

NOGCC Modifications to Wellbore Flex Program

02/08/2011 Chuck Borchert, NOGCC

- Change data feed from ColdFusion to WCF Soap Service.
- Added calculation for missing top of cement values.

$$\text{TOC} = \text{BOC} - (\text{sacks} * \text{yield} * 183.35) / (\text{Hole}^2 - \text{Prod}^2)$$

- Modification to Well Model to identify missing top of cement.

Adobe Flex does not accept null values for any data type other than string. All other null values are automatically converted to 0 (zero) or false. Well Model needed to be changed to pass a value of -999,999 if the top of cement is null.

- Configuring the WCF Service.

Due to a bug in Microsoft .NET 4 the values returned by querying the WCF soap service (<http://???/WellboreService/WellBoreService.svc?wsdl>) do not return the correct values for host domain. This query returns host machine name instead of host domain name.

Fortunately WCF configuration allows for the use of an external metadata reference. The external wsdl file will contain the corrected values for domain for all of the following queries: ?wsdl, ?xsd=xsd0, ?xsd=xsd1 and ?xsd=xsd2.

The WCF configuration must expose two end points: a basicHttpBinding endpoint and a mexHttpBinding endpoint. The mexHttpBinding (metadata exchange) endpoint must point to the external wsdl file which in turn points the subsequent xsd files.

- Listing for web.config:

```
<?xml version="1.0"?>
<configuration>
  <system.web>
    <compilation debug="true" targetFramework="4.0">
      <assemblies>
        <add assembly="System.Data.Entity, Version=4.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089"/>
      </assemblies>
    </compilation>
  </system.web>
  <connectionStrings>
    <add name="WellContext"
connectionString="metadata=res://*/WellModel.csd1|res://*/WellModel.ssd1|res://*/WellModel
.msl;provider=System.Data.SqlClient;provider connection string="Data
Source=PE2970WS\SQLEXPRESS;Initial Catalog=NE_RBDMS;Persist Security Info=True;User
ID=Wellbore;Password=w311b0r3;MultipleActiveResultSets=True";
providerName="System.Data.EntityClient"/>
  </connectionStrings>
```

```

<system.serviceModel>
  <services>
    <service name="Wellbore.WellBoreService"
behaviorConfiguration="WellBoreServiceBehavior">
    <endpoint contract="Wellbore.IWellBoreService" binding="basicHttpBinding"
bindingConfiguration="basicBinding" address=""/>
    <endpoint contract="IMetadataExchange" binding="mexHttpBinding" address="mex"/>
  </service>
</services>
  <bindings>
    <basicHttpBinding>
      <binding name="basicBinding" openTimeout="01:00:00"/>
    </basicHttpBinding>
  </bindings>
  <behaviors>
    <serviceBehaviors>
      <behavior name="WellBoreServiceBehavior">
        <serviceMetadata httpGetEnabled="true"
externalMetadataLocation="http://www.nogcc.ne.gov/WellboreService/WellBoreService.wsdl" />
        <serviceDebug includeExceptionDetailInFaults="true"/>
      </behavior>
    </serviceBehaviors>
  </behaviors>
</system.serviceModel>
<system.webServer>
  <defaultDocument>
    <files>
      <add value="WellBoreService.svc"/>
    </files>
  </defaultDocument>
</system.webServer>
</configuration>

```

- Listing for WellBoreService.wsdl:

```

<?xml version="1.0" encoding="utf-8" ?>
<wsdl:definitions name="WellBoreService"
targetNamespace="http://tempuri.org/"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
wssecurity-utility-1.0.xsd" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
xmlns:tns="http://tempuri.org/"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
xmlns:wsap="http://schemas.xmlsoap.org/ws/2004/08/addressing/policy"
xmlns:wsaw="http://www.w3.org/2006/05/addressing/wsdl"
xmlns:msc="http://schemas.microsoft.com/ws/2005/12/wsdl/contract"
xmlns:wsa10="http://www.w3.org/2005/08/addressing"
xmlns:wsx="http://schemas.xmlsoap.org/ws/2004/09/mex"
xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata">
  <wsdl:types>
    <xsd:schema targetNamespace="http://tempuri.org/Imports">
      <xsd:import
schemaLocation="http://www.nogcc.ne.gov/WellBoreService/WellBoreService0.xsd"
" namespace="http://tempuri.org/" />
      <xsd:import
schemaLocation="http://www.nogcc.ne.gov/WellBoreService/WellBoreService1.xsd"
" namespace="http://schemas.microsoft.com/2003/10/Serialization/" />

```

```

        <xsd:import
schemaLocation="http://www.nogcc.ne.gov/WellBoreService/WellBoreService2.xsd
" namespace="http://schemas.datacontract.org/2004/07/Wellbore" />
    </xsd:schema>
</wsdl:types>
<wsdl:message name="IWellBoreService_getWellByAPI_InputMessage">
    <wsdl:part name="parameters" element="tns:getWellByAPI" />
</wsdl:message>
<wsdl:message name="IWellBoreService_getWellByAPI_OutputMessage">
    <wsdl:part name="parameters" element="tns:getWellByAPIResponse" />
</wsdl:message>
<wsdl:portType name="IWellBoreService">
    <wsdl:operation name="getWellByAPI">
        <wsdl:input
wsaw:Action="http://tempuri.org/IWellBoreService/getWellByAPI"
message="tns:IWellBoreService_getWellByAPI_InputMessage" />
        <wsdl:output
wsaw:Action="http://tempuri.org/IWellBoreService/getWellByAPIResponse"
message="tns:IWellBoreService_getWellByAPI_OutputMessage" />
    </wsdl:operation>
</wsdl:portType>
<wsdl:binding name="BasicHttpBinding_IWellBoreService"
type="tns:IWellBoreService">
    <soap:binding transport="http://schemas.xmlsoap.org/soap/http" />
    <wsdl:operation name="getWellByAPI">
        <soap:operation
soapAction="http://tempuri.org/IWellBoreService/getWellByAPI"
style="document" />
        <wsdl:input>
            <soap:body use="literal" />
        </wsdl:input>
        <wsdl:output>
            <soap:body use="literal" />
        </wsdl:output>
    </wsdl:operation>
</wsdl:binding>
<wsdl:service name="WellBoreService">
    <wsdl:port name="BasicHttpBinding_IWellBoreService"
binding="tns:BasicHttpBinding_IWellBoreService">
        <soap:address
location="http://www.nogcc.ne.gov/WellBoreService/WellBoreService.svc" />
    </wsdl:port>
</wsdl:service>
</wsdl:definitions>

```

- Listing for WellBoreService0.xsd:

```

<?xml version="1.0" encoding="utf-8" ?>
<xs:schema elementFormDefault="qualified"
targetNamespace="http://tempuri.org/"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:tns="http://tempuri.org/">
    <xs:import
schemaLocation="http://www.nogcc.ne.gov/WellBoreService/WellBoreService2.xsd
" namespace="http://schemas.datacontract.org/2004/07/Wellbore" />
    <xs:element name="getWellByAPI">
        <xs:complexType>
            <xs:sequence>

```

```

        <xs:element minOccurs="0" name="api" nillable="true"
type="xs:string" />
    </xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="getWellByAPIResponse">
    <xs:complexType>
        <xs:sequence>
            <xs:element minOccurs="0" name="getWellByAPIResult" nillable="true"
type="q1:Well" xmlns:q1="http://schemas.datacontract.org/2004/07/Wellbore"
/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:schema>

```

- Listing for WellBoreService1.xsd:

```

<?xml version="1.0" encoding="utf-8" ?>
<xs:schema attributeFormDefault="qualified" elementFormDefault="qualified"
targetNamespace="http://schemas.microsoft.com/2003/10/Serialization/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:tns="http://schemas.microsoft.com/2003/10/Serialization/"
>
    <xs:element name="anyType" nillable="true" type="xs:anyType" />
    <xs:element name="anyURI" nillable="true" type="xs:anyURI" />
    <xs:element name="base64Binary" nillable="true" type="xs:base64Binary" />
    <xs:element name="boolean" nillable="true" type="xs:boolean" />
    <xs:element name="byte" nillable="true" type="xs:byte" />
    <xs:element name="dateTime" nillable="true" type="xs:dateTime" />
    <xs:element name="decimal" nillable="true" type="xs:decimal" />
    <xs:element name="double" nillable="true" type="xs:double" />
    <xs:element name="float" nillable="true" type="xs:float" />
    <xs:element name="int" nillable="true" type="xs:int" />
    <xs:element name="long" nillable="true" type="xs:long" />
    <xs:element name="QName" nillable="true" type="xs:QName" />
    <xs:element name="short" nillable="true" type="xs:short" />
    <xs:element name="string" nillable="true" type="xs:string" />
    <xs:element name="unsignedByte" nillable="true" type="xs:unsignedByte" />
    <xs:element name="unsignedInt" nillable="true" type="xs:unsignedInt" />
    <xs:element name="unsignedLong" nillable="true" type="xs:unsignedLong" />
    <xs:element name="unsignedShort" nillable="true" type="xs:unsignedShort"
/>
    <xs:element name="char" nillable="true" type="tns:char" />
    <xs:simpleType name="char">
        <xs:restriction base="xs:int" />
    </xs:simpleType>
    <xs:element name="duration" nillable="true" type="tns:duration" />
    <xs:simpleType name="duration">
        <xs:restriction base="xs:duration">
            <xs:pattern value="\-?P(\d*D)?(T(\d*H)?(\d*M)?(\d*(\.\d*)?S)?)?" />
            <xs:minInclusive value="-P10675199DT2H48M5.4775808S" />
            <xs:maxInclusive value="P10675199DT2H48M5.4775807S" />
        </xs:restriction>
    </xs:simpleType>
    <xs:element name="guid" nillable="true" type="tns:guid" />
    <xs:simpleType name="guid">
        <xs:restriction base="xs:string">

```

```

        <xs:pattern value="[\da-fA-F]{8}-[\da-fA-F]{4}-[\da-fA-F]{4}-[\da-fA-F]{4}-[\da-fA-F]{12}" />
    </xs:restriction>
</xs:simpleType>
<xs:attribute name="FactoryType" type="xs:QName" />
<xs:attribute name="Id" type="xs:ID" />
<xs:attribute name="Ref" type="xs:IDREF" />
</xs:schema>

```

- Listing for WellBoreService2.xsd:

```

<?xml version="1.0" encoding="utf-8" ?>
<xs:schema elementFormDefault="qualified"
targetNamespace="http://schemas.datacontract.org/2004/07/Wellbore"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:tns="http://schemas.datacontract.org/2004/07/Wellbore">
    <xs:complexType name="Well">
        <xs:sequence>
            <xs:element minOccurs="0" name="WellFeatures" nillable="true"
type="tns:ArrayOfWellFeature" />
            <xs:element minOccurs="0" name="WellFormations" nillable="true"
type="tns:ArrayOfWellFormation" />
            <xs:element minOccurs="0" name="WellPerforations" nillable="true"
type="tns:ArrayOfWellPerforation" />
            <xs:element minOccurs="0" name="apiWellNumber" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="owner" nillable="true"
type="tns:WellCompany" />
            <xs:element minOccurs="0" name="slant" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="wellLocation" nillable="true"
type="tns:WellLocation" />
            <xs:element minOccurs="0" name="wellName" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="wellType" nillable="true"
type="xs:string" />
        </xs:sequence>
    </xs:complexType>
    <xs:element name="Well" nillable="true" type="tns:Well" />
    <xs:complexType name="ArrayOfWellFeature">
        <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="unbounded" name="WellFeature"
nillable="true" type="tns:WellFeature" />
        </xs:sequence>
    </xs:complexType>
    <xs:element name="ArrayOfWellFeature" nillable="true"
type="tns:ArrayOfWellFeature" />
    <xs:complexType name="WellFeature">
        <xs:sequence>
            <xs:element minOccurs="0" name="WellCementings" nillable="true"
type="tns:ArrayOfWellCement" />
            <xs:element minOccurs="0" name="bottom" type="xs:int" />
            <xs:element minOccurs="0" name="comments" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="diameter" nillable="true"
type="xs:double" />
            <xs:element minOccurs="0" name="feature" nillable="true"
type="xs:string" />

```

```

        <xs:element minOccurs="0" name="featureId" type="xs:long" />
        <xs:element minOccurs="0" name="featureType" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="isNewPipe" nillable="true"
type="xs:boolean" />
        <xs:element minOccurs="0" name="top" nillable="true" type="xs:int" />
        <xs:element minOccurs="0" name="weight" nillable="true"
type="xs:float" />
    </xs:sequence>
</xs:complexType>
<xs:element name="WellFeature" nillable="true" type="tns:WellFeature" />
<xs:complexType name="ArrayOfWellCement">
    <xs:sequence>
        <xs:element minOccurs="0" maxOccurs="unbounded" name="WellCement"
nillable="true" type="tns:WellCement" />
    </xs:sequence>
</xs:complexType>
<xs:element name="ArrayOfWellCement" nillable="true"
type="tns:ArrayOfWellCement" />
<xs:complexType name="WellCement">
    <xs:sequence>
        <xs:element minOccurs="0" name="WellCementClasses" nillable="true"
type="tns:ArrayOfWellCementClass" />
        <xs:element minOccurs="0" name="bottom" type="xs:int" />
        <xs:element minOccurs="0" name="cementId" type="xs:long" />
        <xs:element minOccurs="0" name="description" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="top" nillable="true" type="xs:int" />
        <xs:element minOccurs="0" name="volume" nillable="true"
type="xs:double" />
    </xs:sequence>
</xs:complexType>
<xs:element name="WellCement" nillable="true" type="tns:WellCement" />
<xs:complexType name="ArrayOfWellCementClass">
    <xs:sequence>
        <xs:element minOccurs="0" maxOccurs="unbounded" name="WellCementClass"
nillable="true" type="tns:WellCementClass" />
    </xs:sequence>
</xs:complexType>
<xs:element name="ArrayOfWellCementClass" nillable="true"
type="tns:ArrayOfWellCementClass" />
<xs:complexType name="WellCementClass">
    <xs:sequence>
        <xs:element minOccurs="0" name="cementClassId" type="xs:long" />
        <xs:element minOccurs="0" name="cementType" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="comment" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="gelViscosity" nillable="true"
type="xs:float" />
        <xs:element minOccurs="0" name="sacks" nillable="true" type="xs:int"
/>
        <xs:element minOccurs="0" name="weight" nillable="true"
type="xs:float" />
        <xs:element minOccurs="0" name="yield" nillable="true" type="xs:float"
/>
    </xs:sequence>
</xs:complexType>

```

```

    <xs:element name="WellCementClass" nillable="true"
type="tns:WellCementClass" />
    <xs:complexType name="ArrayOfWellFormation">
        <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="unbounded" name="WellFormation"
nillable="true" type="tns:WellFormation" />
        </xs:sequence>
    </xs:complexType>
    <xs:element name="ArrayOfWellFormation" nillable="true"
type="tns:ArrayOfWellFormation" />
    <xs:complexType name="WellFormation">
        <xs:sequence>
            <xs:element minOccurs="0" name="bottom" nillable="true" type="xs:int"
/>
            <xs:element minOccurs="0" name="comment" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="formation" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="formationCode" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="formationId" type="xs:long" />
            <xs:element minOccurs="0" name="lcz" nillable="true" type="xs:boolean"
/>
            <xs:element minOccurs="0" name="litho" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="producing" nillable="true"
type="xs:boolean" />
            <xs:element minOccurs="0" name="show" nillable="true"
type="xs:boolean" />
            <xs:element minOccurs="0" name="stratAgeCode" nillable="true"
type="xs:string" />
            <xs:element minOccurs="0" name="top" type="xs:int" />
        </xs:sequence>
    </xs:complexType>
    <xs:element name="WellFormation" nillable="true" type="tns:WellFormation"
/>
    <xs:complexType name="ArrayOfWellPerforation">
        <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="unbounded" name="WellPerforation"
nillable="true" type="tns:WellPerforation" />
        </xs:sequence>
    </xs:complexType>
    <xs:element name="ArrayOfWellPerforation" nillable="true"
type="tns:ArrayOfWellPerforation" />
    <xs:complexType name="WellPerforation">
        <xs:sequence>
            <xs:element minOccurs="0" name="bottom" nillable="true" type="xs:int"
/>
            <xs:element minOccurs="0" name="diameter" nillable="true"
type="xs:double" />
            <xs:element minOccurs="0" name="numberOfShots" nillable="true"
type="xs:short" />
            <xs:element minOccurs="0" name="perforationDate" nillable="true"
type="xs:dateTime" />
            <xs:element minOccurs="0" name="perforationId" type="xs:long" />
            <xs:element minOccurs="0" name="perforationMethod" nillable="true"
type="xs:string" />

```

```

        <xs:element minOccurs="0" name="spacing" nillable="true"
type="xs:double" />
        <xs:element minOccurs="0" name="top" type="xs:int" />
    </xs:sequence>
</xs:complexType>
<xs:element name="WellPerforation" nillable="true"
type="tns:WellPerforation" />
<xs:complexType name="WellCompany">
    <xs:sequence>
        <xs:element minOccurs="0" name="companyAddress" nillable="true"
type="tns:Address" />
        <xs:element minOccurs="0" name="companyId" type="xs:double" />
        <xs:element minOccurs="0" name="companyName" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="companyPhone" nillable="true"
type="xs:string" />
    </xs:sequence>
</xs:complexType>
<xs:element name="WellCompany" nillable="true" type="tns:WellCompany" />
<xs:complexType name="Address">
    <xs:sequence>
        <xs:element minOccurs="0" name="address1" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="address2" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="city" nillable="true" type="xs:string"
/>
        <xs:element minOccurs="0" name="state" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="zip" nillable="true" type="xs:string"
/>
    </xs:sequence>
</xs:complexType>
<xs:element name="Address" nillable="true" type="tns:Address" />
<xs:complexType name="WellLocation">
    <xs:sequence>
        <xs:element minOccurs="0" name="bottomHole" nillable="true"
type="tns:LocationPoint" />
        <xs:element minOccurs="0" name="bottomOfTargetInterval"
nillable="true" type="tns:LocationPoint" />
        <xs:element minOccurs="0" name="county" nillable="true"
type="xs:string" />
        <xs:element minOccurs="0" name="kickoff" nillable="true"
type="tns:LocationPoint" />
        <xs:element minOccurs="0" name="proposedTargetFormation"
nillable="true" type="xs:string" />
        <xs:element minOccurs="0" name="quad" nillable="true" type="xs:string"
/>
        <xs:element minOccurs="0" name="surface" nillable="true"
type="tns:LocationPoint" />
        <xs:element minOccurs="0" name="surfaceElevation" nillable="true"
type="xs:int" />
        <xs:element minOccurs="0" name="topOfTargetInterval" nillable="true"
type="tns:LocationPoint" />
        <xs:element minOccurs="0" name="town" nillable="true" type="xs:string"
/>
    </xs:sequence>
</xs:complexType>

```



```
<xs:element name="WellLocation" nillable="true" type="tns:WellLocation" />
<xs:complexType name="LocationPoint">
  <xs:sequence>
    <xs:element minOccurs="0" name="latitude" nillable="true"
type="xs:double" />
    <xs:element minOccurs="0" name="locationType" nillable="true"
type="xs:string" />
    <xs:element minOccurs="0" name="longitude" nillable="true"
type="xs:double" />
    <xs:element minOccurs="0" name="trueMeasuredDepth" nillable="true"
type="xs:int" />
    <xs:element minOccurs="0" name="trueVerticalDepth" nillable="true"
type="xs:int" />
  </xs:sequence>
</xs:complexType>
<xs:element name="LocationPoint" nillable="true" type="tns:LocationPoint"
/>
</xs:schema>
```