.
- Is produced from the witsml package of the UML model from which the WITSML XSDs are produced, using a modeling tool named *Enterprise Architect (EA)*. However, only this document contains the definitions for the data objects, elements, and attributes.

IMPORTANT! This document includes the UML diagrams from EA. In some cases the diagrams are very large and thus appear very small in this standard document size PDF. For better view of the diagrams:

- Use the zoom feature in your PDF viewer.
- View the UML model directly. The XMI file of the UML model is included in the energyML download package (in the witsml→doc folder). This XMI format can be imported by any UML data modeling tool.

1.1 Audience, Purpose and Scope

This document:

- Is for information technology (IT) professionals—programmers, developers, architects and others—who are implementing Energistics domain standards (e.g., into a software package).
- Lists and defines all classes, complex types, elements, and associations in the XML schemas. Each of the subsequent chapters are generated from the relevant package in the UML model.
  - **Organization.** Each chapter describes one of the main packages from the witsml folder. Each chapter is organized by sub-package (if any), element types, and alpha-order within element type.

1.2 Resource Set

- For the complete list of resources (schemas, documents, etc.) available for the Energistics Common Technical Architecture, see *energyML_Download_Package_READ_ME.pdf*.
- WITSML-specific resources are listed in *WITSML_v2.1_Release_Notes.pdf*.

2 BhaRun

Package: xsd_schemas

Notes: BhaRun Schema.

2.1 BhaRun

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/17/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *The object used to capture information about one run of the drill string into and out of the hole. The drill string configuration is described in the Tubular object. That is, one drill string configuration may be used for many runs.*

Attributes

Name	Type	Notes
ActDogleg	AnglePerLengthMeasure	Actual dogleg severity.
ActDoglegMx	AnglePerLengthMeasure	Actual dogleg severity: maximum.
BhaRunStatus	BhaStatus	This is the status of the Bharun, not the Bha.
DTimStart	TimeStamp	Date and time that activities for this run started.
DTimStartDrilling	TimeStamp	Start on bottom: date and time.
DTimStop	TimeStamp	Date and time that activities for this run stopped.
DTimStopDrilling	TimeStamp	Stop off bottom: date and time.
NumBitRun	long	Bit run number.
NumStringRun	long	The BHA (drilling string) run number.
ObjectiveBha	String2000	Objective of the bottomhole assembly.
PlanDogleg	AnglePerLengthMeasure	Planned dogleg severity.
ReasonTrip	String2000	Reason for a trip.

Associations

Association		Notes
1	From: **BhaRun.**Wellbore To: **Wellbore**	
0..*	From: **BhaRun.**DrillingParams To: **DrillingParams**	Drilling parameters.
0..1	From: **BhaRun.**Tubular To: **Tubular**	
	From: **BhaRun.** To: **AbstractObject**	
	From: **BhaRun.** To: **BhaStatus**	
0..*	From: **WellboreGeometry.**BhaRun To: **BhaRun**	
0..*	From: **WellboreGeometrySection.**BhaRun To: **BhaRun**	
0..*	From: **RigUtilization.**BhaRun To: **BhaRun**	
0..1	From: **DrillActivity.**BhaRun To: **BhaRun**	

2.2 BhaStatus

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*3/14/2019 *Status:* Proposed *Author:* William McKenzie
Notes: *Stage of the BHA Run (plan, progress, final)*

Attributes

Name	Type	Notes
final		Bha above rotary and the BhaRun DTimStop is populated with a value (e.g. the run is completed)
progress		Active. The Bha is in the hole.
plan		In planning stage.

Associations

Association	Notes
From: **BhaStatus.** To: **TypeEnum**	
From: **BhaRun.** To: **BhaStatus**	

2.3 DrillingParams

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The bottomhole assembly drilling parameters schema, which contains statistical and calculated operations data for the run, related to depths, activities, temperature, pressure, flow rates, torque, etc.*

Attributes

Name	Type	Notes
AziBottom	PlaneAngleMeasure	Azimuth at stop measured depth.
AziTop	PlaneAngleMeasure	Azimuth at start measured depth.
Comments	String2000	Comments and remarks.
CTimCirc	TimeMeasure	Time spent circulating from start of bit run.
CTimDrillRot	TimeMeasure	Time spent rotary drilling from start of bit run.
CTimDrillSlid	TimeMeasure	Time spent slide drilling from start of bit run.
CTimHold	TimeMeasure	Time spent on hold from start of bit run.
CTimReam	TimeMeasure	Time spent reaming from start of bit run.
CTimSteering	TimeMeasure	Time spent steering from start of bit run.
DistDrillRot	LengthMeasure	Distance drilled - rotating.
DistDrillSlid	LengthMeasure	Distance drilled - sliding
DistHold	LengthMeasure	Distance covered while holding angle with a steerable drilling assembly.
DistReam	LengthMeasure	Distance reamed.
DistSteering	LengthMeasure	Distance covered while actively steering with a steerable drilling assembly.
ETimOpBit	TimeMeasure	Operating time spent by bit for run. BUSINESS RULE: When reporting an actual as opposed to design, this is required.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowrateBit	VolumePerTimeMeasure	Flow rate at bit.
FlowratePumpAv	VolumePerTimeMeasure	Average mud pump flow rate.
FlowratePumpMn	VolumePerTimeMeasure	Minimum mud pump flow rate.
FlowratePumpMx	VolumePerTimeMeasure	Maximum mud pump flow rate.
HkldDn	ForceMeasure	Hookload when the string is moving down.
HkldRot	ForceMeasure	Hookload: rotating.
HkldUp	ForceMeasure	Hookload when the string is moving up.
InclMn	PlaneAngleMeasure	Minimum inclination.
InclMx	PlaneAngleMeasure	Maximum inclination.
InclStart	PlaneAngleMeasure	Inclination at start measured depth.

InclStop	PlaneAngleMeasure	Inclination at stop measured depth.
MdHoleStart	MeasuredDepth	Measured depth at start of the run.
MdHoleStop	MeasuredDepth	Measured depth at the end of the run.
MudClass	MudClass	The class of the drilling fluid.
MudSubClass	MudSubClass	Mud Subtype at event occurrence.
ObjectiveBha	String2000	Objective of bottom hole assembly.
OverPull	ForceMeasure	Overpull = HkldUp - HkldRot
PowBit	PowerMeasure	Bit hydraulic.
PresDropBit	PressureMeasure	Pressure drop in bit.
PresPumpAv	PressureMeasure	Average pump pressure.
ReasonTrip	String2000	Reason for trip.
RopAv	LengthPerTimeMeasure	Average rate of penetration through Interval.
RopMn	LengthPerTimeMeasure	Minimum rate of penetration through Interval.
RopMx	LengthPerTimeMeasure	Maximum rate of penetration through Interval.
RpmAv	AngularVelocityMeasure	Average turn rate (commonly in rpm) through Interval.
RpmAvDh	AngularVelocityMeasure	Average turn rate (commonly in rpm) downhole.
RpmMn	AngularVelocityMeasure	Minimum turn rate (commonly in rpm).
RpmMx	AngularVelocityMeasure	Maximum turn rate (commonly in rpm).
SlackOff	ForceMeasure	Slackoff = HkldRot - HkdDown.
TempMudDhMx	ThermodynamicTemperatureMeasure	Maximum mud temperature downhole during run.
TqDhAv	MomentOfForceMeasure	Average torque: downhole.
TqOffBotAv	MomentOfForceMeasure	Average torque: off bottom.
TqOnBotAv	MomentOfForceMeasure	Average Torque: on bottom.
TqOnBotMn	MomentOfForceMeasure	Minimum torque: on bottom.
TqOnBotMx	MomentOfForceMeasure	Maximum torque: on bottom.
uid	String64	Unique identifier for the parameters
VelNozzleAv	LengthPerTimeMeasure	Bit nozzle average velocity.
WobAv	ForceMeasure	Surface weight on bit - average through interval.
WobAvDh	ForceMeasure	Weight on bit - average downhole.
WobMn	ForceMeasure	Weight on bit - minimum.
WobMx	ForceMeasure	Weight on bit - maximum.
WtAboveJar	ForceMeasure	Weight of the string above the jars.
WtBelowJar	ForceMeasure	Weight of the string below the jars.
WtMud	MassPerVolumeMeasure	Drilling fluid density.

Associations

Association		Notes
	From**: DrillingParams.** To: **MudClass**	
	From**: DrillingParams.** To: **MudSubClassExt**	
0..1	From**: DrillingParams.**Tubular To: **Tubular**	
0..*	From**: BhaRun.**DrillingParams To: **DrillingParams**	Drilling parameters.
0..*	From**: OpsReport.**DrillingParams To: **DrillingParams**	Average bottom hole assembly parameters for report duration or actual instances of bottom hole assembly operations.

2.4 MudSubClass

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The name of a data extension.*

Attributes

Name	Type	Notes
aerated mud		
air		
brackish water		
brine		
caesium formate		
diesel oil-based		
ester synthetic-based		
freshwater		
glycol mud		
gyp mud		
internal-olefin synthetic-based		
lightly treated non-dispersed		
lignite/lignosulfonate mud		
lime mud		
linear paraffin synthetic-based		
linear-alpha-olefin synthetic-based		
low solids		
low toxicity mineral oil-based		
mineral oil-based		
mist		
mixed-metal oxide mud		
native/natural mud		
natural gas		
nitrogen-aerated mud		
non-aqueous (invert emulsion) drilling fluids		
non-dispersed		
pneumatic (gaseous) drilling fluids		
polymer mud		
potassium formate		
potassium-treated mud		
salt water mud		

saturated salt mud		
sea water		
seawater mud		
silicate mud		
sodium formate		
spud mud		
stable foam		
stiff foam		
water-based drilling fluids		

Associations

Association	Notes
From: **MudSubClass.** To: **TypeEnum**	
From: **MudSubClassExt.** To: **MudSubClass**	

2.5 MudSubClassExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **MudSubClassExt.** To: **EnumExtensionPattern**	
From: **MudSubClassExt.** To: **MudSubClass**	
From: **DrillingParams.** To: **MudSubClassExt**	

3 CementJob

Package: xsd_schemas

Notes: CementJob Schema.

3.1 AbstractCementJob

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*11/17/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Defines common elements for both cement job designs and reports.*

Attributes

Name	Type	Notes
CementEngr	String64	Cementing engineer.
Contractor	BusinessAssociate	Pointer to a BusinessAssociate representing the cementing contractor.
ETimWaitingOnCement	TimeMeasure	Duration for waiting on cement to set.
LenPipeRecipStroke	LengthMeasure	Pipe reciprocation: stroke length.
MdHole	MeasuredDepth	Measured depth at the bottom of the hole.
OverPull	ForceMeasure	String-up weight during reciprocation.
PlugInterval	MdInterval	If plug used, measured depth interval between the top and base of the plug.
Reciprocating	boolean	Is the pipe being reciprocated (raised and lowered)? Values are "true" (or "1") and "false" (or "0").
RpmPipe	AngularVelocityMeasure	Pipe rotation rate (commonly in rotations per minute (RPM)).
RpmPipeRecip	AngularVelocityMeasure	Pipe reciprocation (RPM).
SlackOff	ForceMeasure	String-down weight during reciprocation.
TqInitPipeRot	MomentOfForceMeasure	Pipe rotation: initial torque.
TqPipeAv	MomentOfForceMeasure	Pipe rotation: average torque.
TqPipeMx	MomentOfForceMeasure	Pipe rotation: maximum torque.

Associations

Association	Notes
From: **CementJobReport.** To: **AbstractCementJob**	
From: **CementJobDesign.** To: **AbstractCementJob**	

3.2 AbstractCementStage

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Defines the information that is common to the cement job stage design and reports.*

Attributes

Name	Type	Notes
AnnularFlowAfter	boolean	Annular flow present after the stage was completed? Values are "true" (or "1") and "false" (or "0").
BotPlug	boolean	Bottom plug used? Values are "true" (or "1") and "false" (or "0").
BotPlugNumber	long	Amount of bottom plug used.
DiaTailPipe	LengthMeasure	Tail pipe size (diameter).
DisplacementFluid	ComponentReference	Reference to displacement fluid properties.
ETimPresHeld	TimeMeasure	Time the pressure was held.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowrateMudCirc	VolumePerTimeMeasure	Rate the mud was circulated during the stage.
Gel10Min	PressureMeasure	Gels-10Min (in hole at start of job).
Gel10Sec	PressureMeasure	Gels-10Sec (in hole at start of job).
MdCircOut	MeasuredDepth	Circulate out measured depth.
MdCoilTbg	MeasuredDepth	Measured depth of coil tubing (multi-stage cement job).
MdString	MeasuredDepth	Measured depth of string (multi-stage cement job).
MdTool	MeasuredDepth	Measured depth of the tool (multi-stage cement job).
MixMethod	String64	Mix method.
NumStage	long	Stage number.
PillBelowPlug	boolean	Pill below plug? Values are "true" (or "1") and "false" (or "0").
PlugCatcher	boolean	Plug catcher? Values are "true" (or "1") and "false" (or "0").
PresBackPressure	PressureMeasure	Constant back pressure applied while pumping the job (can be superseded by a back pressure per pumping stage).
PresBump	PressureMeasure	Pressure plug bumped.
PresCoilTbgEnd	PressureMeasure	Pressure coiled tubing end.
PresCoilTbgStart	PressureMeasure	Pressure coiled tubing start
PresCsgEnd	PressureMeasure	Casing pressure at the end of the job.
PresCsgStart	PressureMeasure	Casing pressure at the start of the job.
PresDisplace	PressureMeasure	Final displacement pressure.
PresHeld	PressureMeasure	Pressure held to.

PresMudCirc	PressureMeasure	Mud circulation pressure.
PresTbgEnd	PressureMeasure	Tubing pressure at the end of the job (not coiled tubing).
PresTbgStart	PressureMeasure	Tubing pressure at the start of the job (not coiled tubing).
PvMud	DynamicViscosityMeasure	Plastic viscosity (in the hole at the start of the job).
ReciprocationOverpull	ForceMeasure	Overpull amount for reciprocation.
ReciprocationSlackoff	ForceMeasure	Slackoff for reciprocation.
SqueezeObjective	String64	Squeeze objective.
StageMdInterval	MdInterval	Measured depth interval for the cement stage.
TailPipePerf	boolean	Tail pipe perforated? Values are "true" (or "1") and "false" (or "0").
TailPipeUsed	boolean	Tail pipe used? Values are "true" (or "1") and "false" (or "0").
TempBHCT	ThermodynamicTemperatureMeasure	Bottomhole temperature: circulating.
TempBHST	ThermodynamicTemperatureMeasure	Bottomhole temperature: static.
TopPlug	boolean	Top plug used? Values are "true" (or "1") and "false" (or "0").
TypeOriginalMud	String64	Type of mud in the hole.
TypeStage	String64	Stage type.
VolCircPrior	VolumeMeasure	Total volume circulated before starting the job/stage.
VolCsgIn	VolumeMeasure	Total volume inside the casing for this stage placement.
VolCsgOut	VolumeMeasure	Total volume outside casing for this stage placement.
VolDisplaceFluid	VolumeMeasure	Volume of displacement fluid.
VolExcess	VolumeMeasure	Excess volume.
VolExcessMethod	String64	Method to estimate excess volume.
VolMudLost	VolumeMeasure	Total mud lost.
VolReturns	VolumeMeasure	Volume of returns.
WtMud	MassPerVolumeMeasure	Mud density.
YpMud	PressureMeasure	Yield point (in the hole at the start of the job).

Associations

Association	Notes
0..* From: **AbstractCementStage.**Step To: **CementPumpScheduleStep**	Set of (Time / Rate / Back Pressure).
0..* From: **AbstractCementStage.**EndingFluidLocation To: **FluidLocation**	
0..* From: **AbstractCementStage.**OriginalFluidLocation To: **FluidLocation**	

Association	Notes
From: **CementStageReport.** To: **AbstractCementStage**	
From: **CementStageDesign.** To: **AbstractCementStage**	
From: **CementDesignStage.** To: **AbstractCementStage**	

3.3 CementAdditive

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Cement Additive Component Schema.*

Attributes

Name	Type	Notes
Additive	MassMeasure	Additive amount.
DensAdd	MassPerVolumeMeasure	Additive density.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FormAdd	String64	Wet or dry.
NameAdd	String64	Additive name.
TypeAdd	String64	Additive type or function (e.g., retarder, visosifier, weighting agent).
uid	String64	Unique identifier for the additive.

Associations

Association	Notes
From: **CementingFluid.**CementAdditive **0..*** To: **CementAdditive**	Additives can be added in slurry but also in spacers, washes, and mud.

3.4 CementDesignStage

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Robert Schave
Notes: *Configuration and other information about the cement stage.*

Associations

Association	Notes
From: **CementDesignStage.** To: **AbstractCementStage**	

3.5 CementingFluid

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Cementing Fluid Component Schema.*

Attributes

Name	Type	Notes
ClassSlurryDryBlend	String64	Slurry class.
ConsTestThickening	DimensionlessMeasure	Test thickening consistency/slurry viscosity: Bearden Consistency (Bc) 0 to 100.
DensAtPres	MassPerVolumeMeasure	Slurry density at pressure.
DensBaseFluid	MassPerVolumeMeasure	Density of base fluid.
DensConstGasFoam	MassPerVolumeMeasure	Constant gas ratio method: average density.
DensConstGasMethod	MassPerVolumeMeasure	Constant gas ratio method: average density.
DensDryBlend	MassPerVolumeMeasure	Density of dry blend.
Density	MassPerVolumeMeasure	Fluid density.
DescFluid	String64	Fluid description.
DryBlendDescription	String64	Description of dry blend.
DryBlendName	String64	Name of dry blend.
ETimComprStren1	TimeMeasure	Compressive strength time 1.
ETimComprStren2	TimeMeasure	Compressive strength time 2.
ETimThickening	TimeMeasure	Test thickening time.
ETimTransitions	TimeMeasure	The elapsed time between the development of 100lbf/100sq ft gel strength and 500lbf/100 sq ft gel strength.
ETimZeroGel	TimeMeasure	The elapsed time from initiation of the static portion of the test until the slurry attains a gel strength of 100lbf/100sq ft.
ExcessPc	VolumePerVolumeMeasure	Excess percent.
FluidIndex	PositiveLong	Fluid Index: 1: first fluid pumped (= original mud), last - 1 = tail cement, last = displacement mud.
FluidRheologicalModel	String64	Specify one of these models: Newtonian, Bingham, Power Law, and Herschel Bulkley.
FoamUsed	boolean	Foam used? Values are "true" (or "1") and "false" (or "0").
Gel10MinReading	PlaneAngleMeasure	Gel reading after 10 minutes.
Gel10MinStrength	PressureMeasure	Gel strength after 10 minutes.
Gel10SecReading	PlaneAngleMeasure	Gel reading after 10 seconds.
Gel10SecStrength	PressureMeasure	Gel strength after 10 seconds.
Gel1MinReading	PlaneAngleMeasure	Gel reading after 1 minute.

Gel1MinStrength	PressureMeasure	Gel strength after 1 minute.
K	DimensionlessMeasure	Consistency index (Power Law and Herschel Bulkley models).
MassDryBlend	MassMeasure	Mass of dry blend: the blend is made of different solid additives: the volume is not constant.
MassSackDryBlend	MassMeasure	Weight of a sack of dry blend.
N	DimensionlessMeasure	Power Law index (Power Law and Herschel Bulkley models).
PcFreeWater	VolumePerVolumeMeasure	Test free water na: = mL/250ML.
PresComprStren1	PressureMeasure	Compressive strength pressure 1.
PresComprStren2	PressureMeasure	Compressive strength pressure 2.
PresTestFluidLoss	PressureMeasure	Test fluid loss pressure.
PresTestThickening	PressureMeasure	Test thickening pressure.
Purpose	String64	Purpose description.
RatioConstGasMethodAv	VolumePerVolumeMeasure	Constant gas ratio method ratio.
RatioConstGasMethodEnd	VolumePerVolumeMeasure	Constant gas ratio method: final method ratio.
RatioConstGasMethodStart	VolumePerVolumeMeasure	Constant gas ratio method: initial method ratio.
RatioMixWater	VolumePerMassMeasure	Mix-water ratio.
SlurryPlacementInterval	MdInterval	Measured depth interval between the top and base of the slurry placement.
SolidVolumeFraction	VolumePerVolumeMeasure	Equals 1 - Porosity.
SourceWater	String64	Water source description.
TempComprStren1	ThermodynamicTemperatureMeasure	Compressive strength temperature 1.
TempComprStren2	ThermodynamicTemperatureMeasure	Compressive strength temperature 2.
TempFluidLoss	ThermodynamicTemperatureMeasure	Test fluid loss temperature.
TempFreeWater	ThermodynamicTemperatureMeasure	Test free water temperature.
TempThickening	ThermodynamicTemperatureMeasure	Test thickening temperature.
TimeFluidLoss	TimeMeasure	Test fluid loss: dehydrating test period, used to compute the API fluid loss.
TypeBaseFluid	String64	Type of base fluid: fresh water, sea water, brine, brackish water.
TypeFluid	String64	Fluid type: Mud, Wash, Spacer, Slurry.
TypeGasFoam	String64	Gas type used for foam job.
uid	String64	Unique identifier for this cementing fluid.
Viscosity	DynamicViscosityMeasure	Viscosity (if Newtonian model) or plastic viscosity (if Bingham model).
VolAPIFluidLoss	VolumeMeasure	API fluid loss = 2 * volTestFluidLoss * SQRT(30/timefluidloss).
VolCement	VolumeMeasure	Volume of cement.
VolFluid	VolumeMeasure	Fluid/slurry volume.

VolGasFoam	VolumeMeasure	Volume of gas used for foam job.
VolOther	VolumeMeasure	Other volume.
VolPumped	VolumeMeasure	Volume pumped.
VolReserved	VolumeMeasure	Volume reserved.
VolTestFluidLoss	VolumeMeasure	Test fluid loss.
VolTotSlurry	VolumeMeasure	Total Slurry Volume.
VolWater	VolumeMeasure	Volume of water.
VolYield	VolumePerMassMeasure	Slurry yield.
Yp	PressureMeasure	Yield point (Bingham and Herschel Bulkley models).

Associations

Association		Notes
0..*	From**: CementingFluid.**Rheometer To: **Rheometer**	
0..*	From**: CementingFluid.**CementAdditive To: **CementAdditive**	Additives can be added in slurry but also in spacers, washes, and mud.
	From**: CementJob. 0..*** To: **CementingFluid**	Displaced Mud, washes and spacers, cements, displacement mud.

3.6 CementJob

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Used to capture information about cementing operations, which are done to seal the annulus after a casing string has been run, to seal a lost circulation zone, or to set a plug to support directional drilling operations or seal a well so that it may be abandoned.*

Attributes

Name	Type	Notes
CoilTubing	boolean	Is coiled tubing used? Values are "true" (or "1") and "false" (or "0").
JobConfig	String2000	Job configuration.
JobType	CementJobType	Type of cement job.
MdHole	MeasuredDepth	Measured depth at bottom of hole.
MdPrevShoe	MeasuredDepth	Measured depth of previous shoe.
MdSqueeze	MeasuredDepth	Measured depth of squeeze.
MdStringSet	MeasuredDepth	Measured depth of cement string shoe.
MdWater	LengthMeasure	Water depth if offshore. The distance from mean sea level to water bottom (seabed floor).
NameCementedString	String64	Name for the cemented string
NameCementString	String64	Name for the cementing string
NameWorkString	String64	Name for the cement work string
OffshoreJob	boolean	Offshore job? Values are "true" (or "1") and "false" (or "0").
ReturnsToSeabed	boolean	Returns to seabed? Values are "true" (or "1") and "false" (or "0").
ToolCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the company providing the cementing tool.
TvdPrevShoe	AbstractVerticalDepth	True vertical depth of previous shoe.
TvdStringSet	AbstractVerticalDepth	True vertical depth of cement string shoe.
TypePlug	String64	Plug type.
TypeSqueeze	String64	Type of squeeze.
TypeTool	String64	Cement tool type.

Associations

Association		Notes
0..1	From: **CementJob.**Design To: **CementJobDesign**	
	From: **CementJob.** To: **CementJobType**	
	From: **CementJob.** To: **AbstractObject**	
0..1	From: **CementJob.**HoleConfig To: **WellboreGeometryReport**	Wellbore Geometry of annulus.

Association		Notes
	From**: CementJob. 0..*** To: **CementingFluid**	Displaced Mud, washes and spacers, cements, displacement mud.
0..1	From**: CementJob.**JobReport To: **CementJobReport**	Set of stages for the job (usually 1 or 2).
1..1	From**: CementJob.**Wellbore To: **Wellbore**	
	From**: CementJobEvaluation.** To: **CementJob**	

3.7 CementJobDesign

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Design and other information about the cement job*

Associations

Association	Notes
From: **CementJobDesign.**CementDesignStage **1..*** To: **CementStageDesign**	
From: **CementJobDesign.** To: **AbstractCementJob**	
From: **CementJob.**Design **0..1** To: **CementJobDesign**	

3.8 CementJobEvaluation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A top-level object that is used to record the testing and evaluation of a previously performed cement job.*

Attributes

Name	Type	Notes
CblBondQual	boolean	Cement bond log quality indication? Values are "true" (or "1") and "false" (or "0").
CblPres	PressureMeasure	Cement bond log under pressure.
CblRun	boolean	Cement bond log run? Values are "true" (or "1") and "false" (or "0").
CementFoundOnTool	boolean	Cement found on tool? Values are "true" (or "1") and "false" (or "0").
CementShoeCollar	boolean	Cement found between shoe and collar? Values are "true" (or "1") and "false" (or "0").
CetBondQual	boolean	Cement evaluation tool bond quality? Values are "true" (or "1") and "false" (or "0").
CetRun	boolean	Cement evaluation tool run? Values are "true" (or "1") and "false" (or "0").
ETimBeforeTest	TimeMeasure	Hours before the liner top test.
ETimCementLog	TimeMeasure	Hours before logging run after cement run.
ETimPitStart	TimeMeasure	Hours between end of cement job and the start of the pressure integrity test.
ETimTest	TimeMeasure	Elapsed tome to perform the test.
FailureMethod	String64	Method used to determine that a cement job was unsuccessful.
FormPit	ForcePerVolumeMeasure	Pressure integrity test/leak-off test formation breakdown gradient or absolute pressure.
JobRating	String64	Job rating.
LinerLap	LengthMeasure	Liner overlap length.
LinerTop	LengthMeasure	The distance to the top of the liner.
MdCementTop	MeasuredDepth	Measured depth at top of cement.
MdDVTool	MeasuredDepth	Measured depth to the diverter tool.
NumRemedial	long	Number of remedials.
PresTest	PressureMeasure	Test pressure.
RemedialCement	boolean	Remedial cement required? Values are "true" (or "1") and "false" (or "0").
TempSurvey	boolean	Temperature survey run? Values are "true" (or "1") and "false" (or "0").
TestNegativeEmw	MassPerVolumeMeasure	Equivalent mud weight. Negative test.

TestNegativeTool	String64	Test negative tool used for the liner top seal.
TestPositiveEmw	MassPerVolumeMeasure	Equivalent mud weight. Positive test or absolute pressure .
TestPositiveTool	String64	Test positive tool for liner top seal.
TocOK	boolean	Is the top of cement sufficient? Values are "true" (or "1") and "false" (or "0").
ToolCompanyPit	String64	Tool name for the pressure integrity test.
TopCementMethod	String64	Method to determine cement top.

Associations

Association	Notes
From: **CementJobEvaluation.** To: **AbstractObject**	
From: **CementJobEvaluation.** To: **CementJob**	

3.9 CementJobReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The as-built report of the job after it has been done.*

Attributes

Name	Type	Notes
CementDrillOut	boolean	Was the cement drilled out? Values are "true" (or "1") and "false" (or "0").
DensMeasBy	String64	Method by which density is measured.
DTimCementDrillOut	TimeStamp	Date and time that the cement was drilled out.
DTimJobEnd	TimeStamp	Date and time of the end of the cement job.
DTimJobStart	TimeStamp	Date and time of the start of the cement job.
DTimPipeRotEnd	TimeStamp	Date and time that pipe rotation started.
DTimPipeRotStart	TimeStamp	Date and time that pipe rotation started.
DTimPlugSet	TimeStamp	Date and time that cement plug was set.
DTimRecipEnd	TimeStamp	Date and time that pipe reciprocation ended.
DTimRecipStart	TimeStamp	Date and time that pipe reciprocation started.
DTimSqueeze	TimeStamp	Date and time of a squeeze.

Associations

Association	Notes
1..* From**: CementJobReport.**CementReportStage To: **CementStageReport**	
From**: CementJobReport.** To: **AbstractCementJob**	
0..1 From**: CementJob.**JobReport To: **CementJobReport**	Set of stages for the job (usually 1 or 2).

3.10 CementJobType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies type of cement job.*

Attributes

Name	Type	Notes
primary		
plug		
squeeze		

Associations

Association	Notes
From: **CementJob.** To: **CementJobType**	

3.11 CementPumpScheduleStep

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Cement Pump Schedule Component Schema, which defines the cement pumping schedule for a given step in a cement job.*

Attributes

Name	Type	Notes
Comments	String2000	Comments and remarks.
ETimPump	TimeMeasure	The duration of the fluid pumping.
ETimShutdown	TimeMeasure	The duration of the shutdown event.
Fluid	ComponentReference	Reference to a fluid used in CementJob.
PresBack	PressureMeasure	Back pressure applied during the pumping stage.
RatePump	VolumePerTimeMeasure	Rate at which the fluid is pumped. 0 means it is a pause.
RatioFluidExcess	VolumePerVolumeMeasure	The ratio of excess fluid to total fluid pumped during the step.
StrokePump	long	Number of pump strokes for the fluid to be pumped (assumes the pump output is known).
uid	String64	Unique identifier for this pump schedule step.
VolPump	VolumeMeasure	Volume pumped = eTimPump * ratePump.

Associations

Association	Notes
From: **AbstractCementStage.**Step **0..*** To: **CementPumpScheduleStep**	Set of (Time / Rate / Back Pressure).

3.12 CementStageDesign

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/19/2016 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Configuration and other information about the cement stage.*

Associations

Association	Notes
From: **CementStageDesign.** To: **AbstractCementStage**	
From: **CementJobDesign.**CementDesignStage **1..*** To: **CementStageDesign**	

3.13 CementStageReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Robert Schave
Notes: *Report of key parameters for a stage of cement job.*

Attributes

Name	Type	Notes
DTimDisplaceStart	TimeStamp	Date and time when displacing of cement started.
DTimMixStart	TimeStamp	Date and time when mixing of cement started.
DTimPumpEnd	TimeStamp	Date and time when pumping cement ended.
DTimPumpStart	TimeStamp	Date and time when pumping cement started.
ETimMudCirculation	TimeMeasure	Elapsed time of mud circulation before the job/stage.
FloatHeld	boolean	Float held? Values are "true" (or "1") and "false" (or "0").
FlowrateBreakDown	VolumePerTimeMeasure	Breakdown rate.
FlowrateDisplaceAv	VolumePerTimeMeasure	Average displacement rate.
FlowrateDisplaceMx	VolumePerTimeMeasure	Maximum displacement rate.
FlowrateEnd	VolumePerTimeMeasure	Final displacement pump rate.
FlowratePumpEnd	VolumePerTimeMeasure	Pump rate at the end of the job.
FlowratePumpStart	VolumePerTimeMeasure	Pump rate at the start of the job.
FlowrateSqueezeAv	VolumePerTimeMeasure	Squeeze job average rate.
FlowrateSqueezeMx	VolumePerTimeMeasure	Squeeze job maximum rate.
PlugBumped	boolean	Plug bumped? Values are "true" (or "1") and "false" (or "0").
PresBreakDown	PressureMeasure	Breakdown pressure.
PresPriorBump	PressureMeasure	Pressure before bumping plug / pressure at the end of the displacement.
PresSqueeze	PressureMeasure	Squeeze pressure left on pipe.
PresSqueezeAv	PressureMeasure	Squeeze pressure average.
PresSqueezeEnd	PressureMeasure	Squeeze pressure final.
PresSqueezeHeld	boolean	Squeeze pressure held. Values are "true" (or "1") and "false" (or "0").
SqueezeObtained	boolean	Squeeze obtained. Values are "true" (or "1") and "false" (or "0").
uid	String64	Unique identifier for this instance of CementStageReport
VisFunnelMud	TimeMeasure	Funnel viscosity in seconds (in hole at start of job/stage).

Associations

Association	Notes
From: **CementStageReport.** To: **AbstractCementStage**	
From: **CementJobReport.**CementReportStage **1..*** To: **CementStageReport**	

3.14 FluidLocation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/14/2016 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Robert Schave
Notes: *Location of fluid in the wellbore.*

Attributes

Name	Type	Notes
Fluid	ComponentReference	Reference to fluid used in the CementJob.
MDFluidBase	LengthMeasure	Measured depth of the base of the cement.
MDFluidTop	LengthMeasure	Measured depth at the top of the interval.
uid	String64	Unique identifier for this instance of FluidLocation.
Volume	VolumeMeasure	Volume of fluid at this location.

Associations

Association	Notes
From: **FluidLocation.**LocationType **1** To: **WellboreFluidLocation**	
From: **AbstractCementStage.**EndingFluidLocation **0..*** To: **FluidLocation**	
From: **AbstractCementStage.**OriginalFluidLocation **0..*** To: **FluidLocation**	

3.15 WellboreFluidLocation

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/6/2016 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specified the location where cement job fluid can be found.*

Attributes

Name	Type	Notes
annulus		
deadend		
in pipe		
rat hole		

Associations

Association		Notes
	From: **WellboreFluidLocation.** To: **TypeEnum**	
1	From: **FluidLocation.**LocationType To: **WellboreFluidLocation**	

4 DrillReport

Package: xsd_schemas

Notes: DrillReport Schema.

«XSDcomplexType»
DrillReportWellTestInfo
«XSDelement»
+ CarbonDioxide: MassPerMassMeasure [0..1]
+ Chloride: MassPerMassMeasure [0..1]
+ ChokeOrificeSize: LengthMeasure [0..1]
+ DensityGas: MassPerVolumeMeasure [0..1]
+ DensityOil: MassPerVolumeMeasure [0..1]
+ DensityWater: MassPerVolumeMeasure [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FlowRateGas: VolumePerTimeMeasure [0..1]
+ FlowRateOil: VolumePerTimeMeasure [0..1]
+ FlowRateWater: VolumePerTimeMeasure [0..1]
+ GasOilRatio: VolumePerVolumeMeasure [0..1]
+ HydrogenSulfide: MassPerMassMeasure [0..1]
+ PresBottom: PressureMeasure [0..1]
+ PresFlowing: PressureMeasure [0..1]
+ PresShutin: PressureMeasure [0..1]
+ TestMdInterval: MdInterval [0..1]
+ TestNumber: long [0..1]
+ TestTvdInterval: AbstractTvdInterval [0..1]
+ TestType: WellTestType [0..1]
+ VolGasTotal: VolumeMeasure [0..1]
+ VolOilStored: VolumeMeasure [0..1]
+ VolOilTotal: VolumeMeasure [0..1]
+ VolWaterTotal: VolumeMeasure [0..1]
+ WaterOilRatio: VolumePerVolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
DrillReportFormTestInfo
«XSDelement»
+ DensityHC: MassPerVolumeMeasure [0..1]
+ Description: String2000 [0..1]
+ DominateComponent: String64 [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ GoodSeal: boolean [0..1]
+ Md: MeasuredDepth [0..1]
+ MdSample: MeasuredDepth [0..1]
+ PresProv: PressureMeasure [0..1]
+ Tvd: AbstractVerticalDepth [0..1]
+ VolumeSample: VolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
DrillReportLithShowInfo
«XSDelement»
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Lithology: String2000 [0..1]
+ Show: String2000 [0..1]
+ ShowMdInterval: MdInterval [0..1]
+ ShowTvdInterval: AbstractTvdInterval [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
DrillReportEquipFailureInfo
«XSDelement»
+ Description: String2000 [0..1]
+ DTim: TimeStamp [0..1]
+ DTimRepair: TimeStamp [0..1]
+ EquipClass: String64 [0..1]
+ ETimMissProduction: TimeMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Md: MeasuredDepth [0..1]
+ Tvd: AbstractVerticalDepth [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
WellTestType
drill stem test
production test
AbstractObject
«XSDcomplexType,XSDtopLevelEl...»
DrillReport
«XSDelement»
+ BrtRecord: BrtRecord [0..*]
+ CreateDate: TimeStamp [0..1]
+ Datum: AbstractReferencePoint [0..*]
+ DTimEnd: TimeStamp
+ DTimStart: TimeStamp
+ VersionKind: OpReportVersion [0..1]
«XSDcomplexType»
DrillReportStratInfo
«XSDelement»
+ Description: String2000 [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ MdTop: MeasuredDepth [0..1]
+ TvdTop: AbstractVerticalDepth [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
DrillReportCoreInfo
«XSDelement»
+ CoreDescription: String2000 [0..1]
+ CoreMdInterval: MdInterval [0..1]
+ CoredTvdInterval: AbstractTvdInterval [0..1]
+ CoreNumber: String64 [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ InnerBarrelType: InnerBarrelType [0..1]
+ LenBarrel: LengthMeasure [0..1]
+ LenRecovered: LengthMeasure [0..1]
+ RecoveryPc: VolumePerVolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
InnerBarrelType
undifferentiated
aluminum
gel
fiberglass
«XSDcomplexType»
DrillReportGasReadingInfo
«XSDelement»
+ DTim: TimeStamp [0..1]
+ Eth: VolumePerVolumeMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ GasHigh: VolumePerVolumeMeasure [0..1]
+ GasLow: VolumePerVolumeMeasure [0..1]
+ GasReadingMdInterval: MdInterval [0..1]
+ GasReadingTvdInterval: AbstractTvdInterval [0..1]
+ Ibut: VolumePerVolumeMeasure [0..1]
+ Ipent: VolumePerVolumeMeasure [0..1]
+ Meth: VolumePerVolumeMeasure [0..1]
+ Nbut: VolumePerVolumeMeasure [0..1]
+ Prop: VolumePerVolumeMeasure [0..1]
+ ReadingType: GasPeakType [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
DrillReportPerfInfo
«XSDelement»
+ DTimClose: TimeStamp [0..1]
+ DTimOpen: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ PerforationMdInterval: MdInterval [0..1]
+ PerforationTvdInterval: AbstractTvdInterval [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
MudLogReport::GasPeakType
circulating background gas
connection gas
drilling background gas
drilling gas peak
flow check gas
no readings
other
shut down gas
trip gas
«XSDcomplexType»
DrillReportControlIncidentInfo
«XSDelement»
+ ActivityCode: DrillActivityCode [0..1]
+ Description: String2000 [0..1]
+ DetailActivity: String64 [0..1]
+ DiaBit: LengthMeasure [0..1]
+ DiaCsgLast: LengthMeasure [0..1]
+ DTim: TimeStamp [0..1]
+ DTimRegained: TimeStamp [0..1]
+ ETimLost: TimeMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Formation: String2000 [0..1]
+ IncidentType: WellControlIncidentType [0..1]
+ KillingType: WellKillingProcedureType [0..1]
+ MdBit: MeasuredDepth [0..1]
+ MdCsgLast: MeasuredDepth [0..1]
+ MdInflow: MeasuredDepth [0..1]
+ Phase: String64 [0..1]
+ PorePressure: MassPerVolumeMeasure
+ PresMaxChoke: PressureMeasure [0..1]
+ PresShutInCasing: PressureMeasure [0..1]
+ PresShutInDrill: PressureMeasure [0..1]
+ ProprietaryCode: NameStruct [0..*]
+ TempBottom: ThermodynamicTemperatureMeasure [0..1]
+ TvdInflow: AbstractVerticalDepth [0..1]
+ VolMudGained: VolumeMeasure [0..1]
+ WtMud: MassPerVolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
WellControlIncidentType
shallow gas kick
water kick
oil kick
gas kick
TypeEnum
«Enumeration»
WellKillingProcedureType
drillers method
wait and weight
bullheading
lubricate and bleed
forward circulation
reverse circulation
TypeEnum
«Enumeration»
DrillActivityCode
abandonment
abandonment – log plugs
abandonment – run plugs
abandonment – wait on cement
casing
cement
cement – circulate
cement – other
cement – rig up
cement – wait on cement
circulate
circulate – boulder or gravel
circulate – casing
circulate – cementing
circulate – circulate samples
circulate – coring
circulate – drilling
circulate – fishing
circulate – gumbo attack
circulate – logging
circulate – lost circulation
circulate – well control
completion operations
completion operations – gravel packing
completion operations – logging
completion operations – rig up
completion operations – running liner
completion operations – tear down
completion operations – testing
cond mud
coring
coring – conventional
coring – flow check
coring – laydown barrel
coring – oriented
coring – plastic sleeve
coring – rig up core barrel
coring – sponge
cut
deviation survey
deviation survey – dir multi-shot
deviation survey – dir single shot
deviation survey – drift
deviation survey – gyro
deviation survey – MWD
dir work
dir work – horizontal drilling
dir work – motor drilling
dir work – orient
dir work – rotary drilling
dir work – slant drilling
drilling
drilling – casing
drilling – connection
drilling – drill cement
drilling – flow check
drilling – hole opening
drilling – new hole
drilling – sidetracking
drilling – under-reaming
DST
DST – cased hole
DST – lay down tools
DST – open hole
DST – open hole closed chamber
DST – rig up tools
fishing
fishing – BHA
fishing – casing
fishing – cones
fishing – other
fishing – stuck pipe
fishing – wireline tools
float equip
HSE
HSE – hold drill
HSE – incident
HSE – safety meeting
mill
mill – cut casing or tubing
mill – milling
miscellaneous
nipple up BOP
nipple up BOP – diverter
nipple up BOP – manifold
nipple up BOP – other
nipple up BOP – PVT system
nipple up BOP – stack
plug back
plug back – abandonment
plug back – kick off plug
plug back – lost circulation
plug back – wait on cement
plug back – well control
pressure test
pressure test – BOP manifold
pressure test – BOP stack
pressure test – form integrity test
pressure test – form leak off test
pressure test – packer
pressure test – PIT
reaming
reaming – back reaming
reaming – coring
reaming – drill
reaming – logging
reaming – under-reaming
rig move
rig move – anchor handling
rig move – inter-pad move
rig move – inter-well move
rig move – jack up or down
rig move – other
rig move – position rig
rig move – skid rig
rig release
rig release – cut casing
rig release – install capping assembly
rig release – MOB or DE-MOB
rig repairs
rig repairs – draworks
rig repairs – electrical
rig repairs – mud system
rig repairs – other
rig repairs – rotary
rig repairs – subsea equipment
rig repairs – well control equipment
rig service
rig service – lubricate rig
rig service – test equipment
rig up or tear down
rig up or tear down – rig up
rig up or tear down – site work
rig up or tear down – tear down
run casing
run liner
run or pull riser
run or pull riser – other
run or pull riser – run or pull riser
set
slip drilling line
squeeze cement
squeeze cement – casing repair
squeeze cement – casing shoe
squeeze cement – parted casing
squeeze cement – perforations DST
stuck pipe
surface string handling
test completion
testing general
testing general – equipment
testing general – flow
tripping
tripping – back-reaming
tripping – flow check
tripping – short trip in
tripping – short trip out
tripping – trip in (from surface)
tripping – trip out (to surface)
wait
wait – daylight
wait – environmental or regulatory
wait – equipment
wait – holiday
wait – ice
wait – on orders
wait – operator
wait – other
wait – partners
wait – service company
wait – weather
well control
well control – mix
well control – shut in
well control – strip
well control – well kill
well srvc
well srvc – casing repair
well srvc – clean well to compl fluid
well srvc – coiled tubing work
well srvc – gravel pack
well srvc – install or test xmas tree
well srvc – kill well
well srvc – land
well srvc – perforate
well srvc – pull completion
well srvc – pull suspension plugs
well srvc – run completion
well srvc – run screens
well srvc – sand control
well srvc – stimulation
well srvc – subsea work
well srvc – surface line work
well srvc – suspend well or pull BOPs
well srvc – test well
well srvc – wash
well srvc – wireline work
well srvc – work tubulars
well srvc – workstring run
wireline logs
wireline logs – abandonment
wireline logs – evaluation
wireline logs – form tester
wireline logs – other
wireline logs – side wall cores
wireline logs – velocity
+WellTestInfo
0..*
+FormTestInfo
0..*
+LithShowInfo
0..*
+EquipFailureInfo
0..*
+StratInfo
0..*
+CoreInfo
0..*
+GasReadingInfo
0..*
+PerfInfo
0..*
+ControlIncidentInfo
0..*

4.1 AbstractBottomHoleTemperature

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 1/22/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *One of either circulating or static temperature*

Attributes

Name	Type	Notes
BottomHoleTemperature	ThermodynamicTemperatureMeasure	Bottomhole temperature for the job or reporting period.

Associations

Association	Notes
From: **DrillReportLogInfo.**BottomHoleTemperature **0..1** To: **AbstractBottomHoleTemperature**	
From: **BottomHoleStaticTemperature.** To: **AbstractBottomHoleTemperature**	
From: **BottomHoleCirculatingTemperature.** To: **AbstractBottomHoleTemperature**	

4.2 BottomHoleCirculatingTemperature

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 1/22/2016 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Circulating temperature at the bottom of the hole.*

Associations

Association	Notes
From: **BottomHoleCirculatingTemperature.** To: **AbstractBottomHoleTemperature**	

4.3 BottomHoleStaticTemperature

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 1/22/2016 *Last modified:*11/5/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Static temperature at the bottom of the hole.*

Attributes

Name	Type	Notes
ETimStatic	TimeMeasure	Elapsed time since circulation stopped.

Associations

Association	Notes
From: **BottomHoleStaticTemperature.** To: **AbstractBottomHoleTemperature**	

4.4 DrillActivity

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Activity Component Schema.*

Attributes

Name	Type	Notes
ActivityCode	DrillActivityCode	A code used to define rig activity.
ActivityMdInterval	MdInterval	Measured depth interval over which the activity was conducted.
ActivityTvdInterval	AbstractTvdInterval	True vertical depth interval over which the activity was conducted.
BitMdInterval	MdInterval	Range of bit measured depths over which the activity occurred.
Comments	String2000	Comments and remarks.
DetailActivity	String64	Custom string to further define an activity.
DTimEnd	TimeStamp	Date and time that activities ended.
DTimStart	TimeStamp	Date and time that activities started.
Duration	TimeMeasure	The activity duration (commonly in hours).
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
ItemState	ItemState	The item state for the data object.
Md	MeasuredDepth	The measured depth to the drilling activity/operation.
Operator	BusinessAssociate	Pointer to a BusinessAssociate representing the operator.
Optimum	boolean	Is the activity optimum.? Values are "true" (or "1") and "false" (or "0").
Phase	String64	Phase refers to a large activity classification, e.g., drill surface hole.
Productive	boolean	Does activity bring closer to objective? Values are "true" (or "1") and "false" (or "0").
ProprietaryCode	NameStruct	
State	String64	Finish, interrupted, failed, etc.
StateDetailActivity	StateDetailActivity	The outcome of the detailed activity.
Tvd	AbstractVerticalDepth	True vertical depth to the drilling activity/operation.
TypeActivityClass	DrillActivityClassType	Classifier (planned, unplanned, downtime).
uid	String64	Unique identifier for this instance of DrillActivity.

Associations

Association	Notes
From: **DrillActivity.** To: **DrillActivityCode**	

Association		Notes
	From: **DrillActivity.** To: **DrillActivityClassType**	
	From: **DrillActivity.** To: **ItemState**	
0..1	From: **DrillActivity.**Tubular To: **Tubular**	
	From: **DrillActivity.** To: **StateDetailActivity**	
0..1	From: **DrillActivity.**BhaRun To: **BhaRun**	
0..*	From: **DrillReport.**DrillActivity To: **DrillActivity**	Activity breakdown, multiple for many activities.
0..*	From: **OpsReport.**Activity To: **DrillActivity**	Activity breakdown, multiple for many activities.

4.5 DrillActivityClassType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Activity classifier, e.g., planned, unplanned, downtime*

Attributes

Name	Type	Notes
planned		
unplanned		
downtime		

Associations

Association	Notes
From: **DrillActivityClassType.** To: **TypeEnum**	
From: **DrillActivity.** To: **DrillActivityClassType**	

4.6 DrillActivityCode

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A code to specify the drilling activity.*

Attributes

Name	Type	Notes
abandonment		
abandonment -- log plugs		
abandonment -- run plugs		
abandonment -- wait on cement		
casing		
cement		
cement -- circulate		
cement -- other		
cement -- rig up		
cement -- wait on cement		
circulate		
circulate -- boulder or gravel		
circulate -- casing		
circulate -- cementing		
circulate -- circulate samples		
circulate -- coring		
circulate -- drilling		
circulate -- fishing		
circulate -- gumbo attack		
circulate -- logging		
circulate -- lost circulation		
circulate -- well control		
completion operations		
completion operations -- gravel packing		
completion operations -- logging		
completion operations -- rig up		
completion operations -- running liner		
completion operations -- tear down		
completion operations -- testing		
cond mud		
coring		
coring -- conventional		

coring -- flow check		
coring -- laydown barrel		
coring -- oriented		
coring -- plastic sleeve		
coring -- rig up core barrel		
coring -- sponge		
cut		
deviation survey		
deviation survey -- dir multi-shot		
deviation survey -- dir single shot		
deviation survey -- drift		
deviation survey -- gyro		
deviation survey -- MWD		
dir work		
dir work -- horizontal drilling		
dir work -- motor drilling		
dir work -- orient		
dir work -- rotary drilling		
dir work -- slant drilling		
drilling		
drilling -- casing		
drilling -- connection		
drilling -- drill cement		
drilling -- flow check		
drilling -- hole opening		
drilling -- new hole		
drilling -- sidetracking		
drilling -- under-reaming		
DST		
DST -- cased hole		
DST -- lay down tools		
DST -- open hole		
DST -- open hole closed chamber		
DST -- rig up tools		
fishing		
fishing -- BHA		
fishing -- casing		
fishing -- cones		
fishing -- other		
fishing -- stuck pipe		

fishing -- wireline tools		
float equip		
HSE		
HSE -- hold drill		
HSE -- incident		
HSE -- safety meeting		
mill		
mill -- cut casing or tubing		
mill -- milling		
miscellaneous		
nipple up BOP		
nipple up BOP -- diverter		
nipple up BOP -- manifold		
nipple up BOP -- other		
nipple up BOP -- PVT system		
nipple up BOP -- stack		
plug back		
plug back -- abandonment		
plug back -- kick off plug		
plug back -- lost circulation		
plug back -- wait on cement		
plug back -- well control		
pressure test		
pressure test -- BOP manifold		
pressure test -- BOP stack		
pressure test -- form integrity test		
pressure test -- form leak off test		
pressure test -- packer		
pressure test -- PIT		
reaming		
reaming -- back reaming		
reaming -- coring		
reaming -- drill		
reaming -- logging		
reaming -- under-reaming		
rig move		
rig move -- anchor handling		
rig move -- inter-pad move		
rig move -- inter-well move		
rig move -- jack up or down		

rig move -- other		
rig move -- position rig		
rig move -- skid rig		
rig release		
rig release -- cut casing		
rig release -- install capping assembly		
rig release -- MOB or DE-MOB		
rig repairs		
rig repairs -- drawworks		
rig repairs -- electrical		
rig repairs -- mud system		
rig repairs -- other		
rig repairs -- rotary		
rig repairs -- subsea equipment		
rig repairs -- well control equipment		
rig service		
rig service -- lubricate rig		
rig service -- test equipment		
rig up or tear down		
rig up or tear down -- rig up		
rig up or tear down -- site work		
rig up or tear down -- tear down		
run casing		
run liner		
run or pull riser		
run or pull riser -- other		
run or pull riser -- run or pull riser		
set		
slip drilling line		
squeeze cement		
squeeze cement -- casing repair		
squeeze cement -- casing shoe		
squeeze cement -- parted casing		
squeeze cement -- perforations DST		
stuck pipe		
surface string handling		
test completion		
testing general		
testing general -- equipment		
testing general -- flow		

tripping		
tripping -- back-reaming		
tripping -- flow check		
tripping -- short trip in		
tripping -- short trip out		
tripping -- trip in (from surface)		
tripping -- trip out (to surface)		
wait		
wait -- daylight		
wait -- environmental or regulatory		
wait -- equipment		
wait -- holiday		
wait -- ice		
wait -- on orders		
wait -- operator		
wait -- other		
wait -- partners		
wait -- service company		
wait -- weather		
well control		
well control -- mix		
well control -- shut in		
well control -- strip		
well control -- well kill		
well srvc		
well srvc -- casing repair		
well srvc -- clean well to compl fluid		
well srvc -- coiled tubing work		
well srvc -- gravel pack		
well srvc -- install or test xmas tree		
well srvc -- kill well		
well srvc -- land		
well srvc -- perforate		
well srvc -- pull completion		
well srvc -- pull suspension plugs		
well srvc -- run completion		
well srvc -- run screens		
well srvc -- sand control		
well srvc -- stimulation		
well srvc -- subsea work		

well srvc -- surface line work		
well srvc -- suspend well or pull BOPs		
well srvc -- test well		
well srvc -- wash		
well srvc -- wireline work		
well srvc -- work tubulars		
well srvc -- workstring run		
wireline logs		
wireline logs -- abandonment		
wireline logs -- evaluation		
wireline logs -- form tester		
wireline logs -- other		
wireline logs -- side wall cores		
wireline logs -- velocity		

Associations

Association	Notes
From: **DrillActivityCode.** To: **TypeEnum**	
From: **DrillReportControlIncidentInfo.** To: **DrillActivityCode**	
From: **DrillActivity.** To: **DrillActivityCode**	

4.7 DrillReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Used to capture a daily drilling report focused on reporting from the operator to partners or to a governmental agency. For a similar report whose focus is service company to operator, see the OpsReport object.

Attributes

Name	Type	Notes
BitRecord	BitRecord	Information about a bit.
CreateDate	TimeStamp	The date and time the report was created. A later timestamp indicates a newer version of the report. To update values in a report, a full updated copy of the original report should be submitted.
Datum	AbstractReferencePoint	A pointer to a reference point defining a vertical datum used for measured depths, vertical depths, or elevations. If one of these coordinate values is included in the report, then you must specify a well datum. This requirement only applies to this report, which is generally a copy of the same information from the well object.
DTimEnd	TimeStamp	Date and time that the reporting period ended. A report period is commonly 24 hours.
DTimStart	TimeStamp	Date and time that the reporting period started. A report period is commonly 24 hours.
VersionKind	OpsReportVersion	The kind of report version. For example, a preliminary version.

Associations

Association		Notes
0..*	From: **DrillReport.**DrillActivity To: **DrillActivity**	Activity breakdown, multiple for many activities.
0..*	From: **DrillReport.**StatusInfo To: **DrillReportStatusInfo**	General status information.
0..*	From: **DrillReport.**PerfInfo To: **DrillReportPerfInfo**	General information about a well control incident.
0..1	From: **DrillReport.**SurveyStations To: **DrillReportSurveyStationReport**	A survey station recorded during the report interval.
0..*	From: **DrillReport.**FormTestInfo To: **DrillReportFormTestInfo**	General information about a wireline formation test.
	From: **DrillReport.** To: **OpsReportVersion**	
0..*	From: **DrillReport.**Fluid To: **Fluid**	One fluid record.
0..*	From: **DrillReport.**EquipFailureInfo To: **DrillReportEquipFailureInfo**	General information about equipment failure.

Association		Notes
0..1	From: **DrillReport.**WellboreInfo To: **DrillReportWellboreInfo**	General information about a wellbore. The well is represented by the original wellbore.
	From: **DrillReport.** To: **AbstractObject**	
0..*	From: **DrillReport.**CoreInfo To: **DrillReportCoreInfo**	General information about a core.
0..*	From: **DrillReport.**ControlIncidentInfo To: **DrillReportControlIncidentInfo**	General information about a well control incident.
0..*	From: **DrillReport.**WellTestInfo To: **DrillReportWellTestInfo**	General information about a production well test.
0..1	From: **DrillReport.**ExtendedReport To: **TimestampedCommentString**	A description of what happened from the end of report to an alternative time before the end of the next report. This is intended to allow a preliminary description of what happened from the end of the report (commonly midnight) until the time of submission of a preliminary report (commonly 6:00 in the morning).
0..*	From: **DrillReport.**PorePressure To: **DrillReportPorePressure**	Information about the pore pressure.
0..*	From: **DrillReport.**StratInfo To: **DrillReportStratInfo**	General information about a well control incident.
0..*	From: **DrillReport.**LogInfo To: **DrillReportLogInfo**	General information about a log.
0..*	From: **DrillReport.**GasReadingInfo To: **DrillReportGasReadingInfo**	General information about a gas reading.
0..*	From: **DrillReport.**LithShowInfo To: **DrillReportLithShowInfo**	General information about the lithology and shows in an interval.
1..1	From: **DrillReport.**Wellbore To: **Wellbore**	

4.8 DrillReportControlIncidentInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information about a well control incident that occurred during the drill report period.*

Attributes

Name	Type	Notes
ActivityCode	DrillActivityCode	A code used to define rig activity.
Description	String2000	A description of the well control incident.
DetailActivity	String64	Custom string to further define an activity.
DiaBit	LengthMeasure	The drill bit nominal outside diameter at the time of the well control incident.
DiaCsgLast	LengthMeasure	Diameter of the last installed casing.
DTim	TimeStamp	Date and time of the well control incident.
DTimRegained	TimeStamp	The date and time at which control of the well was regained.
ETimLost	TimeMeasure	The amount of time lost because of the well control incident. Commonly specified in hours.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Formation	String2000	The lithological description of the geological formation at the incident depth.
IncidentType	WellControlIncidentType	The type of well control incident.
KillingType	WellKillingProcedureType	The type of procedure used to kill the well.
MdBit	MeasuredDepth	The measured depth of the bit at the time of the the well control incident.
MdCsgLast	MeasuredDepth	Measured depth of the last casing joint.
MdInflow	MeasuredDepth	The measured depth to the well inflow entry point.
Phase	String64	Phase is large activity classification, e.g. drill surface hole.
PorePressure	MassPerVolumeMeasure	The equivalent mud weight value of the pore pressure reading.
PresMaxChoke	PressureMeasure	The maximum pressure that the choke valve can be exposed to.
PresShutInCasing	PressureMeasure	The shut in casing pressure.
PresShutInDrill	PressureMeasure	The actual pressure in the drill pipe when the rams were closed around it.
ProprietaryCode	NameStruct	A proprietary code used to define rig activity. The name of the proprietary system should be defined in the namingSystem attribute.
TempBottom	ThermodynamicTemperatureMeasure	The temperature at the bottom of the wellbore.
TvdInflow	AbstractVerticalDepth	The true vertical depth to the well inflow entry point.

uid	String64	Unique identifier for this instance of DrillReportControlIncidentInfo.
VolMudGained	VolumeMeasure	The gained volume of drilling fluid due to the well kick.
WtMud	MassPerVolumeMeasure	The density of the drilling fluid at the time of the well control incident.

Associations

Association	Notes
From: **DrillReportControlIncidentInfo.** To: **DrillActivityCode**	
From: **DrillReportControlIncidentInfo.** To: **WellKillingProcedureType**	
From: **DrillReportControlIncidentInfo.** To: **WellControlIncidentType**	
From: **DrillReport.**ControlIncidentInfo **0..*** To: **DrillReportControlIncidentInfo**	General information about a well control incident.

4.9 DrillReportCoreInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a core taken during the drill report period.*

Attributes

Name	Type	Notes
CoreDescription	String2000	General core description.
CoredMdInterval	MdInterval	Cored interval expressed as measured depth.
CoredTvdInterval	AbstractTvdInterval	Cored interval expressed as true vertical depth.
CoreNumber	String64	Core identification number.
DTim	TimeStamp	Date and time that the core was completed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
InnerBarrelType	InnerBarrelType	Core inner barrel type.
LenBarrel	LengthMeasure	Length of the core barrel.
LenRecovered	LengthMeasure	Length of the core recovered.
RecoverPc	VolumePerVolumeMeasure	The relative amount of core recovered.
uid	String64	Unique identifier for this instance of DrillReportCoreInfo.

Associations

Association	Notes
From: **DrillReportCoreInfo.** To: **InnerBarrelType**	
From: **DrillReport.**CoreInfo **0..*** To: **DrillReportCoreInfo**	General information about a core.

4.10 DrillReportEquipFailureInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about equipment failure that occurred during the drill report period.*

Attributes

Name	Type	Notes
Description	String2000	A description of the equipment failure.
DTim	TimeStamp	Date and time that the equipment failed.
DTimRepair	TimeStamp	The date and time at which the production equipment was repaired and ready for production.
EquipClass	String64	The classification of the equipment that failed.
ETimMissProduction	TimeMeasure	The missed production time because of the equipment failure.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Md	MeasuredDepth	The measured depth of the operation end point where the failure happened.
Tvd	AbstractVerticalDepth	The true vertical depth of the operation end point where failure the failure happened.
uid	String64	Unique identifier for this instance of DrillReportEquipFailureInfo.

Associations

Association	Notes
From: **DrillReport.**EquipFailureInfo **0..*** To: **DrillReportEquipFailureInfo**	General information about equipment failure.

4.11 DrillReportFormTestInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a wireline formation test that occurred during the drill report period.*

Attributes

Name	Type	Notes
DensityHC	MassPerVolumeMeasure	The density of the hydrocarbon component of the fluid sample.
Description	String2000	A detailed description of the wireline formation test.
DominateComponent	String64	The dominate component in the fluid sample.
DTim	TimeStamp	Date and time that the wireline formation test was completed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GoodSeal	boolean	Was there a good seal for the wireline formation test? Values are "true" or "1" or "false" or "0".
Md	MeasuredDepth	Measured depth at which the wireline formation test was conducted.
MdSample	MeasuredDepth	Measured depth where the fluid sample was taken.
PresPore	PressureMeasure	The formation pore pressure. The pressure of fluids within the pores of a reservoir, usually hydrostatic pressure, or the pressure exerted by a column of water from the formation's depth to sea level.
Tvd	AbstractVerticalDepth	True vertical depth at which the wireline formation test was conducted.
uid	String64	Unique identifier for this instance of DrillReportFormTestInfo.
VolumeSample	VolumeMeasure	The volume of the fluid sample.

Associations

Association	Notes
From: **DrillReport.**FormTestInfo **0..*** To: **DrillReportFormTestInfo**	General information about a wireline formation test.

4.12 DrillReportGasReadingInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a gas reading taken during the drill report period.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time of the gas reading.
Eth	VolumePerVolumeMeasure	Ethane (C2) concentration.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GasHigh	VolumePerVolumeMeasure	The highest gas reading.
GasLow	VolumePerVolumeMeasure	The lowest gas reading.
GasReadingMdInterval	MdInterval	Measured depth interval over which the gas reading was conducted.
GasReadingTvdInterval	AbstractTvdInterval	True vertical depth interval over which the gas reading was conducted.
Ibut	VolumePerVolumeMeasure	Iso-butane (iC4) concentration.
Ipent	VolumePerVolumeMeasure	Iso-pentane (iC5) concentration.
Meth	VolumePerVolumeMeasure	Methane (C1) concentration.
Nbut	VolumePerVolumeMeasure	Nor-butane (nC4) concentration.
Prop	VolumePerVolumeMeasure	Propane (C3) concentration.
ReadingType	GasPeakType	Type of gas reading.
uid	String64	Unique identifier for this instance of DrillReportGasReadingInfo.

Associations

Association	Notes
From: **DrillReportGasReadingInfo.** To: **GasPeakType**	
From: **DrillReport.**GasReadingInfo **0..*** To: **DrillReportGasReadingInfo**	General information about a gas reading.

4.13 DrillReportLithShowInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about the lithology and shows in an interval encountered during the drill report period.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time that the well test was completed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Lithology	String2000	A geological/lithological description/evaluation of the interval.
Show	String2000	A textual description of any shows in the interval.
ShowMdInterval	MdInterval	Measured depth interval over which the show appears.
ShowTvdInterval	AbstractTvdInterval	True vertical depth interval over which the show appears.
uid	String64	Unique identifier for this instance of DrillReportLithShowInfo

Associations

Association		Notes
0..*	From: **DrillReport.**LithShowInfo To: **DrillReportLithShowInfo**	General information about the lithology and shows in an interval.

4.14 DrillReportLogInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a log conducted during the drill report period.*

Attributes

Name	Type	Notes
DTim	TimeStamp	The date and time that the log was completed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
LoggedMdInterval	MdInterval	Measured depth interval from the top to the base of the interval logged.
LoggedTvdInterval	AbstractTvdInterval	True vertical depth interval from the top to the base of the interval logged.
MdTempTool	MeasuredDepth	Measured depth to the temperature measurement tool.
RunNumber	String64	Log run number. For measurement while drilling, this should be the bottom hole assembly number.
ServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor who provided the service.
Tool	LoggingToolKind	A pointer to the logging tool kind for the logging tool.
TvdTempTool	AbstractVerticalDepth	True vertical depth to the temperature measurement tool.
uid	String64	Unique identifier for this instance of DrillReportLogInfo.

Associations

Association	Notes
From: **DrillReportLogInfo.**BottomHoleTemperature **0..1** To: **AbstractBottomHoleTemperature**	
From: **DrillReport.**LogInfo **0..*** To: **DrillReportLogInfo**	General information about a log.

4.15 DrillReportPerfInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a perforation interval related to the drill report period.*

Attributes

Name	Type	Notes
DTimClose	TimeStamp	The date and time at which the well perforation interval is closed.
DTimOpen	TimeStamp	The date and time at which the well perforation interval is opened.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
PerforationMdInterval	MdInterval	Measured depth interval between the top and the base of the perforations.
PerforationTvdInterval	AbstractTvdInterval	True vertical depth interval between the top and the base of the perforations.
uid	String64	Unique identifier for this instance of DrillReportPerfInfo.

Associations

Association	Notes
From: **DrillReport.**PerfInfo **0..*** To: **DrillReportPerfInfo**	General information about a well control incident.

4.16 DrillReportPorePressure

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about pore pressure related to the drill report period.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time at the reading was recorded.
EquivalentMudWeight	MassPerVolumeMeasure	The equivalent mud weight value of the pore pressure reading.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Md	MeasuredDepth	Measured depth where the readings were recorded.
ReadingKind	ReadingKind	Indicate if the reading was estimated or measured.
Tvd	AbstractVerticalDepth	True vertical depth where the readings were recorded.
uid	String64	Unique identifier for this instance of DrillReportPorePressure.

Associations

Association	Notes
From: **DrillReportPorePressure.** To: **ReadingKind**	
From: **DrillReport.**PorePressure **0..*** To: **DrillReportPorePressure**	Information about the pore pressure.

4.17 DrillReportStatusInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General status information for the drill report period.*

Attributes

Name	Type	Notes
ConditionHole	String64	Description of the hole condition.
DiaCsgLast	LengthMeasure	Diameter of the last casing joint.
DiaHole	LengthMeasure	Hole nominal inside diameter.
DiaPilot	LengthMeasure	Pilot hole nominal inside diameter.
DistDrill	LengthMeasure	Distance drilled. This should be measured along the centerline of the wellbore.
DistDrillRot	LengthMeasure	Distance drilled: rotating.
DistDrillSlid	LengthMeasure	Distance drilled: sliding.
DistHold	LengthMeasure	Distance covered while holding angle with a steerable drilling assembly.
DistReam	LengthMeasure	Distance reamed.
DistSteering	LengthMeasure	Distance covered while actively steering with a steerable drilling assembly.
DTim	TimeStamp	The date and time for which the well status is reported.
Engineer	String64	Name of the operator's drilling engineer.
ETimCirc	TimeMeasure	Time spent circulating from the start of the bit run.
ETimDrill	TimeMeasure	Drilling time.
ETimDrillRot	TimeMeasure	Time spent rotary drilling.
ETimDrillSlid	TimeMeasure	Time spent slide drilling from the start of the bit run.
ETimHold	TimeMeasure	Time spent with no directional drilling work (commonly in hours).
ETimLoc	TimeMeasure	Time the rig has been on location (commonly in days).
ETimReam	TimeMeasure	Time spent reaming from the start of the bit run.
ETimSpud	TimeMeasure	Time since the bit broke ground (commonly in days).
ETimStart	TimeMeasure	Time from the start of operations (commonly in days).
ETimSteering	TimeMeasure	Time spent steering the bottomhole assembly (commonly in hours).
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Forecast24Hr	String2000	A summary of planned activities for the next reporting period.
Geologist	String64	Name of operator's wellsite geologist.

Maasp	PressureMeasure	Maximum allowable shut-in casing pressure.
Md	MeasuredDepth	Wellbore measured depth at the end of the report period.
MdCsgLast	MeasuredDepth	Measured depth of the last casing joint.
MdDiaHoleStart	MeasuredDepth	Measured depth to the start of the current hole diameter.
MdDiaPilotPlan	MeasuredDepth	The planned measured depth of the pilot hole.
MdKickoff	MeasuredDepth	Measured depth to the kickoff point of the wellbore.
MdPlanned	MeasuredDepth	The measured depth planned to be reached.
MdPlugTop	MeasuredDepth	The measured plug back depth.
MdStrengthForm	MeasuredDepth	The measured depth of the formation strength measurement.
NumAFE	String64	Authorization for expenditure (AFE) number that this cost item applies to.
NumContract	long	Number of contractor personnel on the rig.
NumOperator	long	Number of operator personnel on the rig.
NumPob	long	Total number of personnel on board the rig.
NumService	long	Number of service company personnel on the rig.
ParentWellbore	Wellbore	References to the parent wellbore(s). These are the wellbore(s) from which the current wellbore (indirectly) kickedoff.
PresKickTol	PressureMeasure	Kick tolerance pressure.
PresLotEmw	MassPerVolumeMeasure	Leak off test equivalent mud weight.
PresTestType	PresTestType	The type of pressure test that was run.
RigUtilization	RigUtilization	A pointer to the rig used.
RopAv	LengthPerTimeMeasure	Average rate of penetration.
RopCurrent	LengthPerTimeMeasure	Rate of penetration at the end of the reporting period.
StrengthForm	MassPerVolumeMeasure	The measured formation strength. This should be the final measurement before the end of the report period.
Sum24Hr	String2000	A summary of the activities performed and the status of the ongoing activities.
Supervisor	String64	Name of the operator's rig supervisor.
Tubular	Tubular	A pointer to the tubular (assembly) used in this report period.
Tvd	AbstractVerticalDepth	Wellbore true vertical depth at the end of the report.
TvdCsgLast	AbstractVerticalDepth	True vertical depth of last casing joint.
TvdDiaPilotPlan	AbstractVerticalDepth	The planned true vertical depth of the pilot hole.
TvdKickoff	MeasuredDepth	True vertical depth to the kickoff point of the wellbore.
TvdLot	AbstractVerticalDepth	True vertical depth of a leak off test point.

TvdStrengthForm	AbstractVerticalDepth	The true vertical depth of the formation strength measurement.
TypeWellbore	WellboreType	Type of wellbore.
uid	String64	Unique identifier for this instance of DrillReportStatusInfo.
VolKickTol	VolumeMeasure	Kick tolerance volume.

Associations

Association	Notes
From**: DrillReportStatusInfo.** To: **PresTestType**	
0..1 From**: DrillReportStatusInfo.**ElevKelly To: **AbstractElevation**	Elevation of the rotary kelly bushing.
0..1 From**: DrillReportStatusInfo.**CostDayMud To: **Cost**	Daily Mud Cost.
0..1 From**: DrillReportStatusInfo.**CostDay To: **Cost**	Daily Cost.
0..* From**: DrillReport.**StatusInfo To: **DrillReportStatusInfo**	General status information.

4.18 DrillReportStratInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about stratigraphy for the drill report period.*

Attributes

Name	Type	Notes
Description	String2000	A lithological description of the geological formation at the given depth.
DTim	TimeStamp	Date and time at which a preliminary zonation was established.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
MdTop	MeasuredDepth	Measured depth at the top of the formation.
TvdTop	AbstractVerticalDepth	True vertical depth at the top of the formation.
uid	String64	Unique identifier for this instance of DrillReportStratInfo.

Associations

Association	Notes
From: **DrillReport.**StratInfo **0..*** To: **DrillReportStratInfo**	General information about a well control incident.

4.19 DrillReportSurveyStation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Trajectory station information for the drill report period.*

Attributes

Name	Type	Notes
Azi	PlaneAngleMeasure	Hole azimuth, corrected to a well's azimuth reference.
Dls	AnglePerLengthMeasure	Dogleg severity.
DTim	TimeStamp	The date at which the directional survey took place.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Incl	PlaneAngleMeasure	Hole inclination, measured from vertical.
Md	MeasuredDepth	Measured depth of measurement from the drill datum.
Tvd	AbstractVerticalDepth	True vertical depth of the measurements.
uid	String64	Unique identifier for this instance of DrillReportSurveyStation.
VertSect	LengthMeasure	Distance along the vertical section of an azimuth plane.

Associations

Association	Notes
From: **DrillReportSurveyStation.**Location **0..*** To: **Abstract2dPosition**	The 2D coordinates of the item. Note that within the context of trajectory, the "original" coordinates are inherently local coordinates as defined above.
From: **DrillReportSurveyStationReport.**DrillReportSurveyStation **0..*** To: **DrillReportSurveyStation**	

4.20 DrillReportSurveyStationReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/12/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Captures information for a report including drill report survey stations.*

Associations

Association	Notes
From: **DrillReportSurveyStationReport.**DrillReportSurveyStation **0..*** To: **DrillReportSurveyStation**	
From: **DrillReportSurveyStationReport. 1** To: **TrajectoryMetadata**	
From: **DrillReport.**SurveyStations **0..1** To: **DrillReportSurveyStationReport**	A survey station recorded during the report interval.

4.21 DrillReportWellboreInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a wellbore for a drill report period.*

Attributes

Name	Type	Notes
DateDrillComplete	date	The date when the drilling activity was completed.
DrillContractor	BusinessAssociate	Pointer to a BusinessAssociate representing the lling contractor company.
DTimPreSpud	TimeStamp	Date and time at which the well was predrilled. This is when the well drilling equipment begin to bore into the earth's surface for the purpose of drilling a well.
DTimSpud	TimeStamp	Date and time at which the well was spudded. This is when the well drilling equipment began to bore into the earth's surface for the purpose of drilling a well.
Operator	BusinessAssociate	Pointer to a BusinessAssociate representing the drilling Operator company responsible for the well being drilled (the company for whom the well is being drilled).
Rig	RigUtilization	Optional pointers to RigUtilization objects representing the rigs(s) used to drill the wellbore.

Associations

Association	Notes
From: **DrillReport.**WellboreInfo **0..1** To: **DrillReportWellboreInfo**	General information about a wellbore. The well is represented by the original wellbore.

4.22 DrillReportWellTestInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General information about a production well test conducted during the drill report period.*

Attributes

Name	Type	Notes
CarbonDioxide	MassPerMassMeasure	The relative amount of CO2 gas.
Chloride	MassPerMassMeasure	The relative amount of chloride in the produced water.
ChokeOrificeSize	LengthMeasure	The diameter of the choke opening.
DensityGas	MassPerVolumeMeasure	The density of the produced gas.
DensityOil	MassPerVolumeMeasure	The density of the produced oil.
DensityWater	MassPerVolumeMeasure	The density of the produced water.
DTim	TimeStamp	Date and time that the well test was completed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowRateGas	VolumePerTimeMeasure	The maximum rate at which gas was produced.
FlowRateOil	VolumePerTimeMeasure	The maximum rate at which oil was produced.
FlowRateWater	VolumePerTimeMeasure	The maximum rate at which water was produced.
GasOilRatio	VolumePerVolumeMeasure	The ratio of the volume of gas to the volume of oil.
HydrogenSulfide	MassPerMassMeasure	The relative amount of H2S gas.
PresBottom	PressureMeasure	The final bottomhole pressure.
PresFlowing	PressureMeasure	The final flowing pressure.
PresShutIn	PressureMeasure	The final shut-in pressure.
TestMdInterval	MdInterval	Test interval expressed as a measured depth.
TestNumber	long	The number of the well test.
TestTvdInterval	AbstractTvdInterval	Test interval expressed as a true vertical depth.
TestType	WellTestType	The type of well test.
uid	String64	Unique identifier for this instance of DrillReportWellTestInfo.
VolGasTotal	VolumeMeasure	The total amount of gas produced. This includes gas that was disposed of (e.g., burned).
VolOilStored	VolumeMeasure	The total amount of produced oil that was stored.
VolOilTotal	VolumeMeasure	The total amount of oil produced. This includes oil that was disposed of (e.g., burned).

VolWaterTotal	VolumeMeasure	The total amount of water produced. This includes water that was disposed of.
WaterOilRatio	VolumePerVolumeMeasure	The relative amount of water per amount of oil.

Associations

Association	Notes
From: **DrillReportWellTestInfo.** To: **WellTestType**	
From: **DrillReport.**WellTestInfo **0..*** To: **DrillReportWellTestInfo**	General information about a production well test.

4.23 InnerBarrelType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Core inner barrel type.*

Attributes

Name	Type	Notes
undifferentiated		A pipe that is located inside a core barrel to hold the core sample.
aluminum		An inner core barrel made of aluminium.
gel		An inner core barrel that that seals off the core sample using gel as the sealing material.
fiberglass		An inner core barrel made of glass fiber reinforced plastic.

Associations

Association	Notes
From: **InnerBarrelType.** To: **TypeEnum**	
From: **DrillReportCoreInfo.** To: **InnerBarrelType**	

4.24 ItemState

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *These values represent the state of a WITSML object.*

Attributes

Name	Type	Notes
actual		Actual data measured or entered at the well site.
model		Model data used for "what if" calculations.
plan		A planned object. That is, one which is expected to be executed in the future.

Associations

Association	Notes
From: **ItemState.** To: **TypeEnum**	
From: **DrillActivity.** To: **ItemState**	

4.25 OpsReportVersion

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Version of the report, e.g., preliminary, normal, final, etc.*

Attributes

Name	Type	Notes
preliminary		A report that has not yet been approved by the drilling operator. This report is normally issued at the beginning of the work day (e.g., 6:00 am).
normal		A daily status report that has been approved by the drilling operator.
final		A report that represents the final definitive status for the well. This report is typically issued some period of time (e.g., 6 months) after drilling has concluded.

Associations

Association	Notes
From: **OpsReportVersion.** To: **TypeEnum**	
From: **DrillReport.** To: **OpsReportVersion**	

4.26 PresTestType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the types of pressure test(s) conducted during a drilling report period.*

Attributes

Name	Type	Notes
leak off test		A leakoff test (LOT) is usually conducted immediately after drilling below a new casing shoe. The test indicates the strength of the wellbore at the casing seat, typically considered one of the weakest points in any interval. The data gathered during the LOT is used to prevent lost circulations while drilling. During the test, the well is shut in and fluid is pumped into the wellbore gradually to increase the pressure on the formation.
formation integrity test		To avoid breaking down the formation, many operators perform a formation integrity test (FIT) at the casing seat to determine if the wellbore will tolerate the maximum mud weight anticipated while drilling the interval. If the casing seat holds pressure that is equivalent to the prescribed mud density, the test is considered successful and drilling resumes.

Associations

Association	Notes
From: **PresTestType.** To: **TypeEnum**	
From: **DrillReportStatusInfo.** To: **PresTestType**	

4.27 ReadingKind

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies if the reading was measured or estimated.*

Attributes

Name	Type	Notes
measured		The reading was measured.
estimated		The reading was estimated.
unknown		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **ReadingKind.** To: **TypeEnum**	
From: **DrillReportPorePressure.** To: **ReadingKind**	

4.28 StateDetailActivity

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the state of a drilling activity (DrillActivity).*

Attributes

Name	Type	Notes
injury		Personnel injury in connection with drilling and/or drilling related operations.
operation failed		Operation failed to achieve objective.
kick		Formation fluid invading the wellbore.
circulation loss		Circulation lost to the formation.
mud loss		Circulation impossible due to plugging or failure of equipment.
stuck equipment		Equipment got stuck in the hole.
equipment failure		Equipment failure occurred.
equipment hang		Operations had to be aborted due to an equipment issue
success		Operation achieved the objective.

Associations

Association	Notes
From: **StateDetailActivity.** To: **TypeEnum**	
From: **DrillActivity.** To: **StateDetailActivity**	

4.29 TimestampedCommentString

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A timestamped textual description.*

Attributes

Name	Type	Notes
dTim	TimeStamp	The timestamp of the time-qualified comment.

Associations

Association	Notes
From: **TimestampedCommentString.** To: **String2000**	
From: **DrillReport.**ExtendedReport **0..1** To: **TimestampedCommentString**	A description of what happened from the end of report to an alternative time before the end of the next report. This is intended to allow a preliminary description of what happened from the end of the report (commonly midnight) until the time of submission of a preliminary report (commonly 6:00 in the morning).

4.30 WellControlIncidentType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of a well control incident.*

Attributes

Name	Type	Notes
shallow gas kick		Shallow gas is flowing incidentally into a well being drilled.
water kick		Water is flowing incidentally into a well being drilled.
oil kick		Crude oil is flowing incidentally into a well being drilled.
gas kick		Gas is flowing incidentally into a well being drilled.

Associations

Association	Notes
From: **WellControlIncidentType.** To: **TypeEnum**	
From: **DrillReportControlIncidentInfo.** To: **WellControlIncidentType**	

4.31 WellKillingProcedureType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Specifies the type of procedure used to stop (kill) the flow of formation fluids into a well. A well-killing procedure may be planned or unplanned. The particular situation determines what type of procedure is used.

Attributes

Name	Type	Notes
drillers method		Prescribes circulating the kick fluids out of the well and then circulating a higher density kill mud into the well through a kill line with an adjustable choke.
wait and weight		Prescribes circulating heavier kill mud while a constant downhole pressure is maintained by pressure relief through a choke.
bullheading		Prescribes pumping kill-weight fluid down the tubing and forcing the wellbore fluids back into the formation through the perforations.
lubricate and bleed		Prescribes this process: 1) Pump a volume of killing fluid corresponding to half the volume of the well tubing into the well. 2) Observe the well for 30 to 60 minutes and wait for the tubing head pressure to drop. 3) Pump additional killing fluid into the well. 4) When the wellhead pressure drops below 200 psi above observed tubing head pressure, bleed off gas from the tubing at high rate.
forward circulation		Prescribes circulating drilling fluid down the tubing, through a circulation device (or out the end of a workstring/coiled tubing) and up the annulus.
reverse circulation		Prescribes circulating a drilling fluid down the completion annulus, workstring annulus, or pipe annulus and taking returns up the tubing, workstring, or pipe.

Associations

Association	Notes
From: **WellKillingProcedureType.** To: **TypeEnum**	
From: **DrillReportControlIncidentInfo.** To: **WellKillingProcedureType**	

4.32 WellTestType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of well test conducted.*

Attributes

Name	Type	Notes
drill stem test		Determines the productive capacity, pressure, permeability or extent (or a combination of these) of a hydrocarbon reservoir, with the drill string still in the hole.
production test		Determines the daily rate of oil, gas, and water production from a (potential) reservoir.

Associations

Association	Notes
From: **WellTestType.** To: **TypeEnum**	
From: **DrillReportWellTestInfo.** To: **WellTestType**	

5 FluidsReport

Package: xsd_schemas

Notes: FluidsReport Schema.

«XSDcomplexType»
Fluid
«XSDelement»
+ AlkalinityP1: VolumeMeasure [0..1]
+ AlkalinityP2: VolumeMeasure [0..1]
+ Asg: MassPerMassMeasure [0..1]
+ AverageCuttingSize: LengthMeasure [0..1]
+ BaritePc: VolumePerVolumeMeasure [0..1]
+ BrineClass: BrineClassExt [0..1]
+ BrineDensity: MassPerVolumeMeasure [0..1]
+ BrinePc: VolumePerVolumeMeasure [0..1]
+ Calcium: MassPerVolumeMeasure [0..1]
+ CalciumChloride: MassPerVolumeMeasure [0..1]
+ CalciumChloridePc: VolumePerVolumeMeasure [0..1]
+ Carbonate: MassPerVolumeMeasure [0..1]
+ Chloride: MassPerVolumeMeasure [0..1]
+ Comments: String2000 [0..1]
+ Company: BusinessAssociate [0..1]
+ Density: MassPerVolumeMeasure [0..1]
+ DTim: TimeStamp [0..1]
+ Ecd: MassPerVolumeMeasure [0..1]
+ ElectStab: ElectricPotentialDifferenceMeasure [0..1]
+ Engineer: String64 [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FilterCakeHthp: LengthMeasure [0..1]
+ FilterCakeLtlp: LengthMeasure [0..1]
+ FiltrateHthp: VolumeMeasure [0..1]
+ FiltrateLtlp: VolumeMeasure [0..1]
+ Gel10Min: PressureMeasure [0..1]
+ Gel10Sec: PressureMeasure [0..1]
+ Gel30Min: PressureMeasure [0..1]
+ Gel3Sec: PressureMeasureExt [0..1]
+ Gel6Sec: PressureMeasureExt [0..1]
+ HardnessCa: MassPerMassMeasure [0..1]
+ Iron: MassPerVolumeMeasure [0..1]
+ KickToleranceIntensity: MassPerVolumeMeasure [0..1]
+ KickToleranceVolume: VolumeMeasure [0..1]
+ Lcm: MassPerVolumeMeasure [0..1]
+ Lime: MassPerVolumeMeasure [0..1]
+ LocationSample: String64 [0..1]
+ Magnesium: MassPerVolumeMeasure [0..1]
+ Mbt: CationExchangeCapacityMeasureExt [0..1]
+ Md: MeasuredDepth [0..1]
+ MetalRecovered: MassMeasure [0..1]
+ Mf: VolumeMeasure [0..1]
+ MudClass: MudClass [0..1]
+ OilCtg: MassPerMassMeasure [0..1]
+ OilCtgDry: MassPerVolumeMeasure [0..1]
+ OilGrease: MassPerVolumeMeasure [0..1]
+ OilPc: VolumePerVolumeMeasure [0..1]
+ Ph: double [0..1]
+ Pm: VolumeMeasure [0..1]
+ PmFiltrate: VolumeMeasure [0..1]
+ Polymer: VolumePerVolumeMeasure [0..1]
+ PolyType: String64 [0..1]
+ Potassium: MassPerVolumeMeasure [0..1]
+ PptPressure: PressureMeasureExt [0..1]
+ PptSpurtLoss: VolumeMeasureExt [0..1]
+ PptTemperature: ThermodynamicTemperatureMeasureExt [0..1]
+ PresBopRating: PressureMeasure [0..1]
+ PresHthp: PressureMeasure [0..1]
+ Pv: DynamicViscosityMeasure [0..1]
+ Salt: MassPerVolumeMeasure [0..1]
+ SaltPc: VolumePerVolumeMeasure [0..1]
+ SandPc: VolumePerVolumeMeasure [0..1]
+ SodiumChloride: MassPerVolumeMeasure [0..1]
+ SodiumChloridePc: VolumePerVolumeMeasure [0..1]
+ SolCorPc: VolumePerVolumeMeasure [0..1]
+ SolidsCalcPc: VolumePerVolumeMeasure [0..1]
+ SolidsHiGrav: MassPerVolumeMeasure [0..1]
+ SolidsHiGravPc: VolumePerVolumeMeasure [0..1]
+ SolidsLowGrav: MassPerVolumeMeasure [0..1]
+ SolidsLowGravPc: VolumePerVolumeMeasure [0..1]
+ SolidsPc: VolumePerVolumeMeasure [0..1]
+ Sulfide: MassPerVolumeMeasure [0..1]
+ Tct: ThermodynamicTemperatureMeasure [0..1]
+ TempFlowLine: ThermodynamicTemperatureMeasure [0..1]
+ TempHthp: ThermodynamicTemperatureMeasure [0..1]
+ TempPh: ThermodynamicTemperatureMeasure [0..1]
+ TempVis: ThermodynamicTemperatureMeasure [0..1]
+ Turbidity: double [0..1]
+ Tvd: AbstractVerticalDepth [0..1]
+ Type: String64 [0..1]
+ VisFunnel: TimeMeasure [0..1]
+ WaterPc: VolumePerVolumeMeasure [0..1]
+ WaterPhaseSalinity: MassPerVolumeMeasure [0..1]
+ WholeMudCalcium: MassPerVolumeMeasure [0..1]
+ WholeMudChloride: MassPerVolumeMeasure [0..1]
+ Yp: PressureMeasure [0..1]
+ ZincOxide: MassPerVolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
AbstractActiveObject
«XSDcomplexType,XSDtopLevelEl...
Wellbore::Wellbore
+Wellbore
1..1
AbstractObject
«XSDcomplexType,XSDtopLevelElement»
FluidsReport
«XSDelement»
+ DTim: TimeStamp
+ Md: MeasuredDepth
+ NumReport: long [0..1]
+ Tvd: AbstractVerticalDepth [0..1]
+Fluid
0..*
«XSDcomplexType»
Rheometer
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ PresRheom: PressureMeasure [0..1]
+ TempRheom: ThermodynamicTemperatureMeasure [0..1]
«XSDattribute»
+ uid: String64
+Rheometer
0..*
+Viscosity
0..*
«XSDcomplexType»
RheometerViscosity
«XSDelement»
+ Speed: AngularVelocityMeasure
+ Viscosity: double
«XSDattribute»
+ uid: String64
EnumExtensionPattern
«XSDunion»
BrineClassExt
TypeEnum
«enumeration»
BrineClass
calcium bromide
potassium bromide
sodium bromide
zinc dibromide
ammonium chloride
calcium chloride
potassium chloride
sodium chloride
cesium formate
potassium formate
sodium formate
blend

5.1 BrineClass

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/12/2021 *Last modified:*11/12/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the class of brine.*

Attributes

Name	Type	Notes
calcium bromide		
potassium bromide		
sodium bromide		
zinc dibromide		
ammonium chloride		
calcium chloride		
potassium chloride		
sodium chloride		
cesium formate		
potassium formate		
sodium formate		
blend		

Associations

Association	Notes
From: **BrineClass.** To: **TypeEnum**	
From: **BrineClassExt.** To: **BrineClass**	

5.2 BrineClassExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/12/2021 *Last modified:*11/12/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **BrineClassExt.** To: **EnumExtensionPattern**	
From: **BrineClassExt.** To: **BrineClass**	
From: **Fluid.** To: **BrineClassExt**	

5.3 Fluid

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Fluid component schema.*

Attributes

Name	Type	Notes
AlkalinityP1	VolumeMeasure	Mud alkalinity P1 from alternate alkalinity method (volume in ml of 0.02N acid to reach the phenolphthalein endpoint).
AlkalinityP2	VolumeMeasure	Mud alkalinity P2 from alternate alkalinity method (volume in ml of 0.02N acid to titrate, the reagent mixture to the phenolphthalein endpoint).
Asg	MassPerMassMeasure	Average specific gravity of solids.
AverageCuttingSize	LengthMeasure	Average size of the drill cuttings.
BaritePc	VolumePerVolumeMeasure	Barite content percent.
BrineClass	BrineClassExt	Class of Brine.
BrineDensity	MassPerVolumeMeasure	Density of water phase of NAF.
BrinePc	VolumePerVolumeMeasure	Percent brine content.
Calcium	MassPerVolumeMeasure	Calcium content.
CalciumChloride	MassPerVolumeMeasure	Calcium chloride content.
CalciumChloridePc	VolumePerVolumeMeasure	Calcium chloride percent.
Carbonate	MassPerVolumeMeasure	Carbonate content.
Chloride	MassPerVolumeMeasure	Chloride content.
Comments	String2000	Comments and remarks.
Company	BusinessAssociate	Pointer to a BusinessAssociate representing the company.
Density	MassPerVolumeMeasure	Fluid density.
DTim	TimeStamp	The time when fluid readings were recorded.
Ecd	MassPerVolumeMeasure	Equivalent circulating density where fluid reading was recorded.
ElectStab	ElectricPotentialDifference Measure	Measurement of the emulsion stability and oil-wetting capability in oil-based muds.
Engineer	String64	Engineer name
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FilterCakeHthp	LengthMeasure	High temperature high pressure (HTHP) filter cake thickness.
FilterCakeLtlp	LengthMeasure	Filter cake thickness at low (normal) temperature and pressure.
FiltrateHthp	VolumeMeasure	High temperature high pressure (HTHP) filtrate (volume per 30 min).

FiltrateLtlp	VolumeMeasure	API water loss (low temperature and pressure mud filtrate measurement) (volume per 30 min).
Gel10Min	PressureMeasure	Ten-minute gels.
Gel10Sec	PressureMeasure	Ten-second gels.
Gel30Min	PressureMeasure	Thirty-minute gels.
Gel3Sec	PressureMeasureExt	Three-second gels.
Gel6Sec	PressureMeasureExt	Six-second gels.
HardnessCa	MassPerMassMeasure	Total calcium hardness.
Iron	MassPerVolumeMeasure	Iron content.
KickToleranceIntensity	MassPerVolumeMeasure	Assumed kick density for calculation of kick tolerance where the fluid reading was recorded.
KickToleranceVolume	VolumeMeasure	Assumed kick volume for calculation of kick tolerance based on the kick intensity where the fluid reading was recorded.
Lcm	MassPerVolumeMeasure	Lost circulation material.
Lime	MassPerVolumeMeasure	Lime content.
LocationSample	String64	Sample location.
Magnesium	MassPerVolumeMeasure	Magnesium content.
Mbt	CationExchangeCapacityMeasureExt	Cation exchange capacity (CEC) of the mud sample as measured by methylene blue titration (MBT).
Md	MeasuredDepth	The measured depth where the fluid readings were recorded.
MetalRecovered	MassMeasure	Metal recovered from the wellbore.
Mf	VolumeMeasure	Methyl orange alkalinity of filtrate.
MudClass	MudClass	The class of the drilling fluid.
OilCtg	MassPerMassMeasure	Oil on cuttings.
OilCtgDry	MassPerVolumeMeasure	Oil on dried cuttings.
OilGrease	MassPerVolumeMeasure	Oil and grease content.
OilPc	VolumePerVolumeMeasure	Percent oil content from retort.
Ph	double	Mud pH.
Pm	VolumeMeasure	Phenolphthalein alkalinity of whole mud.
PmFiltrate	VolumeMeasure	Phenolphthalein alkalinity of mud filtrate.
Polymer	VolumePerVolumeMeasure	Polymers present in the mud system.
PolyType	String64	Type of polymers present in the mud system.
Potassium	MassPerVolumeMeasure	Potassium content.
PptPressure	PressureMeasureExt	Permeability Plugging Test pressure.
PptSpurtLoss	VolumeMeasureExt	Permeability Plugging Test spurt loss.
PptTemperature	ThermodynamicTemperatureMeasureExt	Permeability Plugging Test temperature.
PresBopRating	PressureMeasure	Maximum pressure rating of the blow out preventer.

PresHthp	PressureMeasure	High temperature high pressure (HTHP) pressure.
Pv	DynamicViscosityMeasure	Plastic viscosity.
Salt	MassPerVolumeMeasure	Salt content.
SaltPc	VolumePerVolumeMeasure	Salt percent.
SandPc	VolumePerVolumeMeasure	Sand content percent.
SodiumChloride	MassPerVolumeMeasure	Sodium chloride content.
SodiumChloridePc	VolumePerVolumeMeasure	Sodium chloride percent.
SolCorPc	VolumePerVolumeMeasure	Solids corrected for chloride content percent.
SolidsCalcPc	VolumePerVolumeMeasure	Percent calculated solids content.
SolidsHiGrav	MassPerVolumeMeasure	Solids high gravity content.
SolidsHiGravPc	VolumePerVolumeMeasure	Solids high gravity percent.
SolidsLowGrav	MassPerVolumeMeasure	Solids low gravity content.
SolidsLowGravPc	VolumePerVolumeMeasure	Low gravity solids percent.
SolidsPc	VolumePerVolumeMeasure	Solids percentage from retort.
Sulfide	MassPerVolumeMeasure	Sulfide content.
Tct	ThermodynamicTemperatureMeasure	True crystallization temperature.
TempFlowLine	ThermodynamicTemperatureMeasure	Flow line temperature measurement where the fluid reading was recorded.
TempHthp	ThermodynamicTemperatureMeasure	High temperature high pressure (HTHP) temperature.
TempPh	ThermodynamicTemperatureMeasure	Mud pH measurement temperature.
TempVis	ThermodynamicTemperatureMeasure	Funnel viscosity temperature.
Turbidity	double	Turbidity units to measure the cloudiness or haziness of a fluid.
Tvd	AbstractVerticalDepth	The true vertical depth where the fluid readings were recorded.
Type	String64	Description for the type of fluid.
uid	String64	Unique identifier for this instance of Fluid.
VisFunnel	TimeMeasure	Funnel viscosity in seconds.
WaterPc	VolumePerVolumeMeasure	Water content percent.
WaterPhaseSalinity	MassPerVolumeMeasure	A factor showing the activity level of salt in oil-based mud.
WholeMudCalcium	MassPerVolumeMeasure	Calcium content in the whole mud sample, including oil and water phases.
WholeMudChloride	MassPerVolumeMeasure	Chloride content in the whole mud sample, including oil and water phases.
Yp	PressureMeasure	Yield point (Bingham and Herschel Bulkley models).
ZincOxide	MassPerVolumeMeasure	Zinc oxide content.

Associations

Association		Notes
0..*	From**: Fluid.**Rheometer To: **Rheometer**	
	From**: Fluid.** To: **BrineClassExt**	
0..*	From**: DrillReport.**Fluid To: **Fluid**	One fluid record.
0..*	From**: OpsReport.**Fluid To: **Fluid**	One fluid record.
0..*	From**: FluidsReport.**Fluid To: **Fluid**	A Fluid record.

5.4 FluidsReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Used to capture an analysis of the drilling mud.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time the information is related to.
Md	MeasuredDepth	Along-hole measured depth of measurement from the drill datum.
NumReport	long	Fluids report number.
Tvd	AbstractVerticalDepth	Vertical depth of the measurements.

Associations

Association		Notes
1..1	From: **FluidsReport.**Wellbore To: **Wellbore**	
	From: **FluidsReport.** To: **AbstractObject**	
0..*	From: **FluidsReport.**Fluid To: **Fluid**	A Fluid record.

5.5 MudClass

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/5/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the class of a drilling fluid.*

Attributes

Name	Type	Notes
oil-based		
water-based		
other		A drilling fluid in which neither water nor oil is the continuous phase.
pneumatic		A drilling fluid which is gas-based.

Associations

Association	Notes
From: **MudClass.** To: **TypeEnum**	
From: **DrillingParams.** To: **MudClass**	
From: **MudClassExt.** To: **MudClass**	

5.6 MudClassExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **MudClassExt.** To: **EnumExtensionPattern**	
From: **MudClassExt.** To: **MudClass**	

5.7 Rheometer

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*2/20/2019 *Status:* Proposed *Author:* William McKenzie
Notes: Rheometer readings taken during a drill report period. A rheometer is viscosimeter use for some fluid measurements, particularly when solid suspension properties are needed.

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
PresRheom	PressureMeasure	Rheometer pressure.
TempRheom	ThermodynamicTemperatureMeasure	Rheometer temperature.
uid	String64	Unique identifier for this instance of Rheometer.

Associations

Association	Notes
0..* From: **Rheometer.**Viscosity To: **RheometerViscosity**	
0..* From: **CementingFluid.**Rheometer To: **Rheometer**	
0..* From: **Fluid.**Rheometer To: **Rheometer**	

5.8 RheometerViscosity

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Viscosity reading of the rheometer*

Attributes

Name	Type	Notes
Speed	AngularVelocityMeasure	Rotational speed of the rheometer, typically in RPM.
uid	String64	Unique identifier for this instance of RheometerViscosity.
Viscosity	double	The raw reading from a rheometer. This could be , but is not necessarily, a viscosity.

Associations

Association	Notes
From: **Rheometer.**Viscosity **0..*** To: **RheometerViscosity**	

6 OpsReport

Package: xsd_schemas

Notes: OpsReport Schema

«XSDcomplexType» DayCost
«XSDElement»
+ CostAmount: Cost [0..1]
+ CostClass: String64
+ CostCode: String64
+ CostGroup: String64 [0..1]
+ CostItemDescription: String64 [0..1]
+ CostPerItem: Cost [0..1]
+ CostSubCode: String64 [0..1]
+ Estimated: boolean [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ IsCarryOver: boolean [0..1]
+ IsRental: boolean [0..1]
+ ItemKind: UomEnum [0..1]
+ ItemSize: double [0..1]
+ NameTag: NameTag [0..*]
+ NumAFE: String64 [0..1]
+ NumInvoice: String64 [0..1]
+ NumPO: String64 [0..1]
+ NumSerial: String64 [0..1]
+ NumTicket: String64 [0..1]
+ NumVendor: String64 [0..1]
+ Pool: String64 [0..1]
+ QtyItem: double [0..1]
+ Vendor: BusinessAssociate [0..1]
«XSDattribute»
+ uid: String64
AbstractActiveObject
«XSDcomplexType.XSDtopLevelElement»
Wellbore::Wellbore
+Wellbore
1..1
«XSDcomplexType» Trajectory::TrajectoryReport
«XSDcomplexType» WellboreGeometry:: WellboreGeometryReport
+WbGeometry
0..1
+TrajectoryStations
0..1
+DayCost
«XSDcomplexType» Inventory
«XSDElement»
+ CostItem: Cost [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ ItemWtOrVolPerUnit: AbstractItemWtOrVolPerUnit
+ Name: String64
+ PricePerUnit: Cost [0..1]
+ QtyAdjustment: double [0..1]
+ QtyOnLocation: double [0..1]
+ QtyReceived: double [0..1]
+ QtyReturned: double [0..1]
+ QtyStart: double [0..1]
+ QtyUsed: double [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType» AbstractItemWtOrVolPerUnit
«XSDcomplexType» ItemWtPerUnit
«XSDElement»
+ ItemWtPerUnit: MassMeasure
«XSDcomplexType» ItemVolPerUnit
«XSDElement»
+ ItemVolPerUnit: VolumeMeasure
«XSDcomplexType» ShakerScreen
«XSDElement»
+ CutPoint: LengthMeasure [0..1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ MeshX: LengthMeasure [0..1]
+ MeshY: LengthMeasure [0..1]
+ Model: String64 [0..1]
+ NumDeck: long [0..1]
+ShakerScreen
0..1
AbstractObject
«XSDcomplexType.XSDtopLevelElement»
OpsReport
«XSDElement»
+ ConditionHole: String64 [0..1]
+ CostDay: Cost [0..1]
+ CostDayMud: Cost [0..1]
+ DiaCsgLast: LengthMeasure [0..1]
+ DiaHole: LengthMeasure [0..1]
+ DistDrill: LengthMeasure [0..1]
+ DistDrillRot: LengthMeasure [0..1]
+ DistDrillSlid: LengthMeasure [0..1]
+ DistHold: LengthMeasure [0..1]
+ DistReam: LengthMeasure [0..1]
+ DistSteering: LengthMeasure [0..1]
+ DTim: TimeStamp
+ Engineer: String64 [0..1]
+ ETimCirc: TimeMeasure [0..1]
+ ETimDrill: TimeMeasure [0..1]
+ ETimDrillRot: TimeMeasure [0..1]
+ ETimDrillSlid: TimeMeasure [0..1]
+ ETimHold: TimeMeasure [0..1]
+ ETimLoc: TimeMeasure [0..1]
+ ETimReam: TimeMeasure [0..1]
+ ETimSpud: TimeMeasure [0..1]
+ ETimStart: TimeMeasure [0..1]
+ ETimSteering: TimeMeasure [0..1]
+ Forecast24Hr: String2000 [0..1]
+ Geologist: String64 [0..1]
+ Lithology: String64 [0..1]
+ Maasp: PressureMeasure [0..1]
+ MdCsgLast: MeasuredDepth [0..1]
+ MdPlanned: MeasuredDepth [0..1]
+ MdReport: MeasuredDepth [0..1]
+ NameFormation: String64 [0..1]
+ NumAFE: String64 [0..1]
+ NumContract: long [0..1]
+ NumOperator: long [0..1]
+ NumPob: long [0..1]
+ NumService: long [0..1]
+ PresKickTol: PressureMeasure [0..1]
+ PresLotEmw: MassPerVolumeMeasure [0..1]
+ RigUtilization: RigUtilization [0..1]
+ RopAv: LengthPerTimeMeasure [0..1]
+ RopCurrent: LengthPerTimeMeasure [0..1]
+ StatusCurrent: String2000 [0..1]
+ Sum24Hr: String2000 [0..1]
+ Supervisor: String64 [0..1]
+ Tubular: Tubular [0..1]
+ TvdCsgLast: AbstractVerticalDepth [0..1]
+ TvdLot: AbstractVerticalDepth [0..1]
+ TvdReport: AbstractVerticalDepth [0..1]
+ VolKickTol: VolumeMeasure [0..1]
+MudInventory
0..*
0..*
+BulkInventory
«XSDcomplexType» SupportCraft
«XSDElement»
+ Comments: String2000 [0..1]
+ DTimArrived: TimeStamp [0..1]
+ DTimDeparted: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Name: String64
+ TypeSupportCraft: SupportCraftType
«XSDattribute»
+ uid: String64
TypeEnum
«enumerati...
SupportCraftType
barge
standby boat
helicopter
supply boat
truck
crew vehicle
tug boat
+SupportCraft
0..*
«XSDcomplexType» ShakerOp
«XSDElement»
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ HoursRun: TimeMeasure [0..1]
+ MdHole: MeasuredDepth [0..1]
+ PcScreenCovered: AreaPerAreaMeasure [0..1]
+ Shaker: ComponentReference
«XSDattribute»
+ uid: String64
+ShakerOp
0..*
«XSDcomplexType» BhaRun::DrillingParams
+DrillingParams
0..*
«XSDcomplexType» MudVolume
«XSDElement»
+ VolMudBuilt: VolumeMeasure [0..1]
+ VolMudCasing: VolumeMeasure [0..1]
+ VolMudDumped: VolumeMeasure [0..1]
+ VolMudHole: VolumeMeasure [0..1]
+ VolMudReceived: VolumeMeasure [0..1]
+ VolMudReturned: VolumeMeasure [0..1]
+ VolMudRiser: VolumeMeasure [0..1]
+ VolMudString: VolumeMeasure [0..1]
+ VolTotMudEnd: VolumeMeasure [0..1]
+ VolTotMudStart: VolumeMeasure [0..1]
+MudVolume
0..1
+MudLosses
0..1
«XSDcomplexType» MudLosses
«XSDElement»
+ VolLostAbandonHole: VolumeMeasure [0..1]
+ VolLostBhdCsgHole: VolumeMeasure [0..1]
+ VolLostCircHole: VolumeMeasure [0..1]
+ VolLostCmtHole: VolumeMeasure [0..1]
+ VolLostCsgHole: VolumeMeasure [0..1]
+ VolLostMudCleanerSurf: VolumeMeasure [0..1]
+ VolLostOtherHole: VolumeMeasure [0..1]
+ VolLostOtherSurf: VolumeMeasure [0..1]
+ VolLostPitsSurf: VolumeMeasure [0..1]
+ VolLostShakerSurf: VolumeMeasure [0..1]
+ VolLostTrippingSurf: VolumeMeasure [0..1]
+ VolTotMudLostHole: VolumeMeasure [0..1]
+ VolTotMudLostSurf: VolumeMeasure [0..1]
TypeEnum
«Enumeration»
ScrType
string annulus
string kill line
string choke line
unknown
«XSDcomplexType» Scr
«XSDElement»
+ DTim: TimeStamp
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ MdBit: MeasuredDepth [0..1]
+ PresRecorded: PressureMeasure
+ Pump: ComponentReference
+ RateStroke: AngularVelocityMeasure
+ TypeScr: ScrType
«XSDattribute»
+ uid: String64
+Scr
0..*
+RigResponse
0..1
«XSDcomplexType» RigResponse
«XSDcomplexType» PumpOp
«XSDElement»
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ IdLiner: LengthMeasure [0..1]
+ LenStroke: LengthMeasure [0..1]
+ MdBit: MeasuredDepth [0..1]
+ PcEfficiency: PowerPerPowerMeasure [0..1]
+ Pressure: PressureMeasure
+ Pump: ComponentReference
+ PumpOutput: VolumePerTimeMeasure [0..1]
+ RateStroke: AngularVelocityMeasure
+ TypeOperation: PumpOpType [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumerati...
PumpOpType
drilling
reaming
circulating
slow pump
+PumpOp
0..*
+Personnel
0..*
«XSDcomplexType» Personnel
«XSDElement»
+ Company: BusinessAssociate [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ NumPeople: long [0..1]
+ TotalTime: TimeMeasure [0..1]
+ TypeService: String64 [0..1]
«XSDattribute»
+ uid: String64
+Weather
0..*
«XSDcomplexType» Weather
«XSDElement»
+ Agency: BusinessAssociate [0..1]
+ AmtPrecip: LengthMeasure [0..1]
+ AziCurrentSea: PlaneAngleMeasure [0..1]
+ AziWave: PlaneAngleMeasure [0..1]
+ AziWind: PlaneAngleMeasure [0..1]
+ BarometricPressure: PressureMeasure [0..1]
+ BeaufortScaleNumber: BeaufortScaleIntegerCode [0..1]
+ CeilingCloud: LengthMeasure [0..1]
+ Comments: String2000 [0..1]
+ CoverCloud: String64 [0..1]
+ CurrentSea: LengthPerTimeMeasure [0..1]
+ DTim: TimeStamp
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ HtWave: LengthMeasure [0..1]
+ MaxWave: LengthMeasure [0..1]
+ PeriodWave: TimeMeasure [0..1]
+ SignificantWave: LengthMeasure [0..1]
+ Tempsea: ThermodynamicTemperatureMeasure [0..1]
+ TempSurfaceMn: ThermodynamicTemperatureMeasure [0..1]
+ TempSurfaceMx: ThermodynamicTemperatureMeasure [0..1]
+ TempWindChill: ThermodynamicTemperatureMeasure [0..1]
+ TypePrecip: String64 [0..1]
+ VelWind: LengthPerTimeMeasure [0..1]
+ Visibility: LengthMeasure [0..1]
«XSDattribute»
+ uid: String64
+Hse
0..1
«XSDcomplexType» Hse
+PitVolume
0..*
«XSDcomplexType» PitVolume
«XSDElement»
+ DensFluid: MassPerVolumeMeasure [0..1]
+ DescFluid: String64 [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Pit: ComponentReference
+ VisFunnel: TimeMeasure [0..1]
+ VolPit: VolumeMeasure
«XSDattribute»
+ uid: String64
long
«XSDsimpleType»
BeaufortScaleIntegerCode

AbstractObject
«XSDcomplexType,XSDtopLevelElem...
OpsReport
+RigResponse
0..1
«XSDcomplexType»
RigResponse
«XSDelement»
+ BallJointAngle: PlaneAngleMeasure [0..1]
+ BallJointDirection: PlaneAngleMeasure [0..1]
+ DispRig: LengthMeasure [0..1]
+ GuideBaseAngle: PlaneAngleMeasure [0..1]
+ LoadLeg1: ForceMeasure [0..1]
+ LoadLeg2: ForceMeasure [0..1]
+ LoadLeg3: ForceMeasure [0..1]
+ LoadLeg4: ForceMeasure [0..1]
+ MeanDraft: LengthMeasure [0..1]
+ OffsetRig: LengthMeasure [0..1]
+ PenetrationLeg1: LengthMeasure [0..1]
+ PenetrationLeg2: LengthMeasure [0..1]
+ PenetrationLeg3: LengthMeasure [0..1]
+ PenetrationLeg4: LengthMeasure [0..1]
+ RigHeading: PlaneAngleMeasure [0..1]
+ RigHeave: LengthMeasure [0..1]
+ RigPitchAngle: PlaneAngleMeasure [0..1]
+ RigRollAngle: PlaneAngleMeasure [0..1]
+ RiserAngle: PlaneAngleMeasure [0..1]
+ RiserDirection: PlaneAngleMeasure [0..1]
+ RiserTension: ForceMeasure [0..1]
+ TotalDeckLoad: ForceMeasure [0..1]
+ VariableDeckLoad: ForceMeasure [0..1]
+AnchorState
0..*
«XSDcomplexType»
AnchorState
«XSDelement»
+ AnchorAngle: PlaneAngleMeasure [0..1]
+ AnchorName: String64
+ AnchorTension: ForceMeasure [0..1]
+ Description: String2000 [0..1]

6.1 AbstractItemWtOrVolPerUnit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/12/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Item weight or volume per unit.*

Associations

Association	Notes
From: **ItemVolPerUnit.** To: **AbstractItemWtOrVolPerUnit**	
From: **ItemWtPerUnit.** To: **AbstractItemWtOrVolPerUnit**	

6.2 AnchorState

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/3/2016 *Last modified:*11/3/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
AnchorAngle	PlaneAngleMeasure	Angle of the anchor or mooring line.
AnchorName	String64	The anchor number within a mooring system, or name if a name is used instead.
AnchorTension	ForceMeasure	Tension on the mooring line represented by the named anchor.
Description	String2000	Free-test description of the state of this anchor or mooring line.

Associations

Association	Notes
0..* From: **RigResponse.**AnchorState To: **AnchorState**	The response of the mooring system represented by the OpsReport. There is one AnchorState for each anchor or mooring line.

6.3 BeaufortScaleIntegerCode

Type: Class *Stereotype:* «XSDsimpleType»
Detail: *Created:* 4/13/2015 *Last modified:*11/10/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *An estimated wind strength based on the Beaufort Wind Scale. Values range from 0 (calm) to 12 (hurricane).*

6.4 DayCost

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Day Cost SchemaSchema. Captures daily cost information for the object (cost item) to which it is attached.*

Attributes

Name	Type	Notes
CostAmount	Cost	Cost for the item for this record.
CostClass	String64	Cost class code.
CostCode	String64	Cost code.
CostGroup	String64	Cost group code.
CostItemDescription	String64	Description of the cost item.
CostPerItem	Cost	Cost of each cost item, assume same currency.
CostSubCode	String64	Cost subcode.
Estimated	boolean	Is this an estimated cost? Values are "true" (or "1") and "false" (or "0").
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IsCarryOver	boolean	Is this item carried from day to day? Values are "true" (or "1") and "false" (or "0").
IsRental	boolean	Is this item a rental? Values are "true" (or "1") and "false" (or "0").
ItemKind	UomEnum	The kind of cost item specified (e.g., rig dayrate, joints casing).
ItemSize	double	Size of one cost item.
NameTag	NameTag	An identification tag for the item. A serial number is a type of identification tag; however, some tags contain many pieces of information. This element only identifies the tag and does not describe the contents.
NumAFE	String64	AFE number that this cost item applies to.
NumInvoice	String64	Invoice number for cost item; the bill is sent to the operator.
NumPO	String64	Purchase order number provided by the operator.
NumSerial	String64	Serial number.
NumTicket	String64	The field ticket number issued by the service company on location.
NumVendor	String64	Vendor number.
Pool	String64	Name of pool/reservoir that this cost item can be accounted to.

QtyItem	double	Number of cost items used that day, e.g., 1 rig dayrate, 30 joints of casing.
uid	String64	Unique identifier for this instance of DayCost
Vendor	BusinessAssociate	Pointer to a BusinessAssociate representing the vendor.

Associations

Association		Notes
0..*	From: **WellCMLedger.**Cost To: **DayCost**	The job or event cost detail.
0..*	From: **OpsReport.**DayCost To: **DayCost**	Cost item for the report interval.

6.5 Hse

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Health, Safety and Environment Schema. Captures data related to HSE events (e.g., tests, inspections, meetings, and drills), test values (e.g., pressure tested to), and/or incidents (e.g., discharges, non-compliance notices received, etc.).*

Attributes

Name	Type	Notes
Comments	String2000	Comments and remarks.
DaysIncFree	TimeMeasure	Incident free duration (commonly in days).
FluidDischarged	VolumeMeasure	Daily whole mud discarded.
LastAbandonDrill	TimeStamp	Last abandonment drill.
LastBopDrill	TimeStamp	Last blow out preventer drill.
LastBopPresTest	TimeStamp	Last blow out preventer pressure test.
LastCsgPresTest	TimeStamp	Last casing pressure test date and time.
LastDiverterDrill	TimeStamp	Last diverter drill.
LastFireBoatDrill	TimeStamp	Last fire or life boat drill.
LastRigInspection	TimeStamp	Last rig inspection/check.
LastSafetyInspection	TimeStamp	Last safety inspection.
LastSafetyMeeting	TimeStamp	Last safety meeting.
LastTripDrill	TimeStamp	Last trip drill.
NextBopPresTest	TimeStamp	Next blow out preventer pressure test.
NonComplianceIssued	boolean	Inspection non-compliance notice served? Values are "true" (or "1") and "false" (or "0").
NumStopCards	long	Number of health, safety and environment incidents reported.
PresAnnular	PressureMeasure	Blow out preventer annular preventer pressure tested to.
PresChokeLine	PressureMeasure	Choke line pressure tested to.
PresChokeMan	PressureMeasure	Choke line manifold pressure tested to.
PresDiverter	PressureMeasure	Blow out preventer diverter pressure tested to.
PresKellyHose	PressureMeasure	Kelly hose pressure tested to.
PresLastCsg	PressureMeasure	Last casing pressure test pressure.
PresRams	PressureMeasure	Blow out preventer ram pressure tested to.
PresStdPipe	PressureMeasure	Standpipe manifold pressure tested to.
RegAgencyInsp	boolean	Governmental regulatory inspection agency inspection? Values are "true" (or "1") and "false" (or "0").
VolCtgDischarged	VolumeMeasure	Volume of cuttings discharged.

VolOilCtgDischarge	VolumeMeasure	Oil on cuttings daily discharge.
WasteDischarged	VolumeMeasure	Volume of sanitary waste discharged.

Associations

Association		Notes
0..*	From**: Hse.**Incident To: **Incident**	Incident report occurrences description.
0..1	From**: OpsReport.**Hse To: **Hse**	Health, safety and environmental information.

6.6 Incident

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations HSE Schema. Captures data for a specific incident.*

Attributes

Name	Type	Notes
CauseDesc	String2000	Cause description.
CostLossGross	Cost	Gross estimate of the cost incurred due to the incident.
DescAccident	String2000	Accident description.
DescLocation	String64	Location description.
DTim	TimeStamp	Date and time the information is related to.
ETimLostGross	TimeMeasure	Number of hours lost due to the incident.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IsNearMiss	boolean	Near miss incident occurrence? Values are "true" (or "1") and "false" (or "0").
NumFatality	long	Number of personnel killed due to the incident.
NumMajorInjury	long	Number of personnel with major injuries.
NumMinorInjury	long	Number of personnel with minor injuries.
RemedialActionDesc	String2000	Remedial action description.
Reporter	String64	Name of the person who prepared the incident report.
ResponsibleCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the company that caused the incident.
uid	String64	Unique identifier for this instance of Incident

Associations

Association	Notes
From: **Hse.**Incident **0..*** To: **Incident**	Incident report occurrences description.

6.7 Inventory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Inventory Component Schema.*

Attributes

Name	Type	Notes
CostItem	Cost	Cost for the product for the report interval.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
ItemWtOrVolPerUnit	AbstractItemWtOrVolPerUnit	Item weight or volume per unit.
Name	String64	Name or type of inventory item.
PricePerUnit	Cost	Price per item unit, assume same currency for all items.
QtyAdjustment	double	Daily quantity adjustment/correction.
QtyOnLocation	double	Amount of the item remaining on location after all adjustments for the report interval.
QtyReceived	double	Quantity received at the site.
QtyReturned	double	Quantity returned to base from site.
QtyStart	double	Start quantity for report interval.
QtyUsed	double	Quantity used for the report interval.
uid	String64	Unique identifier for this instance of Inventory.

Associations

Association		Notes
0..*	From: **OpsReport.**MudInventory To: **Inventory**	Mud inventory item and cost for the report interval.
0..*	From: **OpsReport.**BulkInventory To: **Inventory**	Bulk item usage and cost.

6.8 ItemVolPerUnit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/12/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Item volume per unit.*

Attributes

Name	Type	Notes
ItemVolPerUnit	VolumeMeasure	Item volume per unit.

Associations

Association	Notes
From: **ItemVolPerUnit.** To: **AbstractItemWtOrVolPerUnit**	

6.9 ItemWtPerUnit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/12/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Item weight per unit.*

Attributes

Name	Type	Notes
ItemWtPerUnit	MassMeasure	Item weight per unit.

Associations

Association	Notes
From: **ItemWtPerUnit.** To: **AbstractItemWtOrVolPerUnit**	

6.10 MudLosses

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Mud Losses Schema.Captures volumes of mud lost for specific activities or onsite locations and total volumes for surface and down hole.*

Attributes

Name	Type	Notes
VolLostAbandonHole	VolumeMeasure	Mud volume lost downhole during abandonment.
VolLostBhdCsgHole	VolumeMeasure	Mud volume lost downhole behind casing.
VolLostCircHole	VolumeMeasure	Mud volume lost downhole while circulating.
VolLostCmtHole	VolumeMeasure	Mud volume lost downhole while cementing.
VolLostCsgHole	VolumeMeasure	Mud volume lost downhole while running casing.
VolLostMudCleanerSurf	VolumeMeasure	Volume of mud lost in mud cleaning equipment (at surface).
VolLostOtherHole	VolumeMeasure	Mud volume lost downhole from other location.
VolLostOtherSurf	VolumeMeasure	Surface volume lost other location.
VolLostPitsSurf	VolumeMeasure	Volume of mud lost in pit room (at surface).
VolLostShakerSurf	VolumeMeasure	Volume of mud lost at shakers (at surface).
VolLostTrippingSurf	VolumeMeasure	Volume of mud lost while tripping (at surface).
VolTotMudLostHole	VolumeMeasure	Total volume of mud lost downhole.
VolTotMudLostSurf	VolumeMeasure	Total volume of mud lost at surface.

Associations

Association	Notes
From: **MudVolume.**MudLosses **0..1** To: **MudLosses**	

6.11 MudVolume

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Mud Volume Component Schema.*

Attributes

Name	Type	Notes
VolMudBuilt	VolumeMeasure	Volume of mud built.
VolMudCasing	VolumeMeasure	Volume of mud contained in casing annulus.
VolMudDumped	VolumeMeasure	Volume of mud dumped.
VolMudHole	VolumeMeasure	Volume of mud contained in the openhole annulus.
VolMudReceived	VolumeMeasure	Volume of mud received from mud warehouse.
VolMudReturned	VolumeMeasure	Volume of mud returned to mud warehouse.
VolMudRiser	VolumeMeasure	Volume of mud contained in riser section annulus.
VolMudString	VolumeMeasure	Volume of mud contained within active string.
VolTotMudEnd	VolumeMeasure	Total volume of mud at the end of the report interval (including pits and hole).
VolTotMudStart	VolumeMeasure	Total volume of mud at start of report interval (including pits and hole).

Associations

Association		Notes
0..1	From: **MudVolume.**MudLosses To: **MudLosses**	
0..1	From: **OpsReport.**MudVolume To: **MudVolume**	Description of mud built, received, etc.

6.12 OpsReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Used to capture a daily drilling report focused on reporting from the service company to the operator. For a similar object whose focus is operator to partner or to governmental agency, see DrillReport. This object is uniquely identified within the context of one wellbore object.

Attributes

Name	Type	Notes
ConditionHole	String64	Hole condition description.
CostDay	Cost	Daily cost.
CostDayMud	Cost	Daily mud cost.
DiaCsgLast	LengthMeasure	Diameter of the last casing installed.
DiaHole	LengthMeasure	Hole diameter.
DistDrill	LengthMeasure	Distance drilled since the previous report.
DistDrillRot	LengthMeasure	Distance drilled: rotating.
DistDrillSlid	LengthMeasure	Distance drilled: sliding.
DistHold	LengthMeasure	Distance covered while holding angle with a steerable drilling assembly.
DistReam	LengthMeasure	Distance reamed.
DistSteering	LengthMeasure	Distance covered while actively steering with a steerable drilling assembly.
DTim	TimeStamp	Date and time the information is related to.
Engineer	String64	Name of the engineer.
ETimCirc	TimeMeasure	Time spent circulating from start of the bit run.
ETimDrill	TimeMeasure	Drilling time.
ETimDrillRot	TimeMeasure	Time spent rotary drilling for the report interval.
ETimDrillSlid	TimeMeasure	Time spent slide drilling from start of the bit run.
ETimHold	TimeMeasure	Time spent with no directional drilling work (commonly in hours).
ETimLoc	TimeMeasure	Time the rig has been on location (commonly in days).
ETimReam	TimeMeasure	Time spent reaming from start of the bit run.
ETimSpud	TimeMeasure	Time since the bit broke ground (commonly in days).
ETimStart	TimeMeasure	Time from the start of operations (commonly in days).
ETimSteering	TimeMeasure	Time spent steering the bottomhole assembly (commonly in hours).
Forecast24Hr	String2000	Forecast of activities for the next 24 hrs.
Geologist	String64	Name of the operator's wellsite geologist.

Lithology	String64	Description of the lithology for the interval.
Maasp	PressureMeasure	Maximum allowable shut-in casing pressure.
MdCsgLast	MeasuredDepth	Measured depth of last casing.
MdPlanned	MeasuredDepth	Measured depth of plan for this day number.
MdReport	MeasuredDepth	The measured depth of the wellbore.
NameFormation	String64	Name of the formation.
NumAFE	String64	Authorization for expenditure (AFE) number that this cost item applies to.
NumContract	long	Number of contractor personnel on board the rig.
NumOperator	long	Number of operator personnel on board the rig.
NumPob	long	Total number of personnel on board the rig.
NumService	long	Number of service company personnel on board the rig.
PresKickTol	PressureMeasure	Kick tolerance pressure.
PresLotEmw	MassPerVolumeMeasure	Leak off test equivalent mud weight.
RigUtilization	RigUtilization	A pointer to the rig used in this reporting period.
RopAv	LengthPerTimeMeasure	Average rate of penetration through the interval.
RopCurrent	LengthPerTimeMeasure	Rate of penetration at report time.
StatusCurrent	String2000	Current status description.
Sum24Hr	String2000	Summary of the operations and events for the reporting period (the previous 24 hours).
Supervisor	String64	Name of the operator's rig supervisor.
Tubular	Tubular	A pointer to the tubular assembly (as specified in the Tubular object) used in this report period.
TvdCsgLast	AbstractVerticalDepth	True vertical depth of the last casing installed.
TvdLot	AbstractVerticalDepth	True vertical depth of the leak-off test point.
TvdReport	AbstractVerticalDepth	True vertical depth of the wellbore.
VolKickTol	VolumeMeasure	Kick tolerance volume.

Associations

Association		Notes
0..*	From: **OpsReport.**ShakerOp To: **ShakerOp**	Container element for shaker operation elements.
0..1	From: **OpsReport.**TrajectoryStations To: **TrajectoryReport**	Survey station recorded during the report interval.
0..*	From: **OpsReport.**MudInventory To: **Inventory**	Mud inventory item and cost for the report interval.
0..*	From: **OpsReport.**Weather To: **Weather**	Meteorlogical readings for the day.

Association		Notes
0..1	From: **OpsReport.**Hse To: **Hse**	Health, safety and environmental information.
0..*	From: **OpsReport.**BulkInventory To: **Inventory**	Bulk item usage and cost.
0..*	From: **OpsReport.**Scr To: **Scr**	Slow circulation rate pressure test for well control operations.
0..1	From: **OpsReport.**RigResponse To: **RigResponse**	Average rig response readings for the day.
0..*	From: **OpsReport.**PitVolume To: **PitVolume**	
	From: **OpsReport.** To: **AbstractObject**	
1..1	From: **OpsReport.**Wellbore To: **Wellbore**	
0..*	From: **OpsReport.**DayCost To: **DayCost**	Cost item for the report interval.
0..*	From: **OpsReport.**Activity To: **DrillActivity**	Activity breakdown, multiple for many activities.
0..1	From: **OpsReport.**MudVolume To: **MudVolume**	Description of mud built, received, etc.
0..1	From: **OpsReport.**WbGeometry To: **WellboreGeometryReport**	Record of actual hole geometry at report time.
0..*	From: **OpsReport.**Fluid To: **Fluid**	One fluid record.
0..*	From: **OpsReport.**Personnel To: **Personnel**	Personnel Records
0..*	From: **OpsReport.**PumpOp To: **PumpOp**	
0..*	From: **OpsReport.**DrillingParams To: **DrillingParams**	Average bottom hole assembly parameters for report duration or actual instances of bottom hole assembly operations.
0..*	From: **OpsReport.**SupportCraft To: **SupportCraft**	Support craft object container element.

6.13 Personnel

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Personnel Component Schema. List each company on the rig at the time of the report and key information about each company, for example, name, type of service, and number of personnel.*

Attributes

Name	Type	Notes
Company	BusinessAssociate	Pointer to a BusinessAssociate representing the company.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
NumPeople	long	Number of people on board for that company.
TotalTime	TimeMeasure	Total time worked by the company (commonly in hours).
TypeService	String64	Service provided by the company.
uid	String64	Unique identifier for this instance of Personnel.

Associations

Association	Notes
From: **OpsReport.**Personnel **0..*** To: **Personnel**	Personnel Records

6.14 PitVolume

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Pit Volume Component Schema.*

Attributes

Name	Type	Notes
DensFluid	MassPerVolumeMeasure	Density of fluid in the pit.
DescFluid	String64	Description of the fluid in the pit.
DTim	TimeStamp	Date and time the information is related to.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Pit	ComponentReference	This is a pointer to the corresponding pit on the rig containing the volume being described.
uid	String64	Unique identifier for this instance of PitVolume.
VisFunnel	TimeMeasure	Funnel viscosity (in seconds).
VolPit	VolumeMeasure	Volume of fluid in the pit.

Associations

Association	Notes
From: **OpsReport.**PitVolume **0..*** To: **PitVolume**	

6.15 PumpOp

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Pump Component Schema.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time the information is related to.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IdLiner	LengthMeasure	Liner inside diameter.
LenStroke	LengthMeasure	Stroke length.
MdBit	MeasuredDepth	Along-hole measured depth of the measurement from the drill datum.
PcEfficiency	PowerPerPowerMeasure	Pump efficiency.
Pressure	PressureMeasure	Pump pressure recorded.
Pump	ComponentReference	A pointer to the corresponding pump on the rig.
PumpOutput	VolumePerTimeMeasure	Pump output (included for efficiency).
RateStroke	AngularVelocityMeasure	Pump rate (strokes per minute).
TypeOperation	PumpOpType	Type of pump operation.
uid	String64	Unique identifier for this instance of PumpOp.

Associations

Association	Notes
From: **PumpOp.** To: **PumpOpType**	
0..* From: **OpsReport.**PumpOp To: **PumpOp**	

6.16 PumpOpType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies type of well operation being conducted while this pump was in use.*

Attributes

Name	Type	Notes
drilling		
reaming		
circulating		
slow pump		

Associations

Association	Notes
From: **PumpOpType.** To: **TypeEnum**	
From: **PumpOp.** To: **PumpOpType**	

6.17 RigResponse

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/9/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Rig Response Component Schema.*

Attributes

Name	Type	Notes
BallJointAngle	PlaneAngleMeasure	Angle between the riser and the blowout preventer (BOP) at the flex joint.
BallJointDirection	PlaneAngleMeasure	Direction of the ball joint.
DispRig	LengthMeasure	Vessel displacement (in water).
GuideBaseAngle	PlaneAngleMeasure	Direction of the guide base.
LoadLeg1	ForceMeasure	Load carried by one leg of a jackup rig.
LoadLeg2	ForceMeasure	Load carried by the second leg of a jackup rig.
LoadLeg3	ForceMeasure	Load carried by the third leg of a jackup rig.
LoadLeg4	ForceMeasure	Load carried by the fourth leg of a jackup rig.
MeanDraft	LengthMeasure	Mean draft at mid-section of the vessel.
OffsetRig	LengthMeasure	Horizontal displacement of the rig relative to the wellhead.
PenetrationLeg1	LengthMeasure	Penetration of the first leg into the seabed.
PenetrationLeg2	LengthMeasure	Penetration of the second leg into the seabed.
PenetrationLeg3	LengthMeasure	Penetration of the third leg into the seabed.
PenetrationLeg4	LengthMeasure	Penetration of the fourth leg into the seabed.
RigHeading	PlaneAngleMeasure	Direction, relative to true north, to which the rig is facing.
RigHeave	LengthMeasure	Maximum amplitude of the vertical motion of the rig.
RigPitchAngle	PlaneAngleMeasure	Measure of the fore-aft rotational movement of the rig due to the combined effects of wind and waves; measured as the angle from horizontal.
RigRollAngle	PlaneAngleMeasure	Measure of the side-to-side rotational movement of the rig due to the combined effects of wind and waves; measured as the angle from vertical.
RiserAngle	PlaneAngleMeasure	Angle of the marine riser with the vertical.
RiserDirection	PlaneAngleMeasure	Direction of the marine riser.
RiserTension	ForceMeasure	Tension of the marine riser.
TotalDeckLoad	ForceMeasure	Total deck load.
VariableDeckLoad	ForceMeasure	Current temporary load on the rig deck.

Associations

Association		Notes
0..*	From**: RigResponse.**AnchorState To: **AnchorState**	The response of the mooring system represented by the OpsReport. There is one AnchorState for each anchor or mooring line.
0..1	From**: OpsReport.**RigResponse To: **RigResponse**	Average rig response readings for the day.

6.18 Scr

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Slow Circulation Rates (SCR) Component Schema.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time the information is related to.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
MdBit	MeasuredDepth	Along hole measured depth of measurement from the drill datum.
PresRecorded	PressureMeasure	Recorded pump pressure for the stroke rate.
Pump	ComponentReference	A pointer to the corresponding pump on the rig.
RateStroke	AngularVelocityMeasure	Pump stroke rate.
TypeScr	ScrType	Type of slow circulation rate.
uid	String64	Unique identifier for this instance of Scr

Associations

Association		Notes
	From: **Scr.** To: **ScrType**	
0..*	From: **OpsReport.**Scr To: **Scr**	Slow circulation rate pressure test for well control operations.

6.19 ScrType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Specifies the type of slow circulation rate.

Attributes

Name	Type	Notes
string annulus		
string kill line		
string choke line		
unknown		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **ScrType.** To: **TypeEnum**	
From: **Scr.** To: **ScrType**	

6.20 ShakerOp

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Shaker Component Schema.*

Attributes

Name	Type	Notes
DTim	TimeStamp	Date and time the information is related to.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
HoursRun	TimeMeasure	Hours run the shaker has run for this operation.
MdHole	MeasuredDepth	Hole measured depth at the time of measurement.
PcScreenCovered	AreaPerAreaMeasure	Percent of screen covered by cuttings.
Shaker	ComponentReference	A pointer to the shaker that is characterized by this report.
uid	String64	Unique identifier for this instance of ShakerOp

Associations

Association		Notes
0..1	From**: ShakerOp.**ShakerScreen To: **ShakerScreen**	Set of shaker screen records for the operation.
0..*	From**: OpsReport.**ShakerOp To: **ShakerOp**	Container element for shaker operation elements.

6.21 ShakerScreen

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Shaker Screen Component Schema.*

Attributes

Name	Type	Notes
CutPoint	LengthMeasure	Shaker screen cut point, which is the maximum size cuttings that will pass through the screen.
DTimEnd	TimeStamp	Date and time activities were completed.
DTimStart	TimeStamp	Date and time that activities started.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
MeshX	LengthMeasure	Mesh size in the X direction.
MeshY	LengthMeasure	Mesh size in the Y direction.
Model	String64	Manufacturers designated model.
NumDeck	long	Deck number the mesh is installed on.

Associations

Association	Notes
From: **ShakerOp.**ShakerScreen **0..1** To: **ShakerScreen**	Set of shaker screen records for the operation.

6.22 SupportCraft

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Support Craft Component Schema.*

Attributes

Name	Type	Notes
Comments	String2000	Comments and remarks.
DTimArrived	TimeStamp	Date and time when the vehicle arrived at the rig site.
DTimDeparted	TimeStamp	Date and time when the vehicle departed from the rig site.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Name	String64	Human-recognizable context for the support craft.
TypeSupportCraft	SupportCraftType	Type of support craft (e.g., barge, helicopter, tug boat, etc.)
uid	String64	Unique identifier for this instance of SupportCraft.

Associations

Association		Notes
	From: **SupportCraft.** To: **SupportCraftType**	
0..*	From: **OpsReport.**SupportCraft To: **SupportCraft**	Support craft object container element.

6.23 SupportCraftType

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/3/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of support craft.*

Attributes

Name	Type	Notes
barge		
standby boat		
helicopter		
supply boat		
truck		
crew vehicle		
tug boat		

Associations

Association	Notes
From: **SupportCraftType.** To: **TypeEnum**	
From: **SupportCraft.** To: **SupportCraftType**	

6.24 Weather

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Operations Weather Component Schema.*

Attributes

Name	Type	Notes
Agency	BusinessAssociate	Pointer to a BusinessAssociate representing the company that supplied the weather data.
AmtPrecip	LengthMeasure	Amount of precipitation.
AziCurrentSea	PlaneAngleMeasure	Azimuth of current.
AziWave	PlaneAngleMeasure	The direction from which the waves are coming, measured from true north.
AziWind	PlaneAngleMeasure	The direction from which the wind is blowing, measured from true north.
BarometricPressure	PressureMeasure	Atmospheric pressure.
BeaufortScaleNumber	BeaufortScaleIntegerCode	The Beaufort wind force scale is a system used to estimate and report wind speeds when no measuring apparatus is available. It was invented in the early 19th century by Admiral Sir Francis Beaufort of the British Navy as a way to interpret winds from conditions. Values range from 0 (calm) to 12 (hurricane force).
CeilingCloud	LengthMeasure	Height of cloud cover.
Comments	String2000	Comments and remarks.
CoverCloud	String64	Description of cloud cover.
CurrentSea	LengthPerTimeMeasure	The speed of the ocean current.
DTim	TimeStamp	Date and time the information is related to.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
HtWave	LengthMeasure	Average height of the waves.
MaxWave	LengthMeasure	The maximum wave height.
PeriodWave	TimeMeasure	The elapsed time between the passing of two wave tops.
SignificantWave	LengthMeasure	An average of the higher 1/3 of the wave heights passing during a sample period (typically 20 to 30 minutes).
Tempsea	ThermodynamicTemperatureMeasure	Sea temperature.
TempSurfaceMn	ThermodynamicTemperatureMeasure	Minimum temperature above ground. Temperature of the atmosphere.
TempSurfaceMx	ThermodynamicTemperatureMeasure	Maximum temperature above ground.

TempWindChill	ThermodynamicTemperatureMeasure	A measure of the combined chilling effect of wind and low temperature on living things, also named chill factor, e.g., according to the US weather service table, an air temperature of 30 degF with a 10 mph corresponds to a windchill of 22 degF.
TypePrecip	String64	Type of precipitation.
uid	String64	Unique identifier for this instance of Weather
VelWind	LengthPerTimeMeasure	Wind speed.
Visibility	LengthMeasure	Horizontal visibility.

Associations

Association	Notes
From: **OpsReport.**Weather **0..*** To: **Weather**	Meteorlogical readings for the day.

7 Log

Package: xsd_schemas

Notes: Log Schema.

AbstractActiveObject
«XSDcomplexType,XSDto...
Wellbore::Wellbore
+Wellbore
0..1
0..1
+Wellbore
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Log
«XSDelement»
+ ChannelState: ChannelState [0..1]
+ Derivation: ChannelDerivation [0..1]
+ HoleLoggingStatus: HoleLoggingStatus [0..1]
+ LoggingCompany: BusinessAssociate [0..1]
+ LoggingCompanyCode: long [0..1]
+ LoggingMethod: LoggingMethod [0..1]
+ LoggingServicePeriod: DateTimeInterval [0..1]
+ LoggingToolClass: LoggingToolClassExt [0..1]
+ LoggingToolClassLongName: String256 [0..1]
+ LoggingToolKind: LoggingToolKind [0..1]
+ LogOSDUIntegration: LogOSDUIntegration [0..1]
+ MudClass: MudClassExt [0..1]
+ MudSubClass: MudSubClassExt [0..1]
+ NominalHoleSize: LengthMeasureExt [0..1]
+ NominalSamplingInterval: GenericMeasure [0..1]
+ PassDescription: String64 [0..1]
+ PassDetail: PassDetail [0..-1]
+ PassNumber: String64 [0..1]
+ PrimaryIndexInterval: AbstractInterval [0..1]
+ RunNumber: String64 [0..1]
«XSDcomplexType»
LogOSDUIntegration
«XSDelement»
+ FrameIdentifier: String64 [0..1]
+ IntermediaryServiceCompany: BusinessAssociate [0..1]
+ IsRegular: boolean [0..1]
+ LogVersion: String64 [0..1]
+ ZeroTime: TimeStamp [0..1]
«XSDcomplexType»
ChannelSetOSDUIntegration
«XSDelement»
+ ChannelSetVersion: String64 [0..1]
+ FrameIdentifier: String64 [0..1]
+ IntermediaryServiceCompany: BusinessAssociate [0..1]
+ IsRegular: boolean [0..1]
+ ZeroTime: TimeStamp [0..1]
+ChannelSet
«byValue»
0..*
«XSDcomplexType»
ChannelData
«XSDelement»
+ Data: string [0..1]
+ FileUri: anyURI [0..1]
+Data
0..1
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
ChannelSet
«XSDelement»
+ ChannelSetOSDUIntegration: ChannelSetOSDUIntegration [0..1]
+ ChannelState: ChannelState [0..1]
+ Derivation: ChannelDerivation [0..1]
+ HoleLoggingStatus: HoleLoggingStatus [0..1]
+ LoggingCompany: BusinessAssociate [0..1]
+ LoggingCompanyCode: long [0..1]
+ LoggingMethod: LoggingMethod [0..1]
+ LoggingToolClass: LoggingToolClassExt [0..1]
+ LoggingToolClassLongName: String256 [0..1]
+ LoggingToolKind: LoggingToolKind [0..1]
+ MudClass: MudClassExt [0..1]
+ MudSubClass: MudSubClassExt [0..1]
+ NominalHoleSize: LengthMeasureExt [0..1]
+ NominalSamplingInterval: GenericMeasure [0..1]
+ PassDescription: String64 [0..1]
+ PassDetail: PassDetail [0..-1]
+ PassNumber: String64 [0..1]
+ PrimaryIndexInterval: AbstractInterval [0..1]
+ RunNumber: String64 [0..1]
«XSDcomplexType»
Abstract::AbstractObject
«XSDelement»
+ Aliases: ObjectAlias [0..*]
+ BusinessActivityHistory: String64 [0..-1]
+ Citation: Citation
+ CustomData: CustomData [0..1]
+ Existence: ExistenceKindExt [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ ObjectVersionReason: String2000 [0..1]
+ OSDUIntegration: OSDUIntegration [0..1]
«XSDattribute»
+ objectVersion: String64 [0..1]
+ schemaVersion: String64
+ uuid: UuidString
0..1
+DataSource
+DataSource
0..1
«XSDcomplexType»
ChannelIndex
«XSDelement»
+ Datum: AbstractReferencePoint [0..1]
+ Direction: IndexDirection
+ IndexInterval: AbstractInterval [0..1]
+ IndexKind: DataIndexKind
+ IndexPropertyKind: PropertyKind [0..1]
+ Mnemonic: String64
+ Uom: UnitOfMeasureExt
+Index
0..*
+Index
1..*
TypeEnum
«Enumeration»
CommonEnumerations::DataIndexKind
measured depth
true vertical depth
pass indexed depth
date time
elapsed time
temperature
pressure
scalar
TypeEnum
«Enumeration»
CommonEnumerations::IndexDirection
decreasing
increasing
unordered
TypeEnum
«Enumeration»
ChannelState
calculated
final
memory
processed
real time
+Channel
«byValue»
0..*
TypeEnum
«Enumeration»
ChannelDerivation
raw
simulated
spliced
sampled
model
interpreted
corrected
edited
TypeEnum
«Enumeration»
PWLS::LoggingMethod
coiled tubing
computed
distributed
LWD
mixed
MWD
subsea
surface
wireline
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Channel
«XSDelement»
+ ChannelKind: ChannelKind [0..1]
+ ChannelOSDUIntegration: ChannelOSDUIntegration [0..1]
+ ChannelPropertyKind: PropertyKind
+ ChannelState: ChannelState [0..1]
+ Data: ChannelData [0..1]
+ DataKind: ChannelDataKind
+ Datum: AbstractReferencePoint [0..1]
+ Derivation: ChannelDerivation [0..1]
+ GlobalMnemonic: String64
+ HoleLoggingStatus: HoleLoggingStatus [0..1]
+ IsContinuous: boolean [0..1]
+ LoggingCompany: BusinessAssociate
+ LoggingCompanyCode: long [0..1]
+ LoggingMethod: LoggingMethod [0..1]
+ LoggingToolClass: LoggingToolClassExt [0..1]
+ LoggingToolKind: LoggingToolKind [0..1]
+ Mnemonic: String64
+ MudClass: MudClassExt [0..1]
+ MudSubClass: MudSubClassExt [0..1]
+ NominalHoleSize: LengthMeasureExt [0..1]
+ NominalSamplingInterval: GenericMeasure [0..1]
+ PassDescription: String64 [0..1]
+ PassDetail: PassDetail [0..-1]
+ PassNumber: String64 [0..1]
+ PrimaryIndexInterval: AbstractInterval [0..1]
+ RunNumber: String64 [0..1]
+ SeismicReferenceElevation: AbstractReferencePoint [0..1]
+ SensorOffset: LengthMeasureExt [0..1]
+ Source: String64 [0..1]
+ Uom: UnitOfMeasureExt
AbstractInterval
«XSDcomplexType»
PassIndexedDepthInterval
«XSDelement»
+ Datum: AbstractReferencePoint [0..1]
+ End: PassIndexedDepth
+ Start: PassIndexedDepth
«XSDcomplexType»
PassIndexedDepth
«XSDelement»
+ Direction: PassDirection
+ MeasuredDepth: LengthMeasureExt
+ Pass: long
TypeEnum
«enumeration»
PassDirection
up
holding steady
down

7.1 Channel

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*12/2/2021 *Status:* Proposed *Author:* William McKenzie
Notes: A channel object. It corresponds roughly to the LogCurveInfo structure in WITSML1411, and directly corresponds to the ChannelMetadataRecord structure in ETP. In historian terminology, a channel corresponds directly to a tag.
Channels are the fundamental unit of organization for WITSML logs.
BUSINESS RULE: The Uom MUST be compatible with the QuantityClass of the PropertyKind specified in ChannelClass.

Attributes

Name	Type	Notes
ChannelKind	ChannelKind	An optional value pointing to a ChannelKind. Energistics provides a list of standard channel kinds from the Practical Well Logging Standard (PWLS). This ChannelKind enumeration is in the external ChannelKindDictionary XML file in the WITSML ancillary folder.
ChannelOSDUIntegration	ChannelOSDUIntegration	Information about a Channel that is relevant for OSDU integration but does not have a natural place in a Channel object.
ChannelPropertyKind	PropertyKind	A mandatory value pointing to a PropertyKind. Energistics provides a list of standard property kinds that represent the basis for the commonly used properties in the E&P subsurface workflow. This PropertyKind enumeration is in the external PropertyKindDictionary XML file in the Common ancillary folder.
ChannelState	ChannelState	Defines where the channel gets its data from, e.g., calculated from another source, or from archive, or raw real-time, etc.
Data	ChannelData	STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
DataKind	ChannelDataKind	The kind of channel data value for this channel. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

Datum	AbstractReferencePoint	Pointer to a reference point that defines a vertical datum that channel data values that are measured depth or vertical depth values are referenced to. This is NOT an datum for index values. See Datum in ChannelIndex for the datum for index values. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Derivation	ChannelDerivation	Indicates how data in the channel is derived.
GlobalMnemonic	String64	A standardized mnemonic name for this channel.
HoleLoggingStatus	HoleLoggingStatus	The status of the hole at the time of logging.
IsContinuous	boolean	If true, the channel data values are continues values, such as sampled measurement values. If false, the channel data values are discrete, such as rig activity codes.
LoggingCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the logging company.
LoggingCompanyCode	long	The RP66 organization code assigned to a logging company. The list is available at http://www.energistics.org/geosciences/geology-standards/rp66-organization-codes
LoggingMethod	LoggingMethod	Defines where the log channel gets its data from: LWD, MWD, wireline; or whether it is computed, etc.
LoggingToolClass	LoggingToolClassExt	A value categorizing a logging tool. The classification system used in WITSML is the one from the PWLS group.
LoggingToolKind	LoggingToolKind	An optional value pointing to a LoggingToolKind. Energistics provides a list of standard logging tool kinds from the Practical Well Logging Standard (PWLS). This LoggingToolKind enumeration is in the external LoggingToolKindDictionary XML file in the WITSML ancillary folder.
Mnemonic	String64	The mnemonic name for this channel. Mnemonics are not unique within a store. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
MudClass	MudClassExt	The class of the drilling fluid at the time of logging.
MudSubClass	MudSubClassExt	The subclass of drilling fluid at the time of logging.

NominalHoleSize	LengthMeasureExt	The nominal hole size at the time the measurement tool was in the hole. The size is "nominal" to indicate that this is not the result of a caliper reading or other direct measurement of the hole size, but is just a name used to refer to the diameter. This is normally the bit size. In a case where there are more than one diameter hole being drilled at the same time (like where a reamer is behind the bit) this diameter is the one which was seen by the sensor which produced a particular log channel.
NominalSamplingInterval	GenericMeasure	For regularly sampled channel data, this represents the nominal sampling interval. This should not be set when data is not regularly sampled.
PassDescription	String64	The nominal pass description for the pass such as Calibration Pass, Main Pass, Repeated Pass. Use PassDetail instead if the channel contains information about several passes using PassIndexedDepth.
PassDetail	PassDetail	Details about one or more passes when using PassIndexedDepth.
PassNumber	String64	The nominal pass number for the channel. No precise meaning is declared for this attribute but it is so commonly used that it must be included. The value here should match a wireline pass number for logging data. Use PassDetail instead if the channel contains information about several passes using PassIndexedDepth..
PrimaryIndexInterval	AbstractInterval	The primary index value range for the channel. This MUST reflect the minimum and maximum primary index values for data points in the channel. This is independent of the direction for the primary index. This MUST be specified when there are data points in the channel, and it MUST NOT be specified when there are no data points in the channel. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
RunNumber	String64	The nominal run number for the channel. No precise meaning is declared for this attribute but it is so commonly used that it must be included. The value here should match a bit run number for LWD data and a wireline run number for logging data.

SeismicReferenceElevation	AbstractReferencePoint	Pointer to a reference point that defines the seismic reference elevation. This should only be populated if the channel represents time-depth relationships or checkshots.
SensorOffset	LengthMeasureExt	The consistent distance from the downhole equipment vertical reference (the drill bit, for MWD logs; the tool zero reference for wireline logs) at which the channel values are measured or calculated. This is typically, but not always, the distance from the bit to the sensor. This element is only informative (channel values are presented at actual depth, not requiring subtraction of an offset).
Source	String64	Source of the data in the channel. Enter the contractor name who conducted the log.
Uom	UnitOfMeasureExt	The underlying unit of measure of the value. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

Associations

Association			Notes
	From: **Channel.**	To: **LoggingMethod**	
0..*	From: **Channel.**DerivedFrom To: **Channel**		For derived channels, a list of the source channels which went into the derivation. For example, if you create a composite GR channel from several separate measured channels, this would point to those channels. Note, that these references are for provenance only. The derived data must be store independently on the server for a derived channel.
	From: **Channel.**	To: **ChannelDerivation**	
	From: **Channel.**	To: **ChannelState**	
	From: **Channel. 0..1**	To: **Wellbore**	
	From: **Channel.**	To: **ChannelOSDUIntegration**	
0..*	From: **Channel.**PointMetadata To: **PointMetadata**		
0..*	From: **Channel.**AxisDefinition To: **LogChannelAxis**		Indicates that the curve is an array curve (i.e., multi-valued samples), and provides meta data by which an axis of the array can be understood. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
	From: **Channel.**	To: **ChannelDataKind**	
	From: **Channel.**	To: **AbstractActiveObject**	

Association		Notes
0..1	From: **Channel.**DataSource To: **AbstractObject**	The containing data object for the channel set. For example, for a Log, this could be either the wellbore for the log or a LoggingRun
	From: **Channel.** To: **ActiveStatusKind**	
1..*	From: **Channel.**Index To: **ChannelIndex**	Defines metadata about the channel's primary and secondary indexes. The first index is the primary index. Any additional indexes are secondary indexes.
0..*	From: **Channel.**DerivedFrom To: **Channel**	For derived channels, a list of the source channels which went into the derivation. For example, if you create a composite GR channel from several separate measured channels, this would point to those channels. Note, that these references are for provenance only. The derived data must be store independently on the server for a derived channel.
	From: **PPFGChannel.** To: **Channel**	
0..*	From: **ChannelSet.**Channel To: **Channel**	
1	From: **GasInMud.**Channel To: **Channel**	
1	From: **GasPeak.**Channel To: **Channel**	
0..1	From: **Chromatograph.**Channel To: **Channel**	

7.2 ChannelData

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Contains the bulk data for the log, either as a base64-encoded string or as a reference to an external file.*

Attributes

Name	Type	Notes
Data	string	The data blob in JSON form. This attribute lets you embed the bulk data in a single file with the xml, to avoid the issues that arise when splitting data across multiple files. BUSINESS RULE: Either this element or the FileUri element must be present. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
FileUri	anyURI	The URI of a file containing the bulk data. If this field is non-null, then the data field is ignored. For files written to disk, this should normally contain a simple file name in relative URI form. For example, if an application writes a log file to disk, it might write the xml as abc.xml, and the bulk data as abc.avro. In this case, the value of this element would be './abc.avro'. BUSINESS RULE: Either this element or the Data element must be present.

Associations

Association	Notes
From: **ChannelSet.**Data **0..1** To: **ChannelData**	STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write

7.3 ChannelDataKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 3/4/2016 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the kind of data contained in a channel.*

Attributes

Name	Type	Notes
boolean		True or false values.
bytes		Integer data value (nominally a one-byte value). The value must conform to the format of the xsd:dateTime data type (minInclusive=-128 and maxInclusive=127).
double		Double-precision floating-point value (nominally an 8-byte value). The value must conform to the format of the xsd:double data type.
float		Single-precision floating-point value (nominally a 4-byte value). The value must conform to the format of the xsd:float data type
int		Integer data value (nominally a 4-byte value). The value must conform to the format of the xsd:int data type.
long		Long integer data value (nominally an 8-byte value). The value must conform to the format of the xsd:long data type.
string		Character string data. The value must conform to the format of the xsd:string data type. The maximum length of a value is determined by individual servers.
measured depth		Measured depth.
true vertical depth		True vertical depth.
pass indexed depth		An index value that includes pass, direction, and depth values This can only refer to measured depths.
date time		Date with time.
elapsed time		Time that has elapsed.

Associations

Association	Notes
From: **ChannelDataKind.** To: **TypeEnum**	
From: **PointMetadata.** To: **ChannelDataKind**	
From: **Channel.** To: **ChannelDataKind**	

7.4 ChannelDerivation

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/5/2015 *Last modified:*11/11/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the source of data in a channel.*

Attributes

Name	Type	Notes
raw		Raw measured data, directly from sensors.
simulated		Simulated.
spliced		Derived by splicing values from two or more other channels.
sampled		Derived by sampling values from one or more other channels.
model		Based on some modeled results of values in another one or more channels.
interpreted		Interpreted results of values in another one or more channels.
corrected		Values that have been environmentally corrected.
edited		Values that have undergone depth shift, merge or other operations.

Associations

Association	Notes
From: **ChannelDerivation.** To: **TypeEnum**	
From: **Channel.** To: **ChannelDerivation**	

7.5 ChannelIndex

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*11/11/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Common information about a primary or secondary index for a channel or channel set.*

Attributes

Name	Type	Notes
Datum	AbstractReferencePoint	For depth indexes, this is a pointer to the reference point defining the vertical datum, in a channel's Well object, to which all of the index values are referenced. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Direction	IndexDirection	The direction of the index, either increasing or decreasing. Index direction may not change within the life of a channel or channel set. This only affects the order in which data is streamed or serialized. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
IndexInterval	AbstractInterval	The index value range for this index for the channel or channel set. This MUST reflect the minimum and maximum index values for this index for data points in the channel or channel set. This is independent of the direction for the primary index. This MUST be specified when there are data points in the channel or channel set, and it MUST NOT be specified when there are no data points in the channel or channel set. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
IndexKind	DataIndexKind	The kind of index (date time, measured depth, etc.). IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

IndexPropertyKind	PropertyKind	An optional value pointing to a PropertyKind. Energistics provides a list of standard property kinds that represent the basis for the commonly used properties in the E&P subsurface workflow. This PropertyKind enumeration is in the external PropertyKindDictionary XML file in the Common ancillary folder. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Mnemonic	String64	The mnemonic for the index. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Uom	UnitOfMeasureExt	The unit of measure of the index. Must be one of the units allowed for the specified IndexKind (e.g., time or depth). IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

Associations

Association		Notes
	From: **ChannelIndex.** To: **DataIndexKind**	
	From: **ChannelIndex.** To: **IndexDirection**	
0..*	From: **ChannelSet.**Index To: **ChannelIndex**	
1..*	From: **Channel.**Index To: **ChannelIndex**	Defines metadata about the channel's primary and secondary indexes. The first index is the primary index. Any additional indexes are secondary indexes.

7.6 ChannelOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a Channel that is relevant for OSDU integration but does not have a natural place in a Channel object.*

Attributes

Name	Type	Notes
ChannelBusinessValue	String64	The business value of the channel.
ChannelFamily	String64	The detailed Geological Physical Quantity measured by the channel such as neutron porosity.
ChannelMainFamily	String64	The Geological Physical Quantity measured by the channel such as porosity.
ChannelQuality	String64	The quality of the channel.
IntermediaryServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate that represents the company who engaged the service company (ServiceCompany) to perform the logging.
IsRegular	boolean	Boolean property indicating the sampling mode of the primary index. True means all channel data values are regularly spaced (see NominalSamplingInterval); false means irregular or discrete sample spacing.
ZeroTime	TimeStamp	Optional time reference for time-based primary indexes. The ISO date time string representing zero time. Not to be confused with seismic travel time zero.

Associations

Association	Notes
From: **Channel.** To: **ChannelOSDUIntegration**	

7.7 ChannelSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*2/14/2019 *Status:* Proposed *Author:* William McKenzie
Notes: A grouping of channels with a compatible index, for some purpose. Each channel has its own index. A 'compatible' index simply means that all of the channels are either in time or in depth using a common datum.

Attributes

Name	Type	Notes
ChannelSetOSDUIntegration	ChannelSetOSDUIntegration	Information about a ChannelSet that is relevant for OSDU integration but does not have a natural place in a ChannelSet object.
ChannelState	ChannelState	Defines where the channel gets its data from, e.g., calculated from another source, or from archive, or raw real-time, etc.
Derivation	ChannelDerivation	The nominal derivation for channels in the channel set. Individual channels may have a different derivation.
HoleLoggingStatus	HoleLoggingStatus	The nominal status of the hole at the time of logging. Individual channels may have been logged while the hole was in a different state.
LoggingCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the logging company.
LoggingCompanyCode	long	The RP66 organization code assigned to a logging company. The list is available at http://www.energistics.org/geosciences/geology-standards/rp66-organization-codes
LoggingMethod	LoggingMethod	Defines where the log channel gets its data from: LWD, MWD, wireline; or whether it is computed, etc
LoggingToolClass	LoggingToolClassExt	A value categorizing a logging tool. The classification system used in WITSML is the one from the PWLS group.
LoggingToolClassLongName	String256	A long concatenation of the tools used for the logging service such as GammaRay+NeutronPorosity.
LoggingToolKind	LoggingToolKind	An optional value pointing to a LoggingToolKind. Energistics provides a list of standard logging tool kinds from the Practical Well Logging Standard (PWLS). This LoggingToolKind enumeration is in the external LoggingToolKindDictionary XML file in the WITSML ancillary folder.
MudClass	MudClassExt	The nominal class of the drilling fluid at the time of logging. Individual channels may have been logged while a different drilling fluid was in use.

MudSubClass	MudSubClassExt	The nominal subclass of drilling fluid at the time of logging. Individual channels may have been logged while a different drilling fluid was in use.
NominalHoleSize	LengthMeasureExt	The nominal hole size at the time the measurement tool was in the hole. The size is "nominal" to indicate that this is not the result of a caliper reading or other direct measurement of the hole size, but is just a name used to refer to the diameter. This is normally the bit size. In a case where there are more than one diameter hole being drilled at the same time (like where a reamer is behind the bit) this diameter is the one which was seen by the sensor which produced a particular log channel.
NominalSamplingInterval	GenericMeasure	For regularly sampled channel data, this represents the nominal sampling interval. This should only be set when it is representative for channels in the channel set. Individual channels may have a different nominal sampling interval.
PassDescription	String64	The nominal pass description for the pass such as Calibration Pass, Main Pass, Repeated Pass. Use PassDetail instead if the channel set contains information about several passes using PassIndexedDepth.
PassDetail	PassDetail	Details about one or more passes when using PassIndexedDepth.
PassNumber	String64	The nominal pass number for the channel set. No precise meaning is declared for this attribute but it is so commonly used that it must be included. The value here should match a wireline pass number for logging data. Use PassDetail instead if the channel set contains information about several passes using PassIndexedDepth.
PrimaryIndexInterval	AbstractInterval	The primary index value range for the channel set. This MUST reflect the minimum and maximum primary index values for any channels in the channel set. This is independent of the direction for the primary index. This MUST be specified when there is at least one channel in the channel set with data points, and it MUST NOT be specified when there are no channels with data points in the channel set. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write

RunNumber	String64	The nominal run number for the channel. No precise meaning is declared for this attribute but it is so commonly used that it must be included. The value here should match a bit run number for LWD data and a wireline run number for logging data.

Associations

Association		Notes
0..*	From: **ChannelSet.**Index To: **ChannelIndex**	
0..1	From: **ChannelSet.**Data To: **ChannelData**	STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
0..*	From: **ChannelSet.**Channel To: **Channel**	
AbstractActiveObject	From: **ChannelSet.** To:	
0..1	From: **ChannelSet.**Wellbore To: **Wellbore**	
0..1	From: **ChannelSet.**DataSource To: **AbstractObject**	
0..*	From: **Log.**ChannelSet To: **ChannelSet**	An array of channel sets that comprise this log. A log must have at least one channel set, and may have more than one. The channel set is evaluated in such a way that the channels in the log is a UNION of all of the channels in the array of channel sets. That is to say, the result is also a set, no channel can appear more than once in a given log.
	From: **PPFGChannelSet.** To: **ChannelSet**	
0..1	From: **DepthRegLogSection.**ChannelSet To: **ChannelSet**	

7.8 ChannelSetOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a ChannelSet that is relevant for OSDU integration but does not have a natural place in a ChannelSet object.*

Attributes

Name	Type	Notes
ChannelSetVersion	String64	The channel set version. Distinct from objectVersion.
FrameIdentifier	String64	For multi-frame or multi-section files, this identifier defines the source frame in the file. If the identifier is an index number the index starts with zero and is converted to a string for this property.
IntermediaryServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate that represents the company who engaged the service company (ServiceCompany) to perform the logging.
IsRegular	boolean	Boolean property indicating the sampling mode of the primary index. True means all channel data values are regularly spaced (see NominalSamplingInterval); false means irregular or discrete sample spacing.
ZeroTime	TimeStamp	Optional time reference for time-based primary indexes. The ISO date time string representing zero time. Not to be confused with seismic travel time zero.

7.9 ChannelState

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 3/4/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the source of the data values in the channel, e.g., calculated from another source, or from archive, or raw real-time, etc.*

Attributes

Name	Type	Notes
calculated		Calculated from measurements
final		Considered final and not subject to change
memory		Sensor data is recorded into downhole memory of a tool, rather than transmitting in "real time" to surface.
processed		Results of calculations based on measurements
real time		Measurements at the actual time.

Associations

Association	Notes
From: **ChannelState.** To: **TypeEnum**	
From: **Channel.** To: **ChannelState**	

7.10 HoleLoggingStatus

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/17/2021 *Last modified:*12/1/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The status of the hole during logging.*

Attributes

Name	Type	Notes
open hole		The hole has not been cased or cemented.
cased hole		The hole has been cased but not cemented.
cemented hole		The hole has been cased and cemented.

Associations

Association	Notes
From: **HoleLoggingStatus.** To: **TypeEnum**	

7.11 Log

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/14/2015 *Last modified:*9/3/2021 *Status:* Proposed *Author:* William McKenzie
Notes: Primarily a container for one or more channel sets (ChannelSet). In WITSML v2.+, most of the log information is now at the channel set level. The concept of multiple channel sets in a single log is significant change from WITSML v1.4.1.1, where each log represented exactly one group of curves and their data. For more information about log organization and how it works, see the *WITSML Technical Usage Guide*.

Attributes

Name	Type	Notes
ChannelState	ChannelState	Defines where the channel gets its data from, e.g., calculated from another source, or from archive, or raw real-time, etc.
Derivation	ChannelDerivation	The nominal derivation for channels in the log. Individual channels and channel sets may have different derivations. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
HoleLoggingStatus	HoleLoggingStatus	The nominal status of the hole at the time of logging. Individual channels may have been logged while the hole was in a different state.
LoggingCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the logging company. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
LoggingCompanyCode	long	The RP66 organization code assigned to a logging company. The list is available at http://www.energistics.org/geosciences/geology-standards/rp66-organization-codes Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.

LoggingMethod	LoggingMethod	Defines where the log channel gets its data from: LWD, MWD, wireline; or whether it is computed, etc. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
LoggingServicePeriod	DateTimeInterval	The time interval during which the logging service was performed that acquired the data in the channel set.
LoggingToolClass	LoggingToolClassExt	A value categorizing a logging tool. The classification system used in WITSML is the one from the PWLS group. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
LoggingToolClassLongName	String256	A long concatenation of the tools used for the logging service such as GammaRay+NeutronPorosity.
LoggingToolKind	LoggingToolKind	An optional value pointing to a LoggingToolKind. Energistics provides a list of standard logging tool kinds from the Practical Well Logging Standard (PWLS). This LoggingToolKind enumeration is in the external LoggingToolKindDictionary XML file in the WITSML ancillary folder. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
LogOSDUIntegration	LogOSDUIntegration	Information about a Log that is relevant for OSDU integration but does not have a natural place in a Log object.
MudClass	MudClassExt	The nominal class of the drilling fluid at the time of logging. Individual channels may have been logged while a different drilling fluid was in use.
MudSubClass	MudSubClassExt	The nominal subclass of drilling fluid at the time of logging. Individual channels may have been logged while a different drilling fluid was in use.

NominalHoleSize	LengthMeasureExt	The nominal hole size at the time the measurement tool was in the hole. The size is "nominal" to indicate that this is not the result of a caliper reading or other direct measurement of the hole size, but is just a name used to refer to the diameter. This is normally the bit size. In a case where there are more than one diameter hole being drilled at the same time (like where a reamer is behind the bit) this diameter is the one which was seen by the sensor which produced a particular log channel. Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels.
NominalSamplingInterval	GenericMeasure	For regularly sampled channel data, this represents the nominal sampling interval. This should only be set when it is representative for channels in the log. Individual channels may have a different nominal sampling interval.
PassDescription	String64	The nominal pass description for the pass such as Calibration Pass, Main Pass, Repeated Pass. Use PassDetail instead if the log contains information about several passes using PassIndexedDepth.
PassDetail	PassDetail	Details about one or more passes when using PassIndexedDepth.
PassNumber	String64	Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels. Use PassDetail instead if the log contains information about several passes using PassIndexedDepth.

PrimaryIndexInterval	AbstractInterval	If all channel sets within the log have a compatible primary index, this is the primary index value range for the channel sets in the log. When specified, this MUST reflect the minimum and maximum primary index values for any channel sets in the log. This is independent of the direction for the primary index. This MAY be specified if all channel sets in the log have a compatible primary index AND at least one channel set has at least one channel with data points. This MUST NOT be specified if any channel sets in the log have incompatible primary indexes OR no channel sets in the log have channels with any data points. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write
RunNumber	String64	Should be a nominal value intended as a guide that applies to all or most ChannelSets and Channels in the Log. Should NOT be populated if the value does not apply for the majority of the ChannelSets and Channels. The value here should match a bit run number for LWD data and a wireline run number for logging data.

Associations

Association		Notes
0..*	From: **Log.**ChannelSet To: **ChannelSet**	An array of channel sets that comprise this log. A log must have at least one channel set, and may have more than one. The channel set is evaluated in such a way that the channels in the log is a UNION of all of the channels in the array of channel sets. That is to say, the result is also a set, no channel can appear more than once in a given log.
	From: **Log.** To: **AbstractActiveObject**	
0..1	From: **Log.**Wellbore To: **Wellbore**	
	From: **SidewallCore.** To: **Log**	
0..*	From: **MudLogReport.**RelatedLog To: **Log**	
	From: **PPFGLog.** To: **Log**	
1..*	From: **StimJobLogCatalog.**JobLog To: **Log**	
0..*	From: **StimJobStage.**StimStageLog To: **Log**	

7.12 LogChannelAxis

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/3/2016 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Metadata by which the array structure of a compound value is defined. It defines one axis of an array type used in a log channel.*

Attributes

Name	Type	Notes
AxisCount	PositiveLong	The count of elements along this axis of the array.
AxisName	String64	The name of the array axis.
AxisPropertyKind	String64	The property type by which the array axis is classified. Like "measured depth" or "elapsed time".
AxisSpacing	double	The increment to be used to fill out the list of the log channel axis index values.
AxisStart	double	Value of the initial entry in the list of axis index values.
AxisUom	UnitOfMeasureExt	A string representing the units of measure of the axis values.
uid	String64	A unique identifier for an instance of a log channel axis

Associations

Association	Notes
From: **Channel.**AxisDefinition **0..*** To: **LogChannelAxis**	Indicates that the curve is an array curve (i.e., multi-valued samples), and provides meta data by which an axis of the array can be understood. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

7.13 LogOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a Log that is relevant for OSDU integration but does not have a natural place in a Log object.*

Attributes

Name	Type	Notes
FrameIdentifier	String64	For multi-frame or multi-section files, this identifier defines the source frame in the file. If the identifier is an index number the index starts with zero and is converted to a string for this property.
IntermediaryServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate that represents the company who engaged the service company (ServiceCompany) to perform the logging.
IsRegular	boolean	Boolean property indicating the sampling mode of the primary index. True means all channel data values are regularly spaced (see NominalSamplingInterval); false means irregular or discrete sample spacing.
LogVersion	String64	The log version. Distinct from objectVersion.
ZeroTime	TimeStamp	Optional time reference for time-based primary indexes. The ISO date time string representing zero time. Not to be confused with seismic travel time zero.

7.14 PassDetail

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Details about an individual pass when using PassIndexedDepth.*

Attributes

Name	Type	Notes
Description	String64	Description of pass such as Calibration Pass, Main Pass, Repeated Pass.
Pass	long	The pass number.

7.15 PassDirection

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/11/2021 *Last modified:*11/11/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
up		The tool is moving up (decreasing depth).
holding steady		The tools is not moving up or down (depth is not changing).
down		The tool is moving down (increasing depth).

Associations

Association	Notes
From: **PassDirection.** To: **TypeEnum**	
From: **PassIndexedDepth.** To: **PassDirection**	

7.16 PassIndexedDepth

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/15/2015 *Last modified:*11/11/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Qualifies measured depth based on pass, direction and depth*

Attributes

Name	Type	Notes
Direction	PassDirection	The direction of the tool in a pass. For primary index values, index values within a pass MUST be strictly ordered according to the direction. Holding steady MUST NOT be used for primary index values; it is only allowed for secondary index values.
MeasuredDepth	LengthMeasureExt	The measured depth of the point.
Pass	long	The pass number. When pass indexed depth values are used as primary index values, the pass number MUST change any time direction changes. When used as secondary index values, this is not required.

Associations

Association	Notes
From: **PassIndexedDepth.** To: **PassDirection**	
From: **PassIndexedDepthInterval.** To: **PassIndexedDepth**	
From: **PassIndexedDepthInterval.** To: **PassIndexedDepth**	

7.17 PassIndexedDepthInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/11/2021 *Last modified:*11/11/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
Datum	AbstractReferencePoint	
End	PassIndexedDepth	
Start	PassIndexedDepth	

Associations

Association	Notes
From: **PassIndexedDepthInterval.** To: **AbstractInterval**	
From: **PassIndexedDepthInterval.** To: **PassIndexedDepth**	
From: **PassIndexedDepthInterval.** To: **PassIndexedDepth**	

7.18 PointMetadata

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/4/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: Used to declare that data points in a specific WITSML log channel may contain value attributes (e.g., quality identifiers). This declaration is independent from the possibility that ETP may have sent ValueAttributes in real time.
If an instance of PointMetadata is present for a Channel, then the value for that point is represented as an array in the bulk data string.

Attributes

Name	Type	Notes
AxisDefinition	LogChannelAxis	IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
DataKind	ChannelDataKind	The kind of point metadata. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Datum	AbstractReferencePoint	Defines a vertical datum that point metadata values that are measured depth or vertical depth values are referenced to. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Description	String2000	Free format description of the point metadata.
MetadataPropertyKind	PropertyKind	An optional value pointing to a PropertyKind. Energistics provides a list of standard property kinds that represent the basis for the commonly used properties in the E&P subsurface workflow. This PropertyKind enumeration is in the external PropertyKindDictionary XML file in the Common ancillary folder. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

Name	String64	The name of the point metadata. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.
Uom	UnitOfMeasureExt	The underlying unit of measure of the value. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error.

Associations

Association	Notes
From: **PointMetadata.** To: **ChannelDataKind**	
From: **Channel.**PointMetadata **0..*** To: **PointMetadata**	

8 PWLS

Package: xsd_schemas

Notes: Schema containing PWLS data to support the Logs model

8.1 ChannelKind

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/9/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Common information about a kind of channel, such as channels produced by a sensor on a specific type of equipment. For example, a kind could represent the gamma ray channels from a specific gamma ray logging tool from a specific logging company.*

Attributes

Name	Type	Notes
LoggingCompanyCode	long	The RP66 organization code assigned to the logging company. The list is available at http://www.energistics.org/geosciences/geology-standards/rp66-organization-codes
LoggingCompanyName	String256	Name of the logging company that creates this kind of channel.
Mnemonic	String64	The mnemonic for this kind of channel.
MnemonicLIS	String64	The LIS mnemonic for this kind of channel.
PropertyKind	PropertyKind	The kind of property for this kind of channel.

Associations

Association		Notes
	From: **ChannelKind.** To: **AbstractObject**	
0..*	From: **ChannelKind.**LoggingToolKind To: **LoggingToolKind**	The kind of logging tool that creates this kind of channel.
1..*	From: **ChannelKindDictionary.**ChannelKind To: **ChannelKind**	

8.2 ChannelKindDictionary

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/9/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **ChannelKindDictionary.**ChannelKind **1..*** To: **ChannelKind**	
From: **ChannelKindDictionary.** To: **AbstractObject**	

8.3 LoggingMethod

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/17/2016 *Last modified:*11/10/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the method of logging used to record or produce the data in the log.*

Attributes

Name	Type	Notes
coiled tubing		The data of the log is a result of coiled tubing logging.
computed		The log is a result of computed analyses from various sources.
distributed		The log is derived from various different systems.
LWD		The data of the log is a result of logging-while-drilling.
mixed		The data is derived from multiple logging methods.
MWD		The data of the log is a result of measurement-while-drilling.
subsea		The data is recorded with a subsea sensor.
surface		The data is recorded on the surface or in real time.
wireline		The data of the log is a result of wireline logging.

Associations

Association	Notes
From: **LoggingMethod.** To: **TypeEnum**	
From: **Channel.** To: **LoggingMethod**	
From: **LoggingToolKind.** To: **LoggingMethod**	

8.4 LoggingToolClass

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/9/2021 *Last modified:*11/9/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
AAC		Array Acoustic
AC		Acoustic
ADEN		Array Density
AGR		Array Gamma Ray
ARIN		Array Induction Resistivity
ARLL		Array Laterolog Resistivity
AUX		Auxiliary
DEN		Density
DIP		Dipmeter
DIR		Directional, including gravity, magnetic and gyro tools
DYN		Drill String Dynamics, including downhole weight on bit, torque, bending and vibration modes
FPR		Formation Pressure
GR		Gamma Ray
HDIA		Hole Diameter
INTERP		Petrophysical Interpretation
JOINED_GEOPH		Joined Geophysical
JOINED_PETRO		Joined Petrophysical
NEU		Neutron
NMR		Nuclear Magnetic Resonance
REMP		Electromagnetic Propagation Resistivity
RIN		Induction Resistivity
RLL		Laterolog Resistivity
RMIC		Micro Resistivity
SAMP		Formation Sampling
SGR		Spectral Gamma Ray
SP		Spontaneous Potential
SURF		Surface Sensors

Associations

Association	Notes
From: **LoggingToolClass.** To: **TypeEnum**	

Association	Notes
From: **LoggingToolClassExt.** To: **LoggingToolClass**	

8.5 LoggingToolClassExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/9/2021 *Last modified:*11/9/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **LoggingToolClassExt.** To: **LoggingToolClass**	
From: **LoggingToolClassExt.** To: **EnumExtensionPattern**	
From: **LoggingToolKind.** To: **LoggingToolClassExt**	

8.6 LoggingToolKind

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/9/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Common information about a kind of logging tool, such as a specific model of logging tool from a logging company.*

Attributes

Name	Type	Notes
Class	LoggingToolClassExt	The class for this kind of logging tool such as AC (Acoustic) or GR (Gamma Ray).
ClassDescription	String256	An optional description of the class for this kind of logging tool. This should be populated when the class is an extension value.
GroupIdentifier	String64	The tool group or tool series for the kind of logging tool.
Identifier	String64	The tool code or tool model that uniquely identifies the kind of logging tool.
LoggingCompanyCode	long	The RP66 organization code assigned to the logging company. The list is available at http://www.energistics.org/geosciences/geology-standards/rp66-organization-codes
LoggingCompanyName	String256	Name of the logging company that operates this kind of logging tool.
LoggingMethod	LoggingMethod	The logging method (e.g., LWD, MWD, wireline) for this kind of logging tool.
MarketingName	String64	The marketing name for the kind of logging tool.

Associations

Association	Notes
From: **LoggingToolKind.** To: **LoggingMethod**	
From: **LoggingToolKind.** To: **LoggingToolClassExt**	
From: **LoggingToolKind.** To: **AbstractObject**	
From: **LoggingToolKindDictionary.**LoggingToolKind **1..*** To: **LoggingToolKind**	
From: **ChannelKind.**LoggingToolKind **0..*** To: **LoggingToolKind**	The kind of logging tool that creates this kind of channel.

8.7 LoggingToolKindDictionary

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/9/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **LoggingToolKindDictionary.** To: **AbstractObject**	
From: **LoggingToolKindDictionary.**LoggingToolKind **1..*** To: **LoggingToolKind**	

9 DepthRegImage

Package: xsd_schemas

Notes: Depth registry image schemas.

Schemas for the set of data objects for raster well log depth registration (DepthRegImage), which provides a common, industry-standard depth calibration (registration) format that improves on and replaces existing proprietary standards. These data objects allow service companies, data vendors, and customers to more readily associate depth registration information with the correct raster log and move well logs and registration information between software systems.

TypeEnum
«Enumerati...
LogTrackType
curves
data
depth
traces
other
«XSDcomplexType»
DepthRegTrack
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ LeftEdge: NonNegativeLong
+ Name: String64 [0..1]
+ RightEdge: NonNegativeLong
+ TrackCurveScaleRect: DepthRegRectangle [0..*]
+ Type: LogTrackType
«XSDattribute»
+ uid: String64
+Track
0..*
«XSDcomplexType»
DepthRegLogSection
+AssociatedCurve
0..*
«XSDcomplexType»
DepthRegTrackCurve
«XSDelement»
+ CurveBackupScaleType: BackupScaleType
+ CurveInfo: String64
+ CurveLeftScaleValue: double
+ CurveRightScaleValue: double
+ CurveScaleRect: DepthRegRectangle [0..*]
+ CurveScaleType: ScaleType
+ CurveUnit: TypeEnum
+ Description: String2000 [0..1]
+ LineColor: String64
+ LineStyle: LineStyle
+ LineWeight: String64
«XSDattribute»
+ uid: String64
TypeEnum
«Enumerati...
LineStyle
dashed
solid
dotted
short dashed
long dashed
TypeEnum
«Enumerati...
ScaleType
linear
logarithmic
TypeEnum
«Enumeration»
BackupScaleType
x10
offscale left/right
other

9.1 BackupScaleType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Backup scale types.*

Attributes

Name	Type	Notes
x10		
offscale left/right		
other		

Associations

Association	Notes
From: **BackupScaleType.** To: **TypeEnum**	
From: **DepthRegTrackCurve.** To: **BackupScaleType**	

9.2 CalibrationPointRole

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *The role of a calibration point in a log depth registration.*

Attributes

Name	Type	Notes
left edge		Denotes the calibration being made on the left edge of the image.
right edge		Denotes the calibration being made on the right edge of the image.
fraction		Denotes an intermediate point from the left edge to the right edge.
other		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **CalibrationPointRole.** To: **TypeEnum**	
From: **DepthRegCalibrationPoint.** To: **CalibrationPointRole**	

9.3 DepthRegCalibrationPoint

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *A mapping of pixel positions on the log image to rectified or depth-registered positions on the log image. Specifically, pixels along the depth track are tagged with the matching measured depth for that position.*

Attributes

Name	Type	Notes
Comment	String2000	Comments about the log section.
CurveName	String64	Facilitates searching for logs based on curve type.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Fraction	DimensionlessMeasure	An intermediate point from the left edge to the right edge. Required when CalibrationPointRole is "fraction"; otherwise, not allowed otherwise.) Used to extrapolate the rectified position of a track boundary that has wandered off the edge of the image.
Index	GenericMeasure	The index (depth or time) for the calibration point. The UOM value must be consistent with the indexType.
Role	CalibrationPointRole	The horizontal position on the grid that the calibration point represents.
Track	String64	A pointer to the track containing the point.
uid	String64	Unique identifier for the calibration point.

Associations

Association	Notes
1 From: **DepthRegCalibrationPoint.**Point To: **DepthRegPoint**	The position on the image of the calibration point
From: **DepthRegCalibrationPoint.** To: **CalibrationPointRole**	
0..* From: **DepthRegCalibrationPoint.**Parameter To: **DepthRegParameter**	Parameters associated with the calibration point.
From: **DepthRegLogSection.** To: **DepthRegCalibrationPoint**	

9.4 DepthRegImage

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/14/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Information about the composition, layout, and depth registration of a digital image of a well log, typically a scanned image of a paper well log document.*

Attributes

Name	Type	Notes
AlternateSection	DepthRegLogRect	Provides a positional reference for sections of the image file not included in other elements of this object.
Checksum	MessageDigestType	Image file checksum.
FileName	String64	Reference to the file containing the image content.
FileNameType	FileNameType	Mimetype of image file content.
FileSize	DigitalStorageMeasure	Size of image file, in bytes.
HeaderSection	DepthRegLogRect	Log header information extracted from the well log image header section. Also contains X, Y coordinates and positional data with respect to the header section location within the log image file.
ImageBoundary	DepthRegRectangle	The bounding rectangle of the image
ImagePixelHeight	NonNegativeLong	Image file height, in pixels.
ImagePixelWidth	NonNegativeLong	Image file width, in pixels.
LogSection	DepthRegLogSection	Provides log name, log type, curve scale and other information about each log section of the image file. Most importantly, this section contains the depth registration elements (CalibrationPoint) necessary for depth calibrating well log sections.
Mimetype	MimeType	Mimetype of image file content.
uid	String64	Unique identifier for the registration image.
Version	String64	File version.

Associations

Association	Notes
From: **DepthRegImage.** To: **MimeType**	
From: **DepthRegImage.** To: **FileNameType**	
From: **DepthRegImage.** To: **DepthRegRectangle**	
From: **DepthRegImage.** To: **DepthRegLogSection**	
From: **DepthRegImage.** To: **DepthRegLogRect**	
From: **DepthRegImage.** To: **DepthRegLogRect**	

Association	Notes
1 From: **DepthRegImage.**Wellbore To: **Wellbore**	Reference to the the wellbore this depth registration image belongs.
From: **DepthRegImage.** To: **MessageDigestType**	
From: **DepthRegImage.** To: **AbstractObject**	

9.5 DepthRegLogRect

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *A region of an image containing a log rectangle.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Name	String64	The name of a rectangular section.
Type	LogRectangleType	A region of an image containing a log section image.
uid	String64	Unique identifier for the log section.

Associations

Association	Notes
From: **DepthRegLogRect.** To: **LogRectangleType**	
From: **DepthRegLogRect.**Position **0..1** To: **DepthRegRectangle**	The bounding box of the log section image.
From: **DepthRegImage.** To: **DepthRegLogRect**	
From: **DepthRegImage.** To: **DepthRegLogRect**	

9.6 DepthRegLogSection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/14/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Defines the description and coordinates of a well log section, the curves on the log. An important XSDelement to note is log:refNameString; it is a reference to the actual log/data (in a WITSML server) that this raster image represents; this object does not contain the log data.*

Attributes

Name	Type	Notes
CalibrationPoint	DepthRegCalibrationPoint	Generally this associates an X, Y value pair with a depth value from the log section.
Comment	String2000	Comments about the calibration.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IndexDatum	AbstractReferencePoint	Pointer to a reference point representing the origin for vertical coordinates on the original log. If this is not specified, information about the datum should be specified in a comment.
IndexInterval	AbstractInterval	The range of the index values.
IndexKind	DataIndexKind	Primary index type. For date-time indexes, any specified index values should be defined as a time offset (e.g., in seconds) from the creationDate of the well log.
IndexUom	String64	Index UOM of the original log.
LogMatrix	String64	Log matrix assumed for porosity computations.
LogSectionName	String64	Name of a log section; used to distinguish log sections of the same type.
LogSectionRect	DepthRegRectangle	The bounding rectangle of this log section.
LogSectionSequenceNumber	NonNegativeLong	Zero-based index in the log sections, in order of appearance.
LogSectionType	LogSectionType	Type of log section.
LowerCurveScaleRect	DepthRegRectangle	Boundaries of the lower curve scale (or horizontal scale) section for this log section.
ScaleDenominator	GenericMeasure	The denominator of the index (depth or time) scale of the original log, e. g. "100 ft". '@uom' must be consistent with '//indexType'.
ScaleNumerator	LengthMeasure	The numerator of the index (depth or time) scale of the original log, e. g. "5 in".
uid	String64	Unique identifier for the log section.
UpperCurveScaleRect	DepthRegRectangle	Boundaries of the upper curve scale (or horizontal scale) section for this log section.
VerticalLabel	String2000	Vertical log scale label (e.g., “1 IN/100 F”).

VerticalRatio	String2000	Second term of the vertical scale ratio (e.g., “240” for a 5-inch-per-100-foot log section).
WhiteSpace	DepthRegRectangle	Defines blank space occurring within a log section in an image.

Associations

Association	Notes
From: **DepthRegLogSection.** To: **LogSectionType**	
From: **DepthRegLogSection.**Parameter **0..*** To: **DepthRegParameter**	Parameters associated with the log section.
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.** To: **DepthRegCalibrationPoint**	
From: **DepthRegLogSection.**ChannelSet **0..1** To: **ChannelSet**	
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.**Track **0..*** To: **DepthRegTrack**	Defines the position of the tracks within this section.
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegImage.** To: **DepthRegLogSection**	

9.7 DepthRegParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies parameters associated with the log section and includes top and bottom indexes, a description string, and mnemonic.*

Attributes

Name	Type	Notes
Description	String2000	A description or definition for the mnemonic; required when ../dictionary is absent.
Dictionary	String64	The name or identifier of the controlling dictionary.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IndexInterval	AbstractInterval	The index value range for the vertical region for which the parameter value is applicable.
Mnemonic	String64	A dictionary-controlled mnemonic.
uid	String64	Unique identifier for the parameter.
Value	GenericMeasure	The value assigned to the parameter. The unit of measure should be consistent with the property implied by 'mnemonic' in 'dictionary'. If the value is unitless, then use a unit of 'Euc'.

Associations

Association		Notes
0..*	From: **DepthRegLogSection.**Parameter To: **DepthRegParameter**	Parameters associated with the log section.
0..*	From: **DepthRegCalibrationPoint.**Parameter To: **DepthRegParameter**	Parameters associated with the calibration point.

9.8 DepthRegPoint

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *The position of a pixel of an image, in x-y coordinates.*

Attributes

Name	Type	Notes
X	NonNegativeLong	The x pixel position of a point.
Y	NonNegativeLong	The y pixel position of a point.

Associations

Association	Notes
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegCalibrationPoint.**Point **1** To: **DepthRegPoint**	The position on the image of the calibration point
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegRectangle.** To: **DepthRegPoint**	

9.9 DepthRegRectangle

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Uses 4 corner points (Ul, Ur, Ll, Lr) to define the position (pixel) of a rectangular area of an image, using x-y coordinates. Most objects point to this object because most are rectangles, and use this schema to define each rectangle.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Ll	DepthRegPoint	The lower left point of a rectangular region.
Lr	DepthRegPoint	The lower right point of a rectangular region.
uid	String64	Unique identifier for the rectangular area.
Ul	DepthRegPoint	The upper left point of a rectangular region.
Ur	DepthRegPoint	The upper right point of a rectangular region.

Associations

Association	Notes
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegRectangle.** To: **DepthRegPoint**	
From: **DepthRegImage.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogSection.** To: **DepthRegRectangle**	
From: **DepthRegLogRect.**Position **0..1** To: **DepthRegRectangle**	The bounding box of the log section image.
From: **DepthRegLogSection.** To: **DepthRegRectangle**	

9.10 DepthRegTrack

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Horizontal track layout of the rectified log image that identifies the rectangle for a single log track.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
LeftEdge	NonNegativeLong	The position of the left edge of the track.
Name	String64	A label associated with the track.
RightEdge	NonNegativeLong	The position of the right edge of the track.
TrackCurveScaleRect	DepthRegRectangle	Coordinates of rectangle representing the track.
Type	LogTrackType	The kind of track.
uid	String64	Unique identifier for the track.

Associations

Association	Notes
From: **DepthRegTrack.** To: **LogTrackType**	
0..* From: **DepthRegTrack.**AssociatedCurve To: **DepthRegTrackCurve**	One or more curves specified in this track.
0..* From: **DepthRegLogSection.**Track To: **DepthRegTrack**	Defines the position of the tracks within this section.

9.11 DepthRegTrackCurve

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Descriptions of the actual curve, including elements such as line weight, color, and style, within a log track.*

Attributes

Name	Type	Notes
CurveBackupScaleType	BackupScaleType	Scale of the backup curve
CurveInfo	String64	Curve mnemonic
CurveLeftScaleValue	double	Scale value on the left axis
CurveRightScaleValue	double	Scale value on the right axis
CurveScaleRect	DepthRegRectangle	Coordinates of rectangle representing the area describing the scale.
CurveScaleType	ScaleType	Scale linearity
CurveUnit	TypeEnum	Unit of data represented
Description	String2000	Details of the line
LineColor	String64	Color of this line
LineStyle	LineStyle	Image line style
LineWeight	String64	Description of line graveness
uid	String64	Unique identifier for the curve.

Associations

Association	Notes
From: **DepthRegTrackCurve.** To: **ScaleType**	
From: **DepthRegTrackCurve.** To: **BackupScaleType**	
From: **DepthRegTrackCurve.** To: **LineStyle**	
0..* From: **DepthRegTrack.**AssociatedCurve To: **DepthRegTrackCurve**	One or more curves specified in this track.

9.12 FileNameType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the type of file referenced.*

Attributes

Name	Type	Notes
file name		The file name of the image.
path name		The path where the file is located.
universal resource locator		A string of characters used to identify a resource.
other		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **FileNameType.** To: **TypeEnum**	
From: **DepthRegImage.** To: **FileNameType**	

9.13 LineStyle

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the style of line used to define the DepthRegTrackCurve.*

Attributes

Name	Type	Notes
dashed		
solid		
dotted		
short dashed		
long dashed		

Associations

Association	Notes
From: **LineStyle.** To: **TypeEnum**	
From: **DepthRegTrackCurve.** To: **LineStyle**	

9.14 LogRectangleType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the type of content from the original log defined by the rectangle.*

Attributes

Name	Type	Notes
header		Denotes rectangle bounds a header section
alternate		

Associations

Association	Notes
From: **LogRectangleType.** To: **TypeEnum**	
From: **DepthRegLogRect.** To: **LogRectangleType**	

9.15 LogSectionType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the type of log section.*

Attributes

Name	Type	Notes
main		
repeat		An interval of log that has been recorded for a second time.
calibration		
tie in		
going in hole		
other		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **LogSectionType.** To: **TypeEnum**	
From: **DepthRegLogSection.** To: **LogSectionType**	

9.16 LogTrackType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the kinds of track.*

Attributes

Name	Type	Notes
curves		
data		
depth		The index used by the track is depth
traces		
other		The index used by the track is something other than depth.

Associations

Association	Notes
From: **LogTrackType.** To: **TypeEnum**	
From: **DepthRegTrack.** To: **LogTrackType**	

9.17 MessageDigestType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies message digest types.*

Attributes

Name	Type	Notes
MD5		See IETF RFC 1321 (http://www.ietf.org/rfc/rfc1321.txt)
SHA1		See IETF RFC 3174 (http://www.ietf.org/rfc/rfc3174.txt).
other		

Associations

Association	Notes
From: **MessageDigestType.** To: **TypeEnum**	
From: **DepthRegImage.** To: **MessageDigestType**	

9.18 MimeType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the list of mimetypes.*

Attributes

Name	Type	Notes
image/tiff		The image format is Tagged Image File Format.
image/gif		The image format is Graphic Interchange Format.
image/png		The image format is Portable Network Graphics.
image/xml+svg		The image format is xml with scalable vector graphics.
other		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **MimeType.** To: **TypeEnum**	
From: **DepthRegImage.** To: **MimeType**	

9.19 ScaleType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the main line scale types.*

Attributes

Name	Type	Notes
linear		
logarithmic		

Associations

Association	Notes
From: **ScaleType.** To: **TypeEnum**	
From: **DepthRegTrackCurve.** To: **ScaleType**	

10 PPFG

Package: xsd_schemas

Notes: Schema for pore pressure/fracture gradient data

EnumExtensionPattern
«XSDunion»
PPFGTransformModelTypeExt
EnumExtensionPattern
«XSDunion»
PPFGModeledLithologyExt
EnumExtensionPattern
«XSDunion»
PPFGTectonicSettingExt
EnumExtensionPattern
«XSDunion»
PPFGDataProcessingExt
EnumExtensionPattern
«XSDunion»
PPFGUncertaintyClassExt
EnumExtensionPattern
«XSDunion»
PPFGFamilyMnemonicExt
EnumExtensionPattern
«XSDunion»
PPFGFamilyExt
EnumExtensionPattern
«XSDunion»
PPFGMainFamilyExt
EnumExtensionPattern
«XSDunion»
PPFGDataDerivationExt
TypeEnum
«enumeration»
PPFGTransformModelType
apparent poisson's ratio
bowers
diagenetic
eaton
eaton-daines
equivalent depth
k0
stress path
TypeEnum
«enumeration»
PPFGModeledLithology
carbonate
composite
igneous
salt
sand
shale
TypeEnum
«enumeration»
PPFGTectonicSetting
compressional
extensional
strike slip
transpressional
transtensional
TypeEnum
«enumeration»
PPFGDataProcessing
calibrated
corrected
filtered
interpolated
interpreted
normalized
smoothed
transformed
TypeEnum
«enumeration»
PPFGUncertaintyClass
high
low
maximum
mean
mid
minimum
most likely
p10
p50
p90
TypeEnum
«enumeration»
PPFGFamilyMnemonic
BOAngle
ES
ESG
ESN
FA
FBP
FBPG
FCP
FCPG
FG
FG ACHIV
FG BM
FG STREN
FIP
FIPG
FP
FPP
FPPG
FTEMP
IPS
IPSG
LPS
LPSG
MD
MES
MESG
MPD BP
MPS
MPSG
MRGN
MS
MSG
NCT
NCT DT
NCT DXC
NCT MSE
NCT PHIT
NCT RES
NCT RHOB
NESG
OB
OBG
OP
OPG
PFW
PNORM
PNORMG
PP
PP BM
PP CG
PP DG
PP DP
PP DT
PP DXC
PP LOG
PP MEAS
PP MSE
PP PHIT
PP RES
PP RHOB
PP VSEIS
PP ZADJ
PPG
PPG BM
PPG CG
PPG DG
PPG DP
PPG DT
PPG DxC
PPG EST
PPG MEAS
PPG MSE
PPG PHIT
PPG RES
PPG RHOB
PPG VSEIS
PPG ZADJ
PSNORM
SDM
SEDRT
SFP
SFPG
SHAZ
SHmax
SHmaxG
Shmin
ShminG
SV
SVG
TEMP A
TEMP BHA
TEMP C
TVD
TWT
UCS
VES
VESG
TypeEnum
«enumeration»
PPFGFamily
achievable fracture gradient
breakout width
corrected temperature
effective stress
effective stress gradient
formation temperature
fracture breakdown gradient
fracture breakdown pressure
fracture closure gradient
fracture closure pressure
fracture gradient
fracture initiation pressure
fracture initiation pressure gradient
fracture pressure
fracture propagation pressure
fracture propagation pressure gradient
friction angle (failure criteria)
intermediate principle stress
intermediate principle stress gradient
least principle stress
least principle stress gradient
margin
max horizontal stress
max horizontal stress gradient
maximum horizontal stress azimuth
maximum principle stress
maximum principle stress gradient
mean effective stress
mean effective stress gradient
mean stress
mean stress gradient
measured depth
measured formation pressure
measured formation pressure gradient
minimum horizontal stress
minimum horizontal stress gradient
modeled fracture gradient
mpd back pressure
normal compaction trendline
normal compaction trendline - corrected drilling exponent
normal compaction trendline - density
normal compaction trendline - mechanical specific energy
normal compaction trendline - resistivity
normal compaction trendline - sonic
normal compaction trendline - total porosity
normal effective stress
normal effective stress gradient
normal hydrostatic pressure
normal hydrostatic pressure gradient
overburden gradient
overburden pressure
overpressure
overpressure gradient
pore pressure
pore pressure estimated from connection gas
pore pressure estimated from density
pore pressure estimated from drill gas
pore pressure estimated from drilling parameter
pore pressure estimated from log
pore pressure estimated from resistivity
pore pressure estimated from seismic velocity
pore pressure estimated from sonic
pore pressure estimated from total porosity
pore pressure from basin model
pore pressure from corrected drilling exponent
pore pressure from mechanical specific energy
pore pressure gradient
pore pressure gradient estimated from connection gas
pore pressure gradient estimated from density
pore pressure gradient estimated from drill gas
pore pressure gradient estimated from drilling parameter
pore pressure gradient estimated from log
pore pressure gradient estimated from resistivity
pore pressure gradient estimated from seismic velocity
pore pressure gradient estimated from sonic
pore pressure gradient estimated from total porosity
pore pressure gradient from basin model
pore pressure gradient from corrected drilling exponent
pore pressure gradient from mechanical specific energy
pore-frac window
safe drilling margin
sedimentation rate
shear failure pressure (collapse pressure)
shear failure pressure gradient (collapse pressure gradient)
strengthened fracture gradient
structurally adjusted pore pressure
structurally adjusted pore pressure gradient
subnormal pressure
temperature annular
temperature bha
true vertical depth
two way time
unconfined compressive strength
vertical effective stress
vertical effective stress gradient
vertical stress
vertical stress gradient
TypeEnum
«enumeration»
PPFGMainFamily
compaction trendline
effective stress
effective stress gradient
formation pressure
formation pressure gradient
fracture pressure
fracture pressure gradient
geomechanics
margin
mpd
overpressure
overpressure gradient
pore pressure
pore pressure gradient
reference
sedimentation rate
stress
stress gradient
temperature
transform model parameter
window
TypeEnum
«enumeration»
PPFGDataDerivation
basin model
estimated
inferred
measured
post-drill interpretation
pre-drill interpretation
real time
transformed

10.1 PPFGChannel

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A channel object specific to pore pressure and fracture gradient modeling. It corresponds roughly to a PPFGDataSetCurve in OSDU.*

Attributes

Name	Type	Notes
PPFGChannelOSDUIntegration	PPFGChannelOSDUIntegration	Information about a PPFGChannel that is relevant for OSDU integration but does not have a natural place in a PPFGChannel object.
PPFGDataProcessingApplied	PPFGDataProcessingExt	An array of processing operations that have been applied to this channel's data. For example: 'Smoothed', 'Calibrated', etc.
PPFGDerivation	PPFGDataDerivationExt	Indicates how the PPFG data in the channel was derived.
PPFGFamily	PPFGFamilyExt	The PPFG Family of the PPFG quantity measured, for example 'Pore Pressure from Corrected Drilling Exponent'. An individual channel that belongs to a Main Family.
PPFGFamilyMnemonic	PPFGFamilyMnemonicExt	The mnemonic of the PPFG Family.
PPFGMainFamily	PPFGMainFamilyExt	The Main Family Type of the PPFG quantity measured, for example 'Pore Pressure'. Primarily used for high level data classification.
PPFGModeledLithology	PPFGModeledLithologyExt	The lithology that this channel was modeled on. The assumption is that several different channels will be modeled, each for a specific lithology type, and during drilling, when it is known which lithologyy the well is currently in, users would refer to the channels modeled on the appropropriate type of lithology.
PPFGTransformModelType	PPFGTransformModelTypeExt	The empirical calibrated model used for pressure calculations from a petrophysical channel (sonic or resistivity), for example 'Eaton' and 'Bowers',... .
PPFGUncertaintyClass	PPFGUncertaintyClassExt	The uncertainty class for the channel, for example 'most likely' or 'p50'.

Associations

Association	Notes
From: **PPFGChannel.** To: **Channel**	

10.2 PPFGChannelOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a PPFGChannel that is relevant for OSDU integration but does not have a natural place in a PPFGChannel object.*

Attributes

Name	Type	Notes
RecordDate	TimeStamp	The date that the PPFG channel was created by the PPFG practitioner or contractor.

10.3 PPFGChannelSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A channel set object specific to pore pressure and fracture gradient modeling. It corresponds roughly to a PPFGDataSet in OSDU.*

Attributes

Name	Type	Notes
PPFGChannelSetOSDUIntegration	PPFGChannelSetOSDUIntegration	Information about a PPFGChannelSet that is relevant for OSDU integration but does not have a natural place in a PPFGChannelSet object.
PPFGComment	String2000	Open comments from the PPFG calculation team.
PPFGDerivation	PPFGDataDerivationExt	Nominal indication of how how the PPFG data in the channel set was derived. Individual channels may have different derivations.
PPFGGaugeType	String64	Free text to describe the type of gauge used for the pressure measurement.
PPFGOffsetWellbore	Wellbore	Offset Wellbores included in the context and calculations of this PPFG channel set.
PPFGTectonicSetting	PPFGTectonicSettingExt	Tectonic Scenario Setting for Planning and Pore Pressure Practitioners. Built into interpretive curves. Can be, for example 'Strike Slip'.

Associations

Association	Notes
From: **PPFGChannelSet.** To: **ChannelSet**	

10.4 PPFGChannelSetOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a PPFGChannelSet that is relevant for OSDU integration but does not have a natural place in a PPFGChanneSet object.*

Attributes

Name	Type	Notes
RecordDate	TimeStamp	The date that the PPFGChanneSet was created by the PPFG practitioner or contractor.

10.5 PPFGDataDerivation

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the source of PPFG data.*

Attributes

Name	Type	Notes
basin model		Data resulting from general basin modeling.
estimated		Data built as an estimation from another datasource.
inferred		Data inferred from parent data.
measured		Data resulting from raw measurement on site.
post-drill interpretation		Data resulting from a PostDrill Interpretation.
pre-drill interpretation		Data resulting from a PreDrill Interpretation.
real time		Raw dataset resulting from real-time acquisition.
transformed		Data resulting from a transformation.

Associations

Association	Notes
From: **PPFGDataDerivation.** To: **TypeEnum**	
From: **PPFGDataDerivationExt.** To: **PPFGDataDerivation**	

10.6 PPFGDataDerivationExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGDataDerivationExt.** To: **EnumExtensionPattern**	
From: **PPFGDataDerivationExt.** To: **PPFGDataDerivation**	

10.7 PPFGDataProcessing

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The type and level of data processing that has been applied to PPFG data.*

Attributes

Name	Type	Notes
calibrated		
corrected		
filtered		
interpolated		
interpreted		
normalized		
smoothed		
transformed		

Associations

Association	Notes
From: **PPFGDataProcessing.** To: **TypeEnum**	
From: **PPFGDataProcessingExt.** To: **PPFGDataProcessing**	

10.8 PPFGDataProcessingExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGDataProcessingExt.** To: **PPFGDataProcessing**	
From: **PPFGDataProcessingExt.** To: **EnumExtensionPattern**	

10.9 PPFGFamily

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The Family Type of the PPFG quantity measured, for example 'pore pressure from corrected drilling exponent'. An individual quantity that belongs to a Main Family.*

Attributes

Name	Type	Notes
achievable fracture gradient		
breakout width		
corrected temperature		
effective stress		
effective stress gradient		
formation temperature		
fracture breakdown gradient		
fracture breakdown pressure		
fracture closure gradient		
fracture closure pressure		
fracture gradient		
fracture initiation pressure		
fracture initiation pressure gradient		
fracture pressure		
fracture propagation pressure		
fracture propagation pressure gradient		
friction angle (failure criteria)		
intermediate principle stress		
intermediate principle stress gradient		
least principle stress		
least principle stress gradient		
margin		
max horizontal stress		
max horizontal stress gradient		
maximum horizontal stress azimuth		
maximum principle stress		
maximum principle stress gradient		
mean effective stress		
mean effective stress gradient		
mean stress		
mean stress gradient		

measured depth		
measured formation pressure		
measured formation pressure gradient		
minimum horizontal stress		
minimum horizontal stress gradient		
modeled fracture gradient		
mpd back pressure		
normal compaction trendline		
normal compaction trendline - corrected drilling exponent		
normal compaction trendline - density		
normal compaction trendline - mechanical specific energy		
normal compaction trendline - resistivity		
normal compaction trendline - sonic		
normal compaction trendline - total porosity		
normal effective stress		
normal effective stress gradient		
normal hydrostatic pressure		
normal hydrostatic pressure gradient		
overburden gradient		
overburden pressure		
overpressure		
overpressure gradient		
pore pressure		
pore pressure estimated from connection gas		
pore pressure estimated from density		
pore pressure estimated from drill gas		
pore pressure estimated from drilling parameter		
pore pressure estimated from log		
pore pressure estimated from resistivity		
pore pressure estimated from seismic velocity		
pore pressure estimated from sonic		
pore pressure estimated from total porosity		
pore pressure from basin model		
pore pressure from corrected drilling exponent		
pore pressure from mechanical specific energy		
pore pressure gradient		

pore pressure gradient estimated from connection gas		
pore pressure gradient estimated from density		
pore pressure gradient estimated from drill gas		
pore pressure gradient estimated from drilling parameter		
pore pressure gradient estimated from log		
pore pressure gradient estimated from resistivity		
pore pressure gradient estimated from seismic velocity		
pore pressure gradient estimated from sonic		
pore pressure gradient estimated from total porosity		
pore pressure gradient from basin model		
pore pressure gradient from corrected drilling exponent		
pore pressure gradient from mechanical specific energy		
pore-frac window		
safe drilling margin		
sedimentation rate		
shear failure pressure (collapse pressure)		
shear failure pressure gradient (collapse pressure gradient)		
strengthened fracture gradient		
structurally adjusted pore pressure		
structurally adjusted pore pressure gradient		
subnormal pressure		
temperature annular		
temperature bha		
true vertical depth		
two way time		
unconfined compressive strength		
vertical effective stress		
vertical effective stress gradient		
vertical stress		
vertical stress gradient		

Associations

Association	Notes
From: **PPFGFamily.** To: **TypeEnum**	
From: **PPFGFamilyExt.** To: **PPFGFamily**	

10.10 PPFGFamilyExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGFamilyExt.** To: **PPFGFamily**	
From: **PPFGFamilyExt.** To: **EnumExtensionPattern**	

10.11 PPFGFamilyMnemonic

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The mnemonic for the Family Type of the PPFG quantity measured.*

Attributes

Name	Type	Notes
BOAngle		
ES		
ESG		
ESN		
FA		
FBP		
FBPG		
FCP		
FCPG		
FG		
FG ACHIV		
FG BM		
FG STREN		
FIP		
FIPG		
FP		
FPP		
FPPG		
FTEMP		
IPS		
IPSG		
LPS		
LPSG		
MD		
MES		
MESG		
MPD BP		
MPS		
MPSG		
MRGN		
MS		
MSG		

NCT		
NCT DT		
NCT DXC		
NCT MSE		
NCT PHIT		
NCT RES		
NCT RHOB		
NESG		
OB		
OBG		
OP		
OPG		
PFW		
PNORM		
PNORMG		
PP		
PP BM		
PP CG		
PP DG		
PP DP		
PP DT		
PP DXC		
PP LOG		
PP MEAS		
PP MSE		
PP PHIT		
PP RES		
PP RHOB		
PP VSEIS		
PP ZADJ		
PPG		
PPG BM		
PPG CG		
PPG DG		
PPG DP		
PPG DT		
PPG DxC		
PPG EST		
PPG MEAS		
PPG MSE		

PPG PHIT		
PPG RES		
PPG RHOB		
PPG VSEIS		
PPG ZADJ		
PSNORM		
SDM		
SEDRT		
SFP		
SFPG		
SHAZ		
SHmax		
SHmaxG		
Shmin		
ShminG		
SV		
SVG		
TEMP A		
TEMP BHA		
TEMP C		
TVD		
TWT		
UCS		
VES		
VESG		

Associations

Association	Notes
From: **PPFGFamilyMnemonic.** To: **TypeEnum**	
From: **PPFGFamilyMnemonicExt.** To: **PPFGFamilyMnemonic**	

10.12 PPFGFamilyMnemonicExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGFamilyMnemonicExt.** To: **EnumExtensionPattern**	
From: **PPFGFamilyMnemonicExt.** To: **PPFGFamilyMnemonic**	

10.13 PPFGLog

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A log object specific to pore pressure and fracture gradient modeling.*

Attributes

Name	Type	Notes
PPFGComment	String2000	Open comments from the PPFG calculation team.
PPFGDerivation	PPFGDataDerivationExt	Nominal indication of how how the PPFG data in the log was derived. Individual channels may have different derivations.
PPFGGaugeType	String64	Free text to describe the type of gauge used for the pressure measurement.
PPFGLogOSDUIntegration	PPFGLogOSDUIntegration	Information about a PPFGLog that is relevant for OSDU integration but does not have a natural place in a PPFGLog object.
PPFGOffsetWellbore	Wellbore	Offset Wellbores included in the context and calculations of this PPFG log.
PPFGTectonicSetting	PPFGTectonicSettingExt	Tectonic Scenario Setting for Planning and Pore Pressure Practitioners. Built into interpretive curves. Can be, for example 'Strike Slip'.

Associations

Association	Notes
From: **PPFGLog.** To: **Log**	

10.14 PPFGLogOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a PPFGLog that is relevant for OSDU integration but does not have a natural place in a PPFGLog object.*

Attributes

Name	Type	Notes
RecordDate	TimeStamp	The date that the PPFG channel set was created by the PPFG practitioner or contractor.

10.15 PPFGMainFamily

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The Main Family Type of the PPFG quantity measured, for example 'pore pressure'. Primarily used for high level data classification.*

Attributes

Name	Type	Notes
compaction trendline		
effective stress		
effective stress gradient		
formation pressure		
formation pressure gradient		
fracture pressure		
fracture pressure gradient		
geomechnanics		
margin		
mpd		
overpressure		
overpressure gradient		
pore pressure		
pore pressure gradient		
reference		
sedimentation rate		
stress		
stress gradient		
temperature		
transform model parameter		
window		

Associations

Association	Notes
From: **PPFGMainFamily.** To: **TypeEnum**	
From: **PPFGMainFamilyExt.** To: **PPFGMainFamily**	

10.16 PPFGMainFamilyExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGMainFamilyExt.** To: **EnumExtensionPattern**	
From: **PPFGMainFamilyExt.** To: **PPFGMainFamily**	

10.17 PPFGModeledLithology

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the type of lithology modeled in PPFG data.*

Attributes

Name	Type	Notes
carbonate		
composite		
igneous		
salt		
sand		
shale		

Associations

Association	Notes
From: **PPFGModeledLithology.** To: **TypeEnum**	
From: **PPFGModeledLithologyExt.** To: **PPFGModeledLithology**	

10.18 PPFGModeledLithologyExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGModeledLithologyExt.** To: **PPFGModeledLithology**	
From: **PPFGModeledLithologyExt.** To: **EnumExtensionPattern**	

10.19 PPFGTectonicSetting

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the source of PPFG data.*

Attributes

Name	Type	Notes
compressional		
extensional		
strike slip		
transpressional		
transtensional		

Associations

Association	Notes
From: **PPFGTectonicSetting.** To: **TypeEnum**	
From: **PPFGTectonicSettingExt.** To: **PPFGTectonicSetting**	

10.20 PPFGTectonicSettingExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGTectonicSettingExt.** To: **PPFGTectonicSetting**	
From: **PPFGTectonicSettingExt.** To: **EnumExtensionPattern**	

10.21 PPFGTransformModelType

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Empirical calibrated models used for pressure calculations from a petrophysical channel (sonic or resistivity).*

Attributes

Name	Type	Notes
apparent poisson's ratio		
bowers		
diagenetic		
eaton		
eaton-daines		
equivalent depth		
k0		
stress path		

Associations

Association	Notes
From: **PPFGTransformModelType.** To: **TypeEnum**	
From: **PPFGTransformModelTypeExt.** To: **PPFGTransformModelType**	

10.22 PPFGTransformModelTypeExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGTransformModelTypeExt.** To: **PPFGTransformModelType**	
From: **PPFGTransformModelTypeExt.** To: **EnumExtensionPattern**	

10.23 PPFGUncertaintyClass

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies class of uncertainty for PPFG data.*

Attributes

Name	Type	Notes
high		
low		
maximum		
mean		
mid		
minimum		
most likely		
p10		
p50		
p90		

Associations

Association	Notes
From: **PPFGUncertaintyClass.** To: **TypeEnum**	
From: **PPFGUncertaintyClassExt.** To: **PPFGUncertaintyClass**	

10.24 PPFGUncertaintyClassExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **PPFGUncertaintyClassExt.** To: **PPFGUncertaintyClass**	
From: **PPFGUncertaintyClassExt.** To: **EnumExtensionPattern**	

11 Rig

Package: xsd_schemas

Notes: Rig Schema

AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Wellbore::Wellbore
arentWellbore
0..1
+Wellbore
1
AbstractObject
«XSDcomplexType,XSDtopLevelElement»
BhaRun::BhaRun
+BhaRun
0..*
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Rig
«XSDelement»
+ Approvals: String64 [0..1]
+ CapWindDerrick: LengthPerTimeMeasure [0..1]
+ ClassRig: String64 [0..1]
+ EmailAddress: String64 [0..1]
+ FaxNumber: String64 [0..1]
+ HtDerrick: LengthMeasure [0..1]
+ IsOffshore: boolean [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ NameContact: String64 [0..1]
+ NumCranes: long [0..1]
+ Owner: BusinessAssociate [0..1]
+ RatingDerrick: ForceMeasure [0..1]
+ RatingDrillDepth: LengthMeasure [0..1]
+ RatingWaterDepth: LengthMeasure [0..1]
+ Registration: String64 [0..1]
+ TelNumber: String64 [0..1]
+ TypeDerrick: DerrickType [0..1]
+ TypeRig: RigType [0..1]
+ YearEntService: gYear [0..1]
+Rig
1
TypeEnum
«Enumeration»
RigType
barge
coiled tubing
floater
jackup
land
platform
semi-submersible
TypeEnum
«Enumeration»
DerrickType
double
quadruple
slant
triple
long
«XSDsimpleType»
PumpActionIntegerCode
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
RigUtilization
«XSDelement»
+ AirGap: LengthMeasure [0..1]
+ Azimuthing: boolean [0..1]
+ BunksPerRoom: long [0..1]
+ CapBulkCement: VolumeMeasure [0..1]
+ CapBulkMud: VolumeMeasure [0..1]
+ CapDrillWater: VolumeMeasure [0..1]
+ CapFuel: VolumeMeasure [0..1]
+ CapLiquidMud: VolumeMeasure [0..1]
+ CapPotableWater: VolumeMeasure [0..1]
+ CementUnit: String64 [0..1]
+ Datum: AbstractReferencePoint [0..1]
+ DescBrake: String64 [0..1]
+ DescRotSystem: String64 [0..1]
+ EndHoleDepth: LengthMeasure [0..1]
+ EndOperationTime: TimeStamp [0..1]
+ Flares: String64 [0..1]
+ Gantry: String64 [0..1]
+ Generator: String64 [0..1]
+ HeaveMx: LengthMeasure [0..1]
+ MainEngine: String64 [0..1]
+ MoorType: String64 [0..1]
+ MotionCompensationMn: ForceMeasure [0..1]
+ MotionCompensationMx: ForceMeasure [0..1]
+ MotorDrawWorks: String64 [0..1]
+ NumAnch: long [0..1]
+ NumBlockLines: long [0..1]
+ NumBunks: long [0..1]
+ NumGuideTens: long [0..1]
+ NumRiserTens: long [0..1]
+ NumThrusters: long [0..1]
+ PipeHandlingSystem: String64 [0..1]
+ PowerDrawWorks: PowerMeasure [0..1]
+ RatingBlock: ForceMeasure [0..1]
+ RatingDrawWorks: ForceMeasure [0..1]
+ RatingHkld: ForceMeasure [0..1]
+ RatingRotSystem: ForceMeasure [0..1]
+ RatingSwivel: ForceMeasure [0..1]
+ RatingTqRotSys: MomentOfForceMeasure [0..1]
+ RiserAngleLimit: PlaneAngleMeasure [0..1]
+ RotSizeOpening: LengthMeasure [0..1]
+ RotSystem: DriveType [0..1]
+ ScrSystem: String64 [0..1]
+ SizeDrillLine: LengthMeasure [0..1]
+ StartHoleDepth: LengthMeasure [0..1]
+ StartOperationTime: TimeStamp [0..1]
+ StrokeMotionCompensation: LengthMeasure [0..1]
+ TypeDrawWorks: DrawWorksType [0..1]
+ TypeHook: String64 [0..1]
+ TypeSwivel: String64 [0..1]
+ VarDeckLdMx: ForceMeasure [0..1]
+ VdlStorm: ForceMeasure [0..1]
+ WtBlock: ForceMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
DrawWorksType
mechanical
standard electric
diesel electric
ram rig
TypeEnum
«Enumeration»
DriveType
coiled tubing
rotary kelly drive
top drive
«XSDcomplexType»
Bop
+Bop
0..1
«XSDcomplexType»
Shaker
«XSDelement»
+ CapFlow: VolumePerTimeMeasure [0..1]
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ LocationShaker: String64 [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ MudCleaner: boolean [0..1]
+ Name: String64
+ NameTag: NameTag [0..*]
+ NumCascLevel: long [0..1]
+ NumDecks: long [0..1]
+ Owner: BusinessAssociate [0..1]
+ SizeMeshMn: LengthMeasure [0..1]
+ Type: String64 [0..1]
«XSDattribute»
+ uid: String64
+Shaker
0..*
TypeEnum
«Enumerati...
SurfEquipType
IADC
custom
coiled tubing
unknown
«XSDcomplexType»
SurfaceEquipment
«XSDelement»
+ CtWrapType: String64 [0..1]
+ Description: String2000 [0..1]
+ HtFlange: LengthMeasure [0..1]
+ HtInjStk: LengthMeasure [0..1]
+ HtSurfaceIron: LengthMeasure [0..1]
+ HtTopStk: LengthMeasure [0..1]
+ IdDischargeLine: LengthMeasure [0..1]
+ IdHose: LengthMeasure [0..1]
+ IdKelly: LengthMeasure [0..1]
+ IdStandpipe: LengthMeasure [0..1]
+ IdSurfaceIron: LengthMeasure [0..1]
+ IdSwivel: LengthMeasure [0..1]
+ IdTopStk: LengthMeasure [0..1]
+ InjStkUp: boolean [0..1]
+ LenDischargeLine: LengthMeasure [0..1]
+ LenHose: LengthMeasure [0..1]
+ LenKelly: LengthMeasure [0..1]
+ LenReel: LengthMeasure [0..1]
+ LenStandpipe: LengthMeasure [0..1]
+ LenSurfaceIron: LengthMeasure [0..1]
+ LenSwivel: LengthMeasure [0..1]
+ LenUmbilical: LengthMeasure [0..1]
+ OdCore: LengthMeasure [0..1]
+ OdReel: LengthMeasure [0..1]
+ OdUmbilical: LengthMeasure [0..1]
+ PresRating: PressureMeasure [0..1]
+ TypeSurfEquip: SurfEquipType
+ UmbInside: boolean [0..1]
+ UseHose: boolean [0..1]
+ UseInjStack: boolean [0..1]
+ UseKelly: boolean [0..1]
+ UsePumpDischarge: boolean [0..1]
+ UseStandpipe: boolean [0..1]
+ UseSurfaceIron: boolean [0..1]
+ UseSwivel: boolean [0..1]
+ UseTopStack: boolean [0..1]
+ WidReelWrap: LengthMeasure [0..1]
+SurfaceEquipment
0..1
«XSDcomplexType»
Centrifuge
«XSDelement»
+ CapFlow: VolumePerTimeMeasure [0..1]
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ NameTag: NameTag [0..*]
+ Owner: BusinessAssociate [0..1]
+ Type: String64 [0..1]
«XSDattribute»
+ uid: String64
+Centrifuge
0..*
+Degasser
0..*
«XSDcomplexType»
Degasser
«XSDelement»
+ AreaSeparatorFlow: AreaMeasure [0..1]
+ CapBlowdown: VolumePerTimeMeasure [0..1]
+ CapFlow: VolumePerTimeMeasure [0..1]
+ CapGasSep: VolumePerTimeMeasure [0..1]
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Height: LengthMeasure [0..1]
+ HtMudSeal: LengthMeasure [0..1]
+ Id: LengthMeasure [0..1]
+ IdInlet: LengthMeasure [0..1]
+ IdVentLine: LengthMeasure [0..1]
+ Len: LengthMeasure [0..1]
+ LenVentLine: LengthMeasure [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ NameTag: NameTag [0..*]
+ Owner: BusinessAssociate [0..1]
+ PresRating: PressureMeasure [0..1]
+ TempRating: ThermodynamicTemperatureMeasure [0..1]
+ Type: String64 [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
Hydrocyclone
«XSDelement»
+ DescCone: String64 [0..1]
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ NameTag: NameTag [0..*]
+ Owner: BusinessAssociate [0..1]
+ Type: String64 [0..1]
«XSDattribute»
+ uid: String64
+Hydrocyclone
0..*
«XSDcomplexType»
Pit
«XSDelement»
+ CapMx: VolumeMeasure
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Index: long
+ IsActive: boolean [0..1]
+ NameTag: NameTag [0..*]
+ Owner: BusinessAssociate [0..1]
+ TypePit: PitType [0..1]
«XSDattribute»
+ uid: String64
+Pit
0..*
TypeEnum
«Enumeration»
PitType
bulk
chemical
drilling
mix
mud cleaning
sand trap
slug
storage
surge tank
trip tank
+Pump
0..*
«XSDcomplexType»
MudPump
«XSDelement»
+ Displacement: VolumeMeasure
+ DTimInstall: TimeStamp [0..1]
+ DTimRemove: TimeStamp [0..1]
+ Eff: PowerPerPowerMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ IdLiner: LengthMeasure
+ Index: long
+ LenStroke: LengthMeasure [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ NameTag: NameTag [0..*]
+ NumCyl: long [0..1]
+ OdRod: LengthMeasure [0..1]
+ Owner: BusinessAssociate [0..1]
+ PowHydMx: PowerMeasure [0..1]
+ PowMechMx: PowerMeasure [0..1]
+ PresDamp: PressureMeasure [0..1]
+ PresMx: PressureMeasure [0..1]
+ PumpAction: PumpActionIntegerCode [0..1]
+ SpmMx: AngularVelocityMeasure [0..1]
+ TypePump: PumpType [0..1]
+ VolDamp: VolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumerati...
PumpType
centrifugal
duplex
triplex

11.1 Bop

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/17/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig blowout preventer (BOP) schema.*

Attributes

Name	Type	Notes
Accumulator	String64	Type of accumulator/description.
CapAccFluid	VolumeMeasure	Accumulator fluid capacity.
DescControlManifold	String2000	Description of the control system.
DiaDiverter	LengthMeasure	Diameter of the diverter.
DTimInstall	TimeStamp	Date and time the BOP was installed.
DTimRemove	TimeStamp	Date and time of the BOP was removed.
IdBoosterLine	LengthMeasure	Inner diameter of the booster line.
IdChkLine	LengthMeasure	Inner diameter of the choke line.
IdKillLine	LengthMeasure	Inner diameter of the kill line.
IdSurfLine	LengthMeasure	Inner diameter of the surface line.
LenBoosterLine	LengthMeasure	Length of the booster line along the riser.
LenChkLine	LengthMeasure	Length of the choke line along the riser.
LenKillLine	LengthMeasure	Length of the kill line.
LenSurfLine	LengthMeasure	Length of the surface line the along riser.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
NameTag	NameTag	An identification tag for the blowout preventer. A serial number is a type of identification tag; however, some tags contain many pieces of information.This element only identifies the tag and does not describe the contents.
OdBoosterLine	LengthMeasure	Outer diameter of the booster line.
OdChkLine	LengthMeasure	Outer diameter of the choke line.
OdKillLine	LengthMeasure	Outer diameter of the kill line.
OdSurfLine	LengthMeasure	Outer diameter of the surface line.
PresAccOpRating	PressureMeasure	Accumulator operating pressure rating.
PresAccPreCharge	PressureMeasure	Accumulator pre-charge pressure.
PresBopRating	PressureMeasure	Maximum pressure rating of the blowout preventer.
PresChokeManifold	PressureMeasure	Choke manifold pressure.
PresWorkDiverter	PressureMeasure	Working rating pressure of the component.

RotBop	boolean	Is this a rotating blowout preventer? Values are "true" (or "1") and "false" (or "0").
SizeBopSys	LengthMeasure	Maximum tubulars passable through the blowout preventer.
SizeConnectionBop	LengthMeasure	Size of the connection to the blowout preventer.
TypeChokeManifold	String64	Type of choke manifold.
TypeConnectionBop	String64	Type of connection to the blowout preventer.
TypeControlManifold	String64	The blowout preventer control system.
TypeDiverter	String64	Diverter description.
VolAccPreCharge	VolumeMeasure	Accumulator pre-charge volume

Associations

Association		Notes
0..*	From: **Bop.**BopComponent To: **BopComponent**	Container element for Blow Out Preventer component schema elements.
0..1	From: **RigUtilization.**Bop To: **Bop**	Blow out preventer description and components.

11.2 BopComponent

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Blowout Preventer Component Schema.*

Attributes

Name	Type	Notes
DescComp	String64	Description of the component.
DiaCloseMn	LengthMeasure	Minimum diameter of the component it will seal.
DiaCloseMx	LengthMeasure	Maximum diameter of the component it will seal.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IdPassThru	LengthMeasure	Inner diameter that tubulars can pass through.
IsVariable	boolean	Is ram bore variable or single size? Defaults to false. Values are "true" (or "1") and "false" (or "0").
Nomenclature	String64	Arrangement nomenclature for the blowout preventer stack (e.g., S, R, A).
PresWork	PressureMeasure	Working rating pressure of the component.
TypeBopComp	BopType	Type of ram or preventer.
uid	String64	Unique identifier for this instance of BopComponent

Associations

Association			Notes
	From: **BopComponent.**	To: **BopType**	
0..*	From: **Bop.**BopComponent To: **BopComponent**		Container element for Blow Out Preventer component schema elements.

11.3 BopType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Specifies the type of blowout preventer.

Attributes

Name	Type	Notes
annular preventer		
shear ram		
blind ram		
pipe ram		
drilling spool		
flexible joint		
connector		

Associations

Association	Notes
From: **BopType.** To: **TypeEnum**	
From: **BopComponent.** To: **BopType**	

11.4 Centrifuge

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Centrifuge Schema.*

Attributes

Name	Type	Notes
CapFlow	VolumePerTimeMeasure	Maximum pump rate at which the unit efficiently operates.
DTimInstall	TimeStamp	Date and time the centrifuge was installed.
DTimRemove	TimeStamp	Date and time the centrifuge was removed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
NameTag	NameTag	An identification tag for the centrifuge. A serial number is a type of identification tag; however, some tags contain many pieces of information.This element only identifies the tag and does not describe the contents.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
Type	String64	Description for the type of object.
uid	String64	Unique identifier for this instance of Centrifuge.

Associations

Association	Notes
From: **RigUtilization.**Centrifuge **0..*** To: **Centrifuge**	Mud cleaning centrifuge equipment for the rig.

11.5 Degasser

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Degasser Schema.*

Attributes

Name	Type	Notes
AreaSeparatorFlow	AreaMeasure	Flow area of the separator.
CapBlowdown	VolumePerTimeMeasure	Gas vent rate at which the vent line pressure drop exceeds the hydrostatic head because of the mud seal.
CapFlow	VolumePerTimeMeasure	Maximum pump rate at which the unit efficiently operates.
CapGasSep	VolumePerTimeMeasure	Safe gas-separating capacity.
DTimInstall	TimeStamp	Date and time the degasser was installed.
DTimRemove	TimeStamp	Date and time the degasser was removed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Height	LengthMeasure	Height of the separator.
HtMudSeal	LengthMeasure	Depth of trip-tank fluid level to provide back pressure against the separator flow.
Id	LengthMeasure	Internal diameter of the object.
IdInlet	LengthMeasure	Internal diameter of the inlet line.
IdVentLine	LengthMeasure	Internal diameter of the vent line.
Len	LengthMeasure	Length of the separator.
LenVentLine	LengthMeasure	Length of the vent line.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
NameTag	NameTag	An identification tag for the degasser. A serial number is a type of identification tag; however, some tags contain many pieces of information.This element only identifies the tag and does not describe the contents.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
PresRating	PressureMeasure	Pressure rating of the item.
TempRating	ThermodynamicTemperatureMeasure	Temperature rating of the separator.
Type	String64	Description for the type of object.
uid	String64	Unique identifier for this instance of degasser

Associations

Association	Notes
From: **RigUtilization.**Degasser **0..*** To: **Degasser**	Mud de-gasser equipment for the rig.

11.6 DerrickType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of drilling derrick.*

Attributes

Name	Type	Notes
double		2-stand capacity derrick.
quadruple		4-stand capacity derrick.
slant		Slant derrick.
triple		3-stand capacity derrick.

Associations

Association	Notes
From: **DerrickType.** To: **TypeEnum**	
From: **Rig.** To: **DerrickType**	

11.7 DrawWorksType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of draw works.*

Attributes

Name	Type	Notes
mechanical		
standard electric		
diesel electric		
ram rig		

Associations

Association	Notes
From: **DrawWorksType.** To: **TypeEnum**	
From: **RigUtilization.** To: **DrawWorksType**	

11.8 DriveType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of work-string drive (rotary system).*

Attributes

Name	Type	Notes
coiled tubing		Coiled tubing rig
rotary kelly drive		Kelly drive system
top drive		Top Drive

Associations

Association	Notes
From: **DriveType.** To: **TypeEnum**	
From: **RigUtilization.** To: **DriveType**	

11.9 Hydrocyclone

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Hydrocyclones Schema. A hydrocyclone is a cone-shaped device for separating fluids and the solids dispersed in fluids.*

Attributes

Name	Type	Notes
DescCone	String64	Cone description.
DTimInstall	TimeStamp	Date and time the hydroclone was installed.
DTimRemove	TimeStamp	Removal date and time the hydroclone was removed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
NameTag	NameTag	An identification tag for the hydrocyclone. A serial number is a type of identification tag; however, some tags contain many pieces of information. This element only identifies the tag and does not describe the contents.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
Type	String64	Description of the type of object.
uid	String64	Unique identifier for this instance of Hydrocyclone.

Associations

Association	Notes
From: **RigUtilization.**Hydrocyclone **0..*** To: **Hydrocyclone**	Mud cleaning hydrocyclone equipment for the rig.

11.10 MudPump

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Mud Pump Schema.*

Attributes

Name	Type	Notes
Displacement	VolumeMeasure	Pump displacement.
DTimInstall	TimeStamp	Date and time the pump was installed.
DTimRemove	TimeStamp	Date and time the pump was removed.
Eff	PowerPerPowerMeasure	Efficiency of the pump.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IdLiner	LengthMeasure	Inner diameter of the pump liner.
Index	long	Relative pump number. One-based.
LenStroke	LengthMeasure	Stroke length.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
NameTag	NameTag	An identification tag for the pump. A serial number is a type of identification tag; however, some tags contain many pieces of information.This element onlyidentifies the tag and does not describe the contents.
NumCyl	long	Number of cylinders (3 = single acting, 2 = double acting)
OdRod	LengthMeasure	Rod outer diameter.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
PowHydMx	PowerMeasure	Maximum hydraulics horsepower.
PowMechMx	PowerMeasure	Maximum mechanical power.
PresDamp	PressureMeasure	Pulsation dampener pressure.
PresMx	PressureMeasure	Maximum pump pressure.
PumpAction	PumpActionIntegerCode	Pump action. 1 = single acting, 2 = double acting.
SpmMx	AngularVelocityMeasure	Maximum speed.
TypePump	PumpType	Pump type reference list.
uid	String64	Unique identifier for this instance of MudPump.
VolDamp	VolumeMeasure	Pulsation dampener volume.

Associations

Association		Notes
	From**: MudPump.** To: **PumpType**	
0..*	From**: RigUtilization.**Pump To: **MudPump**	Drilling fluid (mud/cement) pumping units for the rig.

11.11 Pit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Pit Schema.*

Attributes

Name	Type	Notes
CapMx	VolumeMeasure	Maximum pit capacity.
DTimInstall	TimeStamp	Date and time the pit was installed.
DTimRemove	TimeStamp	Date and time the pit was removed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Index	long	Relative pit number of all pits on the rig. One-based.
IsActive	boolean	Flag to indicate if the pit is part of the active system. Values are "true" (or "1") and "false" (or "0").
NameTag	NameTag	An identification tag for the pit. A serial number is a type of identification tag; however, some tags contain many pieces of information. This element only identifies the tag and does not describe the contents.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
TypePit	PitType	The type of pit.
uid	String64	Unique identifier for this instance of pit

Associations

Association	Notes
From: **Pit.** To: **PitType**	
From: **RigUtilization.**Pit **0..*** To: **Pit**	Pit equipment for the rig.

11.12 PitType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specfies the type of pit.*

Attributes

Name	Type	Notes
bulk		
chemical		
drilling		
mix		
mud cleaning		
sand trap		
slug		The pit in the active pit system located immediately downstream of the shale shakers, whose primary purpose is to allow the settling and disposal of the larger drilled cuttings not removed by the shale shakers. It is also called a settling tank”.
storage		
surge tank		
trip tank		

Associations

Association	Notes
From: **PitType.** To: **TypeEnum**	
From: **Pit.** To: **PitType**	

11.13 PumpActionIntegerCode

Type: Class *Stereotype:* «XSDsimpleType»
Detail: *Created:* 4/13/2015 *Last modified:*11/10/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Pump Action: 1 = single acting, 2 = double acting.*

11.14 PumpType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of pump.*

Attributes

Name	Type	Notes
centrifugal		Centrifugal mud pump.
duplex		Duplex mud mump, two cylinders.
triplex		Triplex mud pump, three cylinders.

Associations

Association	Notes
From: **PumpType.** To: **TypeEnum**	
From: **MudPump.** To: **PumpType**	

11.15 Rig

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 10/18/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Rig Schema. Used to capture information unique to a drilling rig. For information about the usage of a rig in a specific operation, see the RigUtilization object.

Attributes

Name	Type	Notes
Approvals	String64	Rig approvals/certification.
CapWindDerrick	LengthPerTimeMeasure	Derrick wind capacity.
ClassRig	String64	Classification of the rig.
EmailAddress	String64	Email address of the contact person.
FaxNumber	String64	Fax number on the rig.
HtDerrick	LengthMeasure	Height of the derrick.
IsOffshore	boolean	Flag to indicate that the rig is an offshore rig (drill ship, semi-submersible, jack-up, platform, TADU). Values are "true" (or "1") and "false" (or "0").
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the company that manufactured the rig.
NameContact	String64	Name of the contact person.
NumCranes	long	Number of cranes on the rig.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the company that owns the rig.
RatingDerrick	ForceMeasure	Derrick rating.
RatingDrillDepth	LengthMeasure	Maximum hole depth rating for the rig.
RatingWaterDepth	LengthMeasure	Maximum water depth rating for the rig.
Registration	String64	Rig registration location.
TelNumber	String64	Telephone number on the rig.
TypeDerrick	DerrickType	Derrick type.
TypeRig	RigType	The type of rig (e.g., semi-submersible, jack-up, etc.)
YearEntService	gYear	The year the rig entered service.

Associations

Association			Notes
	From: **Rig.**	To: **RigType**	
	From: **Rig.**	To: **AbstractActiveObject**	
	From: **Rig.**	To: **DerrickType**	
1	From: **RigUtilization.**Rig To: **Rig**		

11.16 RigType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of drilling rig.*

Attributes

Name	Type	Notes
barge		Barge rig.
coiled tubing		Coiled tubing rig.
floater		Floating rig.
jackup		Jackup rig.
land		Land rig.
platform		Fixed platform.
semi-submersible		Semi-submersible rig.

Associations

Association	Notes
From: **RigType.** To: **TypeEnum**	
From: **Rig.** To: **RigType**	

11.17 RigUtilization

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Rig Utilization Schema. Used to capture information related to the usage of a specific rig. For information unique to the rig itself, see the Rig object.

Attributes

Name	Type	Notes
AirGap	LengthMeasure	Air gap from the rig floor to the ground or mean sea level, depending on the rig location.
Azimuthing	boolean	Are the thrusters azimuth? Values are "true" (or "1") and "false" (or "0").
BunksPerRoom	long	Number of bunks per room.
CapBulkCement	VolumeMeasure	Capacity of bulk cement.
CapBulkMud	VolumeMeasure	Bulk/dry mud storage capacity.
CapDrillWater	VolumeMeasure	Drill water capacity.
CapFuel	VolumeMeasure	Fuel capacity.
CapLiquidMud	VolumeMeasure	Liquid mud storage capacity.
CapPotableWater	VolumeMeasure	Potable water capacity.
CementUnit	String64	Name of the cement unit on the rig.
Datum	AbstractReferencePoint	Pointer to a reference point representing the datum for location reference.
DescBrake	String64	Rig brake description.
DescRotSystem	String64	Description of rotating system.
EndHoleDepth	LengthMeasure	Measured depth of the wellbore when operations performed with this rig ended.
EndOperationTime	TimeStamp	End time of the operation in which the rig was used.
Flares	String64	Description of flare(s).
Gantry	String64	Description of the gantry.
Generator	String64	Description of the electrical power generating system.
HeaveMx	LengthMeasure	Maximum allowable heave.
MainEngine	String64	Power system.
MoorType	String64	Mooring type.
MotionCompensationMn	ForceMeasure	Minimum motion compensation.
MotionCompensationMx	ForceMeasure	Maximum motion compensation.
MotorDrawWorks	String64	Description of the draw works motor.
NumAnch	long	Number of anchors.
NumBlockLines	long	Number of block lines.
NumBunks	long	Number of beds available on the rig.
NumGuideTens	long	Number of guideline tensioners.

NumRiserTens	long	Number of riser tensioners.
NumThrusters	long	Number of thrusters.
PipeHandlingSystem	String64	Name of pipe-handling system.
PowerDrawWorks	PowerMeasure	Draw works horse power.
RatingBlock	ForceMeasure	Rating for the block.
RatingDrawWorks	ForceMeasure	Weight rating of the draw works.
RatingHkld	ForceMeasure	Maximum weight rating of the hook as configured for this rig usage.
RatingRotSystem	ForceMeasure	The maximum weight rating of the rotary system on the rig. This could be the rotary system or the top drive.
RatingSwivel	ForceMeasure	Maximum swivel rating.
RatingTqRotSys	MomentOfForceMeasure	Work string rotational torque rating.
RiserAngleLimit	PlaneAngleMeasure	Riser angle limit.
RotSizeOpening	LengthMeasure	Rotary size opening.
RotSystem	DriveType	Work string drive type.
ScrSystem	String64	Description of slow circulation rates (SCR) system.
SizeDrillLine	LengthMeasure	Drill line diameter.
StartHoleDepth	LengthMeasure	Measured depth of the wellbore when operations performed with this rig started.
StartOperationTime	TimeStamp	Start time of the operation in which the rig was used.
StrokeMotionCompensation	LengthMeasure	Length of motion compensation provided by equipment.
TypeDrawWorks	DrawWorksType	Draw works type.
TypeHook	String64	Type of hook installed for this rig usage.
TypeSwivel	String64	Type of swivel.
VarDeckLdMx	ForceMeasure	Variable deck load maximum (offshore rigs only).
VdlStorm	ForceMeasure	Variable deck load storm rating (offshore rigs only).
WtBlock	ForceMeasure	Weight of the block.

Associations

Association		Notes
0..*	From: **RigUtilization.**Degasser To: **Degasser**	Mud de-gasser equipment for the rig.
1	From: **RigUtilization.**Rig To: **Rig**	
0..*	From: **RigUtilization.**Pit To: **Pit**	Pit equipment for the rig.
0..*	From: **RigUtilization.**Pump To: **MudPump**	Drilling fluid (mud/cement) pumping units for the rig.
0..*	From: **RigUtilization.**Shaker To: **Shaker**	
0..*	From: **RigUtilization.**BhaRun To: **BhaRun**	
	From: **RigUtilization.** To: **DrawWorksType**	

Association		Notes
0..1	From**: RigUtilization.**SurfaceEquipment To: **SurfaceEquipment**	Coiled tubing specific equipment configuration.
	From**: RigUtilization.** To: **DriveType**	
1	From**: RigUtilization.**Wellbore To: **Wellbore**	
0..*	From**: RigUtilization.**Hydrocyclone To: **Hydrocyclone**	Mud cleaning hydrocyclone equipment for the rig.
0..*	From**: RigUtilization.**Centrifuge To: **Centrifuge**	Mud cleaning centrifuge equipment for the rig.
0..1	From**: RigUtilization.**Bop To: **Bop**	Blow out preventer description and components.
AbstractActiveObject	From**: RigUtilization.** To:	

11.18 Shaker

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Shaker Schema.*

Attributes

Name	Type	Notes
CapFlow	VolumePerTimeMeasure	Maximum pump rate at which the unit efficiently operates.
DTimInstall	TimeStamp	Date and time the shaker was installed.
DTimRemove	TimeStamp	Date and time the shaker was removed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
LocationShaker	String64	Shaker location on the rig.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
Model	String64	Manufacturer's designated model.
MudCleaner	boolean	Is part of mud-cleaning assembly as opposed to discrete shale shaker? Values are "true" (or "1") and "false" (or "0").
Name	String64	Human-recognizable context for the shaker.
NameTag	NameTag	An identification tag for the shaker. A serial number is a type of identification tag; however, some tags contain many pieces of information. This element only identifies the tag and does not describe the contents. .
NumCascLevel	long	Number of cascade levels.
NumDecks	long	Number of decks.
Owner	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor/owner.
SizeMeshMn	LengthMeasure	Minimum mesh size.
Type	String64	Description for the type of object.
uid	String64	Unique identifier for this instance of Shaker.

Associations

Association	Notes
From: **RigUtilization.**Shaker **0..*** To: **Shaker**	

11.19 SurfaceEquipment

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Rig Surface Equipment Schema.*

Attributes

Name	Type	Notes
CtWrapType	String64	Coiled tubing: the coiled tubing wrap type.
Description	String2000	Description of item and details.
HtFlange	LengthMeasure	Height of the flange.
HtInjStk	LengthMeasure	Coiled tubing: The length of tubing from the end of the coil reel to the rotary kelly bushing. This length includes the tubing in the hole and the tubing on the reel. This measurement takes into account the 20 or so feet of tubing that is being straightened and pushed through the injector head.
HtSurfaceIron	LengthMeasure	Height of the surface iron.
HtTopStk	LengthMeasure	Top drive: The distance that the mud travels from the end of the standpipe hose to the drill pipe connection at the bottom of the top drive. We are measuring the distance that the mud will flow through the top drive.For the top drive. The distance that the mud travels from the end of the standpipe hose to the drill pipe connection at the bottom of the top drive. This is the measurement of the distance that the mud flows through the top drive.
IdDischargeLine	LengthMeasure	Coiled tubing: inner diameter of the pump discharge line.
IdHose	LengthMeasure	Inner diameter of the kelly hose.
IdKelly	LengthMeasure	Inner diameter of the kelly bushing.
IdStandpipe	LengthMeasure	Inner diameter of the standpipe.
IdSurfaceIron	LengthMeasure	Inner diameter of the surface iron.
IdSwivel	LengthMeasure	Inner diameter of the swivel.
IdTopStk	LengthMeasure	Top drive: inner diameter of the top stack.
InjStkUp	boolean	Coiled tubing: Does it have an injector stack up? Values are "true" (or "1") and "false" (or "0").
LenDischargeLine	LengthMeasure	Coiled tubing: length of the pump discharge line.
LenHose	LengthMeasure	Length of the kelly hose.
LenKelly	LengthMeasure	Length of the kelly bushing.
LenReel	LengthMeasure	Coiled tubing: length of the coiled tubing remaining on the reel.

LenStandpipe	LengthMeasure	Length of the standpipe.
LenSurfaceIron	LengthMeasure	Length of the surface iron.
LenSwivel	LengthMeasure	Length of the swivel.
LenUmbilical	LengthMeasure	Coiled tubing: length of the umbilical.
OdCore	LengthMeasure	Coiled tubing: outside diameter of the reel core that the coiled tubing is wrapped around.
OdReel	LengthMeasure	Coiled tubing: outside diameter of the coiled tubing reel.
OdUmbilical	LengthMeasure	Coiled tubing: outer diameter of the umbilical.
PresRating	PressureMeasure	Pressure rating of the item.
TypeSurfEquip	SurfEquipType	Surface equipment type (IADC1-4, Custom, Coiled Tubing).
UmbInside	boolean	Coiled tubing: Umbilical inside, true/false flag to account for the wireline inside the coiled tubing. With this pressure loss calculation, you can calculate for the strings used for logging, wireline coring, etc. Values are "true" (or "1") and "false" (or "0").
UseHose	boolean	Use kelly hose geometry? Values are "true" (or "1") and "false" (or "0").
UseInjStack	boolean	Use injector stack height? Values are "true" (or "1") and "false" (or "0").
UseKelly	boolean	Use kelly geometry? Values are "true" (or "1") and "false" (or "0").
UsePumpDischarge	boolean	Use pump discharge line? Values are "true" (or "1") and "false" (or "0").
UseStandpipe	boolean	Use standpipe geometry? Values are "true" (or "1") and "false" (or "0").
UseSurfaceIron	boolean	Use surface iron description? Values are "true" (or "1") and "false" (or "0").
UseSwivel	boolean	Use swivel geometry? Values are "true" (or "1") and "false" (or "0").
UseTopStack	boolean	Use top stack height? Values are "true" (or "1") and "false" (or "0").
WidReelWrap	LengthMeasure	Coiled tubing: width of the reel core. This is the inside dimension.

Associations

Association	Notes
From: **SurfaceEquipment.** To: **SurfEquipType**	

Association		Notes
0..1	From**: RigUtilization.**SurfaceEquipment To: **SurfaceEquipment**	Coiled tubing specific equipment configuration.

11.20 SurfEquipType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of surface equipment.*

Attributes

Name	Type	Notes
IADC		
custom		
coiled tubing		
unknown		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **SurfEquipType.** To: **TypeEnum**	
From: **SurfaceEquipment.** To: **SurfEquipType**	

12 Risk

Package: xsd_schemas

Notes: Risk Schema.

TypeEnum
«Enumeration»
RiskType
risk
event
near miss
best practice
lessons learned
other
TypeEnum
«Enumeration»
RiskCategory
hydraulics
mechanical
time related
wellbore stability
directional drilling
bit
equipment failure
completion
casing
other
HSE
TypeEnum
«Enumeration»
RiskSubCategory
gas kick
shallow water influx
other influx or kicks
loss circulation
poor hole cleaning
good hole cleaning at high ROP
high mud weight
special additives needed
gumbo problems
high ECD - rheology related
excessive circulation
performing a kill
mud weight change
excessive pipe cement scaling
pit gain or loss
mud stability problems
shallow gas flow
twist off
stuck pipe
wireline stuck in hole
stick and slip
vibration - axial
vibration - torsional
vibration - transverse
vibration unknown or rough drilling
uneven wear of BHA
uneven wear of drillstring
excessive torque
excessive drag
reaming greater than 2 hours
washouts
tight hole or overPull
failed inspections or fatigue wear
mechanical
drilling greater than 1000 feet/day
drilling greater than 2000 feet/day
drilling less than 20 feet/day
trips greater than 24 hours
excessive time for BHA makeup
waiting on decisions
waiting on weather
waiting on tools
sloughing or packoffs
ballooning
fracture problems
unstable zones
formation integrity test
leak-off test
tectonics
pore pressure
breakouts
bed parallel
wellbore stability
excessive doglegs
sidetrack
BHA change for directional
wrong total flow area
well collision - actual
well collision - technical
geosteering
abnormal tendency changes
resurveying
in-field referencing (IFR) actions
bit or BHA performance
drilling optimization
bit balling
lost cones or broken cutters
excessive bit wear or gauge
low rate of bit penetration
high rate of bit penetration
downhole tool
surface system
motor or rotary steerable system failure
topdrive failure
hoisting equipment failure
circulating equipment failure
electrical system failure
blow out preventer events
surface instrumentation problems
rig communications
completion equipment failure
miscellaneous rig equipment
tool or equipment failure
squeeze jobs
casing surge losses
stuck casing or completion
shoe failures
early cement setup
casing collapse
milling
excessive casing wear or cuttings
excessive formation damage or skin
casing rotation or reciprocation rqd
broaching
completion or casing
stratigraphy
fishing
junk in hole
delay due to political unrest
rig move
gas hydrates
pending analysis
riser disconnect
other
personnel
environmental
automotive
asset
information
time
HSE
TypeEnum
«Enumeration»
RiskAffectedPersonnel
cementer
company man
contractor
directional driller
driller
drilling engineer
drilling superintendent
drilling team
facility engineer
field service manager
foreman
general service supervisor
geologist
member
mud engineer
mud logger
MWD or LWD engineer
perform engineer
petrophysicist
production engineer
remotely operated vehicle engineer
safety manager
sales engineer
service supervisor
technical support
tool pusher
wireline engineer
«XSDcomplexType,XSDtopLevelElement»
Risk
«XSDelement»
+ AffectedPersonnel: RiskAffectedPersonnel [0..*]
+ Category: RiskCategory
+ Contingency: String2000 [0..1]
+ Details: String2000 [0..1]
+ DiaHole: LengthMeasure [0..1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ ExtendCategory: String64 [0..1]
+ Identification: String2000 [0..1]
+ MdBitEnd: MeasuredDepth [0..1]
+ MdBitStart: MeasuredDepth [0..1]
+ MdHoleEnd: MeasuredDepth [0..1]
+ MdHoleStart: MeasuredDepth [0..1]
+ Mitigation: String2000 [0..*]
+ ProbabilityLevel: LevelIntegerCode [0..1]
+ SeverityLevel: LevelIntegerCode [0..1]
+ SubCategory: RiskSubCategory [0..1]
+ Summary: String2000 [0..1]
+ TvdHoleEnd: AbstractVerticalDepth [0..1]
+ TvdHoleStart: AbstractVerticalDepth [0..1]
+ Type: RiskType
notes
Risk Schema. Used to provide a central location for capturing risk information about the well design and other well-related data objects.
+ParentWellbore
0..1
AbstractActiveObject
«XSDcomplexType,XSDto...
Wellbore::Wellbore
+Wellbore
1..1
long
«XSDsimpleType»
LevelIntegerCode
+ObjectReference
0..*
«XSDcomplexType»
Abstract::AbstractObject
«XSDelement»
+ Aliases: ObjectAlias [0..*]
+ BusinessActivityHistory: String64 [0..-1]
+ Citation: Citation
+ CustomData: CustomData [0..1]
+ Existence: ExistenceKindExt [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ ObjectVersionReason: String2000 [0..1]
+ OSDUIntegration: OSDUIntegration [0..1]
«XSDattribute»
+ objectVersion: String64 [0..1]
+ schemaVersion: String64
+ uuid: UuidString

12.1 LevelIntegerCode

Type: Class *Stereotype:* «XSDsimpleType»
Detail: *Created:* 4/13/2015 *Last modified:*11/10/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Integer level code from 1 through 8.*

Associations

Association	Notes
From: **Risk.** To: **LevelIntegerCode**	
From: **Risk.** To: **LevelIntegerCode**	

12.2 Risk

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Risk Schema. Used to provide a central location for capturing risk information about the well design and other well-related data objects.

Attributes

Name	Type	Notes
AffectedPersonnel	RiskAffectedPersonnel	The personnel affected by the risk.
Category	RiskCategory	The category of risk.
Contingency	String2000	Plan of action if the risk materializes.
Details	String2000	Complete description of the risk.
DiaHole	LengthMeasure	Hole diameter.
DTimEnd	TimeStamp	Date and time that activities (related to the risk) were completed.
DTimStart	TimeStamp	Date and time that activities (related to the risk) started.
ExtendCategory	String64	Custom string to further categorize the risk.
Identification	String2000	Details for identifying the risk.
MdBitEnd	MeasuredDepth	Measured depth of the bit at the end of the activity.
MdBitStart	MeasuredDepth	Measured depth of the bit at the start of the activity.
MdHoleEnd	MeasuredDepth	Measured Depth at the end of the activity.
MdHoleStart	MeasuredDepth	Measured Depth at the start of the activity.
Mitigation	String2000	Plan of action to ensure the risk does not materialize.
ProbabilityLevel	LevelIntegerCode	Probability level of the risk occurring. Values of 1 through 5, with 1 being the lowest probability.
SeverityLevel	LevelIntegerCode	Severity level of the risk. Values of 1 through 5, with 1 being the lowest risk level.
SubCategory	RiskSubCategory	The sub category of risk.
Summary	String2000	Summary description of the risk.
TvdHoleEnd	AbstractVerticalDepth	True vertical depth at the end of the activity.
TvdHoleStart	AbstractVerticalDepth	True vertical depth at the start of the activity.
Type	RiskType	The type of risk.

Associations

Association	Notes
From: **Risk.** To: **LevelIntegerCode**	

Association		Notes
	From: **Risk.** To: **RiskCategory**	
1..1	From: **Risk.**Wellbore To: **Wellbore**	
	From: **Risk.** To: **LevelIntegerCode**	
	From: **Risk.** To: **RiskAffectedPersonnel**	
	From: **Risk.** To: **AbstractObject**	
0..*	From: **Risk.**ObjectReference To: **AbstractObject**	A reference to an object that is defined within the context of a wellbore.
	From: **Risk.** To: **RiskSubCategory**	
	From: **Risk.** To: **RiskType**	

12.3 RiskAffectedPersonnel

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Personnel affected by a risk.*

Attributes

Name	Type	Notes
cementer		
company man		
contractor		
directional driller		
driller		
drilling engineer		
drilling superintendent		
drilling team		
facility engineer		
field service manager		
foreman		
general service supervisor		
geologist		
member		
mud engineer		
mud logger		
MWD or LWD engineer		measurement while drilling or logging while drilling
perform engineer		
petrophysicist		
production engineer		
remotely operated vehicle engineer		
safety manager		
sales engineer		
service supervisor		
technical support		
tool pusher		
wireline engineer		

Associations

Association	Notes
From: **RiskAffectedPersonnel.** To: **TypeEnum**	
From: **Risk.** To: **RiskAffectedPersonnel**	

12.4 RiskCategory

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the category of risk.*

Attributes

Name	Type	Notes
hydraulics		
mechanical		
time related		Specifies the category of risk.
wellbore stability		
directional drilling		
bit		
equipment failure		
completion		
casing		
other		
HSE		health, safety and environmental

Associations

Association	Notes
From: **RiskCategory.** To: **TypeEnum**	
From: **Risk.** To: **RiskCategory**	

12.5 RiskSubCategory

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the sub-category of risk, in relation to value of Risk Category.*

Attributes

Name	Type	Notes
gas kick		
shallow water influx		
other influx or kicks		
loss circulation		
poor hole cleaning		
good hole cleaning at high ROP		Rate of Penetration
high mud weight		High mud weight (i.e., greater than 10 parts per US gallon).
special additives needed		
gumbo problems		
high ECD - rheology related		
excessive circulation		Greater than 2 hours.
performing a kill		
mud weight change		Greater than 0.5 parts per US gallon.
excessive pipe cement scaling		
pit gain or loss		Greater than ten barrles.
mud stability problems		
shallow gas flow		
twist off		
stuck pipe		Greater than 30 minutes.
wireline stuck in hole		
stick and slip		
vibration - axial		
vibration - torsional		
vibration - transverse		
vibration unknown or rough drilling		
uneven wear of BHA		
uneven wear of drillstring		
excessive torque		
excessive drag		
reaming greater than 2 hours		Greater than 2 hours.
washouts		

tight hole or overPull		
failed inspections or fatigue wear		
mechanical		
drilling greater than 1000 feet/day		Greater than 1000 feet per day.
drilling greater than 2000 feet/day		Greater than 2000 feet per day.
drilling less than 20 feet/day		Less than 20 feet per day.
trips greater than 24 hours		Greater than 24 hours.
excessive time for BHA makeup		Bottom Hole Assembly
waiting on decisions		
waiting on weather		
waiting on tools		
sloughing or packoffs		
ballooning		
fracture problems		
unstable zones		
formation integrity test		
leak-off test		
tectonics		
pore pressure		
breakouts		
bed parallel		
wellbore stability		
excessive doglegs		
sidetrack		
BHA change for directional		Bottom Hole Assembly
wrong total flow area		
well collision - actual		
well collision - technical		
geosteering		
abnormal tendency changes		
resurveying		
in-field referencing (IFR) actions		
bit or BHA performance		Bottom Hole Assembly
drilling optimization		
bit balling		
lost cones or broken cutters		
excessive bit wear or gauge		
low rate of bit penetration		
high rate of bit penetration		
downhole tool		

surface system		
motor or rotary steerable system failure		
topdrive failure		
hoisting equipment failure		
circulating equipment failure		
electrical system failure		
blow out preventer events		
surface instrumentation problems		
rig communications		
completion equipment failure		
miscellaneous rig equipment		
tool or equipment failure		
squeeze jobs		
casing surge losses		
stuck casing or completion		
shoe failures		
early cement setup		
casing collapse		
milling		
excessive casing wear or cuttings		
excessive formation damage or skin		
casing rotation or reciprocation rqd		
broaching		
completion or casing		
stratigraphy		
fishing		
junk in hole		
delay due to political unrest		
rig move		
gas hydrates		
pending analysis		
riser disconnect		
other		
personnel		
environmental		
automotive		
asset		
information		
time		
HSE		health, safety and environmental

Associations

Association	Notes
From: **RiskSubCategory.** To: **TypeEnum**	
From: **Risk.** To: **RiskSubCategory**	

12.6 RiskType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of risk.*

Attributes

Name	Type	Notes
risk		
event		
near miss		
best practice		
lessons learned		
other		

Associations

Association	Notes
From: **RiskType.** To: **TypeEnum**	
From: **Risk.** To: **RiskType**	

13 StimJob

Package: xsd_schemas

Notes: Stimulation Job (StimJob) Schema.

AbstractObject
«XSDcomplexType,XSDtopLevelElement»
StimJob
«XSDelement»
+ AvgJobPres: PressureMeasure [0..1]
+ BottomholeStaticTemperature: ThermodynamicTemperatureMeasure [0..1]
+ CustomerName: String2000
+ DTimArrival: TimeStamp [0..1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ FlowBackPres: PressureMeasure [0..1]
+ FlowBackRate: VolumePerTimeMeasure [0..1]
+ FlowBackVolume: VolumeMeasure [0..1]
+ FluidEfficiency: VolumePerVolumeMeasure [0..1]
+ HhpOrdered: PowerMeasure [0..1]
+ HhpUsed: PowerMeasure [0..1]
+ JobPerforationClusters: StimPerforationClusterSet [0..1]
+ Kind: String2000
+ MaxFluidRate: VolumePerTimeMeasure [0..1]
+ MaxJobPres: PressureMeasure [0..1]
+ PIDXCommodityCode: PIDXCommodityCode [0..1]
+ ServiceCompany: BusinessAssociate
+ StageCount: NonNegativeLong [0..1]
+ Supervisor: String64 [0..1]
+ TotalJobVolume: VolumeMeasure [0..1]
+ TotalProppantInFormation: MassMeasure [0..1]
+ TotalProppantUsed: MassMeasure [0..1]
+ TotalPumpTime: TimeMeasure [0..1]
+ TreatingBottomholeTemperature: ThermodynamicTemperatureMeasure [0..1]
+JobStage
«byValue»
0..*
AbstractObject
«XSDcomplexType,XSDtopLevelElement»
StimJobStage
«XSDelement»
+ AvgBaseFluidReturnVolumeRate: VolumePerTimeMeasure [0..1]
+ AvgBHStaticTemperature: ThermodynamicTemperatureMeasure [0..1]
+ AvgBHTreatingTemperature: ThermodynamicTemperatureMeasure [0..1]
+ AvgBottomholePumpedVolumeRate: VolumePerTimeMeasure [0..1]
+ AvgConductivity: LengthPerTimeMeasure [0..1]
+ AvgFractureWidth: LengthMeasure [0..1]
+ AvgHydraulicPower: PowerMeasure [0..1]
+ AvgPresAnnulus: PressureMeasure [0..1]
+ AvgPresCasing: PressureMeasure [0..1]
+ AvgPresSurface: PressureMeasure [0..1]
+ AvgPresTubing: PressureMeasure [0..1]
+ AvgProppantConcBottomhole: MassPerVolumeMeasure [0..1]
+ AvgProppantConcSurface: MassPerVolumeMeasure [0..1]
+ AvgSlurryReturnVolumeRate: VolumePerTimeMeasure [0..1]
+ BreakDownPres: PressureMeasure [0..1]
+ ClosureDuration: TimeMeasure [0..1]
+ ClosurePres: PressureMeasure [0..1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ FormationBreakLengthPerDay: LengthMeasure [0..1]
+ FormationName: String2000 [0..1]
+ FormationProppantMass: MassMeasure [0..1]
+ FractureGradientFinal: ForcePerVolumeMeasure [0..1]
+ FractureGradientInitial: ForcePerVolumeMeasure [0..1]
+ FractureHeight: LengthMeasure [0..1]
+ FractureLength: LengthMeasure [0..1]
+ FrictionPressure: PressureMeasure [0..1]
+ HhpOrderedCO2: PowerMeasure [0..1]
+ HhpOrderedFluid: PowerMeasure [0..1]
+ HhpUsedCO2: PowerMeasure [0..1]
+ HhpUsedFluid: PowerMeasure [0..1]
+ InitialShutinPres: PressureMeasureExt [0..1]
+ MaxFluidVolumeRateAnnulus: VolumePerTimeMeasure [0..1]
+ MaxFluidVolumeRateCasing: VolumePerTimeMeasure [0..1]
+ MaxFluidVolumeRateTubing: VolumePerTimeMeasure [0..1]
+ MaxHydraulicPower: PowerMeasure [0..1]
+ MaxPresAnnulus: PressureMeasure [0..1]
+ MaxPresCasing: PressureMeasure [0..1]
+ MaxPresSurface: PressureMeasure [0..1]
+ MaxPresTubing: PressureMeasure [0..1]
+ MaxProppantConcBottomhole: MassPerVolumeMeasure [0..1]
+ MaxProppantConcSurface: MassPerVolumeMeasure [0..1]
+ MdFormationBottom: MeasuredDepth [0..1]
+ MdFormationTop: MeasuredDepth [0..1]
+ MdOpenHoleBottom: MeasuredDepth [0..1]
+ MdOpenHoleTop: MeasuredDepth [0..1]
+ NetPres: PressureMeasure [0..1]
+ Number: PositiveLong [0..1]
+ OpenHoleDiameter: LengthMeasure [0..1]
+ OpenHoleName: String2000 [0..1]
+ PercentPad: VolumePerVolumeMeasure [0..1]
+ PercentProppantPumped: VolumePerVolumeMeasure [0..1]
+ PerfBallCount: NonNegativeLong [0..1]
+ PerfBallSize: LengthMeasure [0..1]
+ PerfProppantConc: MassPerVolumeMeasure [0..1]
+ ProppantHeight: LengthMeasure [0..1]
+ ScreenedOut: boolean [0..1]
+ ScreenOutPres: PressureMeasure [0..1]
+ StagePerforationClusters: StimPerforationClusterSet [0..1]
+ TechnologyType: String64 [0..1]
+ TotalProppantInFormation: MassMeasure [0..1]
+ TotalPumpTime: TimeMeasure [0..1]
+ TotalVolume: VolumeMeasure [0..1]
+ TvdFormationBottom: AbstractVerticalDepth [0..1]
+ TvdFormationTop: AbstractVerticalDepth [0..1]
+ TvdOpenHoleBottom: AbstractVerticalDepth [0..1]
+ TvdOpenHoleTop: AbstractVerticalDepth [0..1]
+ VolumeBody: VolumeMeasure [0..1]
+ VolumeFlush: VolumeMeasure [0..1]
+ VolumePad: VolumeMeasure [0..1]
+ WaterSource: String2000 [0..1]
+ WellboreProppantMass: MassMeasure [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
StimPerforationClusterSet
+StimPerforationCluster
«byValue»
1..*
AbstractObject
«XSDcomplexType,XSDtopLevelElement»
StimPerforationCluster
«XSDelement»
+ DensityPerforation: ReciprocalLengthMeasure [0..1]
+ DischargeCoefficient: double [0..1]
+ FrictionFactor: double [0..1]
+ FrictionPres: PressureMeasure [0..1]
+ MdPerforatedInterval: MdInterval [0..1]
+ PerforationCount: NonNegativeLong [0..1]
+ PhasingPerforation: PlaneAngleMeasure [0..1]
+ Size: LengthMeasure [0..1]
+ TvdPerforatedInterval: AbstractTvdInterval [0..1]
+ Type: String64 [0..1]
+MaterialCatalog
0..1
+LogCatalog
0..*
«XSDcomplexType»
StimJobMaterialCatalog
«XSDelement»
+ Additives: StimAdditive [0..*]
+ ProppantAgents: StimProppantAgent [0..-1]
«XSDcomplexType»
StimJobLogCatalog
«XSDcomplexType»
StimMaterial
+JobLog
1..*
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Log::Log
«XSDelement»
+ ChannelState: ChannelState [0..1]
+ Derivation: ChannelDerivation [0..1]
+ HoleLoggingStatus: HoleLoggingStatus [0..1]
+ LoggingCompany: BusinessAssociate [0..1]
+ LoggingCompanyCode: long [0..1]
+ LoggingMethod: LoggingMethod [0..1]
+ LoggingServicePeriod: DateTimeInterval [0..1]
+ LoggingToolClass: LoggingToolClassExt [0..1]
+ LoggingToolClassLongName: String256 [0..1]
+ LoggingToolKind: LoggingToolKind [0..1]
+ LogOSDUIntegration: LogOSDUIntegration [0..1]
+ MudClass: MudClassExt [0..1]
+ MudSubClass: MudSubClassExt [0..1]
+ NominalHoleSize: LengthMeasureExt [0..1]
+ NominalSamplingInterval: GenericMeasure [0..1]
+ PassDescription: String64 [0..1]
+ PassDetail: PassDetail [0..-1]
+ PassNumber: String64 [0..1]
+ PrimaryIndexInterval: AbstractInterval [0..1]
+ RunNumber: String64 [0..1]
+StimStageLog
0..*

«XSDcomplexType»
StimJobDiagnosticSession
«XSDelement»
+ AvgBottomholeTreatmentPres: PressureMeasure [0..1]
+ AvgBottomholeTreatmentRate: VolumePerTimeMeasure [0..1]
+ BaseFluidVol: VolumeMeasure [0..1]
+ BottomholeHydrostaticPres: PressureMeasure [0..1]
+ BottomholeTemperature: ThermodynamicTemperatureMeasure [0..1]
+ BubblePointPres: PressureMeasure [0..1]
+ ChokeSize: LengthMeasure [0..1]
+ Description: String2000 [0..1]
+ DTimFractureClose: TimeStamp [0..1]
+ DTimPumpOff: TimeStamp [0..1]
+ DTimPumpOn: TimeStamp [0..1]
+ DTimWellShutin: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FluidCompressibility: IsothermalCompressibilityMeasure [0..1]
+ FluidDensity: MassPerVolumeMeasure [0..1]
+ FluidEfficiency: VolumePerVolumeMeasure [0..1]
+ FluidKprimeFactor: DimensionlessMeasure [0..1]
+ FluidNprimeFactor: DimensionlessMeasure [0..1]
+ FluidSpecificHeat: SpecificHeatCapacityMeasure [0..1]
+ FluidThermalConductivity: ThermalConductivityMeasure [0..1]
+ FluidThermalExpansionCoefficient: VolumetricThermalExpansionMeasure [0..1]
+ FoamQuality: VolumePerVolumeMeasure [0..1]
+ FractureClosePres: PressureMeasure [0..1]
+ FrictionPres: PressureMeasure [0..1]
+ InitialShutinPres: PressureMeasure [0..1]
+ MdBottomhole: MeasuredDepth [0..1]
+ MdMidPerforation: MeasuredDepth [0..1]
+ MdSurface: MeasuredDepth [0..1]
+ Name: String64 [0..1]
+ Number: NonNegativeLong [0..1]
+ PercentPad: VolumePerVolumeMeasure [0..1]
+ PorePres: PressureMeasure [0..1]
+ PumpDuration: TimeMeasure [0..1]
+ ReservoirTotalCompressibility: IsothermalCompressibilityMeasure [0..1]
+ StageNumber: NonNegativeLong [0..1]
+ SurfaceFluidTemperature: ThermodynamicTemperatureMeasure [0..1]
+ SurfaceTemperature: ThermodynamicTemperatureMeasure [0..1]
+ TemperatureCorrectionApplied: boolean [0..1]
+ TvdMidPerforation: AbstractVerticalDepth [0..1]
+ WellboreVolume: VolumeMeasure [0..1]
«XSDattribute»
+ uid: String64
+StepDownTest
0..*
«XSDcomplexType»
StimStepDownTest
«XSDelement»
+ BottomholeFluidDensity: MassPerVolumeMeasure [0..1]
+ DiameterEntryHole: LengthMeasure [0..1]
+ DischargeCoefficient: DimensionlessMeasure [0..1]
+ EffectivePerfs: NonNegativeLong [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ InitialShutinPres: PressureMeasure [0..1]
+ PerforationCount: NonNegativeLong [0..1]
+ Step: StimPumpFlowBackTestStep [0..*]
«XSDattribute»
+ uid: String64
+StepRateTest
0..*
«XSDcomplexType»
StimStepTest
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FractureExtensionPres: PressureMeasure [0..1]
«XSDattribute»
+ uid: String64
+PresMeasurement
0..*
«XSDcomplexType»
StimPressureFlowRate
«XSDelement»
+ BottomholeRate: VolumePerTimeMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Pressure: PressureMeasure [0..1]
«XSDattribute»
+ uid: String64
+PumpFlowBackTest
0..*
«XSDcomplexType»
StimPumpFlowBackTest
«XSDelement»
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FlowBackVolume: VolumeMeasure [0..1]
+ FractureCloseDuration: TimeMeasure [0..1]
+ FractureClosePres: PressureMeasure [0..1]
+ PresCasing: PressureMeasure [0..1]
+ PresTubing: PressureMeasure [0..1]
«XSDattribute»
+ uid: String64
+Step
0..*
«XSDcomplexType»
StimPumpFlowBackTestStep
«XSDelement»
+ BottomholeRate: VolumePerTimeMeasure [0..1]
+ DTim: TimeStamp [0..1]
+ EntryFriction: PressureMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FlowbackVolume: VolumeMeasure [0..1]
+ FlowbackVolumeRate: VolumePerTimeMeasure [0..1]
+ NearWellboreFriction: PressureMeasure [0..1]
+ Number: NonNegativeLong
+ PerfFriction: PressureMeasure [0..1]
+ PipeFriction: PressureMeasure [0..1]
+ Pres: PressureMeasure [0..1]
+ SurfaceRate: VolumePerTimeMeasure [0..1]
«XSDattribute»
+ uid: String64
+FluidEfficiencyTest
0..*
«XSDcomplexType»
StimFetTest
«XSDelement»
+ AnalysisMethod: StimFetTestAnalysisMethod [0..-1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ EndPdlDuration: TimeMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FluidEfficiency: VolumePerVolumeMeasure [0..1]
+ FractureCloseDuration: TimeMeasure [0..1]
+ FractureClosePres: PressureMeasure [0..1]
+ FractureExtensionPres: PressureMeasure [0..1]
+ FractureGradient: ForcePerVolumeMeasure [0..1]
+ FractureLength: LengthMeasure [0..1]
+ FractureWidth: LengthMeasure [0..1]
+ NetPres: PressureMeasure [0..1]
+ PdlCoef: DimensionlessMeasure [0..1]
+ PorePres: PressureMeasure [0..1]
+ PseudoRadialPres: PressureMeasure [0..1]
+ ResidualPermeability: PermeabilityRockMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
StimFetTestAnalysisMethod
average
delta pressure over g-time
delta pressure over linear time
delta pressure over radial time
gdk 2-d
horner
linear
log-log
nolte
other
pdl coefficient
perkins and kern 2-d
radial 2-d
square root
third-party software

AbstractObject
«XSDcomplexType,XSDtopLevelElement»
StimJobStage
«XSDelement»
+ AvgBaseFluidReturnVolumeRate: VolumePerTimeMeasure [0..1]
+ AvgBHStaticTemperature: ThermodynamicTemperatureMeasure [0..1]
+ AvgBHTreatingTemperature: ThermodynamicTemperatureMeasure [0..1]
+ AvgBottomholePumpedVolumeRate: VolumePerTimeMeasure [0..1]
+ AvgConductivity: LengthPerTimeMeasure [0..1]
+ AvgFractureWidth: LengthMeasure [0..1]
+ AvgHydraulicPower: PowerMeasure [0..1]
+ AvgPresAnnulus: PressureMeasure [0..1]
+ AvgPresCasing: PressureMeasure [0..1]
+ AvgPresSurface: PressureMeasure [0..1]
+ AvgPresTubing: PressureMeasure [0..1]
+ AvgProppantConcBottomhole: MassPerVolumeMeasure [0..1]
+ AvgProppantConcSurface: MassPerVolumeMeasure [0..1]
+ AvgSlurryReturnVolumeRate: VolumePerTimeMeasure [0..1]
+ BreakDownPres: PressureMeasure [0..1]
+ ClosureDuration: TimeMeasure [0..1]
+ ClosurePres: PressureMeasure [0..1]
+ DTimEnd: TimeStamp [0..1]
+ DTimStart: TimeStamp [0..1]
+ FormationBreakLengthPerDay: LengthMeasure [0..1]
+ FormationName: String2000 [0..1]
+ FormationProppantMass: MassMeasure [0..1]
+ FractureGradientFinal: ForcePerVolumeMeasure [0..1]
+ FractureGradientInitial: ForcePerVolumeMeasure [0..1]
+ FractureHeight: LengthMeasure [0..1]
+ FractureLength: LengthMeasure [0..1]
+ FrictionPressure: PressureMeasure [0..1]
+ HhpOrderedCO2: PowerMeasure [0..1]
+ HhpOrderedFluid: PowerMeasure [0..1]
+ HhpUsedCO2: PowerMeasure [0..1]
+ HhpUsedFluid: PowerMeasure [0..1]
+ InitialShutinPres: PressureMeasureExt [0..1]
+ MaxFluidVolumeRateAnnulus: VolumePerTimeMeasure [0..1]
+ MaxFluidVolumeRateCasing: VolumePerTimeMeasure [0..1]
+ MaxFluidVolumeRateTubing: VolumePerTimeMeasure [0..1]
+ MaxHydraulicPower: PowerMeasure [0..1]
+ MaxPresAnnulus: PressureMeasure [0..1]
+ MaxPresCasing: PressureMeasure [0..1]
+ MaxPresSurface: PressureMeasure [0..1]
+ MaxPresTubing: PressureMeasure [0..1]
+ MaxProppantConcBottomhole: MassPerVolumeMeasure [0..1]
+ MaxProppantConcSurface: MassPerVolumeMeasure [0..1]
+ MdFormationBottom: MeasuredDepth [0..1]
+ MdFormationTop: MeasuredDepth [0..1]
+ MdOpenHoleBottom: MeasuredDepth [0..1]
+ MdOpenHoleTop: MeasuredDepth [0..1]
+ NetPres: PressureMeasure [0..1]
+ Number: PositiveLong [0..1]
+ OpenHoleDiameter: LengthMeasure [0..1]
+ OpenHoleName: String2000 [0..1]
+ PercentPad: VolumePerVolumeMeasure [0..1]
+ PercentProppantPumped: VolumePerVolumeMeasure [0..1]
+ PerfBallCount: NonNegativeLong [0..1]
+ PerfBallSize: LengthMeasure [0..1]
+ PerfProppantConc: MassPerVolumeMeasure [0..1]
+ ProppantHeight: LengthMeasure [0..1]
+ ScreenedOut: boolean [0..1]
+ ScreenOutPres: PressureMeasure [0..1]
+ StagePerforationClusters: StimPerforationClusterSet [0..1]
+ TechnologyType: String64 [0..1]
+ TotalProppantInFormation: MassMeasure [0..1]
+ TotalPumpTime: TimeMeasure [0..1]
+ TotalVolume: VolumeMeasure [0..1]
+ TvdFormationBottom: AbstractVerticalDepth [0..1]
+ TvdFormationTop: AbstractVerticalDepth [0..1]
+ TvdOpenHoleBottom: AbstractVerticalDepth [0..1]
+ TvdOpenHoleTop: AbstractVerticalDepth [0..1]
+ VolumeBody: VolumeMeasure [0..1]
+ VolumeFlush: VolumeMeasure [0..1]
+ VolumePad: VolumeMeasure [0..1]
+ WaterSource: String2000 [0..1]
+ WellboreProppantMass: MassMeasure [0..1]
«XSDattribute»
+ uid: String64
+Diversion
0..1
«XSDcomplexType»
StimJobDiversion
«XSDelement»
+ Contractor: BusinessAssociate [0..1]
+ ElementSpacing: LengthMeasure [0..1]
+ Method: StimJobDiversionMethod [0..1]
+ ToolDescription: String2000 [0..1]
TypeEnum
«Enumeration»
StimJobDiversionMethod
ball sealer
bands
chemical
fibers
other
packer
solid particle
straddle packer
«XSDcomplexType»
StimReservoirInterval
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ FormationPermeability: PermeabilityRockMeasure [0..1]
+ FormationPorosity: VolumePerVolumeMeasure [0..1]
+ GrossPayMdInterval: MdInterval [0..1]
+ GrossPayThickness: LengthMeasure [0..1]
+ LithFormationPermeability: PermeabilityRockMeasure [0..1]
+ LithMdInterval: MdInterval [0..1]
+ LithName: String2000 [0..1]
+ LithNetPayThickness: LengthMeasure [0..1]
+ LithPoissonsRatio: DimensionlessMeasure [0..1]
+ LithPorePres: PressureMeasure [0..1]
+ LithYoungsModulus: PressureMeasure [0..1]
+ NameFormation: String2000 [0..1]
+ NetPayFluidCompressibility: IsothermalCompressibilityMeasure [0..1]
+ NetPayFluidViscosity: DynamicViscosityMeasure [0..1]
+ NetPayFormationPermeability: PermeabilityRockMeasure [0..1]
+ NetPayFormationPorosity: VolumePerVolumeMeasure [0..1]
+ NetPayName: String2000 [0..1]
+ NetPayPorePres: PressureMeasure [0..1]
+ NetPayThickness: LengthMeasure [0..1]
«XSDattribute»
+ uid: String64
+ReservoirInterval
0..*
«XSDcomplexType»
StimShutInPressure
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Pressure: PressureMeasure
+ TimeAfterShutin: TimeMeasure
«XSDattribute»
+ uid: String64
+ShutInPres
0..*
«XSDcomplexType»
StimEvent
«XSDelement»
+ Comment: String2000 [0..1]
+ DTim: TimeStamp [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Number: PositiveLong
+ NumStep: PositiveLong [0..1]
«XSDattribute»
+ uid: String64
+JobEvent
0..*
«XSDcomplexType»
StimFlowPath
«XSDelement»
+ AvgPmaxPacPres: PressureMeasure [0..1]
+ AvgPmaxWeakLinkPres: PressureMeasure [0..1]
+ BreakDownPres: PressureMeasure [0..1]
+ BridgePlugMD: MeasuredDepth [0..1]
+ FractureGradient: ForcePerVolumeMeasure [0..1]
+ FrictionFactorOpenHole: DimensionlessMeasure [0..1]
+ FrictionFactorPipe: DimensionlessMeasure [0..1]
+ Kind: StimFlowPathType [0..1]
+ MaxPmaxPacPres: PressureMeasure [0..1]
+ MaxPmaxWeakLinkPres: PressureMeasure [0..1]
+ PackerMD: MeasuredDepth [0..1]
+ TubingBottomMD: MeasuredDepth [0..1]
+FlowPath
0..1
TypeEnum
«enumeration»
StimFlowPathType
annulus
casing
drill pipe
open hole
tubing
tubing and annulus
+PdatSession
0..*
«XSDcomplexType»
StimJobDiagnosticSession
+Tubular
0..*
«XSDcomplexType»
StimTubular
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Id: LengthMeasure [0..1]
+ Od: LengthMeasure [0..1]
+ TubularMdInterval: MdInterval [0..1]
+ TubularTvdInterval: AbstractTvdInterval [0..1]
+ Type: String64 [0..1]
+ VolumeFactor: VolumePerLengthMeasure [0..1]
+ Weight: MassPerLengthMeasure [0..1]
«XSDattribute»
+ uid: String64

«XSDcomplexType»
StimJobMaterialCatalog
«XSDelement»
+ Additives: StimAdditive [0..*]
+ ProppantAgents: StimProppantAgent [0..-1]
«XSDcomplexType»
StimMaterial
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Kind: StimMaterialKind [0..1]
+ Name: String2000 [0..1]
+ Supplier: String2000 [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
StimMaterialKind
additive
brine
CO2
gel
N2
other
proppant agent
water
TypeEnum
«Enumeration»
StimAdditiveKind
acid
activator
biocide
breaker
breaker aid
buffer
clay stabilizer
corrosion inhibitor
corrosion inhibitor aid
crosslinker
delaying agent
fibers
fluid loss additive
foamer
friction reducer
gelling agent
iron control additive
mutual solvent
salt
stabilizer
surfactant
«XSDcomplexType»
StimAdditive
«XSDelement»
+ AdditiveKind: StimAdditiveKind [0..1]
+ SupplierCode: String2000
+ Type: String2000
«XSDcomplexType»
StimProppantAgent
«XSDelement»
+ FrictionCoefficientLaminar: double [0..1]
+ FrictionCoefficientTurbulent: double [0..1]
+ MassAbsorptionCoefficient: AreaPerMassMeasure [0..1]
+ MeshSizeHigh: NonNegativeLong [0..1]
+ MeshSizeLow: NonNegativeLong [0..1]
+ ProppantAgentKind: ProppantAgentKind [0..1]
+ UnconfinedCompressiveStrength: PressureMeasure [0..1]
TypeEnum
«Enumeration»
ProppantAgentKind
ceramic
resin coated ceramic
resin coated sand
sand
+ISO13503_2Properties
0..*
+ISO13503_5Point
0..*
«XSDcomplexType»
StimISO13503_2Properties
«XSDelement»
+ AbsoluteDensity: MassPerVolumeMeasure [0..1]
+ AcidSolubility: MassPerMassMeasure [0..1]
+ ApparentDensity: MassPerVolumeMeasure [0..1]
+ BulkDensity: MassPerVolumeMeasure [0..1]
+ ClustersPercent: DimensionlessMeasure [0..1]
+ KValue: double [0..1]
+ LossOnIgnition: DimensionlessMeasure [0..1]
+ MeanParticleDiameter: LengthMeasure [0..1]
+ MedianParticleDiameter: LengthMeasure [0..1]
+ Roundness: double [0..1]
+ SpecificGravity: double [0..1]
+ Sphericity: double [0..1]
+ Turbidity: double [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
StimISO13503_5Point
«XSDelement»
+ Conductivity: PermeabilityLengthMeasure
+ Permeability: PermeabilityRockMeasure
+ Stress: PressureMeasure
+ Temperature: ThermodynamicTemperatureMeasure
«XSDattribute»
+ uid: String64
+CrushTestData
0..*
+SieveAnalysisData
0..*
«XSDcomplexType»
ISO13503_2CrushTestData
«XSDelement»
+ Fines: MassPerMassMeasure
+ Stress: PressureMeasure
«XSDattribute»
+ uid: String64
«XSDcomplexType»
ISO13503_2SieveAnalysisData
«XSDelement»
+ PercentRetained: MassPerMassMeasure
+ SieveNumber: NonNegativeLong
«XSDattribute»
+ uid: String64

13.1 ISO13503_2CrushTestData

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* chapman11
Notes: *Crush test data point.*

Attributes

Name	Type	Notes
Fines	MassPerMassMeasure	Mass percentage of fines after being exposed to stress.
Stress	PressureMeasure	Stress measured at a point during a crush test.
uid	String64	Unique identifier for this instance of ISO13503_2CrushTestData.

Associations

Association	Notes
From: **StimISO13503_2Properties.**CrushTestData **0..*** To: **ISO13503_2CrushTestData**	

13.2 ISO13503_2SieveAnalysisData

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/14/2016 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Proppant properties on percent retained and sieve number. Data from this ISO anaylsis.*

Attributes

Name	Type	Notes
PercentRetained	MassPerMassMeasure	The percentage of mass retained in the sieve.
SieveNumber	NonNegativeLong	ASTM US Standard mesh opening size used in the sieve analysis test. To indicate "Pan", use "0".
uid	String64	Unique identifier for this instance of ISO13503_2SieveAnalysisData.

Associations

Association	Notes
From: **StimISO13503_2Properties.**SieveAnalysisData **0..*** To: **ISO13503_2SieveAnalysisData**	

13.3 PIDXCommodityCode

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: UNSPSC (Segment 71) commodity code from oil and gas extraction and production enhancement services family. For more information, see http://www.pidx.org/.

Attributes

Name	Type	Notes
71131001		
71131002		
71131003		
71131004		
71131005		
71131006		
71131007		
71131008		
71131009		
71131010		
71131011		
71131012		
71131013		
71131014		
71131015		
71131016		
71131018		
71131019		

Associations

Association	Notes
From: **PIDXCommodityCode.** To: **TypeEnum**	
From: **StimJob.** To: **PIDXCommodityCode**	

13.4 ProppantAgentKind

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the type of proppant agent: ceramic, resin, sand, etc.*

Attributes

Name	Type	Notes
ceramic		
resin coated ceramic		
resin coated sand		
sand		

Associations

Association	Notes
From: **ProppantAgentKind.** To: **TypeEnum**	
From: **StimProppantAgent.** To: **ProppantAgentKind**	

13.5 StimAdditive

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Provides generic attributes associated with defining an additive used for stimulation.*

Attributes

Name	Type	Notes
AdditiveKind	StimAdditiveKind	Additive type or function from the enumeration 'StimAdditiveKind'.
SupplierCode	String2000	A code used to identify the supplier of the additive.
Type	String2000	The type of additive that is used, which can represent a suppliers description or type of AdditiveKind. For example, 5% HCl could be the type when AdditiveKind=acid.

Associations

Association	Notes
From: **StimAdditive.** To: **StimAdditiveKind**	
From: **StimAdditive.** To: **StimMaterial**	

13.6 StimAdditiveKind

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the type of stimulation additive added to the fluid used in the stim job.*

Attributes

Name	Type	Notes
acid		
activator		
biocide		
breaker		
breaker aid		
buffer		
clay stabilizer		
corrosion inhibitor		
corrosion inhibitor aid		
crosslinker		
delaying agent		
fibers		
fluid loss additive		
foamer		
friction reducer		
gelling agent		
iron control additive		
mutual solvent		
salt		
stabilizer		
surfactant		

Associations

Association	Notes
From: **StimAdditiveKind.** To: **TypeEnum**	
From: **StimAdditive.** To: **StimAdditiveKind**	

13.7 StimEvent

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Provides a mechanism to capture general events that occurred during a stage of a stimulation job.*

Attributes

Name	Type	Notes
Comment	String2000	A short description of the event.
DTim	TimeStamp	Date and time of this event.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Number	PositiveLong	Event number.
NumStep	PositiveLong	Step number. Use it to reference an existing job step entry.
uid	String64	Unique identifier for this instance of StimEvent.

Associations

Association	Notes
From: **StimJobStage.**JobEvent **0..*** To: **StimEvent**	

13.8 StimFetTest

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A diagnostic test that determines fluid efficiency. Fluid efficiency test (FET).*

Attributes

Name	Type	Notes
AnalysisMethod	StimFetTestAnalysisMethod	An analysis method used for this FET.
DTimEnd	TimeStamp	End time for the FET.
DTimStart	TimeStamp	Start time for the FET.
EndPdlDuration	TimeMeasure	The end of the pressure-dependent leak-off portion of the FET.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FluidEfficiency	VolumePerVolumeMeasure	A measurement, derived from a data frac, of the efficiency of a particular fluid in creating fracture area on a particular formation at a set of conditions.
FractureCloseDuration	TimeMeasure	The time at which the fracture effectively closes without proppant in place.
FractureClosePres	PressureMeasure	The pressure at which the fracture effectively closes without proppant in place.
FractureExtensionPres	PressureMeasure	The fracture pressure limit for an unfractured formation is the fracture initiation pressure. This is typically considered the upper bound for the minimum horizontal stress or closure pressure. A step-rate test is used to determine the fracture extension pressure.
FractureGradient	ForcePerVolumeMeasure	The fracture gradient.
FractureLength	LengthMeasure	The length of the fracture tip to tip; fracture half length is the length of one wing of a fracture from the wellbore to the tip.
FractureWidth	LengthMeasure	The width of a fracture at the wellbore. Hydraulic frac width is generated by frac fluid viscosity and/or pump rate (i.e., horsepower).
NetPres	PressureMeasure	The difference between the fracture extension pressure and the pressure that exists in the fracture.
PdlCoef	DimensionlessMeasure	The pressure dependent leak-off coefficient.
PorePres	PressureMeasure	The pressure of the liquids in the formation pores.

PseudoRadialPres	PressureMeasure	The Horner plot is used to determine if pseudo-radial flow developed during pressure decline. If a semi-log straight line is observed and the line can be extrapolated to a reasonable value of reservoir pressure, then radial or pseudo-radial flow may be affecting the decline behavior. This suggests that the fracture is already closed and that data beyond the point of influence need not be considered in the evaluation of closure.
ResidualPermeability	PermeabilityRockMeasure	That permeability which remains after a fractured formation has closed, allowing the the formation fracture face to be pressurized before the fracture is mechanically reopened.
uid	String64	Unique identifier for this instance of StimFetTest.

Associations

Association	Notes
From: **StimFetTest.** To: **StimFetTestAnalysisMethod**	
From: **StimJobDiagnosticSession.**FluidEfficiencyTest **0..*** To: **StimFetTest**	

13.9 StimFetTestAnalysisMethod

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the types of stimulation FET analysis methods.*

Attributes

Name	Type	Notes
average		
delta pressure over g-time		
delta pressure over linear time		
delta pressure over radial time		
gdk 2-d		
horner		
linear		
log-log		
nolte		
other		
pdl coefficient		
perkins and kern 2-d		
radial 2-d		
square root		
third-party software		

Associations

Association	Notes
From: **StimFetTestAnalysisMethod.** To: **TypeEnum**	
From: **StimFetTest.** To: **StimFetTestAnalysisMethod**	

13.10 StimFlowPath

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The fluid flow path for used when pumping a stage in a stimulation job.*

Attributes

Name	Type	Notes
AvgPmaxPacPres	PressureMeasure	PMax prediction allows the tool assembly to be designed with expected pressures. It determines maximum allowable surface pressure and is typically calculated as a single number by which the pressure relief valves are set. This variable is the average of all the pmax pressures calculated for this flow path.
AvgPmaxWeaklinkPres	PressureMeasure	Average allowable pressure for the zone of interest with respect to the bottomhole assembly during the stimulation services.
BreakDownPres	PressureMeasure	The pressure at which the formation broke.
BridgePlugMD	MeasuredDepth	The measured depth of a bridge plug.
FractureGradient	ForcePerVolumeMeasure	The formation fracture gradient for this treatment interval.
FrictionFactorOpenHole	DimensionlessMeasure	The friction factor used to compute openhole pressure loss.
FrictionFactorPipe	DimensionlessMeasure	The friction factor for the pipe, tubing, and/or casing.
Kind	StimFlowPathType	The type of flow path.
MaxPmaxPacPres	PressureMeasure	PMax prediction allows the tool assembly to be designed with expected pressures. It determines maximum allowable surface pressure and is typically calculated as a single number by which the pressure relief valves are set. This variable is the maximum of all the pmax pressures calculated for this flow path.
MaxPmaxWeaklinkPres	PressureMeasure	Maximum allowable pressure for the zone of interest with respect to the bottomhole assembly during the stimulation services.
PackerMD	MeasuredDepth	The measured depth of a packer.
TubingBottomMD	MeasuredDepth	The maximum measured depth of the tubing used for treatment of a stage.

Associations

Association		Notes
	From: **StimFlowPath.** To: **StimFlowPathType**	
0..*	From: **StimFlowPath.**Tubular To: **StimTubular**	
0..1	From: **StimJobStage.**FlowPath To: **StimFlowPath**	

13.11 StimFlowPathType

Type: Enumeration *Stereotype:*
Detail: *Created:* 5/25/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the type of flow paths used in a stimulation job.*

Attributes

Name	Type	Notes
annulus		Fluid is conducted through the annulus.
casing		Fluid is conducted through the casing (no tubing present).
drill pipe		Fluid is conducted through the drill pipe.
open hole		Fluid is conducted through the open hole.
tubing		Fluid is conducted through tubing.
tubing and annulus		Fluid is conducted through tubing and the annulus.

Associations

Association	Notes
From: **StimFlowPath.** To: **StimFlowPathType**	

13.12 StimFluid

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The characteristics and recipe of the stimulation fluid without proppant.*

Attributes

Name	Type	Notes
Density	MassPerVolumeMeasure	The density of the fluid.
Description	String2000	The description of the fluid.
FluidTemp	ThermodynamicTemperatureMeasure	The temperature of the fluid at surface.
GelStrength10Min	PressureMeasure	The shear stress measured at low shear rate after a mud has set quiescently for 10 minutes.
GelStrength10Sec	PressureMeasure	The shear stress measured at low shear rate after a mud has set quiescently for 10 seconds.
IsKillFluid	boolean	Is the fluid a kill fluid? Values are "true" (or "1") and "false" (or "0").
Kind	StimFluidKind	The fluid types.
Name	String2000	The name of the fluid.
pH	UnitlessMeasure	The pH of the fluid.
Purpose	String2000	The purpose of the fluid.
SpecificGravity	DimensionlessMeasure	The specific gravity of the fluid at surface.
Subtype	StimFluidSubtype	The fluid subtypes.
Supplier	String2000	The supplier of the fluid.
Viscosity	DynamicViscosityMeasure	Viscosity of stimulation fluid.
Volume	VolumeMeasure	Volume of fluid.

Associations

Association		Notes
	From: **StimFluid.** To: **StimFluidSubtype**	
0..*	From: **StimFluid.**AdditiveConcentration To: **StimMaterialQuantity**	An amount of material used per volume of fluid specified in FluidConcentrationVolume.
	From: **StimFluid.** To: **StimFluidKind**	
0..1	From: **StimJobStep.**Fluid To: **StimFluid**	

13.13 StimFluidKind

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 3/18/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the fluid type.*

Attributes

Name	Type	Notes
acid-based		A fluid in which the primary fluid medium of mixing and transport is acidic (substance which reacts with a base; aqueous acids have a pH less than 7).
gas		A carrier medium in which gas is the primary medium of mixing and transport.
oil-based		A fluid in which oil is the primary fluid medium of mixing and transport.
water-based		

Associations

Association	Notes
From: **StimFluidKind.** To: **TypeEnum**	
From: **StimFluid.** To: **StimFluidKind**	

13.14 StimFluidSubtype

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the secondary qualifier for fluid type, e.g., acid, base, condensate, etc.*

Attributes

Name	Type	Notes
acid		
base		
carbon dioxide		
carbon dioxide and nitrogen		
carbon dioxide and water		
condensate		
cross-linked gel		
crude oil		
diesel		
foam		
fracturing oil		
fresh water		
gelled acid		
gelled condensate		
gelled crude		
gelled diesel		
gelled oil		
gelled salt water		
hot condensate		
hot fresh water		
hot oil		
hot salt water		
hybrid		
linear gel		
liquefied petroleum gas		
nitrogen		
oil		
other		
produced water		
salt water		
slick water		

Associations

Association	Notes
From: **StimFluidSubtype.** To: **TypeEnum**	
From: **StimFluid.** To: **StimFluidSubtype**	

13.15 StimISO13503_2Properties

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *ISO13503-2 properties.*

Attributes

Name	Type	Notes
AbsoluteDensity	MassPerVolumeMeasure	The density the material would have if no intra-granular porosity is present. (e.g. Boyle's Law porosimetry).
AcidSolubility	MassPerMassMeasure	The solubility of a proppant in 12:3 HCl:HF for 30 minutes at 150°F is an indication of the amount of soluble materials (i.e. carbonates, feldspars, iron oxides, clays, etc) present in the proppant.
ApparentDensity	MassPerVolumeMeasure	Apparent density excludes extra-granular porosity by placing a known mass in a volume of fluid and determining how much of the fluid is displaced (Archimedes).
BulkDensity	MassPerVolumeMeasure	Bulk density includes both the proppant and the porosity. This is measured by filling a known volume with dry proppant and measuring the weight.
ClustersPercent	DimensionlessMeasure	Percentage of undesirable agglomerated discrete proppant particles which typically occurs more with inefficiently processed natural sand proppants as opposed to manufactured ceramic proppants. ISO 13503-2 and API RP19C limit the mass of clusters to less than 1%.
KValue	double	Crush test classification indicating the highest stress level at which a proppant generated no more than 10% crushed material rounded down to the nearest 1,000 psi during a crush test. For example, a value of 14 means '14K' which is 14000 psi.
LossOnIgnition	DimensionlessMeasure	A mass loss (gravimetric) test method applied to coated proppants only, which determines the mass of resin coating applied to a natural sand or manufactured proppant by means of thorough combustion of the flammable resin from the nonflammable proppant. Reported as a % of original mass.
MeanParticleDiameter	LengthMeasure	The mean diameter of particles in a sample of proppant.
MedianParticleDiameter	LengthMeasure	The median diameter of particles in a sample of proppant.

Roundness	double	Krumbein Roundness Shape Factor that is a measure of the relative sharpness of grain corners or of grain curvature. Krumbein and Sloss (1963) are the most widely used method of determining shape factors.
SpecificGravity	double	Not formally part of ISO 13503.2 properties, the specific gravity is the apparent density of the proppant divided by the density of water.
Sphericity	double	Krumbein Sphericity Shape Factor that is a measure of how closely a proppant particle approaches the shape of a sphere. Krumbein and Sloss (1963) are the most widely used method of determining shape factors.
Turbidity	double	A measure of water clarity, how much the material suspended in water decreases the passage of light through the water. Unit of measure may be Nephelometric Turbidity Unit (NTU), but may vary based upon the detector geometry.
uid	String64	Unique identifier for this instance of StimISO13503_2Properties.

Associations

Association	Notes
From: **StimISO13503_2Properties.**CrushTestData **0..*** To: **ISO13503_2CrushTestData**	
From: **StimISO13503_2Properties.**SieveAnalysisData **0..*** To: **ISO13503_2SieveAnalysisData**	
From: **StimProppantAgent.**ISO13503_2Properties **0..*** To: **StimISO13503_2Properties**	

13.16 StimISO13503_5Point

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* chapman11
Notes: *A stress, conductivity, permeability, and temperature data point.*

Attributes

Name	Type	Notes
Conductivity	PermeabilityLengthMeasure	The conductivity under stress.
Permeability	PermeabilityRockMeasure	The permeability under stress.
Stress	PressureMeasure	The amount of stress applied.
Temperature	ThermodynamicTemperatureMeasure	The temperature at the time measurements were taken.
uid	String64	Unique identifier for this instance of StimISO13503_5Point

Associations

Association	Notes
From: **StimProppantAgent.**ISO13503_5Point **0..*** To: **StimISO13503_5Point**	

13.17 StimJob

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Parent object (transferrable object) for all the information about one stimulation job. A stimulation job has multiple stages, and each stage has multiple steps.*

Attributes

Name	Type	Notes
AvgJobPres	PressureMeasure	Average pressure encountered during treatment of all stages.
BottomholeStaticTemperature	ThermodynamicTemperatureMeasure	Bottomhole static temperature for the job.
CustomerName	String2000	Customer or company name.
DTimArrival	TimeStamp	Date and time at which the stimulation contractor arrives on location.
DTimEnd	TimeStamp	Ending date and time of the stimulation job.
DTimStart	TimeStamp	Start date and time of the stimulation job.
FlowBackPres	PressureMeasure	Pressure recorded on fluid returning to surface.
FlowBackRate	VolumePerTimeMeasure	Rate recorded on fluid returning to surface.
FlowBackVolume	VolumeMeasure	Volume recorded on fluid returning to surface.
FluidEfficiency	VolumePerVolumeMeasure	Percentage of fluid volume in the fracture at the end of pumping.
HhpOrdered	PowerMeasure	Hydraulic horsepower ordered for the stimulation job.
HhpUsed	PowerMeasure	Hydraulic horsepower actually used for the stimulation job.
JobPerforationClusters	StimPerforationClusterSet	Perforation clusters existing before starting the job.
Kind	String2000	Type of well stimulation job.
MaxFluidRate	VolumePerTimeMeasure	Maximum job fluid pumping rate encountered during treatment of all stages.
MaxJobPres	PressureMeasure	Maximum pressure encountered during the job.
PIDXCommodityCode	PIDXCommodityCode	UNSPSC (Segment 71) commodity code from the oil and gas extraction and production enhancement services family.
ServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the well stimulation contractor.
StageCount	NonNegativeLong	Number of stages treated during the stimulation service.
Supervisor	String64	Name of the service company supervisor.
TotalJobVolume	VolumeMeasure	Total volume pumped for all stages.
TotalProppantInFormation	MassMeasure	The total mass of proppant placed in the formation for the entire job.

TotalProppantUsed	MassMeasure	The name and amount of a proppant used during some time period in a performance enhancement job.
TotalPumpTime	TimeMeasure	The total pumping time.
TreatingBottomholeTemperature	ThermodynamicTemperatureMeasure	Expected or calculated bottomhole treating temperature for the job.

Associations

Association		Notes
0..*	From: **StimJob.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just the entire job.
0..1	From: **StimJob.**MaterialCatalog To: **StimJobMaterialCatalog**	
	From: **StimJob.** To: **Citation**	
0..*	From: **StimJob.**LogCatalog To: **StimJobLogCatalog**	Low frequency log data. To be referenced from stages.
1	From: **StimJob.**Wellbore To: **Wellbore**	
	From: **StimJob.** To: **AbstractObject**	
PIDXCommodityCode	From: **StimJob.** To:	
0..*	From: **StimJob.**JobStage To: **StimJobStage**	
StimPerforationClusterSet	From: **StimJob.** To:	

13.18 StimJobDiagnosticSession

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A pumping diagnostics session.*

Attributes

Name	Type	Notes
AvgBottomholeTreatmentPres	PressureMeasure	Average bottomhole treatment pressure.
AvgBottomholeTreatmentRate	VolumePerTimeMeasure	Average bottomhole treatment flow rate.
BaseFluidVol	VolumeMeasure	Base fluid volume entering equipment.
BottomholeHydrostaticPres	PressureMeasure	Bottomhole hydrostatic pressure.
BottomholeTemperature	ThermodynamicTemperatureMeasure	Static bottomhole temperature.
BubblePointPres	PressureMeasure	The pressure at which gas begins to break out of an under saturated oil and form a free gas phase in the matrix or a gas cap.
ChokeSize	LengthMeasure	The size of the choke used during a flow back test.
Description	String2000	A description of the session.
DTimFractureClose	TimeStamp	The date and time when the fluid in the fracture is completely leaked off into the formation and the fracture closes on its faces.
DTimPumpOff	TimeStamp	The date and time pumping ended.
DTimPumpOn	TimeStamp	The date and time pumping began.
DTimWellShutin	TimeStamp	The date and time at which a well ceases flowing and the valves are closed.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FluidCompressibility	IsothermalCompressibilityMeasure	The volume change of a fluid when pressure is applied.
FluidDensity	MassPerVolumeMeasure	The density of the fluid.
FluidEfficiency	VolumePerVolumeMeasure	A measurement, derived from a data frac, of the efficiency of a particular fluid in creating fracture area on a particular formation at a set of conditions.
FluidKprimeFactor	DimensionlessMeasure	The consistency index K is the shear stress or viscosity of the fluid at one sec-1 shear rate. An increasing K raises the effective viscosity.
FluidNprimeFactor	DimensionlessMeasure	Power law component. As 'n' decreases from 1, the fluid becomes more shear thinning. Reducing 'n' produces more non-Newtonian behavior.
FluidSpecificHeat	SpecificHeatCapacityMeasure	The heat required to raise one unit mass of a substance by one degree.

FluidThermalConductivity	ThermalConductivityMeasure	In physics, thermal conductivity is the property of a material describing its ability to conduct heat. It appears primarily in Fourier's Law for heat conduction. Thermal conductivity is measured in watts per kelvin-meter. Multiplied by a temperature difference (in kelvins) and an area (in square meters), and divided by a thickness (in meters), the thermal conductivity predicts the rate of energy loss (in watts) through a piece of material.
FluidThermalExpansionCoefficient	VolumetricThermalExpansionMeasure	Dimensional response to temperature change is expressed by its coefficient of thermal expansion. When the temperature of a substance changes, the energy that is stored in the intermolecular bonds between atoms also changes. When the stored energy increases, so does the length of the molecular bonds. As a result, solids typically expand in response to heating and contract on cooling. The degree of expansion divided by the change in temperature is called the material's coefficient of thermal expansion and generally varies with temperature.
FoamQuality	VolumePerVolumeMeasure	Foam quality percentage of foam for the job during the stimulation services.
FractureClosePres	PressureMeasure	The pressure when the fracture width becomes zero.
FrictionPres	PressureMeasure	The pressure loss due to fluid friction with the pipe while a fluid is being pumped.
InitialShutinPres	PressureMeasure	Initial shutin pressure.
MdBottomhole	MeasuredDepth	The measured depth of the bottom of the hole.
MdMidPerforation	MeasuredDepth	The measured depth of the middle perforation.
MdSurface	MeasuredDepth	The measured depth of the wellbore to its injection point.
Name	String64	The name of the session.
Number	NonNegativeLong	The number of this pumping diagnostics session.
PercentPad	VolumePerVolumeMeasure	The volume of the pad divided by the (volume of the pad + the volume of the proppant laden fluid).
PorePres	PressureMeasure	The pressure of the liquids in the formation pores.
PumpDuration	TimeMeasure	The time between the shutin time and the pump on time.
ReservoirTotalCompressibility	IsothermalCompressibilityMeasure	The volume change of a reservoir material when pressure is applied.
StageNumber	NonNegativeLong	The number of a stage associated with this diagnostics session.

SurfaceFluidTemperature	ThermodynamicTemperatureMeasure	Temperature of the fluid at the surface.
SurfaceTemperature	ThermodynamicTemperatureMeasure	The constant earth temperature at a given depth specific to a region.
TemperatureCorrectionApplied	boolean	Are the calculations corrected for temperature? A value of "true" (or "1") indicates that the calculations were corrected for temperature. A value of "false" (or "0") or not given indicates otherwise.
TvdMidPerforation	AbstractVerticalDepth	The true vertical depth of the middle perforation.
uid	String64	Unique identifier for this instance of StimJobDiagnosticSession.
WellboreVolume	VolumeMeasure	The volume of fluid in the wellbore.

Associations

Association	Notes
From: **StimJobDiagnosticSession.**StepDownTest **0..*** To: **StimStepDownTest**	
From: **StimJobDiagnosticSession.**FluidEfficiencyTest **0..*** To: **StimFetTest**	
From: **StimJobDiagnosticSession.**StepRateTest **0..*** To: **StimStepTest**	
From: **StimJobDiagnosticSession.**PumpFlowBackTest **0..*** To: **StimPumpFlowBackTest**	
From: **StimJobStage.**PdatSession **0..*** To: **StimJobDiagnosticSession**	

13.19 StimJobDiversion

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 10/12/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Captures the high-level description of the diversion method used in the stimulation job.*

Attributes

Name	Type	Notes
Contractor	BusinessAssociate	Pointer to a BusinessAssociate representing the diversion contractor.
ElementSpacing	LengthMeasure	Spacing between packer elements.
Method	StimJobDiversionMethod	The diversion method used.
ToolDescription	String2000	A supplier description of the diversion tool, such as its commercial name.

Associations

Association	Notes
From: **StimJobDiversion.** To: **StimJobDiversionMethod**	
0..1 From: **StimJobStage.**Diversion To: **StimJobDiversion**	

13.20 StimJobDiversionMethod

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 10/9/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jeremy Simpson
Notes: *Specifies the type of diversion used during a stimulation job.*

Attributes

Name	Type	Notes
ball sealer		
bands		
chemical		
fibers		
other		
packer		
solid particle		
straddle packer		

Associations

Association	Notes
From: **StimJobDiversionMethod.** To: **TypeEnum**	
From: **StimJobDiversion.** To: **StimJobDiversionMethod**	

13.21 StimJobLogCatalog

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/22/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *A group of logs from a stimulation job, one log per stage.*

Associations

Association		Notes
1..*	From: **StimJobLogCatalog.**JobLog To: **Log**	
0..*	From: **StimJob.**LogCatalog To: **StimJobLogCatalog**	Low frequency log data. To be referenced from stages.

13.22 StimJobMaterialCatalog

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* chapman11
Notes: *A listing of materials for a particular job. Any stage of the stim job can reference material(s) in the catalog, which eliminates the need to repeat the materials for each stage.*

Attributes

Name	Type	Notes
Additives	StimAdditive	List of additives in the catalog.
ProppantAgents	StimProppantAgent	List of proppant agents in the catalog.

Associations

Association	Notes
From: **StimJobMaterialCatalog.** To: **StimMaterial**	
From: **StimJob.**MaterialCatalog **0..1** To: **StimJobMaterialCatalog**	

13.23 StimJobStage

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Stage treated during a stimulation job.*

Attributes

Name	Type	Notes
AvgBaseFluidReturnVolumeRate	VolumePerTimeMeasure	Average base fluid pumping rate of all steps for stage treatment.
AvgBHStaticTemperature	ThermodynamicTemperatureMeasure	The average static temperature of the wellbore injection point(s) or formation at equilibrium (steady state) with no fluid or tool movement, allowing for equilibrium conditions at the wellbore injection point; (BHST: bottom hole static temperature.
AvgBHTreatingTemperature	ThermodynamicTemperatureMeasure	The average measured or calculated temperature of the wellbore during the treating with well fluid injection or circulation of the wellbore at the point of interest. Point of interest is generally the injection point or region of interest for the test or treatment.
AvgBottomholePumpedVolumeRate	VolumePerTimeMeasure	Average bottomhole treatment flow rate.
AvgConductivity	LengthPerTimeMeasure	Average conductivity of a fracture created during the treatment supported by proppant during the stimulation services Hydraulic conductivity, symbolically represented as K, is a property of vascular plants, soil or rock, that describes the ease with which water can move through pore spaces or fractures. It depends on the intrinsic permeability of the material and on the degree of saturation. Saturated hydraulic conductivity, Ksat, describes water movement through saturated media.
AvgFractureWidth	LengthMeasure	Average fracture width created during the treatment of the stage.
AvgHydraulicPower	PowerMeasure	Average hydraulic horse power used.
AvgPresAnnulus	PressureMeasure	The average annulus pressure for any step for the stage treatment.
AvgPresCasing	PressureMeasure	The average casing pressure of any step for the stage treatment.
AvgPresSurface	PressureMeasure	The average pressure for treating the stage across all steps.
AvgPresTubing	PressureMeasure	The average tubing pressure of any step for the stage treatment.
AvgProppantConcBottomhole	MassPerVolumeMeasure	The average proppant concentration at the bottom of the hole.
AvgProppantConcSurface	MassPerVolumeMeasure	The average proppant concentration on the surface.

AvgSlurryReturnVolumeRate	VolumePerTimeMeasure	The average slurry return rate of all steps for the stage treatment.
BreakDownPres	PressureMeasure	The pressure at which the formation fractures and accepts injected fluid.
ClosureDuration	TimeMeasure	Delta time recorded for the closure of the fracture to occur during the stage treatment.
ClosurePres	PressureMeasure	An analysis parameter used in hydraulic fracture design to indicate the pressure at which the fracture effectively closes without proppant in place.
DTimEnd	TimeStamp	Ending date and time for the stage treatment.
DTimStart	TimeStamp	Starting date and time for the stage treatment.
FormationBreakLengthPerDay	LengthMeasure	The length of formation broken per day.
FormationName	String2000	The name of the formation being stimulated.
FormationProppantMass	MassMeasure	The weight of proppant placed in the formation.
FractureGradientFinal	ForcePerVolumeMeasure	The formation fracture gradient for the stage after treatment.
FractureGradientInitial	ForcePerVolumeMeasure	The formation fracture gradient for stage before treatment.
FractureHeight	LengthMeasure	The height of the fracture.
FractureLength	LengthMeasure	The length of the fracture created after treating the stage.
FrictionPressure	PressureMeasure	Friction pressure loss.
HhpOrderedCO2	PowerMeasure	Carbon dioxide hydraulic horsepower ordered for the stage.
HhpOrderedFluid	PowerMeasure	Fluid hydraulic horsepower ordered for the stage.
HhpUsedCO2	PowerMeasure	Carbon dioxide hydraulic horsepower actually used for the stage.
HhpUsedFluid	PowerMeasure	Fluid hydraulic horsepower actually used for the stage.
InitialShutinPres	PressureMeasureExt	The initial shut-in pressure.
MaxFluidVolumeRateAnnulus	VolumePerTimeMeasure	Maximum annulus fluid pumping rate of any step while treating the stage.
MaxFluidVolumeRateCasing	VolumePerTimeMeasure	Maximum casing fluid pumping rate of any step while treating the stage.
MaxFluidVolumeRateTubing	VolumePerTimeMeasure	Maximum tubing fluid pumping rate of any step while treating the stage.
MaxHydraulicPower	PowerMeasure	Maximum hydraulic horse power used for the stage.
MaxPresAnnulus	PressureMeasure	The highest annulus pressure of any step while treating the stage.
MaxPresCasing	PressureMeasure	The highest casing pressure of any step while treating the stage.
MaxPresSurface	PressureMeasure	Maximum surface pressure during treatment of the stage.
MaxPresTubing	PressureMeasure	The highest tubing pressure of any step while treating the stage.

MaxProppantConcBottomhole	MassPerVolumeMeasure	The maximum proppant concentration at the bottom of the wellbore.
MaxProppantConcSurface	MassPerVolumeMeasure	The maximum proppant concentration on the surface.
MdFormationBottom	MeasuredDepth	Measured depth of the bottom of the formation.
MdFormationTop	MeasuredDepth	Measured depth of the top of the formation.
MdOpenHoleBottom	MeasuredDepth	Measured depth of the bottom open hole.
MdOpenHoleTop	MeasuredDepth	Measured depth of the top open hole.
NetPres	PressureMeasure	The difference between the pressure which holds a fracture closed (minimal principal stress) and that pressure which is necessary to open the fracture.
Number	PositiveLong	The number associated with the stage.
OpenHoleDiameter	LengthMeasure	The diameter of the open hole.
OpenHoleName	String2000	A name for the open hole. To be used for open hole completions.
PercentPad	VolumePerVolumeMeasure	The percentage of volume pumped used for the pad.
PercentProppantPumped	VolumePerVolumeMeasure	Total proppant mass used as a percent of the design mass.
PerfBallCount	NonNegativeLong	Total number of perforation balls used while treating the stage.
PerfBallSize	LengthMeasure	The size of the perforation balls used while treating the stage
PerfProppantConc	MassPerVolumeMeasure	The proppant concentration at the perforations.
ProppantHeight	LengthMeasure	The proppant height.
ScreenedOut	boolean	Did screen out occur? True ("true" or "1") indicates that screen out occurred. False ("false" or "0") or not given indicates otherwise.
ScreenOutPres	PressureMeasure	The screen out pressure.
StagePerforationClusters	StimPerforationClusterSet	Perforations added just before treating the stage.
TechnologyType	String64	Text describing the technology used while pumping the stage.
TotalProppantInFormation	MassMeasure	The total amount of proppant in the formation relative to the current stage.
TotalPumpTime	TimeMeasure	The total pumping time for the treatment of the stage.
TotalVolume	VolumeMeasure	The total volume pumped for all steps while treating the stage.
TvdFormationBottom	AbstractVerticalDepth	True vertical depth of the bottom of the formation.
TvdFormationTop	AbstractVerticalDepth	True vertical depth of the top of the formation.
TvdOpenHoleBottom	AbstractVerticalDepth	True vertical depth of the bottom open hole.
TvdOpenHoleTop	AbstractVerticalDepth	True vertical depth of the top open hole.
uid	String64	Unique identifier for this instance of StimJobStage.

VolumeBody	VolumeMeasure	The volume pumped for the body portion of the stage treatment.
VolumeFlush	VolumeMeasure	Volume pumped during flush portion of stage treatment.
VolumePad	VolumeMeasure	Volume pumped for pad portion of stage treatment.
WaterSource	String2000	Water source for fluid pumped during stage.
WellboreProppantMass	MassMeasure	The weight of proppant left in the wellbore after pumping has stopped.

Associations

Association		Notes
	From: **StimJobStage.** To: **AbstractObject**	
0..*	From: **StimJobStage.**PdatSession To: **StimJobDiagnosticSession**	
0..1	From: **StimJobStage.**Diversion To: **StimJobDiversion**	
0..*	From: **StimJobStage.**JobEvent To: **StimEvent**	
0..1	From: **StimJobStage.**FlowPath To: **StimFlowPath**	
0..*	From: **StimJobStage.**MaxMaterialUsageRate To: **StimMaterialQuantity**	
0..*	From: **StimJobStage.**ShutInPres To: **StimShutInPressure**	
StimPerforationClusterSet	From: **StimJobStage.** To:	
0..*	From: **StimJobStage.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just this stage only.
0..*	From: **StimJobStage.**ReservoirInterval To: **StimReservoirInterval**	
0..*	From: **StimJobStage.**JobStep To: **StimJobStep**	
0..*	From: **StimJobStage.**StimStageLog To: **Log**	
0..*	From: **StimJob.**JobStage To: **StimJobStage**	

13.24 StimJobStep

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A step in the treatment of a stage for a stimulation job.*

Attributes

Name	Type	Notes
AvgBaseFluidQuality	VolumePerVolumeMeasure	Base quality percentage of foam.
AvgCO2BaseFluidQuality	VolumePerVolumeMeasure	Base quality carbon dioxide percent of foam.
AvgHydraulicPower	PowerMeasure	Average hydraulic horse power used.
AvgInternalPhaseFraction	VolumePerVolumeMeasure	Internal gas phase percentage of the foam.
AvgMaterialUsedRate	StimMaterialQuantity	Average material used per minute entering the flow stream.
AvgMaterialUseRateBottomhole	StimMaterialQuantity	Average material amount used (pumped) per minute at bottomhole.
AvgN2BaseFluidQuality	VolumePerVolumeMeasure	Base quality nitrogen percentage of foam.
AvgPresBottomhole	PressureMeasure	Average bottomhole pressure.
AvgPresSurface	PressureMeasure	Average surface pressure.
AvgPropConc	MassPerVolumeMeasure	Average proppant concentration at the wellhead. ppa: pounds proppant added per volume measure kgpa: kilograms proppant added per volume measure
AvgProppantConcBottomhole	MassPerVolumeMeasure	The average proppant concentration at bottomhole.
AvgProppantConcSurface	MassPerVolumeMeasure	The average proppant concentration at the surface.
AvgSlurryPropConc	MassPerVolumeMeasure	Average proppant concentration exiting the equipment.
AvgSlurryRate	VolumePerTimeMeasure	Average slurry return rate.
AvgTemperature	ThermodynamicTemperatureMeasure	Average fluid temperature.
AvgVolumeRateWellhead	VolumePerTimeMeasure	Average volume per minute at the wellhead.
BallsRecovered	NonNegativeLong	Balls recovered during execution of the step.
BallsUsed	NonNegativeLong	Balls used during execution of the step.
BaseFluidBypassVol	VolumeMeasure	Base fluid volume recorded after equipment set to bypass.
BaseFluidVol	VolumeMeasure	Base fluid volume entering the equipment.
Description	String2000	A short description of the step.
DTimEnd	TimeStamp	Date and time the step ended.
DTimStart	TimeStamp	Date and time the step started.

EndDirtyMaterialRate	VolumePerTimeMeasure	Ending dirty fluid pump volume per minute.
EndMaterialUsedRate	StimMaterialQuantity	Ending quantity of material used per minute entering the flow stream.
EndMaterialUsedRateBottomhole	StimMaterialQuantity	Ending quantity of material used per minute at bottomhole.
EndPresBottomhole	PressureMeasure	Final bottomhole pressure.
EndPresSurface	PressureMeasure	Final surface pressure.
EndProppantConcBottomhole	MassPerVolumeMeasure	The final proppant concentration at bottomhole.
EndProppantConcSurface	MassPerVolumeMeasure	The final proppant concentration at the surface.
EndRateSurfaceCO2	VolumePerTimeMeasure	Final CO2 pump rate in volume per time at the surface.
EndStdRateSurfaceN2	VolumePerTimeMeasure	Final nitrogen pump rate in volume per time at the surface.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FluidVolBase	VolumeMeasure	The step volume of the base step.
FluidVolCirculated	VolumeMeasure	Fluid volume circulated.
FluidVolPumped	VolumeMeasure	Fluid volume pumped.
FluidVolReturned	VolumeMeasure	Fluid volume returned.
FluidVolSlurry	VolumeMeasure	The volume of the slurry (dirty) step.
FluidVolSqueezed	VolumeMeasure	Fluid volume squeezed.
FluidVolWashed	VolumeMeasure	Fluid volume washed.
FractureGradientFinal	ForcePerVolumeMeasure	The fracture gradient when the step ends.
FractureGradientInitial	ForcePerVolumeMeasure	The fracture gradient before starting the step.
FrictionFactor	DimensionlessMeasure	Numeric value used to scale a calculated rheological friction.
Kind	String2000	The type of step.
MaxHydraulicPower	PowerMeasure	Maximum hydraulic power used during the step.
MaxPresSurface	PressureMeasure	Maximum pumping pressure on surface.
MaxProppantConcBottomhole	MassPerVolumeMeasure	Maximum proppant concentration at bottomhole during the stimulation step.
MaxProppantConcSurface	MassPerVolumeMeasure	Maximum proppant concentration at the wellhead.
MaxSlurryPropConc	MassPerVolumeMeasure	Maximum proppant concentration exiting the equipment.
MaxVolumeRateWellhead	VolumePerTimeMeasure	Maximum volume per minute at the wellhead.
PipeFrictionPressure	PressureMeasure	The friction pressure contribution from pipes.
PumpTime	TimeMeasure	Total pumping time for the step.
StartDirtyMaterialRate	VolumePerTimeMeasure	Starting dirty fluid volume per minute.
StartMaterialUsedRate	StimMaterialQuantity	Starting quantity of material used per minute entering the flow stream.
StartMaterialUsedRateBottomHole	StimMaterialQuantity	Starting quantity of material used per minute at bottomhole.

StartPresBottomhole	PressureMeasure	Starting bottomhole pressure.
StartPresSurface	PressureMeasure	Starting surface pressure.
StartProppantConcBottomhole	MassPerVolumeMeasure	The beginning proppant concentration at bottomhole.
StartProppantConcSurface	MassPerVolumeMeasure	The beginning proppant concentration at the surface.
StepName	String2000	A human readable name for the step.
StepNumber	PositiveLong	Step number.
uid	String64	Unique identifier for this instance of StimJobStep.
WellheadVol	VolumeMeasure	Slurry volume entering the well.

Associations

Association		Notes
0..*	From: **StimJobStep.**MaxMaterialUsedRate To: **StimMaterialQuantity**	
0..1	From: **StimJobStep.**Fluid To: **StimFluid**	
0..*	From: **StimJobStep.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just this step.
0..*	From: **StimJobStage.**JobStep To: **StimJobStep**	

13.25 StimMaterial

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*1/18/2017 *Status:* Proposed *Author:* chapman11
Notes: *Materials as a concept refers to the materials left in the well or consumed in the process of making the stimulation; it does not refer the carrier fluid.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Kind	StimMaterialKind	The material kind.
Name	String2000	The name of the material.
Supplier	String2000	The name of the material supplier.
uid	String64	Unique identifier for this instance of StimMaterial.

Associations

Association	Notes
From: **StimMaterial.** To: **StimMaterialKind**	
From: **StimMaterialQuantity.** To: **StimMaterial**	
From: **StimJobMaterialCatalog.** To: **StimMaterial**	
From: **StimAdditive.** To: **StimMaterial**	
From: **StimProppantAgent.** To: **StimMaterial**	

13.26 StimMaterialKind

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 9/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: *Specifies the type of stimulation material.*

Attributes

Name	Type	Notes
additive		
brine		
CO2		
gel		
N2		
other		
proppant agent		
water		

Associations

Association	Notes
From: **StimMaterialKind.** To: **TypeEnum**	
From: **StimMaterial.** To: **StimMaterialKind**	

13.27 StimMaterialQuantity

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Stimulation material used.*

Attributes

Name	Type	Notes
Density	MassPerVolumeMeasure	The density of material used.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Mass	MassMeasure	The mass of material used. This should be used without specifying any of the other material measures (e.g. volume, standard volume, etc.).
MassFlowRate	MassPerTimeMeasure	Rate at which mass of material is flowing.
Material	ComponentReference	This is a reference to the UID of the StimMaterial in the StimJobMaterialCatalog.
StdVolume	VolumeMeasure	The standard volume of material used. Standard volume is the volume measured under the same conditions. This should be used without specifying any of the other material measures (e.g., mass, volume, etc.).
uid	String64	Unique identifier for this instance of StimMaterialQuantity
Volume	VolumeMeasure	The volume of material used. This should be used without specifying any of the other material measures (e.g. mass, standard volume, etc.).
VolumeConcentration	VolumePerVolumeMeasure	The volume per volume measure of material used. This should be used without specifying any of the other material measures (e.g. mass, density, standard volume, etc.).
VolumetricFlowRate	VolumePerTimeMeasure	Rate at which the volume of material is flowing.

Associations

Association		Notes
	From: **StimMaterialQuantity.** To: **StimMaterial**	
0..*	From: **StimJobStep.**MaxMaterialUsedRate To: **StimMaterialQuantity**	
0..*	From: **StimJob.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just the entire job.
0..*	From: **StimJobStage.**MaxMaterialUsageRate To: **StimMaterialQuantity**	
0..*	From: **StimJobStep.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just this step.

Association		Notes
0..*	From**: StimFluid.**AdditiveConcentration To: **StimMaterialQuantity**	An amount of material used per volume of fluid specified in FluidConcentrationVolume.
0..*	From**: StimJobStage.**MaterialUsed To: **StimMaterialQuantity**	This is the total quantities of materials pumped—water, proppant and additives—over just this stage only.

13.28 StimPerforationCluster

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: Information about a set of perforations. The assumption is that all perforations within a given set are created with the same device or method.

Attributes

Name	Type	Notes
DensityPerforation	ReciprocalLengthMeasure	The number of perforation holes per length across the treatment interval. Used to describe but not limited to the configuration of perforating guns or the placement of perforations (holes, slots, openings, etc.) in the wellbore, and is often abbreviated to spf (shots per foot).
DischargeCoefficient	double	A coefficient used in the equation for calculation of pressure drop across a perforation set.
FrictionFactor	double	The friction factor of each perforation set.
FrictionPres	PressureMeasure	The friction pressure for the perforation set.
MdPerforatedInterval	MdInterval	Measured depths of the top and base perforation.
PerforationCount	NonNegativeLong	The number of perforations in this interval.
PhasingPerforation	PlaneAngleMeasure	The radial distribution of successive perforations around the wellbore axis. Radial distribution is commonly available in 0, 180 120, 90 and 60 degree phasing.
Size	LengthMeasure	The size of the perforations.
TvdPerforatedInterval	AbstractTvdInterval	True vertical depth of the top and base perforation.
Type	String64	The type of perforation and/or how the perforation was created.

Associations

Association	Notes
From: **StimPerforationCluster.** To: **AbstractObject**	
From: **StimPerforationClusterSet.**StimPerforationCluster **1..*** To: **StimPerforationCluster**	

13.29 StimPerforationClusterSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/22/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Clinton Chapman
Notes: Provides mechanism for combining perforation clusters into a group. This could be used to specify the set of existing perforations present in a well before starting a stimulation job, for example, for a re-frac job.

Associations

Association	Notes
From: **StimPerforationClusterSet.**StimPerforationCluster **1..*** To: **StimPerforationCluster**	
From: **StimJobStage.** To: **StimPerforationClusterSet**	
From: **StimJob.** To: **StimPerforationClusterSet**	

13.30 StimPressureFlowRate

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *In an injection step test, the injection rate at a particular pressure.*

Attributes

Name	Type	Notes
BottomholeRate	VolumePerTimeMeasure	The flow of the fluid at the bottomhole.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Pressure	PressureMeasure	The pressure of the step test.
uid	String64	Unique identifier for this instance of StimPressureFlowRate.

Associations

Association	Notes
From: **StimStepTest.**PresMeasurement **0..*** To: **StimPressureFlowRate**	

13.31 StimProppantAgent

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Captures a description of a proppant used in a stimulation job.*

Attributes

Name	Type	Notes
FrictionCoefficientLaminar	double	Laminar flow friction coefficient.
FrictionCoefficientTurbulent	double	Turbulent flow friction coefficient.
MassAbsorptionCoefficient	AreaPerMassMeasure	Characterizes how easily radiation passes through a material. This can be used to compute the concentration of proppant in a slurry using a densitometer.
MeshSizeHigh	NonNegativeLong	High value of sieve mesh size: for 40/70 sand, this value is 70.
MeshSizeLow	NonNegativeLong	Low value of sieve mesh size: for 40/70 sand, this value is 40.
ProppantAgentKind	ProppantAgentKind	Proppant type or function.
UnconfinedCompressiveStrength	PressureMeasure	The unconfined compressive strength of the proppant.

Associations

Association	Notes
From: **StimProppantAgent.**ISO13503_2Properties **0..*** To: **StimISO13503_2Properties**	
From: **StimProppantAgent.**ISO13503_5Point **0..*** To: **StimISO13503_5Point**	
From: **StimProppantAgent.** To: **ProppantAgentKind**	
From: **StimProppantAgent.** To: **StimMaterial**	

13.32 StimPumpFlowBackTest

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Diagnostic test involving flowing a well back after treatment.*

Attributes

Name	Type	Notes
DTimEnd	TimeStamp	End time for the test.
DTimStart	TimeStamp	Start time for the test.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowBackVolume	VolumeMeasure	Total volume recovered during a flow back test.
FractureCloseDuration	TimeMeasure	The time required for the fracture width to become zero.
FractureClosePres	PressureMeasure	The pressure when the fracture width becomes zero.
PresCasing	PressureMeasure	Casing pressure.
PresTubing	PressureMeasure	Tubing pressure.
uid	String64	Unique identifier for this instance of StimPumpFlowBackTest.

Associations

Association	Notes
From: **StimPumpFlowBackTest.**Step **0..*** To: **StimPumpFlowBackTestStep**	
From: **StimJobDiagnosticSession.**PumpFlowBackTest **0..*** To: **StimPumpFlowBackTest**	

13.33 StimPumpFlowBackTestStep

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *In a step-down pump diagnostics test, this object contains all the data for a particular step in that test.*

Attributes

Name	Type	Notes
BottomholeRate	VolumePerTimeMeasure	Bottomhole flow rate for the specific step.
DTim	TimeStamp	Time stamp of the pressure measurement.
EntryFriction	PressureMeasure	Calculated entry friction accounting for perforation and near wellbore restrictions for the specific step.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowbackVolume	VolumeMeasure	Volume of flowback since the start of the test.
FlowbackVolumeRate	VolumePerTimeMeasure	Flowback rate.
NearWellboreFriction	PressureMeasure	Calculated near-wellbore friction loss.
Number	NonNegativeLong	The number of the step. Identifies the step within the step down test.
PerfFriction	PressureMeasure	Calculated perforation friction for the specific step.
PipeFriction	PressureMeasure	Calculated pipe friction for the specific step.
Pres	PressureMeasure	Surface pressure measured for the specific step.
SurfaceRate	VolumePerTimeMeasure	Surface rate entering the well for the specific step.
uid	String64	Unique identifier for this instance of StimPumpFlowBackTestStep.

Associations

Association	Notes
From: **StimPumpFlowBackTest.**Step **0..*** To: **StimPumpFlowBackTestStep**	

13.34 StimReservoirInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Description of a reservoir interval.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FormationPermeability	PermeabilityRockMeasure	Permeability of the formation.
FormationPorosity	VolumePerVolumeMeasure	Porosity of the formation.
GrossPayMdInterval	MdInterval	Measured depth of the bottom of the formation.
GrossPayThickness	LengthMeasure	The total thickness of the interval being treated, whether or not it is productive.
LithFormationPermeability	PermeabilityRockMeasure	Formation permeability, a measurement of the ability of a fluid to flow through a rock. Commonly measured in milliDarcys (1m2 = 0.000000000000986923 Darcy).
LithMdInterval	MdInterval	Lithology measured depth interval.
LithName	String2000	A name for the formation lithology.
LithNetPayThickness	LengthMeasure	Net pay is computed. It is the thickness of rock that can deliver hydrocarbons to the wellbore formation.
LithPoissonsRatio	DimensionlessMeasure	The ratio of the relative contraction strain, or transverse strain (normal to the applied load), divided by the relative extension strain, or axial strain (in the direction of the applied load).
LithPorePres	PressureMeasure	Refers to the pressure of fluids held within a soil or rock, in gaps between particles' formation porosity.
LithYoungsModulus	PressureMeasure	Young's modulus (E) is a measure of the stiffness of an isotropic elastic material. It is also known as the Young modulus, modulus of elasticity, elastic modulus (though Young's modulus is actually one of several elastic moduli such as the bulk modulus and the shear modulus) or tensile modulus. It is defined as the ratio of the uniaxial stress over the uniaxial strain.
NameFormation	String2000	Name of the formation.
NetPayFluidCompressibility	IsothermalCompressibilityMeasure	The volume change of the fluid in the net pay when pressure is applied.
NetPayFluidViscosity	DynamicViscosityMeasure	With respect to the net pay, a measurement of the internal resistance of a fluid to flow against itself. Expressed as the ratio of shear stress to shear rate.

NetPayFormationPermeability	PermeabilityRockMeasure	The permeability of the net pay of the formation.
NetPayFormationPorosity	VolumePerVolumeMeasure	The porosity of the net pay formation.
NetPayName	String2000	The name used for the net pay zone.
NetPayPorePres	PressureMeasure	The pore pressure of the net pay.
NetPayThickness	LengthMeasure	The thickness of the most productive part of the interval. Net pay is a subset of the gross.
uid	String64	Unique identifier for this instance of StimReservoirInterval

Associations

Association	Notes
From: **StimJobStage.**ReservoirInterval **0..*** To: **StimReservoirInterval**	

13.35 StimShutInPressure

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A pressure measurement taken at a certain time after the well has been shut in.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Pressure	PressureMeasure	The shut-in pressure.
TimeAfterShutin	TimeMeasure	The time span after shut in at which the pressure was measured.
uid	String64	Unique identifier for this instance of StimShutInPressure.

Associations

Association	Notes
From: **StimJobStage.**ShutInPres **0..*** To: **StimShutInPressure**	

13.36 StimStepDownTest

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Diagnostic test involving flowing a well back after treatment.*

Attributes

Name	Type	Notes
BottomholeFluidDensity	MassPerVolumeMeasure	The density of the fluid at the bottom of the hole adjusting for bottomhole temperature and pressure during the step-down test.
DiameterEntryHole	LengthMeasure	Diameter of the injection point or perforation.
DischargeCoefficient	DimensionlessMeasure	A coefficient used in the equation for calculation of the pressure drop across a perforation set.
EffectivePerfs	NonNegativeLong	The number of perforations in the interval being tested that are calculated to be open to injection, which is determined during the step-down test.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
InitialShutinPres	PressureMeasure	The initial shutin pressure.
PerforationCount	NonNegativeLong	The number of perforations in the interval being tested.
Step	StimPumpFlowBackTestStep	The data related to a particular step in the step-down test.
uid	String64	Unique identifier for this instance of StimStepDownTest

Associations

Association	Notes
From: **StimJobDiagnosticSession.**StepDownTest **0..*** To: **StimStepDownTest**	

13.37 StimStepTest

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *An injection test, plotted pressure against injection rate, where a curve deflection and change of slope indicates the fracture breakdown pressure.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FractureExtensionPres	PressureMeasure	The pressure necessary to extend the fracture once initiated. The fracture extension pressure may rise slightly with increasing fracture length and/or height because of friction pressure drop down the length of the fracture.
uid	String64	Unique identifier for this instance of StimStepTest.

Associations

Association	Notes
From: **StimStepTest.**PresMeasurement **0..*** To: **StimPressureFlowRate**	
From: **StimJobDiagnosticSession.**StepRateTest **0..*** To: **StimStepTest**	

13.38 StimTubular

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/24/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *In a production enhancement job, this item constitutes the data for a tubular in the hole.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Id	LengthMeasure	The inside diameter of the tubular used.
Od	LengthMeasure	The outside diameter of the tubular used.
TubularMdInterval	MdInterval	Measured depth interval over which the tubular was used.
TubularTvdInterval	AbstractTvdInterval	True vertical depth interval over which the tubular was used.
Type	String64	The type of tubular (e.g., casing, tubing, liner, packer, open hole, other).
uid	String64	Unique identifier for this instance of StimTubular.
VolumeFactor	VolumePerLengthMeasure	The volume per length of the tubular.
Weight	MassPerLengthMeasure	The weight per length of the tubular.

Associations

Association	Notes
From: **StimFlowPath.**Tubular **0..*** To: **StimTubular**	

14 Target

Package: xsd_schemas

Notes: Target Schema

14.1 Target

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*2/19/2019 *Status:* Proposed *Author:* William McKenzie
Notes: The target object is used to capture information about intended targets of a trajectory survey. This object is uniquely identified within the context of one wellbore object.

Attributes

Name	Type	Notes
AziRef	NorthReferenceKind	Specifies the definition of north.
CatTarg	TargetCategoryExt	Geological or drillers target.
Dip	PlaneAngleMeasure	Angle of dip with respect to horizontal.
DispEwCenter	LengthMeasure	Easting of target center point in map coordinates.
DispEwOffset	LengthMeasure	East-west offset of target intercept point from shape center.
DispEwSectOrig	LengthMeasure	Origin east-west used as starting point for sections, mandatory parameter when sections are used.
DispNsCenter	LengthMeasure	Northing of target center point in map coordinates.
DispNsOffset	LengthMeasure	North-south offset of target intercept point from shape center.
DispNsSectOrig	LengthMeasure	Origin north-south used as starting point for sections, mandatory parameter when sections are used..
LenMajorAxis	LengthMeasure	Distance from center to perimeter in rotation direction. This may be ignored depending on the value of typeTargetScope.
Rotation	PlaneAngleMeasure	Direction of target geometry with respect to north azimuth reference.
Strike	PlaneAngleMeasure	Direction of dip with respect to north azimuth reference.
TargetScope	TargetScopeExt	The type of scope of the drilling target.
ThickAbove	LengthMeasure	Height of target above center point.
ThickBelow	LengthMeasure	Depth of target below center point.
Tvd	AbstractVerticalDepth	Vertical depth of the measurements.
WidMinorAxis	LengthMeasure	Distance from center to perimeter at 90 deg to rotation direction. This may be ignored depending on the value of typeTargetScope.

Associations

Association	Notes
From: **Target.**Wellbore **1..1** To: **Wellbore**	

Association		Notes
0..*	From**: Target.**Location To: **Abstract3dPosition**	The 2D coordinates of the item at the start of the section. The location object is mandatory for the first section starting point.
0..*	From**: Target.**TargetSection To: **TargetSection**	Sections describing target. These may be ignored depending on the value of typeTargetScope.
	From**: Target.** To: **AbstractObject**	
	From**: Target.** To: **TargetScopeExt**	
	From**: Target.** To: **TargetCategoryExt**	
0..1	From**: Target.**ParentTarget To: **Target**	A pointer to the parent target. This represents a relationship between a drillers and geological target.
	From**: Target.** To: **NorthReferenceKind**	
0..1	From**: Target.**ParentTarget To: **Target**	A pointer to the parent target. This represents a relationship between a drillers and geological target.

14.2 TargetCategory

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/31/2016 *Status:* Proposed *Author:* William McKenzie
Notes:

Attributes

Name	Type	Notes
geological		
well control		A target being used for well control in another wellbore. This is drilled in the first step of a dynamic kill operation.

Associations

Association	Notes
From: **TargetCategory.** To: **TypeEnum**	
From: **TargetCategoryExt.** To: **TargetCategory**	

14.3 TargetCategoryExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 9/3/2021 *Last modified:*9/3/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TargetCategoryExt.** To: **EnumExtensionPattern**	
From: **TargetCategoryExt.** To: **TargetCategory**	
From: **Target.** To: **TargetCategoryExt**	

14.4 TargetScope

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/31/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *These values represent the type of scope of the drilling target.*

Attributes

Name	Type	Notes
3D volume		Generic 3 dimensional target. Defined by the target.
ellipsoid		
elliptical		Elliptical targets. Includes circle (semi-major = semi-minor axis). Any sections present are ignored.
hardLine		Boundary Conditions. Use sections to describe, length and width ignore.
irregular		Includes half circle and polygon. Use sections to describe, length and width ignored.
lease line		Boundary Conditions. Use sections to describe, length and width ignore.
line		Line target
plane		Plane target. Used for horizontal wells. Any sections present are ignored.
point		Point Target. Any sections present are ignored.
rectangular		Rectangular Targets. Includes square (length = width). Any sections present are ignored.

Associations

Association	Notes
From: **TargetScope.** To: **TypeEnum**	
From: **TargetScopeExt.** To: **TargetScope**	

14.5 TargetScopeExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 9/3/2021 *Last modified:*9/3/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TargetScopeExt.** To: **TargetScope**	
From: **TargetScopeExt.** To: **EnumExtensionPattern**	
From: **Target.** To: **TargetScopeExt**	

14.6 TargetSection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*10/31/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *WITSML Element Types*

Attributes

Name	Type	Notes
AngleArc	PlaneAngleMeasure	Direction of straight line section or radius of arc for continuous curve section.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
LenRadius	LengthMeasure	Length of straight line section or radius of arc for continuous curve section.
SectNumber	long	Sequence number of section, 1,2,3.
ThickAbove	LengthMeasure	Height of target above center point at the start of the section. In the case of an arc, the thickness above should vary linearly with the arc length.
ThickBelow	LengthMeasure	Depth of target below center point at the start of the section. In the case of an arc, the thickness below should vary linearly with the arc length.
TypeTargetSectionScope	TargetSectionScope	Section scope: Line or Arc.
uid	String64	

Associations

Association	Notes
From: **TargetSection.**Location **0..*** To: **Abstract3dPosition**	The 2D coordinates of the item at the start of the section. This is redundant information and can be computed by starting at the section origin and applying the sequence of angleArcs and lenRadius.
From: **TargetSection.** To: **TargetSectionScope**	
From: **Target.**TargetSection **0..*** To: **TargetSection**	Sections describing target. These may be ignored depending on the value of typeTargetScope.

14.7 TargetSectionScope

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*10/31/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *These values represent the type of scope of a section that describes a target.*

Attributes

Name	Type	Notes
arc		continuous curve
line		straight line

Associations

Association	Notes
From: **TargetSectionScope.** To: **TypeEnum**	
From: **TargetSection.** To: **TargetSectionScope**	

15 SurveyProgram

Package: xsd_schemas

Notes: SurveyProgram Schema.

15.1 SurveyProgram

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Captures information about the nature, range, and sequence of directional surveying tools run in a wellbore for the management of positional uncertainty. This object is uniquely identified within the context of one wellbore object.

Attributes

Name	Type	Notes
Engineer	String64	Name of the engineer.
Final	String64	Is program final or intermediate/preliminary?
SurveyVer	NonNegativeLong	Survey version number, incremented every time the program is modified.

Associations

Association	Notes
From: **SurveyProgram.**SurveySection **0..*** To: **SurveySection**	Survey section object.
From: **SurveyProgram.** To: **AbstractObject**	
From: **SurveyProgram.**Wellbore **1..1** To: **Wellbore**	
From: **Trajectory.**SurveyProgram **0..1** To: **SurveyProgram**	

15.2 SurveySection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Survey Section Component Schema.*

Attributes

Name	Type	Notes
Comments	String2000	Comments and remarks.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FrequencyMx	LengthMeasure	Maximum allowable depth frequency for survey stations for this survey run.
ItemState	ExistenceKind	The item state for the data object.
MdInterval	MdInterval	
ModelError	ToolErrorModel	Error model used to calculate the ellipses of uncertainty.
Name	String64	Name of the survey program section.
NameTool	String64	Name of survey tool used in this section.
Overwrite	boolean	Higher index trajectory takes precedence over overlapping section of previous trajectory? Values are "true" (or "1") and "false" (or "0"). Normally, this is true.
Sequence	NonNegativeLong	Order in which the program sections are or were executed.
SurveyCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the company who will run or has run the survey tool.
TypeTool	String64	Type of tool used.
uid	String64	Unique identifier of this instance of SurveySection.

Associations

Association	Notes
From: **SurveyProgram.**SurveySection **0..*** To: **SurveySection**	Survey section object.

16 Trajectory

Package: xsd_schemas

Notes: Trajectory Schema.

16.1 SourceTrajectoryStation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*8/9/2018 *Status:* Proposed *Author:* William McKenzie
Notes: *A reference to a trajectoryStation in a wellbore. The trajectoryStation may be defined within the context of another wellbore. This value represents a foreign key from one element to another.*

Attributes

Name	Type	Notes
StationReference	ComponentReference	A pointer to the trajectoryStation within the parent trajectory. StationReference is a special case where WITSML only uses a UID for the pointer.The natural identity of a station is its physical characteristics (e.g., md).

Associations

Association		Notes
1	From: **SourceTrajectoryStation.**Trajectory To: **Trajectory**	A pointer to the trajectory within the parent wellbore. This trajectory contains the trajectoryStation.
0..*	From: **TrajectoryStation.**SourceStation To: **SourceTrajectoryStation**	A pointer to the trajectoryStation from which this station was derived. The trajectoryStation may be in another wellbore.

16.2 StnTrajCorUsed

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Captures information about corrections applied to a trajectory station.*

Attributes

Name	Type	Notes
DirSensorOffset	LengthMeasure	Offset relative to the bit.
GravAxialAccelCor	LinearAccelerationMeasure	Calculated gravitational field strength correction.
GravTran1AccelCor	LinearAccelerationMeasure	The correction applied to a cross-axial (direction 1) component of the Earth's gravitational field.
GravTran2AccelCor	LinearAccelerationMeasure	The correction applied to a cross-axial (direction 2) component of the Earth's gravitational field.
MagAxialDrlstrCor	MagneticFluxDensityMeasure	Axial magnetic drill string correction.
MagAxialMSACor	MagneticFluxDensityMeasure	Axial magnetic correction due to a multi-station analysis process.
MagTran1DrlstrCor	MagneticFluxDensityMeasure	Cross-axial (direction 1) magnetic correction.
MagTran1MSACor	MagneticFluxDensityMeasure	Cross-axial (direction 1) magnetic correction due to a multi-station analysis process.
MagTran2DrlstrCor	MagneticFluxDensityMeasure	Cross-axial (direction 2) magnetic correction.
MagTran2MSACor	MagneticFluxDensityMeasure	Cross-axial (direction 2) magnetic correction due to a multi-station analysis process.
SagAziCor	PlaneAngleMeasure	Calculated cosag correction to the azimuth.
SagIncCor	PlaneAngleMeasure	Calculated sag correction to the inclination.
StnGridConUsed	PlaneAngleMeasure	The angle used to correct a true north referenced azimuth to a grid north azimuth. WITSML follows the Gauss-Bomford convention in which convergence angles are measured positive clockwise from true north to grid north (or negative in the anti-clockwise direction). To convert a true north referenced azimuth to a grid north azimuth, the convergence angle must be subtracted from true north. If this value is not provided, then GridConUsed applies to all grid-north referenced stations.

StnGridScaleFactorUsed	LengthPerLengthMeasure	A multiplier to change geodetic distances based on the Earth model (ellipsoid) to distances on the grid plane. This is the number which was already used to correct lateral distances. Provide it only if it is used in your trajectory stations. If StnGridScaleFactorUsed is not provided, then the value in the parent Trajectory applies to all trajectory stations. The grid scale factor applies to the DispEw, DispNs and Closure elements on trajectory stations.
StnMagDeclUsed	PlaneAngleMeasure	Magnetic declination used to correct a Magnetic North referenced azimuth to a True North azimuth. Magnetic declination angles are measured positive clockwise from True North to Magnetic North (or negative in the anti-clockwise direction). To convert a Magnetic azimuth to a True North azimuth, the magnetic declination should be added.

Associations

Association	Notes
0..1 From: **TrajectoryStation.**CorUsed To: **StnTrajCorUsed**	Applies only to measured magnetic stations.

16.3 StnTrajMatrixCov

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Captures validation information for a covariance matrix.*

Attributes

Name	Type	Notes
BiasE	LengthMeasure	Bias east.
BiasN	LengthMeasure	Bias north.
BiasVert	LengthMeasure	Bias vertical. The coordinate system is set up in a right-handed configuration, which makes the vertical direction increasing (i.e., positive) downwards.
Sigma	double	The sigma which is appropriate for all the other values in this class.
VarianceEE	AreaMeasure	Covariance east east.
VarianceEVert	AreaMeasure	Crossvariance east vertical.
VarianceNE	AreaMeasure	Crossvariance north east.
VarianceNN	AreaMeasure	Covariance north north.
VarianceNVert	AreaMeasure	Crossvariance north vertical.
VarianceVertVert	AreaMeasure	Covariance vertical vertical.

Associations

Association	Notes
From: **TrajectoryStation.**MatrixCov **0..1** To: **StnTrajMatrixCov**	Covariance matrix for error model.

16.4 StnTrajRawData

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Captures raw data for a trajectory station.*

Attributes

Name	Type	Notes
GravAxialRaw	LinearAccelerationMeasure	Uncorrected gravitational field strength measured in the axial direction.
GravTran1Raw	LinearAccelerationMeasure	Uncorrected gravitational field strength measured in the transverse direction.
GravTran2Raw	LinearAccelerationMeasure	Uncorrected gravitational field strength measured in the transverse direction, approximately normal to tran1.
MagAxialRaw	MagneticFluxDensityMeasure	Uncorrected magnetic field strength measured in the axial direction.
MagTran1Raw	MagneticFluxDensityMeasure	Uncorrected magnetic field strength measured in the transverse direction.
MagTran2Raw	MagneticFluxDensityMeasure	Uncorrected magnetic field strength measured in the transverse direction, approximately normal to tran1.

Associations

Association	Notes
From: **TrajectoryStation.**RawData **0..1** To: **StnTrajRawData**	Applies only to measured magnetic stations.

16.5 StnTrajValid

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Captures validation information for a survey.*

Attributes

Name	Type	Notes
GravTotalFieldCalc	LinearAccelerationMeasure	Calculated total gravitational field.
MagDipAngleCalc	PlaneAngleMeasure	Calculated magnetic dip (inclination), the angle between the horizontal and the geomagnetic field (positive down, res .001).
MagTotalFieldCalc	MagneticFluxDensityMeasure	Calculated total intensity of the geomagnetic field as sum of BGGM, IFR and local field.

Associations

Association	Notes
From: **TrajectoryStation.**Valid **0..1** To: **StnTrajValid**	Applies only to measured magnetic stations.

16.6 Trajectory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/19/2021 *Status:* Proposed *Author:* William McKenzie
Notes: The trajectory object is used to capture information about a directional survey in a wellbore. It contains many trajectory stations to capture the information about individual survey points. This object is uniquely identified within the context of one wellbore object.

Attributes

Name	Type	Notes
DefaultMdDatum	AbstractReferencePoint	This also contains the default projected and geographic systems....
DefaultTvdDatum	AbstractReferencePoint	
Definitive	boolean	True ("true" or "1") indicates that this trajectory is definitive for this wellbore. False ("false" or "0") or not given indicates otherwise. There can only be one trajectory per wellbore with definitive=true and it must define the geometry of the whole wellbore (surface to bottom). The definitive trajectory may represent a composite of information in many other trajectories. A query requesting a subset of the possible information can provide a simplistic view of the geometry of the wellbore.
DTimTrajEnd	TimeStamp	End date and time of trajectory station measurements. Note that this is NOT a server query parameter.
DTimTrajStart	TimeStamp	Start date and time of trajectory station measurements. Note that this is NOT a server query parameter.
FinalTraj	boolean	Is trajectory a final or intermediate/preliminary? Values are "true" (or "1") and "false" (or "0").
Memory	boolean	Is trajectory a result of a memory dump from a tool? Values are "true" (or "1") and "false" (or "0").
ServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the contractor who provided the service.
UniqueIdentifier	String64	A human-readable unique identifier assigned to the trajectory. Similar to a UWI for a well or wellbore.

Associations

Association		Notes
0..1	From: **Trajectory.**SurveyProgram To: **SurveyProgram**	
1	From: **Trajectory.**TrajectoryMetadata To: **TrajectoryMetadata**	
AbstractMdGrowingObject	From: **Trajectory.** To:	
0..*	From: **Trajectory.**SourceTrajectory To: **Trajectory**	Pointers to trajectories that stations in this trajectory are derived from.
1..1	From: **Trajectory.**Wellbore To: **Wellbore**	
0..1	From: **Trajectory.**ParentTrajectory To: **Trajectory**	If a trajectory is tied into another trajectory, a pointer to the parent trajectory. The trajectory may be in another wellbore.
0..*	From: **Trajectory.**TrajectoryStation To: **TrajectoryStation**	Container element for trajectory station elements. This is an API "data-node" query parameter for growing objects. See the relevant API specification for the query behavior related to this element.
0..1	From: **WellboreMarker.**Trajectory To: **Trajectory**	Reference to the directional survey used to convert the marker's MD to TVD. Even though the field is optional, it should be thought of as mandatory for any marker with a TVD (because one would have been used to make the conversion). Because this information is often lost or the survey is unavailable in the context of a data transfer the field is left as optional.
0..*	From: **Trajectory.**SourceTrajectory To: **Trajectory**	Pointers to trajectories that stations in this trajectory are derived from.
1	From: **SourceTrajectoryStation.**Trajectory To: **Trajectory**	A pointer to the trajectory within the parent wellbore. This trajectory contains the trajectoryStation.
0..1	From: **Trajectory.**ParentTrajectory To: **Trajectory**	If a trajectory is tied into another trajectory, a pointer to the parent trajectory. The trajectory may be in another wellbore.

16.7 TrajectoryMetadata

Type: Class *Stereotype:* «XSDgroup»
Detail: *Created:* 11/12/2021 *Last modified:*11/12/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Common metadata that is required to properly interpret trajectory station data.*

Attributes

Name	Type	Notes
AcquisitionRemark	String2000	Remarks related to acquisition context which is not the same as Description, which is a summary of the trajectory.
AziRef	NorthReferenceKind	Specifies the definition of north. While this is optional because of legacy data, it is strongly recommended that this always be specified.
AziVertSect	PlaneAngleMeasureExt	Azimuth used for vertical section plot/computations.
DispEwVertSectOrig	LengthMeasureExt	Origin east-west used for vertical section plot/computations.
DispNsVertSectOrig	LengthMeasureExt	Origin north-south used for vertical section plot/computations.
GridConUsed	PlaneAngleMeasureExt	The angle used to correct a true north referenced azimuth to a grid north azimuth. WITSML follows the Gauss-Bomford convention in which convergence angles are measured positive clockwise from true north to grid north (or negative in the anti-clockwise direction). To convert a true north referenced azimuth to a grid north azimuth, the convergence angle must be subtracted from true north. If StnGridConUsed is not provided, then this value applies to all grid-north referenced stations.
GridScaleFactorUsed	LengthPerLengthMeasureExt	A multiplier to change geodetic distances based on the Earth model (ellipsoid) to distances on the grid plane. This is the number which was already used to correct lateral distances. Provide it only if it is used in your trajectory stations. If StnGridScaleFactorUsed is not provided, then this value applies to all trajectory stations. The grid scale factor applies to the DispEw, DispNs and Closure elements on trajectory stations.

MagDeclUsed	PlaneAngleMeasureExt	Magnetic declination used to correct a Magnetic North referenced azimuth to a True North azimuth. Magnetic declination angles are measured positive clockwise from True North to Magnetic North (or negative in the anti-clockwise direction). To convert a Magnetic azimuth to a True North azimuth, the magnetic declination should be added. Starting value if stations have individual values.
MdMaxExtrapolated	MeasuredDepth	The measured depth to which the survey segment was extrapolated.
MdMaxMeasured	MeasuredDepth	Measured depth within the wellbore of the LAST trajectory station with recorded data. If a trajectory has been extrapolated to a deeper depth than the last surveyed station then that is MdMaxExtrapolated and not MdMaxMeasured.
MdTieOn	MeasuredDepth	Tie-point depth measured along the wellbore from the measurement reference datum to the trajectory station - where tie point is the place on the originating trajectory where the current trajectory intersecst it.
NominalCalcAlgorithm	TrajStnCalcAlgorithmExt	The nominal type of algorithm used in the position calculation in trajectory stations. Individual stations may use different algorithms.
NominalTypeSurveyTool	TypeSurveyToolExt	The nominal type of tool used for the trajectory station measurements. Individual stations may have a different tool type.
NominalTypeTrajStation	TrajStationTypeExt	The nominal type of survey station for the trajectory stations. Individual stations may have a different type.
TrajectoryOSDUIntegration	TrajectoryOSDUIntegration	Information about a Trajectory that is relevant for OSDU integration but does not have a natural place in a Trajectory object.

Associations

Association		Notes
1	From: **Trajectory.**TrajectoryMetadata To: **TrajectoryMetadata**	
1	From: **TrajectoryReport.**TrajectoryMetadata To: **TrajectoryMetadata**	
	From: **DrillReportSurveyStationReport. 1** To: **TrajectoryMetadata**	

16.8 TrajectoryOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a Trajectory that is relevant for OSDU integration but does not have a natural place in a Trajectory object.*

Attributes

Name	Type	Notes
ActiveIndicator	boolean	Active Survey Indicator. Distinct from ActiveStatus on Trajectory.
AppliedOperation	String256	The audit trail of operations applied to the station coordinates from the original state to the current state. The list may contain operations applied prior to ingestion as well as the operations applied to produce the Wgs84Coordinates. The text elements refer to ESRI style CRS and Transformation names, which may have to be translated to EPSG standard names.
IntermediaryServiceCompany	BusinessAssociate	Pointer to a BusinessAssociate that represents the company who engaged the service company (ServiceCompany) to perform the surveying.
SurveyToolType	String256	The type of tool or equipment used to acquire this Directional Survey.
TrajectoryVersion	String64	The version of the wellbore survey deliverable received from the service provider - as given by this provider. Distinct from objectVersion.

16.9 TrajectoryReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/12/2021 *Last modified:*11/12/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Captures information for a report including trajectory stations.*

Associations

Association		Notes
1	From**: TrajectoryReport.**TrajectoryMetadata To: **TrajectoryMetadata**	
0..*	From**: TrajectoryReport.**TrajectoryStation To: **TrajectoryStation**	
0..1	From**: OpsReport.**TrajectoryStations To: **TrajectoryReport**	Survey station recorded during the report interval.

16.10 TrajectoryStation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*4/1/2019 *Status:* Proposed *Author:* William McKenzie
Notes: *WITSML - Trajectory Station Component Schema*

Attributes

Name	Type	Notes
AxialMagInterferenceCorUsed	boolean	Was an Axial Magnetic Interference (AMI) correction applied to the azimuth value? Values are "true" (or "1") and "false" (or "0"). Most of the BHAs used to drill wells include an MWD tool. An MWD is a magnetic survey tool and as such suffer from magnetic interferences from a wide variety of sources. Magnetic interferences can be categorized into axial and radial type interferences. Axial interferences are mainly the result of magnetic poles from the drill string steel components located below and above the MWD tool. Radial interferences are numerous. Therefore, there is a risk that magXAxialCorUsed includes both Axial and radial corrections.
Azi	PlaneAngleMeasure	Hole azimuth. Corrected to wells azimuth reference.
CalcAlgorithm	TrajStnCalcAlgorithm	The type of algorithm used in the position calculation.
Closure	LengthMeasure	The horizontal straight line distance from the trajectory origin (Well surface location) to this trajectory station, calculated using the Pythagorean Theorem from this trajectory station's X and Y Offsets. Closure Distance is often reported only once for the bottom hole location; however, the value stored in this attribute is the Closure Distance at this trajectory station. The distance is subject to distortions by the projection in which the closure is computed. Often referred to as simply "Closure" or sometimes referred to as "Horizontal Displacement".

ClosureDirection	PlaneAngleMeasure	The direction angle, in the horizontal plane relative to the north reference, of the trajectory origin (Well surface location) to this trajectory station calculated using trigonometry from this trajectory station's X and Y Offsets. The North Reference the Trajectory's AziRef. This value should be a number between 0.00 and 360.00 degrees; 0.00 and 360.00 represent North, 90.00 is East, 180.00 is South and 270.00 is West. Sometimes referred to as "Horizontal Displacement Direction" or "Horizontal Displacement Bearing".
CosagCorUsed	boolean	WWas a Cosag Correction applied to the azimuth values? Values are "true" (or "1") and "false" (or "0"). The BHA Sag Correction is the same as the Sag Correction except it includes the horizontal misalignment (Cosag).
DipAngleUncert	PlaneAngleMeasure	Survey tool dip uncertainty.
DispEw	LengthMeasure	East-west offset, positive to the East. This is relative to wellLocation with a North axis orientation of aziRef. If a displacement with respect to a different point is desired then define a localCRS and specify local coordinates in location.
DispLatitude	PlaneAngleMeasure	The difference between the well surface hole latitude and the trajectory station latitude. A positive value indicates a northerly direction; a negative value indicates a southerly direction. ADD this value to the well Surface Latitude to define the Station Latitude.
DispLongitude	PlaneAngleMeasure	The difference between the well surface hole longitude and the trajectory station longitude. A positive value indicates an easterly direction; a negative value indicates a westerly direction. ADD this value to the well Surface Longitude to define the Station Longitude.
DispNs	LengthMeasure	North-south offset, positive to the North. This is relative to wellLocation with a North axis orientation of aziRef. If a displacement with respect to a different point is desired then define a localCRS and specify local coordinates in location.
Dls	AnglePerLengthMeasure	Dogleg severity.
DTimStn	TimeStamp	Date and time the station was measured or created.
GeoModelUsed	String64	Gravitational model used.

GravAccelCorUsed	boolean	Was an accelerometer alignment correction applied to survey computation? Values are "true" (or "1") and "false" (or "0").
GravTotalFieldReference	LinearAccelerationMeasure	Gravitational field theoretical/reference value.
GravTotalUncert	LinearAccelerationMeasure	Survey tool gravity uncertainty.
Gtf	PlaneAngleMeasure	Toolface angle (gravity).
Incl	PlaneAngleMeasure	Hole inclination, measured from vertical.
InfieldRefCorUsed	boolean	Was an In Field Referencing (IFR) correction applied to the azimuth value? Values are "true" (or "1") and "false" (or "0"). An IFR survey measures the strength and direction of the Earth's magnetic field over the area of interest. By taking a geomagnetic modelled values away from these field survey results, we are left with a local crustal correction, which since it is assumed geological in nature, only varies over geological timescales. For MWD survey operations, these corrections are applied in addition to the geomagnetic model to provide accurate knowledge of the local magnetic field and hence to improve the accuracy of MWD magnetic azimuth measurements.
InHoleRefCorUsed	boolean	Was an In Hole Referencing (IHR) correction applied to the inclination and/or azimuth values? Values are "true" (or "1") and "false" (or "0"). In-Hole Referencing essentially involves comparing gyro surveys to MWD surveys in a tangent section of a well. Once a small part of a tangent section has been drilled and surveyed using an MWD tool, then an open hole (OH) gyro is run. By comparing the Gyro surveys to the MWD surveys a correction can be calculated for the MWD. This correction is then assumed as valid for the rest of the tangent section allowing to have a near gyro accuracy for the whole section, therefore reducing the ellipse of uncertainty (EOU) size.

InterpolatedInfieldRefCorUsed	boolean	Was an Interpolated In Field Referencing (IIFR) correction applied to the azimuth value? Values are "true" (or "1") and "false" (or "0"). Interpolated In Field Referencing measures the diurnal Earth magnetic field variations resulting from electrical currents in the ionosphere and effects of magnetic storms hitting the Earth. It increases again the accuracy of the magnetic azimuth measurement.
MagDipAngleReference	PlaneAngleMeasure	Magnetic dip angle theoretical/reference value.
MagDrlstrCorUsed	boolean	Was a drillstring magnetism correction applied to survey computation? Values are "true" (or "1") and "false" (or "0").
MagModelUsed	String64	Geomagnetic model used.
MagModelValid	String64	Current valid interval for the geomagnetic model used.
MagTotalFieldReference	MagneticFluxDensityMeasure	Geomagnetic field theoretical/reference value.
MagTotalUncert	MagneticFluxDensityMeasure	Survey tool magnetic uncertainty.
MagXAxialCorUsed	boolean	Was a magnetometer alignment correction applied to survey computation? Values are "true" (or "1") and "false" (or "0").
ManuallyEntered	boolean	Indicates whether the trajectory station information was manually entered by a human.
MdDelta	LengthMeasure	Delta measured depth from previous station.
MSACorUsed	boolean	Was a correction applied to the survey due to a Multi-Station Analysis process? Values are "true" (or "1") and "false" (or "0").
Mtf	PlaneAngleMeasure	Toolface angle (magnetic).
OriginalLatitude	PlaneAngleMeasure	The latitude of the trajectory station. Recommended practice is to utilize DispLatitude and DispLongitude instead of storing actual OriginalLatitude/OriginalLongitude values. NOTE - These are relative to the same geodetic datum as the well surface location.

OriginalLongitude	PlaneAngleMeasure	The longitude of the trajectory station. Recommended practice is to utilize DispLatitude and DispLongitude instead of storing actual OriginalLatitude/OriginalLongitude values. NOTE - These are relative to the same geodetic datum as the well surface location.
RateBuild	AnglePerLengthMeasure	Build Rate, radius of curvature computation.
RateTurn	AnglePerLengthMeasure	Turn rate, radius of curvature computation.
SagCorUsed	boolean	Was a bottom hole assembly sag correction applied to the survey computation? Values are "true" (or "1") and "false" (or "0").
StatusTrajStation	TrajStationStatus	Status of the station.
Target	Target	A pointer to the intended target of this station.
TrajectoryStationOSDUIntegration	TrajectoryStationOSDUIntegration	Information about a TrajectoryStation that is relevant for OSDU integration but does not have a natural place in a TrajectoryStation object.
TrueClosure	LengthMeasure	The horizontal straight line distance from the trajectory origin (Well surface location) to this trajectory station, calculated using the Pythagorean Theorem from this trajectory station's X and Y Offsets. True Closure Distance is often reported only once for the bottom hole location; however, the value stored in this attribute is the True Closure Distance at this trajectory station. The distance is computed in a local CRS with scale factor one. Often referred to as simply "True Closure" or sometimes referred to as "True Horizontal Displacement".
TrueClosureDirection	PlaneAngleMeasure	The direction angle, in the horizontal plane relative to the True North reference, of the trajectory origin (Well surface location) to this trajectory station, calculated using trigonometry from this trajectory station's X and Y Offsets. The direction is calculated in a True North oriented, local coordinate reference system anchored at the survey origin (Well surface location). This value should be a number between 0.00 and 360.00 degrees; 0.00 and 360.00 represent North, 90.00 is East, 180.00 is South and 270.00 is West.
Tvd	AbstractVerticalDepth	Vertical depth of the measurements.
TvdDelta	LengthMeasure	Delta true vertical depth from previous station.

TypeSurveyTool	TypeSurveyTool	The type of tool used for the measurements.
TypeTrajStation	TrajStationType	Type of survey station.
VertSect	LengthMeasure	Distance along vertical section azimuth plane.
WGS84Latitude	PlaneAngleMeasure	World map latitude based on WGS 84 (EPSG:4326).
WGS84Longitude	PlaneAngleMeasure	World map longitude based on WGS 84 (EPSG:4326).

Associations

Association	Notes
0..1 From: **TrajectoryStation.**CorUsed To: **StnTrajCorUsed**	Applies only to measured magnetic stations.
From: **TrajectoryStation.** To: **TrajStationStatus**	
From: **TrajectoryStation.** To: **TrajStationType**	
From: **TrajectoryStation.** To: **AbstractMdGrowingPart**	
0..1 From: **TrajectoryStation.**RawData To: **StnTrajRawData**	Applies only to measured magnetic stations.
0..* From: **TrajectoryStation.**Location To: **AbstractPosition**	The 2D coordinates of the item. Note that within the context of trajectory, the "original" coordinates are inherently local coordinates as defined above.
From: **TrajectoryStation.** To: **TypeSurveyToolExt**	
From: **TrajectoryStation.** To: **TrajStnCalcAlgorithmExt**	
0..1 From: **TrajectoryStation.**MatrixCov To: **StnTrajMatrixCov**	Covariance matrix for error model.
0..1 From: **TrajectoryStation.**ToolErrorModel To: **ToolErrorModel**	
0..* From: **TrajectoryStation.**SourceStation To: **SourceTrajectoryStation**	A pointer to the trajectoryStation from which this station was derived. The trajectoryStation may be in another wellbore.
0..1 From: **TrajectoryStation.**Valid To: **StnTrajValid**	Applies only to measured magnetic stations.
0..* From: **TrajectoryReport.**TrajectoryStation To: **TrajectoryStation**	
0..* From: **Trajectory.**TrajectoryStation To: **TrajectoryStation**	Container element for trajectory station elements. This is an API "data-node" query parameter for growing objects. See the relevant API specification for the query behavior related to this element.

16.11 TrajectoryStationOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a TrajectoryStation that is relevant for OSDU integration but does not have a natural place in a TrajectoryStation object.*

Attributes

Name	Type	Notes
Easting	LengthMeasureExt	The easting value of the point in the directional survey. Local CRS must be defined.
Northing	LengthMeasureExt	The northing value of the point in the directional survey. Local CRS must be defined.
RadiusOfUncertainty	LengthMeasure	The radius of uncertainty distance of this trajectory station.

16.12 TrajStationStatus

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the status of a trajectory station.*

Attributes

Name	Type	Notes
open		Has not been validated; does not influence position computation for stations below it.
rejected		The quality is not ok; does not influence position computation for stations below it.
position		Validated and in-use.

Associations

Association	Notes
From: **TrajStationStatus.** To: **TypeEnum**	
From: **TrajectoryStation.** To: **TrajStationStatus**	

16.13 TrajStationType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of directional survey station.*

Attributes

Name	Type	Notes
azimuth on plane		Section terminates at a given azimuth on a given plane target; requires target ID.
buildrate to delta-MD		Section follows a given build rate to a specified delta measured depth.
buildrate to INCL		Section follows a given build rate to a specified inclination.
buildrate to MD		Section follows a given build rate to a specified measured depth.
buildrate and turnrate to AZI		Section follows a given build rate and turn rate to a specified azimuth.
buildrate and turnrate to delta-MD		Section follows a given build rate and turn rate to a specified delta measured depth.
buildrate and turnrate to INCL		Section follows a given build rate and turn rate to a specified inclination.
buildrate and turnrate to INCL and AZI		Section follows a given build rate and turn rate to a specified inclination and azimuth.
buildrate and turnrate to MD		Section follows a given build rate and turn rate to a specified measured depth.
buildrate and turnrate to TVD		Section follows a given build rate and turn rate to a specified TVD.
buildrate TVD		Section follows a given build rate to a specified TVD.
casing MD		Measured depth casing point; can also be inserted within actual survey stations.
casing TVD		TVD casing point; can also be inserted within actual survey stations.
DLS		Section follows a given dogleg severity.
DLS to AZI and MD		Section follows a given dogleg severity to a specified measured depth and azimuth.
DLS to AZI-TVD		Section follows a given dogleg severity until a specified TVD and azimuth.
DLS to INCL		Section follows a given dogleg severity until a specified inclination.
DLS to INCL and AZI		Section follows a given dogleg severity to a specified inclination and azimuth.
DLS to INCL and MD		Section follows a given dogleg severity to a specified measured depth and inclination.
DLS to INCL and TVD		Section follows a given dogleg severity until a specified TVD and inclination.
DLS to NS		Section follows a given dogleg severity for a given north, south distance.
DLS and toolface to AZI		Section follows a given toolface angle and dogleg severity to a specified azimuth.

DLS and toolface to delta-MD		Section follows a given toolface angle and dogleg severity to a specified delta measured depth.
DLS and toolface to INCL		Section follows a given toolface angle and dogleg severity to a specified inclination.
DLS and toolface to INCL-AZI		Section follows a given toolface angle and dogleg severity to a specified inclination and azimuth.
DLS and toolface to MD		Section follows a given toolface angle and dogleg severity to a specified measured depth.
DLS and toolface to TVD		Section follows a given toolface angle and dogleg severity to a specified TVD.
extrapolated		Derived by extrapolating beyond the first or last station (either planned or surveyed).
formation MD		Measured depth formation; can be inserted within actual survey stations also .
formation TVD		TVD formation; can be inserted within actual survey stations also.
hold to delta-MD		Section holds angle and azimuth to a specified delta measured depth.
hold to MD		Section holds angle and azimuth to a specified measured depth.
hold to TVD		Section holds angle and azimuth to a specified TVD.
INCL AZI and TVD		Section follows a continuous curve to a specified inclination, azimuth and true vertical depth.
interpolated		Derived by interpolating between stations with entered values (either planned or surveyed).
marker MD		Measured depth marker; can be inserted within actual survey stations also.
marker TVD		TVD marker; can be inserted within actual survey stations also.
MD and INCL		An old style drift indicator by Totco / inclination-only survey.
MD INCL and AZI		A normal MWD / gyro survey.
N E and TVD		A point on a computed trajectory with northing, easting and true vertical depth.
NS EW and TVD		Specified as TVD, NS, EW; could be used for point or drilling target (non-geological target).
target center		Specified as TVD, NS, EW of target center; requires target ID association.
target offset		Specified as TVD, NS, EW of target offset; requires target ID association.
tie in point		Tie-in point for the survey.
turnrate to AZI		Section follows a given turn rate to an azimuth.
turnrate to delta-MD		Section follows a given turn rate to a given delta measured depth.
turnrate to MD		Section follows a given turn rate to a given measured depth.

turnrate to TVD		Section follows a given turn rate to a given TVD.
unknown		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **TrajStationType.** To: **TypeEnum**	
From: **TrajectoryStation.** To: **TrajStationType**	
From: **TrajStationTypeExt.** To: **TrajStationType**	

16.14 TrajStationTypeExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TrajStationTypeExt.** To: **EnumExtensionPattern**	
From: **TrajStationTypeExt.** To: **TrajStationType**	

16.15 TrajStnCalcAlgorithm

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the trajectory station calculation algorithm.*

Attributes

Name	Type	Notes
average angle		
balanced tangential		
constant tool face		
custom		
inertial		
minimum curvature		
radius of curvature		
tangential		

Associations

Association	Notes
From: **TrajStnCalcAlgorithm.** To: **TypeEnum**	
From: **TrajStnCalcAlgorithmExt.** To: **TrajStnCalcAlgorithm**	

16.16 TrajStnCalcAlgorithmExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TrajStnCalcAlgorithmExt.** To: **TrajStnCalcAlgorithm**	
From: **TrajStnCalcAlgorithmExt.** To: **EnumExtensionPattern**	
From: **TrajectoryStation.** To: **TrajStnCalcAlgorithmExt**	

16.17 TypeSurveyTool

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values for the type of directional survey tool; a very generic classification.*

Attributes

Name	Type	Notes
gyroscopic inertial		
gyroscopic MWD		
gyroscopic north seeking		
magnetic multiple-shot		
magnetic MWD		
magnetic single-shot		

Associations

Association	Notes
From: **TypeSurveyTool.** To: **TypeEnum**	
From: **TypeSurveyToolExt.** To: **TypeSurveyTool**	

16.18 TypeSurveyToolExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TypeSurveyToolExt.** To: **TypeSurveyTool**	
From: **TypeSurveyToolExt.** To: **EnumExtensionPattern**	
From: **TrajectoryStation.** To: **TypeSurveyToolExt**	

17 ToolErrorModel

Package: xsd_schemas

Notes: Tool Error Model schema.

«XSDcomplexType»
Abstract::Citation
«XSDelement»
+ Creation: TimeStamp
+ Description: String2000 [0..1]
+ DescriptiveKeywords: String2000 [0..1]
+ Editor: String64 [0..1]
+ EditorHistory: String64 [0..1]
+ Format: String2000
+ LastUpdate: TimeStamp [0..1]
+ Originator: String64
+ Title: String256
«XSDcomplexType»
Abstract::AbstractObject
«XSDelement»
+ Aliases: ObjectAlias [0..*]
+ BusinessActivityHistory: String64 [0..1]
+ Citation: Citation
+ CustomData: CustomData [0..1]
+ Existence: ExistenceKindExt [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ ObjectVersionReason: String2000 [0..1]
+ OSDUIntegration: OSDUIntegration [0..1]
«XSDattribute»
+ objectVersion: String64 [0..1]
+ schemaVersion: String64
+ uuid: UuidString
«XSDcomplexType»
AbstractOperatingRange
«XSDelement»
+ Comment: String2000 [0..1]
+ End: double
+ EndInclusive: boolean
+ Start: double
+ StartInclusive: boolean
«XSDcomplexType»
PlaneAngleOperatingRange
«XSDelement»
+ Uom: PlaneAngleUomExt
«XSDcomplexType»
CustomOperatingRange
«XSDelement»
+ Title: String64
+ Uom: UomEnum
«XSDcomplexType»
AzimuthRange
«XSDelement»
+ IsMagneticNorth: boolean
«XSDcomplexType,XS...
ToolErrorModelDictionary
«XSDcomplexType,XSDtopLevelElement»
ToolErrorModel
«XSDelement»
+ Application: String2000 [0..1]
+ CorrectionConsidered: CorrectionConsideredExt [0..-1]
+ MisalignmentMode: MisalignmentMode
+ OperatingCondition: OperatingConditionExt [0..-1]
+ Source: String2000 [0..1]
+ SurveyRunDateEnd: TimeStamp [0..1]
+ SurveyRunDateStart: TimeStamp [0..1]
+ ToolKind: ToolKind [0..1]
+ ToolSubKind: ToolSubKindExt [1..-1]
TypeEnum
«enumeration»
ToolKind
gyroscopic
magnetic
utility
TypeEnum
«enumeration»
MisalignmentMode
1
2
3
«XSDcomplexType»
OperatingConstraints
«XSDelement»
+ CustomLimits: GenericMeasure [0..-1]
+ HorizontalEastWestMaxValue: PlaneAngleMeasureExt [0..1]
+ MdRange: MdInterval [0..-1]
+ PressureLimit: PressureMeasureExt [0..1]
+ ThermodynamicTemperatureLimit: ThermodynamicTemperatureMeasureExt [0..1]
+ TvdRange: AbstractTvdInterval [0..-1]
«XSDcomplexTyp...
ErrorTermDictionary
«XSDcomplexType,XSDt...
WeightingFunctionDictionary
«XSDcomplexType,XSDtopLevelElement»
ErrorTerm
«XSDelement»
+ GyroMode: GyroMode [0..1]
+ MeasureClass: MeasureClass [0..1]
+ PropagationMode: ErrorPropagationMode
«XSDcomplexType»
ErrorTermValue
«XSDelement»
+ Magnitude: GenericMeasure
+ MeanValue: GenericMeasure [0..1]
«XSDcomplexType»
Parameter
«XSDelement»
+ Formula: String2000
+ Title: String64
«XSDcomplexType»
AzimuthFormula
«XSDelement»
+ Formula: String2000
«XSDcomplexType,XSDtopLevelElement»
WeightingFunction
«XSDelement»
+ Comment: String2000 [0..1]
+ DepthFormula: String2000
+ InclinationFormula: String2000
+ Kind: ErrorKind [0..1]
+ SingularityEastFormula: String2000 [0..1]
+ SingularityNorthFormula: String2000 [0..1]
+ SingularityVerticalFormula: String2000 [0..1]
+ Source: String64 [0..-1]
TypeEnum
«enumeration»
ErrorKind
alignment
azimuth reference
depth
magnetic
reading
sensor
TypeEnum
«enumeration»
ErrorPropagationMode
B
G
R
S
W
TypeEnum
«enumeration»
GyroMode
continuous
stationary
«XSDcomplexType»
ContinuousAzimuthFormula
«XSDelement»
+ GyroAxis: GyroAxisCombination [0...1]
TypeEnum
«enumeration»
GyroAxisCombination
z
xy
xyz
+ToolErrorModel
«byValue»
+Replaces
0..1
2..*
+InclinationRange
+LatitudeRange
+CustomRange
+AzimuthRange
+OperatingConstraints
+ErrorTermValue
+ErrorTerm
«byValue»
+WeightingFunction
«byValue»
+WeightingFunction
+ErrorTerm
+Parameter
+AzimuthFormula
+ContinuousAzimuthFormula
0..3

«XSDcomplexType»
Abstract::ObjectAlias
«XSDattribute»
+ authority: String64
«XSDelement»
+ Description: String2000 [0..1]
+ EffectiveDateTime: TimeStamp [0..1]
+ Identifier: String64
+ IdentifierKind: AliasIdentifierKindExt [0..1]
+ TerminationDateTime: TimeStamp [0..1]
«XSDcomplexType»
Abstract::Citation
«XSDelement»
+ Creation: TimeStamp
+ Description: String2000 [0..1]
+ DescriptiveKeywords: String2000 [0..1]
+ Editor: String64 [0..1]
+ EditorHistory: String64 [0..-1]
+ Format: String2000
+ LastUpdate: TimeStamp [0..1]
+ Originator: String64
+ Title: String256
«XSDcomplexType»
Abstract::AbstractObject
«XSDelement»
+ Aliases: ObjectAlias [0..*]
+ BusinessActivityHistory: String64 [0..-1]
+ Citation: Citation
+ CustomData: CustomData [0..1]
+ Existence: ExistenceKindExt [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ ObjectVersionReason: String2000 [0..1]
+ OSDUIntegration: OSDUIntegration [0..1]
«XSDattribute»
+ objectVersion: String64 [0..1]
+ schemaVersion: String64
+ uuid: UuidString
«XSDcomplexType»
AbstractOperatingRange
«XSDelement»
+ Comment: String2000 [0..1]
+ End: double
+ EndInclusive: boolean
+ Start: double
+ StartInclusive: boolean
«XSDcomplexType»
PlaneAngleOperatingRange
«XSDelement»
+ Uom: PlaneAngleUomExt
«XSDcomplexType»
CustomOperatingRange
«XSDelement»
+ Title: String64
+ Uom: UomEnum
«XSDcomplexType»
AzimuthRange
«XSDelement»
+ IsMagneticNorth: boolean
+DeclinationRange
+LatitudeRange
+CustomRange
+AzimuthRange
0..*
«XSDcomplexType»
OperatingConstraints
«XSDelement»
+ CustomLimits: GenericMeasure [0..-1]
+ HorizontalEastWestMaxValue: PlaneAngleMeasureExt [0..1]
+ MdRange: MdInterval [0..-1]
+ PressureLimit: PressureMeasureExt [0..1]
+ ThermodynamicTemperatureLimit: ThermodynamicTemperatureMeasureExt [0..1]
+ TvdRange: AbstractTvdInterval [0..-1]
+OperatingConstraints
0..1
«XSDcomplexType,XSDtopLevelElement»
ToolErrorModel
«XSDelement»
+ Application: String2000 [0..1]
+ CorrectionConsidered: CorrectionConsideredExt [0..-1]
+ MisalignmentMode: MisalignmentMode
+ OperatingCondition: OperatingConditionExt [0..-1]
+ Source: String2000 [0..1]
+ SurveyRunDateEnd: TimeStamp [0..1]
+ SurveyRunDateStart: TimeStamp [0..1]
+ ToolKind: ToolKind [0..1]
+ ToolSubKind: ToolSubKindExt [1..-1]
+Replaces
0..1
TypeEnum
«enumeration»
ToolSubKind
blind
blind plus trend
camera based film gyro multi shot
camera based film gyro single shot
camera based film magnetic multi shot
camera based film magnetic single shot
dipmeter
electro magnetic survey
ferranti inertial navigation system
gyro suspicious
gyro while drilling
inclinometer actual
inclinometer planned
inclinometer plus trend
magnetic while drilling
north seeking gyro
ring laser inertial guidance surveyor
surface readout gyro multi shot
surface readout gyro single shot
zero error
unknown
TypeEnum
«enumeration»
ToolKind
gyroscopic
magnetic
utility
TypeEnum
«enumeration»
OperatingCondition
bent sub
cable conveyed
casing
casing collar locator
centrollers
drill pipe
dropped
fast logging speed
floating
large inside diameter
single shot
slow logging speed
TypeEnum
«enumeration»
CorrectionConsidered
depth
dual inclinometer
sag
cosag
axial magnetic interference
drill string magnetic interference
international geomagnetic reference field
high resolution geomagnetic model
in field referencing 1
in field referencing 2
in hole referencing
single station analysis
multi station analysis
EnumExtensionPattern
«XSDunion»
ToolSubKindExt
EnumExtensionPattern
«XSDunion»
OperatingConditionExt
EnumExtensionPattern
«XSDunion»
CorrectionConsideredExt
TypeEnum
«enumeration»
MisalignmentMode
1
2
3
TypeEnum
«enumeration»
AccelerometerAxisCombination
xy
xyz
+Authorization
«XSDcomplexType»
Authorization
«XSDelement»
+ ApprovalAuthority: String64
+ ApprovedBy: String64 [0..1]
+ ApprovedOn: TimeStamp [0..1]
+ CheckedBy: String64 [0..1]
+ CheckedOn: TimeStamp [0..1]
+ RevisionComment: String2000 [0..1]
+ RevisionDate: TimeStamp [0..1]
+ Status: AuthorizationStatus [0..1]
+GyroToolConfiguration
0..1
«XSDcomplexType»
GyroToolConfiguration
«XSDelement»
+ AccelerometerAxisCombination: AccelerometerAxisCombination [0..-1]
+ ExternalReference: boolean
+XyAccelerometer
0..1
«XSDcomplexType»
XyAccelerometer
«XSDelement»
+ CantAngle: PlaneAngleMeasureExt
+ Switching: boolean
TypeEnum
«enumeration»
AuthorizationStatus
agreed
provisional
obsolete
+ContinuousGyro
0..*
«XSDcomplexType»
ContinuousGyro
«XSDelement»
+ AxisCombination: GyroAxisCombination
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ GyroReinitializationDistance: LengthMeasureExt [0..1]
+ Initialization: PlaneAngleMeasureExt [0..1]
+ NoiseReductionFactor: double [0..1]
+ Range: PlaneAngleOperatingRange
+ Speed: LengthPerTimeMeasureExt [0..1]
+StationaryGyro
0..*
«XSDcomplexType»
StationaryGyro
«XSDelement»
+ AxisCombination: GyroAxisCombination
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Range: PlaneAngleOperatingRange
TypeEnum
«enumeration»
GyroAxisCombination
z
xy
xyz

17.1 AbstractOperatingRange

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Comment	String2000	
End	double	
EndInclusive	boolean	Is the end inclusive or exclusive in the range.
Start	double	
StartInclusive	boolean	Is the start inclusive or exclusive in the range.

Associations

Association	Notes
From: **PlaneAngleOperatingRange.** To: **AbstractOperatingRange**	
From: **CustomOperatingRange.** To: **AbstractOperatingRange**	

17.2 AccelerometerAxisCombination

Type: Enumeration *Stereotype:*
Detail: *Created:* 7/25/2018 *Last modified:*7/25/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
xy		
xyz		

Associations

Association	Notes
From: **AccelerometerAxisCombination.** To: **TypeEnum**	
From: **GyroToolConfiguration.** To: **AccelerometerAxisCombination**	

17.3 Authorization

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 7/24/2018 *Last modified:*8/6/2018 *Status:* Proposed *Author:* j0293564
Notes:

Attributes

Name	Type	Notes
ApprovalAuthority	String64	
ApprovedBy	String64	
ApprovedOn	TimeStamp	
CheckedBy	String64	
CheckedOn	TimeStamp	
RevisionComment	String2000	
RevisionDate	TimeStamp	
Status	AuthorizationStatus	

Associations

Association	Notes
From**: Authorization.** To: **AuthorizationStatus**	
From**: ToolErrorModel.**Authorization To: **Authorization**	

17.4 AuthorizationStatus

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* J0293564
Notes:

Attributes

Name	Type	Notes
agreed		
provisional		
obsolete		

Associations

Association	Notes
From: **AuthorizationStatus.** To: **TypeEnum**	
From: **Authorization.** To: **AuthorizationStatus**	

17.5 AzimuthFormula

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Formula	String2000	

Associations

Association	Notes
From**: AzimuthFormula.**Parameter **0..*** To: **Parameter**	Allows to define parameters which are used in an azimuth formula.
From**: WeightingFunction.**AzimuthFormula To: **AzimuthFormula**	In gyro case, to be used for stationary formula.
From**: ContinuousAzimuthFormula.** To: **AzimuthFormula**	

17.6 AzimuthRange

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*8/7/2018 *Status:* Proposed *Author:* j0293564
Notes:

Attributes

Name	Type	Notes
IsMagneticNorth	boolean	True = magnetic north, False = True North

Associations

Association	Notes
From: **AzimuthRange.** To: **PlaneAngleOperatingRange**	
0..* From: **OperatingConstraints.**AzimuthRange To: **AzimuthRange**	

17.7 ContinuousAzimuthFormula

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* J0293564
Notes:

Attributes

Name	Type	Notes
GyroAxis	GyroAxisCombination	

Associations

Association	Notes
From: **ContinuousAzimuthFormula.** To: **GyroAxisCombination**	
From: **ContinuousAzimuthFormula.** To: **AzimuthFormula**	
From: **WeightingFunction.**ContinuousAzimuthFormula **0..3** To: **ContinuousAzimuthFormula**	In gyro case, to be used for continuous formula and for specifying axis in case of transition between 2 different gyros (z & xy for instance)

17.8 ContinuousGyro

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 7/24/2018 *Last modified:*8/17/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
AxisCombination	GyroAxisCombination	
ExtensionNameValue	ExtensionNameValue	
GyroReinitializationDistance	LengthMeasureExt	
Initialization	PlaneAngleMeasureExt	
NoiseReductionFactor	double	
Range	PlaneAngleOperatingRange	
Speed	LengthPerTimeMeasureExt	

Associations

Association	Notes
From: **ContinuousGyro.** To: **GyroAxisCombination**	
From: **GyroToolConfiguration.**ContinuousGyro **0..*** To: **ContinuousGyro**	

17.9 CorrectionConsidered

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
depth		
dual inclinometer		
sag		
cosag		
axial magnetic interference		
drill string magnetic interference		
international geomagnetic reference field		
high resolution geomagnetic model		
in field referencing 1		
in field referencing 2		
in hole referencing		
single station analysis		
multi station analysis		

Associations

Association	Notes
From: **CorrectionConsidered.** To: **TypeEnum**	
From: **CorrectionConsideredExt.** To: **CorrectionConsidered**	

17.10 CorrectionConsideredExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **CorrectionConsideredExt.** To: **EnumExtensionPattern**	
From: **CorrectionConsideredExt.** To: **CorrectionConsidered**	
From: **ToolErrorModel.** To: **CorrectionConsideredExt**	

17.11 CustomOperatingRange

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Title	String64	
Uom	UomEnum	

Associations

Association	Notes
From: **CustomOperatingRange.** To: **AbstractOperatingRange**	
From: **OperatingConstraints.**CustomRange **0..*** To: **CustomOperatingRange**	To cover Hor East/West Exclusion or Sin(I)Sin(Am)

17.12 ErrorKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
alignment		
azimuth reference		
depth		
magnetic		
reading		
sensor		

Associations

Association	Notes
From: **ErrorKind.** To: **TypeEnum**	
From: **WeightingFunction.** To: **ErrorKind**	

17.13 ErrorPropagationMode

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
B		
G		
R		
S		
W		

Associations

Association	Notes
From: **ErrorPropagationMode.** To: **TypeEnum**	
From: **ErrorTerm.** To: **ErrorPropagationMode**	

17.14 ErrorTerm

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
GyroMode	GyroMode	
MeasureClass	MeasureClass	
PropagationMode	ErrorPropagationMode	

Associations

Association	Notes
From: **ErrorTerm.**WeightingFunction To: **WeightingFunction**	
From: **ErrorTerm.** To: **AbstractObject**	
From: **ErrorTerm.** To: **GyroMode**	
From: **ErrorTerm.** To: **ErrorPropagationMode**	
From: **ErrorTermDictionary.**ErrorTerm **2..*** To: **ErrorTerm**	
From: **ErrorTermValue.**ErrorTerm To: **ErrorTerm**	

17.15 ErrorTermDictionary

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*10/8/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **ErrorTermDictionary.** To: **AbstractObject**	
From: **ErrorTermDictionary.**ErrorTerm **2..*** To: **ErrorTerm**	

17.16 ErrorTermValue

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Magnitude	GenericMeasure	Business Rule : The unconstrained uom of the magnitude is actually constrained by the MeasureClass set to the associated ErrorTerm.
MeanValue	GenericMeasure	Business Rules : - The unconstrained uom of the mean value is actually constrained by the MeasureClass set to the associated ErrorTerm. - If propagation mode is set to 'B' then MeanValue must exist

Associations

Association		Notes
	From: **ErrorTermValue.**ErrorTerm To: **ErrorTerm**	
0..*	From: **ToolErrorModel.**ErrorTermValue To: **ErrorTermValue**	

17.17 GyroAxisCombination

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*7/25/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
z		
xy		
xyz		

Associations

Association	Notes
From: **GyroAxisCombination.** To: **TypeEnum**	
From: **StationaryGyro.** To: **GyroAxisCombination**	
From: **ContinuousGyro.** To: **GyroAxisCombination**	
From: **ContinuousAzimuthFormula.** To: **GyroAxisCombination**	

17.18 GyroMode

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/13/2018 *Last modified:*9/13/2018 *Status:* Proposed *Author:* Philippe Verney
Notes:

Attributes

Name	Type	Notes
continuous		
stationary		

Associations

Association	Notes
From: **GyroMode.** To: **TypeEnum**	
From: **ErrorTerm.** To: **GyroMode**	

17.19 GyroToolConfiguration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 7/24/2018 *Last modified:*7/24/2018 *Status:* Proposed *Author:* j0293564
Notes: *SPE90408 Table 11 & Appendix D*

Attributes

Name	Type	Notes
AccelerometerAxisCombination	AccelerometerAxisCombination	BR VS GyroMode
ExternalReference	boolean	

Associations

Association	Notes
0..* From**: GyroToolConfiguration.**StationaryGyro To: **StationaryGyro**	
From**: GyroToolConfiguration.** To: **AccelerometerAxisCombination**	
0..1 From**: GyroToolConfiguration.**XyAccelerometer To: **XyAccelerometer**	
0..* From**: GyroToolConfiguration.**ContinuousGyro To: **ContinuousGyro**	
0..1 From**: ToolErrorModel.**GyroToolConfiguration To: **GyroToolConfiguration**	Details Operating Mode Interval

17.20 MisalignmentMode

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*10/15/2018 *Status:* Proposed *Author:* Philippe
Notes: Specifies the various misalignment maths as described in SPE-90408-MS.

Attributes

Name	Type	Notes
1		
2		
3		

Associations

Association	Notes
From: **MisalignmentMode.** To: **TypeEnum**	
From: **ToolErrorModel.** To: **MisalignmentMode**	

17.21 OperatingCondition

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
bent sub		
cable conveyed		
casing		
casing collar locator		
centrollers		
drill pipe		
dropped		
fast logging speed		
floating		
large inside diameter		
single shot		
slow logging speed		

Associations

Association	Notes
From: **OperatingCondition.** To: **TypeEnum**	
From: **OperatingConditionExt.** To: **OperatingCondition**	

17.22 OperatingConditionExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **OperatingConditionExt.** To: **EnumExtensionPattern**	
From: **OperatingConditionExt.** To: **OperatingCondition**	
From: **ToolErrorModel.** To: **OperatingConditionExt**	

17.23 OperatingConstraints

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
CustomLimits	GenericMeasure	
HorizontalEastWestMaxValue	PlaneAngleMeasureExt	Absolute value of the maximum value allowed for the product sin(Inclination) * sin(Azimuth).
MdRange	MdInterval	
PressureLimit	PressureMeasureExt	
ThermodynamicTemperatureLimit	ThermodynamicTemperatureMeasureExt	
TvdRange	AbstractTvdInterval	

Associations

Association		Notes
0..*	From: **OperatingConstraints.**InclinationRange To: **PlaneAngleOperatingRange**	
0..*	From: **OperatingConstraints.**CustomRange To: **CustomOperatingRange**	To cover Hor East/West Exclusion or Sin(I)Sin(Am)
0..*	From: **OperatingConstraints.**AzimuthRange To: **AzimuthRange**	
0..*	From: **OperatingConstraints.**LatitudeRange To: **PlaneAngleOperatingRange**	BUSINESS RULE: MUST be in WGS84
0..1	From: **ToolErrorModel.**OperatingConstraints To: **OperatingConstraints**	

17.24 Parameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Formula	String2000	
Title	String64	

Associations

Association	Notes
From: **AzimuthFormula.**Parameter **0..*** To: **Parameter**	Allows to define parameters which are used in an azimuth formula.

17.25 PlaneAngleOperatingRange

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Uom	PlaneAngleUomExt	

Associations

Association	Notes
From: **PlaneAngleOperatingRange.** To: **AbstractOperatingRange**	
0..* From: **OperatingConstraints.**InclinationRange To: **PlaneAngleOperatingRange**	
0..* From: **OperatingConstraints.**LatitudeRange To: **PlaneAngleOperatingRange**	BUSINESS RULE: MUST be in WGS84
From: **AzimuthRange.** To: **PlaneAngleOperatingRange**	

17.26 StationaryGyro

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/17/2018 *Last modified:*7/24/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
AxisCombination	GyroAxisCombination	
ExtensionNameValue	ExtensionNameValue	
Range	PlaneAngleOperatingRange	

Associations

Association	Notes
From: **StationaryGyro.** To: **GyroAxisCombination**	
From: **GyroToolConfiguration.**StationaryGyro **0..*** To: **StationaryGyro**	

17.27 ToolErrorModel

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Application	String2000	
CorrectionConsidered	CorrectionConsideredExt	
MisalignmentMode	MisalignmentMode	Because software handles it (possibility
OperatingCondition	OperatingConditionExt	
Source	String2000	
SurveyRunDateEnd	TimeStamp	QC with Trajectory date end
SurveyRunDateStart	TimeStamp	QC with Trajectory date end
ToolKind	ToolKind	
ToolSubKind	ToolSubKindExt	

Associations

Association	Notes
From: **ToolErrorModel.** To: **ToolKind**	
From: **ToolErrorModel.**Authorization To: **Authorization**	
From: **ToolErrorModel.** To: **MisalignmentMode**	
From: **ToolErrorModel.** To: **ToolSubKindExt**	
From: **ToolErrorModel.**Replaces **0..1** To: **ToolErrorModel**	
From: **ToolErrorModel.**OperatingConstraints **0..1** To: **OperatingConstraints**	
From: **ToolErrorModel.** To: **AbstractObject**	
From: **ToolErrorModel.**GyroToolConfiguration **0..1** To: **GyroToolConfiguration**	Details Operating Mode Interval
From: **ToolErrorModel.** To: **OperatingConditionExt**	
From: **ToolErrorModel.**ErrorTermValue **0..*** To: **ErrorTermValue**	
From: **ToolErrorModel.** To: **CorrectionConsideredExt**	
From: **ToolErrorModelDictionary.**ToolErrorModel **2..*** To: **ToolErrorModel**	
From: **ToolErrorModel.**Replaces **0..1** To: **ToolErrorModel**	
From: **TrajectoryStation.**ToolErrorModel **0..1** To: **ToolErrorModel**	

17.28 ToolErrorModelDictionary

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **ToolErrorModelDictionary.** To: **AbstractObject**	
From: **ToolErrorModelDictionary.**ToolErrorModel **2..*** To: **ToolErrorModel**	

17.29 ToolKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
gyroscopic		
magnetic		
utility		

Associations

Association	Notes
From: **ToolKind.** To: **TypeEnum**	
From: **ToolErrorModel.** To: **ToolKind**	

17.30 ToolSubKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
blind		
blind plus trend		
camera based film gyro multi shot		
camera based film gyro single shot		
camera based film magnetic multi shot		
camera based film magnetic single shot		
dipmeter		
electro magnetic survey		
ferranti inertial navigation system		
gyro suspicious		
gyro while drilling		
inclinometer actual		
inclinometer planned		
inclinometer plus trend		
magnetic while drilling		
north seeking gyro		
ring laser inertial guidance surveyor		
surface readout gyro multi shot		
surface readout gyro single shot		
zero error		
unknown		

Associations

Association	Notes
From: **ToolSubKind.** To: **TypeEnum**	
From: **ToolSubKindExt.** To: **ToolSubKind**	

17.31 ToolSubKindExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **ToolSubKindExt.** To: **EnumExtensionPattern**	
From: **ToolSubKindExt.** To: **ToolSubKind**	
From: **ToolErrorModel.** To: **ToolSubKindExt**	

17.32 WeightingFunction

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
Comment	String2000	
DepthFormula	String2000	
InclinationFormula	String2000	
Kind	ErrorKind	
SingularityEastFormula	String2000	
SingularityNorthFormula	String2000	
SingularityVerticalFormula	String2000	
Source	String64	

Associations

Association	Notes
From: **WeightingFunction.**ContinuousAzimuthFormula **0..3** To: **ContinuousAzimuthFormula**	In gyro case, to be used for continuous formula and for specifying axis in case of transition between 2 different gyros (z & xy for instance)
From: **WeightingFunction.** To: **AbstractObject**	
From: **WeightingFunction.**AzimuthFormula To: **AzimuthFormula**	In gyro case, to be used for stationary formula.
From: **WeightingFunction.** To: **ErrorKind**	
From: **ErrorTerm.**WeightingFunction To: **WeightingFunction**	
From: **WeightingFunctionDictionary.**WeightingFunction **2..*** To: **WeightingFunction**	

17.33 WeightingFunctionDictionary

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 6/19/2018 *Last modified:*6/19/2018 *Status:* Proposed *Author:* Philippe
Notes:

Associations

Association	Notes
From: **WeightingFunctionDictionary.** To: **AbstractObject**	
From: **WeightingFunctionDictionary.**WeightingFunction **2..*** To: **WeightingFunction**	

17.34 XyAccelerometer

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 7/24/2018 *Last modified:*7/25/2018 *Status:* Proposed *Author:* Philippe
Notes:

Attributes

Name	Type	Notes
CantAngle	PlaneAngleMeasureExt	
Switching	boolean	

Associations

Association	Notes
From: **GyroToolConfiguration.**XyAccelerometer **0..1** To: **XyAccelerometer**	

18 Tubular

Package: xsd_schemas

Notes: Tubular Schema. Used to capture information about the configuration of a drill string. For information about a use of this configuration, see the BhaRun object.

AbstractActiveObject
«XSDcomplexType,XSDtop...
Wellbore::Wellbore
1..1
+Wellbore
AbstractObject
«XSDcomplexType,XSDtopLevelElement»
Tubular
«XSDelement»
+ DiaHoleAssy: LengthMeasure [0..1]
+ MixedString: boolean [0..1]
+ NominalDiameter: LengthMeasure [0..1]
+ SourceNuclear: boolean [0..1]
+ TubularOSDUIntegration: TubularOSDUIntegration [0..1]
+ TubularUmbilical: TubularUmbilical [0..*]
+ TypeTubularAssy: TubularAssembly
+ ValveFloat: boolean [0..1]
EnumExtensionPattern
«XSDunion»
TubularAssemblyExt
TypeEnum
«Enumeration»
TubularAssembly
drilling
directional drilling
fishing
condition mud
tubing conveyed logging
cementing
casing
clean out
completion or testing
coring
hole opening or underreaming
milling or dressing or cutting
wiper or check or reaming
unknown
+TubularComponent
0..*
«XSDcomplexType»
TubularComponent
«XSDelement»
+ AreaNozzleFlow: AreaMeasure [0..1]
+ AxialStiffness: ForcePerLengthMeasure [0..1]
+ BendStiffness: ForcePerLengthMeasure [0..1]
+ ClassService: String64 [0..1]
+ ConfigCon: BoxPinConfig [0..1]
+ Count: long [0..1]
+ Description: String2000 [0..1]
+ Disp: VolumeMeasure [0..1]
+ DoglegMx: AnglePerLengthMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Grade: String64 [0..1]
+ Id: LengthMeasure
+ IdFishneck: LengthMeasure [0..1]
+ Len: LengthMeasure
+ LenFishneck: LengthMeasure [0..1]
+ LenJointAv: LengthMeasure [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ Model: String64 [0..1]
+ NameTag: NameTag [0..*]
+ NominalDiameter: LengthMeasure [0..1]
+ NominalWeight: MassMeasureExt [0..1]
+ NumJointStand: long [0..1]
+ Od: LengthMeasure
+ OdDrift: LengthMeasure [0..1]
+ OdFishneck: LengthMeasure [0..1]
+ OdMx: LengthMeasure [0..1]
+ PresBurst: PressureMeasure [0..1]
+ PresCollapse: PressureMeasure [0..1]
+ Sequence: long
+ StressFatigue: PressureMeasure [0..1]
+ Supplier: BusinessAssociate [0..1]
+ TensStrength: PressureMeasureExt [0..1]
+ TensYield: PressureMeasure [0..1]
+ ThickWall: LengthMeasure [0..1]
+ TorsionalStiffness: ForcePerLengthMeasure [0..1]
+ TqYield: MomentOfForceMeasure [0..1]
+ TubularComponentOSDUIntegration: TubularComponentOSDUIntegration [0..1]
+ TypeMaterial: MaterialType [0..1]
+ TypeTubularComponent: TubularComponentTypeExt
+ WearWall: LengthPerLengthMeasure [0..1]
+ WtPerLen: MassPerLengthMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«Enumeration»
BoxPinConfig
bottom box top box
bottom box top pin
bottom pin top pin
bottom pin top box
TypeEnum
«Enumeration»
MaterialType
aluminum
beryllium copper
chrome alloy
composite
other
non-magnetic steel
plastic
steel
steel alloy
titanium
«XSDcomplexType»
OSDUTubularAssemblyStatus
«XSDelement»
+ Date: TimeStamp [0..1]
+ Description: String256 [0..1]
+ StatusType: String64 [0..1]
EnumExtensionPattern
«XSDunion»
TubularComponentTypeExt
TypeEnum
«enumeration»
TubularComponentType
accelerator
adjustable kickoff
bit core diamond
bit core PDC
bit diamond fixed cut
bit hole opener
bit insert roller cone
bit mill tooth roller cone
bit PDC fixed cutter
bit under reamer
bridge plug
bull plug
bullnose
casing
casing crossover
casing cutter
casing head
casing inflatable packer
casing shoe screw-in
catch assembly
coiled tubing in hole
coiled tubing on coil
core barrel
core orientation barrel
die collar
die collar LH
directional guidance system
drill collar
drill collar short
drill pipe
drill pipe compressive
drill pipe LH
drill stem test BHA
drive pipe
dual catch assembly
extension bowl overshot
extension sub-overshot
float collar
float shoe
flow head
guide shoe
hanger casing subsea
hanger casing surface
hanger liner
hanger mud line
hanger tubing
heavy weight drill pipe
heavy weight drill pipe LH
jar
junk basket
junk basket reverse circulation
kelly
keyseat wiper tool
landing float collar
lead impression block
liner
logging while drilling tool
magnet
mill casing cutting
mill dress
mill flat bottom
mill hollow
mill packer picker assembly
mill pilot
mill polish
mill section
mill taper
mill washover
mill watermelon
millout extension
motor
motor instrumented
motor steerable
mule shoe
multilateral hanger running tool
MWD hang off sub
MWD pulser
non-magnetic collar
non-magnetic stabilizer
other
overshot
overshot LH
oversize lip guide overshot
packer
packer retrieve TT squeeze
packer RTTS
packer storm valve RTTS
pipe cutter
polished bore receptacle
ported stinger
prepacked screens
reamer
reversing tool
riser high pressure
riser marine
riser production
rotary steering tool
running tool
safety joint
safety joint LH
scab liner bit guide
scraper
scratchers
slotted liner
spear
stabilizer
stabilizer inline
stabilizer near bit
stabilizer near bit roller reamer
stabilizer non-rotating
stabilizer steerable
stabilizer string
stabilizer string roller reamer
stabilizer turbo back
stabilizer variable blade
stage cement collar
sub-bar catcher
sub-bent
sub-bit
sub-bumper
sub-catcher
sub-circulation
sub-cone
sub-crossover
sub-dart
sub-filter
sub-float
sub-jetting
sub-junk
sub-orienting
sub-ported
sub-pressure relief
sub-pump out
sub-restrictor
sub-saver
sub-shock
sub-side entry
sub-stop
surface pipe
taper tap
taper tap LH
thruster
tieback polished bore receptacle
tieback stinger
tubing
tubing-conveyed perforating gun
turbine
unknown
washover pipe
whipstock
whipstock anchor
«XSDcomplexType»
TubularUmbilicalOSDUIntegration
«XSDelement»
+ WellheadOutletKey: String64 [0..1]
«XSDcomplexType»
TubularUmbilicalCut
«XSDelement»
+ CutDate: TimeStamp [0..1]
+ CutMd: MeasuredDepth [0..1]
+ IsAccidental: boolean [0..1]
«XSDcomplexType»
TubularUmbilical
«XSDelement»
+ ConnectedTubularComponent: ComponentReference
+ Cut: TubularUmbilicalCut [0..1]
+ ServiceType: String64 [0..1]
+ TubularUmbilicalOSDUIntegration: TubularUmbilicalOSDUIntegration [0..1]
+ UmbilicalType: String64
«XSDcomplexType»
TubularOSDUIntegration
«XSDelement»
+ ActiveIndicator: boolean [0..1]
+ ActivityType: String64 [0..1]
+ ActivityTypeReasonDescription: String64 [0..1]
+ ArtificialLiftType: String64 [0..1]
+ AssemblyBaseMd: MeasuredDepth [0..1]
+ AssemblyBaseReportedTvd: AbstractVerticalDepth [0..1]
+ AssemblyTopMd: MeasuredDepth [0..1]
+ AssemblyTopReportedTvd: AbstractVerticalDepth [0..1]
+ LinerType: String64 [0..1]
+ OSDUTubularAssemblyStatus: OSDUTubularAssemblyStatus [0..1]
+ Parent: Tubular [0..1]
+ PilotHoleSize: LengthMeasure [0..1]
+ SeaFloorPenetrationLength: LengthMeasure [0..1]
+ StringClass: String64 [0..1]
+ SuspensionPointMd: MeasuredDepth [0..1]
+ TubularAssemblyNumber: long [0..1]
«XSDcomplexType»
TubularComponentOSDUIntegration
«XSDelement»
+ PackerSetDepthTvd: AbstractVerticalDepth [0..1]
+ PilotHoleSize: LengthMeasure [0..1]
+ SectionType: String64 [0..1]
+ ShoeDepthTvd: AbstractVerticalDepth [0..1]
+ TubularComponentBaseMd: MeasuredDepth [0..1]
+ TubularComponentBaseReportedTvd: AbstractVerticalDepth [0..1]
+ TubularComponentBottomConnectionType: String64 [0..1]
+ TubularComponentBoxPinConfig: String64 [0..1]
+ TubularComponentMaterialType: String64 [0..1]
+ TubularComponentTopConnectionType: String64 [0..1]
+ TubularComponentTopMd: MeasuredDepth [0..1]
+ TubularComponentTopReportedTvd: AbstractVerticalDepth [0..1]

«XSDcomplexType»
TubularComponent
+BitRecord
0..1
«XSDcomplexType»
BitRecord
«XSDelement»
+ BitClass: String64 [0..1]
+ CodeIADC: String64 [0..1]
+ CodeMfg: String64 [0..1]
+ CondFinalBearing: IadcBearingWearCode [0..1]
+ CondFinalDull: BitDullCode [0..1]
+ CondFinalGauge: String64 [0..1]
+ CondFinalInner: IadcIntegerCode [0..1]
+ CondFinalLocation: String64 [0..1]
+ CondFinalOther: String64 [0..1]
+ CondFinalOuter: IadcIntegerCode [0..1]
+ CondFinalReason: BitReasonPulled [0..1]
+ CondInitBearing: IadcBearingWearCode [0..1]
+ CondInitDull: BitDullCode [0..1]
+ CondInitGauge: String64 [0..1]
+ CondInitInner: IadcIntegerCode [0..1]
+ CondInitLocation: String64 [0..1]
+ CondInitOther: String64 [0..1]
+ CondInitOuter: IadcIntegerCode [0..1]
+ CondInitReason: BitReasonPulled [0..1]
+ DiaBit: LengthMeasure
+ DiaPassThru: LengthMeasure [0..1]
+ DiaPilot: LengthMeasure [0..1]
+ Drive: String64 [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Manufacturer: BusinessAssociate [0..1]
+ NumBit: String64 [0..1]
+ TypeBit: BitType [0..1]
«XSDattribute»
+ uid: String64
«Enumeration»
IadcIntegerCode
0
1
2
3
4
5
6
7
8
TypeEnum
«Enumeration»
BitType
diamond
diamond core
insert roller cone
PDC
PDC core
roller cone
TypeEnum
«Enumerati...
BitReasonPulled
BHA
CM
CP
DMF
DP
DST
DTF
FM
HP
HR
LOG
PP
PR
RIG
TD
TQ
TW
WC
«Enumeration»
IadcBearingWearCode
0
1
2
3
4
5
6
7
8
E
F
N
X
TypeEnum
«Enumeration»
BitDullCode
BC
BF
BT
BU
CC
CD
CI
CR
CT
ER
FC
HC
JD
LC
LN
LT
NO
NR
OC
PB
PN
RG
RO
RR
SD
SS
TR
WO
WT
+Cost
0..1
AbstractMeasure
«XSDcomplexTy...
BaseTypes::Cost
«XSDattribute»
+ currency: String64

«XSDcomplexType»
Motor
«XSDelement»
+ BendSettingsMn: PlaneAngleMeasure [0..1]
+ BendSettingsMx: PlaneAngleMeasure [0..1]
+ ClearanceBearBox: LengthMeasure [0..1]
+ DiaNozzle: LengthMeasure [0..1]
+ DiaRotorNozzle: LengthMeasure [0..1]
+ DumpValve: boolean [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ FlowrateMn: VolumePerTimeMeasure [0..1]
+ FlowrateMx: VolumePerTimeMeasure [0..1]
+ LobesRotor: long [0..1]
+ LobesStator: long [0..1]
+ OffsetTool: LengthMeasure [0..1]
+ PresLossFact: double [0..1]
+ Rotatable: boolean [0..1]
+ RotorCatcher: boolean [0..1]
+ Sensor: Sensor [0..*]
+ TempOpMx: ThermodynamicTemperatureMeasure [0..1]
+ TypeBearing: BearingType [0..1]
TypeEnum
«Enumeration»
BearingType
oil seal
mud lube
other
«XSDcomplexType»
Bend
«XSDelement»
+ Angle: PlaneAngleMeasure [0..1]
+ DistBendBot: LengthMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
«XSDattribute»
+ uid: String64
+Bend
0..*
+Motor
0..1
«XSDcomplexType»
TubularComponent
«XSDcomplexType»
Stabilizer
«XSDelement»
+ DistBladeBot: LengthMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ FactFric: double [0..1]
+ LenBlade: LengthMeasure [0..1]
+ LenBladeGauge: LengthMeasure [0..1]
+ OdBladeMn: LengthMeasure [0..1]
+ OdBladeMx: LengthMeasure [0..1]
+ ShapeBlade: BladeShapeType [0..1]
+ TypeBlade: BladeType [0..1]
«XSDattribute»
+ uid: String64
+Stabilizer
0..*
TypeEnum
«Enumerati...
BladeShapeType
dynamic
melon
spiral
straight
variable
TypeEnum
«Enumerati...
BladeType
clamp-on
integral
sleeve
welded
«XSDcomplexType»
Nozzle
«XSDelement»
+ DiaNozzle: LengthMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Index: long [0..1]
+ Len: LengthMeasure [0..1]
+ Orientation: String64 [0..1]
+ TypeNozzle: NozzleType [0..1]
«XSDattribute»
+ uid: String64
+Nozzle
0..*
TypeEnum
«Enumerati...
NozzleType
extended
normal
«XSDcomplexType»
Connection
«XSDelement»
+ CriticalCrossSection: AreaMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Id: LengthMeasure [0..1]
+ Len: LengthMeasure [0..1]
+ Od: LengthMeasure [0..1]
+ Position: ConnectionPosition [0..1]
+ PresLeak: PressureMeasure [0..1]
+ SizeThread: LengthMeasure [0..1]
+ TensYield: PressureMeasure [0..1]
+ TqMakeup: MomentOfForceMeasure [0..1]
+ TqYield: MomentOfForceMeasure [0..1]
+ TypeThread: String64 [0..1]
«XSDattribute»
+ uid: String64
+Connection
0..*
TypeEnum
«Enumeration»
ConnectionPosition
both
bottom
top
+HoleOpener
0..1
«XSDcomplexType»
HoleOpener
«XSDelement»
+ DiaHoleOpener: LengthMeasure [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ Manufacturer: BusinessAssociate [0..1]
+ NumCutter: long [0..1]
+ TypeHoleOpener: HoleOpenerType [0..1]
TypeEnum
«Enumerati...
HoleOpenerType
under-reamer
fixed blade
+BitRecord
0..1
«XSDcomplexType»
BitRecord
+RotarySteerableTool
0..1
«XSDcomplexType»
RotarySteerableTool
+MwdTool
0..1
«XSDcomplexType»
MwdTool
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ FlowrateMn: VolumePerTimeMeasure [0..1]
+ FlowrateMx: VolumePerTimeMeasure [0..1]
+ IdEquv: LengthMeasure [0..1]
+ TempMx: ThermodynamicTemperatureMeasure [0..1]
+Jar
0..1
«XSDcomplexType»
Jar
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..-1]
+ ForDownSet: ForceMeasure [0..1]
+ ForDownTrip: ForceMeasure [0..1]
+ ForPmpOpen: ForceMeasure [0..1]
+ ForSealFric: ForceMeasure [0..1]
+ ForUpSet: ForceMeasure [0..1]
+ ForUpTrip: ForceMeasure [0..1]
+ JarAction: JarAction [0..1]
+ TypeJar: JarType [0..1]
TypeEnum
«Enumeration»
JarType
mechanical
hydraulic
hydro mechanical
TypeEnum
«Enumerati...
JarAction
up
down
both
vibrating

«XSDsimpleType»
TubularComponent
«XSDcomplexType»
WellPlot
«XSDcomplexType»
Sensor
«XSDcomplexType»
RotaryDrillable
«XSDsimpleType»
AbstractRotaryDrillable
«XSDsimpleType»
BendAngle
«XSDsimpleType»
BendOffset
«Enumeration»
MeasurementType

18.1 AbstractRotarySteerableTool

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Choice placeholder in a rotary steerable tool.*

Associations

Association	Notes
From: **BendOffset.** To: **AbstractRotarySteerableTool**	
From: **BendAngle.** To: **AbstractRotarySteerableTool**	
From: **RotarySteerableTool.**Tool **1** To: **AbstractRotarySteerableTool**	

18.2 BearingType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the bearing type of a motor.*

Attributes

Name	Type	Notes
oil seal		
mud lube		
other		

Associations

Association	Notes
From: **BearingType.** To: **TypeEnum**	
From: **Motor.** To: **BearingType**	

18.3 Bend

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Bend Component Schema.*

Attributes

Name	Type	Notes
Angle	PlaneAngleMeasure	Angle of the bend.
DistBendBot	LengthMeasure	Distance of the bend from the bottom of the component.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
uid	String64	Unique identifier for this instance of Bend.

Associations

Association	Notes
From: **TubularComponent.**Bend **0..*** To: **Bend**	Bend object.

18.4 BendAngle

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Used with point-the-bit type of rotary steerable system tools; describes the angle of the bit.*

Attributes

Name	Type	Notes
BendAngle	PlaneAngleMeasure	The angle of the bend.

Associations

Association	Notes
From: **BendAngle.** To: **AbstractRotarySteerableTool**	

18.5 BendOffset

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/25/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Used with point-the-bit type of rotary steerable system tools; describes the angle of the bit.*

Attributes

Name	Type	Notes
BendOffset	LengthMeasure	Offset distance from the bottom connection to the bend.

Associations

Association	Notes
From: **BendOffset.** To: **AbstractRotarySteerableTool**	

18.6 BitDullCode

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the reason a drill bit was declared inoperable; these codes were originally defined by the IADC.*

Attributes

Name	Type	Notes
BC		Broken Cone
BF		Bond Failure
BT		Broken Teeth/Cutters
BU		Balled Up
CC		Cracked Cone
CD		Cone Dragged
CI		Cone Interference
CR		Cored
CT		Chipped Teeth
ER		Erosion
FC		Flat Crested Wear
HC		Heat Checking
JD		Junk Damage
LC		Lost Cone
LN		Lost Nozzle
LT		Lost Teeth/Cutters
NO		No Dull/No Other Wear
NR		Not Reusable
OC		Off-Center Wear
PB		Pinched Bit
PN		Plugged Nozzle
RG		Rounded Gauge
RO		Ring Out
RR		Re-usable
SD		Shirttail Damage
SS		Self-Sharpening Wear
TR		Tracking
WO		WashOut on Bit
WT		Worn Teeth/Cutters

Associations

Association	Notes
From: **BitDullCode.** To: **TypeEnum**	
From: **BitRecord.** To: **BitDullCode**	
From: **BitRecord.** To: **BitDullCode**	

18.7 BitReasonPulled

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the reason for pulling a drill bit from the wellbore, these codes were originally defined by the IADC.*

Attributes

Name	Type	Notes
BHA		Change Bottom Hole Assembly
CM		Condition Mud
CP		Core Point
DMF		Downhole Motor Failure
DP		Drill Plug
DST		Drill Stem Test
DTF		Downhole Tool Failure
FM		Formation Change
HP		Hole Problems
HR		Hours on Bit
LOG		Run Logs
PP		Pump Pressure
PR		Penetration Rate
RIG		Rig Repairs
TD		Total Depth/Casing Depth
TQ		Torque
TW		Twist Off
WC		Weather Conditions

Associations

Association	Notes
From: **BitReasonPulled.** To: **TypeEnum**	
From: **BitRecord.** To: **BitReasonPulled**	
From: **BitRecord.** To: **BitReasonPulled**	

18.8 BitRecord

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/12/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Bit Record Component Schema. Captures information that describes the bit and problems with the bit. Many of the problems are classified using IADC codes that are specified as enumerated lists in WITSML.*

Attributes

Name	Type	Notes
BitClass	String64	N = new, U = used.
CodeIADC	String64	IADC bit code.
CodeMfg	String64	The manufacturer's code for the bit.
CondFinalBearing	IadcBearingWearCode	Final condition of the bit bearings (integer 0-8 or E, F, N or X).
CondFinalDull	BitDullCode	Final dull condition from the IADC bit-wear 2-character codes.
CondFinalGauge	String64	Final condition of the bit gauge in 1/16 of a inch. I = in gauge, else number of 16ths out of gauge.
CondFinalInner	IadcIntegerCode	Final condition of the inner tooth rows (inner 2/3 of bit) (0-8).
CondFinalLocation	String64	Final conditions for row and cone numbers for items that need location information (e.g., cracked cone, lost cone, etc).
CondFinalOther	String64	Other final comments on bit condition from the IADC list (BitDullCode enumerated list).
CondFinalOuter	IadcIntegerCode	Final condition of the outer tooth rows (outer 1/3 of bit) (0-8).
CondFinalReason	BitReasonPulled	Final reason the bit was pulled from IADC codes (BitReasonPulled enumerated list).
CondInitBearing	IadcBearingWearCode	Initial condition of the bit bearings (integer 0-8 or E, F, N or X).
CondInitDull	BitDullCode	Initial dull condition from the IADC bit-wear 2-character codes.
CondInitGauge	String64	Initial condition of the bit gauge in 1/16 of an inch. I = in gauge, else the number of 16ths out of gauge.
CondInitInner	IadcIntegerCode	Initial condition of the inner tooth rows (inner 2/3 of the bit) (0-8).
CondInitLocation	String64	Initial row and cone numbers for items that need location information (e.g., cracked cone, lost cone, etc).
CondInitOther	String64	Other comments on initial bit condition from the IADC list (BitDullCode enumerated list).
CondInitOuter	IadcIntegerCode	Initial condition of the outer tooth rows (outer 1/3 of bit) (0-8).
CondInitReason	BitReasonPulled	Initial reason the bit was pulled from IADC codes (BitReasonPulled enumerated list).

DiaBit	LengthMeasure	Diameter of the drilled hole.
DiaPassThru	LengthMeasure	Minimum hole or tubing diameter that the bit will pass through (for bi-center bits).
DiaPilot	LengthMeasure	Diameter of the pilot bit (for bi-center bits).
Drive	String64	Bit drive type (motor, rotary table, etc.).
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the item.
NumBit	String64	Bit number and rerun number, e.g., "4.1" for the first rerun of bit 4.
TypeBit	BitType	Type of bit.
uid	String64	Unique identifier for this instance of BitRecord.

Associations

Association			Notes
0..1	From: **BitRecord.**Cost To: **Cost**		Bit cost in local currency.
	From: **BitRecord.**	To: **BitDullCode**	
	From: **BitRecord.**	To: **BitReasonPulled**	
	From: **BitRecord.**	To: **BitDullCode**	
	From: **BitRecord.**	To: **IadcIntegerCode**	
	From: **BitRecord.**	To: **IadcIntegerCode**	
	From: **BitRecord.**	To: **BitReasonPulled**	
	From: **BitRecord.**	To: **IadcBearingWearCode**	
	From: **BitRecord.**	To: **IadcIntegerCode**	
	From: **BitRecord.**	To: **BitType**	
	From: **BitRecord.**	To: **IadcBearingWearCode**	
	From: **BitRecord.**	To: **IadcIntegerCode**	
0..1	From: **TubularComponent.**BitRecord To: **BitRecord**		

18.9 BitType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Specifies the values that represent the type of drill or core bit.

Attributes

Name	Type	Notes
diamond		Diamond bit.
diamond core		Diamond core bit.
insert roller cone		Insert roller cone bit.
PDC		Polycrystalline diamond compact fixed-cutter bit.
PDC core		Polycrystalline diamond compact core bit.
roller cone		Milled-tooth roller-cone bit.

Associations

Association	Notes
From: **BitType.** To: **TypeEnum**	
From: **BitRecord.** To: **BitType**	

18.10 BladeShapeType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Blade shape of the stabilizer: melon, spiral, straight, etc.*

Attributes

Name	Type	Notes
dynamic		
melon		
spiral		
straight		
variable		

Associations

Association	Notes
From: **BladeShapeType.** To: **TypeEnum**	
From: **Stabilizer.** To: **BladeShapeType**	

18.11 BladeType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the blade type of the stabilizer.*

Attributes

Name	Type	Notes
clamp-on		
integral		
sleeve		
welded		

Associations

Association	Notes
From: **BladeType.** To: **TypeEnum**	
From: **Stabilizer.** To: **BladeType**	

18.12 BoxPinConfig

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values that represent the type of box and pin configuration.*

Attributes

Name	Type	Notes
bottom box top box		
bottom box top pin		
bottom pin top pin		
bottom pin top box		

Associations

Association	Notes
From: **BoxPinConfig.** To: **TypeEnum**	
From: **TubularComponent.** To: **BoxPinConfig**	

18.13 Connection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Connection Component Schema. Describes dimensions and properties of a connection between tubulars.*

Attributes

Name	Type	Notes
CriticalCrossSection	AreaMeasure	For bending stiffness ratio.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Id	LengthMeasure	Inside diameter of the connection.
Len	LengthMeasure	Length of the item.
Od	LengthMeasure	Outside diameter of the body of the item.
Position	ConnectionPosition	Where connected.
PresLeak	PressureMeasure	Leak pressure rating.
SizeThread	LengthMeasure	Thread size.
TensYield	PressureMeasure	Yield stress of steel: worn stress.
TqMakeup	MomentOfForceMeasure	Make-up torque.
TqYield	MomentOfForceMeasure	Torque at which yield occurs.
TypeThread	String64	Thread type from API RP7G, 5CT.
uid	String64	Unique identifier for this instance of Connection.

Associations

Association	Notes
From: **Connection.** To: **ConnectionPosition**	
From: **EquipmentConnection.** To: **Connection**	
From: **TubularComponent.**Connection **0..*** To: **Connection**	Connection object.

18.14 ConnectionPosition

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the position of a connection.*

Attributes

Name	Type	Notes
both		The connection is the same at both ends of the component.
bottom		This connection is only at the bottom of the component.
top		This connection is only at the top of the component.

Associations

Association	Notes
From: **ConnectionPosition.** To: **TypeEnum**	
From: **Connection.** To: **ConnectionPosition**	

18.15 DeflectionMethod

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the method used to direct the deviation of the trajectory in directional drilling.*

Attributes

Name	Type	Notes
hybrid		Rotary steerable system that changes the trajectory of a wellbore using both point-the-bit and push-the-bit methods.
point bit		Rotary steerable system that changes the trajectory of a wellbore by tilting the bit to point it in the desired direction.
push bit		Rotary steerable system that changes the trajectory of a wellbore by inducing a side force to push the bit in the desired direction.

Associations

Association	Notes
From: **DeflectionMethod.** To: **TypeEnum**	
From: **RotarySteerableTool.** To: **DeflectionMethod**	

18.16 HoleOpener

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Hole Opener Component Schema. Describes the hole-opener tool (often called a 'reamer') used on the tubular string.

Attributes

Name	Type	Notes
DiaHoleOpener	LengthMeasure	Diameter of the reamer.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer or supplier of the tool.
NumCutter	long	Number of cutters on the tool.
TypeHoleOpener	HoleOpenerType	Under reamer or fixed blade.

Associations

Association		Notes
	From: **HoleOpener.** To: **HoleOpenerType**	
0..1	From: **TubularComponent.**HoleOpener To: **HoleOpener**	Hole opener object.

18.17 HoleOpenerType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the types of hole openers.*

Attributes

Name	Type	Notes
under-reamer		
fixed blade		

Associations

Association	Notes
From: **HoleOpenerType.** To: **TypeEnum**	
From: **HoleOpener.** To: **HoleOpenerType**	

18.18 Iadc BearingWearCode

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the condition codes for the bearing wear.*

Attributes

Name	Type	Notes
0		
1		
2		
3		
4		
5		
6		
7		
8		
E		
F		
N		
X		

Associations

Association	Notes
From: **BitRecord.** To: **Iadc BearingWearCode**	
From: **BitRecord.** To: **Iadc BearingWearCode**	

18.19 IadcIntegerCode

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 2/25/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the IADC integer codes for the inner or outer tooth rows.*

Attributes

Name	Type	Notes
0		
1		
2		
3		
4		
5		
6		
7		
8		

Associations

Association	Notes
From: **BitRecord.** To: **IadcIntegerCode**	
From: **BitRecord.** To: **IadcIntegerCode**	
From: **BitRecord.** To: **IadcIntegerCode**	
From: **BitRecord.** To: **IadcIntegerCode**	

18.20 Jar

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *WITSML - Tubular Jar Component Schema. Captures information about jars, which are mechanical or hydraulic devices used in the drill stem to deliver an impact load to another component of the drill stem, especially when that component is stuck.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
ForDownSet	ForceMeasure	Down set force.
ForDownTrip	ForceMeasure	Down trip force.
ForPmpOpen	ForceMeasure	Pump open force.
ForSealFric	ForceMeasure	Seal friction force.
ForUpSet	ForceMeasure	Up set force.
ForUpTrip	ForceMeasure	Up trip force.
JarAction	JarAction	The jar action.
TypeJar	JarType	The kind of jar.

Associations

Association			Notes
	From: **Jar.**	To: **JarAction**	
	From: **Jar.**	To: **JarType**	
0..1	From: **TubularComponent.**Jar To: **Jar**		Jar object.

18.21 JarAction

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of jar action.*

Attributes

Name	Type	Notes
up		
down		
both		
vibrating		

Associations

Association	Notes
From: **JarAction.** To: **TypeEnum**	
From: **Jar.** To: **JarAction**	

18.22 JarType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of jar.*

Attributes

Name	Type	Notes
mechanical		
hydraulic		
hydro mechanical		

Associations

Association	Notes
From: **JarType.** To: **TypeEnum**	
From: **Jar.** To: **JarType**	

18.23 MaterialType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the primary type of material that a component is made of.*

Attributes

Name	Type	Notes
aluminum		
beryllium copper		
chrome alloy		
composite		
other		
non-magnetic steel		
plastic		
steel		
steel alloy		
titanium		

Associations

Association	Notes
From: **MaterialType.** To: **TypeEnum**	
From: **TubularComponent.** To: **MaterialType**	

18.24 MeasurementType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of sensor in a tubular string. The source (except for "CH density porosity", "CH neutron porosity", "OH density porosity" and "OH neutron porosity") of the values and the descriptions is the POSC V2.2 "well log trace class" standard instance values, which are documented as "A classification of well log traces based on specification of a range of characteristics. Traces may be classed according to the type of physical characteristic they are meant to measure."*

Attributes

Name	Type	Notes
acceleration		Output from an accelerometer on a logging tool.
acoustic caliper		A well log that uses an acoustic device to measure hole diameter.
acoustic casing collar locator		The signal measured by an acoustic device at the location of casing collars and other features (e.g., perforations).
acoustic impedance		Seismic velocity multiplied by density.
acoustic porosity		Porosity calculated from an acoustic log.
acoustic velocity		The velocity of an acoustic wave.
acoustic wave matrix travel time		The time it takes for an acoustic wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero-porosity rock, e.g., sandstone, limestone or dolomite.
acoustic wave travel time		The time it takes for an acoustic wave to traverse a fixed distance.
amplitude		Any measurement of the maximum departure of a wave from an average value.
amplitude of acoustic wave		The extent of departure of an acoustic wave measured from the mean position.
amplitude of E-M wave		The extent of departure of an electromagnetic wave measured from the mean position.
amplitude ratio		The ratio of two amplitudes.
area		A particular extent of space or surface.
attenuation		The amount of reduction in the amplitude of a wave.
attenuation of acoustic wave		The amount of reduction in the amplitude of an acoustic wave.
attenuation of E-M wave		The amount of reduction in the amplitude of an electromagnetic wave.
auxiliary		A general classification for measurements, which are very specialized and not normally accessed by petrophysicists.

average porosity		The pore volume of a rock averaged using various well log or core porosity measurements.
azimuth		In the horizontal plane, it is the clockwise angle of departure from magnetic north (while looking down hole).
barite mud correction		A trace that has been corrected for the effects of barite in the borehole fluid.
bed thickness correction		A trace that has been corrected for bed thickness effects.
bit size		The diameter of the drill bit used to drill the hole.
blocked		A well log trace that has been edited to reflect sharp bed boundaries. The trace has a square wave appearance.
borehole environment correction		A trace that has been corrected for the effects of the borehole environment, e.g., borehole size.
borehole fluid correction		A trace that has been corrected for the effects of borehole fluid; e.g., a mud cake correction.
borehole size correction		A trace that has been corrected for the effects of borehole size.
bromide mud correction		A trace that has been corrected for the effects of bromide in the borehole fluid.
bulk compressibility		The relative compressibility of a material.
bulk density		The measured density of a rock with the pore volume filled with fluid. The pore fluid is generally assumed to be water.
bulk volume		A quantity-per-unit volume.
bulk volume gas		The quantity of gas present in a unit volume of rock. The product of gas saturation and total porosity.
bulk volume hydrocarbon		The quantity of hydrocarbon present in a unit volume of rock. The product of hydrocarbon saturation and total porosity.
bulk volume oil		The quantity of oil present in a unit volume of rock. The product of oil saturation and total porosity.
bulk volume water		The quantity of formation water present in a unit volume of rock. The product of water saturation and total porosity.
C/O ratio		The ratio of the carbon measurement to the oxygen measurement.
caliper		A well log used to record hole diameter (open or cased).
cased hole correction		A trace that has been corrected for the effects of being recorded in a cased hole, e.g., corrected for casing weight and thickness.
casing collar locator		The signal measured by a device at the location of casing collars and other features (e.g., perforations).

casing correction		A trace that has been corrected for the effects of casing; this includes things such as casing weight, thickness and diameter.
casing diameter correction		A trace that has been corrected for the effects of casing diameter.
casing inspection		Any of the measurements made for the purpose of determining the properties of the well casing.
casing thickness correction		A trace that has been corrected for the effects of casing thickness.
casing weight correction		A trace that has been corrected for the effects of casing weight.
cement correction		A trace that has been corrected for the effects of the cement surrounding the casing; this includes cement thickness, density and type.
cement density correction		A trace that has been corrected for the effects of cement density.
cement evaluation		Any of the measurements made to determine the presence and quality of the cement bond to casing or to formation.
cement thickness correction		A trace that has been corrected for the effects of cement thickness.
cement type correction		A trace that has been corrected for the effects of the type of cement used.
CH density porosity		
CH dolomite density porosity		Porosity calculated from the bulk density measurement of a cased hole density log using a dolomite matrix density.
CH dolomite neutron porosity		Porosity calculated from a cased hole neutron log using a dolomite matrix.
CH limestone density porosity		Porosity calculated from the bulk density measurement of a cased hole density log using a limestone matrix density.
CH limestone neutron porosity		Porosity calculated from a cased-hole neutron log using a limestone matrix.
CH neutron porosity		
CH sandstone density porosity		Porosity calculated from the bulk density measurement of a cased-hole density log using a sandstone matrix density.
CH sandstone neutron porosity		Porosity calculated from an openhole neutron log using a sandstone matrix.
compressional wave dolomite porosity		Porosity calculated from a compressional wave acoustic log using a dolomite matrix.
compressional wave limestone porosity		Porosity calculated from a compressional wave acoustic log using a limestone matrix
compressional wave matrix travel time		The time it takes for a compressional acoustic wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero porosity rock, e.g. sandstone, limestone or dolomite.
compressional wave sandstone porosity		Porosity calculated from a compressional wave acoustic log using a sandstone matrix.

compressional wave travel time		The time it takes for a compressional acoustic wave to traverse a fixed distance.
conductivity		The property of a medium (solid or fluid) that allows the medium to conduct a form of energy; e.g., electrical conductivity or thermal conductivity.
conductivity from attenuation		Conductivity calculated from the attenuation of an electromagnetic wave. Generally recorded from a LWD resistivity tool.
conductivity from phase shift		Conductivity calculated from the phase shift of an electromagnetic wave. Generally recorded from a LWD resistivity tool.
connate water conductivity		The conductivity of the water entrapped in the interstices of the rock.
connate water resistivity		The resistivity of the water entrapped in the interstices of the rock.
conventional core porosity		Porosity from a measurement made on a conventional core.
core matrix density		The density of a rock matrix measured on a core sample.
core permeability		The permeability derived from a core.
core porosity		Porosity from a core measurement.
corrected		A trace that has had corrections applied; e.g. environmental corrections.
count rate		The rate of occurrences; e.g. the far counts from a density tool..
count rate ratio		The ratio of two count rates.
cross plot porosity		The pore volume of a rock calculated from cross plotting two or more well log porosity measurements.
decay time		The time it takes for a population to decay, generally expressed as a half life.
deep conductivity		The conductivity that represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.
deep induction conductivity		The conductivity, measured by an induction log, which represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.
deep induction resistivity		The resistivity, measured by an induction log, which represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.

deep laterolog conductivity		The conductivity, measured by a laterolog, which represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.
deep laterolog resistivity		The resistivity, measured by a laterolog, which represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.
deep resistivity		The resistivity, which represents a measurement made several feet into the formation; generally considered a measurement of the undisturbed formation.
density		Mass per unit Volume; well logging units are usually gm/cc.
density porosity		Porosity calculated using the bulk density measurement from a density log.
depth		The distance to a point in a wellbore.
depth adjusted		The process of depth correcting a trace by depth matching it to a reference trace.
depth derived from velocity		The depth calculated from velocity information.
deviation		Departure of a borehole from vertical. Also, the angle measured between the tool axis and vertical.
dielectric		Relative permittivity.
diffusion correction		A trace that has been corrected for the effects of diffusion.
dip		The angle that a structural surface, e.g. a bedding or fault plane, makes with the horizontal, measured perpendicular to the strike of the structure.
dipmeter		Any of a number of measurements produced by a tool designed to measure formation dip and borehole characteristics through direct and indirect measurements.
dipmeter conductivity		The conductivity, measured by a dipmeter, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids that are comprised primarily of mud filtrate.
dipmeter resistivity		The resistivity, measured by a dipmeter, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids that are comprised primarily of mud filtrate.
dolomite acoustic porosity		Porosity calculated from an acoustic log using a dolomite matrix.

dolomite density porosity		Porosity calculated from the bulk density measurement of a density log using a dolomite matrix density.
dolomite neutron porosity		Porosity calculated from a neutron log using a dolomite matrix.
edited		A well log trace which has been corrected or adjusted through an editing process.
effective porosity		The interconnected pore volume occupied by free fluids.
electric current		The flow of electric charge.
electric potential		The difference in electrical energy between two systems.
electromagnetic wave matrix travel time		The time it takes for an electromagnetic wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero porosity rock, e.g. sandstone, limestone or dolomite.
electromagnetic wave travel time		The time it takes for an electromagnetic wave to traverse a fixed distance.
element		The elemental composition, generally in weight percent, of a formation as calculated from information obtained from a geochemical logging pass; e.g., weight percent of Al, Si, Ca, Fe, etc.
elemental ratio		The ratio of two different elemental measurements; e.g. K/U.
enhanced		A well log trace that has been filtered to improve its value; e.g. inverse filtering for better resolution.
filtered		A well log trace which has had a filter applied to it.
flowmeter		A logging tool to measure the rate and/or direction of fluid flow in a wellbore.
fluid density		The quantity per unit volume of fluid.
fluid velocity		The velocity of a flowing fluid.
fluid viscosity		The amount of a fluid resistance to flow.
flushed zone conductivity		The conductivity of the zone immediately behind the mud cake and which is considered to be flushed by mud filtrate, i.e., it is considered to have all mobile formation fluids displaced from it.
flushed zone resistivity		The resistivity of the zone immediately behind the mud cake and which is considered to be flushed by mud filtrate, i.e., it is considered to have all mobile formation fluids displaced from it.
flushed zone saturation		The fraction or percentage of pore volume of rock occupied by drilling mud or mud filtrate in the flushed zone.
force		Energy exerted or brought to bear.
formation density correction		A trace that has been corrected for formation density effects.

formation properties correction		A trace that has been corrected for formation properties; e.g., salinity.
formation salinity correction		A trace that has been corrected for the salinity effects from the water in the formation.
formation saturation correction		A trace that has been corrected for formation saturation effects.
formation volume factor correction		A trace that has been corrected for the effects of the hydrocarbon formation volume factor.
formation water density correction		A trace that has been corrected for the effects of the density of the formation water.
formation water saturation correction		A trace that has been corrected for water saturation effects.
free fluid index		The percent of the bulk volume occupied by fluids that are free to flow as measured by the nuclear magnetism log.
friction effect correction		A trace that has been corrected for the effects of friction.
gamma ray		The measurement of naturally occurring gamma ray radiation being released by radioisotopes in clay or other minerals in the formation.
gamma ray minus uranium		The measurement of the naturally occurring gamma radiation less the radiation attributed to uranium.
gas saturation		The fraction or percentage of pore volume of rock occupied by gas.
gradiomanometer		The measurement of the average density of fluids in a wellbore.
high frequency conductivity		A measurement of the conductivity of the formation, by a high frequency electromagnetic tool, within the first few cubic inches of the borehole wall.
high frequency electromagnetic		High frequency electromagnetic measurements, e.g. from a dielectric logging tool.
high frequency electromagnetic porosity		Porosity calculated using a high frequency electromagnetic measurement as input.
high frequency E-M phase shift		The amount of change in the phase of a high frequency electromagnetic wave.
high frequency resistivity		A measurement of the resistivity of the formation, by a high frequency electromagnetic tool, within the first few cubic inches of the borehole wall.
hydrocarbon correction		A trace that has been corrected for the effects of hydrocarbons.
hydrocarbon density correction		A trace that has been corrected for the effects of hydrocarbon density.
hydrocarbon gravity correction		A trace that has been corrected for the effects of hydrocarbon gravity.
hydrocarbon saturation		The fraction or percentage of pore volume of rock occupied by hydrocarbon.

hydrocarbon viscosity correction		A trace that has been corrected for the effects of hydrocarbon viscosity.
image		The likeness of an object produced by an electrical device.
interpretation variable		A variable in a well log interpretation equation.
iron mud correction		A trace that has been corrected for the effects of iron in the borehole fluid.
joined		A well log trace that has had two or more runs spliced together to make a single trace.
KCl mud correction		A trace that has been corrected for the effects of KCl in the borehole fluid.
length		A measured distance or dimension.
limestone acoustic porosity		Porosity calculated from an acoustic log using a limestone matrix.
limestone density porosity		Porosity calculated from the bulk density measurement of a density log using a limestone matrix density.
limestone neutron porosity		Porosity calculated from a neutron log using a limestone matrix.
lithology correction		A trace that has been corrected for lithology effects.
log derived permeability		The permeability derived from a well log.
log matrix density		The density of a rock matrix used with, or derived from, the bulk density from a well log. The matrix is assumed to have zero porosity.
magnetic casing collar locator		The signal measured by a magnetic device at the location of casing collars and other features (e.g., perforations).
matrix density		The density of a rock matrix. In this case, the matrix is assumed to have zero porosity.
matrix travel time		The time it takes for an electromagnetic or acoustic wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero porosity rock, e.g. sandstone, limestone or dolomite.
measured depth		The distance measured along the path of a wellbore.
mechanical caliper		A well log which uses a mechanical device to measure hole diameter.
mechanical casing collar locator		The signal measured by a mechanical device at the location of casing collars and other features (e.g., perforations).
medium conductivity		The conductivity which represents a measurement made approximately two to three feet into the formation; generally considered to measure the formation where it contain fluids which are a mixture of mud filtrate, connate water and possibly hydrocarbons.

medium induction conductivity		The conductivity, made by an induction log, which represents a measurement made approximately two to three feet into the formation.
medium induction resistivity		The resistivity, made by an induction log, which represents a measurement made approximately two to three feet into the formation.
medium laterolog conductivity		The conductivity, measured by a laterolog, which represents a measurement made approximately two to three feet into the formation.
medium laterolog resistivity		The resistivity, measured by a laterolog, which represents a measurement made approximately two to three feet into the formation.
medium resistivity		The resistivity which represents a measurement made approximately two to three feet into the formation; generally considered to measure the formation where it contain fluids which are a mixture of mud filtrate, connate water and possibly hydrocarbons.
micro conductivity		A measurement of the conductivity of the formation within the first few cubic inches of the borehole wall.
micro inverse conductivity		A conductivity measurement made by a micro log tool which measures within the first few cubic inches of the borehole wall.
micro inverse resistivity		A resistivity measurement made by a micro log tool which measures within the first few cubic inches of the borehole wall.
micro laterolog conductivity		A measurement of the conductivity of the formation, by a laterolog, within the first few cubic inches of the borehole wall.
micro laterolog resistivity		A measurement of the resistivity of the formation, by a laterolog, within the first few cubic inches of the borehole wall.
micro normal conductivity		A conductivity measurement made by a micro log tool which measures within the first few cubic inches of the borehole wall.
micro normal resistivity		A resistivity measurement made by a micro log tool which measures within the first few cubic inches of the borehole wall.
micro resistivity		A measurement of the resistivity of the formation within the first few cubic inches of the borehole wall.
micro spherically focused conductivity		A measurement of the conductivity of the formation, by a spherically focused tool, within the first few cubic inches of the borehole wall.
micro spherically focused resistivity		A measurement of the resistivity of the formation, by a spherically focused tool, within the first few cubic inches of the borehole wall.

mineral		The mineral composition, generally in weight percent, of a formation as calculated from elemental information obtained from a geochemical logging pass; e.g., weight percent of dolomite, calcite, illite, quartzite, etc.
mud cake conductivity		The conductivity of the filter cake, the residue deposited on the borehole wall as mud loses filtrate into porous and permeable rock.
mud cake correction		A trace which has been corrected for the effects of mud cake; e.g., mud cake thickness and/or density.
mud cake density correction		A trace which has been corrected for the effects of mud cake density.
mud cake resistivity		The resistivity of the filter cake, the residue deposited on the borehole wall as mud loses filtrate into porous and permeable rock.
mud cake resistivity correction		A trace which has been corrected for the effects of mud cake resistivity.
mud cake thickness correction		A trace which has been corrected for the effects of mud cake thickness.
mud composition correction		A trace which has been corrected for the effects of borehole fluid composition; e.g., a correction for KCl in the borehole fluid.
mud conductivity		The conductivity of the continuous phase liquid used for the drilling of the well.
mud filtrate conductivity		The conductivity of the effluent of the continuous phase liquid of the drilling mud which permeates porous and permeable rock.
mud filtrate correction		A trace which has been corrected for the effects of mud filtrate. This includes things such as filtrate salinity.
mud filtrate density correction		A trace which has been corrected for the effects of mud filtrate density.
mud filtrate resistivity		The resistivity of the effluent of the continuous phase liquid of the drilling mud which permeates porous and permeable rock.
mud filtrate resistivity correction		A trace which has been corrected for the effects of mud filtrate resistivity.
mud filtrate salinity correction		A trace which has been corrected for the effects of mud filtrate salinity.
mud resistivity		The resistivity of the continuous phase liquid used for the drilling of the well.
mud salinity correction		A trace which has been corrected for the effects of salinity in the borehole fluid.
mud viscosity correction		A trace which has been corrected for the effects of the viscosity of the borehole fluid.
mud weight correction		A trace which has been corrected for the effects of weighting the borehole fluid.

neutron die away time		The time it takes for a neutron population to die away to half value.
neutron porosity		Porosity from a neutron log.
nuclear caliper		A well log which uses a nuclear device to measure hole diameter.
nuclear magnetic decay time		The decay time of a nuclear magnetic signal.
nuclear magnetism log permeability		The permeability derived from a nuclear magnetism log.
nuclear magnetism porosity		Porosity calculated using the measurements from a nuclear magnetism logging pass.
OH density porosity		
OH dolomite density porosity		Porosity calculated from the bulk density measurement of an open hole density log using a dolomite matrix density.
OH dolomite neutron porosity		Porosity calculated from an open hole neutron log using a dolomite matrix.
OH limestone density porosity		Porosity calculated from the bulk density measurement of an open hole density log using a limestone matrix density.
OH limestone neutron porosity		Porosity calculated from an open hole neutron log using a limestone matrix.
OH neutron porosity		
OH sandstone density porosity		Porosity calculated from the bulk density measurement of an open hole density log using a sandstone matrix density.
OH sandstone neutron porosity		Porosity calculated from an open hole neutron log using a sandstone matrix.
oil based mud correction		A trace which has been corrected for the effects of oil based borehole fluid.
oil saturation		The fraction or percentage of pore volume of rock occupied by oil.
perforating		The procedure for introducing holes through casing into a formation so that formation fluids can enter into the casing.
permeability		The permeability of the surrounding formation.
phase shift		A change or variation according to a harmonic law from a standard position or instant of starting.
photoelectric absorption		The effect measured by the density log and produced by the process of a photon colliding with an atom, and then being completely absorbed and its total energy used to eject one of the orbital electrons from those surrounding the nucleus.
photoelectric absorption correction		The correction that is to be made to the photoelectric absorption curve.
physical measurement correction		A trace which has been corrected for various physical measurement effects; e.g. spreading loss.
plane angle		An angle formed by two intersecting lines.

porosity		The total pore volume occupied by fluid in a rock. Includes isolated nonconnecting pores and volume occupied by absorbed, immobile fluid.
porosity correction		A trace which has been corrected for porosity effects.
potassium		The measurement of gamma radiation emitted by potassium.
pressure		The force or thrust exerted upon a surface divided by the area of the surface.
pressure correction		A trace which has been corrected for the effects of pressure in the borehole.
processed		A well log trace which has been processed in some way; e.g., depth adjusted or environmentally corrected.
pulsed neutron porosity		Porosity calculated from a pulsed neutron log.
quality		Degree of excellence.
ratio		A relationship between two values usually expressed as a fraction.
raw		A well log trace which has not had any processing. In other words, a trace which has not been depth adjusted or environmentally corrected.
relative bearing		While looking down hole, it is the clockwise angle from the upper side of the sonde to the reference pad or electrode.
resistivity		The property measuring the resistance to flow of an electrical current.
resistivity factor correction		A trace which has been corrected for resistivity factor effects.
resistivity from attenuation		Resistivity calculated from the attenuation of an electromagnetic wave. Generally recorded from a LWD resistivity tool.
resistivity from phase shift		Resistivity calculated from the phase shift of an electromagnetic wave. Generally recorded from a LWD resistivity tool.
resistivity phase shift		The amount of change in the phase of an electrical wave.
resistivity ratio		The ratio of two resistivity values.
salinity		The concentration of ions in solution.
sampling		To take a sample of or from something.
sandstone acoustic porosity		Porosity calculated from an acoustic log using a sandstone matrix.
sandstone density porosity		Porosity calculated from the bulk density measurement of a density log using a sandstone matrix density.
sandstone neutron porosity		Porosity calculated from a neutron log using a sandstone matrix.
saturation		The fraction or percentage of the pore volume of a rock.
shale volume		An estimate of the amount of shale present in the formation. Frequently calculated from a gamma ray or SP curve.

shallow conductivity		The conductivity which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shallow induction conductivity		The conductivity, measured by an induction log, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shallow induction resistivity		The resistivity, measured by an induction log, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shallow laterolog conductivity		The conductivity, measured by a laterolog, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shallow laterolog resistivity		The resistivity, measured by a laterolog, which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shallow resistivity		The resistivity which represents a measurement made approximately one to two feet into the formation; generally considered to measure the formation where it contains fluids which are comprised primarily of mud filtrate.
shear wave dolomite porosity		Porosity calculated from a shear wave acoustic log using a dolomite matrix.
shear wave limestone porosity		Porosity calculated from a shear wave acoustic log using a limestone matrix.
shear wave matrix travel time		The time it takes for a shear acoustic wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero porosity rock, e.g. sandstone, limestone or dolomite.
shear wave sandstone porosity		Porosity calculated from a shear wave acoustic log using a sandstone matrix.
shear wave travel time		The time it takes for a shear acoustic wave to traverse a fixed distance.
shifted		A well log trace which has had its original values shifted by some factor; e.g., added or multiplied by a constant.

sidewall core porosity		Porosity from a measurement made on a sidewall core.
sigma		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume for the capture of neutrons.
sigma formation		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of the formation for the capture of neutrons.
sigma gas		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of gas for the capture of neutrons.
sigma hydrocarbon		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of hydrocarbon for the capture of neutrons.
sigma matrix		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of the rock matrix for the capture of neutrons.
sigma oil		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of oil for the capture of neutrons.
sigma water		The macroscopic capture cross section, i.e. the effective cross-sectional area per unit volume, of water for the capture of neutrons.
slippage velocity correction		A trace which has been corrected for slippage velocity.
smoothed		A well log trace which has been filtered to smooth, or average the trace.
spectral gamma ray		The measurement of all the naturally occurring gamma radiation separated by energy windows.
spherically focused conductivity		The conductivity, measured by a spherically focused log, which represents the resistivity approximately one to two feet into the formation.
spherically focused resistivity		The resistivity, measured by a spherically focused log, which represents the resistivity approximately one to two feet into the formation.
spontaneous potential		The difference in potential (DC Voltage) between a moveable electrode in the borehole and a distant reference electrode usually at the surface.
spreading loss correction		A trace which has been corrected for the effects of spreading loss.
synthetic well log trace		A well log trace which has been artificially created, as opposed to an actual measurement, from associated measurements or information.
temperature		A temperature measurement.

temperature correction		A trace which has been corrected for the effects of the temperature in the borehole.
tension		The tension on the wireline cable while logging.
Th/K ratio		The ratio of the Thorium measurement to the Potassium measurement.
thorium		The measurement of gamma radiation emitted by thorium.
time		A measured or measurable period.
tool diameter correction		A trace which has been corrected for the tool diameter.
tool eccentricity correction		A trace which has been corrected for the effects of the tool not being centered in the borehole.
total gamma ray		The measurement of all the naturally occurring gamma radiation.
total porosity		The total pore volume occupied by fluid in a rock.
tracer survey		A well log used for the purpose of monitoring a traceable material; e.g. a radioactive isotope.
travel time		The time it takes for an acoustic or electromagnetic wave to traverse a specific distance.
true conductivity		The conductivity of fluid-filled rock where fluid distributions and saturations are representative of those in the uninvaded, undisturbed part of the formation.
true resistivity		The resistivity of fluid-filled rock where fluid distributions and saturations are representative of those in the uninvaded, undisturbed part of the formation.
true vertical depth		The distance along a straight, vertical path. Usually computed from a measured depth and deviation information.
tube wave dolomite porosity		Porosity calculated from a tube wave acoustic log using a dolomite matrix.
tube wave limestone porosity		Porosity calculated from a tube wave acoustic log using a limestone matrix.
tube wave matrix travel time		The time it takes for a acoustic tube wave to traverse a fixed distance of a given material or matrix. In this case the material or matrix is a specific, zero porosity rock, e.g. sandstone, limestone or dolomite.
tube wave sandstone porosity		Porosity calculated from a tube wave acoustic log using a sandstone matrix.
tube wave travel time		The time it takes for a tube acoustic wave to traverse a fixed distance.
uranium		The measurement of gamma radiation emitted by uranium.
velocity		directional speed
volume		cubic capacity

water based fluid correction		A trace which has been corrected for the effects of the components in a water based borehole fluid system; e.g., a correction for KCL in the mud.
water holdup correction		A trace which has been corrected for water holdup.
water saturated conductivity		The conductivity of rock completely saturated with connate water.
water saturated resistivity		The resistivity of rock completely saturated with connate water.
water saturation		The fraction or percentage of pore volume of rock occupied by water.

Associations

Association	Notes
From: **MeasurementType.** To: **TypeEnum**	
From: **Sensor.** To: **MeasurementType**	

18.25 Motor

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Motor Component Schema. Used to capture properties about a motor used in a tubular string.*

Attributes

Name	Type	Notes
BendSettingsMn	PlaneAngleMeasure	Minimum bend angle setting.
BendSettingsMx	PlaneAngleMeasure	Maximum bend angle setting.
ClearanceBearBox	LengthMeasure	Clearance inside bearing box.
DiaNozzle	LengthMeasure	Nozzle diameter.
DiaRotorNozzle	LengthMeasure	Diameter of rotor at nozzle.
DumpValve	boolean	Is dump valve present? Values are "true" (or "1") and "false" (or "0").
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowrateMn	VolumePerTimeMeasure	Minimum flow rate.
FlowrateMx	VolumePerTimeMeasure	Maximum flow rate.
LobesRotor	long	Number of rotor lobes.
LobesStator	long	Number of stator lobes.
OffsetTool	LengthMeasure	Tool offset from bottom.
PresLossFact	double	Pressure loss factor.
Rotatable	boolean	Is motor rotatable? Values are "true" (or "1") and "false" (or "0").
RotorCatcher	boolean	Is rotor catcher present? Values are "true" (or "1") and "false" (or "0").
Sensor	Sensor	
TempOpMx	ThermodynamicTemperatureMeasure	Maximum operating temperature.
TypeBearing	BearingType	Type of bearing.

Associations

Association	Notes
From: **Motor.** To: **BearingType**	
0..1 From: **TubularComponent.**Motor To: **Motor**	Motor object.

18.26 MwdTool

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/12/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular MWD Tool Component Schema. Used to capture operating parameters of the MWD tool.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowrateMn	VolumePerTimeMeasure	Minimum flow rate.
FlowrateMx	VolumePerTimeMeasure	Maximum flow rate.
IdEquv	LengthMeasure	Equivalent inner diameter.
TempMx	ThermodynamicTemperatureMeasure	Maximum Temperature.

Associations

Association		Notes
0..*	From: **MwdTool.**Sensor To: **Sensor**	
0..1	From: **TubularComponent.**MwdTool To: **MwdTool**	MWD (measurement while drilling) tool object.

18.27 Nozzle

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Nozzle Component Schema.*

Attributes

Name	Type	Notes
DiaNozzle	LengthMeasure	Nozzle diameter.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Index	long	Index if this is an indexed object.
Len	LengthMeasure	Length of the nozzle.
Orientation	String64	Nozzle orientation.
TypeNozzle	NozzleType	Nozzle type.
uid	String64	Unique identifier for this instance of Nozzle

Associations

Association	Notes
From**: Nozzle.** To: **NozzleType**	
From**: TubularComponent.**Nozzle **0..*** To: **Nozzle**	

18.28 NozzleType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type of nozzle.*

Attributes

Name	Type	Notes
extended		
normal		

Associations

Association	Notes
From: **NozzleType.** To: **TypeEnum**	
From: **Nozzle.** To: **NozzleType**	

18.29 OSDUTubularAssemblyStatus

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *OSDU Tubular Assembly Status information.*

Attributes

Name	Type	Notes
Date	TimeStamp	Date the status has been established.
Description	String256	Used to describe the reason of Activity - such as cut/pull, pulling.
StatusType	String64	Status type.

18.30 RotarySteerableTool

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/12/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Rotary Steerable Tool Component Schema. Captures size and performance information about the rotary steerable tool used in the tubular string.*

Attributes

Name	Type	Notes
ClosePadOd	LengthMeasure	Outside diameter of the tool when the pads are closed.
DeflectionMethod	DeflectionMethod	Method used to direct the deviation of the trajectory: point bit or push bit.
DownLinkFlowRateMn	VolumePerTimeMeasure	Minimum flow rate for programming the tool.
DownLinkFlowRateMx	VolumePerTimeMeasure	Maximum flow rate for programming the tool.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowRateMn	VolumePerTimeMeasure	Minimum flow rate for tool operation.
FlowRateMx	VolumePerTimeMeasure	Maximum flow rate for tool operation.
HoleSizeMn	LengthMeasure	Minimum size of the hole in which the tool can operate.
HoleSizeMx	LengthMeasure	Maximum size of the hole in which the tool can operate.
OpenPadOd	LengthMeasure	Outside diameter of the tool when the pads are activated.
OperatingSpeed	AngularVelocityMeasure	Suggested operating speed.
PadCount	long	The number of contact pads.
PadLen	LengthMeasure	Length of the contact pad.
PadOffset	LengthMeasure	Offset from the bottom of the pad to the bottom connector.
PadWidth	LengthMeasure	Width of the contact pad.
PressLossFact	double	Pressure drop across the tool.
SpeedMx	AngularVelocityMeasure	Maximum rotation speed.
WobMx	ForceMeasure	Maximum weight on the bit.

Associations

Association	Notes
0..* From: **RotarySteerableTool.**Sensor To: **Sensor**	
1 From: **RotarySteerableTool.**Tool To: **AbstractRotarySteerableTool**	
From: **RotarySteerableTool.** To: **DeflectionMethod**	
0..1 From: **TubularComponent.**RotarySteerableTool To: **RotarySteerableTool**	Rotary Steerable Tool.

18.31 Sensor

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Sensor Component Schema.*

Attributes

Name	Type	Notes
Comments	String2000	Comments and remarks.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
OffsetBot	LengthMeasure	Offset from the bottom of the MWD tool.
TypeMeasurement	MeasurementType	Type from POSC.
uid	String64	Unique identifier for this instance of Sensor.

Associations

Association		Notes
	From: **Sensor.** To: **MeasurementType**	
0..*	From: **RotarySteerableTool.**Sensor To: **Sensor**	
0..*	From: **MwdTool.**Sensor To: **Sensor**	

18.32 Stabilizer

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Stablizer Component Schema. Captures dimension and operation information about stabilizers used in the tubular string.*

Attributes

Name	Type	Notes
DistBladeBot	LengthMeasure	Distance of the blade bottom from the bottom of the component.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FactFric	double	Friction factor.
LenBlade	LengthMeasure	Length of the blade.
LenBladeGauge	LengthMeasure	Gauge Length of the blade. That is, the length of the blade measured at the OdBladeMx.
OdBladeMn	LengthMeasure	Minimum outer diameter of the blade.
OdBladeMx	LengthMeasure	Maximum outer diameter of the blade.
ShapeBlade	BladeShapeType	Blade shape.
TypeBlade	BladeType	Blade type.
uid	String64	Unique identifier for this instance of Stabilizer.

Associations

Association			Notes
	From: **Stabilizer.**	To: **BladeShapeType**	
	From: **Stabilizer.**	To: **BladeType**	
0..*	From: **TubularComponent.**Stabilizer To: **Stabilizer**		Stabilizer object.

18.33 Tubular

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Used to capture information about the configuration of a drill string. For information about a use of this configuration, See the BhaRun object . This object is uniquely identified within the context of one wellbore object.

Attributes

Name	Type	Notes
DiaHoleAssy	LengthMeasure	Maximum hole size generated by the assembly.
MixedString	boolean	Flag indicating the assembly is a mixed string. The length of the assembly may be made up of joints with different tensile strengths, or collapse resistance and yield strengths.
NominalDiameter	LengthMeasure	Nominal size (diameter) describing the whole assembly, e.g., 9.625", 12.25".
SourceNuclear	boolean	Is nuclear tool present? Values are "true" (or "1") and "false" (or "0").
TubularOSDUIntegration	TubularOSDUIntegration	Information about a Tubular that is relevant for OSDU integration but does not have a natural place in a Tubular object.
TubularUmbilical	TubularUmbilical	
TypeTubularAssy	TubularAssembly	Type of tubular assembly.
ValveFloat	boolean	Is float valve present? Values are "true" (or "1") and "false" (or "0").

Associations

Association		Notes
1..1	From: **Tubular.**Wellbore To: **Wellbore**	
	From: **Tubular.** To: **AbstractObject**	
	From: **Tubular.** To: **TubularAssemblyExt**	
0..*	From: **Tubular.**TubularComponent To: **TubularComponent**	Container element for the tubular component elements.
0..1	From: **DrillingParams.**Tubular To: **Tubular**	
0..1	From: **BhaRun.**Tubular To: **Tubular**	
0..1	From: **DrillActivity.**Tubular To: **Tubular**	

18.34 TubularAssembly

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the type (or purpose) of the tubular assembly.*

Attributes

Name	Type	Notes
drilling		
directional drilling		
fishing		
condition mud		
tubing conveyed logging		
cementing		
casing		
clean out		
completion or testing		
coring		
hole opening or underreaming		
milling or dressing or cutting		
wiper or check or reaming		
unknown		The value is not known. Avoid using this value. All reasonable attempts should be made to determine the appropriate value. Use of this value may result in rejection in some situations.

Associations

Association	Notes
From: **TubularAssembly.** To: **TypeEnum**	
From: **TubularAssemblyExt.** To: **TubularAssembly**	

18.35 TubularAssemblyExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/17/2021 *Last modified:*12/2/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TubularAssemblyExt.** To: **EnumExtensionPattern**	
From: **TubularAssemblyExt.** To: **TubularAssembly**	
From: **Tubular.** To: **TubularAssemblyExt**	

18.36 TubularComponent

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/9/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Tubular Component Schema. Captures the order of the components in the XML instance,which is significant. The components are listed in the order in which they enter the hole. That is, the first component is the bit.*

Attributes

Name	Type	Notes
AreaNozzleFlow	AreaMeasure	Total area of nozzles.
AxialStiffness	ForcePerLengthMeasure	Axial stiffness of tubular.
BendStiffness	ForcePerLengthMeasure	Bending stiffness of tubular.
ClassService	String64	Service class.
ConfigCon	BoxPinConfig	Box/Pin configuration.
Count	long	The count number of the same component.
Description	String2000	Description of item and details.
Disp	VolumeMeasure	Closed end displacement.
DoglegMx	AnglePerLengthMeasure	Maximum dogleg severity.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Grade	String64	Material grade for the tubular section.
Id	LengthMeasure	Internal diameter of object.
IdFishneck	LengthMeasure	Fish neck inside diameter.
Len	LengthMeasure	Length of the item.
LenFishneck	LengthMeasure	Fish neck length.
LenJointAv	LengthMeasure	Average length of the joint for this string.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer of this component.
Model	String64	Component name from manufacturer.
NameTag	NameTag	An identification tag for the component tool. A serial number is a type of identification tag; however, some tags contain many pieces of information. This element only identifies the tag; it does not describe the contents.
NominalDiameter	LengthMeasure	Nominal size (diameter) of the component, e.g., 9.625", 12.25".
NominalWeight	MassMeasureExt	Nominal weight of the component
NumJointStand	long	Number of joints per stand of tubulars.
Od	LengthMeasure	Outside diameter of the body of the item.
OdDrift	LengthMeasure	Minimum pass through diameter.
OdFishneck	LengthMeasure	Fish neck outside diameter.

OdMx	LengthMeasure	Maximum outside diameter.
PresBurst	PressureMeasure	Burst pressure.
PresCollapse	PressureMeasure	Collapse pressure.
Sequence	long	The sequence within which the components entered the hole. That is, a sequence number of 1 entered first, 2 entered next, etc.
StressFatigue	PressureMeasure	Fatigue endurance limit.
Supplier	BusinessAssociate	Pointer to a BusinessAssociate representing the supplier for this component.
TensStrength	PressureMeasureExt	Yield stress of steel - worn stress.
TensYield	PressureMeasure	Yield stress of steel - worn stress.
ThickWall	LengthMeasure	Wall thickness.
TorsionalStiffness	ForcePerLengthMeasure	Torsional stiffness of tubular.
TqYield	MomentOfForceMeasure	Torque at which yield occurs.
TubularComponentOSDUIntegration	TubularComponentOSDUIntegration	Information about a TubularComponent that is relevant for OSDU integration but does not have a natural place in a TubularComponent.
TypeMaterial	MaterialType	Type of material.
TypeTubularComponent	TubularComponentTypeExt	Type of component.
uid	String64	Unique identifier for this instance of TubularComponent
WearWall	LengthPerLengthMeasure	Wall thickness wear (commonly in percent).
WtPerLen	MassPerLengthMeasure	Weight per unit length.

Associations

Association	Notes
0..1 From: **TubularComponent.**BitRecord To: **BitRecord**	
0..1 From: **TubularComponent.**RotarySteerableTool To: **RotarySteerableTool**	Rotary Steerable Tool.
0..1 From: **TubularComponent.**Motor To: **Motor**	Motor object.
0..* From: **TubularComponent.**Bend To: **Bend**	Bend object.
From: **TubularComponent.** To: **BoxPinConfig**	
From: **TubularComponent.** To: **TubularComponentTypeExt**	
0..* From: **TubularComponent.**Nozzle To: **Nozzle**	
0..1 From: **TubularComponent.**HoleOpener To: **HoleOpener**	Hole opener object.
From: **TubularComponent.** To: **MaterialType**	
0..1 From: **TubularComponent.**MwdTool To: **MwdTool**	MWD (measurement while drilling) tool object.

Association		Notes
0..*	From**: TubularComponent.**Stabilizer To: **Stabilizer**	Stabilizer object.
0..1	From**: TubularComponent.**Jar To: **Jar**	Jar object.
0..*	From**: TubularComponent.**Connection To: **Connection**	Connection object.
0..*	From**: Tubular.**TubularComponent To: **TubularComponent**	Container element for the tubular component elements.

18.37 TubularComponentOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/18/2021 *Last modified:*11/18/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a TubularComponent that is relevant for OSDU integration but does not have a natural place in a TubularComponent.*

Attributes

Name	Type	Notes
PackerSetDepthTvd	AbstractVerticalDepth	The depth the packer equipment was set to seal the casing or tubing.
PilotHoleSize	LengthMeasure	Size of the Pilot Hole.
SectionType	String64	Identifier of the Section Type.
ShoeDepthTvd	AbstractVerticalDepth	Depth of the tubing shoe measured from the surface.
TubularComponentBaseMd	MeasuredDepth	The measured depth of the base from the specific component.
TubularComponentBaseReportedTvd	AbstractVerticalDepth	Depth of the base of the component measured from the Well-Head.
TubularComponentBottomConnectionTyp e	String64	The Bottom Connection Type.
TubularComponentBoxPinConfig	String64	Type of collar used to couple the tubular with another tubing string.
TubularComponentMaterialType	String64	Specifies the material type constituting the component.
TubularComponentTopConnectionType	String64	The Top Connection Type.
TubularComponentTopMd	MeasuredDepth	The measured depth of the top from the specific component.
TubularComponentTopReportedTvd	AbstractVerticalDepth	Depth of the top of the component measured from the Well-Head.

18.38 TubularComponentType

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/15/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the types of components that can be used in a tubular string. These are used to specify the type of component and multiple components are used to define a tubular string (Tubular).*

Attributes

Name	Type	Notes
accelerator		
adjustable kickoff		
bit core diamond		
bit core PDC		
bit diamond fixed cut		
bit hole opener		
bit insert roller cone		
bit mill tooth roller cone		
bit PDC fixed cutter		
bit under reamer		
bridge plug		
bull plug		
bullnose		
casing		
casing crossover		
casing cutter		
casing head		
casing inflatable packer		
casing shoe screw-in		
catch assembly		
coiled tubing in hole		
coiled tubing on coil		
core barrel		
core orientation barrel		
die collar		
die collar LH		
directional guidance system		
drill collar		
drill collar short		
drill pipe		

drill pipe compressive		
drill pipe LH		
drill stem test BHA		
drive pipe		
dual catch assembly		
extension bowl overshot		
extension sub-overshot		
float collar		
float shoe		
flow head		
guide shoe		
hanger casing subsea		
hanger casing surface		
hanger liner		
hanger mud line		
hanger tubing		
heavy weight drill pipe		
heavy weight drill pipe LH		
jar		
junk basket		
junk basket reverse circulation		
kelly		
keyseat wiper tool		
landing float collar		
lead impression block		
liner		
logging while drilling tool		
magnet		
mill casing cutting		
mill dress		
mill flat bottom		
mill hollow		
mill packer picker assembly		
mill pilot		
mill polish		
mill section		
mill taper		
mill washover		
mill watermelon		
millout extension		

motor		
motor instrumented		
motor steerable		
mule shoe		
multilateral hanger running tool		
MWD hang off sub		
MWD pulser		
non-magnetic collar		
non-magnetic stabilizer		
other		
overshot		
overshot LH		
oversize lip guide overshot		
packer		
packer retrieve TT squeeze		
packer RTTS		
packer storm valve RTTS		
pipe cutter		
polished bore receptacle		
ported stinger		
prepacked screens		
reamer		
reversing tool		
riser high pressure		
riser marine		
riser production		
rotary steering tool		
running tool		
safety joint		
safety joint LH		
scab liner bit guide		
scraper		
scratchers		
slotted liner		
spear		
stabilizer		
stabilizer inline		
stabilizer near bit		
stabilizer near bit roller reamer		
stabilizer non-rotating		

stabilizer steerable		
stabilizer string		
stabilizer string roller reamer		
stabilizer turbo back		
stabilizer variable blade		
stage cement collar		
sub-bar catcher		
sub-bent		
sub-bit		
sub-bumper		
sub-catcher		
sub-circulation		
sub-cone		
sub-crossover		
sub-dart		
sub-filter		
sub-float		
sub-jetting		
sub-junk		
sub-orienting		
sub-ported		
sub-pressure relief		
sub-pump out		
sub-restrictor		
sub-saver		
sub-shock		
sub-side entry		
sub-stop		
surface pipe		
taper tap		
taper tap LH		
thruster		
tieback polished bore receptacle		
tieback stinger		
tubing		
tubing-conveyed perforating gun		
turbine		
unknown		
washover pipe		
whipstock		

whipstock anchor		

Associations

Association	Notes
From: **TubularComponentTypeExt.** To: **TubularComponentType**	

18.39 TubularComponentTypeExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/12/2021 *Last modified:*11/12/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **TubularComponentTypeExt.** To: **EnumExtensionPattern**	
From: **TubularComponentTypeExt.** To: **TubularComponentType**	
From: **TubularComponent.** To: **TubularComponentTypeExt**	

18.40 TubularOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a Tubular that is relevant for OSDU integration but does not have a natural place in a Tubular object.*

Attributes

Name	Type	Notes
ActiveIndicator	boolean	Indicates if the Assembly is activated or not.
ActivityType	String64	Used to describe if it belongs to a RunActivity or to a PullActivity.
ActivityTypeReasonDescription	String64	Used to describe the reason of Activity - such as cut/pull, pulling, ...
ArtificialLiftType	String64	Type of Artificial Lift used (could be "Surface Pump" / "Submersible Pump" / "Gas Lift" ...)
AssemblyBaseMd	MeasuredDepth	The measured depth of the base from the whole assembly.
AssemblyBaseReportedTvd	AbstractVerticalDepth	Depth of the base of the Assembly measured from the Well-Head.
AssemblyTopMd	MeasuredDepth	The measured depth of the top from the whole assembly.
AssemblyTopReportedTvd	AbstractVerticalDepth	Depth of the top of the Assembly measured from the Well-Head.
LinerType	String64	This reference table describes the type of liner used in the borehole. For example, slotted, gravel packed or pre-perforated etc.
OSDUTubularAssemblyStatus	OSDUTubularAssemblyStatus	Record that reflects the status of the Assembly - as 'installed', 'pulled', 'planned',... - Applicable to tubing/completions as opposed to drillstrings.
Parent	Tubular	Optional - Identifier of the parent assembly (in case of side-track, multi-nesting, ...) - The Concentric Tubular model is used to identify the Assembly that an Assembly sits inside e.g. Surface Casing set inside Conductor, Tubing set inside Production Casing, a Bumper Spring set inside a Production Tubing Profile Nipple, Liner set inside Casing, etc. This is needed to enable a Digital Well Sketch application to understand relationships between Assemblies and their parent Wellbores.
PilotHoleSize	LengthMeasure	Diameter of the Pilot Hole.
SeaFloorPenetrationLength	LengthMeasure	The distance that the assembly has penetrated below the surface of the sea floor.

StringClass	String64	Descriptor for Assembly, e.g. Production, Surface, Conductor, Intermediate, Drilling.
SuspensionPointMd	MeasuredDepth	In case of multi-nesting of assemblies, the 'point' is the Measured Depth of the top of the assembly though with PBRs the Suspension Point may not be the top.
TubularAssemblyNumber	long	Sequence of the TubularAssembly (Typically BHA sequence).

18.41 TubularUmbilical

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *An umbilical is any control, power or sensor cable or tube run through an outlet on the wellhead down to a particular receptacle on a downhole component (power or hydraulic line) or simply to a specific depth (sensors). Examples include Gas lift injection tube, Subsea valve control line, ESP power cable, iWire for external gauges, external Fiber Optic Sensor cable. Umbilicals are run outside of the casing or completion assembly and are typically attached by clamps. Umbilicals are run in hole same time as the host assembly. Casing Umbilicals may be cemented in place e.g. Fiber Optic.*

Attributes

Name	Type	Notes
ConnectedTubularComponent	ComponentReference	The Tubular component the umbilical is connected to.
Cut	TubularUmbilicalCut	A cut in the umbilical.
ServiceType	String64	The Type of Service the umbilical is facilitating.
TubularUmbilicalOSDUIntegration	TubularUmbilicalOSDUIntegration	Information about a TubularUmbilical that is relevant for OSDU integration but does not have a natural place in a TubularUmbilical.
UmbilicalType	String64	The type of umbilical.

18.42 TubularUmbilicalCut

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a cut in a TubularUmbilical.*

Attributes

Name	Type	Notes
CutDate	TimeStamp	The date the cut happened.
CutMd	MeasuredDepth	Measured Depth at which the cut has happened.
IsAccidental	boolean	Flag indicating whether the cut is accidental or not.

18.43 TubularUmbilicalOSDUIntegration

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/17/2021 *Last modified:*11/17/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information about a TubularUmbilical that is relevant for OSDU integration but does not have a natural place in a TubularUmbilical.*

Attributes

Name	Type	Notes
WellheadOutletKey	String64	The Wellhead Outlet the Umbilical is connected to.

19 Well

Package: xsd_schemas

Notes: Well Schema. Used to capture the general information about a well. This might sometimes be called a “well header”. All information that is the same for all wellbores (sidetracks) is contained in the well object.

19.1 LicensePeriod

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *This class is used to represent a period of time when a particular license was valid.*

Attributes

Name	Type	Notes
EffectiveDateTime	TimeStamp	The date and time when the license became effective.
NumLicense	String64	License number.
TerminationDateTime	TimeStamp	The date and time when the license ceased to be effective.

19.2 OperatingEnvironment

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The general location of a well or wellbore.*

Attributes

Name	Type	Notes
onshore		On land.
midshore		Transitional marine environment.
offshore		At sea with some distance from the shore.

Associations

Association	Notes
From: **OperatingEnvironment.** To: **TypeEnum**	
From: **OperatingEnvironmentExt.** To: **OperatingEnvironment**	

19.3 OperatingEnvironmentExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **OperatingEnvironmentExt.** To: **EnumExtensionPattern**	
From: **OperatingEnvironmentExt.** To: **OperatingEnvironment**	

19.4 Well

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*8/26/2021 *Status:* Proposed *Author:* William McKenzie
Notes: Used to capture the general information about a well. Sometimes called a "well header". Contains all information that is the same for all wellbores (sidetracks).

Attributes

Name	Type	Notes
Basin	String64	Basin in which the well is located.
Block	String64	Block name in which the well is located.
Country	String64	Country in which the well is located.
County	String64	County in which the well is located.
DataSourceOrganization	BusinessAssociate	Pointer to a BusinessAssociate representing the company providing the data in this well object.
DirectionWell	WellDirection	POSC well direction. The direction of the flow of the fluids in a well facility (generally, injected or produced, or some combination).
District	String64	Geo-political district name.
DTimLicense	TimeStamp	Date and time the license was issued.
DTimPa	TimeStamp	Date and time at which the well was plugged and abandoned.
DTimSpud	TimeStamp	Date and time at which the well was spudded.
Field	String64	Name of the field in which the well is located.
FluidWell	WellFluid	POSC well fluid. The type of fluid being produced from or injected into a well facility.
InformationalGeographicLocationWGS84	Geographic2dPosition	The approximate 2D well location. Intended for use cases where a low-fidelity, approximate location are acceptable such as displaying the well on a map in a dashboard.
InformationalProjectedLocation	Projected2dPosition	
InterestType	WellInterestExt	Reasons for interest in the well or information about the well.
LicenseHistory	LicensePeriod	The history of license numbers for the well.
LifeCycleHistory	FacilityLifecyclePeriod	The well's life cycle state history.
LifeCycleState	FacilityLifecycleStateExt	The well's life cycle state (e.g., planning, constructing, operating, closing, closed).
NameLegal	String64	Legal name of the well.
NumAPI	String64	American Petroleum Institute well number.
NumGovt	String64	Government assigned well number.
NumLicense	String64	License number of the well.

OperatingEnvironment	OperatingEnvironmentExt	Environment in which the well operates (e.eg, onshore, offshore, etc.).
Operator	BusinessAssociate	Pointer to a BusinessAssociate representing the operating company.
OperatorDiv	String64	Division of the operator company.
OperatorHistory	FacilityOperator	The history of operators for the well optionally including the dates and times that they were operators. If provided, the first operator should be the same as OriginalOperator and the last operator should be the same as Operator.
OriginalOperator	BusinessAssociate	Pointer to a BusinessAssociate representing the original operator of the well. This may be different than the current operator.
PcInterest	DimensionlessMeasure	Interest for operator. Commonly in percent.
Play	String64	Play in which the well is located.
Prospect	String64	Prospect in which the well is located.
PurposeHistory	WellPurposePeriod	History of the well's POSC well purpose.
PurposeWell	WellPurpose	POSC well purpose.
Region	String64	Geo-political region in which the well is located.
SlotName	String64	The well's slot name.
State	String64	State or province in which the well is located.
StatusHistory	WellStatusPeriod	History of the well's POSC well status.
StatusWell	WellStatus	POSC well status.
TimeZone	TimeZone	The time zone in which the well is located. It is the deviation in hours and minutes from UTC. This should be the normal time zone at the well and not a seasonally-adjusted value, such as daylight savings time.
UniqueIdentifier	String64	A human-readable unique identifier assigned to the well. Commonly referred to as a UWI.
WaterDepth	LengthMeasure	Depth of water (not land rigs).

Associations

Association			Notes
	From: **Well.**	To: **WellFluid**	
	From: **Well.**	To: **AbstractActiveObject**	
	From: **Well.**	To: **WellStatus**	
	From: **Well.**	To: **WellDirection**	
	From: **Well.**	To: **WellPurpose**	
0..1	From: **Well.**WellheadElevation To: **AbstractElevation**		Elevation of wellhead relative to the well surface location datum The referenced Wellbore can be any wellbore, since they all share the same surface location

Association		Notes
0..*	From: **Well.**WellSurfaceLocation To: **AbstractPosition**	The surface location of the well. This is shared by all wellbores within the well. This is where the well crosses ground level on land and crosses the platform offshore. This is a sequence of concrete instances of reference points of different types and/or reference systems, including the PLSS location. Each of these must have the "kind"element set to "well surface location". These are not different realizations or interpretations of the well surface location, but are exactly the same location expressed differently.
0..1	From: **Well.**GroundElevation To: **AbstractElevation**	Elevation of ground level (land rigs). This is given as MD relative to the well surface location and is likely 0.0 The referenced Wellbore can be any wellbore, since they all share the same surface location
1..1	From: **WellCompletion.**Well To: **Well**	
1..1	From: **Wellbore.**Well To: **Well**	
1..1	From: **DownholeComponent.**Well To: **Well**	

19.5 WellDirection

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values for the direction of flow of the fluids in a well facility (generally, injected or produced, or some combination).*

Attributes

Name	Type	Notes
huff-n-puff		The well facility alternately injects (usually a steam or hot fluid) and produces.
injector		The well facility is injecting fluids into the subsurface.
producer		The well facility is producing fluids from the subsurface.
uncertain		The flow direction of the fluids is variable, but not on a regular basis as is the case with the huff-n-puff flow.

Associations

Association	Notes
From: **WellDirection.** To: **TypeEnum**	
From: **Well.** To: **WellDirection**	

19.6 WellFluid

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values for the type of fluid being produced from or injected into a well facility.*

Attributes

Name	Type	Notes
air		This is generally an injected fluid.
condensate		Liquid hydrocarbons produced with natural gas that are separated from the gas by cooling and various other means. Condensate generally has an API gravity of 50 degrees to 120 degrees and is water white, straw, or bluish in color. It is the liquid recovery from a well classified as a gas well. It is generally dissolved in the gaseous state under reservoir conditions but separates as a liquid either in passing up the hole or at the surface. These hydrocarbons, from associated and non-associated gas well gas, normally are recovered from lease separators or field facilities by mechanical separation.
dry		The well facility is classified as a dry well. It has not been, nor will it be used to produce or inject any fluids.
gas		The well is classified as a gas well, producing or injecting a hydrocarbon gas. The gas is generally methane but may have a mixture of other gases also.
gas-water		The well facility is classified as producing both gas and water. USe this classification when the produced stream flow is a mixture of gas and water. When a facility produces gas and water in separate streams, classify it twice, as gas and as water.
non HC gas		The well produces or injects non-hydrocarbon gases. Typical other gases would be helium and carbon dioxide.
non HC gas -- CO2		Carbon dioxide gas.
oil		The liquid hydrocarbon generally referred to as crude oil.
oil-gas		The well facility is classified as producing both gas and oil. Use this classification when the produced stream flow is a mixture of oil and gas. When a facility produces oil and gas in separate streams, classify it twice, as oil and as gas.

oil-water		The well facility is classified as producing both oil and water. Use this classification when the produced stream flow is a mixture of oil and water. When a facility produces oil and water in separate streams, classify it twice, as oil and as water.
steam		The gaseous state of water. This is generally an injected fluid, but it is possible that some hydrothermal wells produce steam.
water		The well is classified as a water well without distinguishing between brine or fresh water.
water -- brine		The well facility is classified as producing or injecting salt water.
water -- fresh water		The well facility is classified as producing fresh water that is capable of use for drinking or crop irrigation.

Associations

Association	Notes
From: **WellFluid.** To: **TypeEnum**	
From: **Well.** To: **WellFluid**	

19.7 WellInterest

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Reasons for interest in the well or information about the well.*

Attributes

Name	Type	Notes
operated		
non-operated joint venture		
competitor		

Associations

Association	Notes
From: **WellInterest.** To: **TypeEnum**	
From: **WellInterestExt.** To: **WellInterest**	

19.8 WellInterestExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **WellInterestExt.** To: **EnumExtensionPattern**	
From: **WellInterestExt.** To: **WellInterest**	

19.9 WellPurpose

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values that represent the classification of a well or wellbore by the purpose for which it was initially drilled.*

Attributes

Name	Type	Notes
appraisal		A well drilled into a formation shown to be potentially productive of oil or gas by an earlier well for the purpose of obtaining more information about the reservoir. Also known as a delineation well.
appraisal -- confirmation appraisal		An appraisal well, generally drilled in a location interpreted to be in the reservoir, whose purpose is to confirm the interpretation.
appraisal -- exploratory appraisal		An appraisal well, generally drilled in an area unknown to be part of the reservoir, whose purpose is to determine the extent of the reservoir.
exploration		An exploratory well drilled in an unproved area to test for a new field, a new pay, a deeper reservoir, or a shallower reservoir. Also known as a wildcat.
exploration -- deeper-pool wildcat		An exploratory well drilled to search for additional pools of hydrocarbon near known pools of hydrocarbon but at deeper stratigraphic levels than known pools.
exploration -- new-field wildcat		An exploratory well drilled to search for an occurrence of hydrocarbon at a relatively considerable distance outside the limits of known pools of hydrocarbon, as those limits were understood at the time.
exploration -- new-pool wildcat		An exploratory well drilled to search for additional pools of hydrocarbon near and at the same stratigraphic level as known pools.
exploration -- outpost wildcat		An exploratory well drilled to search for additional pools of hydrocarbon or to extend the limits of a known pool by searching in the same interval at some distance from a known pool.
exploration -- shallower-pool wildcat		An exploratory well drilled to search for additional pools of hydrocarbon near but at a shallower stratigraphic levels than known pools.
development		A well drilled in a zone in an area already proved productive.

development -- infill development		A development well drilled to fill in between established wells, usually as part of a drilling program to reduce the spacing between wells to increase production.
development -- injector		A development well drilled with the intent of injecting fluids into the reservoir for the purpose of improving reservoir production.
development -- producer		A development well drilled with the intent of producing fluids.
fluid storage		A well drilled for storing fluids - generally either hydrocarbons or waste disposal.
fluid storage -- gas storage		A well drilled with the intent of injecting gas into the reservoir rock as a storage facility.
general srvc		A well drilled with the intent of providing a general service as opposed to producing or injecting fluids. Examples of such services are geologic tests, pressure relief (for blowouts), and monitoring and observation.
general srvc -- borehole re-acquisition		A service well drilled to intersect another well below the surface for the purpose of extending the life of a well whose surface borehole has been lost or damaged.
general srvc -- observation		A service well drilled for the purpose of monitoring fluids in a reservoir, or observing some other subsurface phenomena. Also called a monitor well.
general srvc -- relief		A service well drilled with the specific purpose to provide communication at some point below the surface to another well that is out of control.
general srvc -- research		A well drilled with the purpose of obtaining information on the stratigraphy, on drilling practices, for logging tests, or other such purpose. It is not expected to find economic reserves of hydrocarbons.
general srvc -- research -- drill test		A research well drilled to test the suitablity of a particular type of equipment or drilling practice.
general srvc -- research -- strat test		A research well drilled for the purpose of gathering geologic information on the stratigraphy of an area. A C.O.S.T. well would be included in this category.
general srvc -- waste disposal		A service well drilled for the purpose of injection of sewage, industrial waste, or other waste fluids into the subsurface for disposal.
mineral		A non-oil and gas well drilled for the purpose of locating and/or extracting a mineral from the subsurface, usually through the injection and/or extraction of mineral-bearing fluids.

Associations

Association	Notes
From: **WellPurpose.** To: **TypeEnum**	
From: **Wellbore.** To: **WellPurpose**	
From: **Well.** To: **WellPurpose**	

19.10 WellPurposePeriod

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *This class is used to represent a period of time when a facility had a consistent WellPurpose.*

Attributes

Name	Type	Notes
EndDateTime	TimeStamp	The date and time when the purpose ended.
Purpose	WellPurpose	The facility's purpose.
StartDateTime	TimeStamp	The date and time when the purpose started.

20 Wellbore

Package: xsd_schemas

Notes: Wellbore Schema. To maximize operational efficiency and increase subsurface access, a well may contain multiple wellbores, which are the actual boreholes that comprise the well. A wellbore represents the path from surface to a unique bottomhole.

20.1 BottomHoleLocation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/19/2021 *Last modified:*11/19/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *This class is used to represent the bottomhole location of a wellbore.*

Attributes

Name	Type	Notes
Location	AbstractPosition	The bottomhole's position.
OSDULocationMetadata	OSDUSpatialLocationIntegration	Additional OSDU-specific metadata about the location.

20.2 Wellbore

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*12/2/2021 *Status:* Proposed *Author:* William McKenzie
Notes: Used to capture the general information about a wellbore. A wellbore represents the path from the parent Well's surface location to a unique bottomhole location. The wellbore object is uniquely identified within the context of one well object.

Attributes

Name	Type	Notes
AchievedTD	boolean	True ("true" of "1") indicates that the wellbore has acheieved total depth. That is, drilling has completed. False ("false" or "0") indicates otherwise. Not given indicates that it is not known whether total depth has been reached.
DataSourceOrganization	BusinessAssociate	Pointer to a BusinessAssociate representing the company providing the data in this wellbore object.
DayTarget	TimeMeasure	Target days for drilling wellbore.
DefaultMdDatum	AbstractReferencePoint	
DefaultTvdDatum	AbstractReferencePoint	
DTimKickoff	TimeStamp	Date and time of wellbore kickoff.
FluidWellbore	WellFluid	POSC well fluid. The type of fluid being produced from or injected into a wellbore facility.
GeographicBottomHoleLocation	BottomHoleLocation	The bottom hole location in geographic coordinates. Location MUST be a geographic position.
LicenseHistory	LicensePeriod	The history of license numbers for the wellbore.
LifecycleHistory	FacilityLifecyclePeriod	The wellbore's life cycle state history.
LifecycleState	FacilityLifecycleStateExt	The wellbore's lifecycle state (e.g., planning, constructing, operating, closing, closed).
Md	MeasuredDepth	The measured depth of the borehole. If status is plugged, indicates the maximum depth reached before plugging. It is recommended that this value be updated about every 10 minutes by an assigned raw data provider at a site.
MdBit	MeasuredDepth	The measured depth of the bit. If isActive=false then this value is not relevant. It is recommended that this value be updated about every 10 minutes by an assigned raw data provider at a site.

MdKickoff	MeasuredDepth	Kickoff measured depth of the wellbore.
MdPlanned	MeasuredDepth	Planned measured depth for the wellbore total depth.
MdSubSeaPlanned	MeasuredDepth	Planned measured for the wellbore total depth - with respect to seabed.
Number	String64	Operator borehole number.
NumGovt	String64	Government assigned number.
NumLicense	String64	License number of the wellbore.
Operator	BusinessAssociate	Pointer to a BusinessAssociate representing the operating company.
OperatorHistory	FacilityOperator	The history of operators for the wellbore optionally including the dates and times that they were operators. If provided, the first operator should be the same as OriginalOperator and the last operator should be the same as Operator.
OriginalOperator	BusinessAssociate	Pointer to a BusinessAssociate representing the original operator of the wellbore. This may be different than the current operator.
ProjectedBottomHoleLocation	BottomHoleLocation	The bottom hole location in projected coordinates. Location MUST be a projected position.
PurposeHistory	WellPurposePeriod	History of the wellbore's POSC well purpose.
PurposeWellbore	WellPurpose	POSC wellbore purpose.
Shape	WellboreShape	POSC wellbore trajectory shape.
SlotName	String64	The well's slot name.
StatusHistory	WellStatusPeriod	History of the wellbore's POSC well status.
StatusWellbore	WellStatus	POSC wellbore status.
SuffixAPI	String64	API suffix.
TargetFormation	String64	A formation of interest for which the Wellbore is drilled to interact with.
TargetGeologicUnitInterpretation	DataObjectReference	Pointer to a RESQML GeologicUnitInterpretation that represents a geologic unit of interest for which the Wellbore is drilled to interact with.
Tvd	AbstractVerticalDepth	The true vertical depth of the borehole. If status is plugged, indicates the maximum depth reached before plugging. It is recommended that this value be updated about every 10 minutes by an assigned raw data provider at a site.
TvdBit	AbstractVerticalDepth	The true vertical depth of the bit. If isActive=false then this value is not relevant. It is recommended that this value be updated about every 10 minutes by an assigned raw data provider at a site.

TvdKickoff	AbstractVerticalDepth	Kickoff true vertical depth of the wellbore.
TvdPlanned	AbstractVerticalDepth	Planned true vertical depth for the wellbore total depth.
TvdSubSeaPlanned	AbstractVerticalDepth	Planned true vertical depth for the wellbore total depth - with respect to seabed.
TypeWellbore	WellboreType	Type of wellbore.
UniqueIdentifier	String64	A human-readable unique identifier assigned to the wellbore. Commonly referred to as a UWI.

Associations

Association		Notes
	From: **Wellbore.** To: **WellPurpose**	
0..1	From: **Wellbore.**ParentWellbore To: **Wellbore**	This is a pointer to the parent wellbore. No parent = starts from top.
1..1	From: **Wellbore.**Well To: **Well**	
	From: **Wellbore.** To: **WellboreShape**	
	From: **Wellbore.** To: **WellStatus**	
	From: **Wellbore.** To: **WellboreType**	
	From: **Wellbore.** To: **AbstractActiveObject**	
1	From: **WellboreGeology.**Wellbore To: **Wellbore**	
1..1	From: **Target.**Wellbore To: **Wellbore**	
1..1	From: **FluidsReport.**Wellbore To: **Wellbore**	
1..1	From: **DownholeString.**ReferenceWellbore To: **Wellbore**	
1..1	From: **Tubular.**Wellbore To: **Wellbore**	
0..1	From: **WellboreMarker.**Wellbore To: **Wellbore**	
1	From: **BhaRun.**Wellbore To: **Wellbore**	
1..1	From: **SidewallCore.**Wellbore To: **Wellbore**	
1..1	From: **WellCMLedger.**Wellbore To: **Wellbore**	
1..1	From: **Risk.**Wellbore To: **Wellbore**	
0..1	From: **Wellbore.**ParentWellbore To: **Wellbore**	This is a pointer to the parent wellbore. No parent = starts from top.
1	From: **MudLogReport.**Wellbore To: **Wellbore**	
1	From: **StimJob.**Wellbore To: **Wellbore**	
0..1	From: **WellboreMarkerSet.**Wellbore To: **Wellbore**	
	From: **Channel. 0..1** To: **Wellbore**	
1	From: **WellboreCompletion.**ReferenceWellbore To: **Wellbore**	

Association		Notes
0..1	From**: ChannelSet.**Wellbore To: **Wellbore**	
1	From**: WellboreGeometry.**Wellbore To: **Wellbore**	
1..1	From**: OpsReport.**Wellbore To: **Wellbore**	
1	From**: DepthRegImage.**Wellbore To: **Wellbore**	Reference to the the wellbore this depth registration image belongs.
1..1	From**: ConvCore.**ReferenceWellbore To: **Wellbore**	
1..1	From**: SurveyProgram.**Wellbore To: **Wellbore**	
1	From**: RigUtilization.**Wellbore To: **Wellbore**	
	From**: CuttingsGeology. 1** To: **Wellbore**	
1..1	From**: BoreholeString.**ReferenceWellbore To: **Wellbore**	
1..1	From**: Trajectory.**Wellbore To: **Wellbore**	
1..1	From**: CementJob.**Wellbore To: **Wellbore**	
	From**: InterpretedGeology. 1** To: **Wellbore**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.
0..1	From**: Log.**Wellbore To: **Wellbore**	
1..1	From**: DrillReport.**Wellbore To: **Wellbore**	
	From**: ShowEvaluation. 1** To: **Wellbore**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.

20.3 WellboreShape

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values to represent the classification of a wellbore based on its shape. The source of the values and the descriptions is the POSC V2.2 "facility class" standard instance values in classification system "POSC wellbore trajectory shape".*

Attributes

Name	Type	Notes
build and hold		A wellbore configuration where the inclination is increased to some terminal angle of inclination and maintained at that angle to the specified target.
deviated		A wellbore that significantly departs from vertical with respect to the surface location.
double kickoff		Incorporates two tangential (constant, non-zero inclination) sections, the second of which must be at a higher inclination than the first.
horizontal		A wellbore whose path deviates from the vertical by at least 75 degrees.
S-shaped		A wellbore drilled with a vertical segment, a deviated segment, and a return toward a vertical segment.
vertical		A wellbore that is nearly vertical with respect to the surface location.

Associations

Association	Notes
From: **WellboreShape.** To: **TypeEnum**	
From: **Wellbore.** To: **WellboreShape**	

20.4 WellboreType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the classification of a wellbore with respect to its parent well/wellbore.*

Attributes

Name	Type	Notes
bypass		The original wellbore had to be abandoned before its final usage. This wellbore is being drilled as a different wellbore, but one which has the same target as the one that was abandoned.
initial		This is the first wellbore that has been drilled, or attempted, in a given well.
redrill		The wellbore is being redrilled.
reentry		The wellbore is being reentered after a period of abandonment.
respud		The wellbore is part of an existing regulatory well. The original borehole did not reach the target depth. This borehole required the well to be respudded (drilled from a different surface position).
sidetrack		The wellbore is a deviation from a given wellbore that produces a different borehole from the others, and whose bottomhole differs from any previously existing wellbore bottomholes.

Associations

Association	Notes
From: **WellboreType.** To: **TypeEnum**	
From: **Wellbore.** To: **WellboreType**	

21 WellboreGeology

Package: xsd_schemas

Notes: This WellboreGeology data object is new in WITSML v2.0. The WITSML v1.4.1 Mud Log data object has been reorganized into the Wellbore Geology data object and the Mud Log Report data object.
Contains the description and/or interpretation of the geology along a wellbore. Can contain cuttings lithologies, interpreted lithologies, and/or show evaluations. This is a top-level object.
Provides modeling of data for different levels of geological description and interpretation conducting by wellsite geologists or mud loggers.

AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
CuttingsGeology
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElem...
Wellbore::Wellbore
1
+ParentWellbore
0..1
TypeEnum
«enumeration»
Abstract::
ActiveStatusKind
active
inactive
+CuttingsGeologyInterval
0..*
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
CuttingsGeologyInterval
«XSDelement»
+ BottomsUpTime: TimeMeasure
+ Calcite: VolumePerVolumeMeasure [0..1]
+ CalcStab: VolumePerVolumeMeasure [0..1]
+ Cec: DimensionlessMeasure [0..1]
+ CleaningMethod: String64 [0..1]
+ DensBulk: MassPerVolumeMeasure [0..1]
+ DensShale: MassPerVolumeMeasure [0..1]
+ Dolomite: VolumePerVolumeMeasure [0..1]
+ DryingMethod: String64 [0..1]
+ Qft: IlluminanceMeasure [0..1]
+ SizeMax: LengthMeasure [0..1]
+ SizeMin: LengthMeasure [0..1]
+CuttingsIntervalLithology
0..*
EnumExtensionPattern
«XSDunion»
CommonEnumerations:
:LithologyKindExt
TypeEnum
«Enumeration»
CommonEnumerations:
:MatrixCementKind
ankerite
calcite
chlorite
dolomite
illite
kaolinite
quartz
siderite
smectite
«XSDcomplexType»
CuttingsIntervalLithology
«XSDelement»
+ Citation: Citation [0..1]
+ CodeLith: String64 [0..1]
+ Color: String64 [0..1]
+ Compaction: String64 [0..1]
+ Hardness: String64 [0..1]
+ Kind: LithologyKindExt
+ LithPc: VolumePerVolumeMeasure
+ MatrixCement: MatrixCementKind [0..1]
+ Permeability: String64 [0..1]
+ PorosityFabric: String64 [0..1]
+ PorosityVisible: String64 [0..1]
+ Roundness: String64 [0..1]
+ SizeGrain: String64 [0..1]
+ Sorting: String64 [0..1]
+ Sphericity: String64 [0..1]
+ Texture: String64 [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
LithologyQualifier
«XSDelement»
+ Abundance: VolumePerVolumeMeasure [0..1]
+ Description: String2000 [0..1]
+ Kind: LithologyQualifierKindExt
+ MdInterval: MdInterval [0..1]
«XSDattribute»
+ uid: String64
+Qualifier
0..*
TypeEnum
«enumeration»
ShowRating
none
very poor
poor
fair
good
very good
+Shows
0..*
«XSDcomplexType»
CuttingsIntervalShow
«XSDelement»
+ Citation: Citation [0..1]
+ CutColor: String64 [0..1]
+ CutFlorColor: String64 [0..1]
+ CutFlorForm: ShowLevel [0..1]
+ CutFlorLevel: ShowFluorescence [0..1]
+ CutFlorSpeed: ShowSpeed [0..1]
+ CutFlorStrength: String64 [0..1]
+ CutForm: ShowLevel [0..1]
+ CutLevel: String64 [0..1]
+ CutSpeed: ShowSpeed [0..1]
+ CutStrength: String64 [0..1]
+ CuttingFluid: String64 [0..1]
+ ImpregnatedLitho: String64 [0..1]
+ NatFlorColor: String64 [0..1]
+ NatFlorDesc: String64 [0..1]
+ NatFlorLevel: ShowFluorescence [0..1]
+ NatFlorPc: AreaPerAreaMeasure [0..1]
+ Odor: String64 [0..1]
+ ResidueColor: String64 [0..1]
+ ShowRating: ShowRating [0..1]
+ StainColor: String64 [0..1]
+ StainDistr: String64 [0..1]
+ StainPc: AreaPerAreaMeasure [0..1]
«XSDattribute»
+ uid: String64
TypeEnum
«enumeration»
ShowSpeed
slow
moderately fast
fast
instantaneous
none
TypeEnum
«enumeration»
ShowFluorescence
faint
bright
none
TypeEnum
«enumerati...
ShowLevel
blooming
streaming

AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
InterpretedGeology
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Wellbore::Wellbore
1
+ParentWellbore
0..1
TypeEnum
«enumeration»
Abstract::
ActiveStatusKind
active
inactive
+InterpretedGeologyInterval
0..*
String64
«XSDcomplexType»
GeochronologicalUnit
«XSDattribute»
+ authority: String64 [0..1]
+ kind: GeochronologicalRank
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
InterpretedGeologyInterval
«XSDelement»
+ GeochronologicalUnit: GeochronologicalUnit [0..-1]
+ LithostratigraphicUnit: LithostratigraphicUnit [0..-1]
String64
«XSDcomplexType»
LithostratigraphicUnit
«XSDattribute»
+ authority: String64
+ kind: LithostratigraphicRank
+InterpretedLithology
0..1
EnumExtensionPattern
«XSDunion»
CommonEnumerations::
LithologyKindExt
«XSDcomplexType»
InterpretedIntervalLithology
«XSDelement»
+ Citation: Citation [0..1]
+ CodeLith: String64 [0..1]
+ Color: String64 [0..1]
+ Compaction: String64 [0..1]
+ Hardness: String64 [0..1]
+ Kind: LithologyKindExt
+ MatrixCement: MatrixCementKind [0..1]
+ Permeability: String64 [0..1]
+ PorosityFabric: String64 [0..1]
+ PorosityVisible: String64 [0..1]
+ Roundness: String64 [0..1]
+ SizeGrain: String64 [0..1]
+ Sorting: String64 [0..1]
+ Sphericity: String64 [0..1]
+ Texture: String64 [0..1]
«XSDattribute»
+ uid: String64
+Qualifier
0..*
EnumExtensionPattern
«XSDunion»
CommonEnumerations::
LithologyQualifierKindExt
«XSDcomplexType»
LithologyQualifier
«XSDelement»
+ Abundance: VolumePerVolumeMeasure [0..1]
+ Description: String2000 [0..1]
+ Kind: LithologyQualifierKindExt
+ MdInterval: MdInterval [0..1]
«XSDattribute»
+ uid: String64

AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElem...
ShowEvaluation
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElem...
Wellbore::Wellbore
1
+ParentWellbore
0..1
TypeEnum
«enumeration»
Abstract::
ActiveStatusKind
active
inactive
+ShowEvaluationInterval
0..*
TypeEnum
«enumeration»
ShowFluid
gas
oil
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElem...
ShowEvaluationInterval
«XSDelement»
+ BottomsUpTime: TimeMeasure
+ ShowFluid: ShowFluid
+ ShowRating: ShowRating [0..1]
TypeEnum
«enumeration»
ShowRating
none
very poor
poor
fair
good
very good
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
WellboreGeology
«XSDelement»
+ MdInterval: MdInterval
+Wellbore
1
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Wellbore::Wellbore
+CuttingsGeology
«byValue»
0..1
+InterpretedGeology
«byValue»
0..1
+ShowEvaluation
«byValue»
0..1
AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
CuttingsGeology
AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
InterpretedGeology
AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
ShowEvaluation
+CuttingsGeologyInterval
0..*
+InterpretedGeologyInterval
0..*
+ShowEvaluationInterval
0..*
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
CuttingsGeologyInterval
«XSDelement»
+ BottomsUpTime: TimeMeasure
+ Calcite: VolumePerVolumeMeasure [0..1]
+ CalcStab: VolumePerVolumeMeasure [0..1]
+ Cec: DimensionlessMeasure [0..1]
+ CleaningMethod: String64 [0..1]
+ DensBulk: MassPerVolumeMeasure [0..1]
+ DensShale: MassPerVolumeMeasure [0..1]
+ Dolomite: VolumePerVolumeMeasure [0..1]
+ DryingMethod: String64 [0..1]
+ Qft: IlluminanceMeasure [0..1]
+ SizeMax: LengthMeasure [0..1]
+ SizeMin: LengthMeasure [0..1]
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
InterpretedGeologyInterval
«XSDelement»
+ GeochronologicalUnit: GeochronologicalUnit [0..-1]
+ LithostratigraphicUnit: LithostratigraphicUnit [0..-1]
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
ShowEvaluationInterval
«XSDelement»
+ BottomsUpTime: TimeMeasure
+ ShowFluid: ShowFluid
+ ShowRating: ShowRating [0..1]

String64
«XSDcomplexType»
LithostratigraphicUnit
«XSDattribute»
+ authority: String64
+ kind: LithostratigraphicRank
TypeEnum
«Enumeration»
CommonEnumerations::
LithostratigraphicRank
group
formation
member
bed
String64
«XSDcomplexType»
GeochronologicalUnit
«XSDattribute»
+ authority: String64 [0..1]
+ kind: GeochronologicalRank
TypeEnum
«enumeration»
CommonEnumerations::
GeochronologicalRank
eon
era
period
epoch
age
chron
TypeEnum
«enumerati...
ShowFluid
gas
oil
TypeEnum
«enumerati...
ShowRating
none
very poor
poor
fair
good
very good
TypeEnum
«enumeration»
ShowFluorescence
faint
bright
none
TypeEnum
«enumeration»
ShowSpeed
slow
moderately fast
fast
instantaneous
none
TypeEnum
«enumerati...
ShowLevel
blooming
streaming

21.1 CuttingsGeology

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 10/22/2015 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: Container for Cuttings Lithology items. The mud logger at the wellsite takes regular samples of drilled cuttings while the well is being drilled and examines the cuttings to determine the rock types (lithologies) present in each sample. The cuttings samples will typically contain a mix of different lithologies in each sample because there may have been multiple rock types that were drilled within the sample depth interval and there can also be mixing of cuttings as they travel up the wellbore and are collected on the shakers. CuttingsGeology therefore will typically contain multiple lithology elements for each interval so that the percentages of each lithology in the sample along with the more detailed geological description can be recorded.

Associations

Association		Notes
0..*	From**: CuttingsGeology.**CuttingsGeologyInterval To: **CuttingsGeologyInterval**	
	From**: CuttingsGeology. 1** To: **Wellbore**	
AbstractMdGrowingObject	From**: CuttingsGeology.** To:	
0..1	From**: WellboreGeology.**CuttingsGeology To: **CuttingsGeology**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.

21.2 CuttingsGeologyInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 10/22/2015 *Last modified:*11/10/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: A depth range along the wellbore containing one or more lithology types and information about how the cuttings were sampled. These intervals can be sent via ETP using the GrowingObject protocol.

Attributes

Name	Type	Notes
BottomsUpTime	TimeMeasure	Time required for a sample to leave the bottomhole and reach the surface.
Calcite	VolumePerVolumeMeasure	Calcimetry calcite percentage.
CalcStab	VolumePerVolumeMeasure	Calcimetry stabilized percentage.
Cec	DimensionlessMeasure	Cuttings cationic exchange capacity. Temporarily calling this a DimensionlessMeasure.
CleaningMethod	String64	Sample treatment: cleaning method.
DensBulk	MassPerVolumeMeasure	Sample bulk density for the interval.
DensShale	MassPerVolumeMeasure	Shale density for the interval.
Dolomite	VolumePerVolumeMeasure	Calcimetry dolomite percentage.
DryingMethod	String64	Sample treatment: drying method.
Qft	IlluminanceMeasure	Fluorescence as measured using a device licensed for the Quantitative Fluorescence Technique.
SizeMax	LengthMeasure	Maximum size.
SizeMin	LengthMeasure	Minimum size.

Associations

Association	Notes
From: **CuttingsGeologyInterval.** To: **AbstractMdIntervalGrowingPart**	
From: **CuttingsGeologyInterval.**CuttingsIntervalLithology **0..*** To: **CuttingsIntervalLithology**	
From: **CuttingsGeology.**CuttingsGeologyInterval **0..*** To: **CuttingsGeologyInterval**	

21.3 CuttingsIntervalLithology

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The description of a single rock type in this interval. Can include one or more CuttingsIntervalShow objects for hydrocarbon show evaluation of the individual lithology.*

Attributes

Name	Type	Notes
Citation	Citation	An ISO 19115 EIP-derived set of metadata attached to ensure the traceability of the CuttingsIntervalLithology.
CodeLith	String64	An optional custom lithology encoding scheme. If used, it is recommended that the scheme follows the NPD required usage. With the numeric values noted in the enum tables, which was the original intent for this item. The NPD Coding System assigns a digital code to the main lithologies as per the Norwegian Blue Book data standards. The code was then derived by lithology = (main lithology * 10) + cement + (modifier / 100). Example: Calcite cemented silty micaceous sandstone: (33 * 10) + 1 + (21 / 100) gives a numeric code of 331.21. However, the NPD is also working through Energistics/Caesar to potentially change this usage.) This scheme should not be used for mnemonics, because those vary by operator, and if an abbreviation is required, a local look-up table should be used by the rendering client, based on Lithology Type.
Color	String64	STRUCTURED DESCRIPTION USAGE. Lithology color description, from Shell 1995 4.3.3.1 and 4.3.3.2 colors with the addition of: frosted. e.g., black, blue, brown, buff, green, grey, olive, orange, pink, purple, red, translucent, frosted, white, yellow; modified by: dark, light, moderate, medium, mottled, variegated, slight, weak, strong, and vivid.
Compaction	String64	STRUCTURED DESCRIPTION USAGE. Lithology compaction from Shell 1995 4.3.1.5, which includes: not compacted, slightly compacted, compacted, strongly compacted, friable, indurated, hard.

Hardness	String64	STRUCTURED DESCRIPTION USAGE. Mineral hardness. Typically, this element is rarely used because mineral hardness is not typically recorded. What typically is recorded is compaction. However, this element is retained for use defined as per Mohs scale of mineral hardness.
Kind	LithologyKindExt	The geological name for the type of lithology from the enum table listing a subset of the OneGeology/CGI defined formation types.
LithPc	VolumePerVolumeMeasure	Lithology percent. Represents the portion of the sampled interval this lithology type relates to. The total of the lithologies within an interval should add up to 100 percent. If LithologySource in geology is: • "interpreted" only 100% is allowed. • "core" or "cuttings" then recommended usage is that the creating application uses blocks of 10%. i.e. 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. Ideally the input application should enforce a total of 100% for each defined depth interval. If the total for a depth interval does not add up to 100%, then use the "undifferentiated" code to fill out to 100%.
MatrixCement	MatrixCementKind	STRUCTURED DESCRIPTION USAGE. Lithology matrix/cement description. Terms will be as defined in the enumeration table. e.g., "calcite" (Common) "dolomite", "ankerite" (e.g., North Sea HPHT reservoirs such as Elgin and Franklin have almost pure ankerite cementation) "siderite" (Sherwood sandstones, southern UK typical Siderite cements), "quartz" (grain-to-grain contact cementation or secondary quartz deposition), "kaolinite", "illite" (e.g., Village Fields North Sea), "smectite","chlorite" (Teg, Algeria.).
Permeability	String64	STRUCTURED DESCRIPTION USAGE. Lithology permeability description from Shell 4.3.2.5. In the future, these values would benefit from quantification, e.g., tight, slightly, fairly, highly.

PorosityFabric	String64	STRUCTURED DESCRIPTION USAGE. Visible porosity fabric description from after Shell 4.3.2.1 and 4.3.2.2: intergranular (particle size greater than 20m), fine interparticle (particle size less than 20m), intercrystalline, intragranular, intraskeletal, intracrystalline, mouldic, fenestral, shelter, framework, stylolitic, replacement, solution, vuggy, channel, cavernous.
PorosityVisible	String64	STRUCTURED DESCRIPTION USAGE. Lithology visible porosity description. Defined after BakerHughes definitions, as opposed to Shell, which has no linkage to actual numeric estimates. The theoretical maximum porosity for a clastic rock is about 26%, which is normally much reduced by other factors. When estimating porosities use: more than 15% "good"; 10 to 15% "fair"; 5 to 10% "poor"; less than 5% "trace"; 0 "none".
Roundness	String64	STRUCTURED DESCRIPTION USAGE. Lithology roundness description from Shell 4.3.1.3. Roundness refers to modal size class: very angular, angular, subangular, subrounded, rounded, well rounded.

SizeGrain	String64	STRUCTURED DESCRIPTION USAGE. Lithology grain size description. Defined from Shell 4.3.1.1.(Wentworth) modified to remove the ambiguous term pelite. Size ranges in millimeter (or micrometer) and inches. LT 256 mm LT 10.1 in "boulder" 64-256 mm 2.5–10.1 in "cobble"; 32–64 mm 1.26–2.5 in "very coarse gravel" 16–32 mm 0.63–1.26 in "coarse gravel" 8–16 mm 0.31–0.63 in "medium gravel" 4–8 mm 0.157–0.31 in "fine gravel" 2–4 mm 0.079–0.157 in "very fine gravel" 1–2 mm 0.039–0.079 in "very coarse sand" 0.5–1 mm 0.020–0.039 in "coarse sand" 0.25–0.5 mm 0.010–0.020 in "medium sand" 125–250 um 0.0049–0.010 in "fine sand" 62.5–125 um .0025–0.0049 in "very fine sand" 3.90625–62.5 um 0.00015–0.0025 in "silt" LT 3.90625 um LT 0.00015 in "clay" LT 1 um LT 0.000039 in "colloid"
Sorting	String64	STRUCTURED DESCRIPTION USAGE. Lithology sorting description from Shell 4.3.1.2 Sorting: very poorly sorted, unsorted, poorly sorted, poorly to moderately well sorted, moderately well sorted, well sorted, very well sorted, unimodally sorted, bimodally sorted.
Sphericity	String64	STRUCTURED DESCRIPTION USAGE. Lithology sphericity description for the modal size class of grains in the sample, defined as per Shell 4.3.1.4 Sphericity: very elongated, elongated, slightly elongated, slightly spherical, spherical, very spherical.

Texture	String64	STRUCTURED DESCRIPTION USAGE. Lithology matrix texture description from Shell 1995 4.3.2.6: crystalline, (often "feather-edge" appearance on breaking), friable, dull, earthy, chalky, (particle size less than 20m; often exhibits capillary imbibition) visibly particulate, granular, sucrosic, (often exhibits capillary imbibition). Examples: compact interlocking, particulate, (Gradational textures are quite common.) chalky matrix with sucrosic patches, (Composite textures also occur).
uid	String64	Unique identifier for this instance of CuttingsIntervalLithology.

Associations

Association	Notes
From: **CuttingsIntervalLithology.**Shows **0..*** To: **CuttingsIntervalShow**	
From: **CuttingsIntervalLithology.** To: **LithologyKindExt**	
From: **CuttingsIntervalLithology.**Qualifier **0..*** To: **LithologyQualifier**	
From: **CuttingsIntervalLithology.** To: **MatrixCementKind**	
From: **CuttingsGeologyInterval.**CuttingsIntervalLithology **0..*** To: **CuttingsIntervalLithology**	

21.4 CuttingsIntervalShow

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *A set of measurements or observations on cuttings samples describing the evaluation of a hydrocarbon show based on observation of hydrocarbon staining and fluorescence. For information on procedures for show evaluation, see the WITSML Technical Usage Guide.*

Attributes

Name	Type	Notes
Citation	Citation	An ISO 19115 EIP-derived set of metadata attached to ensure the traceability of the CuttingsIntervalShow.
CutColor	String64	Cut color.
CutFlorColor	String64	Cut fluorescence color.
CutFlorForm	ShowLevel	Cut fluorescence form.
CutFlorLevel	ShowFluorescence	Cut fluorescence level.
CutFlorSpeed	ShowSpeed	Cut fluorescence speed.
CutFlorStrength	String64	Cut fluorescence strength.
CutForm	ShowLevel	Cut formulation.
CutLevel	String64	Cut level (faint, bright, etc.).
CutSpeed	ShowSpeed	Cut speed.
CutStrength	String64	Cut strength.
CuttingFluid	String64	Description of the cutting solvent used to treat the cuttings.
ImpregnatedLitho	String64	Impregnated lithology.
NatFlorColor	String64	Natural fluorescence color.
NatFlorDesc	String64	Natural fluorescence description.
NatFlorLevel	ShowFluorescence	Natural fluorescence level.
NatFlorPc	AreaPerAreaMeasure	Natural fluorescence (commonly in percent).
Odor	String64	Description of any hydrocarbon type odors smelled.
ResidueColor	String64	Residue color.
ShowRating	ShowRating	Show Rating.
StainColor	String64	Visible stain color.
StainDistr	String64	Visible stain distribution.
StainPc	AreaPerAreaMeasure	Visible stain (commonly in percent).
uid	String64	Unique identifier for this instance of CuttingsIntervalShow.

Associations

Association	Notes
From: **CuttingsIntervalShow.** To: **ShowFluorescence**	
From: **CuttingsIntervalShow.** To: **ShowRating**	
From: **CuttingsIntervalShow.** To: **ShowLevel**	
From: **CuttingsIntervalShow.** To: **ShowFluorescence**	
From: **CuttingsIntervalShow.** To: **ShowSpeed**	
From: **CuttingsIntervalShow.** To: **ShowLevel**	
From: **CuttingsIntervalShow.** To: **ShowSpeed**	
0..* From: **CuttingsIntervalLithology.**Shows To: **CuttingsIntervalShow**	
0..1 From: **SwcSample.**Show To: **CuttingsIntervalShow**	Show description for the plug.
0..1 From: **GeologicIntervalC.**Show To: **CuttingsIntervalShow**	Show record through the Interval.

21.5 GeochronologicalUnit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/2/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: A unit of geological time that can be used as part of an interpretation of a geology sequence. Use it for major units of geological time such as “Paleozoic”, “Mesozoic” or for more detailed time intervals such as ”Permian”, “Triassic”, “Jurassic”, etc.

Attributes

Name	Type	Notes
authority	String64	Person or collective body responsible for authorizing the information.
kind	GeochronologicalRank	Defines the time spans in geochronology.

Associations

Association	Notes
From: **GeochronologicalUnit.** To: **String64**	
From: **GeochronologicalUnit.** To: **GeochronologicalRank**	
From: **WellboreMarker.** To: **GeochronologicalUnit**	

21.6 InterpretedGeology

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: A container object for zero or more InterpretedGeologyInterval objects. The container references a specific wellbore, a depth interval, a growing object status, and a collection of interpreted geology intervals.

These values are manually entered per sample by the wellsite geologist or mud logger as an interpretation of the actual lithology sequence along the length of the wellbore by correlating the percentage lithologies observed in the cuttings samples along with other data (typically the drill rate and gamma ray curves), to estimate the location of the boundaries between the different lithology types. This analysis creates a sequence of individual lithologies along the wellbore. Therefore, InterpretedGeology typically contains a single lithology element for each interval that captures the detailed geological description of the lithology.

Associations

Association	Notes
From: **InterpretedGeology.** To: **AbstractMdGrowingObject**	
From: **InterpretedGeology.**InterpretedGeologyInterval **0..*** To: **InterpretedGeologyInterval**	
From: **InterpretedGeology. 1** To: **Wellbore**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.
From: **WellboreGeology.**InterpretedGeology **0..1** To: **InterpretedGeology**	

21.7 InterpretedGeologyInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/10/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: Represents a depth interval along the wellbore which contains a single interpreted lithology type. It can be used to:

- carry information about geochronology and lithostratigraphy
- create a pre-well geological prognosis with chronostratigraphic, lithostratigraphic, and lithology entries.

These intervals can be sent via ETP using the GrowingObject protocol.

Attributes

Name	Type	Notes
GeochronologicalUnit	GeochronologicalUnit	The name of a Geochronology, with the "kind" attribute specifying the geochronological time span.
LithostratigraphicUnit	LithostratigraphicUnit	Specifies the unit of lithostratigraphy.

Associations

Association	Notes
From: **InterpretedGeologyInterval.**InterpretedLithology **0..1** To: **InterpretedIntervalLithology**	
From: **InterpretedGeologyInterval.** To: **AbstractMdIntervalGrowingPart**	
From: **InterpretedGeology.**InterpretedGeologyInterval **0..*** To: **InterpretedGeologyInterval**	

21.8 InterpretedIntervalLithology

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The description of a single rock type that is used within InterpretedGeologyInterval. There can only be one of these in each InterpretedGeologyInterval.*

Attributes

Name	Type	Notes
Citation	Citation	An ISO 19115 EIP-derived set of metadata attached to ensure the traceability of the InterpretedIntervalLithology
CodeLith	String64	An optional custom lithology encoding scheme. If used, it is recommended that the scheme follows the NPD required usage. With the numeric values noted in the enum tables, which was the original intent for this item. The NPD Coding System assigns a digital code to the main lithologies as per the Norwegian Blue Book data standards. The code was then derived by lithology = (main lithology * 10) + cement + (modifier / 100). Example: Calcite cemented silty micaceous sandstone: (33 * 10) + 1 + (21 / 100) gives a numeric code of 331.21. However, the NPD is also working through Energistics/Caesar to potentially change this usage.) This scheme should not be used for mnemonics, because those vary by operator, and if an abbreviation is required, a local look-up table should be used by the rendering client, based on Lithology Type.
Color	String64	STRUCTURED DESCRIPTION USAGE. Lithology color description, from Shell 1995 4.3.3.1 and 4.3.3.2 Colors with the addition of: frosted. e.g., black, blue, brown, buff, green, grey, olive, orange, pink, purple, red, translucent, frosted, white, yellow; modified by: dark, light, moderate, medium, mottled, variegated, slight, weak, strong, and vivid.
Compaction	String64	STRUCTURED DESCRIPTION USAGE. Lithology compaction from Shell 1995 4.3.1.5, which includes: not compacted, slightly compacted, compacted, strongly compacted, friable, indurated, hard.

Hardness	String64	STRUCTURED DESCRIPTION USAGE. Mineral hardness. Typically, this element is rarely used because mineral hardness is not typically recorded. What typically is recorded is compaction. However, this element is retained for use defined as per Mohs scale of mineral hardness.
Kind	LithologyKindExt	The geological name for the type of lithology from the enum table listing a subset of the OneGeology / CGI defined formation types.
MatrixCement	MatrixCementKind	STRUCTURED DESCRIPTION USAGE. Lithology matrix/cement description. Terms will be as defined in the enumeration table. e.g., "calcite" (Common) "dolomite", "ankerite" (e.g., North Sea HPHT reservoirs such as Elgin and Franklin have almost pure ankerite cementation) "siderite" (Sherwood sandstones, southern UK typical Siderite cements), "quartz" (grain-to-grain contact cementation or secondary quartz deposition), "kaolinite", "illite" (e.g., Village Fields North Sea), "smectite","chlorite" (Teg, Algeria.).
Permeability	String64	STRUCTURED DESCRIPTION USAGE. Lithology permeability description from Shell 4.3.2.5. In the future, these values would benefit from quantification, e.g., tight, slightly, fairly, highly.
PorosityFabric	String64	STRUCTURED DESCRIPTION USAGE. Visible porosity fabric description from after Shell 4.3.2.1 and 4.3.2.2: intergranular (particle size greater than 20m), fine interparticle (particle size less than 20m), intercrystalline, intragranular, intraskeletal, intracrystalline, mouldic, fenestral, shelter, framework, stylolitic, replacement, solution, vuggy, channel, cavernous.
PorosityVisible	String64	STRUCTURED DESCRIPTION USAGE. Lithology visible porosity description. Defined after BakerHughes definitions, as opposed to Shell, which has no linkage to actual numeric estimates.
Roundness	String64	STRUCTURED DESCRIPTION USAGE. Lithology roundness description from Shell 4.3.1.3. Roundness refers to modal size class: very angular, angular, subangular, subrounded, rounded, well rounded.

SizeGrain	String64	STRUCTURED DESCRIPTION USAGE. Lithology grain size description. Defined from Shell 4.3.1.1. (Wentworth) modified to remove the ambiguous term pelite. Size ranges in millimeter (or micrometer) and inches. LT 256 mm LT 10.1 in "boulder" 64-256 mm 2.5–10.1 in "cobble"; 32–64 mm 1.26–2.5 in "very coarse gravel" 16–32 mm 0.63–1.26 in "coarse gravel" 8–16 mm 0.31–0.63 in "medium gravel" 4–8 mm 0.157–0.31 in "fine gravel" 2–4 mm 0.079–0.157 in "very fine gravel" 1–2 mm 0.039–0.079 in "very coarse sand" 0.5–1 mm 0.020–0.039 in "coarse sand" 0.25–0.5 mm 0.010–0.020 in "medium sand" 125–250 um 0.0049–0.010 in "fine sand" 62.5–125 um .0025–0.0049 in "very fine sand" 3.90625–62.5 um 0.00015–0.0025 in "silt" LT 3.90625 um LT 0.00015 in "clay" LT 1 um LT 0.000039 in "colloid"
Sorting	String64	STRUCTURED DESCRIPTION USAGE. Lithology sorting description from Shell 4.3.1.2 Sorting: very poorly sorted, unsorted, poorly sorted, poorly to moderately well sorted, moderately well sorted, well sorted, very well sorted, unimodally sorted, bimodally sorted.
Sphericity	String64	STRUCTURED DESCRIPTION USAGE. Lithology sphericity description for the modal size class of grains in the sample, defined as per Shell 4.3.1.4 Sphericity: very elongated, elongated, slightly elongated, slightly spherical, spherical, very spherical.

Texture	String64	STRUCTURED DESCRIPTION USAGE. Lithology matrix texture description from Shell 1995 4.3.2.6: crystalline, (often "feather-edge" appearance on breaking), friable, dull, earthy, chalky, (particle size less than 20m; often exhibits capillary imbibition) visibly particulate, granular, sucrosic, (often exhibits capillary imbibition). Examples: compact interlocking, particulate, (Gradational textures are quite common.) chalky matrix with sucrosic patches, (Composite textures also occur).
uid	String64	Unique identifier for this instance of InterpretedIntervalLithology.

Associations

Association	Notes
From: **InterpretedIntervalLithology.** To: **LithologyKindExt**	
From: **InterpretedIntervalLithology.**Qualifier **0..*** To: **LithologyQualifier**	*Needs Documentation*
From: **InterpretedGeologyInterval.**InterpretedLithology **0..1** To: **InterpretedIntervalLithology**	

21.9 LithologyQualifier

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A description of minerals or accessories that constitute a fractional part of a CuttingsIntervalLithology.*

Attributes

Name	Type	Notes
Abundance	VolumePerVolumeMeasure	The relative abundance of the qualifier estimated based on a "visual area" by inspecting the cuttings spread out on the shaker table before washing, or in the sample tray after washing. This represents the upper bound of the observed range, and is in the following increments at the upper bound: 1 = less than or equal to 1% 2 = greater than 1% and less than 2% 5 = greater than or equal to 2% and less than 5% and then in 5% increments, 10 (=5-10%), 15 (=10-15%) up to 100 (=95-100%). The end user can then elect to either display the %, or map them to an operator-specific term or coding, e.g., 1 less than or equal to 1% = rare trace, or occasional, or very sparse, etc., depending on the end users' terminology. i.e. 1 less then or equal to 1%=Rare Trace, or occasional, or very sparse etc., depending on the the end users' terminology.)
Description	String2000	A textual description of the qualifier.
Kind	LithologyQualifierKindExt	The type of qualifier.
MdInterval	MdInterval	The measured depth interval represented by the qualifier. This must be within the range of the parent geologic interval. If MdInterval is not given then the qualifier is deemed to exist over the entire depth range of the parent geologyInterval.
uid	String64	Unique identifier for this instance of LithologyQualifier

Associations

Association	Notes
From: **LithologyQualifier.** To: **LithologyQualifierKindExt**	
0..* From: **InterpretedIntervalLithology.**Qualifier To: **LithologyQualifier**	*Needs Documentation*

Association	Notes
From: **CuttingsIntervalLithology.**Qualifier **0..*** To: **LithologyQualifier**	

21.10 LithostratigraphicUnit

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: The name of a lithostratigraphy, with the "kind" attribute specifying the lithostratigraphic unit-hierarchy (group, formation, member or bed). The entry at each level is free text for the local lithostratigraphy at that level in the hierarchy. If a single hierarchy is defined, it is assumed this is at the formation level in the hierarchy and kind=formation should be used for the entry.

Used to hold information about the stratigraphic units that an interpreted lithology may belong to. These are based primarily on the differences between rock types rather than their specific age. For example, in the Grand Canyon, some of the major lithostratigraphic units are the “Navajo”, “Kayenta”, “Wingate”, “Chinle” and “Moenkopi” formations, each of which is represented by a particular set of rock properties or characteristics.

Attributes

Name	Type	Notes
authority	String64	Person or collective body responsible for authorizing the information.
kind	LithostratigraphicRank	Specifies the lithostratigraphic unit-hierarchy (group, formation, member or bed).

Associations

Association	Notes
From: **LithostratigraphicUnit.** To: **LithostratigraphicRank**	
From: **LithostratigraphicUnit.** To: **String64**	
From: **WellboreMarker.** To: **LithostratigraphicUnit**	

21.11 ShowEvaluation

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: A container object for zero or more ShowEvaluationInterval objects. The container references a specific wellbore, a depth interval, a growing object status, and a collection of show evaluation intervals.
In a similar way to the InterpretedGeology, these are manually entered by the wellsite geologist or mud logger as an interpretation of the hydrocarbon show along the wellbore, based on the raw readings from one or more show analyses of individual show tests on cuttings samples.

Associations

Association	Notes
From: **ShowEvaluation.**ShowEvaluationInterval **0..*** To: **ShowEvaluationInterval**	
From: **ShowEvaluation.** To: **AbstractMdGrowingObject**	
From: **ShowEvaluation. 1** To: **Wellbore**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.
From: **WellboreGeology.**ShowEvaluation **0..1** To: **ShowEvaluation**	

21.12 ShowEvaluationInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/10/2016 *Last modified:*11/10/2021 *Status:* Proposed *Author:* Jeremy Simpson
Notes: An interpretation of the overall hydrocarbon show derived from analysis of individual show tests on cuttings samples. An interval in the wellbore for which data is manually entered by the wellsite geologist or mud logger as an interpretation of the hydrocarbon show along the wellbore, based on the raw readings from one or more show analyses of individual show tests on cuttings samples.
These intervals can be sent via ETP using the GrowingObject protocol.

Attributes

Name	Type	Notes
BottomsUpTime	TimeMeasure	Time required for a sample to leave the bottomhole and reach the surface.
ShowFluid	ShowFluid	Gas or oil exhibited at the show interval.
ShowRating	ShowRating	Quality of the fluid showing at this interval.

Associations

Association	Notes
From: **ShowEvaluationInterval.** To: **ShowFluid**	
From: **ShowEvaluationInterval.** To: **AbstractMdIntervalGrowingPart**	
From: **ShowEvaluationInterval.** To: **ShowRating**	
From: **ShowEvaluation.**ShowEvaluationInterval **0..*** To: **ShowEvaluationInterval**	

21.13 ShowFluid

Type: Enumeration *Stereotype:*
Detail: *Created:* 2/10/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the type of fluid analyzed in this interval.*

Attributes

Name	Type	Notes
gas		
oil		

Associations

Association	Notes
From: **ShowFluid.** To: **TypeEnum**	
From: **ShowEvaluationInterval.** To: **ShowFluid**	

21.14 ShowFluorescence

Type: Enumeration *Stereotype:*
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the intensity and color of the show.*

Attributes

Name	Type	Notes
faint		
bright		
none		

Associations

Association	Notes
From: **ShowFluorescence.** To: **TypeEnum**	
From: **CuttingsIntervalShow.** To: **ShowFluorescence**	
From: **CuttingsIntervalShow.** To: **ShowFluorescence**	

21.15 ShowLevel

Type: Enumeration *Stereotype:*
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies another qualifier for the show: blooming or streaming.*

Attributes

Name	Type	Notes
blooming		
streaming		

Associations

Association	Notes
From: **ShowLevel.** To: **TypeEnum**	
From: **CuttingsIntervalShow.** To: **ShowLevel**	
From: **CuttingsIntervalShow.** To: **ShowLevel**	

21.16 ShowRating

Type: Enumeration *Stereotype:*
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies the quality of the fluid showing at this interval.*

Attributes

Name	Type	Notes
none		
very poor		
poor		
fair		
good		
very good		

Associations

Association	Notes
From: **ShowRating.** To: **TypeEnum**	
From: **CuttingsIntervalShow.** To: **ShowRating**	
From: **ShowEvaluationInterval.** To: **ShowRating**	

21.17 ShowSpeed

Type: Enumeration *Stereotype:*
Detail: *Created:* 2/8/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Joey Magsipok
Notes: *Specifies an indication of both the solubility of the oil and the permeability of the show. The speed can vary from instantaneous to very slow.*

Attributes

Name	Type	Notes
slow		
moderately fast		
fast		
instantaneous		
none		

Associations

Association	Notes
From: **ShowSpeed.** To: **TypeEnum**	
From: **CuttingsIntervalShow.** To: **ShowSpeed**	
From: **CuttingsIntervalShow.** To: **ShowSpeed**	

21.18 WellboreGeology

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/10/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The transferrable class of the WellboreGeology object.*

Attributes

Name	Type	Notes
MdInterval	MdInterval	[maintained by the server] The interval that contains the minimum and maximum measured depths for all wellbore geology types under this wellbore geology entry.

Associations

Association		Notes
1	From: **WellboreGeology.**Wellbore To: **Wellbore**	
AbstractActiveObject	From: **WellboreGeology.** To:	
0..1	From: **WellboreGeology.**ShowEvaluation To: **ShowEvaluation**	
0..1	From: **WellboreGeology.**InterpretedGeology To: **InterpretedGeology**	
0..1	From: **WellboreGeology.**CuttingsGeology To: **CuttingsGeology**	Business Rule: This MUST point to the same wellbore that the Wellbore element on the containing WellboreGeology object points to.
0..1	From: **MudLogReport.**WellboreGeology To: **WellboreGeology**	Reference to the related WellboreGeology. BUSINESS RULE: The WellboreGeology must be within the same wellbore as the MudLogReport Interval.

22 MudLogReport

Package: xsd_schemas

Notes: The mud log report (MudLogReport) data object can be used to create a report of geological, hydrocarbon evaluation, and drilling parameters observed while drilling a wellbore. The report represents the activities typically performed by mudlogging or wellsite geological personnel at a drilling location. The data from this object can be used to generate the graphical mud log or wellsite geology log that is the service product from these wellsite operations.

The mud log report object uses the objects from wellbore geology object (described above) to carry the detail of specific intervals of cuttings geology, interpreted geology, and hydrocarbon show but, the mud log report object also adds the capability to describe other associated data including:

- Information about the service company and its personnel
- Gas readings (mud gas, gas peaks)
- Chromatographic analysis of gas content
- Drilling parameters
- Links to other wellbore information, such as drilling reports and log data

The mud log report is a growing object. As drilling progresses along the wellbore, new instances of the mud log report interval are generated and added to the object. These intervals may be transferred in real-time via ETP using the GrowingObject protocol.

AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
MudLogReport
«XSDelement»
+ MudLogCompany: BusinessAssociate [0..1]
+ MudLogEngineers: String2000 [0..1]
+ MudLogGeologists: String2000 [0..1]
+Parameter
0..*
«XSDcomplexType»
MudLogParameter
«XSDelement»
+ Citation: Citation
+ Comments: String2000
+ MdInterval: MdInterval [0..1]
«XSDattribute»
+ uid: String64
«XSDcomplexType»
MudLogConcentrationParameter
«XSDelement»
+ Value: VolumePerVolumeMeasureExt
«XSDcomplexType»
MudLogPressureParameter
«XSDelement»
+ Value: PressureMeasureExt
«XSDcomplexType»
MudLogPressureGradientParameter
«XSDelement»
+ Value: ForcePerVolumeMeasureExt
«XSDcomplexType»
MudLogForceParameter
«XSDelement»
+ Value: ForceMeasureExt
«XSDcomplexType»
MudLogStringParameter
«XSDelement»
+ Value: String64
string
«enumeration»
ConcentrationParameterKind
cuttings gas
string
«enumeration»
PressureParameterKind
direct fracture pressure measurement
pore pressure estimate while drilling
string
«enumeration»
PressureGradientParameterKind
direct pore pressure gradient measurement
fracture pressure gradient estimate
kick pressure gradient
lost returns
overburden gradient
pore pressure gradient estimate
string
«enumeration»
ForceParameterKind
overpull on connection
overpull on trip
string
«enumeration»
MudLogStringParameterKind
bit parameters
bit type comment
casing point comment
chromatograph comment
circulation system comment
core interval comment
drilling data comment
gas peaks comment
gas ratio comment
general engineering comment
lithlog comment
LWD comment
marker or formation top comment
midnight depth date
mud check comment
mud data comment
mudlog comment
pressure data comment
shale density comment
short trip comment
show report comment
sidewall core comment
sliding Interval
steam still results comment
survey comment
temperature data comment
temperature trend comment
unknown
wireline log comment

AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Wellbore::Wellbore
+Wellbore
1
AbstractMdGrowingObject
«XSDcomplexType,XSDtopLevelElement»
MudLogReport
«XSDelement»
+ MudLogCompany: BusinessAssociate [0..1]
+ MudLogEngineers: String2000 [0..1]
+ MudLogGeologists: String2000 [0..1]
+WellboreGeology
0..1
AbstractActiveObject
«XSDcomplexType,XSDtopLevelEl...
WellboreGeology::WellboreGeology
«XSDelement»
+ MdInterval: MdInterval
+Wellbore
0..1
+Wellbore
0..1
AbstractActiveObject
«XSDcomplexType,XSDtopLevelEleme...
Log::Log
+RelatedLog
0..*
+Parameter
0..*
«XSDcomplexType»
MudLogParameter
«XSDelement»
+ Citation: Citation
+ Comments: String2000
+ MdInterval: MdInterval [0..1]
«XSDattribute»
+ uid: String64
+MudlogReportInterval
0..*
AbstractMdIntervalGrowingPart
«XSDcomplexType,XSDtopLevelElement»
MudlogReportInterval
«XSDelement»
+ BottomsUpTime: TimeMeasure
+ CuttingsGeologyInterval: CuttingsGeologyInterval [0..1]
+ InterpretedGeologyInterval: InterpretedGeologyInterval [0..1]
+ ShowEvaluationInterval: ShowEvaluationInterval [0..1]
+ChannelSet
«byValue»
0..*
AbstractActiveObject
«XSDcomplexType,XSDtopLevelElement»
Log::ChannelSet
+DrillingParameters
0..*
«XSDcomplexType»
DrillingParameters
«XSDelement»
+ AverageDrillingCoefficient: DxcStatistics [0..1]
+ AverageEcdAtTd: EcdStatistics [0..1]
+ AverageMudDensity: MudDensityStatistics [0..1]
+ AverageTorque: TorqueStatistics [0..1]
+ AverageTorqueCurrent: TorqueCurrentStatistics [0..1]
+ AverageTurnRate: RpmStatistics [0..1]
+ AverageWeightOnBit: WobStatistics [0..1]
+ Rop: RopStatistics [0..1]
+Channel
«byValue»
0..*
AbstractActiveObject
«XSDcomplexType,XSDtopLevelEleme...
Log::Channel
+Channel
0..1
+Chromatograph
0..1
+MudGas
0..*
«XSDcomplexType»
MudGas
+Channel
1
+Channel
1
«XSDcomplexType»
Chromatograph
«XSDelement»
+ Acetylene: VolumePerVolumeMeasure [0..1]
+ ChromatographMdInterval: MdInterval [0..1]
+ ChromatographType: String64 [0..1]
+ ChromReportTime: TimeStamp [0..1]
+ Co2Av: VolumePerVolumeMeasure [0..1]
+ Co2Mn: VolumePerVolumeMeasure [0..1]
+ Co2Mx: VolumePerVolumeMeasure [0..1]
+ DateTimeGasSampleProcessed: TimeStamp [0..1]
+ EpentAv: VolumePerVolumeMeasure [0..1]
+ EpentMn: VolumePerVolumeMeasure [0..1]
+ EpentMx: VolumePerVolumeMeasure [0..1]
+ EthAv: VolumePerVolumeMeasure [0..1]
+ EthMn: VolumePerVolumeMeasure [0..1]
+ EthMx: VolumePerVolumeMeasure [0..1]
+ ETimChromCycle: TimeMeasure [0..1]
+ H2sAv: VolumePerVolumeMeasure [0..1]
+ H2sMn: VolumePerVolumeMeasure [0..1]
+ H2sMx: VolumePerVolumeMeasure [0..1]
+ IbutAv: VolumePerVolumeMeasure [0..1]
+ IbutMn: VolumePerVolumeMeasure [0..1]
+ IbutMx: VolumePerVolumeMeasure [0..1]
+ IhexAv: VolumePerVolumeMeasure [0..1]
+ IhexMn: VolumePerVolumeMeasure [0..1]
+ IhexMx: VolumePerVolumeMeasure [0..1]
+ IpentAv: VolumePerVolumeMeasure [0..1]
+ IpentMn: VolumePerVolumeMeasure [0..1]
+ IpentMx: VolumePerVolumeMeasure [0..1]
+ MethAv: VolumePerVolumeMeasure [0..1]
+ MethMn: VolumePerVolumeMeasure [0..1]
+ MethMx: VolumePerVolumeMeasure [0..1]
+ MudWeightIn: MassPerVolumeMeasure [0..1]
+ MudWeightOut: MassPerVolumeMeasure [0..1]
+ NbutAv: VolumePerVolumeMeasure [0..1]
+ NbutMn: VolumePerVolumeMeasure [0..1]
+ NbutMx: VolumePerVolumeMeasure [0..1]
+ NhexAv: VolumePerVolumeMeasure [0..1]
+ NhexMn: VolumePerVolumeMeasure [0..1]
+ NhexMx: VolumePerVolumeMeasure [0..1]
+ NpentAv: VolumePerVolumeMeasure [0..1]
+ NpentMn: VolumePerVolumeMeasure [0..1]
+ NpentMx: VolumePerVolumeMeasure [0..1]
+ PropAv: VolumePerVolumeMeasure [0..1]
+ PropMn: VolumePerVolumeMeasure [0..1]
+ PropMx: VolumePerVolumeMeasure [0..1]
«XSDcomplexType»
RopStatistics
«XSDelement»
+ Average: LengthPerTimeMeasure [0..1]
+ Channel: Channel [0..1]
+ Maximum: LengthPerTimeMeasure [0..1]
+ Minimum: LengthPerTimeMeasure [0..1]
«XSDcomplexType»
WobStatistics
«XSDelement»
+ Average: ForceMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
TorqueStatistics
«XSDelement»
+ Average: MomentOfForceMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
MudDensityStatistics
«XSDelement»
+ Average: MassPerVolumeMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
TorqueCurrentStatistics
«XSDelement»
+ Average: ElectricCurrentMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
EcdStatistics
«XSDelement»
+ Average: MassPerVolumeMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
RpmStatistics
«XSDelement»
+ Average: AngularVelocityMeasure
+ Channel: Channel [0..1]
«XSDcomplexType»
DxcStatistics
«XSDelement»
+ Average: DimensionlessMeasure
+ Channel: Channel [0..1]
+GasInMud
0..1
«XSDcomplexType»
GasInMud
«XSDelement»
+ Average: VolumePerVolumeMeasure [0..1]
+ Maximum: VolumePerVolumeMeasure [0..1]
+GasPeak
0..*
«XSDcomplexType»
GasPeak
«XSDelement»
+ AverageGas: VolumePerVolumeMeasure [0..1]
+ BackgroundGas: VolumePerVolumeMeasure [0..1]
+ MdPeak: LengthMeasure [0..1]
+ PeakGas: VolumePerVolumeMeasure [0..1]
+ PeakType: GasPeakType
TypeEnum
«Enumeration»
GasPeakType
circulating background gas
connection gas
drilling background gas
drilling gas peak
flow check gas
no readings
other
shut down gas
trip gas

22.1 Chromatograph

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/29/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Analysis done to determine the components in a show.*

Attributes

Name	Type	Notes
Acetylene	VolumePerVolumeMeasure	Acetylene.
ChromatographMdInterval	MdInterval	Measured interval related to the chromatograph results.
ChromatographType	String64	Chromatograph type.
ChromReportTime	TimeStamp	Chromatograph integrator report time; format may be variable due to recording equipment.
Co2Av	VolumePerVolumeMeasure	Carbon Dioxide ppm (average).
Co2Mn	VolumePerVolumeMeasure	Carbon Dioxide ppm (minimum).
Co2Mx	VolumePerVolumeMeasure	Carbon Dioxide ppm (maximum).
DateTimeGasSampleProcessed	TimeStamp	The date and time at which the gas sample was processed.
EpentAv	VolumePerVolumeMeasure	neo-Pentane (eC5) ppm (average).
EpentMn	VolumePerVolumeMeasure	neo-Pentane (eC5) ppm (minimum).
EpentMx	VolumePerVolumeMeasure	neo-Pentane (eC5) ppm (maximum).
EthAv	VolumePerVolumeMeasure	Ethane (C2) ppm (average).
EthMn	VolumePerVolumeMeasure	Ethane (C2) ppm (minimum).
EthMx	VolumePerVolumeMeasure	Ethane (C2) ppm (maximum).
ETimChromCycle	TimeMeasure	Chromatograph cycle time. Commonly in seconds.
H2sAv	VolumePerVolumeMeasure	Hydrogen Sulfide (average) ppm.
H2sMn	VolumePerVolumeMeasure	Hydrogen Sulfide (minimum) ppm.
H2sMx	VolumePerVolumeMeasure	Hydrogen Sulfide (maximum) ppm.
IbutAv	VolumePerVolumeMeasure	iso-Butane (iC4) ppm (average).
IbutMn	VolumePerVolumeMeasure	iso-Butane (iC4) ppm (minimum).
IbutMx	VolumePerVolumeMeasure	iso-Butane (iC4) ppm (maximum).
IhexAv	VolumePerVolumeMeasure	iso-Hexane (iC6) ppm (average).
IhexMn	VolumePerVolumeMeasure	iso-Hexane (iC6) ppm (minimum).
IhexMx	VolumePerVolumeMeasure	iso-Hexane (iC6) ppm (maximum).
IpentAv	VolumePerVolumeMeasure	iso-Pentane (iC5) ppm (average).
IpentMn	VolumePerVolumeMeasure	iso-Pentane (iC5) ppm (minimum).
IpentMx	VolumePerVolumeMeasure	iso-Pentane (iC5) ppm (maximum).
MethAv	VolumePerVolumeMeasure	Methane (C1) ppm (average).
MethMn	VolumePerVolumeMeasure	Methane (C1) ppm (minimum).

MethMx	VolumePerVolumeMeasure	Methane (C1) ppm (maximum).
MudWeightIn	MassPerVolumeMeasure	Mud density in (active pits).
MudWeightOut	MassPerVolumeMeasure	Mud density out (flowline).
NbutAv	VolumePerVolumeMeasure	nor-Butane (nC4) ppm (average).
NbutMn	VolumePerVolumeMeasure	nor-Butane (nC4) ppm (minimum).
NbutMx	VolumePerVolumeMeasure	nor-Butane (nC4) ppm (maximum).
NhexAv	VolumePerVolumeMeasure	nor-Hexane (nC6) ppm (average).
NhexMn	VolumePerVolumeMeasure	nor-Hexane (nC6) ppm (minimum).
NhexMx	VolumePerVolumeMeasure	nor-Hexane (nC6) ppm (maximum).
NpentAv	VolumePerVolumeMeasure	nor-Pentane (nC5) ppm (average).
NpentMn	VolumePerVolumeMeasure	nor-Pentane (nC5) ppm (minimum).
NpentMx	VolumePerVolumeMeasure	nor-Pentane (nC5) ppm (maximum).
PropAv	VolumePerVolumeMeasure	Propane (C3) ppm (average).
PropMn	VolumePerVolumeMeasure	Propane (C3) ppm (minimum).
PropMx	VolumePerVolumeMeasure	Propane (C3) ppm (maximum).

Associations

Association		Notes
0..1	From: **Chromatograph.**Channel To: **Channel**	
0..1	From: **GeologicIntervalC.**Chromatograph To: **Chromatograph**	Chromatographic break down for the interval.
0..1	From: **MudlogReportInterval.**Chromatograph To: **Chromatograph**	

22.2 ConcentrationParameterKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the values for mud log parameters that are measured in units of concentration.*

Attributes

Name	Type	Notes
cuttings gas		The cuttings gas concentration averaged over the interval.

Associations

Association	Notes
From: **MudLogConcentrationParameter.** To: **ConcentrationParameterKind**	

22.3 DrillingParameters

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/1/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information regarding drilling: ROP, WOB, torque, etc.*

Attributes

Name	Type	Notes
AverageDrillingCoefficient	DxcStatistics	Average drilling exponent through the interval.
AverageEcdAtTd	EcdStatistics	Average effective circulating density at TD through the interval.
AverageMudDensity	MudDensityStatistics	Average mud density through the interval.
AverageTorque	TorqueStatistics	Average torque through the interval.
AverageTorqueCurrent	TorqueCurrentStatistics	Average torque current through the interval. This is the raw measurement from which the average torque can be calculated.
AverageTurnRate	RpmStatistics	Average turn rate through the interval (commonly in rpm).
AverageWeightOnBit	WobStatistics	Surface weight on bit: average through the interval.
Rop	RopStatistics	Rate of penetration through the interval.

Associations

Association	Notes
0..* From: **MudlogReportInterval.**DrillingParameters To: **DrillingParameters**	

22.4 DxcStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information on corrected drilling exponents.*

Attributes

Name	Type	Notes
Average	DimensionlessMeasure	Corrected drilling exponent calculated for the interval.
Channel	Channel	Log channel from which the drilling coefficient statistics were calculated.

22.5 EcdStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information on equivalent circulating density statistics.*

Attributes

Name	Type	Notes
Average	MassPerVolumeMeasure	Average equivalent circulating density at TD through the interval.
Channel	Channel	Log channel from which the equivalent circulating density at TD statistics were calculated.

22.6 ForceParameterKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies the values for mud log parameters that are measured in units of force.*

Attributes

Name	Type	Notes
overpull on connection		Additional hookload recorded in excess of static drill string weight when making a connection.
overpull on trip		Additional hookload recorded in excess of static drill string weight when making a trip.

Associations

Association	Notes
From: **MudLogForceParameter.** To: **ForceParameterKind**	

22.7 GasInMud

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information on amount of gas in the mud.*

Attributes

Name	Type	Notes
Average	VolumePerVolumeMeasure	Average percentage of gas in the mud.
Maximum	VolumePerVolumeMeasure	Maximum percentage of gas in the mud.

Associations

Association		Notes
1	From**: GasInMud.**Channel To: **Channel**	
0..1	From**: MudGas.**GasInMud To: **GasInMud**	

22.8 GasPeak

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Readings at maximum gas production.*

Attributes

Name	Type	Notes
AverageGas	VolumePerVolumeMeasure	Average total gas.
BackgroundGas	VolumePerVolumeMeasure	Background gas reading.
MdPeak	LengthMeasure	Measured depth at which the gas reading was taken.
PeakGas	VolumePerVolumeMeasure	Peak gas reading.
PeakType	GasPeakType	Type of gas peak

Associations

Association		Notes
1	From**: GasPeak.**Channel To: **Channel**	
0..*	From**: MudGas.**GasPeak To: **GasPeak**	

22.9 GasPeakType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*9/3/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Type of gas reading.*

Attributes

Name	Type	Notes
circulating background gas		
connection gas		
drilling background gas		
drilling gas peak		
flow check gas		
no readings		
other		
shut down gas		
trip gas		

Associations

Association	Notes
From: **GasPeakType.** To: **TypeEnum**	
From: **DrillReportGasReadingInfo.** To: **GasPeakType**	

22.10 MudDensityStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Mud density readings at average or channel.*

Attributes

Name	Type	Notes
Average	MassPerVolumeMeasure	Average mud density through the interval.
Channel	Channel	Log channel from which the mud density statistics were calculated.

22.11 MudGas

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information on gas in the mud and gas peak.*

Associations

Association		Notes
0..*	From**: MudGas.**GasPeak To: **GasPeak**	
0..1	From**: MudGas.**GasInMud To: **GasInMud**	
0..*	From**: MudlogReportInterval.**MudGas To: **MudGas**	

22.12 MudLogConcentrationParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/29/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
Value	VolumePerVolumeMeasureExt	

Associations

Association	Notes
From: **MudLogConcentrationParameter.** To: **ConcentrationParameterKind**	
From: **MudLogConcentrationParameter.** To: **MudLogParameter**	

22.13 MudLogForceParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/29/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
Value	ForceMeasureExt	

Associations

Association	Notes
From: **MudLogForceParameter.** To: **MudLogParameter**	
From: **MudLogForceParameter.** To: **ForceParameterKind**	

22.14 MudLogParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 3/17/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Information around the mud log: type, time taken, top and bottom depth, pressure gradient, etc.*

Attributes

Name	Type	Notes
Citation	Citation	An ISO 19115 EIP-derived set of metadata attached to ensure the traceability of the MudLogParameter.
Comments	String2000	Description or secondary qualifier pertaining to MudlogParameter or to Value attribute.
MdInterval	MdInterval	Measured depth interval that is the focus of this parameter.
uid	String64	Unique identifier for this instance of MudLogParameter.

Associations

Association	Notes
From: **MudLogPressureParameter.** To: **MudLogParameter**	
From: **MudLogReport.**Parameter **0..*** To: **MudLogParameter**	
From: **MudLogForceParameter.** To: **MudLogParameter**	
From: **MudLogPressureGradientParameter.** To: **MudLogParameter**	
From: **MudLogConcentrationParameter.** To: **MudLogParameter**	
From: **MudLogStringParameter.** To: **MudLogParameter**	

22.15 MudLogPressureGradientParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Describes the kind and value of mud log parameters that are expressed in units of pressure gradient.*

Attributes

Name	Type	Notes
Value	ForcePerVolumeMeasureExt	The value of the parameter in pressure gradient units.

Associations

Association	Notes
From: **MudLogPressureGradientParameter.** To: **MudLogParameter**	
From: **MudLogPressureGradientParameter.** To: **PressureGradientParameterKind**	

22.16 MudLogPressureParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Describes the kind and value of mud log parameters that are expressed in units of pressure.*

Attributes

Name	Type	Notes
Value	PressureMeasureExt	The value of the parameter in pressure units.

Associations

Association	Notes
From: **MudLogPressureParameter.** To: **MudLogParameter**	
From: **MudLogPressureParameter.** To: **PressureParameterKind**	

22.17 MudLogReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/29/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Details of wellbore geology intervals, drilling parameters, chromatograph, mud gas, etc., data within an MD interval.*

Attributes

Name	Type	Notes
MudLogCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the company recording the information.
MudLogEngineers	String2000	Concatenated names of the mudloggers constructing the log.
MudLogGeologists	String2000	Concatenated names of the geologists constructing the log.

Associations

Association		Notes
0..*	From: **MudLogReport.**Parameter To: **MudLogParameter**	
0..1	From: **MudLogReport.**WellboreGeology To: **WellboreGeology**	Reference to the related WellboreGeology. BUSINESS RULE: The WellboreGeology must be within the same wellbore as the MudLogReport Interval.
0..*	From: **MudLogReport.**RelatedLog To: **Log**	
AbstractMdGrowingObject	From: **MudLogReport.** To:	
1	From: **MudLogReport.**Wellbore To: **Wellbore**	
0..*	From: **MudLogReport.**MudlogReportInterval To: **MudlogReportInterval**	

22.18 MudlogReportInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/29/2016 *Last modified:*2/12/2019 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *The interval at which the report on the mud log was taken, detailing cuttings, interpreted geology, and show evaluation.*

Attributes

Name	Type	Notes
BottomsUpTime	TimeMeasure	Time required for a sample to leave the bottomhole and reach the surface.
CuttingsGeologyInterval	CuttingsGeologyInterval	The cuttings geology interval that is part of this mud log report.
InterpretedGeologyInterval	InterpretedGeologyInterval	The interpreted geology interval that is part of this mud log report.
ShowEvaluationInterval	ShowEvaluationInterval	The show evaluation interval that is part of this mud log report.

Associations

Association		Notes
0..*	From**: MudlogReportInterval.**DrillingParameters To: **DrillingParameters**	
AbstractMdIntervalGrowingPart	From**: MudlogReportInterval.** To:	
0..*	From**: MudlogReportInterval.**MudGas To: **MudGas**	
0..1	From**: MudlogReportInterval.**Chromatograph To: **Chromatograph**	
0..*	From**: MudLogReport.**MudlogReportInterval To: **MudlogReportInterval**	

22.19 MudLogStringParameter

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Stores the values of parameters that are described by character strings.*

Attributes

Name	Type	Notes
Value	String64	The value of the parameter as a character string.

Associations

Association	Notes
From: **MudLogStringParameter.** To: **MudLogStringParameterKind**	
From: **MudLogStringParameter.** To: **MudLogParameter**	

22.20 MudLogStringParameterKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies values for mud log parameters that are described by character strings.*

Attributes

Name	Type	Notes
bit parameters		
bit type comment		
casing point comment		
chromatograph comment		
circulation system comment		
core interval comment		
drilling data comment		
gas peaks comment		
gas ratio comment		
general engineering comment		
lithlog comment		
LWD comment		
marker or formation top comment		
midnight depth date		
mud check comment		
mud data comment		
mudlog comment		
pressure data comment		
shale density comment		
short trip comment		
show report comment		
sidewall core comment		
sliding Interval		
steam still results comment		
survey comment		
temperature data comment		
temperature trend comment		
unknown		
wireline log comment		

Associations

Association	Notes
From: **MudLogStringParameter.** To: **MudLogStringParameterKind**	

22.21 PressureGradientParameterKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies values for mud log parameters that are measured in units of pressure gradient.*

Attributes

Name	Type	Notes
direct pore pressure gradient measurement		
fracture pressure gradient estimate		
kick pressure gradient		
lost returns		
overburden gradient		
pore pressure gradient estimate		

Associations

Association	Notes
From: **MudLogPressureGradientParameter.** To: **PressureGradientParameterKind**	

22.22 PressureParameterKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 9/29/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Specifies values for mud log parameters that are measured in units of pressure.*

Attributes

Name	Type	Notes
direct fracture pressure measurement		
pore pressure estimate while drilling		

Associations

Association	Notes
From: **MudLogPressureParameter.** To: **PressureParameterKind**	

22.23 RopStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 2/29/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Measurements on minimum, average and maximum rates of penetration (ROP) and the channel from which this data was calculated.*

Attributes

Name	Type	Notes
Average	LengthPerTimeMeasure	Average rate of penetration through the interval.
Channel	Channel	Log channel from which the ROP statistics were calculated.
Maximum	LengthPerTimeMeasure	Maximum rate of penetration through the interval.
Minimum	LengthPerTimeMeasure	Minimum rate of penetration through the interval.

22.24 RpmStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Measurement of the average turn rate and the channel from which the data was calculated.*

Attributes

Name	Type	Notes
Average	AngularVelocityMeasure	Average bit turn rate through the interval.
Channel	Channel	Log channel from which the turn rate statistics were calculated.

22.25 TorqueCurrentStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: Measurement of the average electric current and the channel from which the data was calculated.

Attributes

Name	Type	Notes
Average	ElectricCurrentMeasure	Average electric current through the interval
Channel	Channel	Log channel from which the electric current statistics were calculated.

22.26 TorqueStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Measurement of average torque and the channel from which the data was calculated.*

Attributes

Name	Type	Notes
Average	MomentOfForceMeasure	Average torque through the interval.
Channel	Channel	Log channel from which the torque statistics were calculated.

22.27 WobStatistics

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/1/2016 *Last modified:*11/7/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Measurement of average weight on bit and channel from which the data was calculated.*

Attributes

Name	Type	Notes
Average	ForceMeasure	Average weight on bit through the interval.
Channel	Channel	Log channel from which the WOB statistics were calculated.

23 WellboreGeometry

Package: xsd_schemas

Notes: Wellbore Geometry Schema. Captures information about the configuration of the permanently installed components in a wellbore. It does not define the transient drilling strings (see the Tubular object) or the hanging production components (see the Completion object).

23.1 HoleCasingType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies values for the types of hole casing.*

Attributes

Name	Type	Notes
blow out preventer		
casing		
conductor		
curved conductor		
liner		
open hole		
riser		
tubing		

Associations

Association	Notes
From: **HoleCasingType.** To: **TypeEnum**	
From: **WellboreGeometrySection.** To: **HoleCasingType**	

23.2 WellboreGeometry

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/9/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Used to capture information about the configuration of the permanently installed components in a wellbore. This object is uniquely identified within the context of one wellbore object.*

Associations

Association	Notes
From: **WellboreGeometry.**BhaRun **0..*** To: **BhaRun**	
From: **WellboreGeometry.**WellboreGeometrySection **0..*** To: **WellboreGeometrySection**	Wellbore geometry section object.
From: **WellboreGeometry.**WellboreGeometryMetadata **1** To: **WellboreGeometryMetadata**	
From: **WellboreGeometry.** To: **AbstractMdGrowingObject**	
From: **WellboreGeometry.**Wellbore **1** To: **Wellbore**	

23.3 WellboreGeometryMetadata

Type: Class *Stereotype:* «XSDgroup»
Detail: *Created:* 11/11/2021 *Last modified:*11/11/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Common metadata that is required to properly interpret wellbore geometry section data.*

Attributes

Name	Type	Notes
DepthWaterMean	LengthMeasureExt	Water depth.
GapAir	LengthMeasureExt	Air gap.

Associations

Association	Notes
From: **WellboreGeometry.**WellboreGeometryMetadata **1** To: **WellboreGeometryMetadata**	
From: **WellboreGeometryReport.**WellboreGeometryMetadata **1** To: **WellboreGeometryMetadata**	

23.4 WellboreGeometryReport

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/11/2021 *Last modified:*11/11/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *Captures information for a report including wellbore geometry.*

Associations

Association	Notes
From: **WellboreGeometryReport.**WellboreGeometryMetadata **1** To: **WellboreGeometryMetadata**	
From: **WellboreGeometryReport.**WellboreGeometrySection **0..*** To: **WellboreGeometrySection**	
From: **CementJob.**HoleConfig **0..1** To: **WellboreGeometryReport**	Wellbore Geometry of annulus.
From: **OpsReport.**WbGeometry **0..1** To: **WellboreGeometryReport**	Record of actual hole geometry at report time.

23.5 WellboreGeometrySection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*2/12/2019 *Status:* Proposed *Author:* William McKenzie
Notes: *Wellbore Geometry Component Schema. Defines the "fixed" components in a wellbore. It does not define the "transient" drilling strings or the "hanging" production components.*

Attributes

Name	Type	Notes
CurveConductor	boolean	Curved conductor? Values are "true" (or "1") and "false" (or "0").
DiaDrift	LengthMeasure	The drift diameter is the inside diameter (ID) that the pipe manufacturer guarantees per specifications. Note that the nominal inside diameter is not the same as the drift diameter, but is always slightly larger. The drift diameter is used by the well planner to determine what size tools or casing strings can later be run through the casing, whereas the nominal inside diameter is used for fluid volume calculations, such as mud circulating times and cement slurry placement calculations. Source: www.glossary.oilfield.slb.com
FactFric	double	Friction factor.
Grade	String64	Material grade for the tubular section.
IdSection	LengthMeasure	Inner diameter.
OdSection	LengthMeasure	Outer diameter. Only for casings and risers.
SectionTvdInterval	AbstractTvdInterval	True vertical depth interval for this wellbore geometry section.
TypeHoleCasing	HoleCasingType	Type of fixed component.
WtPerLen	MassPerLengthMeasure	Weight per unit length for casing sections.

Associations

Association	Notes
From: **WellboreGeometrySection.** To: **AbstractMdIntervalGrowingPart**	
From: **WellboreGeometrySection.** To: **HoleCasingType**	
From: **WellboreGeometrySection.**BhaRun **0..*** To: **BhaRun**	
From: **WellboreGeometry.**WellboreGeometrySection **0..*** To: **WellboreGeometrySection**	Wellbore geometry section object.
From: **WellboreGeometryReport.**WellboreGeometrySection **0..*** To: **WellboreGeometrySection**	

24 WellboreMarkers

Package: xsd_schemas

Notes: WellboreMarkers Schema. The WellboreMarkers object (which was Formation Marker in WITSML v1.4.1) is used to capture information about geologic formations that were encountered in a wellbore. This data is typically captured during drilling using logging while drilling (LWD) tools.

24.1 MarkerQualifierExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 12/1/2021 *Last modified:*12/1/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **MarkerQualifierExt.** To: **EnumExtensionPattern**	

24.2 StratigraphyKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 8/31/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
biostratigraphic		
chemostratigraphic		
chronostratigraphic		
fluid stratigraphic		
lithostratigraphic		
magnetostratigraphic		
seismic stratigraphic		
sequence stratigraphic		

Associations

Association	Notes
From: **StratigraphyKindExt.** To: **StratigraphyKind**	

24.3 StratigraphyKindExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 8/31/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **StratigraphyKindExt.** To: **StratigraphyKind**	
From: **StratigraphyKindExt.** To: **EnumExtensionPattern**	

24.4 StratigraphyKindQualifier

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
base		
fault		
gas-oil contact		
gas-water contact		
oil-water contact		
seafloor		
top		

Associations

Association	Notes
From: **StratigraphyKindQualifier.** To: **TypeEnum**	
From: **StratigraphyKindQualifierExt.** To: **StratigraphyKindQualifier**	

24.5 StratigraphyKindQualifierExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **StratigraphyKindQualifierExt.** To: **StratigraphyKindQualifier**	
From: **StratigraphyKindQualifierExt.** To: **EnumExtensionPattern**	

24.6 WellboreMarker

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 8/3/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Used to capture information about a geologic formation that was encountered in a wellbore. This object is uniquely identified within the context of one wellbore object.*

Attributes

Name	Type	Notes
ChronostratigraphicTop	GeochronologicalUnit	The name of a geochronology for this marker, with the "kind" attribute specifying the geochronological time span.
DipAngle	PlaneAngleMeasure	Angle of dip with respect to horizontal. This is the true dip of the geologic surface, not the apparent dip measured locally by a tool.
DipDirection	PlaneAngleMeasure	Interpreted downdip direction.
DipDirectionRef	NorthReferenceKind	Specifies the definition of north. While this is optional because of legacy data, it is strongly recommended that this always be specified.
GeologicAge	TimeMeasureExt	The geologic age associated with the marker.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation that this marker is characterizing.
HighConfidenceMdInterval	MdInterval	Measured depth interval that marks the limit of the high confidence range for the marker pick.
LithostratigraphicTop	LithostratigraphicUnit	Specifies the unit of lithostratigraphy.
MarkerQualifier	MarkerQualifierExt	Qualifier for markers that may be missing or need additional information carried about them.
Md	MeasuredDepth	Logged measured depth at the top of marker. IMMUTABLE. Set on object creation and MUST NOT change thereafter. Customer provided changes after creation are an error. None of the sub-elements on the MarkerSetInterval can be changed,
ObservationNumber	long	The observation number for this marker. This may be used, for example, to distinguish it from other marker observations recorded on the same date and/or with the same name.
PointOfInterest	WellborePointOfInterestExt	The point of interest in a wellbore that this marker represents. Should be populated if WellboreMarkerKind is point of interest.

StratigraphyKind	StratigraphyKindExt	The kind of stratigraphy this marker represents. Should be populated if WellboreMarkerKind is stratigraphic.
StratigraphyKindQualifier	StratigraphyKindQualifierExt	An optional, additional qualifier on the kind of stratigraphy this marker represents.
Tvd	AbstractVerticalDepth	Logged true vertical depth at top of marker.
WellboreMarkerKind	WellboreMarkerKindExt	A high level classification of what this marker represents: stratigraphic information, a point of interest in a well or something else.

Associations

Association	Notes
From: **WellboreMarker.** To: **LithostratigraphicUnit**	
0..1 From: **WellboreMarker.**Trajectory To: **Trajectory**	Reference to the directional survey used to convert the marker's MD to TVD. Even though the field is optional, it should be thought of as mandatory for any marker with a TVD (because one would have been used to make the conversion). Because this information is often lost or the survey is unavailable in the context of a data transfer the field is left as optional.
0..1 From: **WellboreMarker.**Wellbore To: **Wellbore**	
From: **WellboreMarker.** To: **AbstractObject**	
From: **WellboreMarker.** To: **GeochronologicalUnit**	
From: **MarkerBoundary.** To: **WellboreMarker**	
0..* From: **WellboreMarkerSet.**FormationMarker To: **WellboreMarker**	

24.7 WellboreMarkerKind

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
point of interest		
stratigraphic		

Associations

Association	Notes
From: **WellboreMarkerKind.** To: **TypeEnum**	
From: **WellboreMarkerKindExt.** To: **WellboreMarkerKind**	

24.8 WellboreMarkerKindExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **WellboreMarkerKindExt.** To: **EnumExtensionPattern**	
From: **WellboreMarkerKindExt.** To: **WellboreMarkerKind**	

24.9 WellboreMarkerSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 9/24/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jeremy Simpson
Notes: *A collection of wellbore markers.*

Attributes

Name	Type	Notes
MarkerSetInterval	MdInterval	Measured depth interval that contains the shallowest and deepest formation markers. This is computed by the server and is read only. STORE MANAGED. This is populated by a store on read. Customer provided values are ignored on write

Associations

Association	Notes
From: **WellboreMarkerSet.**Wellbore **0..1** To: **Wellbore**	
From: **WellboreMarkerSet.**FormationMarker **0..*** To: **WellboreMarker**	
From: **WellboreMarkerSet.** To: **AbstractObject**	
From: **MarkerBoundary.** To: **WellboreMarkerSet**	

24.10 WellborePointOfInterest

Type: Enumeration *Stereotype:*
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Attributes

Name	Type	Notes
bottomhole location		
first perforation		
kickoff point		
landing point		
last perforation		

Associations

Association	Notes
From: **WellborePointOfInterest.** To: **TypeEnum**	
From: **WellborePointOfInterestExt.** To: **WellborePointOfInterest**	

24.11 WellborePointOfInterestExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 11/16/2021 *Last modified:*11/16/2021 *Status:* Proposed *Author:* Jay Hollingsworth
Notes:

Associations

Association	Notes
From: **WellborePointOfInterestExt.** To: **WellborePointOfInterest**	
From: **WellborePointOfInterestExt.** To: **EnumExtensionPattern**	

25 WellCompletion

Package: xsd_schemas

Notes: WellCompletion Schema. A top-level object that works with other objects to report flow paths from reservoir to surface.

25.1 CompletionStatus

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values of the status of a wellbore completion.*

Attributes

Name	Type	Notes
active		
inactive		
permanently abandoned		
planned		
suspended		
temporarily abandoned		
testing		

Associations

Association	Notes
From: **CompletionStatus.** To: **TypeEnum**	
From: **WellCompletion.** To: **CompletionStatus**	
From: **WellboreCompletion.** To: **CompletionStatus**	
From: **CompletionStatusHistory.** To: **CompletionStatus**	

25.2 CompletionStatusHistory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the collection of Completion StatusHistory.*

Attributes

Name	Type	Notes
Comment	String2000	Comments or remarks on the status.
EndDate	TimeStamp	The end date of the status.
PerforationMdInterval	MdInterval	Measured depth interval between the top and the base of the perforations.
StartDate	TimeStamp	The start date of the status.
Status	CompletionStatus	Completion status.
uid	String64	Unique identifier for this instance of CompletionStatusHistory.

Associations

Association	Notes
From: **CompletionStatusHistory.** To: **CompletionStatus**	
0..* From: **WellboreCompletion.**StatusHistory To: **CompletionStatusHistory**	
0..* From: **WellCompletion.**StatusHistory To: **CompletionStatusHistory**	

25.3 WellCompletion

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Information regarding a wellhead stream with one or more wellbore completions (completed zones) in the well.

Attributes

Name	Type	Notes
CurrentStatus	CompletionStatus	Status (active, planned, suspended, testing, etc.) of the well completion.
E_P_RightsID	String64	Documents exploration and production rights.
EffectiveDate	TimeStamp	Field date.
ExpiredDate	TimeStamp	Expiration date.
FieldCode	String64	Field code.
FieldID	String64	Field ID.
FieldType	String64	Field type.
StatusDate	TimeStamp	Timestamp for when this status was established.

Associations

Association	Notes
From: **WellCompletion.** To: **CompletionStatus**	
From: **WellCompletion.** To: **AbstractObject**	
1..1 From: **WellCompletion.**Well To: **Well**	
0..* From: **WellCompletion.**StatusHistory To: **CompletionStatusHistory**	
0..1 From: **WellboreCompletion.**WellCompletion To: **WellCompletion**	

26 WellboreCompletion

Package: xsd_schemas

Notes: WellboreCompletion Schema. Each individual wellbore completion data object represents a completion (i.e., open to flow) interval along a wellbore. Meaning “this section of wellbore is open to flow”.

26.1 ContactIntervalSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Information on a collection of contact intervals. Contains one or more "xxxInterval" objects, each representing the details of a single physical connection between well and reservoir, e.g., the perforation details, depth, reservoir connected. Meaning: this is the physical nature of a connection from reservoir to wellbore.

Associations

Association		Notes
0..*	From: **ContactIntervalSet.**SlotsInterval To: **SlotsInterval**	cs_slots interval
0..*	From: **ContactIntervalSet.**OpenHoleInterval To: **OpenHoleInterval**	cs_openHole interval
0..*	From: **ContactIntervalSet.**GravelPackInterval To: **GravelPackInterval**	gravelPack interval
0..*	From: **ContactIntervalSet.**PerforationSetInterval To: **PerforationSetInterval**	perforation interval
0..1	From: **WellboreCompletion.**ContactIntervalSet To: **ContactIntervalSet**	A collection of contact interval information

26.2 GravelPackInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The location/interval of the gravel pack, including its history.*

Attributes

Name	Type	Notes
DownholeString	DataObjectComponentReference	Reference to the downhole string that denotes the interval of the gravel pack.
EventHistory	EventInfo	The contactInterval event information.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation.
GeologyFeature	DataObjectComponentReference	Reference to a geology feature.
GravelPackMdInterval	MdInterval	Gravel packed measured depth interval for this completion.
GravelPackTvdInterval	AbstractTvdInterval	Gravel packed true vertical depth interval for this completion.
uid	String64	Unique identifier for this instance of GravelPackInterval.

Associations

Association		Notes
0..*	From: **GravelPackInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information
0..*	From: **ContactIntervalSet.**GravelPackInterval To: **GravelPackInterval**	gravelPack interval

26.3 IntervalStatusHistory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the status history in the interval.*

Attributes

Name	Type	Notes
AllocationFactor	NonNegativeFraction	Defines the proportional amount of fluid from the well completion that is flowing through this interval within a wellbore.
Comment	String2000	Comments and remarks about the interval over this period of time.
EndDate	TimeStamp	The end date of status and allocation factor.
PhysicalStatus	PhysicalStatus	The physical status of an interval (e.g., open, closed, proposed).
StartDate	TimeStamp	The start date of the status and allocation factor.
StatusMdInterval	MdInterval	Measured depth interval over which this status is valid for the given time frame.
uid	String64	Unique identifier for this instance of IntervalStatusHistory.

Associations

Association	Notes
From: **IntervalStatusHistory.** To: **PhysicalStatus**	
0..* From: **GravelPackInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information
0..* From: **SlotsInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information
0..* From: **OpenHoleInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information

26.4 NonNegativeFraction

Type: Class *Stereotype:* «XSDsimpleType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A floating point value between zero (inclusive) and one (inclusive).*

26.5 OpenHoleInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The location/interval of the open hole and its history.*

Attributes

Name	Type	Notes
BoreholeString	DataObjectComponentReference	Reference to a borehole (the as-drilled hole through the earth).
EventHistory	EventInfo	The OpenHoleInterval event information.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation.
GeologyFeature	DataObjectComponentReference	Reference to a geology feature.
OpenHoleMdInterval	MdInterval	Openhole measured depth interval for this completion.
OpenHoleTvdInterval	AbstractTvdInterval	Openhole true vertical depth interval for this completion.
uid	String64	Unique identifier for this instance of OpenHoleInterval.

Associations

Association		Notes
0..*	From**: OpenHoleInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information
0..*	From**: ContactIntervalSet.**OpenHoleInterval To: **OpenHoleInterval**	cs_openHole interval

26.6 PerforationSetInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The location/interval of the perforation set and its history.*

Attributes

Name	Type	Notes
EventHistory	EventInfo	The PerforationSetInterval event information.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation.
GeologyFeature	DataObjectComponentReference	Reference to a geology feature.
PerforationSet	DataObjectComponentReference	Reference to a perforation set.
PerforationSetMdInterval	MdInterval	Overall measured depth interval for this perforation set.
PerforationSetTvdInterval	AbstractTvdInterval	Overall true vertical depth interval for this perforation set.
uid	String64	Unique identifier for this instance of PerforationSetInterval.

Associations

Association	Notes
From: **PerforationSetInterval.**PerforationStatusHistory **0..*** To: **PerforationStatusHistory**	The contactInterval history information
From: **ContactIntervalSet.**PerforationSetInterval **0..*** To: **PerforationSetInterval**	perforation interval

26.7 PerforationStatus

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the set of values for the status of a perforation.*

Attributes

Name	Type	Notes
open		
proposed		
squeezed		

Associations

Association	Notes
From: **PerforationStatusHistory.** To: **PerforationStatus**	

26.8 PerforationStatusHistory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the collection of perforation status history.*

Attributes

Name	Type	Notes
AllocationFactor	NonNegativeFraction	Defines the proportional amount of fluid from the well completion that is flowing through this interval within a wellbore.
Comment	String2000	Remarks and comments about the status.
EndDate	TimeStamp	The end date of the status.
PerforationMdInterval	MdInterval	Overall measured depth interval for this perforated interval.
PerforationStatus	PerforationStatus	Perforation status.
PerforationTvdInterval	AbstractTvdInterval	Overall true vertical depth interval for this perforated interval.
StartDate	TimeStamp	The start date of the status.
uid	String64	Unique identifier for this instance of PerforationStatusHistory.

Associations

Association	Notes
From: **PerforationStatusHistory.** To: **PerforationStatus**	
From: **PerforationSetInterval.**PerforationStatusHistory **0..*** To: **PerforationStatusHistory**	The contactInterval history information

26.9 PhysicalStatus

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the physical status of an interval.*

Attributes

Name	Type	Notes
closed		
open		
proposed		

Associations

Association	Notes
From: **IntervalStatusHistory.** To: **PhysicalStatus**	

26.10 SlotsInterval

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The location/interval of the slots and the history.*

Attributes

Name	Type	Notes
EventHistory	EventInfo	The SlotsInterval event information.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation.
GeologyFeature	DataObjectComponentReference	Reference to a geology feature.
SlottedMdInterval	MdInterval	Slotted measured depth interval for this completion.
SlottedTvdInterval	AbstractTvdInterval	Slotted true vertical depth interval for this completion.
StringEquipment	DataObjectComponentReference	Reference to an equipment string, which is the equipment (e.g., tubing, gravel pack screens, etc.) that compose the completion.
uid	String64	Unique identifier for this instance of SlotsInterval.

Associations

Association		Notes
0..*	From: **SlotsInterval.**StatusHistory To: **IntervalStatusHistory**	The contactInterval history information
0..*	From: **ContactIntervalSet.**SlotsInterval To: **SlotsInterval**	cs_slots interval

26.11 WellboreCompletion

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: The transferrable class of the WellboreCompletion object. Each individual wellbore completion data object represents a completion (i.e., open to flow) interval along a wellbore. Meaning “this section of wellbore is open to flow”.

Attributes

Name	Type	Notes
CompletionMdInterval	MdInterval	Overall measured depth interval for this wellbore completion.
CompletionTvdInterval	AbstractTvdInterval	Overall true vertical depth interval for this wellbore completion.
CurrentStatus	CompletionStatus	Status (active, planned, suspended, testing, etc.) of the wellbore completion
EventHistory	EventInfo	The WellboreCompletion event information.
StatusDate	TimeStamp	Date for when the status was established.
SuffixAPI	String64	API suffix.
WellboreCompletionAlias	String64	Preferred alias name.
WellboreCompletionDate	TimeStamp	Completion date.
WellboreCompletionNo	String64	CompletionNo, etc. API14.

Associations

Association	Notes
0..* From**: WellboreCompletion.**StatusHistory To: **CompletionStatusHistory**	
From**: WellboreCompletion.** To: **CompletionStatus**	
1 From**: WellboreCompletion.**ReferenceWellbore To: **Wellbore**	
0..1 From**: WellboreCompletion.**WellCompletion To: **WellCompletion**	
0..1 From**: WellboreCompletion.**ContactIntervalSet To: **ContactIntervalSet**	A collection of contact interval information
From**: WellboreCompletion.** To: **AbstractObject**	

27 DownholeComponent

Package: xsd_schemas

Notes: DownholeComponent Schema. Captures all information about the physical completion, all of the well equipment data.

AbstractObject
«XSDcomplexType,XSDtopLev...
DownholeComponent
«XSDelement»
+ EndDate: TimeStamp [0..1]
+ StartDate: TimeStamp [0..1]
+EquipmentSet
0..1
«XSDcomplexType»
EquipmentSet
+Equipment
1..*
«XSDcomplexType»
Equipment
«XSDelement»
+ BrandName: String64 [0..1]
+ CatalogId: String64 [0..1]
+ CatalogName: String64 [0..1]
+ CoatingLinerApplied: boolean [0..1]
+ Description: String2000 [0..1]
+ DescriptionPermanent: String2000 [0..1]
+ Drift: LengthMeasure [0..1]
+ EquipmentName: String64 [0..1]
+ EquipmentType: EquipmentTypeExt
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Grade: GradeType [0..1]
+ Id: LengthMeasure [0..1]
+ InsideCoating: Coating [0..1]
+ IsSerialized: boolean [0..1]
+ MajorId: LengthMeasure [0..1]
+ MajorOd: LengthMeasure [0..1]
+ Manufacturer: BusinessAssociate [0..1]
+ Material: String64 [0..1]
+ MaxId: LengthMeasure [0..1]
+ MaxOd: LengthMeasure [0..1]
+ MinId: LengthMeasure [0..1]
+ MinOd: LengthMeasure [0..1]
+ MinorId: LengthMeasure [0..1]
+ MinorOd: LengthMeasure [0..1]
+ Model: String64 [0..1]
+ ModelType: String64 [0..1]
+ NameService: String64 [0..1]
+ NominalSize: LengthMeasure [0..1]
+ Od: LengthMeasure [0..1]
+ OutsideCoating: Coating [0..1]
+ PartNo: String64 [0..1]
+ Remark: String2000 [0..1]
+ SerialNumber: String64 [0..1]
+ Series: String64 [0..1]
+ SurfaceCondition: String64 [0..1]
+ UnitLength: LengthMeasure [0..1]
+ UnitWeight: MassPerLengthMeasure [0..1]
«XSDattribute»
+ uid: String64
+SlotAsManufactured
0..*
«XSDcomplexType»
PerfSlot
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ Remarks: String2000 [0..1]
+ SlotCenterDistance: LengthMeasure [0..1]
+ SlotCount: long [0..1]
+ SlotHeight: LengthMeasure [0..1]
+ SlotWidth: LengthMeasure [0..1]
«XSDattribute»
+ uid: String64
+HoleAsManufactured
0..*
«XSDcomplexType»
PerfHole
«XSDelement»
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ HoleAngle: PlaneAngleMeasure [0..1]
+ HoleCount: long [0..1]
+ HoleDensity: ReciprocalLengthMeasure [0..1]
+ HoleDiameter: LengthMeasure [0..1]
+ HolePattern: String64 [0..1]
+ MdInterval: MdInterval [0..1]
+ Remarks: String2000 [0..1]
+ TvdInterval: AbstractTvdInterval [0..1]
«XSDattribute»
+ uid: String64
+Property
0..*
«XSDcomplexType»
ExtPropNameValue
«XSDelement»
+ Name: String64 [0..1]
+ Value: String2000 [0..1]
«XSDattribute»
+ uid: String64
EnumExtensionPattern
«XSDunion»
EquipmentTypeExt
«Enumeration»
EquipmentType
bridge plug
bull plug
capillary tubing
casing crossover
casing hanger
casing head
casing liner-expandable
casing shoe
casing spool
casing/casing liner
cement (behind casing)
cement basket
cement retainer
cement squeeze
cement stage tool
chemical injection mandrel
chemical injection valve
corrosion coupon carrier
dip tube
downhole choke
downhole sensor
ESP assembly
ESP bolt on discharge
ESP bolt on intake
ESP bolt on motor base
ESP bolt on motor head
ESP cable
ESP gas handler
ESP gas separator
ESP lower pigtail
ESP motor
ESP motor base centralizer
ESP motor flat cable
ESP motor shroud
ESP promotor
ESP pump
ESP pump discharge sensor sub
ESP seal
expansion joint
external cementing port
fill
fish
float collar
float shoe/guide shoe
gas anchor
gas lift mandrel
gas lift valve
gravel pack screen
hydraulic pump
injection mandrel
injection valve
junk in wellbore
landing collar
liner entry guide
liner hanger
mule shoe
notched collar
on-off tool
overshot
packer
packer plug
packer-multiple strings
packoff (tubing)
pcp-flex shaft intake
pcp-gear reducer (subsurface)
pcp-no turn tool/torque anchor
pcp-rotor
pcp-stator
pcp-tag bar
plug - cement
plug - mud
plunger lift ball
plunger lift bottom hole bumper assembly
plunger lift bumper spring
plunger lift collar stop
plunger lift plunger
polished rod
polished rod liner
ported collar
profile nipple
profile nipple plug
pump-out plug
sand screen-tubing
sand separator
screen liner/insert
seal assembly
seal bore extension
seat nipple/shoe
shear tool
sliding sleeve
steam cup mandrel
steam deflectors
strainer nipple
subsurface safety valve
sucker rod
sucker rod backoff coupling
sucker rod pump-insert
sucker rod pump-jacket
sucker rod pump-tubing pump barrel
sucker rod pump-tubing pump plunger
sucker rod sub
sucker rod-continuous
sucker rod-ribbon
sucker rod-sinker bar
tcp gun
tubing
tubing (coiled)
tubing anchor/catcher
tubing crossover
tubing drain
tubing hanger
tubing head (spool)
tubing purge check valve
tubing sub
wellbore notes
whipstock
wireline re-entry guide (bell collar)
y-tool
«Enumeration»
Coating
bare
carbonnitrided
carburized
carburized-hardened
cementlined
chrome
chrome-plated
chromeplated-grooved
chromeplated-heavy
corrosion coating
dblgalv
duolin20wr
duoline
duoline10
duoline20
epdm
fiberglass-lined
galvanized
hardened
hard-lined
ins
ipc
ipc-epoxy
ipc-epxthk
ipc-epxthn
ipc-nylon
ipc-nwrap
ipc-s505
ipc-s650
ipc-tk70
ipc-tk75
lp
moly
mtr
n/a
nickel-carbide
nickel-plated
nitrided
nitrile
pap
pelined
phosphate
phosphorus
plastic
plunger-lubricant
polished-rodliner
polypropylene
ppwlnitrl
pvclined
rodguide-1
rodguide-2
rodguide-2.
rodguide-3
rodguide-4
rodguide-5
rodguide-6
rodguide-7
rodguide-fx
rodguide-so
rodguide-so1
rodguide-so2
rodguide-so3
rodguide-so4
rodguide-so5
rodguide-so6
rodguide-so8
rodguide-sp
spray-metal
spray-metal-monel
spraymetal-monel
spraymetal-nickel
spraymetal-od/nickelplated-id
spraymetal-steel
spraymetal-thick
selined
teflon
teflon-red
teflon-tan
teflon-yellow
thermo
tk4
tk99
tuffi
tungsten plated
zincplated
«Enumeration»
GradeType
13CR
13CR- 80
13CR- 85
13CR- 95
13CR-110
35
45
46
50
620C
75
750N
75A
780M
95
960M
970N
A53
A53A
A53B
Armco-95
B
C
C-110
C-75
C-90
C-95
D
DE
DER
DR
DWR
E
E-75
EL
F-25
FG
FS-80
FSS-95
G
G-105
GT-80S
H2S-90
H2S-95
H-40
HC-95
HCK-55
HCL-80
HCN-80
HCP-110
HCQ-125
HO-70
HS
J-20
J-55
K
K-40
K-55
KD
KD-63
L-80
LS-140
LS-50
LS-65
M-65
M-90
M-95
MAV-50
MD-56
MMS
N-105
N-23
N-30
N-40
N-54
N-75
N-78
N-80
N-90
N-96
N-97
P-105
P-110
PCP 900
PCP 1000
PCP 1500
PCP 2500
PH-6
Plus
Q-125
QT-1000
QT-1200
QT-700
QT-800
QT-900
S
S-135
S-59
S-60
S-67
S-80
S-87
S-88
S-95
SC-90
SE
SER
SM
SOO-95
Stainless
SWR
T
T-66
T-95
T-D61
T-D63
T-K65
UHS
USS-125
USS-140
USS-50
USS-95
V-150
WC-50
X
X-140
X-42
X-46
X-52
X-56
X-60
X-70
X-95
XD

«XSDcomplexType»
StringEquipment
«XSDElement»
+ Count: long [0..1]
+ Equipment: ComponentReference
+ EquipmentEventHistory: EventInfo [0..*]
+ EquipmentType: EquipmentTypeExt [0..1]
+ ExtensionNameValue: ExtensionNameValue [0..*]
+ HasScratchers: boolean [0..1]
+ HeatRating: ThermodynamicTemperatureMeasure [0..1]
+ IsCentralized: boolean [0..1]
+ IsLinetoSurface: boolean [0..1]
+ Length: LengthMeasure [0..1]
+ MdInterval: MdInterval [0..1]
+ Name: String2000 [0..1]
+ ObjectCondition: String64 [0..1]
+ OutsideString: boolean [0..1]
+ PerforationSet: ComponentReference [0..-1]
+ PermanentRemarks: String2000 [0..1]
+ PresBurst: PressureMeasure [0..1]
+ PresCollapse: PressureMeasure [0..1]
+ PresRating: PressureMeasure [0..1]
+ PreviousRunDays: TimeMeasure [0..1]
+ RunNo: String64 [0..1]
+ Status: String64 [0..1]
+ SurfaceCondition: String64 [0..1]
+ TensileMax: PressureMeasure [0..1]
+ TvdInterval: AbstractTvdInterval [0..1]
+ UsageComment: String2000 [0..1]
«XSDattribute»
+ uid: String64
+Part
0..*
+Assembly
0..1
«XSDcompl...
Assembly
+OutsideComponent
0..*
+InsideComponent
0..*
«XSDcomplexType»
ReferenceContainer
«XSDElement»
+ AccesoryEquipment: ComponentReference [0..1]
+ Comment: String2000
+ Equipment: ComponentReference
+ String: ComponentReference
«XSDattribute»
+ uid: String64
+OrderOfObject
0..1
int
«XSDcomplexType»
ObjectSequence
«XSDattribute»
+ description: String2000
+ConnectionNext
0..*
Connection
«XSDcomplexType»
EquipmentConnection
«XSDElement»
+ ConnectionForm: ConnectionFormType [0..1]
+ ConnectionUpset: String64 [0..1]
+ Equipment: ComponentReference
+ RadialOffset: LengthMeasure [0..1]
+ConnectionType
0..1
«XSDcomplexType»
AbstractConnectionType
TypeEnum
«Enumeration»
ConnectionFormType
box
flange
mandrel
pin
welded
«XSDcomplexType»
CasingConnectionType
«XSDElement»
+ CasingConnectionType: CasingConnectionTypes
TypeEnum
«Enumeration»
CasingConnectionTypes
landed
self-sealing-threaded
welded
«XSDcomplexType»
TubingConnectionType
«XSDElement»
+ TubingConnectionType: TubingConnectionTypes
TypeEnum
«Enumeration»
TubingConnectionTypes
dogscompressionfit-notsealed
landed
latched
radial
selfsealing-threaded
slipfit-sealed
threaded
«XSDcomplexType»
RodConnectionType
«XSDElement»
+ RodConnectionType: RodConnectionTypes
TypeEnum
«Enumeration»
RodConnectionTypes
eating nipple-cup
latched
seating nipple-mechanical
slipfit sealed
threaded
welded
«XSDcomplexType»
OtherConnectionType
«XSDElement»
+ OtherConnectionType: OtherConnectionTypes
TypeEnum
«Enumeration»
OtherConnectionTypes
cemented-in-place
dogscompressionfit-sealed

27.1 AbstractConnectionType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Mark Mao
Notes: *The choice of connection type.*

Associations

Association	Notes
From: **CasingConnectionType.** To: **AbstractConnectionType**	
0..1 From: **EquipmentConnection.**ConnectionType To: **AbstractConnectionType**	
From: **OtherConnectionType.** To: **AbstractConnectionType**	
From: **TubingConnectionType.** To: **AbstractConnectionType**	
From: **RodConnectionType.** To: **AbstractConnectionType**	

27.2 Assembly

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Container element for assemblies, or a collection of all assembly information.*

Associations

Association		Notes
0..*	From**: Assembly.**Part To: **StringEquipment**	
0..1	From**: StringEquipment.**Assembly To: **Assembly**	Describes the assembly connected.

27.3 Borehole

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the borehole.*

Attributes

Name	Type	Notes
BoreholeDiameter	LengthMeasure	Borehole diameter.
DescriptionPermanent	String2000	The description of this equipment to be permanently kept.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
MdInterval	MdInterval	Measured depth interval for the borehole.
Name	String64	The name of the borehole.
TvdInterval	AbstractTvdInterval	True vertical depth interval for the borehole.
TypeBorehole	BoreholeType	Type of borehole. etc. cavern, cavity, normal borehole, under ream, etc.
uid	String64	Unique identifier for this instance of Borehole.

Associations

Association		Notes
0..1	From: **Borehole.**EquipmentEventHistory To: **EventInfo**	Event reference pointing to the eventledger.
	From: **Borehole.** To: **BoreholeType**	
0..*	From: **BoreholeString.**Borehole To: **Borehole**	The collection of boreholes

27.4 BoreholeString

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A section of a borehole. Used to define the drilled hole that corresponds to the wellbore. A collection of contiguous and non-overlapping borehole sections is allowed. Each section has depth range, diameter, and kind.*

Attributes

Name	Type	Notes
Name	String64	The name of the borehole string.
uid	String64	Unique identifier for this instance of BoreholeString.

Associations

Association		Notes
0..*	From**: BoreholeString.**Borehole To: **Borehole**	The collection of boreholes
0..1	From**: BoreholeString.**Accessories To: **StringAccessory**	The borehole accessories.
0..*	From**: BoreholeString.**GeologyFeature To: **GeologyFeature**	Geology feature information
1..1	From**: BoreholeString.**ReferenceWellbore To: **Wellbore**	
1..*	From**: BoreholeStringSet.**BoreholeString To: **BoreholeString**	Borehole string

27.5 BoreholeStringSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Borehole string container element, or a collection of all borehole strings.*

Associations

Association		Notes
1..*	From: **BoreholeStringSet.**BoreholeString To: **BoreholeString**	Borehole string
0..1	From: **DownholeComponent.**BoreholeStringSet To: **BoreholeStringSet**	This section contains bore hole string information including flow interval

27.6 BoreholeType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the type of borehole.*

Attributes

Name	Type	Notes
cavern		
cavity		
normalborehole		
underream		

Associations

Association	Notes
From: **Borehole.** To: **BoreholeType**	

27.7 CasingConnectionType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Container element for casing connections or collection of all casing connections information.*

Attributes

Name	Type	Notes
CasingConnectionType	CasingConnectionTypes	Connection of type casing.

Associations

Association	Notes
From: **CasingConnectionType.** To: **CasingConnectionTypes**	
From: **CasingConnectionType.** To: **AbstractConnectionType**	

27.8 CasingConnectionTypes

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for connection type of casing.*

Attributes

Name	Type	Notes
landed		
self-sealing-threaded		
welded		

Associations

Association	Notes
From: **CasingConnectionTypes.** To: **TypeEnum**	
From: **CasingConnectionType.** To: **CasingConnectionTypes**	

27.9 Coating

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the type of inside or outside coating of this piece of equipment.*

Attributes

Name	Type	Notes
bare		
carbonnitrided		
carburized		
carburized-hardened		
cementlined		
chrome		
chrome-plated		
chromeplated-grooved		
chromeplated-heavy		
corrosion coating		
dblgalv		
duolin20wr		
duoline		
duoline10		
duoline20		
epdm		
fiberglass-lined		
galvanized		
hardened		
hard-lined		
ins		
ipc		
ipc-epoxy		
ipc-epxthk		
ipc-epxthn		
ipc-nylon		
ipc-rwrap		
ipc-s505		
ipc-s650		
ipc-tk70		
ipc-tk75		
lp		

moly		
mtr		
n/a		
nickel-carbide		
nickel-plated		
nitrided		
nitrile		
pap		
pelined		
phosphate		
phosphorus		
plastic		
plunger-lubricant		
polished-rodliner		
polypropylene		
ppw/nitrl		
pvclined		
rodguide-1		
rodguide-2		
rodguide-2.		
rodguide-3		
rodguide-4		
rodguide-5		
rodguide-6		
rodguide-7		
rodguide-fx		
rodguide-so		
rodguide-so1		
rodguide-so2		
rodguide-so3		
rodguide-so4		
rodguide-so5		
rodguide-so6		
rodguide-so8		
rodguide-sp		
spray-metal		
spray-metal-monel		
spraymetal-monel		
spraymetal-nickel		
spraymetal-od/nickelplated-id		

spraymetal-steel		
spraymetal-thick		
sslined		
teflon		
teflon-red		
teflon-tan		
teflon-yellow		
thermo		
tk-4		
tk-99		
tuffr		
tungsten plated		
zincplated		

27.10 ConnectionFormType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the type of equipment-to-equipment connection.*

Attributes

Name	Type	Notes
box		
flange		
mandrel		
pin		
welded		

Associations

Association	Notes
From: **ConnectionFormType.** To: **TypeEnum**	
From: **EquipmentConnection.** To: **ConnectionFormType**	

27.11 DownholeComponent

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *General downhole equipment information.*

Attributes

Name	Type	Notes
EndDate	TimeStamp	The date the equipment was removed.
StartDate	TimeStamp	The date this equipment was installed.

Associations

Association		Notes
	From: **DownholeComponent.** To: **AbstractObject**	
0..1	From: **DownholeComponent.**EquipmentSet To: **EquipmentSet**	A collection of equipment / component
0..1	From: **DownholeComponent.**PerforationSets To: **PerforationSets**	A collection of contact interval information
0..1	From: **DownholeComponent.**DownholeStringSet To: **DownholeStringSet**	The linear downhole string equipment
0..1	From: **DownholeComponent.**BoreholeStringSet To: **BoreholeStringSet**	This section contains bore hole string information including flow interval
0..1	From: **DownholeComponent.**WellHead To: **DownholeString**	This section contains wellhead information, and is composed of string equipment
1..1	From: **DownholeComponent.**Well To: **Well**	

27.12 DownholeString

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: A section of the downhole component equipment. Strings in the completion including casing, tubing, and rod strings .A completion may have multiple sets of strings, which may be nested each inside another, or run in parallel as in dual string completions; all strings are contained in a parent wellbore. Each string is composed of equipment, and may also contain accessories and/or assemblies.

Attributes

Name	Type	Notes
AxisOffset	LengthMeasure	The distance from a sibling string.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Name	String64	The name of the downhole string.
ParentString	ComponentReference	
StringInstallDate	TimeStamp	The install date of the downhole string.
StringMdInterval	MdInterval	Measured depth interval between the top and the base of the downhole string.
StringType	DownholeStringType	The type of string defined in the enumeration DownholeStringType.
SubStringType	SubStringType	The type of substring which can be SurfaceCasing, IntermediaCasing or ProductionCasing.
uid	String64	Unique identifier for this instance of DownholeString.

Associations

Association		Notes
	From: **DownholeString.** To: **SubStringType**	
0..1	From: **DownholeString.**StringEquipmentSet To: **StringEquipmentSet**	the list of equipment in the string. each equipment is liner connected and carry the rest of weight
1..1	From: **DownholeString.**ReferenceWellbore To: **Wellbore**	
	From: **DownholeString.** To: **DownholeStringType**	
0..1	From: **DownholeString.**Accessories To: **StringAccessory**	the accessories equipment of the string. It locates in the downhole string, but it is not equipment which liner connected in string (from top to down), and it is not carraying the weight of string
1..*	From: **DownholeStringSet.**DownholeString To: **DownholeString**	Information about a single downhole string.
0..1	From: **DownholeComponent.**WellHead To: **DownholeString**	This section contains wellhead information, and is composed of string equipment

27.13 DownholeStringSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on a collection of downhole strings*

Associations

Association		Notes
1..*	From: **DownholeStringSet.**DownholeString To: **DownholeString**	Information about a single downhole string.
0..1	From: **DownholeComponent.**DownholeStringSet To: **DownholeStringSet**	The linear downhole string equipment

27.14 DownholeStringType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the type of downhole strings.*

Attributes

Name	Type	Notes
casing		
others		
rod		
tubing		
wellhead		

Associations

Association	Notes
From: **DownholeString.** To: **DownholeStringType**	

27.15 Equipment

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on a piece of equipment. Each kind of equipment in the set has a type (what it is) and attributes common across all instances of that type of equipment. The String Equipment then references these common attributes.*

Attributes

Name	Type	Notes
BrandName	String64	The equipment's brand name.
CatalogId	String64	Catalog where equipment can be found.
CatalogName	String64	Name of equipment as found in the catalog.
CoatingLinerApplied	boolean	Flag indicating whether equipment has a coating.
Description	String2000	The description of this equipment.
DescriptionPermanent	String2000	The description of this equipment to be permanently kept.
Drift	LengthMeasure	The drift diameter is the minimum inside diameter of pipe through which another tool or string can be pulled.
EquipmentName	String64	The name of the piece of equipment.
EquipmentType	EquipmentTypeExt	The equipment type etc. bridge plug, bull plug. capillary tubing.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Grade	GradeType	Grade level of this piece of material.
Id	LengthMeasure	The inside diameter of this equipment.
InsideCoating	Coating	Equipment's inner coating based on enumeration value.
IsSerialized	boolean	A flag that indicates the equipment has a serial number.
MajorId	LengthMeasure	The major inside diameter of this equipment.
MajorOd	LengthMeasure	The major outside diameter of this equipment.
Manufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer of this equipment.
Material	String64	Material that the equipment is made from.
MaxId	LengthMeasure	The maximum inside diameter of this equipment.
MaxOd	LengthMeasure	The maximum outside diameter of this equipment.
MinId	LengthMeasure	The minimum inside diameter of this equipment.
MinOd	LengthMeasure	The minimum outside diameter of this equipment.

MinorId	LengthMeasure	The minor inside diameter of this equipment.
MinorOd	LengthMeasure	The minor outside diameter of this equipment.
Model	String64	The model of the equipment.
ModelType	String64	The equipment's model type.
NameService	String64	Sweet or sour service.
NominalSize	LengthMeasure	The nominal size of this equipment.
Od	LengthMeasure	The outside diameter of this equipment.
OutsideCoating	Coating	Equipment's outside coating based on enumeration value.
PartNo	String64	Number that identifies this part.
Remark	String2000	Remarks about this equipment property.
SerialNumber	String64	Serial number.
Series	String64	Series number.
SurfaceCondition	String64	Surface condition.
uid	String64	Unique identifier for this instance of Equipment.
UnitLength	LengthMeasure	The length of this equipment.
UnitWeight	MassPerLengthMeasure	The weight per length of this equipment.

Associations

Association		Notes
0..*	From**: Equipment.**SlotAsManufactured To: **PerfSlot**	Describes the slot in equipment.
0..*	From**: Equipment.**Property To: **ExtPropNameValue**	Property description
0..*	From**: Equipment.**HoleAsManufactured To: **PerfHole**	Describes the hole in equipment.
1..*	From**: EquipmentSet.**Equipment To: **Equipment**	

27.16 EquipmentConnection

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information detailing the connection between two components.*

Attributes

Name	Type	Notes
ConnectionForm	ConnectionFormType	The form of connection: box or pin.
ConnectionUpset	String64	Connection upset.
Equipment	ComponentReference	Reference to the string equipment.
RadialOffset	LengthMeasure	Measurement of radial offset.

Associations

Association	Notes
From**: EquipmentConnection.** To: **Connection**	
0..1 From**: EquipmentConnection.**ConnectionType To: **AbstractConnectionType**	
From**: EquipmentConnection.** To: **ConnectionFormType**	
0..* From**: StringEquipment.**ConnectionNext To: **EquipmentConnection**	Describes the next component connected.

27.17 EquipmentSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the collection of equipment.*

Associations

Association		Notes
1..*	From**: EquipmentSet.**Equipment To: **Equipment**	
0..1	From**: DownholeComponent.**EquipmentSet To: **EquipmentSet**	A collection of equipment / component

27.18 EquipmentType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for type of equipment.*

Attributes

Name	Type	Notes
bridge plug		
bull plug		
capillary tubing		
casing crossover		
casing hanger		
casing head		
casing liner-expandable		
casing shoe		
casing spool		
casing/casing liner		
cement (behind casing)		
cement basket		
cement retainer		
cement squeeze		
cement stage tool		
chemical injection mandrel		
chemical injection valve		
corrosion coupon carrier		
dip tube		
downhole choke		
downhole sensor		
ESP assembly		
ESP bolt on discharge		
ESP bolt on intake		
ESP bolt on motor base		
ESP bolt on motor head		
ESP cable		
ESP gas handler		
ESP gas separator		
ESP lower pigtail		
ESP motor		
ESP motor base centralizer		

ESP motor flat cable		
ESP motor shroud		
ESP promotor		
ESP pump		
ESP pump discharge sensor sub		
ESP seal		
expansion joint		
external cementing port		
fill		
fish		
float collar		
float shoe/guide shoe		
gas anchor		
gas lift mandrel		
gas lift valve		
gravel pack screen		
hydraulic pump		
injection mandrel		
injection valve		
junk in wellbore		
landing collar		
liner entry guide		
liner hanger		
mule shoe		
notched collar		
on-off tool		
overshot		
packer		
packer plug		
packer-multiple strings		
packoff (tubing)		
pcp-flex shaft intake		
pcp-gear reducer (subsurface)		
pcp-no turn tool/torque anchor		
pcp-rotor		
pcp-stator		
pcp-tag bar		
plug - cement		
plug - mud		
plunger lift ball		

plunger lift bottom hole bumper assembly		
plunger lift bumper spring		
plunger lift collar stop		
plunger lift plunger		
polished rod		
polished rod liner		
ported collar		
profile nipple		
profile nipple plug		
pump-out plug		
sand screen-tubing		
sand separator		
screen liner/insert		
seal assembly		
seal bore extension		
seat nipple/shoe		
shear tool		
sliding sleeve		
steam cup mandrel		
steam deflectors		
strainer nipple		
subsurface safety valve		
sucker rod		
sucker rod backoff coupling		
sucker rod pump-insert		
sucker rod pump-jacket		
sucker rod pump-tubing pump barrel		
sucker rod pump-tubing pump plunger		
sucker rod sub		
sucker rod-continuous		
sucker rod-ribbon		
sucker rod-sinker bar		
tcp gun		
tubing		
tubing (coiled)		
tubing anchor/catcher		
tubing crossover		
tubing drain		
tubing hanger		
tubing head (spool)		

tubing purge check valve		
tubing sub		
wellbore notes		
whipstock		
wireline re-entry guide (bell collar)		
y-tool		

Associations

Association	Notes
From: **EquipmentTypeExt.** To: **EquipmentType**	

27.19 EquipmentTypeExt

Type: Class *Stereotype:* «XSDunion»
Detail: *Created:* 2/8/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* Jay Hollingsworth
Notes: *An extension of possible equipment types.*

Associations

Association	Notes
From: **EquipmentTypeExt.** To: **EquipmentType**	
From: **EquipmentTypeExt.** To: **EnumExtensionPattern**	

27.20 EventInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Event information type.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.

Associations

Association		Notes
0..1	From**: EventInfo.**BeginEvent To: **EventRefInfo**	The referencing event was initailized
0..1	From**: EventInfo.**EndEvent To: **EventRefInfo**	The referencing event when the even was end
0..1	From**: PerforationSet.**EventHistory To: **EventInfo**	
0..1	From**: Borehole.**EquipmentEventHistory To: **EventInfo**	Event reference pointing to the eventledger.

27.21 EventRefInfo

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/1/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Event reference information.*

Attributes

Name	Type	Notes
Event	WellCMLedger	The referencing eventledger event.
EventDate	TimeStamp	Install/pull date.

Associations

Association		Notes
0..1	From: **EventInfo.**BeginEvent To: **EventRefInfo**	The referencing event was initailized
0..1	From: **EventInfo.**EndEvent To: **EventRefInfo**	The referencing event when the even was end

27.22 ExtPropNameValue

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Name-value extensions for the equipment property.*

Attributes

Name	Type	Notes
Name	String64	A string representing the name of property.
uid	String64	Unique identifier for this instance of ExtPropNameValue.
Value	String2000	A value string representing the units of measure of the value.

Associations

Association	Notes
From: **Equipment.**Property **0..*** To: **ExtPropNameValue**	Property description

27.23 GeologyFeature

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Geology features found in the location of the borehole string.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FeatureMdInterval	MdInterval	Measured depth interval for this feature.
FeatureTvdInterval	AbstractTvdInterval	True vertical depth interval for this feature.
GeologicUnitInterpretation	DataObjectReference	Reference to a RESQML geologic unit interpretation for this feature.
GeologyType	GeologyType	Aquifer or reservoir.
Name	String64	Name of the feature.
uid	String64	Unique identifier for this instance of GeologyFeature.

Associations

Association	Notes
From: **GeologyFeature.** To: **GeologyType**	
From: **BoreholeString.**GeologyFeature **0..*** To: **GeologyFeature**	Geology feature information

27.24 GeologyType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for type of geology.*

Attributes

Name	Type	Notes
aquifer		
reservoir		

Associations

Association	Notes
From: **GeologyFeature.** To: **GeologyType**	

27.25 GradeType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the grade level of this piece of equipment.*

Attributes

Name	Type	Notes
13CR		
13CR- 80		
13CR- 85		
13CR- 95		
13CR-110		
35		
45		
46		
50		
620C		
75		
750N		
75A		
780M		
95		
960M		
970N		
A53		
A53A		
A53B		
Armco-95		
B		
C		
C-110		
C-75		
C-90		
C-95		
D		
DE		
DER		
DR		
DWR		

E		
E-75		
EL		
F-25		
FG		
FS-80		
FSS-95		
G		
G-105		
GT-80S		
H2S-90		
H2S-95		
H-40		
HC-95		
HCK-55		
HCL-80		
HCN-80		
HCP-110		
HCQ-125		
HO-70		
HS		
J-20		
J-55		
K		
K-40		
K-55		
KD		
KD-63		
L-80		
LS-140		
LS-50		
LS-65		
M-65		
M-90		
M-95		
MAV-50		
MD-56		
MMS		
N-105		
N-23		

N-30		
N-40		
N-54		
N-75		
N-78		
N-80		
N-90		
N-96		
N-97		
P-105		
P-110		
PCP 900		
PCP 1000		
PCP 1500		
PCP 2500		
PH-6		
Plus		
Q-125		
QT-1000		
QT-1200		
QT-700		
QT-800		
QT-900		
S		
S-135		
S-59		
S-60		
S-67		
S-80		
S-87		
S-88		
S-95		
SC-90		
SE		
SER		
SM		
SOO-95		
Stainless		
SWR		
T		

T-66		
T-95		
T-D61		
T-D63		
T-K65		
UHS		
USS-125		
USS-140		
USS-50		
USS-95		
V-150		
WC-50		
X		
X-140		
X-42		
X-46		
X-52		
X-56		
X-60		
X-70		
X-95		
XD		

27.26 ObjectSequence

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Defines a sequence number with an optional description attribute.*

Attributes

Name	Type	Notes
description	String2000	The description of this object sequence.

Associations

Association		Notes
0..1	From: **StringEquipment.**OrderOfObject To: **ObjectSequence**	Defines a sequence number and with an optional description attribute
1..1	From: **MemberObject.**Sequence3 To: **ObjectSequence**	Defines tertiary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType. A value for sequence3 can only be given if a value is given for sequence2.
1..1	From: **MemberObject.**Sequence1 To: **ObjectSequence**	Defines primary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType.
1..1	From: **MemberObject.**Sequence2 To: **ObjectSequence**	Defines secondary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType. A value for sequence2 can only be given if a value is given for sequence1.

27.27 OtherConnectionType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Allows you to enter a connection type other than the ones in the standard list.*

Attributes

Name	Type	Notes
OtherConnectionType	OtherConnectionTypes	Connection type other than rod, casing or tubing.

Associations

Association	Notes
From: **OtherConnectionType.** To: **AbstractConnectionType**	
From: **OtherConnectionType.** To: **OtherConnectionTypes**	

27.28 OtherConnectionTypes

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for other types of connections.*

Attributes

Name	Type	Notes
cemented-in-place		
dogscompressionfit-sealed		

Associations

Association	Notes
From: **OtherConnectionTypes.** To: **TypeEnum**	
From: **OtherConnectionType.** To: **OtherConnectionTypes**	

27.29 PerfHole

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the perforated hole.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
HoleAngle	PlaneAngleMeasure	The angle of the holes.
HoleCount	long	The number of holes.
HoleDensity	ReciprocalLengthMeasure	The density of the holes.
HoleDiameter	LengthMeasure	The diameter of the hole.
HolePattern	String64	The pattern of the holes.
MdInterval	MdInterval	Measured depth interval for the perforation hole.
Remarks	String2000	Remarks and comments about this perforated hole.
TvdInterval	AbstractTvdInterval	The true vertical depth that describes the hole.
uid	String64	Unique identifier for this instance of PerfHole.

Associations

Association	Notes
From: **Equipment.**HoleAsManufactured **0..*** To: **PerfHole**	Describes the hole in equipment.

27.30 PerforationSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information regarding a collection of perforations.*

Attributes

Name	Type	Notes
BoreholeString	ComponentReference	Reference to the borehole that contains the perf set.
CrushDamageRatio	String64	The ratio value of crash damage.
CrushZoneDiameter	LengthMeasure	The diameter of the crushed zone.
DischargeCoefficient	double	A coefficient used in the equation for calculation of pressure drop across a perforation set.
DownholeString	ComponentReference	Reference to the downhole string.
FrictionFactor	double	The friction factor of each perforation set.
FrictionPres	PressureMeasure	The friction pressure for the perforation set.
HoleAngle	PlaneAngleMeasure	The angle of the holes.
HoleCount	long	The number of holes.
HoleDensity	ReciprocalLengthMeasure	The density of the holes.
HoleDiameter	LengthMeasure	The diameter of the perf holes.
HolePattern	String64	The pattern of the holes.
MdInterval	MdInterval	Measured depth interval for the entire perforation set.
PerforationDate	TimeStamp	The original perforation date.
PerforationPenetration	LengthMeasure	The penetration length of perforation.
PerforationTool	PerforationToolType	The type of perforation tool.
PermanentRemarks	String2000	Remarks regarding this perforation set.
TvdInterval	AbstractTvdInterval	The true vertical depth of the entire perforation set.
uid	String64	Unique identifier for this instance of PerforationSet.

Associations

Association	Notes
0..1 From: **PerforationSet.**EventHistory To: **EventInfo**	
From: **PerforationSet.** To: **PerforationToolType**	
1..* From: **PerforationSets.**PerforationSet To: **PerforationSet**	Contact interval type

27.31 PerforationSets

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the collection of perforation sets.*

Associations

Association		Notes
1..*	From: **PerforationSets.**PerforationSet To: **PerforationSet**	Contact interval type
0..1	From: **DownholeComponent.**PerforationSets To: **PerforationSets**	A collection of contact interval information

27.32 PerforationToolType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Species the values for the type of perforation tool used to create the perfs.*

Attributes

Name	Type	Notes
casing gun		
coiled tubing jet tool		
drilled		
mandrel		
n/a		
slots-machine cut		
slots-undercut		
strip gun		
tcp gun		
through tubing gun		

Associations

Association	Notes
From: **PerforationSet.** To: **PerforationToolType**	

27.33 PerfSlot

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on slot resulting from a perforation.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Remarks	String2000	Remarks and comments about this perforation slot.
SlotCenterDistance	LengthMeasure	Distance from center point.
SlotCount	long	The number of the slots.
SlotHeight	LengthMeasure	The height of slot.
SlotWidth	LengthMeasure	The width of the slot.
uid	String64	Unique identifier for this instance of PerfSlot.

Associations

Association	Notes
From: **Equipment.**SlotAsManufactured **0..*** To: **PerfSlot**	Describes the slot in equipment.

27.34 ReferenceContainer

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/13/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on containing or contained components.*

Attributes

Name	Type	Notes
AccesoryEquipment	ComponentReference	Reference to the equipment for this accessory.
Comment	String2000	Comment or remarks on this container reference.
Equipment	ComponentReference	Equipment reference.
String	ComponentReference	DownholeString reference.
uid	String64	Unique identifier for this instance of ReferenceContainer.

Associations

Association		Notes
0..*	From**: StringEquipment.**InsideComponent To: **ReferenceContainer**	The list of components contained in the equipment
0..*	From**: StringEquipment.**OutsideComponent To: **ReferenceContainer**	The list of components outside of this piece of equipment

27.35 RodConnectionType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 5/3/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *A type of rod connection, e.g., latched, threaded, welded, etc.*

Attributes

Name	Type	Notes
RodConnectionType	RodConnectionTypes	Connection whose type is rod.

Associations

Association	Notes
From: **RodConnectionType.** To: **RodConnectionTypes**	
From: **RodConnectionType.** To: **AbstractConnectionType**	

27.36 RodConnectionTypes

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the connection type of rod.*

Attributes

Name	Type	Notes
eating nipple-cup		
latched		
seating nipple-mechanical		
slipfit sealed		
threaded		
welded		

Associations

Association	Notes
From: **RodConnectionTypes.** To: **TypeEnum**	
From: **RodConnectionType.** To: **RodConnectionTypes**	

27.37 StringAccessory

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: StringAccessories contain the stringequipment's decorative components. An accessory is the stringEquipment or Strings' decorative component. An accessory is NOT directly screwed to the string. This part DOES NOT carry the weight of the rest of the String as opposed to the stringEquipment, which does. An Accessory is UNLIKE an Assembly on which the stringEquipment is built out of.

Associations

Association		Notes
1..*	From: **StringAccessory.**Accessory To: **StringEquipment**	Information on a single accessory.
0..1	From: **BoreholeString.**Accessories To: **StringAccessory**	The borehole accessories.
0..1	From: **DownholeString.**Accessories To: **StringAccessory**	the accessories equipment of the string. It locates in the downhole string, but it is not equipment which liner connected in string (from top to down), and it is not carraying the weight of string

27.38 StringEquipment

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information regarding equipment that composes (makes up) a string.*

Attributes

Name	Type	Notes
Count	long	The count number of the same equipment. The default is 1. In some cases, multiple pieces group into one component.
Equipment	ComponentReference	Reference to a piece of equipment.
EquipmentEventHistory	EventInfo	History of events related to this equipment.
EquipmentType	EquipmentTypeExt	The type of the equipment. See enumerated values.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
HasScratchers	boolean	Flag indicating scratchers have been added to the equipment.
HeatRating	ThermodynamicTemperatureMeasure	Heat rating.
IsCentralized	boolean	Flag indicating equipment is centralized.
IsLinetoSurface	boolean	Flag indicating the equipment has a line connected to the surface.
Length	LengthMeasure	The total length of the equipment. This is NOT length per unit. This is the length of unit stored at equipmentset's equipment information section.
MdInterval	MdInterval	Measured depth interval in which the equipment is installed in the string.
Name	String2000	The name of the equipment.
ObjectCondition	String64	Object condition at installation.
OutsideString	boolean	Flag indicating whether this component is inside the string or not .
PerforationSet	ComponentReference	Reference to the perforated hole in the equipment after a perforation event.
PermanentRemarks	String2000	Remarks on the equipment stored permanently.
PresBurst	PressureMeasure	Burst pressure.
PresCollapse	PressureMeasure	Collapse pressure.
PresRating	PressureMeasure	Pressure rating.
PreviousRunDays	TimeMeasure	The days that the equipment has run.
RunNo	String64	The well run number.
Status	String64	The status of the piece of equipment.
SurfaceCondition	String64	Object surface condition.
TensileMax	PressureMeasure	Max tensile strength.

TvdInterval	AbstractTvdInterval	True vertical depth interval in which the equipment is installed in the string.
uid	String64	Unique identifier for this instance of StringEquipment.
UsageComment	String2000	Remarks on the usage of this equipment.

Associations

Association		Notes
0..*	From: **StringEquipment.**ConnectionNext To: **EquipmentConnection**	Describes the next component connected.
0..1	From: **StringEquipment.**OrderOfObject To: **ObjectSequence**	Defines a sequence number and with an optional description attribute
0..1	From: **StringEquipment.**Assembly To: **Assembly**	Describes the assembly connected.
0..*	From: **StringEquipment.**InsideComponent To: **ReferenceContainer**	The list of components contained in the equipment
0..*	From: **StringEquipment.**OutsideComponent To: **ReferenceContainer**	The list of components outside of this piece of equipment
0..*	From: **Assembly.**Part To: **StringEquipment**	
1..*	From: **StringAccessory.**Accessory To: **StringEquipment**	Information on a single accessory.
1..*	From: **StringEquipmentSet.**StringEquipment To: **StringEquipment**	Information on a single piece of equipment. the equipment id must exist in equipmentSet

27.39 StringEquipmentSet

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on collection of set of equipment included in the string.*

Associations

Association		Notes
1..*	From**: StringEquipmentSet.**StringEquipment To: **StringEquipment**	Information on a single piece of equipment. the equipment id must exist in equipmentSet
0..1	From**: DownholeString.**StringEquipmentSet To: **StringEquipmentSet**	the list of equipment in the string. each equipment is liner connected and carry the rest of weight

27.40 SubStringType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/4/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Specifies the values to further qualify a string type.

Attributes

Name	Type	Notes
abandoned junk/fish		
capillary string (inside tubing)		
capillary string (tubing/casing annulus)		
conductor casing		
drill string		
flowline		
geological objects		
inner liner		
intermediate casing		
production casing		
production liner		
protective casing		
surface casing		
wellbore notes		
y-tool string		

Associations

Association	Notes
From: **DownholeString.** To: **SubStringType**	

27.41 TubingConnectionType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 5/3/2016 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: Container element for tubing connection types or collection of tubing connection types.

Attributes

Name	Type	Notes
TubingConnectionType	TubingConnectionTypes	Tubing connection type.

Associations

Association	Notes
From: **TubingConnectionType.** To: **TubingConnectionTypes**	
From: **TubingConnectionType.** To: **AbstractConnectionType**	

27.42 TubingConnectionTypes

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 5/3/2016 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the connection types of tubing.*

Attributes

Name	Type	Notes
dogscompressionfit-notsealed		
landed		
latched		
radial		
selfsealing-threaded		
slipfit-sealed		
threaded		

Associations

Association	Notes
From: **TubingConnectionTypes.** To: **TypeEnum**	
From: **TubingConnectionType.** To: **TubingConnectionTypes**	

28 WellCMLedger

Package: xsd_schemas

Notes: WellCMLedger Schema. The "event ledger" concept is this: each time an activity associated with a well happens, that event is recorded in the ledger. This collection of event history is what makes it possible to support the completion use cases (snapshot in time or the cumulative history of a completion).

28.1 AbstractEventExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Event extension schema.*

Associations

Association	Notes
From: **AcidizeFracExtension.** To: **AbstractEventExtension**	
From: **BHPExtension.** To: **AbstractEventExtension**	
From: **WaitingOnExtension.** To: **AbstractEventExtension**	
From: **JobExtension.** To: **AbstractEventExtension**	
From: **PerforatingExtension.** To: **AbstractEventExtension**	
From: **FluidReportExtension.** To: **AbstractEventExtension**	
From: **DownholeExtension.** To: **AbstractEventExtension**	
From: **DirectionalSurveyExtension.** To: **AbstractEventExtension**	
From: **CementExtension.** To: **AbstractEventExtension**	
From: **WellCMLedger.**EventExtension **0..*** To: **AbstractEventExtension**	Event extensions
From: **PressureTestExtension.** To: **AbstractEventExtension**	
From: **LostCirculationExtension.** To: **AbstractEventExtension**	
From: **CleanFillExtension.** To: **AbstractEventExtension**	

28.2 AcidizeFracExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/15/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on fractionation event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
StimJobID	StimJob	Reference to a StimJob.

Associations

Association	Notes
From: **AcidizeFracExtension.** To: **AbstractEventExtension**	

28.3 BHPExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on bottom hole pressure during this event.*

Attributes

Name	Type	Notes
BHPRefID	String64	Reference to bottom hole pressure
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.

Associations

Association	Notes
From: **BHPExtension.** To: **AbstractEventExtension**	

28.4 BoreholeStringReference

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Reference to a borehole string.*

Attributes

Name	Type	Notes
BoreholeString	DataObjectComponentReference	Reference to a borehole string.
StringEquipment	ComponentReference	Optional references to string equipment within the BoreholeString.

Associations

Association	Notes
From: **DownholeComponentReference.**BoreholeStringReference **0..*** To: **BoreholeStringReference**	

28.5 CementExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on cement job event.*

Attributes

Name	Type	Notes
CementJob	CementJob	Reference to a cementJob.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.

Associations

Association	Notes
From: **CementExtension.** To: **AbstractEventExtension**	

28.6 CleanFillExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on clean fill event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FillCleaningMethod	String64	method of fill and cleaning
ToolSize	LengthMeasure	the size of the tool

Associations

Association	Notes
From: **CleanFillExtension.** To: **AbstractEventExtension**	

28.7 DirectionalSurveyExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on directional survey event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
Trajectory	Trajectory	Reference to trajectory

Associations

Association	Notes
From: **DirectionalSurveyExtension.** To: **AbstractEventExtension**	

28.8 DownholeComponentReference

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Reference to a downhole component identifier*

Attributes

Name	Type	Notes
PerforationSet	DataObjectComponentReference	Reference to perforation set
StringEquipment	DataObjectComponentReference	Reference to string equipment

Associations

Association	Notes
From: **DownholeComponentReference.**BoreholeStringReference **0..*** To: **BoreholeStringReference**	
From: **DownholeComponentReference.**DownholeStringReference **0..*** To: **DownholeStringReference**	
From: **WellCMLedger.**DownholeComponentReference **0..1** To: **DownholeComponentReference**	this is to associate with verb(Event) and noun (downholeEquipment). to refer to the whole downholeComponent using downholeComponentExtension.

28.9 DownholeExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on downhole related to this event.*

Attributes

Name	Type	Notes
DownholeComponent	DownholeComponent	Reference to downhole component
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.

Associations

Association	Notes
From: **DownholeExtension.** To: **AbstractEventExtension**	

28.10 DownholeStringReference

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/19/2021 *Status:* Proposed *Author:* William McKenzie
Notes: *Reference to a downhole string.*

Attributes

Name	Type	Notes
DownholeString	DataObjectComponentReference	Reference to a downhole string.
StringEquipment	ComponentReference	Optional references to string equipment within the downhole string.

Associations

Association	Notes
From: **DownholeComponentReference.**DownholeStringReference **0..*** To: **DownholeStringReference**	

28.11 EventClassType

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/29/2016 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Qualifies the type of event: daily report, job, npt, etc.*

Attributes

Name	Type	Notes
daily cost		
daily report		
failure (downhole equipment only)		
job		
job plan (phases)		
mud attributes		
npt (lost time event)		
time log (time measure)		

Associations

Association	Notes
From: **EventClassType.** To: **TypeEnum**	
From: **EventType.** To: **EventClassType**	

28.12 EventType

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *The type of the referencing event*

Attributes

Name	Type	Notes
Class	EventClassType	The type of the event (job, daily report, etc.)

Associations

Association	Notes
From: **EventType.** To: **String64**	
From: **EventType.** To: **EventClassType**	
From: **WellCMLedger.**EventType **0..1** To: **EventType**	

28.13 FluidReportExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on fluid report event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FluidsReport	FluidsReport	Reference to the fluid report

Associations

Association	Notes
From: **FluidReportExtension.** To: **AbstractEventExtension**	

28.14 JobExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the job event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
JobReason	String2000	Comment on the reason for the job
JobStatus	String64	Status of job
PrimaryMotivationForJob	String64	The primary reason for doing this job.

Associations

Association	Notes
From: **JobExtension.** To: **AbstractEventExtension**	

28.15 LostCirculationExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on lost circulation event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
VolumeLost	VolumeMeasure	Volume lost

Associations

Association	Notes
From: **LostCirculationExtension.** To: **AbstractEventExtension**	

28.16 MemberObject

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Defines a member of an objectGroup.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IndexInterval	AbstractInterval	The growing-object index value range that applies to this group. The significance of this range is defined by the groupType.
IndexKind	DataIndexKind	For a log object, this specifies the kind of the index curve for the log. This is only relevant for a systematically growing object.
MnemonicList	String2000	A comma delimited list of log curve mnemonics. Each mnemonic should only occur once in the list. If not specified then the group applies to all curves in the log.
ReferenceDateTime	TimeStamp	A date and time related to this group. This does not necessarily represent an actual index within a growing-object. The significance of this time is defined by the groupType.
ReferenceDepth	MeasuredDepth	A measured depth related to this group. This does not necessarily represent an actual depth within a growing-object. The significance of this depth is defined by the groupType.
uid	String64	Unique identifier for this instance of MemberObject

Associations

Association		Notes
1..1	From: **MemberObject.**Sequence3 To: **ObjectSequence**	Defines tertiary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType. A value for sequence3 can only be given if a value is given for sequence2.
1..1	From: **MemberObject.**Sequence1 To: **ObjectSequence**	Defines primary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType.
1	From: **MemberObject.**ObjectReference To: **AbstractObject**	A reference to an object that is defined within the context of the specified wellbore.

Association		Notes
1..1	From**: MemberObject.**Sequence2 To: **ObjectSequence**	Defines secondary numeric ordering of this object within the group. The meaning of this order will be defined by the groupType. A value for sequence2 can only be given if a value is given for sequence1.
0..*	From**: Participant.**Participant To: **MemberObject**	A collection of involved participants.

28.17 Participant

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on WITSML objects used*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.

Associations

Association		Notes
0..*	From: **Participant.**Participant To: **MemberObject**	A collection of involved participants.
0..1	From: **WellCMLedger.**Participant To: **Participant**	Participant points to the involved witsmlobjects

28.18 PerfConveyanceMethod

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/29/2016 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on how perforation is conveyed: slick line, wireline, tubing*

Attributes

Name	Type	Notes
slick line		
tubing conveyed		
wireline		

Associations

Association	Notes
From: **Perforating.** To: **PerfConveyanceMethod**	

28.19 Perforating

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*11/14/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the perforating job.*

Attributes

Name	Type	Notes
BottomPackerSet	MeasuredDepth	Perf-Bottom of packer set depth
CarrierDescription	String2000	Description from carrier
CarrierManufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer of the carrier.
CarrierSize	LengthMeasure	Size of the carrier.
ChargeManufacturer	BusinessAssociate	Pointer to a BusinessAssociate representing the manufacturer of the charge.
ChargeSize	LengthMeasure	The size of the charge.
ChargeType	String64	The type of the charge.
ChargeWeight	MassMeasure	The weight of the charge.
ConveyanceMethod	PerfConveyanceMethod	The conveyance method
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FluidDensity	MassPerMassMeasure	The density of fluid
FluidLevel	MeasuredDepth	Fluid level.
GunCentralized	String64	True if centralized, else decentralized.
GunDesciption	String2000	Description about the perforating gun.
GunLeftInHole	boolean	Flag indicating whether the gun is left in hole or not.
GunSize	LengthMeasure	The size of the perforation gun.
HydrostaticPressure	PressureMeasure	hydrostaticPressure
Orientation	String64	orientaton
OrientationMethod	String64	Description of orientaton method
PerforationCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the company providing the perforation.
PerforationFluidType	String64	Perforation fluid type
RefLog	String64	Reference to the log
ReservoirPressure	PressureMeasure	Reservoir pressure
ShotsDensity	ReciprocalLengthMeasure	Number of shots per unit length (ft, m)
ShotsMisfired	long	The number of missed firings from the gun.
ShotsPlanned	long	Number of shots planned
StageNumber	long	index number of stage

SurfacePressure	PressureMeasure	Surface pressure
uid	String64	Unique identifier for this instance of Perforating

Associations

Association	Notes
From: **Perforating.** To: **PerfConveyanceMethod**	
From: **PerforatingExtension.**Perforating **0..*** To: **Perforating**	Information on perforating event.

28.20 PerforatingExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on the perforating event.*

Attributes

Name	Type	Notes
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
PerforationSet	DataObjectComponentReference	The perforationSet reference.

Associations

Association	Notes
From: **PerforatingExtension.**Perforating **0..*** To: **Perforating**	Information on perforating event.
From: **PerforatingExtension.** To: **AbstractEventExtension**	

28.21 PressureTestExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on pressure test event.*

Attributes

Name	Type	Notes
AnnulusPressure	PressureMeasure	Annulus pressure
CirculatingPosition	String64	Circulating position
DiaOrificeSize	LengthMeasure	Orifice Size
DTimeNextTestDate	TimeStamp	Next Test Date
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
FlowrateRateBled	VolumePerTimeMeasure	Rate Bled
FluidBledType	String64	Fluid bled type
IdentifierJob	String64	String Being Tested
IsSuccess	boolean	True if successful
MaxPressureDuration	PressureMeasure	Maximum pressure held during test
OrientationMethod	String64	Description of orientaton method
Str10Reference	String64	Reference #
TestFluidType	String64	Test fluid type
TestSubType	String64	Test sub type
TestType	String64	Test type
UidAssembly	String64	Well (Assembly)
VolumeBled	VolumeMeasure	Volume Bled
VolumeLost	VolumeMeasure	Volume Lost
VolumePumped	VolumeMeasure	Volume Pumped
WellPressureUsed	String64	Well pressure used

Associations

Association	Notes
From: **PressureTestExtension.** To: **AbstractEventExtension**	

28.22 WaitingOnExtension

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*12/2/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information on waiting event.*

Attributes

Name	Type	Notes
BusinessOrgWaitingOn	String64	Business organization waiting on
ChargeTypeCode	String64	Code for charge type
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
IsNoChargeToProducer	boolean	Flag indicating whether producer is charged or not
SubCategory	String64	Sub category

Associations

Association	Notes
From: **WaitingOnExtension.** To: **AbstractEventExtension**	

28.23 WellCMLedger

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 11/6/2015 *Last modified:*10/25/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Information regarding details of Jobs & Events*

Attributes

Name	Type	Notes
ActivityCode	DrillActivityCode	Activity code
BusinessAssociate	BusinessAssociate	Service company or business
Comment	String2000	Comment on this ledger
Contact	String64	Contact name or person to get in touch with. Might not necessarily be the person responsible.
Description	String2000	Description of this ledger
DTimEnd	TimeStamp	Date and time that activities were completed.
DTimStart	TimeStamp	Date and time that activities started.
Duration	TimeMeasure	The activity duration (commonly in hours).
EventOrder	long	Order number of event.
IsPlan	boolean	True if planned.
MdInterval	MdInterval	Measured depth interval for this activity.
Nonproductive	boolean	True if event is not productive.
ParentEvent	WellCMLedger	Parent event reference id.
Phase	String64	Phase (large activity classification) e.g. Drill Surface Hole.
PreventiveMaintenance	boolean	True of event is for preventive maintenance
ResponsiblePerson	String64	Name or information about person responsible who is implementing the service or job.
Rig	RigUtilization	RigUtilization data object reference.
Trouble	boolean	True if event implies is in-trouble
Type	EventType	Comment on type of this event, either referring to a job type or an activity type e.g. a safety meeting.
Unplanned	boolean	True if there is no planning infomation for this activity.
WorkOrderID	String64	Extension event for work order id.

Associations

Association	Notes
0..1 From: **WellCMLedger.**Participant To: **Participant**	Participant points to the involved witsmlobjects

Association	Notes
From: **WellCMLedger.**DownholeComponentReference **0..1** To: **DownholeComponentReference**	this is to associate with verb(Event) and noun (downholeEquipment). to refer to the whole downholeComponent using downholeComponentExtension.
From: **WellCMLedger.**Cost **0..*** To: **DayCost**	The job or event cost detail.
From: **WellCMLedger.**Wellbore **1..1** To: **Wellbore**	
From: **WellCMLedger.**EventExtension **0..*** To: **AbstractEventExtension**	Event extensions
From: **WellCMLedger.** To: **AbstractObject**	
From: **WellCMLedger.**EventType **0..1** To: **EventType**	

29 WitsmlCommon

Package: xsd_schemas

Notes: Common data object types for WITSML.

29.1 NameTag

Type: Class *Stereotype:* «XSDcomplexType»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *WITSML - Equipment NameTag Schema.*

Attributes

Name	Type	Notes
Comment	String2000	A comment or remark about the tag.
ExtensionNameValue	ExtensionNameValue	Extensions to the schema based on a name-value construct.
InstallationCompany	BusinessAssociate	Pointer to a BusinessAssociate representing the name of the company that installed the tag.
InstallationDate	TimeStamp	When the tag was installed in or on the item.
Location	NameTagLocation	An indicator of where the tag is attached to the item. This is used to assist the user in finding where an identifier is located on an item. This optional field also helps to differentiate where an identifier is located when multiple identifiers exist on an item. Most downhole components have a box (female thread) and pin (male thread) end as well as a pipe body in between the ends. Where multiple identifiers are used on an item, it is convenient to have a reference as to which end, or somewhere in the middle, an identifier may be closer to. Some items may have an identifier on a non-standard location, such as on the arm of a hole opener. 'other', by exclusion, tells a user to look elsewhere than on the body or near the ends of an item. Most non-downhole tools use either 'body', 'other' or not specified because the location tends to lose value with smaller or non threaded items.
MountingCode	String64	Reference to a manufacturer's or installer's installation description, code, or method.
Name	String64	The physical identification string of the equipment tag.
NumberingScheme	NameTagNumberingScheme	The format or encoding specification of the equipment tag. The tag may contain different pieces of information and knowledge of that information is inherent in the specification. The "identification string" is a mandatory part of the information in a tag.

Technology	NameTagTechnology	Identifies the general type of identifier on an item. If multiple identifiers exist on an item, a separate description set for each identifier should be created. For example, a joint of casing may have a barcode label on it along with a painted-on code and an RFID tag attached or embedded into the coupling. The barcode label may in turn be an RFID-equipped label. This particular scenario would require populating five nameTags to fully describe and decode all the possible identifiers as follows: 'tagged' - RFID tag embedded in the coupling, 'label' - Serial number printed on the label, 'tagged' - RFID tag embedded into the label, 'label' - Barcode printed on the label, 'painted'- Mill number painted on the pipe body.
uid	String64	Unique identifier for this instance of NameTag.

Associations

Association	Notes
From: **NameTag.** To: **NameTagTechnology**	
From: **NameTag.** To: **NameTagLocation**	
From: **NameTag.** To: **NameTagNumberingScheme**	

29.2 NameTagLocation

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the locations where an equipment tag might be found.*

Attributes

Name	Type	Notes
body		
box		
other		
pin		

Associations

Association	Notes
From: **NameTagLocation.** To: **TypeEnum**	
From: **NameTag.** To: **NameTagLocation**	

29.3 NameTagNumberingScheme

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values of the specifications for creating equipment tags.*

Attributes

Name	Type	Notes
ANSI/AIM-BC10		
ANSI/AIM-BC2		
ANSI/AIM-BC6		
EAN.UCC		
EPC64		
EPC96		
F2F		
MFM		
MSRCID		
serial number		

Associations

Association	Notes
From: **NameTagNumberingScheme.** To: **TypeEnum**	
From: **NameTag.** To: **NameTagNumberingScheme**	

29.4 NameTagTechnology

Type: Enumeration *Stereotype:* «Enumeration»
Detail: *Created:* 4/13/2015 *Last modified:*11/8/2016 *Status:* Proposed *Author:* William McKenzie
Notes: *Specifies the values for the mechanisms for attaching an equipment tag to an item.*

Attributes

Name	Type	Notes
intrinsic		
labeled		
painted		
stamped		
tagged		
temporary		

Associations

Association	Notes
From: **NameTagTechnology.** To: **TypeEnum**	
From: **NameTag.** To: **NameTagTechnology**	