Atom Indonesia

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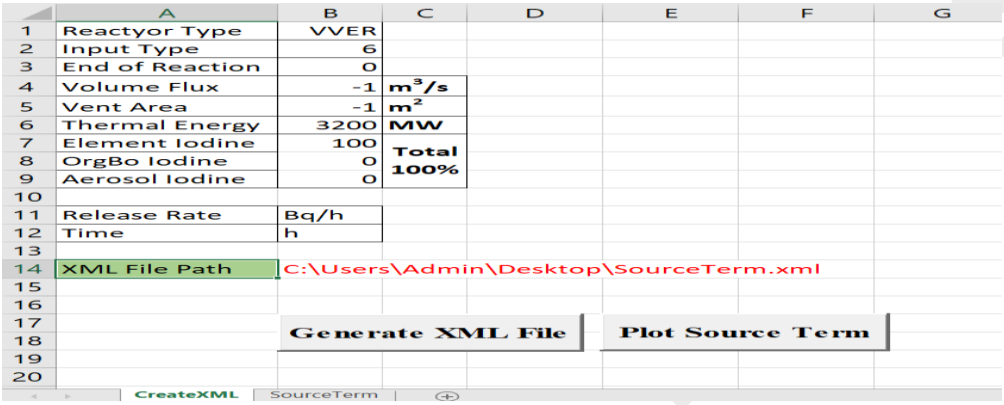
Supplementary Materials

Annexure – I

A Source Code written in Visual Basic is developed to convert the ST Data set from Excel Spreadsheet to a JRODOS-compatible XML formatted file.



Note: *The Button* ***"Generate XML File"*** *is referred to as* ***CommandButton1*** *and the button* ***"Plot ST"*** *is referred to as* ***"CommandButton2"*** *in the source code given below. The XML file path must be a proper directory which should include the filename.xml*

```
'----------------------------------------------This code was written by-----------------------------------
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'----------------------------------------------Senior Engineer--------------------------------------------
'----------------------------------------------Institute of Energy Science---------------------------------
'----------------------------------------------Bangladesh Atomic Energy Commission-------------------------
'----------------------------------------------Date: May 2023----------------------------------------------
'----------This code is open for all to use. Appropriate citation is requested before use-----------

Option Explicit

Private Sub CommandButton1_Click()

Dim ReactorType As String, Height As Single, Thermal_Energy As Single, VolumeFlux As Single, VentArea As
Single

Dim ElemIod As Single, OrgBoIod As Single, AeroIod As Single

ReactorType = Sheets("CreateXML").Range("B1")
VolumeFlux = Sheets("CreateXML").Range("B4")
VentArea = Sheets("CreateXML").Range("B5")
Thermal_Energy = Sheets("CreateXML").Range("B6")
ElemIod = Sheets("CreateXML").Range("B7")
OrgBoIod = Sheets("CreateXML").Range("B8")
AeroIod = Sheets("CreateXML").Range("B9")

Dim Total_TimeSteps As Single, Total_Nuclides As Single

Total_Nuclides = Sheets("SourceTerm").Cells(1, Columns.Count).End(xlToLeft).Column - 3
```

```
Total_TimeSteps = Sheets("SourceTerm").Cells(Rows.Count, 1).End(xlUp).Row - 2

Dim ModNuclide() As String, j As Integer

For j = 0 To Total_Nuclides

   ModNuclide = Split(Replace(Sheets("SourceTerm").Range("C1").Offset(0, j), " ", ""), "-")

   If Len(ModNuclide(0)) = 1 Then
      ModNuclide(0) = ModNuclide(0) & " "
   End If
   If Len(ModNuclide(1)) = 2 Then
      ModNuclide(1) = " " & ModNuclide(1)
   End If
   If Len(ModNuclide(1)) = 1 Then
      ModNuclide(1) = "  " & ModNuclide(1)
   End If

   Sheets("SourceTerm").Range("C1").Offset(0, j) = ModNuclide(0) & "-" & ModNuclide(1)

Next j

Dim XMLContent As String

XMLContent = "<?xml version=" & """1.0""" & " encoding=" & """UTF-8""" & "?>" & vbNewLine
XMLContent = XMLContent & "<root>" & vbNewLine & "  <sourcetermData inputType=""" &
Sheets("CreateXML").Range("B2") & """" & ">" & vbNewLine
XMLContent = XMLContent & "    <label>UserDefined</label>" & vbNewLine & "    <reactorType>" & ReactorType
& "</reactorType>" & vbNewLine
XMLContent = XMLContent & "    <associatedSites />" & vbNewLine
XMLContent = XMLContent & "    <comment />" & vbNewLine

XMLContent = XMLContent & "    <endOfReaction>" & Sheets("CreateXML").Range("B3") & "</endOfReaction>"
& vbNewLine

Dim Activity As Double, Nuclide As String, Start_Time As Single, End_Time As Single, i As Integer

Start_Time = 0

For i = 0 To Total_TimeSteps

   End_Time = Sheets("SourceTerm").Range("A2").Offset(i, 0)

   XMLContent = XMLContent & "    <releaseTimeInterval start=""" & Start_Time & """"
   XMLContent = XMLContent & " end=""" & End_Time & """" & ">" & vbNewLine
   XMLContent = XMLContent & "      <releaseAttribute height=""" & Sheets("SourceTerm").Range("B1").Offset(i +
1, 0) & """"
   XMLContent = XMLContent & " thermalEnergy=""" & Thermal_Energy & """"
   XMLContent = XMLContent & " volumeFlux=""" & VolumeFlux & """"
   XMLContent = XMLContent & " ventArea=""" & VentArea & """" & " />" & vbNewLine
   XMLContent = XMLContent & "      <relativeIodineFraction elemIod=""" & ElemIod & """"
   XMLContent = XMLContent & " orgBoIod=""" & OrgBoIod & """" & " aerosolIod=""" & AeroIod & """" & " />"
& vbNewLine

   Start_Time = End_Time

   For j = 0 To Total_Nuclides

      XMLContent = XMLContent & "      <nuclide name=" & """"

      Nuclide = Sheets("SourceTerm").Range("C1").Offset(0, j)
      XMLContent = XMLContent & Nuclide & """" & " value="""
```

```
        Activity = Sheets("SourceTerm").Range("C1").Offset(i + 1, j)
        XMLContent = XMLContent & Activity & """" & " />" & vbNewLine

    Next j

    XMLContent = XMLContent & "    </releaseTimeInterval>" & vbNewLine

Next i


XMLContent = XMLContent & "  </sourcetermData>" & vbNewLine
XMLContent = XMLContent & "</root>"


Dim FSO As Object, FileToCreate As Object, FileDirectory As String

FileDirectory = Sheets("CreateXML").Range("B14")

Set FSO = CreateObject("Scripting.FileSystemObject")
Set FileToCreate = FSO.CreateTextFile(FileDirectory, True)

FileToCreate.Write XMLContent
FileToCreate.Close

End Sub

Private Sub CommandButton2_Click()

Dim sht As Worksheet

For Each sht In Worksheets
    If sht.Name = "SourceTerm Plot" Then
        Application.DisplayAlerts = False
        Sheets("SourceTerm Plot").Delete
        Application.DisplayAlerts = True
    End If
Next sht

Sheets("SourceTerm").Copy After:=Sheets("SourceTerm")
ActiveSheet.Name = "SourceTerm Plot"

Worksheets("SourceTerm Plot").Columns("B").Delete
Sheets("SourceTerm Plot").Visible = False
Worksheets("SourceTerm").Activate

Dim LastCellAdrs As String, rw As Integer, cl As Integer

rw = Sheets("SourceTerm Plot").Cells(Rows.Count, 1).End(xlUp).Row
cl = Sheets("SourceTerm Plot").Cells(1, Columns.Count).End(xlToLeft).Column

LastCellAdrs = Sheets("SourceTerm Plot").Range("A1").Offset(rw - 1, cl - 1).Address
LastCellAdrs = Replace(LastCellAdrs, "$", "")

Sheets("SourceTerm Plot").Range("A1") = ""

Sheets("SourceTerm Plot").Range("A2:" & LastCellAdrs).Copy _
(Sheets("SourceTerm Plot").Range("A1").Offset(rw, 0))

LastCellAdrs = Sheets("SourceTerm Plot").Range("A" & rw).Offset(rw - 1, cl - 1).Address
LastCellAdrs = Replace(LastCellAdrs, "$", "")
```

```
Sheets("SourceTerm Plot").Range("A" & (rw + 1) & ":" & "A" & (2 * rw - 1)).Cut _
(Sheets("SourceTerm Plot").Range("A" & (rw + 2)))

Sheets("SourceTerm Plot").Range("A" & (rw + 1)).Value = 0
Sheets("SourceTerm Plot").Range("A" & (2 * rw)).Value = ""

Sheets("SourceTerm Plot") _
.Range("A1:" & LastCellAdrs).Sort Key1:=Sheets("SourceTerm Plot").Range("A2"), _
                    Order1:=xlAscending, _
                    Header:=xlYes

Dim Chrt As Object

  Set Chrt = ActiveSheet.Shapes.AddChart2

  Chrt.Chart.Parent.Height = 250
  Chrt.Chart.Parent.Width = 700
  Chrt.Chart.Parent.Left = 200
  Chrt.Chart.Parent.Top = 20

  Chrt.Chart.SetSourceData Source:=Sheets("SourceTerm Plot").Range("A1:" & LastCellAdrs)

  Chrt.Chart.PlotBy = xlColumns

  Chrt.Chart.SetElement (msoElementPrimaryValueGridLinesMinorMajor)
  Chrt.Chart.SetElement (msoElementPrimaryCategoryGridLinesMinorMajor)

  Chrt.Chart.SetElement (msoElementPrimaryValueAxisShow)
  Chrt.Chart.SetElement (msoElementPrimaryValueAxisTitleHorizontal)
  Chrt.Chart.SetElement (msoElementPrimaryCategoryAxisShow)
  Chrt.Chart.SetElement (msoElementPrimaryCategoryAxisTitleHorizontal)
  Chrt.Chart.SetElement (msoElementLegendRight)

  Chrt.Chart.Axes(xlValue).AxisTitle.Text = Sheets("CreateXML").Range("A12") & " (" &
Sheets("CreateXML").Range("B12") & ")"

  Chrt.Chart.Axes(xlValue).AxisTitle.Orientation = xlUpward

  Chrt.Chart.Axes(xlCategory).AxisTitle.Text = Sheets("CreateXML").Range("A13") & " (" &
Sheets("CreateXML").Range("B13") & ")"


  Chrt.Chart.ChartType = xlXYScatterLinesNoMarkers
  Chrt.Chart.Axes(xlValue).ScaleType = xlScaleLogarithmic
  Chrt.Chart.Axes(xlValue).MinimumScale = WorksheetFunction.Min(Sheets("SourceTerm Plot").Range("B2:" &
LastCellAdrs))
  Chrt.Chart.Axes(xlValue).MaximumScale = WorksheetFunction.Max(Sheets("SourceTerm Plot").Range("B2:" &
LastCellAdrs))
  Chrt.Chart.Axes(xlCategory).MinimumScale = WorksheetFunction.Min(Sheets("SourceTerm Plot").Range("A2:" &
"A" & (2 * rw)))
  Chrt.Chart.Axes(xlCategory).MaximumScale = WorksheetFunction.Max(Sheets("SourceTerm Plot").Range("A2:" &
"A" & (2 * rw)))
  Chrt.Chart.HasTitle = False
  Chrt.Chart.legend.Font.ColorIndex = 0

Dim srs As Series

For Each srs In Chrt.Chart.SeriesCollection

   srs.Format.Line.Weight = 0.75

Next srs
```

End Sub
****

Annexure – II

A typical JRODOS compatible XML file is given below for a simple ST data set.

****

```
<?xml version="1.0" encoding="UTF-8"?>
<root>
  <sourcetermData inputType="6">
    <label>UserDefined</label>
    <reactorType>VVER</reactorType>
    <associatedSites />
    <comment />
    <endOfReaction>0</endOfReaction>
    <releaseTimeInterval start="0" end="4.5">
      <releaseAttribute height="20" thermalEnergy="3200" volumeFlux="-1" ventArea="-1" />
      <relativeIodineFraction elemIod="100" orgBoIod="0" aerosolIod="0" />
      <nuclide name="Cs-137" value="3700000000000" />
      <nuclide name="I -131" value="37000000000000" />
      <nuclide name="Xe-133" value="1500000000000" />
    </releaseTimeInterval>
    <releaseTimeInterval start="4.5" end="10.5">
      <releaseAttribute height="20" thermalEnergy="3200" volumeFlux="-1" ventArea="-1" />
      <relativeIodineFraction elemIod="100" orgBoIod="0" aerosolIod="0" />
      <nuclide name="Cs-137" value="2700000000000" />
      <nuclide name="I -131" value="17000000000000" />
      <nuclide name="Xe-133" value="1100000000000" />
    </releaseTimeInterval>
    <releaseTimeInterval start="10.5" end="11">
      <releaseAttribute height="20" thermalEnergy="3200" volumeFlux="-1" ventArea="-1" />
      <relativeIodineFraction elemIod="100" orgBoIod="0" aerosolIod="0" />
      <nuclide name="Cs-137" value="11000000000000" />
      <nuclide name="I -131" value="30000000000000" />
      <nuclide name="Xe-133" value="2200000000000" />
    </releaseTimeInterval>
    <releaseTimeInterval start="11" end="21">
      <releaseAttribute height="20" thermalEnergy="3200" volumeFlux="-1" ventArea="-1" />
      <relativeIodineFraction elemIod="100" orgBoIod="0" aerosolIod="0" />
      <nuclide name="Cs-137" value="8400000000000" />
      <nuclide name="I -131" value="84000000000000" />
      <nuclide name="Xe-133" value="900000000000" />
    </releaseTimeInterval>
  </sourcetermData>
</root>
```

****