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MCNP®

Code Version 6.3.0

Unstructured-mesh HDF5-based Output Verification

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MCNP® Code Version 6.3.0 Unstructured-mesh HDF5-based Output Verification

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Los Alamos National Laboratory

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Contents

1 Introduction

This report describes the verification performed to ensure that a new HDF5-based MCNP® unstructured mesh (UM) [1] file correctly represents elemental values on the associated mesh geometry. The steps taken to perform this verification are:

1. Modify all MCNP UM `regression` test cases to incorporate HDF5 output by adding the `hdf5file` parameter to each `embed` card in the MCNP input files. When the parameter is added, the filename is the same as the `meeout` parameter except for replacing the file extension by "`.h5`". This causes the calculation to produce the "traditional" EEOUT file from the `meeout` parameter as well as the HDF5 binary and accompanying ASCII XDMF files (with suffix "`.h5.xdmf`") from the `hdf5file` entry.

   If there are multiple `embed` cards, the new `hdf5file` parameter is added to each.

2. Execute the test cases. All test cases are run on the Los Alamos National Laboratory `snow` supercomputer in serial.

3. Convert the traditional EEOUT file to an XML-based VTK (VTU) file using a pre-existing conversion utility [2].

4. Compare the converted VTU file results with the XDMF file results on an element-by-element and field-by-field basis.

The modification of input files, test case execution, and conversion from EEOUT to VTU are straightforward processes and are not described further. Section 2 describes how the comparison is performed between the VTU and HDF5+XDMF files and Section 3 gives the results of the comparisons for each test case. Section 4 gives conclusions. Appendix A gives code listings for the scripts used in this work and Appendix B gives the results for each comparison performed.

2 Summary of the Comparison Process

For the comparison, ParaView [3] is executed in batch mode (`pvbatch`) using the Python script shown in Listing 1. Before the comparison, the shell script in Listing 2 is used to convert the traditional EEOUT files to VTU files. The shell script given in Listing 3 is used to launch the comparison for each case. It is recommended that the script in Listing 3 be executed with the GNU `parallel` command.

The comparison takes place by identifying element-center coordinates for each element in the VTU file and then querying the field values at all of those points, for all fields, in the XDMF files. The VTU element-wise values are used directly. The relative difference is computed if the VTU value is greater than zero (the absolute difference is calculated otherwise), and the VTU and XDMF files are considered different if the difference exceeds 10^{-5}. This criterion is selected because of the limited precision available in a traditional ASCII EEOUT file versus full precision in the binary HDF5 file.

As part of this work, the Abaqus mesh input file (`um1034.abaq`) and template MCNP output and EEOUT files for Test Case 1034 are permanently modified to remove the included non-ASCII character "é" in the instance named "2_502 détecteur beta.1". In the future, if a user insists on using non-ASCII characters in an Abaqus-generated mesh input file, the file must be converted from ISO/IEC 8859-1 (a.k.a. "latin1") encoding to UTF-8 to permit correct processing[1]. This limitation exists because HDF5 can only accommodate ASCII and UTF-8 encoded characters.

[1]The file encoding can be confirmed, among other methods, by using the command `set fileencoding` within

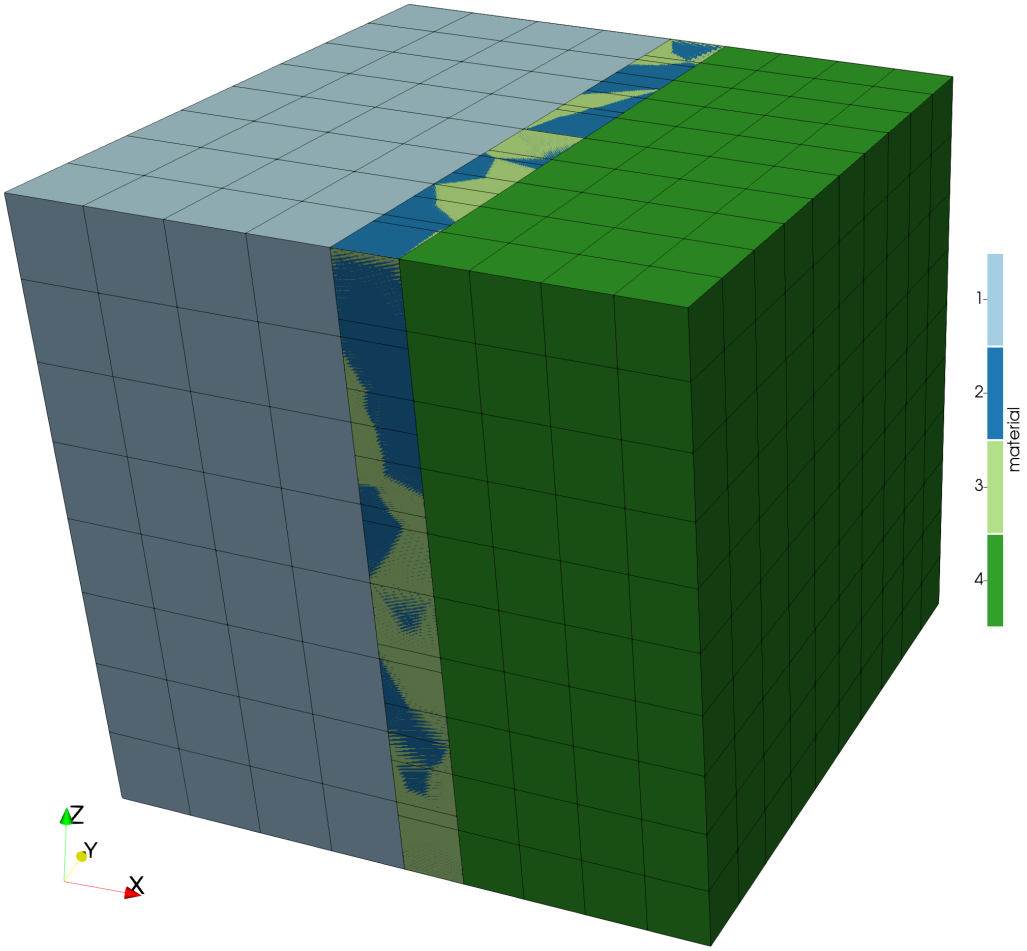


Figure 1: Test Case 1004 and 1015 Elemental Overlaps

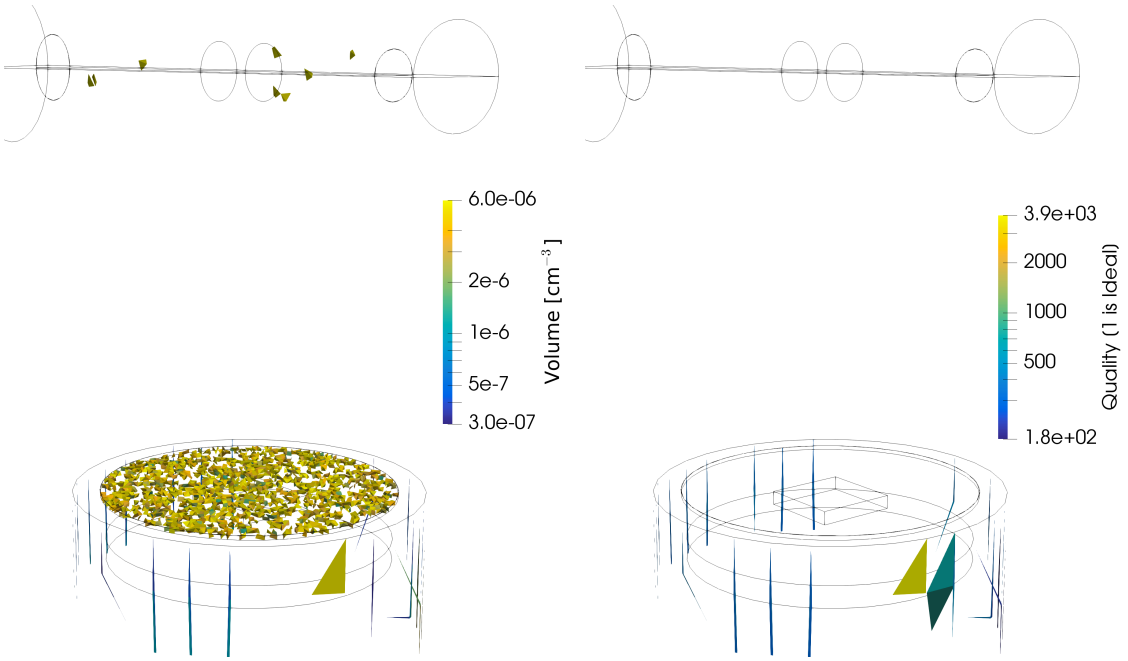
3 Comparison Results

The comparison output log files for each test case are given in Appendix B. **Except for Test Cases 1004, 1015, and 1034, all test cases reported no differences.**

Test Cases 1004 and 1015 both intentionally incorporate overlapping elements as shown in Fig. 1, which shows two materials occupying the same space. Because these regions overlap, it is reasonable to expect that probing the geometry is an invalid approach to compare the two output files. However, no better method of comparison exists and the other test cases that did not feature overlaps had favorable comparisons that suggest the differences are caused by the overlaps

Test Case 1034 exhibited 24 differences in elemental volumes. Each element that disagreed had a small ($\sim 10^{-6}$–10^{-7} cm^3) volume (see Fig. 2a for those elements less than 6×10^{-6} cm^3). This is indicative of the probe querying a neighboring cell because the target cell was too thin to be accurately queued within the scope of the underlying point precision (see Appendix C for a demonstration of how this was determined). The volume disagreed because the neighboring volume

Vim. Correspondingly, Vim can be used to force the writing of a UTF-8-encoded file using the command `:write ++enc=utf-8 <filename>`.



(a) Elements with Volume $< 6 \times 10^{-6}$

(b) Elements with Quality > 100 (Lower is Better, 1 is Ideal)

Figure 2: Test Case 1034 Troublesome Elements

was markedly different than the expected volume. No other fields disagreed because the neighboring element had the same material, mass density, and edit value (i.e., zero). Note that regions of this UM have elements that are objectively of poor quality (see Fig. 2b), so it is unsurprising that problems like the aforementioned are observed

The differences in these three test cases are easily explained by features of the associated UM models. All other test cases report no differences in any of the elemental values. Thus, these tests suggest that the MCNP UM output values using HDF5 and XDMF are consistent with traditional EEOUT values.

4 Conclusions

The results of the comparisons described herein suggests that the HDF5-based XDMF output from an MCNP UM calculation represents element-wise quantities are consistent with the traditional EEOUT file.

To perform the comparison, some effort was spent to make the script in Listing 1 as fast as practical. However, it is still relatively slow and perhaps too slow to be of practical, routine, use. If these types of comparisons are sought more in the future, it would be valuable to identify how to compare the elemental values directly and/or use C++ in lieu of Python with the VTK and XDMF libraries to provide a path toward further optimization and resource management.

Acknowledgements

The author thanks Jerawan Armstrong for performing a technical review of this document and her suggestions for improving it.

References

[Citing pages are listed after each reference.]

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2. J. A. Kulesza and T. C. McClanahan, "A Python Script to Convert MCNP Unstructured Mesh Elemental Edit Output Files to XML-based VTK Files," Los Alamos National Laboratory, Los Alamos, NM, USA, Tech. Rep. LA-UR-19-20291, rev. 1, Sep. 2019. URL: https://mcnp.lanl.gov/pdf_files/la-ur-19-20291.pdf [Page 3]

3. U. Ayachit, *The ParaView Guide*, community ed., L. Avila, K. Osterdahl, S. McKenzie, and S. Jordan, Eds. Kitware Inc., Jun. 2018. URL: https://www.paraview.org/paraview-guide/ [Page 3]

A ParaView Batch (**pvbatch**) and Shell Scripts

The script given in Listing 1 performs an element-by-element and field-by-field comparison between a VTU and XDMF file. The VTU files are created from the traditional EEOUT files with the script given in Listing 2. Execution of the script in Listing 1 is controlled by the script given in Listing 3. For convenience, these files are also electronically attached to this document.

Listing 1: ParaView VTU/XDMF Comparison Script

```
#!/Users/jkulesza/Applications/ParaView-5.6.0.app/Contents/bin/pvbatch

from paraview.simple import *
paraview.simple._DisableFirstRenderCameraReset()

import logging
import os
import re
import sys

from tqdm import tqdm

# From: https://stackoverflow.com/a/46482050/5059002
class ColoredFormatter( logging.Formatter ):
    def __init__(self, patern):
        logging.Formatter.__init__(self, patern)
    def format(self, record):
        import copy

        MAPPING = {
            'DEBUG'   : 33,
            'INFO'    : 32,
            'WARNING' : 31,
            'ERROR'   : 41,
            'CRITICAL': 41,
        }
        PREFIX = '\033['
        SUFFIX = '\033[0m'

        colored_record = copy.copy(record)
        levelname = colored_record.levelname
        seq = MAPPING.get(levelname, 37) # default white
        colored_levelname = ('{0}{1}m{2:>8s}{3}').format(PREFIX, seq, levelname, SUFFIX)
        colored_record.levelname = colored_levelname
        return logging.Formatter.format(self, colored_record)

def setup_logging( logfilename ):

    # Create top level logger
    log = logging.getLogger()
    log.setLevel( logging.DEBUG )
    logfmt = '%(asctime)s :: %(levelname)8s :: %(message)s'
    logfilefmt = '%(levelname)8s :: %(message)s'

    # Add console handler using the custom ColoredFormatter.
```

```
    ch = logging.StreamHandler()
    ch.setLevel( logging.INFO )
    cf = ColoredFormatter( logfmt )
    ch.setFormatter( cf )
    log.addHandler( ch )

    # Add file handler
    fh = logging.FileHandler( 'comparison_{0}.log'.format( str( logfilename ) ), 'w')
    fh.setLevel( logging.DEBUG )
    ff = logging.Formatter( logfilefmt )
    fh.setFormatter( ff )
    log.addHandler( fh )

    return

# Consume command-line arguments and validate them simplistically.
test_case_number = int( sys.argv[1] )
infilename_vtu = sys.argv[2]
infilename_xmf = sys.argv[3]
setup_logging( test_case_number )
assert( os.path.isfile( infilename_vtu ) )
assert( os.path.isfile( infilename_xmf ) )

infilename_vtu = os.path.abspath( sys.argv[2] )
infilename_xmf = os.path.abspath( sys.argv[3] )

logging.info( 'Loading files for test case number: {:}'.format( test_case_number ) )

renderView1 = GetActiveViewOrCreate('RenderView')
renderView1.ViewSize = [ 1200, 1024 ]

# Read VTU file.
data_vtu = XMLUnstructuredGridReader(FileName=[ infilename_vtu ])
# data_vtu.CellArrayStatus = get_response_names( 'vtu' ) # Comment out to load all responses.
data_vtuDisplay = Show(data_vtu, renderView1)
data_vtuDisplay.Representation = 'Surface'
materialLibrary1 = GetMaterialLibrary()
cell_centers_vtu = CellCenters( Input = data_vtu )
probe_points_vtu = paraview.servermanager.Fetch( cell_centers_vtu )
logging.info( 'Loaded VTU file: {:}'.format( os.path.basename( infilename_vtu ) ) )

# Read XMF file.
data_xmf = XDMFReader(FileNames=[ infilename_xmf ])
# data_xmf.CellArrayStatus = get_response_names( 'xmf' ) # Comment out to load all responses.
data_xmfDisplay = Show(data_xmf, renderView1)
data_xmfDisplay.Representation = 'Surface'
data_xmfDisplay.SetScalarBarVisibility(renderView1, True)
renderView1.ResetCamera()
renderView1.Update()
logging.info( 'Loaded XMF file: {:}'.format( os.path.basename( infilename_xmf ) ) )

logging.info( 'Getting response names...' )
# Query the XML-formatted files to get the response names for each file.  This
# prevents the need to create a dictionary of case-specific responses.
```

```
def get_response_names( infilename_vtu, infilename_xmf ):
    # Get edit names from XML-formatted VTU file.
    from lxml import etree
    tree = etree.parse( infilename_vtu )
    edits_vtu = []
    for e in tree.iter():
        name = e.get("Name")
        try:
            if( name.startswith("EDIT") ):
                edits_vtu.append( name )
        except:
            pass

    # Get edit names from XML-formatted XDMF file.
    tree = etree.parse( infilename_xmf )
    g = 0
    edits_xmf = []
    for e in tree.iter():
        if( e.tag == "Grid"): g += 1 # Only read responses for first grid.
        if( g > 1 ): break
        if( e.tag == "Attribute" ):
            name = e.get("Name")
            if( name.startswith("edit") ):
                edits_xmf.append( name )

    assert( len( edits_vtu ) == len( edits_xmf ) )
    return edits_vtu, edits_xmf

# Build lists of responses to check.
rlist_vtu, rlist_xmf = get_response_names( infilename_vtu, infilename_xmf )
rlist_vtu = [ "material", "density",      "volume" ] + rlist_vtu
rlist_xmf = [ "material", "mass_density", "volume" ] + rlist_xmf

for nr, r in enumerate( rlist_vtu ):
    logging.debug( ' Found response: {:} & {:}'.format( rlist_vtu[nr], rlist_xmf[nr] ) )

# Iterate through all elements and compare the values.
diffs = 0
logging.info( 'Iterating through cells to check all responses...' )
total_responses = len( rlist_vtu )
for i in tqdm( range( probe_points_vtu.GetPointData().GetNumberOfTuples() ),
    desc = 'Comparing {:} and {:}'.format( infilename_vtu, infilename_xmf ),
    disable = False ):

    # Probe XDMF data sets at VTU element cell center.
    p = probe_points_vtu.GetPoint(i)
    probe_xmf = ProbeLocation(Input=data_xmf, ProbeType='Fixed Radius Point Source')
    probe_xmf.ProbeType.Center = p
    probe_xmf_point = paraview.servermanager.Fetch(probe_xmf)

    # Iterate through all responses.
    for nr, r_vtu in tqdm( enumerate( rlist_vtu ), total = total_responses,
        desc = '  Checking responses',
        disable = True ):
```

```
        r_xmf = rlist_xmf[nr] # Set other response name to lookup.

        # Get both field values for comparison.  The VTU value is extracted
        # directly from the cell (i.e., element); the XDMF value is probed.  The
        # XDMF cell value cannot be extracted directly because it follows a
        # different indexing than the VTU file.
        value_vtu = paraview.servermanager.Fetch( data_vtu ).GetCellData().GetArray(r_vtu).
    GetValue(i)
        value_xmf = probe_xmf_point.GetPointData().GetArray(r_xmf).GetValue(0)

        rel_diff = 0
        if( value_vtu > 0 ):
            rel_diff = (value_vtu - value_xmf) / value_vtu
        else:
            rel_diff = (value_vtu - value_xmf) / 1

        if( abs(rel_diff) > 1e-5 ):
            diffs += 1
            logging.warning(
                ' {:s} (x,y,z)_{:} = ({:>15s}) {:13.5e} {:13.5e} {:13.5e}'.format(
                    r_xmf, i,
                    ', '.join( [ '{:14.7e}'.format( pi ) for pi in p ] ),
                    value_vtu, value_xmf, rel_diff )
            )

    Delete( probe_xmf )
    del probe_xmf
    p = None
    del p

logging.info( 'Done iterating.' )
logging.info( 'Number of differences exceeding threshold: {:}.'.format( diffs ) )
```

Listing 2: Create VTU Files from EEOUT Files

```
#!/bin/bash

# Convert all legacy EEOUT files to VTU to compare with XDMF files.

for f in `ls regression/inp10??/*u`; do
  echo "Converting $f...."
  ./Convert_MCNP_eeout_to_VTK.py $f
done

./Convert_MCNP_eeout_to_VTK.py regression/inp1037/inp1037u2
./Convert_MCNP_eeout_to_VTK.py regression/inp1037/inp1037u3
./Convert_MCNP_eeout_to_VTK.py regression/inp1048/inp1048u2
./Convert_MCNP_eeout_to_VTK.py regression/inp1048/inp1048u3
./Convert_MCNP_eeout_to_VTK.py regression/inp1065/inp1065u2
```

Listing 3: ParaView VTU/XDMF Comparison Driver

```
#!/bin/bash

```

```
export PYTHONPATH=~/Applications/anaconda2/lib/python2.7/site-packages

./compare_via_probe.py 1001 ./regression/inp1001/inp1001u.vtu ./regression/inp1001/inp1001u.h5
    .xdmf
./compare_via_probe.py 1002 ./regression/inp1002/inp1002u.vtu ./regression/inp1002/inp1002u.h5
    .xdmf
./compare_via_probe.py 1003 ./regression/inp1003/inp1003u.vtu ./regression/inp1003/inp1003u.h5
    .xdmf
./compare_via_probe.py 1004 ./regression/inp1004/inp1004u.vtu ./regression/inp1004/inp1004u.h5
    .xdmf
./compare_via_probe.py 1005 ./regression/inp1005/inp1005u.vtu ./regression/inp1005/inp1005u.h5
    .xdmf
./compare_via_probe.py 1006 ./regression/inp1006/inp1006u.vtu ./regression/inp1006/inp1006u.h5
    .xdmf
./compare_via_probe.py 1007 ./regression/inp1007/inp1007u.vtu ./regression/inp1007/inp1007u.h5
    .xdmf
./compare_via_probe.py 1008 ./regression/inp1008/inp1008u.vtu ./regression/inp1008/inp1008u.h5
    .xdmf
./compare_via_probe.py 1009 ./regression/inp1009/inp1009u.vtu ./regression/inp1009/inp1009u.h5
    .xdmf
./compare_via_probe.py 1010 ./regression/inp1010/inp1010u.vtu ./regression/inp1010/inp1010u.h5
    .xdmf
./compare_via_probe.py 1011 ./regression/inp1011/inp1011u.vtu ./regression/inp1011/inp1011u.h5
    .xdmf
./compare_via_probe.py 1012 ./regression/inp1012/inp1012u.vtu ./regression/inp1012/inp1012u.h5
    .xdmf
./compare_via_probe.py 1013 ./regression/inp1013/inp1013u.vtu ./regression/inp1013/inp1013u.h5
    .xdmf
./compare_via_probe.py 1014 ./regression/inp1014/inp1014u.vtu ./regression/inp1014/inp1014u.h5
    .xdmf
./compare_via_probe.py 1015 ./regression/inp1015/inp1015u.vtu ./regression/inp1015/inp1015u.h5
    .xdmf
./compare_via_probe.py 1016 ./regression/inp1016/inp1016u.vtu ./regression/inp1016/inp1016u.h5
    .xdmf
./compare_via_probe.py 1017 ./regression/inp1017/inp1017u.vtu ./regression/inp1017/inp1017u.h5
    .xdmf
./compare_via_probe.py 1018 ./regression/inp1018/inp1018u.vtu ./regression/inp1018/inp1018u.h5
    .xdmf
./compare_via_probe.py 1020 ./regression/inp1020/inp1020u.vtu ./regression/inp1020/inp1020u.h5
    .xdmf
./compare_via_probe.py 1021 ./regression/inp1021/inp1021u.vtu ./regression/inp1021/inp1021u.h5
    .xdmf
./compare_via_probe.py 1022 ./regression/inp1022/inp1022u.vtu ./regression/inp1022/inp1022u.h5
    .xdmf
./compare_via_probe.py 1023 ./regression/inp1023/inp1023u.vtu ./regression/inp1023/inp1023u.h5
    .xdmf
./compare_via_probe.py 1024 ./regression/inp1024/inp1024u.vtu ./regression/inp1024/inp1024u.h5
    .xdmf
./compare_via_probe.py 1025 ./regression/inp1025/inp1025u.vtu ./regression/inp1025/inp1025u.h5
    .xdmf
./compare_via_probe.py 1026 ./regression/inp1026/inp1026u.vtu ./regression/inp1026/inp1026u.h5
    .xdmf
./compare_via_probe.py 1027 ./regression/inp1027/inp1027u.vtu ./regression/inp1027/inp1027u.h5
    .xdmf
```

```
./compare_via_probe.py 1028 ./regression/inp1028/inp1028u.vtu ./regression/inp1028/inp1028u.h5.xdmf
./compare_via_probe.py 1029 ./regression/inp1029/inp1029u.vtu ./regression/inp1029/inp1029u.h5.xdmf
./compare_via_probe.py 1030 ./regression/inp1030/inp1030u.vtu ./regression/inp1030/inp1030u.h5.xdmf
./compare_via_probe.py 1031 ./regression/inp1031/inp1031u.vtu ./regression/inp1031/inp1031u.h5.xdmf
./compare_via_probe.py 1032 ./regression/inp1032/inp1032u.vtu ./regression/inp1032/inp1032u.h5.xdmf
./compare_via_probe.py 1033 ./regression/inp1033/inp1033u.vtu ./regression/inp1033/inp1033u.h5.xdmf
./compare_via_probe.py 1034 ./regression/inp1034/inp1034u.vtu ./regression/inp1034/inp1034u.h5.xdmf
./compare_via_probe.py 1035 ./regression/inp1035/inp1035u.vtu ./regression/inp1035/inp1035u.h5.xdmf
./compare_via_probe.py 1036 ./regression/inp1036/inp1036u.vtu ./regression/inp1036/inp1036u.h5.xdmf
./compare_via_probe.py 1037 ./regression/inp1037/inp1037u.vtu ./regression/inp1037/inp1037u.h5.xdmf
./compare_via_probe.py 10372 ./regression/inp1037/inp1037u2.vtu ./regression/inp1037/inp1037u2.h5.xdmf
./compare_via_probe.py 10373 ./regression/inp1037/inp1037u3.vtu ./regression/inp1037/inp1037u3.h5.xdmf
./compare_via_probe.py 1038 ./regression/inp1038/inp1038u.vtu ./regression/inp1038/inp1038u.h5.xdmf
./compare_via_probe.py 1039 ./regression/inp1039/inp1039u.vtu ./regression/inp1039/inp1039u.h5.xdmf
./compare_via_probe.py 1040 ./regression/inp1040/inp1040u.vtu ./regression/inp1040/inp1040u.h5.xdmf
./compare_via_probe.py 1041 ./regression/inp1041/inp1041au.vtu ./regression/inp1041/inp1041au.h5.xdmf
./compare_via_probe.py 10412 ./regression/inp1041/inp1041bu.vtu ./regression/inp1041/inp1041bu.h5.xdmf
./compare_via_probe.py 1042 ./regression/inp1042/inp1042u.vtu ./regression/inp1042/inp1042u.h5.xdmf
./compare_via_probe.py 1043 ./regression/inp1043/inp1043u.vtu ./regression/inp1043/inp1043u.h5.xdmf
./compare_via_probe.py 1044 ./regression/inp1044/inp1044u.vtu ./regression/inp1044/inp1044u.h5.xdmf
./compare_via_probe.py 1045 ./regression/inp1045/inp1045u.vtu ./regression/inp1045/inp1045u.h5.xdmf
./compare_via_probe.py 1046 ./regression/inp1046/inp1046u.vtu ./regression/inp1046/inp1046u.h5.xdmf
./compare_via_probe.py 1047 ./regression/inp1047/inp1047u.vtu ./regression/inp1047/inp1047u.h5.xdmf
./compare_via_probe.py 1048 ./regression/inp1048/inp1048u.vtu ./regression/inp1048/inp1048u.h5.xdmf
./compare_via_probe.py 10482 ./regression/inp1048/inp1048u2.vtu ./regression/inp1048/inp1048u2.h5.xdmf
./compare_via_probe.py 10483 ./regression/inp1048/inp1048u3.vtu ./regression/inp1048/inp1048u3.h5.xdmf
./compare_via_probe.py 1049 ./regression/inp1049/inp1049u.vtu ./regression/inp1049/inp1049u.h5.xdmf
```

```
./compare_via_probe.py 1050 ./regression/inp1050/inp1050u.vtu ./regression/inp1050/inp1050u.h5.xdmf
./compare_via_probe.py 1051 ./regression/inp1051/inp1051u.vtu ./regression/inp1051/inp1051u.h5.xdmf
./compare_via_probe.py 1052 ./regression/inp1052/inp1052u.vtu ./regression/inp1052/inp1052u.h5.xdmf
./compare_via_probe.py 1053 ./regression/inp1053/inp1053u.vtu ./regression/inp1053/inp1053u.h5.xdmf
./compare_via_probe.py 1054 ./regression/inp1054/inp1054u.vtu ./regression/inp1054/inp1054u.h5.xdmf
./compare_via_probe.py 1055 ./regression/inp1055/inp1055u.vtu ./regression/inp1055/inp1055u.h5.xdmf
./compare_via_probe.py 1056 ./regression/inp1056/inp1056u.vtu ./regression/inp1056/inp1056u.h5.xdmf
./compare_via_probe.py 1057 ./regression/inp1057/inp1057u.vtu ./regression/inp1057/inp1057u.h5.xdmf
./compare_via_probe.py 1058 ./regression/inp1058/inp1058u.vtu ./regression/inp1058/inp1058u.h5.xdmf
./compare_via_probe.py 1059 ./regression/inp1059/inp1059u.vtu ./regression/inp1059/inp1059u.h5.xdmf
./compare_via_probe.py 1060 ./regression/inp1060/inp1060u.vtu ./regression/inp1060/inp1060u.h5.xdmf
./compare_via_probe.py 1061 ./regression/inp1061/inp1061u.vtu ./regression/inp1061/inp1061u.h5.xdmf
./compare_via_probe.py 1062 ./regression/inp1062/inp1062u.vtu ./regression/inp1062/inp1062u.h5.xdmf
./compare_via_probe.py 1063 ./regression/inp1063/inp1063u.vtu ./regression/inp1063/inp1063u.h5.xdmf
./compare_via_probe.py 1065 ./regression/inp1065/inp1065u.vtu ./regression/inp1065/inp1065u.h5.xdmf
./compare_via_probe.py 10652 ./regression/inp1065/inp1065u2.vtu ./regression/inp1065/inp1065u2.h5.xdmf
./compare_via_probe.py 1066 ./regression/inp1066/inp1066u.vtu ./regression/inp1066/inp1066u.h5.xdmf
./compare_via_probe.py 1067 ./regression/inp1067/inp1067u.vtu ./regression/inp1067/inp1067u.h5.xdmf
```

B Individual Test Case Results

B.1 Test Case 1001

Listing 4: Test Case 1001 Comparison Results

```
   INFO :: Loading files for test case number: 1001
   INFO :: Loaded VTU file: inp1001u.vtu
   INFO :: Loaded XMF file: inp1001u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.2 Test Case 1002

Listing 5: Test Case 1002 Comparison Results

```
   INFO :: Loading files for test case number: 1002
   INFO :: Loaded VTU file: inp1002u.vtu
   INFO :: Loaded XMF file: inp1002u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
```

```
   INFO :: Number of differences exceeding threshold: 0.
```

B.3 Test Case 1003

Listing 6: Test Case 1003 Comparison Results

```
   INFO :: Loading files for test case number: 1003
   INFO :: Loaded VTU file: inp1003u.vtu
   INFO :: Loaded XMF file: inp1003u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.4 Test Case 1004

Listing 7: Test Case 1004 Comparison Results

```
   INFO :: Loading files for test case number: 1004
   INFO :: Loaded VTU file: inp1004u.vtu
   INFO :: Loaded XMF file: inp1004u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
WARNING ::  material (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   7.54552e-01   1.84837e-01
    7.55037e-01
```

```
WARNING ::  material (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   7.27061e-01   2.48868e-01
    6.57707e-01
WARNING ::  material (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   7.02220e-01   3.18036e-01
    5.47100e-01
WARNING ::  material (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   7.28183e-01   2.67673e-01
    6.32410e-01
WARNING ::  material (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   6.59083e-01   2.14859e-01
    6.74003e-01
WARNING ::  material (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   7.67286e-01   1.96505e-01
    7.43896e-01
WARNING ::  material (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   7.56389e-01   2.51208e-01
    6.67885e-01
WARNING ::  material (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   7.98505e-01   2.56835e-01
    6.78355e-01
WARNING ::  material (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   8.04910e-01   2.53779e-01
    6.84711e-01
WARNING ::  material (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   7.85226e-01   1.64267e-01
    7.90803e-01
WARNING ::  material (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
```

```
WARNING ::  edit_4_particle_1_values (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   7.35675e-01   3.10143e-01
    5.78424e-01
WARNING ::  material (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   6.90047e-01   2.83166e-01
    5.89643e-01
WARNING ::  material (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   8.14337e-01   2.34577e-01
    7.11941e-01
WARNING ::  material (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   7.73384e-01   2.31267e-01
    7.00968e-01
WARNING ::  material (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   7.36846e-01   3.03936e-01
    5.87518e-01
WARNING ::  material (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   8.22270e-01   2.37171e-01
    7.11566e-01
WARNING ::  material (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   7.15529e-01   3.15825e-01
    5.58614e-01
WARNING ::  material (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   8.42647e-01   2.53432e-01
    6.99243e-01
WARNING ::  material (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   8.01470e-01   2.59013e-01
    6.76827e-01
WARNING ::  material (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   7.16264e-01   3.10719e-01
    5.66194e-01
WARNING ::  material (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
```

```
WARNING ::  volume (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   6.88526e-01   2.52790e-01
    6.32854e-01
WARNING ::  material (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   7.05560e-01   2.37498e-01
    6.63391e-01
WARNING ::  material (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   7.57239e-01   2.61375e-01
    6.54831e-01
WARNING ::  material (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   7.86885e-01   2.64150e-01
    6.64310e-01
WARNING ::  material (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   7.08173e-01   2.55687e-01
    6.38949e-01
WARNING ::  material (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   5.86141e-01   2.63627e-01
    5.50233e-01
WARNING ::  material (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   7.02185e-01   2.59411e-01
    6.30566e-01
WARNING ::  material (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   6.75293e-01   3.03811e-01
    5.50105e-01
WARNING ::  material (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   8.18101e-01   2.54637e-01
    6.88747e-01
WARNING ::  material (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   7.00475e-01   2.68704e-01
    6.16397e-01
```

```
WARNING ::  material (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   8.13438e-01   2.68788e-01
    6.69566e-01
WARNING ::  material (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   6.92786e-01   2.73750e-01
    6.04856e-01
WARNING ::  material (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   6.88296e-01   1.66989e-01
    7.57387e-01
WARNING ::  material (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   7.52074e-01   2.23208e-01
    7.03210e-01
WARNING ::  material (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   7.17499e-01   2.91302e-01
    5.94004e-01
WARNING ::  material (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   7.13865e-01   3.11430e-01
    5.63741e-01
WARNING ::  material (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   7.27950e-01   2.55835e-01
    6.48554e-01
WARNING ::  material (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   7.14007e-01   2.28929e-01
    6.79374e-01
WARNING ::  material (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   7.60284e-01   2.77815e-01
    6.34590e-01
WARNING ::  material (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
```

```
129 WARNING ::  edit_4_particle_1_values (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   7.25339e-01   2.34431e-01
        6.76797e-01
130 WARNING ::  material (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
131 WARNING ::  volume (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
132 WARNING ::  edit_4_particle_1_values (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   6.82407e-01   2.27300e-01
        6.66915e-01
133 WARNING ::  material (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
134 WARNING ::  volume (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
135 WARNING ::  edit_4_particle_1_values (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   8.02779e-01   2.56696e-01
        6.80241e-01
136 WARNING ::  material (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
137 WARNING ::  volume (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
138 WARNING ::  edit_4_particle_1_values (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   7.61096e-01   2.59798e-01
        6.58653e-01
139 WARNING ::  material (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
140 WARNING ::  volume (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
141 WARNING ::  edit_4_particle_1_values (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   6.28292e-01   2.46524e-01
        6.07628e-01
142 WARNING ::  material (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
143 WARNING ::  volume (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
144 WARNING ::  edit_4_particle_1_values (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   7.09152e-01   2.34009e-01
        6.70016e-01
145 WARNING ::  material (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
146 WARNING ::  volume (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
147 WARNING ::  edit_4_particle_1_values (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   7.54097e-01   3.02167e-01
        5.99300e-01
148 WARNING ::  material (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
149 WARNING ::  volume (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
150 WARNING ::  edit_4_particle_1_values (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   7.66324e-01   2.85122e-01
        6.27935e-01
151 WARNING ::  material (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
152 WARNING ::  volume (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
153 WARNING ::  edit_4_particle_1_values (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   6.92810e-01   2.76407e-01
        6.01035e-01
154 WARNING ::  material (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
155 WARNING ::  volume (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
156 WARNING ::  edit_4_particle_1_values (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   8.32274e-01   2.50224e-01
        6.99349e-01
157 WARNING ::  material (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
```

```
158 WARNING ::  volume (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
159 WARNING ::  edit_4_particle_1_values (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   7.58044e-01   2.35317e-01
        6.89573e-01
160 WARNING ::  material (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
161 WARNING ::  volume (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
162 WARNING ::  edit_4_particle_1_values (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   6.91331e-01   1.42650e-01
        7.93658e-01
163 WARNING ::  material (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
164 WARNING ::  volume (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
165 WARNING ::  edit_4_particle_1_values (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   8.10868e-01   1.63894e-01
        7.97878e-01
166 WARNING ::  material (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
167 WARNING ::  volume (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
168 WARNING ::  edit_4_particle_1_values (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   8.29698e-01   1.95466e-01
        7.64414e-01
169 WARNING ::  material (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
170 WARNING ::  volume (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
171 WARNING ::  edit_4_particle_1_values (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   8.42897e-01   2.11260e-01
        7.49364e-01
172 WARNING ::  material (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
173 WARNING ::  volume (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
174 WARNING ::  edit_4_particle_1_values (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   7.97575e-01   1.87045e-01
        7.65482e-01
175 WARNING ::  material (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
176 WARNING ::  volume (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
177 WARNING ::  edit_4_particle_1_values (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   8.12030e-01   1.76749e-01
        7.82337e-01
178 WARNING ::  material (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
179 WARNING ::  volume (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
180 WARNING ::  edit_4_particle_1_values (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   7.90971e-01   1.79732e-01
        7.72770e-01
181 WARNING ::  material (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
182 WARNING ::  volume (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
183 WARNING ::  edit_4_particle_1_values (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   6.72217e-01   1.68497e-01
        7.49342e-01
184 WARNING ::  material (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
185 WARNING ::  volume (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
186 WARNING ::  edit_4_particle_1_values (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   8.13542e-01   1.19861e-01
        8.52668e-01
```

```
WARNING ::  material (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   8.42839e-01   1.14817e-01
    8.63774e-01
WARNING ::  material (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   8.48620e-01   1.01098e-01
    8.80868e-01
WARNING ::  material (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   8.78540e-01   1.83716e-01
    7.90884e-01
WARNING ::  material (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   7.55657e-01   2.23593e-01
    7.04108e-01
WARNING ::  material (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_1_values (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   8.20348e-01   1.74579e-01
    7.87189e-01
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 192.
```

B.5 Test Case 1005

Listing 8: Test Case 1005 Comparison Results

```
   INFO :: Loading files for test case number: 1005
   INFO :: Loaded VTU file: inp1005u.vtu
   INFO :: Loaded XMF file: inp1005u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_36_particle_1_2_values
```

```
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.6 Test Case 1006

Listing 9: Test Case 1006 Comparison Results

```
   INFO :: Loading files for test case number: 1006
   INFO :: Loaded VTU file: inp1006u.vtu
   INFO :: Loaded XMF file: inp1006u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.7 Test Case 1007

Listing 10: Test Case 1007 Comparison Results

```
   INFO :: Loading files for test case number: 1007
   INFO :: Loaded VTU file: inp1007u.vtu
   INFO :: Loaded XMF file: inp1007u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_errors
```

```
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_bin_1_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_bin_1_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_bin_1_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_bin_1_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_bin_2_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_bin_2_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_bin_2_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_bin_2_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_1_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_1_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_2_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_2_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_total_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_1_time_total_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_total_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
 edit_36_particle_1_2_energy_bin_2_time_total_errors
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_total_values
DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_total_errors
 INFO :: Iterating through cells to check all responses...
 INFO :: Done iterating.
 INFO :: Number of differences exceeding threshold: 0.
```

B.8 Test Case 1008

Listing 11: Test Case 1008 Comparison Results

```
   INFO :: Loading files for test case number: 1008
   INFO :: Loaded VTU file: inp1008u.vtu
   INFO :: Loaded XMF file: inp1008u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_total_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_total_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_total_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.9 Test Case 1009

Listing 12: Test Case 1009 Comparison Results

```
   INFO :: Loading files for test case number: 1009
   INFO :: Loaded VTU file: inp1009u.vtu
   INFO :: Loaded XMF file: inp1009u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E+39_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_1_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_1_time_total_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_2_MAX_ENERGY_1.000E+10 &
   edit_36_particle_1_2_energy_bin_2_time_total_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_36_particle_1_2_energy_total_time_total_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.10 Test Case 1010

Listing 13: Test Case 1010 Comparison Results

```
   INFO :: Loading files for test case number: 1010
   INFO :: Loaded VTU file: inp1010u.vtu
   INFO :: Loaded XMF file: inp1010u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
   edit_36_particle_1_2_energy_bin_1_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
   edit_36_particle_1_2_energy_bin_2_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
   edit_36_particle_1_2_energy_bin_3_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_4_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
   edit_36_particle_1_2_energy_bin_5_time_bin_1_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
   edit_36_particle_1_2_energy_bin_1_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
   edit_36_particle_1_2_energy_bin_2_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
   edit_36_particle_1_2_energy_bin_3_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_4_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
   edit_36_particle_1_2_energy_bin_5_time_bin_2_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
   edit_36_particle_1_2_energy_bin_1_time_bin_3_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
   edit_36_particle_1_2_energy_bin_2_time_bin_3_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
   edit_36_particle_1_2_energy_bin_3_time_bin_3_values
  DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
   edit_36_particle_1_2_energy_bin_4_time_bin_3_values
```

```
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
  edit_36_particle_1_2_energy_bin_5_time_bin_3_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
  edit_36_particle_1_2_energy_bin_1_time_bin_4_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
  edit_36_particle_1_2_energy_bin_2_time_bin_4_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
  edit_36_particle_1_2_energy_bin_3_time_bin_4_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
  edit_36_particle_1_2_energy_bin_4_time_bin_4_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
  edit_36_particle_1_2_energy_bin_5_time_bin_4_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
  edit_36_particle_1_2_energy_bin_1_time_bin_5_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
  edit_36_particle_1_2_energy_bin_2_time_bin_5_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
  edit_36_particle_1_2_energy_bin_3_time_bin_5_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
  edit_36_particle_1_2_energy_bin_4_time_bin_5_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
  edit_36_particle_1_2_energy_bin_5_time_bin_5_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
  edit_36_particle_1_2_energy_bin_1_time_bin_6_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
  edit_36_particle_1_2_energy_bin_2_time_bin_6_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
  edit_36_particle_1_2_energy_bin_3_time_bin_6_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
  edit_36_particle_1_2_energy_bin_4_time_bin_6_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
  edit_36_particle_1_2_energy_bin_5_time_bin_6_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
  edit_36_particle_1_2_energy_bin_1_time_bin_7_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
  edit_36_particle_1_2_energy_bin_2_time_bin_7_values
 DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
  edit_36_particle_1_2_energy_bin_3_time_bin_7_values
```

```
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_4_time_bin_7_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
 edit_36_particle_1_2_energy_bin_5_time_bin_7_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
 edit_36_particle_1_2_energy_bin_1_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
 edit_36_particle_1_2_energy_bin_2_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
 edit_36_particle_1_2_energy_bin_3_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_4_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
 edit_36_particle_1_2_energy_bin_5_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
 edit_36_particle_1_2_energy_bin_1_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
 edit_36_particle_1_2_energy_bin_2_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
 edit_36_particle_1_2_energy_bin_3_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_4_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
 edit_36_particle_1_2_energy_bin_5_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 &
 edit_36_particle_1_2_energy_bin_1_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 &
 edit_36_particle_1_2_energy_bin_2_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 &
 edit_36_particle_1_2_energy_bin_3_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 &
 edit_36_particle_1_2_energy_bin_4_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 &
 edit_36_particle_1_2_energy_bin_5_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E-05_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_1_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_2_MAX_TIME_1.000E-04_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_36_particle_1_2_energy_total_time_bin_2_values
```

```
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_3_MAX_TIME_1.000E-03_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_3_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_4_MAX_TIME_3.000E-03_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_4_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_5_MAX_TIME_1.000E-02_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_5_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_6_MAX_TIME_5.000E-02_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_6_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_7_MAX_TIME_3.000E-01_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_7_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_8_MAX_TIME_9.000E-01_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_8_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_9_MAX_TIME_1.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_9_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_10_MAX_TIME_2.000E+00_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_bin_10_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_1_MAX_ENERGY_1.000E-02 & edit_36_particle_1_2_energy_bin_1_time_total_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_2_MAX_ENERGY_1.000E-01 & edit_36_particle_1_2_energy_bin_2_time_total_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_3_MAX_ENERGY_5.000E-01 & edit_36_particle_1_2_energy_bin_3_time_total_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_4_MAX_ENERGY_2.000E+00 & edit_36_particle_1_2_energy_bin_4_time_total_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_5_MAX_ENERGY_1.000E+01 & edit_36_particle_1_2_energy_bin_5_time_total_values
DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_TOTAL_MAX_TIME_N/A_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A & edit_36_particle_1_2_energy_total_time_total_values
INFO :: Iterating through cells to check all responses...
INFO :: Done iterating.
INFO :: Number of differences exceeding threshold: 0.
```

B.11 Test Case 1011

Listing 14: Test Case 1011 Comparison Results

```
INFO :: Loading files for test case number: 1011
INFO :: Loaded VTU file: inp1011u.vtu
```

```
   INFO :: Loaded XMF file: inp1011u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.12 Test Case 1012

Listing 15: Test Case 1012 Comparison Results

```
   INFO :: Loading files for test case number: 1012
   INFO :: Loaded VTU file: inp1012u.vtu
   INFO :: Loaded XMF file: inp1012u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.13 Test Case 1013

Listing 16: Test Case 1013 Comparison Results

```
   INFO :: Loading files for test case number: 1013
   INFO :: Loaded VTU file: inp1013u.vtu
   INFO :: Loaded XMF file: inp1013u.h5.xdmf
```

```
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.14 Test Case 1014

Listing 17: Test Case 1014 Comparison Results

```
   INFO :: Loading files for test case number: 1014
   INFO :: Loaded VTU file: inp1014u.vtu
   INFO :: Loaded XMF file: inp1014u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_2.308E+04 &
   edit_4_particle_9_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.15 Test Case 1015

Listing 18: Test Case 1015 Comparison Results

```
   INFO :: Loading files for test case number: 1015
   INFO :: Loaded VTU file: inp1015u.vtu
   INFO :: Loaded XMF file: inp1015u.h5.xdmf
   INFO :: Getting response names...
```

```
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_9_values
   INFO :: Iterating through cells to check all responses...
WARNING ::  material (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_256 = ( 5.0000000e-01,  4.3750000e+00,  9.3750000e+00)   7.21175e-01   2.21465e-01
    6.92911e-01
WARNING ::  material (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_257 = ( 5.0000000e-01,  3.1250000e+00,  9.3750000e+00)   7.25409e-01   3.61620e-01
    5.01496e-01
WARNING ::  material (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_258 = ( 5.0000000e-01,  1.8750000e+00,  9.3750000e+00)   7.93775e-01   2.01221e-01
    7.46502e-01
WARNING ::  material (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_259 = ( 5.0000000e-01,  6.2500000e-01,  9.3750000e+00)   5.57299e-01   1.18196e-01
    7.87912e-01
WARNING ::  material (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_260 = ( 5.0000000e-01, -6.2500000e-01,  9.3750000e+00)   6.69005e-01   3.37183e-01
    4.95994e-01
WARNING ::  material (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_261 = ( 5.0000000e-01, -1.8750000e+00,  9.3750000e+00)   6.07653e-01   1.41570e-01
    7.67022e-01
WARNING ::  material (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_262 = ( 5.0000000e-01, -3.1250000e+00,  9.3750000e+00)   8.35307e-01   1.77478e-01
    7.87529e-01
WARNING ::  material (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_263 = ( 5.0000000e-01, -4.3750000e+00,  9.3750000e+00)   8.49681e-01   1.24942e-01
    8.52954e-01
WARNING ::  material (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
```

```
WARNING ::  volume (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_264 = ( 5.0000000e-01,  4.3750000e+00,  8.1250000e+00)   4.92656e-01   1.72228e-01
    6.50410e-01
WARNING ::  material (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_265 = ( 5.0000000e-01,  3.1250000e+00,  8.1250000e+00)   4.74954e-01   9.79970e-02
    7.93671e-01
WARNING ::  material (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_266 = ( 5.0000000e-01,  1.8750000e+00,  8.1250000e+00)   6.30569e-01   5.16633e-01
    1.80688e-01
WARNING ::  material (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_267 = ( 5.0000000e-01,  6.2500000e-01,  8.1250000e+00)   5.48544e-01   4.58942e-01
    1.63346e-01
WARNING ::  material (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_268 = ( 5.0000000e-01, -6.2500000e-01,  8.1250000e+00)   4.93619e-01   1.84750e-01
    6.25723e-01
WARNING ::  material (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_269 = ( 5.0000000e-01, -1.8750000e+00,  8.1250000e+00)   4.80039e-01   4.49519e-01
    6.35786e-02
WARNING ::  material (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_270 = ( 5.0000000e-01, -3.1250000e+00,  8.1250000e+00)   5.46689e-01   4.04016e-01
    2.60977e-01
WARNING ::  material (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_271 = ( 5.0000000e-01, -4.3750000e+00,  8.1250000e+00)   1.04399e+00   1.36644e-01
    8.69114e-01
WARNING ::  material (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_272 = ( 5.0000000e-01,  4.3750000e+00,  6.8750000e+00)   6.82253e-01   4.52968e-01
    3.36070e-01
WARNING ::  material (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_273 = ( 5.0000000e-01,  3.1250000e+00,  6.8750000e+00)   8.82617e-01   2.51965e-01
    7.14525e-01
```

```
WARNING ::  material (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_274 = ( 5.0000000e-01,  1.8750000e+00,  6.8750000e+00)   5.87016e-01   1.94931e-01
    6.67929e-01
WARNING ::  material (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_275 = ( 5.0000000e-01,  6.2500000e-01,  6.8750000e+00)   8.58870e-01   2.71352e-01
    6.84059e-01
WARNING ::  material (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_276 = ( 5.0000000e-01, -6.2500000e-01,  6.8750000e+00)   6.58738e-01   2.32811e-01
    6.46581e-01
WARNING ::  material (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_277 = ( 5.0000000e-01, -1.8750000e+00,  6.8750000e+00)   6.57219e-01   1.62981e-01
    7.52014e-01
WARNING ::  material (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_278 = ( 5.0000000e-01, -3.1250000e+00,  6.8750000e+00)   8.00160e-01   3.42443e-01
    5.72031e-01
WARNING ::  material (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_279 = ( 5.0000000e-01, -4.3750000e+00,  6.8750000e+00)   5.79962e-01   2.14642e-01
    6.29903e-01
WARNING ::  material (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_280 = ( 5.0000000e-01,  4.3750000e+00,  5.6250000e+00)   6.65931e-01   2.42915e-01
    6.35226e-01
WARNING ::  material (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_281 = ( 5.0000000e-01,  3.1250000e+00,  5.6250000e+00)   3.89941e-01   4.42860e-01
   -1.35710e-01
WARNING ::  material (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_282 = ( 5.0000000e-01,  1.8750000e+00,  5.6250000e+00)   5.24506e-01   3.31119e-01
    3.68702e-01
WARNING ::  material (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
```

```
WARNING ::  edit_4_particle_9_values (x,y,z)_283 = ( 5.0000000e-01,  6.2500000e-01,  5.6250000e+00)   6.55481e-01   3.96827e-01
    3.94602e-01
WARNING ::  material (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_284 = ( 5.0000000e-01, -6.2500000e-01,  5.6250000e+00)   1.07982e+00   1.75741e-01
    8.37250e-01
WARNING ::  material (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_285 = ( 5.0000000e-01, -1.8750000e+00,  5.6250000e+00)   5.42345e-01   2.79800e-01
    4.84092e-01
WARNING ::  material (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_286 = ( 5.0000000e-01, -3.1250000e+00,  5.6250000e+00)   8.45376e-01   6.68469e-02
    9.20926e-01
WARNING ::  material (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_287 = ( 5.0000000e-01, -4.3750000e+00,  5.6250000e+00)   6.96153e-01   1.91134e-01
    7.25443e-01
WARNING ::  material (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_288 = ( 5.0000000e-01,  4.3750000e+00,  4.3750000e+00)   7.18195e-01   2.56793e-01
    6.42446e-01
WARNING ::  material (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_289 = ( 5.0000000e-01,  3.1250000e+00,  4.3750000e+00)   6.08220e-01   3.20651e-01
    4.72804e-01
WARNING ::  material (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_290 = ( 5.0000000e-01,  1.8750000e+00,  4.3750000e+00)   8.27148e-01   2.68613e-01
    6.75254e-01
WARNING ::  material (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_291 = ( 5.0000000e-01,  6.2500000e-01,  4.3750000e+00)   8.81325e-01   2.26539e-01
    7.42956e-01
WARNING ::  material (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_292 = ( 5.0000000e-01, -6.2500000e-01,  4.3750000e+00)   1.08878e+00   2.16900e-01
    8.00787e-01
WARNING ::  material (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
```

```
WARNING ::  volume (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_293 = ( 5.0000000e-01, -1.8750000e+00,  4.3750000e+00)   6.83232e-01   5.89408e-02
    9.13732e-01
WARNING ::  material (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_294 = ( 5.0000000e-01, -3.1250000e+00,  4.3750000e+00)   7.63619e-01   3.05879e-01
    5.99436e-01
WARNING ::  material (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_295 = ( 5.0000000e-01, -4.3750000e+00,  4.3750000e+00)   8.21778e-01   2.98306e-02
    9.63700e-01
WARNING ::  material (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_296 = ( 5.0000000e-01,  4.3750000e+00,  3.1250000e+00)   3.24996e-01   2.74277e-01
    1.56062e-01
WARNING ::  material (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_297 = ( 5.0000000e-01,  3.1250000e+00,  3.1250000e+00)   7.08579e-01   6.02198e-02
    9.15013e-01
WARNING ::  material (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_298 = ( 5.0000000e-01,  1.8750000e+00,  3.1250000e+00)   9.84929e-01   2.43525e-01
    7.52749e-01
WARNING ::  material (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_299 = ( 5.0000000e-01,  6.2500000e-01,  3.1250000e+00)   6.02028e-01   3.13673e-01
    4.78973e-01
WARNING ::  material (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_300 = ( 5.0000000e-01, -6.2500000e-01,  3.1250000e+00)   1.03811e+00   2.18678e-01
    7.89350e-01
WARNING ::  material (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_301 = ( 5.0000000e-01, -1.8750000e+00,  3.1250000e+00)   6.95063e-01   4.86664e-01
    2.99828e-01
WARNING ::  material (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_302 = ( 5.0000000e-01, -3.1250000e+00,  3.1250000e+00)   9.61426e-01   2.64200e-01
    7.25200e-01
```

```
WARNING ::  material (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_303 = ( 5.0000000e-01, -4.3750000e+00,  3.1250000e+00)   9.84700e-01   3.96781e-01
    5.97054e-01
WARNING ::  material (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_304 = ( 5.0000000e-01,  4.3750000e+00,  1.8750000e+00)   7.23348e-01   1.92920e-01
    7.33295e-01
WARNING ::  material (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_305 = ( 5.0000000e-01,  3.1250000e+00,  1.8750000e+00)   8.30034e-01   1.56516e-01
    8.11435e-01
WARNING ::  material (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_306 = ( 5.0000000e-01,  1.8750000e+00,  1.8750000e+00)   5.22245e-01   3.83309e-01
    2.66037e-01
WARNING ::  material (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_307 = ( 5.0000000e-01,  6.2500000e-01,  1.8750000e+00)   9.46468e-01   2.36560e-01
    7.50061e-01
WARNING ::  material (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_308 = ( 5.0000000e-01, -6.2500000e-01,  1.8750000e+00)   6.79643e-01   1.49820e-01
    7.79560e-01
WARNING ::  material (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_309 = ( 5.0000000e-01, -1.8750000e+00,  1.8750000e+00)   7.90512e-01   1.76594e-01
    7.76608e-01
WARNING ::  material (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_310 = ( 5.0000000e-01, -3.1250000e+00,  1.8750000e+00)   5.58711e-01   2.93389e-01
    4.74882e-01
WARNING ::  material (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_311 = ( 5.0000000e-01, -4.3750000e+00,  1.8750000e+00)   7.51253e-01   8.25326e-02
    8.90140e-01
WARNING ::  material (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
```

```
WARNING ::  edit_4_particle_9_values (x,y,z)_312 = ( 5.0000000e-01,  4.3750000e+00,  6.2500000e-01)   9.31072e-01   5.40951e-01
    4.19002e-01
WARNING ::  material (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_313 = ( 5.0000000e-01,  3.1250000e+00,  6.2500000e-01)   5.72700e-01   9.99082e-02
    8.25549e-01
WARNING ::  material (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_314 = ( 5.0000000e-01,  1.8750000e+00,  6.2500000e-01)   9.82130e-01   2.10891e-01
    7.85272e-01
WARNING ::  material (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_315 = ( 5.0000000e-01,  6.2500000e-01,  6.2500000e-01)   7.91144e-01   1.95695e-01
    7.52644e-01
WARNING ::  material (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_316 = ( 5.0000000e-01, -6.2500000e-01,  6.2500000e-01)   1.02967e+00   3.48819e-02
    9.66123e-01
WARNING ::  material (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_317 = ( 5.0000000e-01, -1.8750000e+00,  6.2500000e-01)   1.26023e+00   0.00000e+00
    1.00000e+00
WARNING ::  material (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_318 = ( 5.0000000e-01, -3.1250000e+00,  6.2500000e-01)   7.37214e-01   8.00441e-02
    8.91424e-01
WARNING ::  material (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   2.00000e+00   3.00000e+00  -5.00000e-01
WARNING ::  volume (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   1.56250e+00   1.00000e+00   3.60000e-01
WARNING ::  edit_4_particle_9_values (x,y,z)_319 = ( 5.0000000e-01, -4.3750000e+00,  6.2500000e-01)   1.02299e+00   2.93726e-01
    7.12875e-01
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 192.
```

B.16 Test Case 1016

Listing 19: Test Case 1016 Comparison Results

```
   INFO :: Loading files for test case number: 1016
```

```
   INFO :: Loaded VTU file: inp1016u.vtu
   INFO :: Loaded XMF file: inp1016u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_9_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.17 Test Case 1017

Listing 20: Test Case 1017 Comparison Results

```
   INFO :: Loading files for test case number: 1017
   INFO :: Loaded VTU file: inp1017u.vtu
   INFO :: Loaded XMF file: inp1017u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.18 Test Case 1018

Listing 21: Test Case 1018 Comparison Results

```
   INFO :: Loading files for test case number: 1018
   INFO :: Loaded VTU file: inp1018u.vtu
   INFO :: Loaded XMF file: inp1018u.h5.xdmf
   INFO :: Getting response names...
```

```
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.19 Test Case 1020

Listing 22: Test Case 1020 Comparison Results

```
   INFO :: Loading files for test case number: 1020
   INFO :: Loaded VTU file: inp1020u.vtu
   INFO :: Loaded XMF file: inp1020u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.20 Test Case 1021

Listing 23: Test Case 1021 Comparison Results

```
   INFO :: Loading files for test case number: 1021
   INFO :: Loaded VTU file: inp1021u.vtu
   INFO :: Loaded XMF file: inp1021u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
```

```
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.21 Test Case 1022

Listing 24: Test Case 1022 Comparison Results

```
   INFO :: Loading files for test case number: 1022
   INFO :: Loaded VTU file: inp1022u.vtu
   INFO :: Loaded XMF file: inp1022u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E-01 &
   edit_4_particle_1_energy_bin_1_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_2_MAX_ENERGY_2.500E-01 &
   edit_4_particle_1_energy_bin_2_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_3_MAX_ENERGY_4.000E-01 &
   edit_4_particle_1_energy_bin_3_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_4_MAX_ENERGY_5.500E-01 &
   edit_4_particle_1_energy_bin_4_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_5_MAX_ENERGY_7.000E-01 &
   edit_4_particle_1_energy_bin_5_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_6_MAX_ENERGY_8.500E-01 &
   edit_4_particle_1_energy_bin_6_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_7_MAX_ENERGY_1.000E+00 &
   edit_4_particle_1_energy_bin_7_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
   edit_4_particle_1_energy_total_values
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E-01 &
   edit_14_particle_1_energy_bin_1_values
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_2_MAX_ENERGY_2.500E-01 &
   edit_14_particle_1_energy_bin_2_values
```

```
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_3_MAX_ENERGY_4.000E-01 &
 edit_14_particle_1_energy_bin_3_values
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_4_MAX_ENERGY_5.500E-01 &
 edit_14_particle_1_energy_bin_4_values
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_5_MAX_ENERGY_7.000E-01 &
 edit_14_particle_1_energy_bin_5_values
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_6_MAX_ENERGY_8.500E-01 &
 edit_14_particle_1_energy_bin_6_values
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_7_MAX_ENERGY_1.000E+00 &
 edit_14_particle_1_energy_bin_7_values
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_14_particle_1_energy_total_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E-01 &
 edit_24_particle_1_energy_bin_1_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_2_MAX_ENERGY_2.500E-01 &
 edit_24_particle_1_energy_bin_2_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_3_MAX_ENERGY_4.000E-01 &
 edit_24_particle_1_energy_bin_3_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_4_MAX_ENERGY_5.500E-01 &
 edit_24_particle_1_energy_bin_4_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_5_MAX_ENERGY_7.000E-01 &
 edit_24_particle_1_energy_bin_5_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_6_MAX_ENERGY_8.500E-01 &
 edit_24_particle_1_energy_bin_6_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_7_MAX_ENERGY_1.000E+00 &
 edit_24_particle_1_energy_bin_7_values
DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_TOTAL_MAX_ENERGY_N/A &
 edit_24_particle_1_energy_total_values
DEBUG ::  Found response: EDIT_34_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_34_particle_1_values
 INFO :: Iterating through cells to check all responses...
 INFO :: Done iterating.
 INFO :: Number of differences exceeding threshold: 0.
```

B.22 Test Case 1023

Listing 25: Test Case 1023 Comparison Results

```
   INFO :: Loading files for test case number: 1023
   INFO :: Loaded VTU file: inp1023u.vtu
   INFO :: Loaded XMF file: inp1023u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.23 Test Case 1024

Listing 26: Test Case 1024 Comparison Results

```
   INFO :: Loading files for test case number: 1024
   INFO :: Loaded VTU file: inp1024u.vtu
   INFO :: Loaded XMF file: inp1024u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.24 Test Case 1025

Listing 27: Test Case 1025 Comparison Results

```
   INFO :: Loading files for test case number: 1025
   INFO :: Loaded VTU file: inp1025u.vtu
   INFO :: Loaded XMF file: inp1025u.h5.xdmf
```

```
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.25 Test Case 1026

Listing 28: Test Case 1026 Comparison Results

```
   INFO :: Loading files for test case number: 1026
   INFO :: Loaded VTU file: inp1026u.vtu
   INFO :: Loaded XMF file: inp1026u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.26 Test Case 1027

Listing 29: Test Case 1027 Comparison Results

```
   INFO :: Loading files for test case number: 1027
   INFO :: Loaded VTU file: inp1027u.vtu
   INFO :: Loaded XMF file: inp1027u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
```

```
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.27 Test Case 1028

Listing 30: Test Case 1028 Comparison Results

```
   INFO :: Loading files for test case number: 1028
   INFO :: Loaded VTU file: inp1028u.vtu
   INFO :: Loaded XMF file: inp1028u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_3_values
  DEBUG ::  Found response: EDIT_4_ERROR_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_3_errors
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.28 Test Case 1029

Listing 31: Test Case 1029 Comparison Results

```
   INFO :: Loading files for test case number: 1029
   INFO :: Loaded VTU file: inp1029u.vtu
   INFO :: Loaded XMF file: inp1029u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
```

```
   DEBUG ::  Found response: density & mass_density
   DEBUG ::  Found response: volume & volume
   DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_4_particle_3_values
    INFO :: Iterating through cells to check all responses...
    INFO :: Done iterating.
    INFO :: Number of differences exceeding threshold: 0.
```

B.29 Test Case 1030

Listing 32: Test Case 1030 Comparison Results

```
    INFO :: Loading files for test case number: 1030
    INFO :: Loaded VTU file: inp1030u.vtu
    INFO :: Loaded XMF file: inp1030u.h5.xdmf
    INFO :: Getting response names...
   DEBUG ::  Found response: material & material
   DEBUG ::  Found response: density & mass_density
   DEBUG ::  Found response: volume & volume
   DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+01 &
    edit_4_particle_3_values
    INFO :: Iterating through cells to check all responses...
    INFO :: Done iterating.
    INFO :: Number of differences exceeding threshold: 0.
```

B.30 Test Case 1031

Listing 33: Test Case 1031 Comparison Results

```
    INFO :: Loading files for test case number: 1031
    INFO :: Loaded VTU file: inp1031u.vtu
    INFO :: Loaded XMF file: inp1031u.h5.xdmf
    INFO :: Getting response names...
   DEBUG ::  Found response: material & material
   DEBUG ::  Found response: density & mass_density
   DEBUG ::  Found response: volume & volume
```

```
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.31 Test Case 1032

Listing 34: Test Case 1032 Comparison Results

```
   INFO :: Loading files for test case number: 1032
   INFO :: Loaded VTU file: inp1032u.vtu
   INFO :: Loaded XMF file: inp1032u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_2_values
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_14_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.32 Test Case 1033

Listing 35: Test Case 1033 Comparison Results

```
   INFO :: Loading files for test case number: 1033
   INFO :: Loaded VTU file: inp1033u.vtu
   INFO :: Loaded XMF file: inp1033u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
```

```
   DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_14_particle_1_values
   DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_14_particle_1_errors
   DEBUG ::  Found response: EDIT_36_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_36_particle_1_2_values
   DEBUG ::  Found response: EDIT_36_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_36_particle_1_2_errors
    INFO :: Iterating through cells to check all responses...
    INFO :: Done iterating.
    INFO :: Number of differences exceeding threshold: 0.
```

B.33 Test Case 1034

Listing 36: Test Case 1034 Comparison Results

```
    INFO :: Loading files for test case number: 1034
    INFO :: Loaded VTU file: inp1034u.vtu
    INFO :: Loaded XMF file: inp1034u.h5.xdmf
    INFO :: Getting response names...
   DEBUG ::  Found response: material & material
   DEBUG ::  Found response: density & mass_density
   DEBUG ::  Found response: volume & volume
   DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_4_particle_2_values
    INFO :: Iterating through cells to check all responses...
WARNING ::  volume (x,y,z)_24866 = (-4.8063099e-01, -3.5860801e+00,  6.9244802e-01)   9.80200e-07   2.51755e-04  -2.55840e+02
WARNING ::  volume (x,y,z)_25276 = ( 1.2085176e+00, -3.2844725e+00,  1.4215125e+00)   4.15999e-07   2.05822e-04  -4.93766e+02
WARNING ::  volume (x,y,z)_25846 = (-4.8245475e-01, -3.4776075e+00,  6.9327801e-01)   4.50701e-07   2.28150e-04  -5.05211e+02
WARNING ::  volume (x,y,z)_26019 = (-7.1127623e-01, -3.2769225e+00,  8.1209302e-01)   4.21379e-07   2.01202e-04  -4.76486e+02
WARNING ::  volume (x,y,z)_26076 = (-1.1618249e+00, -3.7731099e+00,  2.3600450e+00)   3.70477e-07   2.15603e-04  -5.80960e+02
WARNING ::  volume (x,y,z)_26141 = (-1.2098351e+00, -3.4658675e+00,  2.3746476e+00)   4.06455e-07   2.07530e-04  -5.09586e+02
WARNING ::  volume (x,y,z)_26199 = (-1.1015494e-16, -3.4855101e+00,  3.1498301e+00)   3.77805e-07   1.05567e-04  -2.78423e+02
WARNING ::  volume (x,y,z)_26200 = (-1.1926224e-16, -3.2874475e+00,  3.1998301e+00)   3.20205e-07   1.90628e-04  -5.94331e+02
WARNING ::  volume (x,y,z)_26305 = ( 1.2085125e+00, -3.2919300e+00,  2.3784850e+00)   4.49577e-07   2.16754e-04  -4.81129e+02
WARNING ::  volume (x,y,z)_26465 = ( 1.2776400e+00, -3.5811801e+00,  1.6614450e+00)   7.71469e-07   2.11103e-04  -2.72638e+02
WARNING ::  volume (x,y,z)_31587 = ( 1.2771825e+00, -3.4829199e+00,  1.6595025e+00)   3.81671e-07   2.04977e-04  -5.36052e+02
WARNING ::  volume (x,y,z)_31641 = ( 1.2781050e+00, -3.2885325e+00,  1.6634275e+00)   3.73713e-07   2.01458e-04  -5.38072e+02
```

```
WARNING ::  volume (x,y,z)_31647 = ( 1.2781025e+00, -3.2919950e+00,  2.1365726e+00)   3.87332e-07   2.06324e-04  -5.31680e+02
WARNING ::  volume (x,y,z)_31657 = ( 1.0852776e+00, -3.4870224e+00,  2.6148624e+00)   5.10199e-07   2.33596e-04  -4.56854e+02
WARNING ::  volume (x,y,z)_31659 = ( 1.0879000e+00, -3.2845049e+00,  1.1887275e+00)   4.56933e-07   2.12367e-04  -4.63767e+02
WARNING ::  volume (x,y,z)_31665 = ( 4.7848725e-01, -3.4815300e+00,  6.9147825e-01)   4.48473e-07   2.22013e-04  -4.94042e+02
WARNING ::  volume (x,y,z)_31740 = ( 7.1127224e-01, -3.2889824e+00,  8.1210101e-01)   4.78851e-07   2.18633e-04  -4.55579e+02
WARNING ::  volume (x,y,z)_31764 = ( 4.7848725e-01, -3.2844374e+00,  6.9147825e-01)   4.15849e-07   2.05771e-04  -4.93822e+02
WARNING ::  volume (x,y,z)_31832 = (-4.7848850e-01, -3.2768924e+00,  6.9147301e-01)   3.83629e-07   1.95000e-04  -5.07304e+02
WARNING ::  volume (x,y,z)_31840 = (-9.1909027e-01, -3.2722125e+00,  9.8090976e-01)   4.13175e-07   1.96480e-04  -4.74537e+02
WARNING ::  volume (x,y,z)_31870 = (-9.1587675e-01, -3.4653151e+00,  9.7801250e-01)   4.66196e-07   2.21227e-04  -4.73536e+02
WARNING ::  volume (x,y,z)_31884 = (-4.7848749e-01, -3.4788401e+00,  3.1085200e+00)   4.38352e-07   2.17029e-04  -4.94101e+02
WARNING ::  volume (x,y,z)_31935 = (-1.0879050e+00, -3.2751524e+00,  2.6112776e+00)   4.13339e-07   1.98634e-04  -4.79560e+02
WARNING ::  volume (x,y,z)_31973 = (-1.2118950e+00, -3.3692701e+00,  1.6119225e+00)   5.83195e-06   3.01569e-03  -5.16099e+02
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 24.
```

B.34 Test Case 1035

Listing 37: Test Case 1035 Comparison Results

```
   INFO :: Loading files for test case number: 1035
   INFO :: Loaded VTU file: inp1035u.vtu
   INFO :: Loaded XMF file: inp1035u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_4_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.35 Test Case 1036

Listing 38: Test Case 1036 Comparison Results

```
   INFO :: Loading files for test case number: 1036
   INFO :: Loaded VTU file: inp1036u.vtu
   INFO :: Loaded XMF file: inp1036u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_2_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.36 Test Case 1037

Listing 39: Test Case 1037 Comparison Results

```
   INFO :: Loading files for test case number: 1037
   INFO :: Loaded VTU file: inp1037u.vtu
   INFO :: Loaded XMF file: inp1037u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_values
  DEBUG ::  Found response: EDIT_24_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_errors
  DEBUG ::  Found response: EDIT_124_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_124_particle_2_values
  DEBUG ::  Found response: EDIT_124_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_124_particle_2_errors
  DEBUG ::  Found response: EDIT_224_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_224_particle_3_values
  DEBUG ::  Found response: EDIT_224_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_224_particle_3_errors
```

```
   DEBUG ::  Found response: EDIT_324_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_324_particle_9_values
   DEBUG ::  Found response: EDIT_324_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_324_particle_9_errors
    INFO :: Iterating through cells to check all responses...
    INFO :: Done iterating.
    INFO :: Number of differences exceeding threshold: 0.
```

B.37 Test Case 10372

Listing 40: Test Case 10372 Comparison Results

```
    INFO :: Loading files for test case number: 10372
    INFO :: Loaded VTU file: inp1037u2.vtu
    INFO :: Loaded XMF file: inp1037u2.h5.xdmf
    INFO :: Getting response names...
   DEBUG ::  Found response: material & material
   DEBUG ::  Found response: density & mass_density
   DEBUG ::  Found response: volume & volume
   DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_14_particle_1_values
   DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_14_particle_1_errors
   DEBUG ::  Found response: EDIT_114_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_114_particle_2_values
   DEBUG ::  Found response: EDIT_114_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
    edit_114_particle_2_errors
   DEBUG ::  Found response: EDIT_214_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_214_particle_3_values
   DEBUG ::  Found response: EDIT_214_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_214_particle_3_errors
   DEBUG ::  Found response: EDIT_314_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_314_particle_9_values
   DEBUG ::  Found response: EDIT_314_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
    edit_314_particle_9_errors
    INFO :: Iterating through cells to check all responses...
    INFO :: Done iterating.
    INFO :: Number of differences exceeding threshold: 0.
```

B.38 Test Case 10373

Listing 41: Test Case 10373 Comparison Results

```
   INFO :: Loading files for test case number: 10373
   INFO :: Loaded VTU file: inp1037u3.vtu
   INFO :: Loaded XMF file: inp1037u3.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_34_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_34_particle_1_values
  DEBUG ::  Found response: EDIT_34_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_34_particle_1_errors
  DEBUG ::  Found response: EDIT_134_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_134_particle_2_values
  DEBUG ::  Found response: EDIT_134_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_134_particle_2_errors
  DEBUG ::  Found response: EDIT_234_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_234_particle_3_values
  DEBUG ::  Found response: EDIT_234_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_234_particle_3_errors
  DEBUG ::  Found response: EDIT_334_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_334_particle_9_values
  DEBUG ::  Found response: EDIT_334_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_334_particle_9_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.39 Test Case 1038

Listing 42: Test Case 1038 Comparison Results

```
   INFO :: Loading files for test case number: 1038
   INFO :: Loaded VTU file: inp1038u.vtu
   INFO :: Loaded XMF file: inp1038u.h5.xdmf
```

```
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_5.000E+01 &
   edit_14_particle_9_values
  DEBUG ::  Found response: EDIT_26_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_5.000E+01 &
   edit_26_particle_9_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.40 Test Case 1039

Listing 43: Test Case 1039 Comparison Results

```
   INFO :: Loading files for test case number: 1039
   INFO :: Loaded VTU file: inp1039u.vtu
   INFO :: Loaded XMF file: inp1039u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.41 Test Case 1040

Listing 44: Test Case 1040 Comparison Results

```
   INFO :: Loading files for test case number: 1040
   INFO :: Loaded VTU file: inp1040u.vtu
   INFO :: Loaded XMF file: inp1040u.h5.xdmf
   INFO :: Getting response names...
```

```
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.42 Test Case 1041

Listing 45: Test Case 1041 Comparison Results

```
   INFO :: Loading files for test case number: 1041
   INFO :: Loaded VTU file: inp1041au.vtu
   INFO :: Loaded XMF file: inp1041au.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.43 Test Case 10412

Listing 46: Test Case 10412 Comparison Results

```
   INFO :: Loading files for test case number: 10412
   INFO :: Loaded VTU file: inp1041bu.vtu
   INFO :: Loaded XMF file: inp1041bu.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
```

```
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.44 Test Case 1042

Listing 47: Test Case 1042 Comparison Results

```
   INFO :: Loading files for test case number: 1042
   INFO :: Loaded VTU file: inp1042u.vtu
   INFO :: Loaded XMF file: inp1042u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.45 Test Case 1043

Listing 48: Test Case 1043 Comparison Results

```
   INFO :: Loading files for test case number: 1043
   INFO :: Loaded VTU file: inp1043u.vtu
   INFO :: Loaded XMF file: inp1043u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
```

```
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.46 Test Case 1044

Listing 49: Test Case 1044 Comparison Results

```
   INFO :: Loading files for test case number: 1044
   INFO :: Loaded VTU file: inp1044u.vtu
   INFO :: Loaded XMF file: inp1044u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.47 Test Case 1045

Listing 50: Test Case 1045 Comparison Results

```
   INFO :: Loading files for test case number: 1045
   INFO :: Loaded VTU file: inp1045u.vtu
   INFO :: Loaded XMF file: inp1045u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
```

```
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.48 Test Case 1046

Listing 51: Test Case 1046 Comparison Results

```
   INFO :: Loading files for test case number: 1046
   INFO :: Loaded VTU file: inp1046u.vtu
   INFO :: Loaded XMF file: inp1046u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_6_RESULT_TIME_BIN_1_MAX_TIME_1.000E+39_ENERGY_BIN_1_MAX_ENERGY_1.000E+10 &
   edit_6_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.49 Test Case 1047

Listing 52: Test Case 1047 Comparison Results

```
   INFO :: Loading files for test case number: 1047
   INFO :: Loaded VTU file: inp1047u.vtu
   INFO :: Loaded XMF file: inp1047u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
```

```
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.50 Test Case 1048

Listing 53: Test Case 1048 Comparison Results

```
   INFO :: Loading files for test case number: 1048
   INFO :: Loaded VTU file: inp1048u.vtu
   INFO :: Loaded XMF file: inp1048u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_errors
  DEBUG ::  Found response: EDIT_114_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_114_particle_2_values
  DEBUG ::  Found response: EDIT_114_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_114_particle_2_errors
  DEBUG ::  Found response: EDIT_214_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_214_particle_3_values
  DEBUG ::  Found response: EDIT_214_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_214_particle_3_errors
  DEBUG ::  Found response: EDIT_314_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_314_particle_9_values
  DEBUG ::  Found response: EDIT_314_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_314_particle_9_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.51 Test Case 10482

Listing 54: Test Case 10482 Comparison Results

```
   INFO :: Loading files for test case number: 10482
   INFO :: Loaded VTU file: inp1048u2.vtu
   INFO :: Loaded XMF file: inp1048u2.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_values
  DEBUG ::  Found response: EDIT_24_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_errors
  DEBUG ::  Found response: EDIT_124_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_124_particle_2_values
  DEBUG ::  Found response: EDIT_124_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_124_particle_2_errors
  DEBUG ::  Found response: EDIT_224_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_224_particle_3_values
  DEBUG ::  Found response: EDIT_224_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_224_particle_3_errors
  DEBUG ::  Found response: EDIT_324_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_324_particle_9_values
  DEBUG ::  Found response: EDIT_324_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_324_particle_9_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.52 Test Case 10483

Listing 55: Test Case 10483 Comparison Results

```
   INFO :: Loading files for test case number: 10483
   INFO :: Loaded VTU file: inp1048u3.vtu
   INFO :: Loaded XMF file: inp1048u3.h5.xdmf
```

```
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_34_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_34_particle_1_values
  DEBUG ::  Found response: EDIT_34_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_34_particle_1_errors
  DEBUG ::  Found response: EDIT_134_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_134_particle_2_values
  DEBUG ::  Found response: EDIT_134_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_134_particle_2_errors
  DEBUG ::  Found response: EDIT_234_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_234_particle_3_values
  DEBUG ::  Found response: EDIT_234_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_234_particle_3_errors
  DEBUG ::  Found response: EDIT_334_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_334_particle_9_values
  DEBUG ::  Found response: EDIT_334_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_334_particle_9_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.53 Test Case 1049

Listing 56: Test Case 1049 Comparison Results

```
   INFO :: Loading files for test case number: 1049
   INFO :: Loaded VTU file: inp1049u.vtu
   INFO :: Loaded XMF file: inp1049u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
```

```
DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_14_particle_1_values
DEBUG ::  Found response: EDIT_94_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_94_particle_1_values
DEBUG ::  Found response: EDIT_64_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_64_particle_1_values
DEBUG ::  Found response: EDIT_74_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_74_particle_1_values
DEBUG ::  Found response: EDIT_44_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_44_particle_2_values
DEBUG ::  Found response: EDIT_54_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_54_particle_2_values
 INFO :: Iterating through cells to check all responses...
 INFO :: Done iterating.
 INFO :: Number of differences exceeding threshold: 0.
```

B.54 Test Case 1050

Listing 57: Test Case 1050 Comparison Results

```
 INFO :: Loading files for test case number: 1050
 INFO :: Loaded VTU file: inp1050u.vtu
 INFO :: Loaded XMF file: inp1050u.h5.xdmf
 INFO :: Getting response names...
DEBUG ::  Found response: material & material
DEBUG ::  Found response: density & mass_density
DEBUG ::  Found response: volume & volume
DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_4_particle_1_values
DEBUG ::  Found response: EDIT_114_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_114_particle_1_values
DEBUG ::  Found response: EDIT_124_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_124_particle_1_values
DEBUG ::  Found response: EDIT_134_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
 edit_134_particle_1_values
 INFO :: Iterating through cells to check all responses...
 INFO :: Done iterating.
 INFO :: Number of differences exceeding threshold: 0.
```

B.55 Test Case 1051

Listing 58: Test Case 1051 Comparison Results

```
   INFO :: Loading files for test case number: 1051
   INFO :: Loaded VTU file: inp1051u.vtu
   INFO :: Loaded XMF file: inp1051u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_44_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_44_particle_9_values
  DEBUG ::  Found response: EDIT_54_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_54_particle_9_values
  DEBUG ::  Found response: EDIT_64_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_64_particle_9_values
  DEBUG ::  Found response: EDIT_74_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_74_particle_9_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.56 Test Case 1052

Listing 59: Test Case 1052 Comparison Results

```
   INFO :: Loading files for test case number: 1052
   INFO :: Loaded VTU file: inp1052u.vtu
   INFO :: Loaded XMF file: inp1052u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_4_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
```

```
   INFO :: Number of differences exceeding threshold: 0.
```

B.57 Test Case 1053

Listing 60: Test Case 1053 Comparison Results

```
   INFO :: Loading files for test case number: 1053
   INFO :: Loaded VTU file: inp1053u.vtu
   INFO :: Loaded XMF file: inp1053u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.58 Test Case 1054

Listing 61: Test Case 1054 Comparison Results

```
   INFO :: Loading files for test case number: 1054
   INFO :: Loaded VTU file: inp1054u.vtu
   INFO :: Loaded XMF file: inp1054u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_16_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_16_particle_9_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.59 Test Case 1055

Listing 62: Test Case 1055 Comparison Results

```
   INFO :: Loading files for test case number: 1055
   INFO :: Loaded VTU file: inp1055u.vtu
   INFO :: Loaded XMF file: inp1055u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_16_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_16_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.60 Test Case 1056

Listing 63: Test Case 1056 Comparison Results

```
   INFO :: Loading files for test case number: 1056
   INFO :: Loaded VTU file: inp1056u.vtu
   INFO :: Loaded XMF file: inp1056u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.61 Test Case 1057

Listing 64: Test Case 1057 Comparison Results

```
   INFO :: Loading files for test case number: 1057
   INFO :: Loaded VTU file: inp1057u.vtu
   INFO :: Loaded XMF file: inp1057u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.62 Test Case 1058

Listing 65: Test Case 1058 Comparison Results

```
   INFO :: Loading files for test case number: 1058
   INFO :: Loaded VTU file: inp1058u.vtu
   INFO :: Loaded XMF file: inp1058u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.63 Test Case 1059

Listing 66: Test Case 1059 Comparison Results

```
   INFO :: Loading files for test case number: 1059
   INFO :: Loaded VTU file: inp1059u.vtu
```

```
   INFO :: Loaded XMF file: inp1059u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_114_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_114_particle_1_values
  DEBUG ::  Found response: EDIT_124_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_124_particle_1_values
  DEBUG ::  Found response: EDIT_134_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_134_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.64 Test Case 1060

Listing 67: Test Case 1060 Comparison Results

```
   INFO :: Loading files for test case number: 1060
   INFO :: Loaded VTU file: inp1060u.vtu
   INFO :: Loaded XMF file: inp1060u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.65 Test Case 1061

Listing 68: Test Case 1061 Comparison Results

```
   INFO :: Loading files for test case number: 1061
   INFO :: Loaded VTU file: inp1061u.vtu
   INFO :: Loaded XMF file: inp1061u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_2_values
  DEBUG ::  Found response: EDIT_34_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_34_particle_2_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.66 Test Case 1062

Listing 69: Test Case 1062 Comparison Results

```
   INFO :: Loading files for test case number: 1062
   INFO :: Loaded VTU file: inp1062u.vtu
   INFO :: Loaded XMF file: inp1062u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+20_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+20_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_errors
  DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+20_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_2_values
  DEBUG ::  Found response: EDIT_24_ERROR_TIME_BIN_1_MAX_TIME_1.000E+20_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_2_errors
   INFO :: Iterating through cells to check all responses...
```

```
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.67 Test Case 1063

Listing 70: Test Case 1063 Comparison Results

```
   INFO :: Loading files for test case number: 1063
   INFO :: Loaded VTU file: inp1063u.vtu
   INFO :: Loaded XMF file: inp1063u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.68 Test Case 1065

Listing 71: Test Case 1065 Comparison Results

```
   INFO :: Loading files for test case number: 1065
   INFO :: Loaded VTU file: inp1065u.vtu
   INFO :: Loaded XMF file: inp1065u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_values
  DEBUG ::  Found response: EDIT_14_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_1_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
```

```
   INFO :: Number of differences exceeding threshold: 0.
```

B.69 Test Case 10652

Listing 72: Test Case 10652 Comparison Results

```
   INFO :: Loading files for test case number: 10652
   INFO :: Loaded VTU file: inp1065u2.vtu
   INFO :: Loaded XMF file: inp1065u2.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_values
  DEBUG ::  Found response: EDIT_24_ERROR_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_24_particle_1_errors
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.70 Test Case 1066

Listing 73: Test Case 1066 Comparison Results

```
   INFO :: Loading files for test case number: 1066
   INFO :: Loaded VTU file: inp1066u.vtu
   INFO :: Loaded XMF file: inp1066u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_4_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

B.71 Test Case 1067

Listing 74: Test Case 1067 Comparison Results

```
   INFO :: Loading files for test case number: 1067
   INFO :: Loaded VTU file: inp1067u.vtu
   INFO :: Loaded XMF file: inp1067u.h5.xdmf
   INFO :: Getting response names...
  DEBUG ::  Found response: material & material
  DEBUG ::  Found response: density & mass_density
  DEBUG ::  Found response: volume & volume
  DEBUG ::  Found response: EDIT_4_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_4_particle_1_values
  DEBUG ::  Found response: EDIT_14_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+36 &
   edit_14_particle_2_values
  DEBUG ::  Found response: EDIT_24_RESULT_TIME_BIN_1_MAX_TIME_1.000E+33_ENERGY_BIN_1_MAX_ENERGY_1.000E+02 &
   edit_24_particle_3_values
   INFO :: Iterating through cells to check all responses...
   INFO :: Done iterating.
   INFO :: Number of differences exceeding threshold: 0.
```

C Demonstration of Inspecting Test Case 1034 Element Volume Disagreement

This appendix gives a ParaView workflow to manually interrogate and compare element properties. It is provided to demonstrate how poor-quality elements and neighboring elements in Test Case 1034 are examined to conclude that probing the thin, poor-quality, elements sometimes probed a neighboring element. Steps to follow include:

1. Load `inp1034u.h5.xdmf` in ParaView.
2. For convenience, create a Point Source at $(0.91908097, -3.2889924, 0.98091900)$, which is the first point identified as disagreeing for Test Case 1034.
   (a) Ensure the point source is colored differently than the background and elements and that it has a substantial point size such as 10–20 to make it visible.
   (b) The camera focal point can be easily reset to this point by hiding all other pipeline objects than the point source and then clicking the "Reset" button in the Camera Controls toolbar.
3. Apply a Mesh Quality filter to the XDMF file (for this work, ParaView 5.7.0 default settings are used).
4. Use the Find Data dialog (in the Edit menu) to find elements that satisfy a "poor quality" criterion. Choose a quality threshold, click the Run Selection Query button, and extract the selection. An example of the Find Data dialog is shown in Fig. 3.
5. The point source created previously should be coincident with a poor quality element as shown in Fig. 4. Note that the elements identified in Fig. 4 are the same as those in Fig. 2b.
6. Probe the poor-quality element for its volume as shown in Fig. 5. This value agrees with the value reported for the VTU file (`4.94396e-07`).
7. Enable the original XDMF file in the pipeline, and apply a Clip filter with its origin at the point of interest and oriented relative to the camera normal (perhaps needing to invert the clip). This will show the entire mesh overlaid with the poor-quality elements as shown in Fig. 6.
8. Finally, probe the clipped view to obtain the volume of the element(s) neighboring the poor-quality element probed previously. The nearby element's volume agrees with the other volume reported for the XDMF value for Test Case 1034 (`2.20965e-04`).
   (a) Using Ctrl + p (or Cmd + p on macOS) can be helpful when trying to select an element.

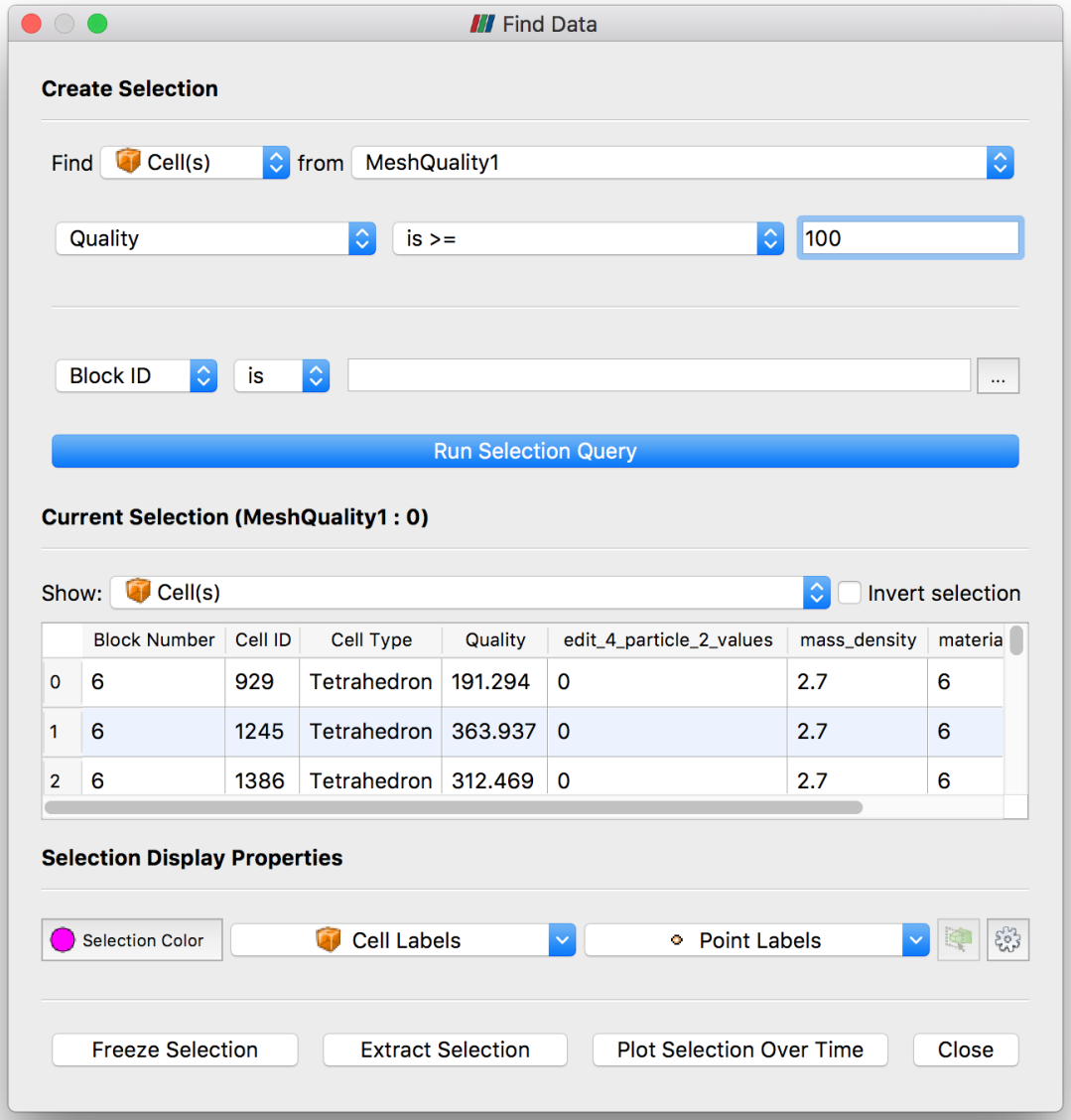

Figure 3: Extracting Poor-quality Elements

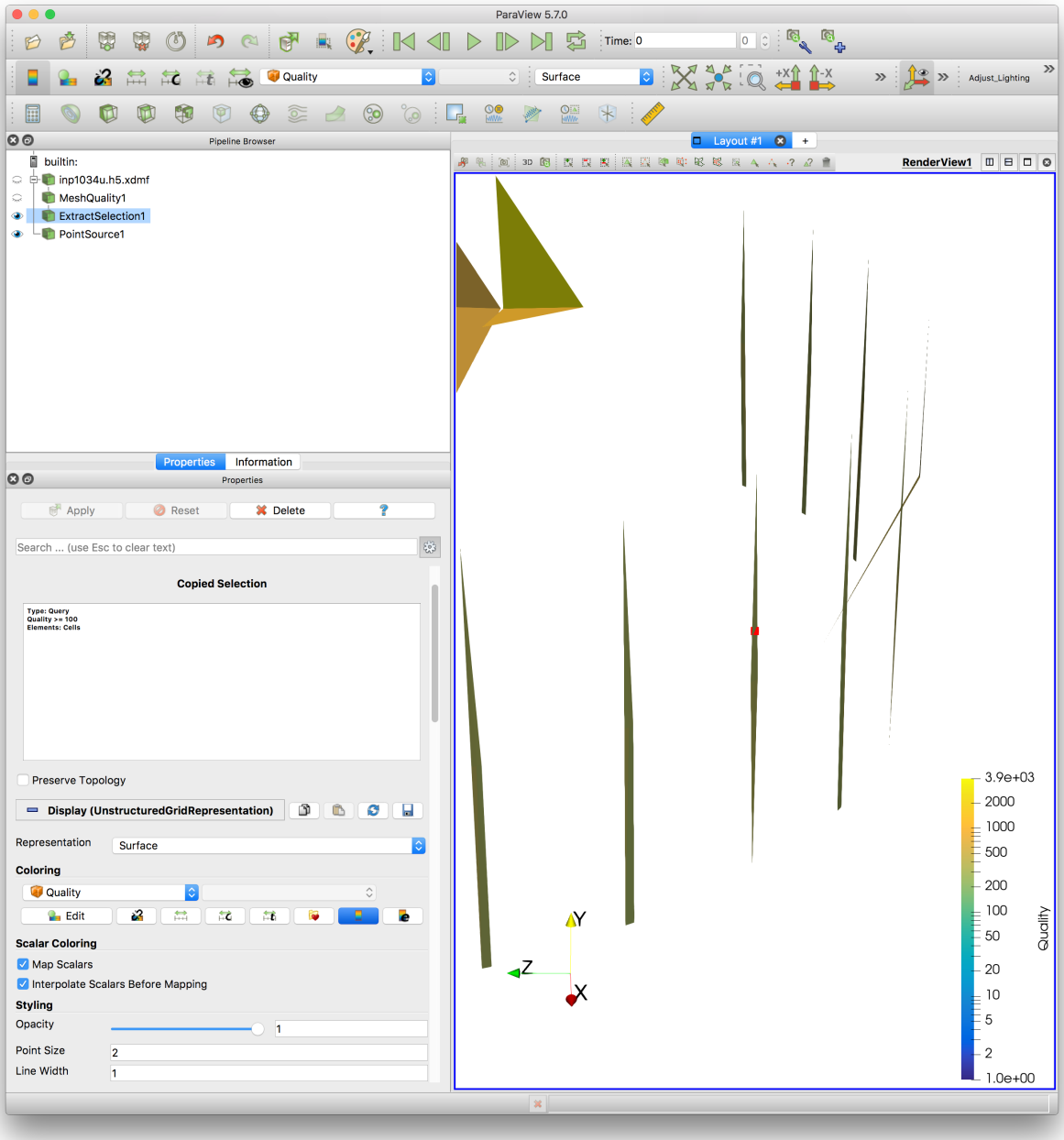

Figure 4: Viewing Poor-quality Elements

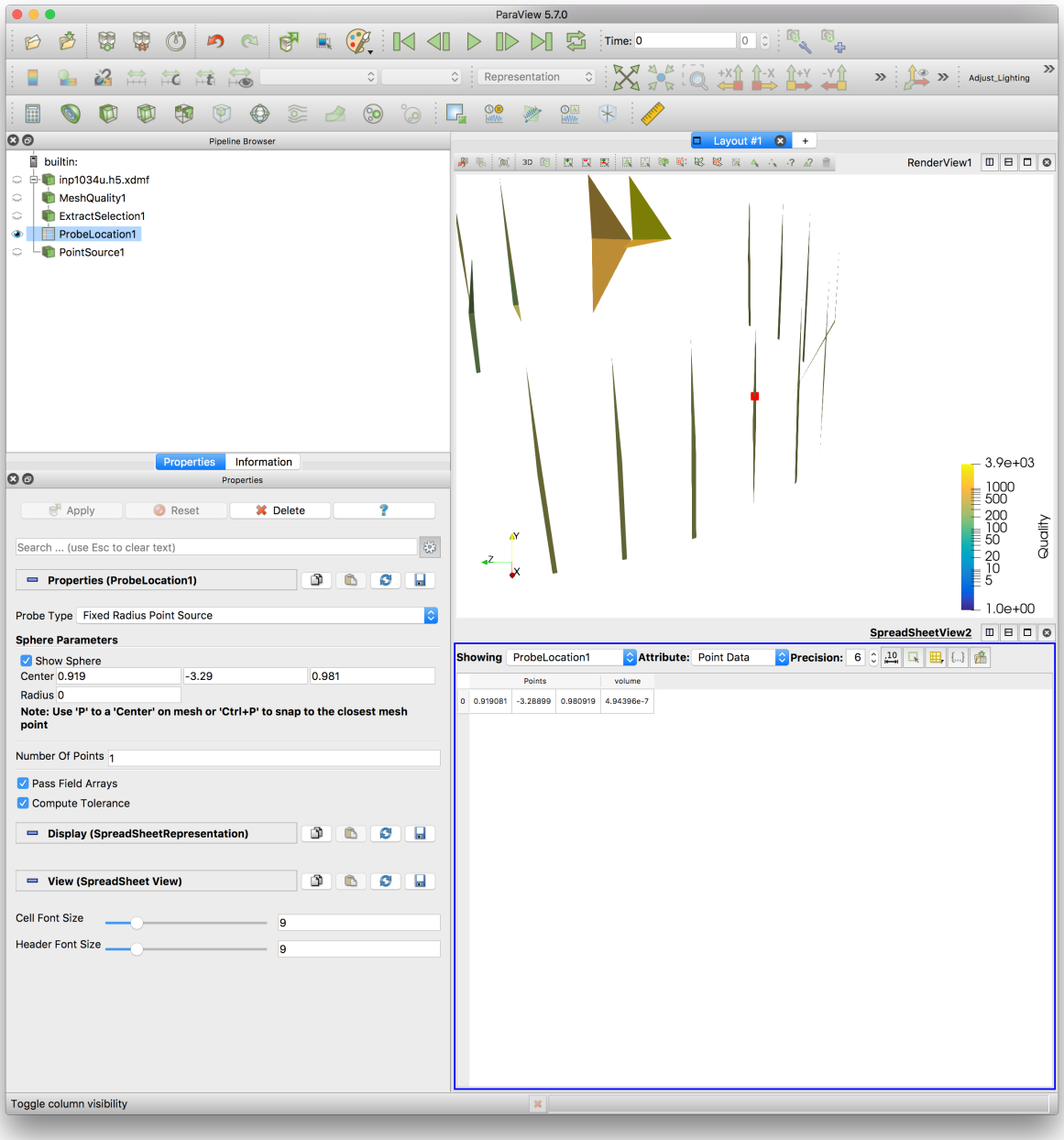

Figure 5: Probing for Element Volume at a Location

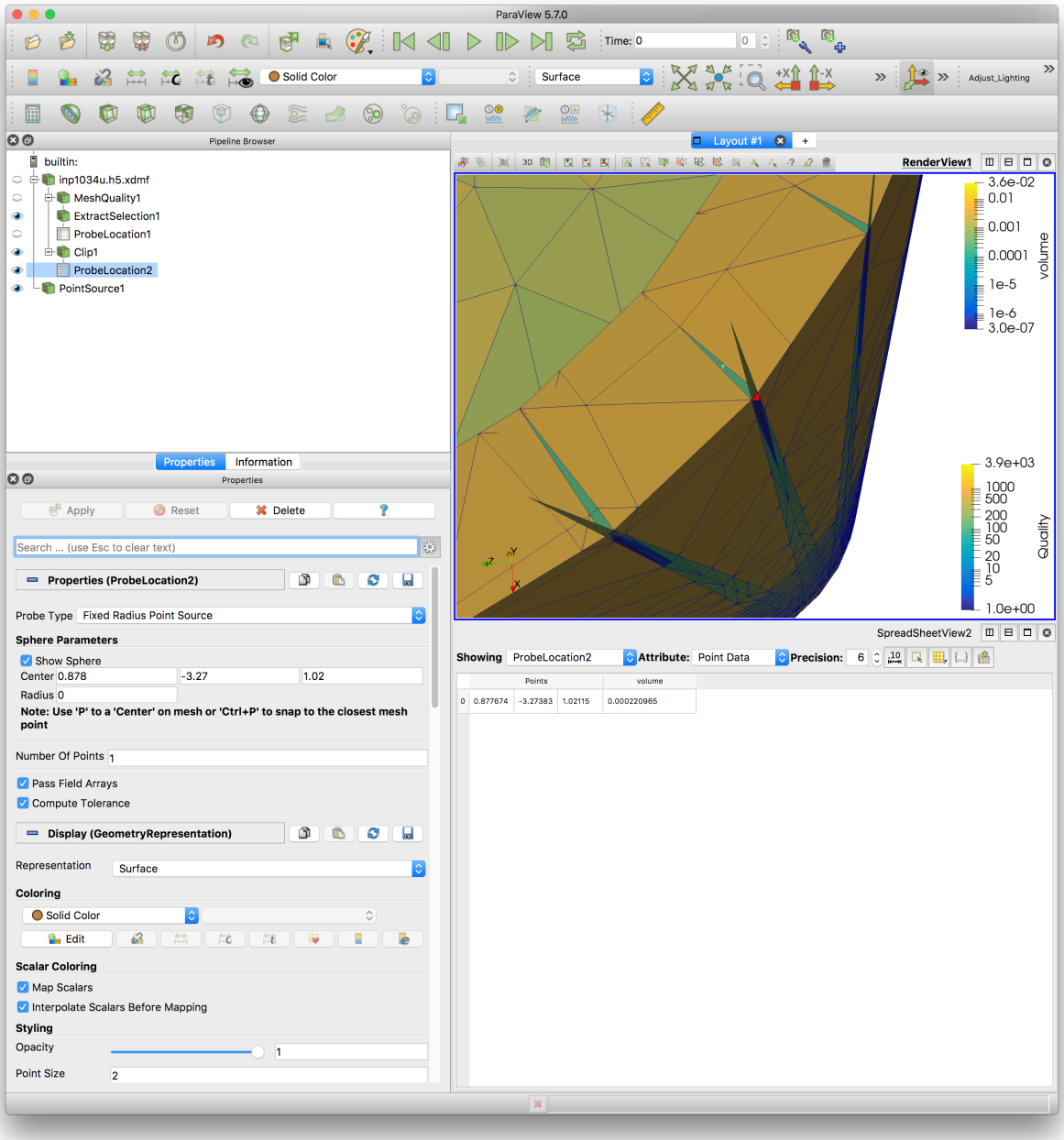

Figure 6: Clipping and Probing for a Neighboring Element Volume