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Appendix 6: CASTNET Data Operations Standard Operating Procedures



Clean Air Status and Trends Network

Quality Assurance Project Plan

Revision 10.2

Appendix 6:

CASTNET Data Operations Standard Operating Procedures

March 6, 2025

TITLE: DATA ANALYSIS AND REPORTS

Effective

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Annual Review						
Reviewed by: Title: Date: Signature:						

DATA ANALYSIS AND REPORTS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) staff for performing the necessary data analysis and production of the required standard figures for CASTNET quarterly and annual data reports.

2.0 SCOPE

These processes apply to the preparation of standard quarterly and annual CASTNET reports. A working knowledge of Structured Query Language (SQL), Microsoft[®] Access[™], MapInfo[®], Microsoft[®] SQL Server[™], and Microsoft[®] Excel[™] is assumed.

3.0 SUMMARY



4.0 MATERIALS

Laptop or personal computer Microsoft SQL Server MapInfo Microsoft Excel Permissions and access to utilize databases

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow,

including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 PROCEDURE

6.1 Quarterly Reports: Dry Chemistry

All analyses and figures described in this section are developed from atmospheric concentration data obtained from the three-stage filter pack installed weekly at all dry deposition-configured CASTNET sites.

Note: All query examples contained within Sections 6.1 through 6.3 refer to the CASTNet Second Quarter 2001 Data Report (Q2 2001 Report).

6.1.1 Creating the DRYCHEM_REPORT table

Creation of dry chemistry concentration figures requires the use of a temporary table generated for the sole purpose of producing the quarterly report. This table, the DRYCHEM_REPORT, is created in the *castnet_working* database by first inserting all records from the DRYCHEM table, which is part of the *castnet* database. Before creating the table for the current quarterly report, verify that the table associated with the previous report was archived and deleted from the *castnet working* database. The following query is used from the SQL Server[™] Query Analyzer:

SELECT * INTO castnet_working.dbo.drychem_report FROM castnet.dbo.drychem

DRYCHEM records represent the archived Level 3 concentration data set. However, when analysis begins, this data set is usually not complete for every site for the quarter being reported. For example, when analysis commenced for the Q2 2001 Report, the maximum "date off" for site SUM156 was January 30, 2001. Since second quarter (Q2) concludes at the end of June, an additional five months of data were needed. To complete the data set for the quarter, the "Dry Chemistry Calculation Process" within the CASTNET Data Management System Application is run for the range of dates for which data are missing. This range is determined by finding the earliest maximum "date off" present among active sites (group by site_id) in the DRYCHEM table and the maximum "date on" needed to complete the quarter. Determination of which samples are included in a calendar quarter is based on the midpoint of the sample period. Therefore, the last week required to complete the quarterly sample period may extend into the next calendar quarter. For the Q2 2001 Report, Week 27 is the last sample needed as the midpoints fall on either 6/29/01 or 6/30/01, both within Q2. To determine the maximum ("date on") needed, the following query of the FILTER PACK table (*castnet* database) is used:

```
SELECT
    lab_key,
    site_id,
    dateon,
    dateoff,
    CONVERT(datetime,((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)) AS mid_point
FROM
    filter_pack
WHERE
    lab_key LIKE '%01-27*%'
ORDER BY
    CONVERT(datetime,((CONVERT(real,dateoff)+CONVERT (real,dateon))/2)) DESC
```

Examination of the "mid_point" results field indicates that all samples fall within the current quarter. Using the earliest maximum ("date off") present for any site within DRYCHEM and the earliest "date on" for the last sample week needed to complete the quarter, enter the date range into the "Dry Chemistry Calculation Process," and calculate concentrations for all sites. Once these calculations are completed, add the necessary records to the DRYCHEM_REPORT table using the following query:

INSERT INTO drychem report(
lab key,
site id,
type,
dateon,
dateoff,
tso4,
tso4 f,
tno3,
tno3 f,
tnh4,
tnh4 f,
ca,
ca f,
mg,
mg f,
na,
na f,
k, —
k f,
nso4,
nso4_f,
nhno3,
nhno3_f,
wso2,
wso2_f,
wno3,
wno3_f,
total_so2,
total_no3,
flow_volume,
flow_volume_f,
valid_hours,
valid_hours_f,
std2local_cf,
temp_source,
comment_codes,
qa_code
)
SELECT
drychem_temp.lab_key,
arychem_temp.site_id,
drychem_temp.type,
drychem_temp.dateoff
drychem_temp.tac4
drychem_temp.tso4,
drychem_temp_tpo3
drychem temp tpo3 f
drychem temp tph/
drychem temp tph4 f.
drychem_temp.ca.
drychem temp.ca f.
drychem temp.mg.
2 · · · _ · · · · · · · · · · · · · · ·

druchem temp ma f
drychem temp na.
drychem temp na f
drychem temp k
drychem centry k f
drychem_temp.k_1,
arychenemp.nso4,
arychem_temp.nso4_t,
drychem_temp.nhno3,
drychem_temp.nhno3_f,
drychem_temp.wso2,
drychem_temp.wso2_f,
drychem temp.wno3,
drychem temp.wno3 f,
drychem temp.total so2,
drychem temp.total no3,
drychem temp.flow volume,
drychem temp.flow volume f,
drychem temp.valid hours,
drychem temp, valid hours f.
drychem temp.comment.codes.
drychem temp std2local cf.
drychem temp source
drychem temp ac code
ur yoneni_cenip.qa_code
FROM
arychem_report Right John arychem_temp on (arychem_report.lab_key = arychem_temp.lab_key)
WHERE we to be an IONIT
drychem report lab key IS NULL

The "RIGHT JOIN" in the "SELECT" statement (in combination with the "WHERE" clause) determines the records needed to complete the DRYCHEM_REPORT table.

6.1.2 Quarterly Mean Concentration Maps

Each quarterly report contains maps of time-weighted, mean concentrations for 11 atmospheric constituents. The maps are developed to show the following:

- 1. Sulfur dioxide (SO₂) current quarter, current year [i.e., Q2 2001];
- 2. Particulate sulfate (SO_4^{2-}) current quarter, current year;
- 3. Nitric acid (HNO₃) current quarter, current year;
- 4. Particulate ammonium (NH_4^*) current quarter, current year;
- 5. Particulate nitrate (NO_3) current quarter, current year;
- 6. Total NO_3^2 current quarter, current year;
- 7. Particulate calcium (Ca^{2+}) current quarter, current year;
- 8. Particulate potassium (K^{\dagger}) current quarter, current year;
- 9. Particulate magnesium (Mg²⁺) current quarter, current year; and
- 10. Particulate sodium (Na $^{+}$) current quarter, current year.
- 11. Particulate chloride (Cl⁻) current quarter, current year.

Quarterly mean concentrations require that 69 percent of the weeks during the quarter are valid. All samples are weighted based on their "runtime" (the length of time the filter pack is on the tower). For example, a sample that ran for two weeks is counted twice as much in the mean as a sample that ran for only one week. The midpoint of the sample period is used to determine which weeks are assigned to the quarter and year being analyzed. Formulas for the six major analytes are as follows (See Section 6.1 for an explanation of the DRYCHEM table field names used in the formulas):

SO ₂	=	(0.667*nso4)+wso2,
SO ₄ ²⁻	=	tso4,
HNO ₃	=	nhno3,
$NH_4^{\scriptscriptstyle+}$	=	tnh4,
NO ⁻ ₃	=	tno3, and
Total NO ⁻ ₃	=	tno3+(0.9841*nhno3).

Maps developed for the quarterly report are based on tables in an Access[™] database created expressly for this task. In this database, queries, such as the following one for SO₂ for Q2 2001, are used to calculate mean quarterly concentrations for all sites. Queries use SQL Server[™] 2022 syntax and are set up as SQL Pass Through Queries to directly access the SQL Server[™] tables. A "Make-Table" query in the Access[™] database is used to access the SQL Pass Through Query and create the new data table:

```
SELECT
   drychem report.site id,
   DATEPART (qq, (CONVERT (datetime, ((CONVERT (real, dateoff) + CONVERT (real, dateon))/2)))) as
quarter,
   DATEPART(yy, (CONVERT(datetime, ((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))) as
year,
   100.0*(drychem days.SO2 total days)/(drychem days.total days) as pct SO2 2001,
   avg_so2_2001 =
      CASE
         WHEN 100.0* (drychem days. SO2 total days) / (drychem days.total days) > 69
         THEN (SUM(((0.667*nso4)+wso2)*(CONVERT(real,dateoff-
dateon))/(drychem days.SO2 total days)))
         ELSE null
     END
FROM
   castnet working.dbo.drychem report INNER JOIN castnet working.dbo.drychem days ON
   (castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id
AND
   DATEPART (qq, (CONVERT (datetime, ((CONVERT (real, dateoff) + CONVERT (real, dateon))/2)))) =
drychem days.quarter AND
   DATEPART(yy, (CONVERT(datetime, ((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))) =
drychem days.year)
```

WHERE
(
(DATEPART(qq, (CONVERT(datetime, ((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))) = 2) AND
(DATEPART(yy, (CONVERT(datetime, ((CONVERT(real, dateoff)+CONVERT(real, dateon))/2)))) = 2001) AND
((nso4_f is null) OR (nso4_f='U') OR (nso4_f='L') OR (nso4_f='R') OR (nso4_f='#') OR
(nso4_f='S'))
AND
((wso2_f is null) OR (wso2_f='U') OR (wso2_f='L') OR (wso2_f='R') OR (wso2_f='#') OR
(wso2_f='S')) AND
((flow_volume_f is null) or (flow_volume_f ='L')) AND
(drychem_report.site_id<> 'ASH235' AND drychem_report.site_id <> 'MCK231')
)
GROUP BY
drychem_report.site_id,
DATEPART (qq, (CONVERT (datetime, ((CONVERT (real, dateoff) +CONVERT (real, dateon))/2)))),
DATEPART(yy,(CONVERT(datetime,((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))),
drychem_days.total_days,
drychem_days. SO2 _total_days

To run queries to calculate the mean quarterly concentrations for each of the remaining five major analytes, replace [(0.667*nso4)+wso2] in the "CASE" statement with the formula for the specific analyte. Also, replace the flags in the "WHERE" clause (i.e., $nso4_f$) with the flag for the specific analyte. Verify that the target quarter and year are also set in the "WHERE" clause (shown in <u>underline/bold</u>). In addition, all references to the previously queried analyte (i.e., SO_2) must be changed to the current analyte of interest. For example, SO_2 is changed to the current analyte of interest in SO2_total_days, pct_SO2_2001, and average SO2 2001 (shown in **bold**).

The SQL Pass Through Queries in the Access[™] database are dependent on the presence of the DRYCHEM_DAYS table in the *castnet_working* database. This table must be recreated for each quarterly report. It contains the number of total possible days for the quarter and the number of valid days present during the quarter for a specific site by analyte. DRYCHEM_DAYS is used to correctly weight individual samples included in the quarterly mean. See Attachment A for the full script used to create this table.

The fields contained in the DRYCHEM_DAYS table include:

- site_id
- quarter
- year
- actual_days
- total_days
- SO2_total_days
- SO4_total_days
- HNO3_total_days

- NO3_total_days
- NH4_total_days
- TOTNO3_total_days
- Ca_total_days
- K_total_days
- Mg_total_days
- Na_total_days

SQL Pass Through Queries are set up for the six major analytes, chloride, and the cations, Ca²⁺, K⁺, Mg²⁺, and Na⁺, for the relevant quarter for both the current and previous years. Although maps for previous years and maps of percent difference between years are no longer included in the reports, they can be useful as a quality control or data analysis tool. Once these queries are set up, an Access[™] query is used to combine them into a table for each year. The SITE table is linked in the Access[™] database and then joined with the relevant queries for each year to obtain latitude and longitude values for each site.

After these summary tables are created, the percent difference between each value for each site for the current quarter and the corresponding value for the same quarter of the previous year is calculated by joining the two tables on site_id, latitude, and longitude. The percent difference is calculated as:

 $PercentDifference = 100* \frac{([concentration from current quarter, year] - [concentration from previous quarter, year])}{[concentration from previous quarter, year]}$

The Access[™] database must now be set up as an open database connectivity (ODBC) data source for access by MapInfo[®], the program used to create maps for quarterly and annual reports. Some maps in the annual reports may be produced using ArcGIS (www.esri.com/software/arcgis/). After opening MapInfo[®], open the "WholeUSA" table (for the Jacksonville office, located in directory P:\castnet\logos_and_ publishing\base_maps\) to obtain a map of the continental United States. The following are the settings for the map:

- **<u>Projection</u>**: Under the "Map" menu option, select "Options." Click the "Projection" button. In the "Category" combo box, select "Region Equal-Area Projection." Then select "Equal Area Projection (North America)" from the "Category Members" list box.
- <u>Map Scale/Center Positioning</u>: To center the map for the preferred display, select "Map" and "Change View." The dialog box shown below (Figure 1) will display. Set the zoom to 3,200 miles and specify the map scale so that 1 inch = 300.0 miles. Finally, to center the window, enter the coordinates for the center position in degrees latitude and longitude as 38.40 and -96.97 respectively. The X dimension is longitude and values in the Northern Hemisphere must start with a negative value.

Figure 1

Change View		×
Zoom (Window Width):	3,200 mi	
<u>M</u> ap Scale: 1 in =	300.0 mi	
<u>C</u> enter of Window: X:	-96.99 deg Y: 38.43 d	deg
OK	Cancel <u>H</u> elp	

To access the data for the maps, select "Open DBMS Table" from under the "File" menu option. Select the ODBC data source that points to the Access[™] database created for the current quarterly report. From the list of tables and queries provided, select one of the tables with data to map. Follow the import wizard and save the MapInfo[®] table in the directory created for the quarterly report. Before the data in a table is displayed on a map, it must be made mappable. The "Make Table mappable" command makes a table in a remote database mappable. Any MapInfo[®] table may be displayed in a table browser, but only a mappable table may have graphical objects attached and be displayed in a map window. To make a DBMS table mappable, choose the "Make DBMS Table Mappable" command under the "Table," then "Maintenance" menu listings. The "Select DBMS" dialog displays for selection of a DBMS table to make mappable dialog displays. Make the appropriate selections for your table, then choose "OK." The table is made mappable and may then be displayed in a map window.

In order to manipulate the values in the table, it must be unlinked from the Access[™] database, which is accomplished by selecting "Unlink DBMS table…" under the "Table" then "Maintenance" menu listings.

Values on the maps for the six major analytes are shown with one significant figure past the decimal point. The four cations (Ca^{2+} , K^+ , Mg^{2+} , and Na^+) and chloride are displayed with two significant figures past the decimal point. Data in the MapInfo[®] table are altered to provide this level of precision by selecting "Table Structure..." under the "Table" and then "Maintenance" menu listings. After the table has been selected from the list, all quarterly mean concentration fields are changed by selecting "decimal" from the "Type" combo box and entering "1" into the "Decimals" text box (enter "2" for the four cations). Make the change for all fields and then click "OK."

Points on the map must be created for all sites by selecting "Create Points…" under the "Table" menu option. Select the correct table name in the "Create Points for Table" combo box and click the "using symbol" button. Select the filled-in-circle from the "Symbol" combo box and set the font size to six. Verify that the X coordinates are from the longitude column and that the Y coordinates are from the latitude column.

The table and points just created are overlaid on the map by selecting "Layer Control..." under the "Map" menu option. Click "Add..." in the "Layers" area of the form and select the relevant

table name. Click the box under the yellow tag that is associated with the table name. Click the "Label..." button. Select the appropriate field name in the "Label with" combo box. Click "Allow Overlapping Text." Click the upper right anchor point. Finally, click the "Aa" font button in the "Styles" area of the form. On the "Text Style" form, set the "Font" combo box to "Arial Narrow" and set the size to "10." Click the "Box" radio button in the "Background" area of the form.

The data analyst must determine the most efficient way to produce all 11 maps. If the Access[™] tables are assembled correctly, batches of maps can be prepared by simply switching the column used as the label. Map labels <u>CAN</u> be moved and then switched but <u>CANNOT</u> be edited and then switched. For example, the anchor point can be changed, and then the label successfully switched. However, the label cannot be edited (i.e., changing 1 to 1.0) and then be followed by a successful label switch. Editing is most effectively done after all map workspaces have been created.

To complete a map, first verify that no labels are overlapping. This usually requires changing the anchor points for OXF122, MKG113, and CDR119 to the upper center position along with changing the anchor points for SHN418 and PED108 to the lower right position. All labels have one significant digit to the right of the decimal (two for the cation maps). If the value at a site is 1.0, the label displayed is 1. These instances must be edited manually by typing a ".0" after the number for all values meeting this description. Finally, MapInfo[®] substitutes zeroes for nulls when the MapInfo[®] table is created. Therefore, sites with null values display a zero instead of no label. These instances must also be edited manually by deleting the label. Before deleting a label, first verify that the value is actually null by reviewing the record for the specific site in the Access[™] table created for the map.

Maps are saved in MapInfo[®] as a "Workspace" by selecting "Save Workspace" under the "File" menu option, and when final, exported as Enhanced Metafiles by selecting "Save Window As…" under the "File" menu item. Figure 2 shows an example of a quarterly mean concentration map.



Figure 2. Quarterly Map Example for SO₂ (Q2 2001)

6.1.3 Concentration Trends

Trends in analyte atmospheric concentrations are produced each quarter. Trends for the quarter of interest are reported for the years 1990 through the current year. For example, the Q2 2001 Report contains second quarter mean concentrations for each year from 1990 through 2001. Only data from the 34-site sub-network of eastern reference sites are considered for inclusion. As with the mean concentration maps, preparation of quarterly trend graphs requires that 69 percent of the weeks during the quarter must be valid in order to calculate the quarterly mean concentrations used in the graphs. Again, the midpoint of the sample period is used to determine the weeks, quarter, and year assigned to the period. Quarters that do not meet this 69 percent criterion are completed either via interpolation or extrapolation. The interpolation and extrapolation are done manually in Microsoft[®] Excel[™] using cell formulas prior to graphing.

Analyte specific queries similar to those used to create the mean concentration maps are used. As with the map queries, the DRYCHEM_DAYS table in *castnet_working* is used in the SQL Pass Through Query to correctly time-weight each sample included in the mean. In addition, the SITE_OPS table is joined with the DRYCHEM and DRYCHEM_DAYS tables. The presence of a "y" in the "continuous" field of the SITE_OPS table is used to designate sub-network sites for inclusion in the statistics. The following is an example of the query used to calculate mean quarterly SO₂ concentrations. Again, these queries are set up as SQL Pass Through Queries in the AccessTM database created to support the quarterly report:

SELECT
drychem report.site id,
DATEPART (qq, (CONVERT (datetime, ((CONVERT (real, dateoff) + CONVERT (real, dateon))/2)))) as
quarter,
DATEPART(yy,(CONVERT(datetime,((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))) as
year,
100.0*(drychem_days.SO2_total_days)/(drychem_days.total_days) as pct_so2,
avg_so2 =
CASE
WHEN 100.0*(drychem_days.SO2_total_days)/(drychem_days.total_days) > 69
THEN (SUM(((0.667*nso4)+wso2)*(convert(float(8),dateoff-
dateon))/(drychem_days.SO2_total_days)))
ELSE NUII
END
IKUM
(castnet_working.dbo.drychem_teport_invest of a castnet_working.dbo.drychem_tadys of
AND
DATEPART (ag. (CONVERT (datetime. ((CONVERT (real.dateoff)+CONVERT (real.dateon))/2)))) =
drychem davs.guarter AND
DATEPART (vv, (CONVERT (datetime, ((CONVERT (real, dateoff) + CONVERT (real, dateon))/2)))) =
drychem days.year))
INNER JOIN castnet.dbo.site ops ON (castnet working.dbo.drychem report.site id =
castnet.dbo.site_ops.site_id)
WHERE
(
(DATEPART(yy, (CONVERT(datetime, ((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))) >=
1990) AND
$((nso4 \pm 1s null) OR (nso4 \pm -'U') OR (nso4 \pm -'L') OR (nso4 \pm -'R') OR (nso4 \pm -'H') OR$
$(nso4 \ re^{S'})$ AND $(usc2 \ fermion (usc2 \ fermion (usc2$
(WS02_1 IS MULT) OR (WS02_10.) OR (WS02_11.) OR (WS02_18.) OR (WS02_14.) OR
(0.001) (flow volume f is null) OR (flow volume f = 11) AND
(continuous = 'v')
(concritations - y)
GROUP BY
drychem report.site id.
DATEPART(gg,(CONVERT(datetime,((CONVERT(real,dateoff)+CONVERT(real,dateon))/2)))),
DATEPART (yy, (CONVERT (datetime, ((CONVERT (real, dateoff) + CONVERT (real, dateon))/2)))),
drychem days.total days,
drychem_days.SO2_total_days

SQL Pass Through Queries like the one above are then joined in a query with the SITE-YEAR-QUARTERS table, which must be included in the Access[™] database. The purpose of this table is to list all possible quarters and years for each site. A right "JOIN" or left "JOIN" must be set up so that <u>all</u> records in the SITE-YEAR-QUARTERS table are included in the query output. This allows for placeholders to be inserted for quarters with no record present in the DRYCHEM_REPORT table. Use a "Make-Table" query to create a new table combining all of the quarterly means by site. Records are sorted by site_id, quarter, and year. Before the means are calculated, records must be inserted into the SITE-YEAR-QUARTERS table for the current quarter for all sites in the sub-network (i.e., 34 records are added each quarter).
 Table 1.
 Sample Insert for Site ALH157 for Q2 2001.

site_id	quarter	year	
ALH157	2	2001	

The results of the query are copied and pasted into Microsoft[®] Excel[™] and sorted by site_id, quarter, and year. Missing values are identified and replaced by either interpolation (if values for surrounding years are valid) or extrapolation (if the missing quarterly mean is at the beginning or end of the period). Extrapolation is accomplished by copying and pasting the closest valid quarterly value while interpolation requires averaging the two surrounding valid means. After values for missing quarters are interpolated or extrapolated in Excel[™], copy and paste the replaced values into the Access[™] data table and average the values by quarter and year for the target quarter. The end result is a series of values for the specific quarter for each year since 1990.

quarter	year	avg_hno3	avg_nh4	avg_no3	Avg_so2	avg_so4	avg_totno3
2	1990	2.446	1.900	0.717	6.893	6.098	3.123
2	1991	2.433	2.073	0.745	6.279	6.671	3.137
2	1992	2.418	1.972	0.871	6.525	5.925	3.251
2	1993	2.281	1.789	0.739	6.776	5.468	2.983
2	1994	2.323	1.725	0.799	6.052	5.407	3.079
2	1995	2.322	1.635	0.801	4.223	4.813	3.085
2	1996	3.248	2.655	0.703	5.657	8.373	3.900
2	1997	2.110	1.504	0.937	5.013	4.173	3.013
2	1998	2.181	1.622	0.737	5.075	4.849	2.884
2	1999	2.463	1.587	0.809	4.700	4.731	3.231
2	2000	2.085	1.577	0.805	4.276	4.593	2.851
2	2001	2.149	1.709	0.784	4.516	5.080	2.898

Table 2.	Example of the	Completed	Concentration	Trends A	Aggregation	Process
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These values are then plotted in Excel[™] using the "Line" graph option. The Y-axis label [i.e., "Concentration (μ g/m³)"] and the axis tick mark values are set to size 14 in the Arial font. Y-axis labels are scaled with a zero set for the minimum and with a maximum that roughly centers the line in the middle of the scale. Figure 3 depicts an example of a trend graph for SO₂.



Figure 3. Example of a Trend Graph for SO₂ (Q2 2001)

6.2 Quarterly Reports: Ozone

The second, third, and fourth quarter reports include two maps created from analysis of the ozone (O_3) 1-hour concentrations measured at most CASTNET sites. Due to low concentrations and inactive ozone seasons, no ozone figures are included in the first quarter report. Ozone statistics are calculated for the year-to-date as of the end of the quarter being reported. For example, fourth quarter maps show ozone analyses representing the entire year, not just the fourth quarter.

6.2.1 Preparation of the Ozone Data Set

As with the dry chemistry analysis, the ozone data set for the quarter being reported is generally not complete. Therefore, data still undergoing validation must be combined with Level 3 validated data to create the necessary data set. This is most easily accomplished using an Access[™] database. First, link the METDATA table (in *castnet*) with the METDATA_L2 and METDATA_L1 (in *castnet_working*) tables. Since the record for a specific site and hour can only exist in one of these tables at one time, simply create a new table in the Access[™] database and populate it with all relevant records for the time period of interest. For example, the ozone analyses in the second quarter report require hourly concentrations for January 1, 00:00 through June 30, 23:00. Insert all of the records from the three linked tables that fall between those dates into the new table.

6.2.2 Fourth Highest Daily Maximum 8-Hour Concentrations

Another map that is consistently created for quarterly reports shows the fourth highest daily maximum 8-hour O_3 concentration for each site (Figure 4). These values are calculated using a SQL script. The details of the calculation are given in *National 8-Hour Primary and Secondary Ambient Air Quality Standards* (EPA, 2023).

Specifications for this map are the same as for quarterly maps described in previous subsections. Labels are 10 point Arial Narrow font and are affixed to each site.

Figure 4. Example of Fourth Highest Daily Maximum 8-Hour O₃ Concentrations (Q2 2001)



6.2.3 Trends in Fourth Highest Daily Maximum Concentrations

Trends in fourth highest daily maximum 8-hour O_3 concentrations are produced for second through fourth quarters. Due to low concentrations and inactive ozone seasons, no ozone figures are included in the first quarter report. Ozone statistics are calculated for the year-to-date as of the end of the quarter being reported. For example, fourth quarter trend graphs show ozone analyses representing the entire year, not just the fourth quarter. Trends for the quarter of interest are reported for the years 1990 through the current year. For example, the Q2 2010 Report contains fourth highest daily concentrations for each year from 1990 through the second quarter of 2010. Only data from the 34-site sub-network of eastern reference sites are considered for inclusion. Values are calculated using a SQL script. Details of the calculation are

given in *National 8-Hour Primary and Secondary Ambient Air Quality Standards* (EPA, 2023). These values are then plotted in Excel[™] using the "Line" graph option. The Y-axis label [i.e., "Concentration (ppb)"] and the axis tick mark values are set to size 14 in the Arial font.





6.3 Quarterly Reports: Quality Assurance

6.3.1 Dry Chemistry Percent Completeness Statistics

Included with the other roles data management personnel play in preparing the quarterly report is calculation of percent completeness statistics for the following dry chemistry analytes. The DRYCHEM table field name for each filter type and its associated analyte(s) follow in parentheses:

- Teflon[®] SO_4^{2-} (tso4)
- Teflon[®] NO_3^- (tno3)
- Teflon[®] NH⁺₄ (tnh4)
- Teflon[®] Cations Ca²⁺, K⁺, Mg²⁺, Na⁺ (ca, k, mg, na)
- Nylon HNO₃ (nhno3)
- Nylon SO_4^2 (nso4)
- Whatman cellulose SO₂ (wso2)

Statistics are computed based on the 13 possible sample weeks assigned to each quarter as indicated by the sample number included in the lab_key. Samples that run for two weeks do not count twice in the denominator for that site. The DRYCHEM_REPORT table in *castnet_working* is joined with the REPORT_GROUP table in *castnet* in order to use the "collection" field, which records the quarter and year of a sample. To calculate a count of the valid samples by site, a query is set up as an SQL Pass Through Query in the database designated for the quarterly report. Each analyte must be calculated with a separate query. To do this, the appropriate field name must be substituted for each analyte. The query in the following example is used to

calculate the valid sample count for the SO₂ derived from the Whatman filters for Q2 2001. The Whatman SO₂ is indicated by wso2 (shown **bolded**). The quarter is selected by the collection criteria, in this case, Q2 2001 (i.e., 2001q2, which is shown **<u>underlined/bolded</u>**):

```
SELECT
site_id,
COUNT(wso2) as wso2
FROM
castnet_working.dbo.drychem_report INNER JOIN castnet.dbo.report_group ON
(castnet_working.dbo.drychem_report.lab_key = castnet.dbo.report_group.lab_key)
WHERE
(collection = '2001q2') AND
(wso2_f is null OR wso2_f in ('U','L','R','#','S')) AND
((flow_volume_f is null) OR (flow_volume_f ='L'))
GROUP BY
site_id
ORDER BY
site id
```

The results of the query are copied and pasted into an Excel[™] spreadsheet. After counts for all of the analytes are calculated separately and grouped in the Excel[™] spreadsheet, the counts are divided by 13 and then multiplied by 100 to give the percent completeness for the quarter. Special consideration is given to those cases in which a site began operation during the quarter or was intentionally shut down for a move or other major, planned refurbishment. In either case, the denominator of the equation is reduced from 13 to the number of possible weeks samples could have run. For example, site IRL141 began operating during third quarter 2001. The first sample was collected for Week 29. As no samples were possible for Weeks 27 and 28, the percent completeness for the quarter was calculated by dividing the counts by 11 instead of 13.

Site ID	Teflon [®] SO₄	Teflon [®] NO ₃	Teflon [®] NH₄	Teflon [®] Minor Cations	Nylon HNO₃	Nylon SO₄	Whatman SO₂
IRL141	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3. An example of one row from the final table:

6.3.2 Analysis of Collocated Filter Pack Samples

Precision estimates for CASTNET dry deposition filter pack sampling are presented in each quarterly report as the mean absolute relative percent difference (MARPD) of the concentrations measured at two independent, collocated sites. The analytes with their associated DRYCHEM fields are shown below:

- SO_4^{2-} = tso4
- NO_3^- = tno3
- NH_4^+ = tnh4
- Ca^{2+} = ca
- Mg^{2+} = mg
- Na[⁺] = na
- K^+ = k
- HNO_3 = nhno3
- SO_2 = (0.667*nso4)+wso2
- Total NO_3^{-} = tno3+(0.9841*nhno3)

Along with the MARPD, the mean for the primary site, the mean for the collocated site, and the mean absolute difference (MAD) for the quarter are displayed.

MCK131/231	SO ₄ ²⁻	- NO ₃ -	NH₄⁺	Ca ²⁺	Mg ²⁺	Na⁺	K⁺	- HNO ₃	SO ₂	Total NO ₃
\overline{X}	5.98	1.21	2.24	0.36	0.07	0.16	0.09	2.59	4.85	3.76
\overline{Y}	5.98	1.31	2.27	0.40	0.07	0.22	0.09	2.59	4.95	3.86
MAD	0.20	0.14	0.08	0.04	0.01	0.06	0.01	0.16	0.32	0.27
MARPD	3.65	14.60	3.72	11.28	8.84	22.07	6.61	6.66	8.65	7.87

 Table 6.
 Precision Analysis at Collocated Sites Table Example (Q2 2001)

The formula for MAD is as follows:

$$MAD = Average(|X - Y|)$$

The formula for MARPD is as follows:

$$MARPD = Average\left[200*\frac{(/X - Y/)}{(X + Y)}\right]$$

In order for values from a sample week to be included in the calculation, samples for both the primary and collocated sites must be valid and have approximately the same duration. Otherwise, that week is excluded from all calculations for both the primary and collocated sites. Historically, these calculations were performed in Excel[™]. They can now be performed using the Dry Chemistry Collocated Stats function in the CASTNET Data Management System Application as described in Section 6.5.8 of the CASTNET Data Management System Application User Manual, Data Operations SOP 3.

6.4 Annual Report

Figure types and specifications in the annual report change from year-to-year. As a result, only an overview of the types of data analyses routinely performed in support of the report are provided in this section. Examples of maps and graphs depicted in this section come from the CASTNET 2000 Annual Report (WSP, 2002).

6.4.1 Concentrations of Sulfur and Nitrogen Species and Cations

6.4.1.1 Concentration Maps

At a minimum, an annual report contains maps of annual average concentrations for each of the following analytes:

- SO₂
- SO²⁻₄
- Total NO₃⁻ (particulate NO₃⁻ plus HNO₃)
- NH⁺₄

All map and label settings are identical to the settings discussed in Section 6.1.2. Beginning with the CASTNET 2000 Annual Report (WSP, 2002), an interpolated grid was constructed using an inverse distance-weighting function as a means of providing psuedo-concentration isopleths on the map. To create the grid, use MapInfo[®], and select "Create Thematic Map…" from under the "Map" menu option. This brings up a form (Figure 6), which requires that you select the option "Grid" from the buttons on the left and then choose "Grid Default."

Figure 6

Create The	matic Map -	Step 1 of 3			×
Туре:	Template:	C Sort by <u>N</u> ame	Sort by <u>T</u> ime	Preview:	
Ranges	Template N	lame iault		Title Subtitle	
Bar Charts	🔂 Grid Gra	y Default		100% 75% 50% 25%	
Pie Charts				0%	
📌 Graduated					
Dot Density					
Individual					
Grid				Use <u>C</u> ustomized Legend T	ext
		<u>N</u> ext >	Cancel	Help	

After clicking the "Next" button, the second of three forms appears (Figure 7). Verify that the correct table is selected in the "Table" combo box and then choose the field that the grid represents. Check the box for "Ignore Zeroes or Blanks." Select the "WholeUSA" table as a guide to clip the boundaries of the grid. Finally, select a location for the grid file name. Ideally, this is on a shared server where the file can be accessed from different workstations. If the file is created in a local directory, the workspace is only available to that machine. Click the "Next" button.

Figure 7

Create	Thematic Map - Step 2 of 3 🛛 🛛 🔀		
Select	a Table and a Field:		
<u>T</u> able:	concentration_maps_2000		
<u>F</u> ield:	so2_conc		
	ore Zeroes or Blanks		
⊢ Grid I	Options		
Select a Table of Boundaries to Clip Against:			
<u>T</u> able	e: WholeUSA		
Grid	Eile Name:		
G:\E	ATA_AND_REPORTS\2000\2000_ANNU		
	rowse		
K	<u>Back</u> <u>N</u> ext>Cancel <u>H</u> elp		

The third form (Figure 8) appears and provides options for the grid. The cell size is set to 6.21 miles (10 km), the exponent is set to the factor by which concentrations at a site are considered in interpolating a value for the grid, and the search radius is set to 310.5 miles (500 km).

Figure 8



Clicking "OK" creates the default grid. Accessing the "Styles…" button from the "Modify Thematic Map" form, selected from the "Map" menu option, allows the user to change colors.

In addition to the grid, the CASTNET 2000 Annual Report (WSP, 2002) also included maps of the remote CASTNET sites in Alaska, Hawaii, and the U.S. Virgin Islands. These maps are created via the same methods detailed above except they use the Alaska, Hawaii, and Virgin_Islands tables, respectively.

See the CASTNET 2000 Annual Report (WSP, 2002) for examples of the grid and remote site maps.

6.4.1.2 Concentration Box Plots

Box plots are also included in the Concentrations Chapter to show long-term trends in concentrations. They are prepared using Excel. Previously, S-Plus[®], a statistical and graphics package was used. Box plots present 10th, 25th, 75th, and 90th percentile, mean, and median values (Figure 9). Box plots are shown only for the following analytes:

- SO₂
- SO²⁻₄
- Total NO₃
- NH⁺₄

Data for the box plots are quarterly aggregations of atmospheric concentrations. Similar to the line graphs discussed in Section 6.1.3, only sites included in the list of 34 reference sites are included in the aggregations.

The data analyst must verify that a value is provided for each quarter. Therefore, values are interpolated or extrapolated for missing or invalid quarters. This process is the same as described in Section 6.1.3. Values are interpolated or extrapolated from the values for the same quarter in neighboring years. For example, the second quarter 1996 value is interpolated from the second quarter 1995 and the second quarter 1997 values. The second quarter 1990 value is extrapolated from the second quarter 1991 value.



Figure 9. Example of the box plots typically included in an annual report. This box plot is for SO_4^{2} .

6.4.2 Deposition of Sulfur and Nitrogen

6.4.2.1 Deposition Maps

CASTNET now uses the National Atmospheric Deposition Program's (NADP) Total Deposition (TDEP) measurement model fusion (MMF) technique to report dry and total deposition fluxes (Schwede and Lear, 2014). Maps in the annual report are generated by EPA and provided for inclusion in the CASTNET annual report.

6.4.2.2 Deposition Box Plots

Box plots are also included in the Deposition Chapter to show long-term trends in deposition. They are prepared using Excel. Box plots present 10th, 25th, 75th, and 90th percentile, mean, and median values. Box plots are shown for dry sulfur, total sulfur (dry + wet), dry nitrogen and total nitrogen (dry + wet) deposition. An example of a deposition box plot graph is shown in Figure 12.

Data for the box plots are extracted from TDEP model grids provided by EPA, which contain annual aggregations of dry depositions. As with the line graphs discussed in Section 3.3, only sites included in the list of 34 reference sites are included in the aggregations.

The data analyst must verify that a value is provided for each year for all components.





6.4.3 Ozone Concentrations

Analyses presented in the chapter titled, "Ozone Concentrations" (Ozone Concentrations Chapter) are very similar to those contained in the second, third, and fourth quarter reports. Please see Section 6.2.2 for a detailed description of the preparation of ozone maps for the quarterly reports. The following is a description of the differences and additions necessary to complete the figures for the annual report. The annual report includes the map depicting the Fourth Highest Daily Maximum 8-Hour O_3 Concentrations (ppb) for current year and most recent three years.

This map is identical to the map described in Section 6.2.2, with the exception that the map presenting the fourth highest daily maximum 8-hour O_3 concentrations is gridded and shaded, and remote sites are displayed. For a description of the processes used to create the grid and remote site maps, see Section 6.4.1.1.

Boxplots are presented to show long-term trends in ozone concentrations specifically, Fourth Highest Daily Maximum 8-Hour O₃ Concentrations – Eastern United States.

Data and figures are prepared using Excel[®]. Box plots present 10th, 25th, 75th, and 90th percentile, mean, and median values. Only sites included in the list of 34 reference sites (designated by continuous = 'y' in the SITE_OPS table) are included. An example of an ozone box plot is shown in Figure 13.

Figure 13. Example of the box plots typically included in the Ozone Concentrations Chapter of an annual report. This box plot is for the fourth highest daily maximum 8-hour O₃ concentrations.



6.4.4 Data Quality

The chapter on data quality in the annual report has changed dramatically over the past several years and is continually refined to reflect ongoing communication with the EPA technical monitors. As a result, no substantive documentation for preparing the data quality figures or tables is provided in this document. Analyses are typically based on the foundation described in Section 6.3.

7.0 REFERENCES

- WSP formerly known as Amec Foster Wheeler Environment & Infrastructure, Inc. 2002. *Clean Air Status and Trends Network (CASTNET) 2000 Annual Report.* Prepared for U.S. Environmental Protection Agency (EPA), Washington, DC. Contract No. 68-D-98-112. Gainesville, FL.
- WSP formerly known as Wood Environment & Infrastructure Solutions, Inc. (Wood)^{*}. 2001.
 Clean Air Status and Trends Network (CASTNET) Second Quarter 2001 Data Report. Prepared for U.S. Environmental Protection Agency (EPA), Washington, DC. Contract
 No. 68-D-98-112. Gainesville, FL.
- WSP formerly known as Wood Environment & Infrastructure Solutions, Inc. (Wood)^{*}. 2010. Clean Air Status and Trends Network (CASTNET) Second Quarter 2010 Data Report. Prepared for U.S. Environmental Protection Agency (EPA), Washington, DC. Contract No. EP-W-09-028. Gainesville, FL.
- U.S. Environmental Protection Agency (EPA). 2023. *National 8-Hour Primary and Secondary Ambient Air Quality Standards for Ozone.* 40 CFR 50, Appendix I.
- Schwede, D.B. and Lear, G.G. 2014. A Novel Hybrid Approach for Estimating Total Deposition in the United States. Atmos. Environ., 92:207-220. DOI: 10.1016/j.atmosenv.2014.04.008

^{*} Formerly known as Amec Foster Wheeler Environment & Infrastructure, Inc.

8.0 ATTACHMENTS

Attachment A – Script Used to Create DRYCHEM_DAYS Tables

ATTACHMENT A Script Used to Create DRYCHEM_DAYS Tables

```
PRINT 'DRYCHEM DAYS table creation process!'
PRINT 'Deleting records from table DRYCHEM_DAYS'
DELETE FROM castnet working.dbo.drychem days
GO
PRINT 'Inserting Records into DRYCHEM DAYS'
INSERT INTO
  castnet working.dbo.drychem days
SELECT
  site id,
   datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) as quarter,
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) as year,
   actual days =
   CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
   END,
   total days =
   CASE
      WHEN datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = 3 AND
           datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) in
(1988, 1994)
      THEN 14 * 7.0
      WHEN datepart (gg, (convert (datetime, ((convert (real, dateoff)+convert (real, dateon))/2)))) = 4 AND
           datepart(yy,(convert(datetime,((convert(real,dateoff)+convert(real,dateon))/2)))) in
(1993, 1999)
      THEN 14 * 7.0
      WHEN datepart(qq,(convert(datetime,((convert(real,dateoff)+convert(real,dateon))/2)))) = 1 AND
          datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) in
(1994)
      THEN 12 * 7.0
     ELSE 13 * 7.0
   END,
   NULL as SO2 total days,
   NULL as SO4_total_days,
   NULL as HNO3 total days,
  NULL as NO3 total days,
   NULL as NH4 total days,
   NULL as TOTNO3 total days,
   NULL as Ca total days,
   NULL as K total days,
   NULL as Mg total days,
  NULL as Na_total_days
FROM
   castnet working.dbo.drychem report
GROUP BY
   site id,
   datepart (qq, (convert (datetime, ((convert (real, dateoff) + convert (real, dateon))/2)))),
   datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2))))
GO
PRINT 'Updating total_days field'
UPDATE castnet working.dbo.drychem days
SET total days = actual days
WHERE total days < actual days
GO
PRINT 'Creating table SO2 TEMP'
SELECT
   castnet working.dbo.drychem days.site id,
   castnet working.dbo.drychem days.quarter,
   castnet working.dbo.drychem_days.year,
   SO2 total days =
   CASE
```

```
WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.SO2 temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
   castnet_working.dbo.drychem_report.site_id = castnet_working.dbo.drychem_days.site_id AND
   datepart(qq, (convert(datetime, ((convert(real, dateoff)+convert(real, dateon))/2)))) = quarter AND
   datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((nso4 f is null) OR (nso4 f='U') OR (nso4 f='L') OR (nso4 f='R') OR (nso4 f='#') OR (nso4 f='S'))
AND
   ((wso2 f is null) OR (wso2 f='U') OR (wso2 f='L') OR (wso2 f='R') OR (wso2 f='#') OR (wso2 f='S'))
AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating SO2_total_days DRYCHEM_DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.SO2 total days = castnet temp.dbo.SO2 temp.SO2 total days
FROM
  castnet temp.dbo.SO2 temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.SO2 temp.site id = castnet working.dbo.drychem days.site id AND
  castnet_temp.dbo.SO2_temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.SO2 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where SO2 total days is null'
UPDATE
  castnet_working.dbo.drychem_days
SET
  castnet working.dbo.drychem days.SO2 total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.SO2 total days IS NULL
GO
PRINT 'Dropping table SO2 TEMP'
DROP TABLE castnet temp.dbo.SO2 temp
GO
PRINT 'Creating table SO4 TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year,
  SO4 total days =
   CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
TNTO
  castnet temp.dbo.SO4 temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
   castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
  datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((tso4 f is null) OR (tso4 f='U') OR (tso4 f='L') OR (tso4 f='R') OR (tso4 f='#') OR (tso4 f='S'))
```

AND

```
((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
   castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating SO4 total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.S04 total days = castnet_temp.dbo.S04_temp.S04_total_days
FROM
  castnet temp.dbo.SO4 temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.SO4 temp.site id = castnet working.dbo.drychem days.site id AND
   castnet temp.dbo.SO4 temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.SO4 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where SO4 total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.SO4 total days = 0.0
FROM
  castnet_working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.SO4 total days IS NULL
GO
PRINT 'Dropping table SO4 TEMP'
DROP TABLE castnet temp.dbo.SO4 temp
GO
PRINT 'Creating table HNO3 TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet_working.dbo.drychem_days.year,
  HNO3 total days =
  CASE
      WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.HNO3 temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
  castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
  datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((nhno3 f is null) OR (nhno3 f='U') OR (nhno3 f='L') OR (nhno3 f='R') OR (nhno3 f='#') OR
(nhno3 f='S')) AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
   castnet working.dbo.drychem days.quarter,
  castnet_working.dbo.drychem_days.year
GO
PRINT 'Updating HNO3 total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.HNO3 total days = castnet temp.dbo.HNO3 temp.HNO3 total days
FROM
  castnet temp.dbo.HNO3 temp, castnet working.dbo.drychem days
WHERE
```

```
castnet temp.dbo.HNO3 temp.quarter = castnet working.dbo.drychem days.quarter AND
   castnet temp.dbo.HNO3 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where HNO3 total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet_working.dbo.drychem_days.HNO3 total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.HNO3 total days IS NULL
GO
PRINT 'Dropping table HNO3 TEMP'
DROP TABLE castnet temp.dbo.HNO3 temp
GO
PRINT 'Creating table NO3 TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year,
  NO3 total days =
  CASE
      WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.NO3 temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
  castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
   datepart(qq,(convert(datetime,((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
   datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((tno3 f is null) OR (tno3 f='U') OR (tno3 f='L') OR (tno3 f='R') OR (tno3 f='#') OR (tno3 f='S'))
AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating NO3 total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.NO3 total days = castnet temp.dbo.NO3 temp.NO3 total days
FROM
  castnet temp.dbo.NO3 temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.NO3 temp.site id = castnet working.dbo.drychem days.site id AND
  castnet temp.dbo.NO3 temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.NO3 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where NO3 total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.NO3 total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.NO3 total days IS NULL
GO
PRINT 'Dropping table NO3_TEMP'
DROP TABLE castnet temp.dbo.NO3 temp
```

```
GO
PRINT 'Creating table NH4_TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year,
  NH4 total days =
  CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.NH4 temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
   castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
   datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
   datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((tnh4 f is null) OR (tnh4 f='U') OR (tnh4 f='L') OR (tnh4 f='R') OR (tnh4 f='#') OR (tnh4 f='S'))
AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem_days.quarter,
  castnet working.dbo.drychem days.year
GΟ
PRINT 'Updating NH4 total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.NH4 total days = castnet temp.dbo.NH4 temp.NH4 total days
FROM
  castnet temp.dbo.NH4 temp, castnet working.dbo.drychem days
WHERE
  castnet_temp.dbo.NH4_temp.site_id = castnet_working.dbo.drychem_days.site_id AND
  castnet temp.dbo.NH4 temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.NH4 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where NH4 total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.NH4 total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.NH4 total days IS NULL
GO
PRINT 'Dropping table NH4 TEMP'
DROP TABLE castnet temp.dbo.NH4 temp
GO
PRINT 'Creating table TOTNO3 TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet_working.dbo.drychem_days.quarter,
  castnet working.dbo.drychem days.year,
  TOTNO3 total days =
  CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
   castnet temp.dbo.TOTNO3 temp
FROM
   castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
```

```
castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
   datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
   datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((tno3 f is null) OR (tno3 f='U') OR (tno3 f='L') OR (tno3 f='R') OR (tno3 f='#') OR (tno3 f='S'))
AND
   ((nhno3 f is null) OR (nhno3 f='U') OR (nhno3 f='L') OR (nhno3 f='R') OR (nhno3 f='#') OR
(nhno3 f='S')) AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating TOTNO3 total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet_working.dbo.drychem days.TOTNO3 total days =
castnet temp.dbo.TOTNO3 temp.TOTNO3 total days
FROM
  castnet temp.dbo.TOTNO3 temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.TOTNO3 temp.site id = castnet working.dbo.drychem days.site id AND
  castnet_temp.dbo.TOTNO3_temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.TOTNO3 temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where TOTNO3 total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.TOTNO3 total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.TOTNO3 total days IS NULL
GO
PRINT 'Dropping table TOTNO3 TEMP'
DROP TABLE castnet temp.dbo.TOTNO3 temp
GO
PRINT 'Creating table Ca TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year,
  Ca total days =
  CASE
      WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.Ca temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
   castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
   datepart(qq,(convert(datetime,((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((ca f is null) OR (ca f='U') OR (ca f='L') OR (ca f='R') OR (ca f='#') OR (ca f='S')) AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
   castnet working.dbo.drychem days.year
GO
PRINT 'Updating Ca total days DRYCHEM DAYS'
```
```
UPDATE
  castnet working.dbo.drychem days
SET
   castnet working.dbo.drychem days.Ca total days = castnet temp.dbo.Ca temp.Ca total days
FROM
  castnet temp.dbo.Ca temp, castnet working.dbo.drychem days
WHERE
  castnet_temp.dbo.Ca_temp.site_id = castnet_working.dbo.drychem_days.site_id AND
   castnet temp.dbo.Ca temp.quarter = castnet working.dbo.drychem days.quarter AND
   castnet temp.dbo.Ca temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where Ca total days is null'
TIPDATE
  castnet working.dbo.drychem days
SET
  castnet_working.dbo.drychem_days.Ca total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.Ca total days IS NULL
GO
PRINT 'Dropping table Ca TEMP'
DROP TABLE castnet temp.dbo.Ca temp
GO
PRINT 'Creating table K TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet_working.dbo.drychem_days.quarter,
  castnet working.dbo.drychem_days.year,
  K total days =
  CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet_temp.dbo.K_temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
  castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
  datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((k f is null) OR (k f='U') OR (k f='L') OR (k f='R') OR (k f='#') OR (k f='S')) AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet_working.dbo.drychem_days.year
GO
PRINT 'Updating K total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.K total days = castnet temp.dbo.K temp.K total days
FROM
  castnet_temp.dbo.K_temp, castnet_working.dbo.drychem_days
WHERE
  castnet temp.dbo.K temp.site id = castnet working.dbo.drychem days.site id AND
  castnet temp.dbo.K temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.K temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where K total days is null'
UPDATE
   castnet working.dbo.drychem days
SET
   castnet working.dbo.drychem days.K total days = 0.0
```

```
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.K total days IS NULL
GO
PRINT 'Dropping table K TEMP'
DROP TABLE castnet temp.dbo.K temp
GO
PRINT 'Creating table Mg TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year,
  Mg total days =
  CASE
      WHEN SUM(convert(float(8),dateoff-dateon)) IS NOT NULL
       THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
TNTO
  castnet temp.dbo.Mg temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
  castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
   datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((mg f is null) OR (mg f='U') OR (mg f='L') OR (mg f='R') OR (mg f='#') OR (mg f='S')) AND
   ((flow_volume_f is null) or (flow_volume_f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating Mg total days DRYCHEM DAYS'
UPDATE
  castnet_working.dbo.drychem_days
SET
  castnet working.dbo.drychem days.Mg total days = castnet temp.dbo.Mg temp.Mg total days
FROM
  castnet temp.dbo.Mg temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.Mg temp.site id = castnet working.dbo.drychem days.site id AND
  castnet temp.dbo.Mg temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.Mg temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where Mg total days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.Mg total days = 0.0
FROM
  castnet working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.Mg total days IS NULL
GO
PRINT 'Dropping table Mg_TEMP'
DROP TABLE castnet temp.dbo.Mg temp
GO
PRINT 'Creating table Na TEMP'
SELECT
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem_days.quarter,
  castnet working.dbo.drychem days.year,
  Na total days =
  CASE
       WHEN SUM(convert(float(8), dateoff-dateon)) IS NOT NULL
```

```
THEN SUM(convert(float(8), dateoff-dateon)) ELSE 0.0
  END
INTO
  castnet temp.dbo.Na temp
FROM
  castnet working.dbo.drychem report RIGHT JOIN castnet working.dbo.drychem days ON
  castnet working.dbo.drychem report.site id = castnet working.dbo.drychem days.site id AND
  datepart(qq, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = quarter AND
  datepart(yy, (convert(datetime, ((convert(real,dateoff)+convert(real,dateon))/2)))) = year
WHERE
   ((na f is null) OR (na f='U') OR (na f='L') OR (na f='R') OR (na f='#') OR (na f='S')) AND
   ((flow volume f is null) or (flow volume f ='L'))
GROUP BY
  castnet working.dbo.drychem days.site id,
  castnet working.dbo.drychem days.quarter,
  castnet working.dbo.drychem days.year
GO
PRINT 'Updating Na total days DRYCHEM DAYS'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.Na total days = castnet temp.dbo.Na temp.Na total days
FROM
  castnet temp.dbo.Na temp, castnet working.dbo.drychem days
WHERE
  castnet temp.dbo.Na temp.site id = castnet working.dbo.drychem days.site id AND
  castnet temp.dbo.Na temp.quarter = castnet working.dbo.drychem days.quarter AND
  castnet temp.dbo.Na temp.year = castnet working.dbo.drychem days.year
GO
PRINT 'Updating DRYCHEM DAYS where Na_total_days is null'
UPDATE
  castnet working.dbo.drychem days
SET
  castnet working.dbo.drychem days.Na total days = 0.0
FROM
  castnet_working.dbo.drychem days
WHERE
  castnet working.dbo.drychem days.Na total days IS NULL
GO
PRINT 'Dropping table Na TEMP'
DROP TABLE castnet temp.dbo.Na temp
PRINT 'DONE!'
```

TITLE: DATA DELIVERABLES

Effective

Date: Prepared by:	3-6-25 Christopher M. Rogers	- Chmp	Digitally signed by Rogers, Christopher (USCR718689) Date: 2025.03.03 10:14:41 -05'00'
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Reviewed and	Marcus O. Stewart	Marent Har	Marcus (USMS/19399) Date: 2025.03.03 09:27:46
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Annual Review					
Reviewed by:	Title:	Date:	Signature:		

DATA DELIVERABLES

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) personnel for delivering data to the U.S. Environmental Protection Agency (EPA) as specified in the CASTNET Quality Assurance Project Plan (QAPP).

2.0 SCOPE

The processes described in this SOP are applicable to the production of contractual CASTNET data deliverables, which are prepared by WSP for submittal to EPA. This SOP assumes that the user possesses a basic understanding of the SQL Server Enterprise Manager.

3.0 SUMMARY

This SOP describes the process for routine data submissions to the EPA Oracle database. Appendix A describes the process for separate monthly generation of ozone data files for uploading to the EPA Air Quality System (AQS) data submittal web application. AQS submittals are performed as per instructions in the AQS User Guide.

Preparation of a CASTNET data deliverable for submittal to EPA involves generating files containing specific data records from various tables contained in the CASTNET SQL Server database. A general overview of the steps necessary for preparation of a CASTNET data deliverable is depicted in Figure 1. For more information concerning the CASTNET database and its contents, please see the CASTNET QAPP.





3.1 Delivery Schedule

3.1.1 Text File Database Submittals

Specific tables are delivered monthly, quarterly, annually (regular and alternate), and "on change." Table 1 lists all of the data tables submitted to EPA and their delivery frequency.

	Delivery Schedule			
Table Name	Monthly	Quarterly	Annually	On Change
DRYCHEM	✓			
FILTER_PACK	✓			
GAS_CALIBRATION	✓			
HOURLY_GAS	✓			
METDATA	✓			
NETWORK_CHANGE	✓			
SITE_PHOTO	✓			
WOOD_INVOICE	✓			
CALIBRATION_SUMMARY		✓		
LABDATA		✓		
LABDATA_QC		✓		
SAMPLE_REFERENCE		✓		
SITE_OPERATORS		✓		
EQUIPMENT_INVENTORY			~	
ASSUMED_FLOW				✓
CALIBRATION_CRITERA				✓
LEAF_ANGLE				✓
MODEL_OUTPUT				✓
MODEL_VERSION				✓
PLANT				✓
PLANT_PROFILE				✓
SITE_OPS				✓
SITE_PLANT_DETAIL				✓
SITE_PLANT_SUMMARY				✓
SITE_STATUS				✓
SITE				✓
SITES_RENAMED				✓

Table 1. Data Table Delivery Schedule

The METDATA, DRYCHEM, and FILTER_PACK tables contain Level 3 validated data for both EPA and National Park Service (NPS)-sponsored sites, and are delivered to EPA by the last day of each month. For the EPA-sponsored sites, the data in these tables span a 6-month period for a specified group of sites. The makeup of each monthly group is determined by the yearly calibration schedule set by WSP's Field Operations Manager. Approximately 12 sites are included in each calibration group. Since each group of sites is calibrated twice a year, the data for each group are submitted twice a year, 60 days after the end of the month in which that group of sites was calibrated. In order to produce a complete data set for use in preparing the annual report, no calibrations are scheduled in December or June. This results in two "rollover" months (February and August) when no monthly submittal is made. Table 2 provides a list of the EPA-sponsored sites in each group along with the months their data are submitted.

Group	E	PA Sites Calibrat	ed	Months Calibrated	Time Period Submitted	Delivery Months
SE-4	BFT142, NC	CND125, NC	COW137,NC	January	July – December	March
(7 Siles)	SPD111, TN	GAS 153, GA	SND152, AL	July	January – June	September
MW-6	CKT136, KY	ESP127, TN		January	July – December	March
(4 Sites)	MCK131, KY	MCK231, KY		July	January – June	September
E-1	ARE 128, PA	BEL116, MD	BWR139,MD	February	August – January	April
(8 Sites)	CTH110, NY	PED108, VA	PSU106, PA	August	February – July	October
	VPI120, VA	WSP144, NJ				
SE-5	CAD150, AR	CNS011, FL	CVL151, MS	February	August – January	April
(5 Sites)	IRL141, FL	SUM156, FL		August	February – July	October
MW-7	BVL130, IL	OXF122, OH	PRK134, WI	March	September – February	May
(7 Sites)	QAK172, OH	RED004, MN	STK138, IL	September	March – August	November
	VIN140, IN					
W-9	ALC188, TX	CHE185, OK	HAS012, KS	March	September – February	May
(5 Sites)	KNZ184, KS	SAN192, NE		September	March – August	November
E-2	ABT147, CT	CAT175, NY	EGB181, ON	April	October – March	June
(6 Sites)	NIC001, NY	WFM105,NY	WST109, NH	October	April – September	December
MW-8	ANA115, MI	HOX148, MI		April	October – March	June
(4 Sites)	SAL133, IN	UVL124, MI		October	April – September	December
E-3	KEF112, PA	LRL117, PA		May	November – April	July
(4 Sites)	MKG113, PA	PAR107, WV		November	May – October	January
W-10	CNT169, WY	GTH161, CO	LPO010, CA	May	November – April	July
(8 Sites)	NPT006, ID	PAL190, TX	PND165, WY	November	May – October	January
	ROM206, CO	UMA009, WA				

 Table 2. EPA-Sponsored Site Calibration and Validated Data Submittal Schedules

The contents of the METDATA, DRYCHEM, and FILTER_PACK tables differ for NPSsponsored sites. The NPS data included in these tables span only one month but include all NPS sites. Air Resource Specialists, Inc. (ARS) submits NPS continuous data to the DMC on a monthly basis, approximately 90 days following the end of data collection for that month. The DMC then delivers NPS data to EPA 30 days later, or by 120 days following the end of data collection for that month. No data for NPS sites are delivered to EPA during the two "rollover" months (February and August). However, two months of NPS data are delivered the month following a "rollover" month. Table 3 lists the delivery schedule for NPS continuous and filter pack data.

NPS Data Collection Period	Delivery Month
January	Мау
February	June
March	July
April	September [*] (delivered with May data)
May	September
June	October
July	November
August	December
September	January
October	March [*] (delivered with November data)
November	March
December	April

Note: *No data are delivered to EPA during February or August, the two "rollover" months.

WOOD_INVOICE submittals are made monthly to provide documentation supporting financial reporting to EPA. Records for a monthly invoice are delivered within 30 days following the end of the financial reporting period.

Quarterly submittals are delivered 120 days following the end of the quarter being submitted and coincide with the delivery of quarterly reports. Table 4 shows the delivery schedule for the four quarterly data submittals.

Table 4.	Quarterly	Data	Submittal	Schedule
----------	-----------	------	-----------	----------

Quarter	Time Period Covered	Delivery Date
First	(January – March)	July 31
Second	(April – June)	October 31
Third	(July – September)	January 31 (of following year)
Fourth	(October – December)	April 30 (of following year)

The EQUIPMENT_INVENTORY table is submitted annually with the property report 30 days after the end of EPA's fiscal year (i.e., by October 31).

The remaining tables in the CASTNET database are designated as "on change." Following a change to the data within them, they are delivered with the next regularly scheduled monthly data submittal.

3.1.2 Daily Submittals

In addition to the submittals detailed in Section 6.0, daily submittals of continuous ozone, meteorological (where measured), and precursor gases (where measured) are delivered via automated processes using Secure File Transfer Protocol (sFTP). The Data Archiver process creates comma-separated variable (CSV) files containing these data. The Data Archiver runs daily at 1400 local time and creates the CSV files for the previous day's data.

Four files are created:

- metdata_yyyymmdd.csv meteorological and ozone data for day indicated in file name,
- hourly_gas_*yyyymmdd*.csv precursor gas data for day indicated in file name,
- gas_calibration_*yyyymmdd*.csv quality control (QC) check data for day indicated in file name, and
- metdata_transfer_yyyymmdd.csv records transferred in the other files.

The CSV files are populated with data that have been screened using outlier criteria to flag data with potential quality issues. The Metdata FTP Uploader automated process runs daily at 1500 and put these files on the sFTP site. The login for the sFTP site must be changed every 90 days and is maintained by the DMAIRM or designee.

Both the Data Archiver and Metdata FTP Uploader were written in ASP.NET and are monitored by the Data Management, Analysis, Interpretation, and Reporting Manager (DMAIRM) using an automated email that shows that the process completed successfully and a status dashboard in iCASTNET that tracks the history of the automated processes.

EPA gets the files from their sFTP site and has automated processes that load the data into their Oracle schemas. Performance of this load is monitored by EPA using automated emails, which are forwarded to WSP.

3.1.3 AQS Submittals

Submittals to AQS are made on a monthly basis using the tool documented in Appendix A of this SOP. Data for one month for all sites actively monitoring ozone according to 40CFR Part 58 protocols are delivered no later than 60 days after the end of the monitoring month. For example, data for July are delivered by the end of October. Data submitted have undergone validation and quality assurance (QA) review as documented in Section 4.0 of the QAPP.

Occasionally, further validation actions are required based on results from semi-annual site visits or further data review. When this occurs, an update submittal is prepared. Data for the complete month for the site-month in question are posted to AQS, and the original submittal is overwritten.

Each quarter, 1-point QC check data are submitted for the previous three months. For example, data for January through March are submitted the following May. Only 1-point QC check data associated with valid hourly ambient concentrations are submitted. QC checks invalidated during data validation are excluded, and a valid daily maximum 8-hour average concentration is required for that day's QC check to be included in the submittal.

4.0 MATERIALS

Laptop or personal computer Microsoft SQL Server Permissions and access to utilized databases

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow, including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 PROCEDURE

Data submittals are delivered to EPA via email. SQL queries are written for each table and then exported to pipe-delimited txt files using SQL Server Integration Services. The files are zipped and then emailed to EPA. Prior to sending the email, a review package is sent to the QA Manager for approval. The package includes all the queries, the resulting submittal files, an Excel spreadsheet listing the tables and record counts, and an Excel file that has all the DRYCHEM records (Table 1) being submitted. Table 5 shows a blank submittal checklist that is completed and provided to the QA Manager. Data sent to EPA are archived in EPA's Oracle 12c database.

Table 5. Data Submittal Checklist

Monthly Submitta	!:		
EPA Sites:	Group ID:		
	Start Date:	End Date:	
BLM/NPS Sites:	Start Date:	End Date:	
Table Name		Records	Query Count EPA Count Verification
DRYCHEM (prelim =	=)		
FILTER_PACK			
NETWORK_CHANG	E (month =)		
SITE_PHOTO (mont	n =)		
DRYCHEM (update)			
GAS_CALIBRATION	(month =)		
HOURLY_GAS (upda	nte; AQS =)		
METDATA (update;	AQS =)		
METDATA L3 record	ls moved to METDATA fro	om METDATA_L2 and	nd deleted from METDATA_L2?
ON CHANGE (acco	mpanies Monthly):		
Table Name		Records	Query Count EPA Count Verification
Signature of Wood	Data representative:		
Signature of Wood	QA representative:		

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Figure 2. Accessing Integration Services Functions

The data source is defined in the first step of the Integration Services Export Wizard, which is labeled, "Choose a Data Source." For this process, the CASTNET database will always be the source. The next step is to "Choose a Destination" (Figure 3). Select "Microsoft OLE DB Provider for Oracle" from the "Destination" combo box. Enter the server, username, and password for the WSP Oracle server and click "Next."

SQL Server Impo	rt and Export Wizard	
Specify where	sunauon to copy data to.	
Destination:	Flat File Destination	•
Select a file and s	pecify the file properties and the file format.	
File name:	C:\20180430_E1-SE5-Q417\20180430_CASTNET\castnetupdate_me	Bro <u>w</u> se
Locale:	English (United States)	Unicode
<u>C</u> ode page:	1252 (ANSI - Latin I)	•
For <u>m</u> at:	Delimited	•
Text gualifier:	<none></none>	
Countring		
<u>H</u> elp	< <u>Back</u>	Cancel

Figure 3. Integration Services Export Wizard – Choose a Destination

The third step, labeled "Specify Table Copy or Query," asks the user to either copy an entire table to the file or to use a query to specify the records to extract. In most cases, it is necessary to use a query to access specific records from the table in question. Selecting the query option brings up the following form (Figure 4), "Type SQL Statement."

Figure 4. Query Statement Form

I SQL Server Import and Export Wizard
Provide a Source Query Type the SQL statement that will select data from the source database.
SQL statement:
select * from (/*open union*// select * from castnet.dbo.metdata /*stes and date range below are for L3 submittal*/ where (ste_id in (*ARE128; "BEL116; BWR139; CAD150; CTH110; CVL151', 1RL141', PED108; 'PSU106', 'SUM156', VPI 120; WSP144) and date_ime between '8/1/17 and '1/31/18 23:59) OR /*nps and blm date range*/ (site_id in (select site_id from castnet.dbo.site where agency = hps') and date_time between '12/1/17' and '12/31/17 23:59) union SELECT site_id, date_time, temperature_deta
Parse Browse
Help < Back Next > Finish >> Cancel

The query typed into the "Query statement" box determines the records to be exported into the text file. It must consist of correct SQL syntax, and it should first be tested using the SQL Server "Query Analyzer" tool to verify that its output matches the requirements of the data submittal. The Query Analyzer provides an interface that allows the user to access data tables using SQL queries.

As shown in Figure 5, the next step is "Configure Flat File Destination." From the "Column delimiter" combo box, select "Vertical Bar (|)" and click "Next." Finally, verify that the "Run Immediately" box is checked and click "Finish" to begin the records transfer. Once the transfer is complete, note the number of records transferred.

Figure 5. Configuring the Flat File

🔄 SQL Server Import and Export	Wizard	
Configure Flat File Destin	nation	
<u>S</u> ource query:	[Query]	•
Specify the characters that deli	mit the destination file:	
<u>R</u> ow delimiter:	{CR}{LF}	•
<u>C</u> olumn delimiter:	Vertical Bar {}	•
	<u>E</u> dit Mappings	Preview
<u>H</u> elp	< <u>B</u> ack <u>N</u> ext > <u>Finis</u>	h >> Cancel

There are two destination schemas in EPA's Oracle database: CASTNETSCRATCH (for appends) and CASTNETUPDATE (for updates). Flat file names incorporate the name of the schema name and the database table (e.g., castnetupdate_metdata.txt).

6.1 Database Updates

Updates to previously submitted database records are delivered to EPA with the next scheduled monthly submittal. These updates may result from additional QC findings, resubmittals from ARS, or general table cleanup. Updates are delivered via pipe-delimited txt files in an identical manner as the other submittals. All updates are processed through EPA's CASTNETUPDATE schema.

When updates have been sent to EPA, they are recorded in a Microsoft Excel spreadsheet named "resubmittal.xls" together with a description of what necessitated the update. Table 6 presents an example of the type of record used to document a database update.

Table	Update	Records Affected	Date Updated	Submitted to EPA?	Date Submitted	Description
lab_comments	Samples 0828001- 89, 0829001- 89, 0830001- 89	3	4/23/09	yes	4/29/09	further QC of atm concentrations

Table 6. Example of Resubmittal Excel Spreadsheet

6.2 Deliverable Quality Assurance

6.2.1 Dry Chemistry Concentrations

QA review of the records in the DRYCHEM table follows the procedures specified in Section 4.3.5, Laboratory or Discrete Data Validation, of the CASTNET QAPP. Before a submittal is initiated, the QA Manager performs a final review of the calculated values following import of the Level 3 flow data into the METDATA table. After acceptance by the WSP CASTNET QA Manager, the DRYCHEM records are ready for submittal to EPA.

6.2.2 Continuous Data

Following completion of Level 3 validation, the QA Manager reviews the continuous data to be submitted using the tools in the CASTNET Data Management System Application (CDMSA). All calibration failures and the resulting changes to the data are reviewed. In general, the QA Manager utilizes all of the tools available to the data validators to verify their work.

Continuous data from NPS-sponsored sites are accepted as validated at Level 3. The DMAIRM or his designee verifies that the correct number of records was included in the submittal from ARS and compares the results from a checksum query to verify that the data were correctly transmitted.

6.2.3 Verification of Deliverable Contents

At each stage during the creation of the deliverable, the DMAIRM or his designee must verify that the correct number of records is being submitted. To assist in this QC process, a submittal checklist is used. Figure 7 provides an example of a submittal checklist.



EDA Sites: Group ID:	MW6, SE	24			
Start Data	1/1/19	End Date:	6/30/19		
DI M/NDS Sites: Start Date:	Slilia.	End Date:	5/31/1	9	
Table Name		Enu Date: _			EBA Court
	Rec	oras	Query	Count	Verification
DRYCHEM (prelim = Jul 19)		460	ø	Ø	0
FILTER_PACK	he 19	463	ø	e de la compañía de l	0 0
SITE PHOTO (month = Jul (9)	- <u>/</u>)	336	å	0	0
		500	553 /CA	2/	
DRYCHEM (update)	110	755	ø	0 X	O'
GAS_CALIBRATION (month = Jo	<u>117)</u>	09016	9	0	er Or
METDATA (update: AOS = 34	<u> </u>	122184	ð	ď	0
				~	Verification
			0	0	Verification
		MSS	0	0	Verification O O
		MS	0	0 0 0	Verification 0 0
		MS \$	0 15019 0	0 0 0 0	Verification 0 0 0
		MS	0 0 750/9 0 0		Verification 0 0 0 0
1		 	0 75019 0 0		Verification O O O O O
An		 	0 350/9 0 0	0 0 0 0	Verification O O O O O
Signature of Wood Data represent	ative	MS \$	0 1,50,19 0 0 0 Date	0 0 0 0	Verification O O O O S
Signature of Wood Data represent	ative	M3 \$	0 0 0 0 0 Date /C	000000000000000000000000000000000000000	Verification 0 0 0 0 0 9
Signature of Wood Data representation	ative	 	0 0 0 0 0 Date <i>/C</i> Date	0 0 0 1/30/1	yerhfcation 0 0 0 0 0 9
Signature of Wood Data representat	ative	MS	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1/30/1 0/2/1	yerhteation 0 0 0 0 0 9 1 1 4

The name of the submittal is written on the line (e.g., September 2019).

At the completion of each step, the appropriate box is checked to signify that it was successfully completed. After the submittal is complete and the record counts have been filled out, the checklist should be signed by the DMAIRM or his designee and sent as part of the submittal package to the QA Manager for approval. The following is a complete list of the contents of the submittal package, which exists as a WinZip archive file:

- 1) Zipped archive file containing text pipe-delimited text files
- 2) Table-specific queries used to extract data from SQL Server
- 3) Scan of signed submittal checklist
- 4) Excel file with TABLE_UPDATE records
- 5) Excel file with DRYCHEM records (to allow for review of concentrations at local conditions)
- 6) Draft e-mail to EPA (see Section 8.0)

The QA Manager completes the submittal checklist by verifying the record counts for each table and reviewing all associated documentation. The QA Manager and Project Manager sign the completed checklist, which is then filed.

6.3 E-mail Documentation of Submittal

Notification of the submittal is sent via e-mail to relevant EPA employees including the Project Officer, Technical Advisor, and Technical Monitor (database support). The e-mail documents the contents of the submittal. The Technical Monitor processes the submittal and confirms the successful loading of the data by replying to the submittal documentation e-mail. An example of the submittal documentation email is provided in Attachment A (Section 8.0).

7.0 REFERENCES

Placeholder

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8.0 ATTACHMENTS

Attachment A – Example of E-mail Documentation

ATTACHMENT A Example of E-mail Documentation

To: Puchalski, Melissa

Cc: Stewart, Marcus O; Howell, Kemp K; Wanta, Carol A; Gregory Beachley

(Beachley.Gregory@epamail.epa.gov); Rogers, Christopher M

Subject: Sep 2019 data submittal

Attachments: 20190930_CASTNET.xxx

Hi Melissa,

Attached are the pipe-delimited text files that comprise the Jul 2019 data submittal.

Notes:

1) This submittal includes sites from groups MW6 (Midwest 6) and SE4 (Southeast 4).

2) This submittal includes photos from the Jul 2019 calibration trips. I placed photos matching the SITE_PHOTO records on your newftp sFTP site. The file is named 20190930_JUL19_photos.zip.

Thanks, Chris

Here is a summary of what has been loaded:

Appends:

TABLE_NAME DRYCHEM FILTER_PACK SITE_PHOTO Updates:	COUNT 460 403 336	COMMENT All sites, preliminary data for Jul 2019. Group MW6, SE4 data submittal for Jan 2019 - Jun 2019, BLM/NPS data submittal for May 2019. Photos from site calibrations during Jul 2019.
TABLE_NAME DRYCHEM GAS_CALIBRATION HOURLY_GAS METDATA	COUNT 553 6758 29016 122184	COMMENT Group MW6, SE4 data submittal for Jan 2019 - Jun 2019, BLM/NPS data submittal for April-May 2019, NPT006 sample 1851004-04. All Level 3 records for Jul 2019. AQS submittal and Level 3 records for all sites for Jul 2019. Group MW6, SE4 data submittal for Jan 2019 - Jun 2019, BLM/NPS data submittal for May 2019, AQS submittal for Jul 2019.

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9.0 APPENDIX

EPA AQS Ozone Data File Generator SOP

APPENDIX A

WSP EPA AQS Ozone Data File Generator SOP

1.0 INTRODUCTION

This Microsoft Access application creates pipe "]" delimited text files of ozone raw data, accuracy data, and precision data for gaseous parameters (e.g. ozone, sulfur dioxide and other gases). These files will be used to upload data in batch format to the EPA Air Quality Subsystem (AQS) application. The data is retrieved from WSP's GNVCASTNET Microsoft SQL Server database, to which this application is linked.

This application utilizes a tab control, which has three tabs or pages. The first tab is used to generate Raw Data text files, the second tab is used to generate Accuracy Data text files, and the third tab is used to generate Precision Data text files.

This SOP describes file generation. The resultant files are subsequently uploaded via the EPA AQS Web application (<u>http://www.epa.gov/aqs</u>) as per the instruction listed in the AQS User Guide (https://www.epa.gov/aqs/aqs-user-guide).

2.0 RAW DATA

Figure 2-1. Raw Data Form

w Data	Accur	acy dat	ta Preci	ision Data													
Start Date: 10/1/2014 15 End Date: 10/31/2014 15					ion sert pdate elete		Param OZOI CO SO2 NO NOY	eters NE		√ Ur	nion Metda Get Data	ta L1 &	L2		Output D	ata out File	•
Selec	t All Site	s					NOY	- NO								_	
Site ID Site Name			Co	ounty		State AQS Code					_	AQS Date					
ABT14	7		Abingt	on	Wi	ndham 		СТ			090159991			04/08/2011			-
ALC18	8		Alaban	na-Coushat	ta Po	lk 	TX			483739991			03/30/2011			=	
ALH15	/		Alham	bra	Ma	adison					1/1199991			03/23/2011			
ANA11	5		Ann Ar	rbor	Wa	ashtenaw	MI				261619991			04/26/2011			
ARE12	8		Arend	tsville	Ad	ams	PA				420019991			07/27/2010			
ASH13	5		Ashlan	id II-	An	Aroostook ME					230039991				05/19/2011		
BELLIC	<u>כ</u>		Beitsvi	lie t	Ph	nce George's MD			240559991 02/2 370319991 07/2			02/23/	/2011				
	2		Rondvi	illo		ampaign	NC II			170101001			07/23/2010				
DVLIJ.	<u> </u>		bondvi	inc.	Ch	ampaign		12			1/015100.			03/22/	2011		*
Code	Action	State	County	Site Code	Site ID	Parameter	POC	Duration	Unit	Method	Day	Hour	Value	Text	Data Code	Coll	
RD	Ι	09	015	9991	ABT147	44201	1	1	800	047	20141001	00:00	12.56	12			*
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	01:00	12.51	12			
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	02:00	13.3		AN		
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	03:00	14.11	14			
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	04:00	13.66	13			
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	05:00	13.49	13			
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	06:00	12.7	12			
	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	07:00	12.22	12			-

2.1 Raw Data Form

The Raw Data form is shown in Figure 2-1.

2.2 Date, Record Action, and Data Source Selection

The desired date range is selected first, as seen in Figure 2-2. The record *Action* indicator is then selected; the action may be an Insert, Update, or Delete operation. Check the *Union Metadata L1 & L2* box for historical data. Select the desired gas(es) in the *Parameters* box. It is not necessary to use the control key for multiple selections.



Figure 2-2. Raw Data Form – Upper Left Section

2.3 Site Selection

On the right side of the sites list is a column labeled Include, as seen in Figure 2-3. The sites desired for data retrieval are selected by checking the boxes in this column. The Include checkbox selections are retained even after the application is closed, unless the Re-load Sites button is clicked, as discussed in the next section.

2.4 Data Retrieval and Text File Generation

The Get Data button is used to retrieve data for the selected sites and date range. The data is displayed in the lower half of the form, as seen in Figure 2-4. The Output Data button creates the raw data text file.

)159991 3739991	04/08/2011	-
3739991	03/30/2011	
199991	03/23/2011	
619991	04/26/2011	
019991	07/27/2010	
039991	05/19/2011	
)339991	02/25/2011	
)319991	07/23/2010	
	619991 019991 039991 339991 319991	619991 04/26/2011 019991 07/27/2010 039991 05/19/2011 339991 02/25/2011 319991 07/23/2010

Figure 2-3. Raw Data Form – Upper Right Section

Code Action State County Site Code Site ID Parameter POC Duration Unit Method Day Hour Value Text Data Code Coll

Figure 2-4.	Raw Data	Form –	Lower	Section
-------------	----------	--------	-------	---------

Code	Action	State	County	Site Code	Site ID	Parameter	POC	Duration	Unit	Method	Day	Hour	Value	Text	Data Code	Coll
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	00:00	12.56	12		
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	01:00	12.51	12		
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	02:00	13.3		AN	
RD	Ι	09	015	9991	ABT147	44201	1	1	800	047	20141001	03:00	14.11	14		
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	04:00	13.66	13		
RD	Ι	09	015	9991	ABT147	44201	1	1	800	047	20141001	05:00	13.49	13		
RD	Ι	09	015	9991	ABT147	44201	1	1	800	047	20141001	06:00	12.7	12		
RD	I	09	015	9991	ABT147	44201	1	1	800	047	20141001	07:00	12.22	12		-
•			1													•

2.5 Output Text File Review

The Open Output File button opens the text file for review in Notepad, as seen in Figure 2-5.

Figure 2-5. Raw Data Output Text File

20141230_all_2014_1	10.txt - Notepad	
<u>File Edit Format V</u>	<u>√</u> iew <u>H</u> elp	
Eile Edit Format V RD I 09 015 9991	Liew Help . 44201 1 1 008 047 20141001 00:00 12 1<	
RD I 09 015 9991 RD <td< td=""><td>. 44201 1 1 008 047 20141001 14:00 11 . 44201 1 1 008 047 20141001 15:00 12 . 44201 1 1 008 047 20141001 16:00 12 . 44201 1 1 008 047 20141001 16:00 12 . 44201 1 1 008 047 20141001 17:00 12 . 44201 1 1 008 047 20141001 18:00 13 . 44201 1 1 008 047 20141001 19:00 15 . 44201 1 1 008 047 20141001 20:00 16 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 22:00 19 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 22:00 19 . 44201 1 1 008 047 20141001 23:00 18 . 44201 1 1 008 047 20141002 00:00 17 . 44201 1 1 008 047 20141002 01:00 17 . 44201 1 1 008 047 20141002 02:00 18 . 44201 1 1 008 047 20141002 02:00 18 . 44201 1 1 008 047 20141002 01:00 17 . 44201 1 1 008 047 20141002 03:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 07:00 16 <td></td></td></td<>	. 44201 1 1 008 047 20141001 14:00 11 . 44201 1 1 008 047 20141001 15:00 12 . 44201 1 1 008 047 20141001 16:00 12 . 44201 1 1 008 047 20141001 16:00 12 . 44201 1 1 008 047 20141001 17:00 12 . 44201 1 1 008 047 20141001 18:00 13 . 44201 1 1 008 047 20141001 19:00 15 . 44201 1 1 008 047 20141001 20:00 16 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 22:00 19 . 44201 1 1 008 047 20141001 21:00 19 . 44201 1 1 008 047 20141001 22:00 19 . 44201 1 1 008 047 20141001 23:00 18 . 44201 1 1 008 047 20141002 00:00 17 . 44201 1 1 008 047 20141002 01:00 17 . 44201 1 1 008 047 20141002 02:00 18 . 44201 1 1 008 047 20141002 02:00 18 . 44201 1 1 008 047 20141002 01:00 17 . 44201 1 1 008 047 20141002 03:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 05:00 16 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 06:00 17 . 44201 1 1 008 047 20141002 07:00 16 <td></td>	

3.0 DATA ACCURACY

3.1 Data Accuracy Form

The AQS Accuracy Data form is shown in Figure 3-1. Creation of the Accuracy Data text file is similar to creation of the Raw Data text file.

Figure 3-1. Data Accuracy Form

CASTNET	Air Qua	ality Sy	stem (AQ	S)											
Raw Data	Accur	acy da	ta Preci	sion Data											
	_														
Deter	7/12/2	012		Act	ion		Paran	neters		Site II	D:				
Date:	//15/2	015	15	In	sert		OZC	ONE		PRK13	34	•]		
Update CO Delete SO2 Output Data															
							NO	,							
							NOY	/ / - NO						Display (Output File
6	Get Data			Add Record	ds										
	A	C 1.1		ch. c. l.	City ID	D	0.1	D	noc	A	D	11.5	Mailard	D	1
Lode	Action	State	County	Site Code	SITE ID	Paramete	r Code	Parameter	POC	Audit ID	Duration	Unit	Method	Day 20120712	Level 1 Valu
NA	1	55	1112	2331	FRK154	44201		OZONE	1	1	1	008	047	20130/13	
-															►.
Get E	ixisting [Data	Upo	date Existing	g Data										
Code	Action	State	County	Site Code	Site ID	Parameter	POC	Level Audi	t ID D	Juration	Unit Metł	nod [Day Value	Expected	

3.2 Date and Record Action Selection

The desired data range is selected first, as seen in Figure 2-2. Next the record Action Indicator is selected; the action may be an Insert, Update, or Delete operation. The source of the AQS accuracy data is the castnet_loggernet.cal_raw table.

TITLE: MULTI-LAYER MODEL OPERATION

Effective

Date:	3-6-25	— / Digitally signed by Rogers,
Prepared by:	Christopher M. Rogers	Christopher (USCR718689) Date: 2025.03.03 10:15:15 -05'00'
	Project Manager	Digitally signed by Stewart,
Reviewed and	Marcus O. Stewart	Marcus (USINIS/19399) Date: 2025.03.03 09:36:52
Approved by:	QA Manager	-05 00

TABLE OF CONTENTS

- 1.0 Purpose
- 2.0 Scope
- 3.0 Operating the Pre-/Post-Processor Interface
- 4.0 Model Output Post Processing: Tables, Aggregation Schemes, and Requirements
- 5.0 Adding the lab_key to VELHR
- 6.0 References
- 7.0 Attachments

Annual Review							
Reviewed by:	Title:	Date:	Signature:				

MULTI-LAYER MODEL OPERATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) staff for operating the Multi-Layer Model (MLM) graphical user interface, including all required tables and files as specified in the CASTNET Quality Assurance Project Plan (QAPP).

2.0 SCOPE

These processes apply to running the MLM to calculate estimates of dry deposition.

3.0 OPERATING THE PRE-/POST-PROCESSOR INTERFACE

The MLM is used by CASTNET DMC staff to calculate estimates of dry deposition for the following pollutants:

- Ozone (O₃)
- Sulfur dioxide (SO₂)
- Particulate sulfate (SO²⁻₄)
- Nitric acid (HNO₃)
- Particulate nitrate (NO_3)
- Particulate ammonium (NH⁺₄)

The MLM is written in FORTRAN and is the latest version in a sequence of inferential models developed by National Oceanic and Atmospheric Association (NOAA) Air Research Laboratory (ARL) and by the U.S. Environmental Protection Agency (EPA) Office of Research and Development (ORD). Further discussion of the MLM can be found in Section 4.2.1.3, Modeling Software, of the CASTNET QAPP.

3.1 Required Directory and File Set Up

Operation of the MLM requires the existence of five files, all of which must be in the same local directory on the user's computer. These files are listed below:

Drydep.ctl Drydep.exe Drydep.pif WDrydep.exe WDrydep.mdb

The user should create a root-level directory on a local drive named "mlm." The drive chosen should have ample storage available [~2 gigabytes (GB)] in order to store the site-specific files created during operation. The display name for the Drydep.pif file is Drydep with a Microsoft® MSDOS icon. If enabled on the workstation, the file extension for the other four files will be visible. The properties of the Drydep.pif file must be customized to point to the correct path for the location of the Drydep.exe program and the location of the working space required for the

creation of input and output files. To accomplish this customization, right click on the file and select "Properties." Select the "Program" tab as shown in the following screen capture (Figure 1):

DryDep Propertie	es ? 🗙
Font General	Memory Screen Misc Security NetWare Version Program
	DryDep
Cmd <u>l</u> ine:	d:\MLM\DRYDEP.EXE
Working:	d:\MLM
<u>B</u> atch file:	
<u>S</u> hortcut key:	None
<u>B</u> un: [Normal window
I	✓ Close on e <u>x</u> it
	Windows <u>N</u> T <u>C</u> hange Icon
	OK Cancel Apply

Figure 1

In the field "Cmd line," the full file path for the Drydep.exe file (including file name and extension) should be entered. In the "Working" field, the directory to be used for input and output files should be entered. This directory must be the location of the five files listed above.

3.2 Operation of the Wdrydep.exe Graphical User Interface

The MLM is run using the Wdrydep.exe program, a compiled program written in Visual Basic. Wdrydep.exe acts as the pre- and post-processor for the model FORTRAN code contained in the Drydep.exe program. The following screen shot (Figure 2) shows the graphical user interface of Wdrydep.exe.

Figure 2

🎇 Dry Deposition Batch Model		×	
<u>File R</u> un <u>V</u> iew			
ADO Import			
Select Sites		Select Dates	
Sites Available	Sites Selected	First Day	
ABT147	GAS153	01/01/87	
ALH157			
ALH257		Last Day	
ANA115 >>			
ANL146		All Decision	
		<u>All Periods</u>	
Model Processing Options	Dry Deposition Model Options	Data Output Options	
☑ Create Meteorology Input Files	🗖 Create Vd Files	🔿 Update Database	
Create Chemistry Input Files	🔲 Create Resistance File	 Add Only 	
🔽 Run Dry Dep Model (Hourly Averages)	🔲 Create Plant Vd File	Before creating inputs	
🔽 Create Weekly Averages	🔲 Create Plant Flux Files	🗖 Delete input files	
Create Monthly Averages	🔽 Calculate Missing Wetness Data	🔽 Delete output files	
🔽 Create Seasonal Averages	🔽 Substitute for Missing Met Data	After database update	
Create Quarterly Averages	🔲 Keep Chemistry Data 👘 Delete input fil		
🔲 Create Annual Averages - Seasonal	Force Calculated Wetness		
🔽 Create Annual Averages - Quarterly 🔲 Force Constant Soil Moisture			
belect sites, dates and options for UryDep model and/or averages.			

Appropriate inputs for the two combo boxes at the top of the form, the "Sites Available" and "Sites Selected" list boxes, the "Select Dates" date tools, and the "Model Processing Options" section are described in Table 1.

Table 1

Information Entry Point	Description	Type of Entry Required
Left Combo Box (at top)	Determines whether CASTNET or MADPRO* information is used	ADO Import for CASTNET Cloud for MADPRO
Right Combo Box (at top)	Not currently used	N/A
Select Sites: "Sites Available" List	Sites that can be included for modeling	N/A
Select Sites: "Sites Selected" List	Sites that have been selected for modeling	Any site for which the user wants to calculate dry deposition. In Figure 2, estimates are to be calculated only for site GAS153.
Select Dates: "First Day" Text Box	Beginning date for the time period to be modeled.	Start date for the model run in MM/DD/YY format (e.g., for a "samples to date" model run, use 01/01/87).
Select Dates: "Last Day" Text Box	Ending date for the time period to be modeled.	End date for the model run in MM/DD/YY format (e.g., use 12/31/YY to get the complete year for year YY).
Model Processing Options: "Create Meteorological Input Files" Box	Accesses the appropriate table for continuous data.	Unless already created, box must be checked.
Model Processing Options: "Create Chemistry Input Files" Box	Accesses the appropriate table for dry chemistry concentrations.	Unless already created, box must be checked.
Model Processing Options: "Run Dry Dep Model (Hourly Averages)" Box	Runs the MLM and creates estimates of hourly deposition velocities and fluxes.	Unless user is only creating input files OR aggregating from hourly estimates that already exist, box must be checked.
Model Processing Options: Aggregation Boxes ("Create Weekly Averages" box through "Create Annual Averages – Quarterly" box)	Create aggregated values for selected time periods.	Check box for specific aggregation period of interest. In order to calculate weekly or monthly values, hourly values must exist. In order to calculate quarterly or seasonal values, weekly values must exist. In order to calculate annual values, the respective seasonal or quarterly values must exist

Note: * Mountain Acid Deposition Program – Part of CASTNET, reported separately.

The defaults in the "Dry Deposition Model Options" section of Figure 2 are all that are required for most model runs. When the form is displayed, the boxes next to "Calculate Missing Wetness Data" and "Substitute for Missing Met Data" are automatically checked. Other options give the user flexibility to create or keep various processing files that are not needed during typical MLM operation. The MLM normally produces these data during the model run but does not export the data to a file. The remaining boxes in the "Dry Deposition Model Options" section provide options useful during testing or sensitivity studies.

In the "Data Output Options" section of Figure 2, either "Update Database" or "Add Only" can be selected. The default, "Add Only," should be used during normal MLM operation. Before the model is run, the user must confirm that records for the site and time period selected do not already exist in the VELHR table. If records are present, a primary key error will result and a corresponding error message will be generated. For more information on the SQL Server tables used for data storage by the post-processor, see Section 4.1. Only the "Delete output files" box should be checked in the "Before creating inputs" section. No boxes should be checked in the "After database update" section.

Once all of the required options have been selected, including the sites and time period of the model run, click the "play" button as shown in the upper left hand corner of Figure 2. The following form (Figure 3) is displayed. The user should enter his initials and the version number of the model in the spaces provided. The current version number is identified in the MODEL_VERSION table in the *castnet_model_arch* database. Special comments for the operational log can be inserted into the "Comments" section. Clicking "Continue" will start the MLM calculation process.

Figure 3

🖷, Dry Deposition Model Program Log 🛛 🔀				
Operator initia	als: CMR	Model \	ersion No	2.3
Comments:				
4				× ×
		C <u>o</u> nti	inue	<u>C</u> ancel
Model	ADO Imp	ort	Dry	Dep Model

3.3 Contents of the Wdrydep.mdb File

The Wdrydep.mdb file is a Microsoft® Access database that provides the information and settings necessary for the operation of the Wdrydep.exe program. It contains eight data tables. Seven are linked to data tables in the *castnet_model* SQL Server database, while one is a local data table with preferences specific to that computer. The following list provides the names of these eight tables and, if applicable, their linked table:

AverageSpecifications (linked to MLM_AVERAGE_SPECIFICATIONS) AverageType (linked to MLM_AVERAGE_TYPE) DatabaseType (linked to MLM_DATABASE_TYPE) ExportFileSpecifications (linked to MLM_EXPORT_FILE_SPECIFICATIONS) ExportQuerySpecifications (linked to MLM_EXPORT_QUERY_SPECIFICATIONS) ImportFileSpecifications (linked to MLM_IMPORT_FILE_SPECIFICATIONS) OperatorLog (linked to MLM_OPERATOR_LOG) UserPreferences

Operation of the Wdrydep.exe does not require changes to any of these tables. Only the CASTNET Data Operations Manager (DOM) or his designee is authorized to make edits to these tables.

3.4 Files Created by the MLM Pre-Processor

The Wdrydep.exe program creates multiple files for use by the MLM during calculation of deposition velocities and fluxes. These files are presented in Table 2.

Table 2

File Name	Description
[site_id].chm	Chemistry data for each site from DRYCHEM table. One file per site is created to contain atmospheric concentrations for the time period being modeled. Example file: GAS153.chm.
[site_id].met	Continuous data for each site from METDATA table. One file per site is created to contain meteorological data for the time period being modeled. Example file: GAS153.met.
Lang.sph	Leaf angle data from the LEAF_ANGLE table.
Leaf.dat	Plant leaf coverage data from the SITE_PLANT_SUMMARY and
	SITE_PLANT_DETAIL tables. Recreated for each site as model calculations progress.
Nearsite.dat	Contains "nearsites" (if applicable) for the site currently being modeled. Recreated for each site as model calculations progress.
Padprof1.20	Canopy data from the PLANT_PROFILE table. Recreated for each site as model
Padprof2.20	calculations progress.
Padprof3.20	
Plant.dat	Plant data from the PLANT table.
Station.dat	Site information from the VW_SITES_OLD view including longitude, latitude, time
	zone, and elevation. Recreated for each site as model calculations progress.

During the calculation process, the MLM also creates several other files. These are listed in Table 3.

Table 3

File Name	Description
[site_id].hvf	Report file to contain site information and a layout of the model output. Example file: GAS153.hvf.
[site_id].mc	Report file to contain combination of continuous data and atmospheric concentrations in one file. Example file: GAS153.mc.
[site_id].vfc	One file per site is created to contain hourly deposition velocity and fluxes output by the model.

4.0 MODEL OUTPUT POST-PROCESSING: TABLES, AGGREGATION SCHEMES, AND REQUIREMENTS

4.1 Database Tables Used as Output Destinations

During post-processing, data from the [site_id].vfc file is imported into the database for storage and additional data aggregation. Table 4 displays the six database tables found in the *castnet_model* SQL Server database that are used as destinations for MLM output.

Table 4

Table Name	Description
VELHR	Hourly deposition velocity and flux values from the MLM output.
VELWK	Weekly deposition velocity and flux values. Aggregated from VELHR. These values represent aggregations based on a 168 hour week.
VELMN	Monthly deposition velocity and flux values. Aggregated from VELHR. These values represent aggregations based on calendar months.
VELQR	Quarterly deposition velocity and flux values. Aggregated from VELWK. These values represent aggregations based on calendar quarters.
VELSN	Seasonal deposition velocity and flux values. Aggregated from VELWK. These values represent aggregations based on the starting date of each season (e.g., spring, summer, fall, and winter).
VELAN	Annual deposition velocity and flux values. Aggregated from either VELQR or VELSN. The typical method for producing annual values uses VELQR (quarterly) values.

4.2 Aggregation Schemes and Completeness Requirements

Table 5 provides the completeness requirements for each aggregation level described in Section 4.1. For more details on aggregations, see Section 4.4.4, Aggregations, of the CASTNET QAPP.

Table 5

Aggregation Level	Completeness Requirement	
Weekly	69% of hourly values during the week must be valid.	
Monthly	69% of the hourly values during the calendar month must be valid.	
Quarterly	69% of the weekly values during the quarter must be valid. This allows quarters	
	with 9 valid weeks out of 13 possible weeks to meet the requirement.	
Seasonal	69% of the weekly values during the season must be valid.	
Annual	75% of the quarters/seasons during the year must be valid.	

5.0 ADDING THE LAB_KEY TO VELHR

One of the requirements for the VELHR table is the inclusion of the analytical sample lab_key designation that documents the atmospheric concentrations used for a specific hourly record. Rather than make significant modifications to either the Drydep.exe or Wdrydep.exe code, a separate program was established to complete this task each time the model is run. The program used is named "Lab_key.exe" and is written in Visual Basic. To operate this program (Figure 4), first select either "working" or "historical." Selection of "working" will add the lab_key to the VELHR table in the SQL Server *castnet_model* database, while selection of "historical" will add the lab_key to be updated is shown in the "To Dry Dep" window. The source of the lab_key values shown in the "From Dry Chem" window does not change. Click the "OK" button to begin adding the lab key values. Records are not updated if the lab key field already contains a value.

Figure 4

🐃 Update velhr lab_key		×
From Dry Chem: castnet.dbo.drychem	 Working 	C Historical
To Dry Dep: castnet_model.dbo.velhr	<u> </u>	<u>C</u> ancel
Click OK to start key code update		

6.0 REFERENCES

Placeholder

7.0 ATTACHMENTS

This SOP does not contain attachments.
TITLE: DATABASE BACKUPS

Effective

Date:

Prepared by: Christopher M. Rogers Project Manager

3-6-25

Reviewed and Marcus O. Stewart Approved by: QA Manager

March Har

Digitally signed by Rogers, Christopher (USCR718689) Date: 2025.03.03 10:16:08 -05'00'

Digitally signed by Stewart, Marcus (USMS719399) Date: 2025.03.03 09:29:39 -05'00'

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- 6.0 Procedure
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Annual Review			
Reviewed by:	Title:	Date:	Signature:

DATABASE BACKUPS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) staff on how to successfully complete the backup procedure for the CASTNET SQL Server version 2022 databases as specified in the CASTNET Quality Assurance Project Plan (QAPP) (WSP, 2023).

2.0 SCOPE

These processes apply to the regular backup of the CASTNET database as performed by the CASTNET Data Operations Manager (DOM) or his designee, the only members of the DMC staff who are authorized to perform database backups. This SOP assumes that the user possesses a basic understanding of the SQL Server Enterprise Manager.

3.0 SUMMARY

4.0 MATERIALS

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow, including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 PROCEDURE

6.1 Creating Backup Devices in Sql Server

The CASTNET data set, which consists of seven permanent databases managed using Microsoft SQL Server, must be backed up weekly to ensure protection against catastrophic server failure, theft, and other forms of data loss. The process for routine backups of SQL Server managed databases begins with the creation of a backup device specific to each database. Figure 1 displays the process of creating a new backup device for an existing database. In the directory tree under "Databases," open the "Management" folder and right click on "Backup." The first option is "New Backup Device":

Figure 1

📅 SQL Server Enterprise Manager - [Console Root	\Microsoft SQL Servers\SQL Serv	er Group\JAX-CASTNET1 (Windows NT)\Management\Ba	ackup] 🔤 🗾 🖉 🗙
∫ <mark>∰ C</mark> onsole <u>W</u> indow <u>H</u> elp			<u>_8×</u>
_ Action ⊻iew Iools 🗢 → 🗈 💽 🔀	🖫 🛃 😫 🕺 😣 📝 🚺	😨 🕞	
Console Root Console Root Soll. Servers Soll. Servers Soll. Servers Databases Castnet Databases Castnet_app_test Castnet_app_test Castnet_app_test Castnet_app_test Castnet_model Castnet_model Castnet_tend Castnet_working Castnet_tend Castnet_working Castnet_tend Castnet_working Castnet_tend Castnet_working Castnet_w	TO CONTRACT OF CON	Physical Location e'\mssql7data\BACKUP\castnet_application_backup.BAK e`\mssql7data\BACKUP\castnet_backup.BAK e`\mssql7data\BACKUP\castnet_backup.BAK e`\mssql7data\BACKUP\castnet_poll_backup.BAK e`\mssql7data\BACKUP\castnet_working_backup.BAK e`\mssql7data\BACKUP\msdb_backup.BAK e`\msdf4dta\BACKUP\msdb_backup.BAK e`\msdf4dta\BACKUP\msdb_backup.BAK e`\msdf4dta\BACKUP\msdb_backup.BAK e`\msdf4dta\BACKUP\msdb_	Device Type Disk Backup Disk Backup
<u>۱</u>			
🎢 Start 🛛 🥵 🥵 🔩 🖸 💋 🧶 💋 🖏 Nove	ell Gr 🔍 Exploring 💐 SQL Serv.	🚈 weather.c 🕎 Microsoft 🎁 SQL Se	📽 🕵 🍕 : N 🕍 🐯 🚱 2:27 PM

Select "New Backup Device" and the following form (Figure 2) is displayed. Enter the name of the new backup device (the file name is automatically created), and click "OK" to establish the device:

Backup Device Prope	arties - New Device 🔀
General	
Name:	cnet_example
\mathbf{C} Tape drive name:	<u> </u>
• <u>F</u> ile name:	e:\mssql7data\BACKUP\cnet_example.BAK
	OK Cancel Help

6.2 Manual Database Backups Using Sql Server

Databases can be backed up without a backup device. However, for a database that is routinely backed up, it is simpler to first create a backup device that can then be used repeatedly. Once the database backup device is established, a database can be manually backed up. To begin, under the "Databases" folder, highlight the database to be backed up (Figure 3):

Figure 3



Multiple options are shown in the right window. Under the "Backup" options, select "backup database." The following form (Figure 4) is displayed:

Figure 4

SQL Server B	ackup - castn	et_working]		×
General Op	tions				
	Database:	castnet w	orking	•	
<u>•</u>	– <u>N</u> ame:	castnet_wo	orking backup		
	Desc <u>r</u> iption:				
Backup —	• Database - (complete			
	O Databa <u>s</u> e - (differential			
	 Transaction File and files 	log Your:			
Destination		jroup.	1		
	Backup to:	O ∐ape	🖲 Dis <u>k</u>		
				<u>A</u> aa	
				Re <u>m</u> ove	
				Contents	
Overwrite					
	 Append to n Overwrite ev 	nedia visting media			
Schedule		asang meala			
	🔲 Sched <u>u</u> le:				
		,			
	[OK	Cancel	Help	

Only complete backups of the CASTNET databases are performed. This is the default setting and is indicated by the selected radio button next to "Database – complete." As an additional step, when a new backup is created, existing backups are overwritten. This option is not a default and must be selected by clicking the radio button next to "Overwrite existing media." In Figure 4, the "Destination" box is empty. To select a destination, click the "Add" button and the following form (Figure 5) will display:

Choose Backu	ip Destination 🛛 🗙
Cr ba tha	noose the file name or backup device to use for the ickup operation. Backup devices can be created for files at you use frequently.
C <u>F</u> ile name:	e:\mssql7data\BACKUP\
• <u>B</u> ackup de	vice: castnet_working_backup
	OK Cancel

Backups can either be sent to a file or to a backup device which points to the file to be used. Open the combo box next to "Backup device" and select the backup device to be used. In this example, the castnet_working database is being backed up and therefore the "castnet_working_backup" backup device is selected. After clicking "OK," the "Destination" box now indicates "castnet_working_backup" (Figure 6):

SQL Server B	ackup - castno	et_workin	9		×
					1
	Data <u>b</u> ase:	castnet_w	orking		<u> </u>
_	<u>N</u> ame:	castnet_w	orking backup		
	Desc <u>r</u> iption:				
Backup —	O Database - c	omplete			
	O Databa <u>s</u> e - d	lifferential			
	O Transaction	log			U
	C <u>File</u> and fileg	roup:			
Destination		<u> </u>	A		
	Backup to:	O <u>L</u> ape	∙© Dis <u>k</u>		Add 1
	Castriet Working	и раскир			800
					Re <u>m</u> ove
					Sentente
	I			<u>_</u>	ontents
Overwrite	C A				
	 App<u>end to m</u> Overwrite exit 	iedia isting media			
Schedule					
	Schedule:				— <u> </u>
	_	1			
	[OK	Canc	el	Help

Figure 6

To start the manual backup, click "OK." The progress bar (Figure 7) indicates the percent of completion for the backup process:

Figure 7

Backup Progress	×
Backup in progress	
Backing up database: castnet_working to device(s): [castnet_working_backup]	
[Cancel]	

When the backup is done, the following will appear (Figure 8):

Figure 8

SQL Serv	SQL Server Enterprise Manager		
i	The backup operation has been completed successfully.		

6.3 Scheduling the Backup Job

To schedule the backup to run at a specific frequency and time, follow the instructions in Section 4.0 for selecting the backup device, but put a check mark in the "Schedule" box instead of clicking "OK" to start the manual backup (Figure 9):

Figure 9

SQL Server I	3ackup - castn	et_workin	g	×		
General 0	General Options					
	Data <u>b</u> ase:	castnet_w	vorking	•		
	<u>N</u> ame:	castnet_w	orking backup			
	Desc <u>r</u> iption:					
Backup —	Database - O Database - D Database - D Database - D Database - D	complete differential				
	C Transaction	log				
	C File and fileg	jroup:				
Destination						
	Backup to:	$\mathbf{C} \; \underline{I} ape$	🖸 Dis <u>k</u>			
	castnet_workin	ig_backup		<u>A</u> dd		
				Remove		
				<u>C</u> ontents		
Overwrite						
	 ○ Append to m ○ Overwrite e> 	nedia «isting media				
Schedule						
	☑ Sched <u>u</u> le:	Occurs	every 1 week(s	s) on Sunday,		
	[OK	Canc	el Help		

To select the date, time, and frequency of the backup job, select the button with three ellipsis dots next to the schedule list box. The following form (Figure 10) is displayed:

Figure 10

Edit Schedule 🛛 🔀
Name: castnet_working backup job
Schedule type
© Start automatically when SQL Server Agent starts
C Start whenever the <u>C</u> PU(s) become idle
O <u>□</u> ne time On date: Fri 4/19/2002 At time: 12: 32 PM
<u>R</u> ecurring
Occurs every 1 week(s) on Sunday, at 12:00:00 AM.
Change
OK Cancel Help

Provide a name for the job in the "Name" box. Since this is a backup of the castnet_working database, the name of the job is "castnet_working backup job." Verify that the "Enabled" box has a check mark in it and that the "Recurring" radio button is selected. Click the "Change" button to provide specifics for the job, which are displayed on a new form (Figure 11):

Fig	ure	11
i iy	ure	

Edit Recurring Job Schedule
Job name: (New Job) Occurs Weekly
O Daily Every 1 📑 week(s) on:
O Monthly □ Sat
Daily frequency
Occurs once at: 12:00 AM
O Occurs every: 1 拱 Hour(s) 🔽 Starting at: 12:00 AM
Ending at: 11:59 PM
Duration
<u>S</u> tart date: Fri 4/19/2002 불 O End date: Fri 4/19/2002
No end date
OK Cancel Help

Each CASTNET database must be backed up at least once a week. The scheduled backups are staggered, beginning on Friday at midnight. To set up a weekly backup, select "Weekly" in the "Occurs" list, select "Every 1 week(s) on Thu" from the "Weekly" list, and then select a time

for the job to run in the "Daily frequency" list. For "Duration," verify the "Start date," which defaults to the current date, and that the radio button for "No end date" is selected. Click "OK" when finished. In addition to the weekly backups, there is a differential backup of the labelement database each day.

Click "OK" on the "Edit Schedule" form (Figure 10) and again on the "SQL Server Backup" form (Figure 9) to save the job. Backup jobs can be viewed in the "Management" folder by clicking on "Jobs." Figure 12 shows the list of all backup jobs scheduled to run each week. Note that each backup job has a "Yes" in the enabled, runnable, and scheduled categories. Information is also given concerning the status of the last run of the backup job and the next time the job is scheduled.

Figure 12

📅 SQL Server Enterprise Manager - [Console	Root\Microsoft SQL Servers\SQ	L Server Group\	AX-CAST	NET1 (Wi	ndows NT)\	Managemen	t\SQL Server Agent\J	obs]	_ 8 ×
∫ ∰ <u>C</u> onsole <u>W</u> indow <u>H</u> elp									- 8 ×
Action ⊻iew Iools 🛛 🗢 → 🗈 💽	× @ 🖸 😫 🛛 🛞 .	65 🗊 🌔 🕅							
Console Root	Name	Category	Enabled	Runnable	Scheduled	Status	Last Run Status (Star	Next Run [Date
Microsoft SQL Servers	💿 castnet backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02	12:00
E CACINETI (Control NT)	castnet_application backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02	12:30
Databases	castnet_model backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02	1:00:
E Castnet	castnet_model_arch backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 *	1:30:
E castnet app test	castnet_poll backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 4	4:30:
castnet_application	castnet_temp backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 2	2:00:
🕀 🚺 castnet_model	castnet_working backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 2	2:30:
🕀 🔋 castnet_model_arch	master backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 3	3:00:
🕀 🕖 castnet_poll	mountain_cloud backup	[Uncategorized	Yes	Yes	Yes	Not Running	Succeeded (4/14/02	(4/21/02 3	3:30:
🗄 🔰 castnet_temp	msdb backup	[Uncategorized	Yes	Yes	Yes	Not Hunning	Succeeded (4/14/U2	(4/21/02 4	4:00:
🖽 🛄 castnet_test									
H master	1								
mousi cloud	1								
⊞ msdb									
Northwind	1								
🕀 🚺 pubs	1								
🖽 🔋 tempdb	1								
🕀 🧰 Data Transformation Services	1								
🖻 📃 Management	1								
E 🔂 SQL Server Agent	1								
Alerts	1								
Uperators	1								
	1								
E Dackup	1								
Database Maintenance Plans	1								
	1								
Web Publishing	1								
🕀 📄 Security	1								
E Gupport Services	1								
🗄 🕣 SQL 6.5	1								
	1								
	1								
	1								
	1								
	1								
	J								
🏦 Start 🛛 🧐 🥭 😤 🖸 🧭 🤌 🖉	Novell Grou 🔯 Exploring - p	🚺 Microsoft W	🎁 SQL S	erv 🤌	Jacksonville,		4:N2***	1 9200	2:58 PM

6.4 Weekly Archiving of the Backup Files

Each Friday, all database backup files are copied to an external hard drive by an automated script.

6.5 CREATING BACKUPS IN ORACLE 19c

The Oracle 19c CASTNET database is also backed up weekly to external hard drive. To backup the Oracle 19c database, open the Oracle Enterprise Manager Console. Select the desired database from the directory tree. Select the "Tools" menu item, and then from the expanded menu select "Database Tools", "Backup Management", and "Backup" (see Figure 13). This item launches the Backup Wizard tool. As shown by Figure 14, select the "Predefined Backup Strategy" radio button and click "Next". For the CASTNET Oracle 19c database, weekly backups are adequate. Therefore, select the radio button for "My database is not frequently updated (DSS)" as shown by Figure 15, which provides for one full backup each week, and click "Next". Figure 16 shows the form for selecting the start time for the backup. The default is 12:00 AM. The specific configuration for the backup job is shown by Figure 17. Accept the default configuration and click "Next". Figure 18 shows which database is selected. Click "Finish" to close the wizard and save the job. The status of the backup job can be viewed by clicking on "Jobs" in the directory tree (Figure 19).



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Figure 14



👯 Backup Wizard	×
	Backup Frequency
	Choose the type of description that best fits your database.
	 My database is not frequently updated (DSS) Full backup once a week Backup day: Sunday My database is moderately updated (OLTP) and is not very large Full backup everyday My database is frequently updated and is large or medium Full backup once a week and incremental backup everyday Full backup day: Sunday Retain at least the specified number of backups for each datafile and delete obsolete backups after every backup.
	Number of backups: 2
Cancel Help	C Back Einish

Figure 16

🍀 Backup Wizard				×
	Specify a time when t be when the databas	Backup Time he backup should be made, / e is least active.	An appropriate time would	
	Backup Time:	12:00:00 AM EDT	A	
Cancel Help		Seck Back	<u>N</u> ext ≫) <u>E</u> inish)

🎎 Backup Wizard	×
	Configuration
	Choose a predefined configuration: castnetora
	Description of the configuration: This a default configuration which backups
	Summary of the configuration:
	Backup Configuration Information: Name: castnetora Type: Backup set saved to disk Channel(s): Channel1 Format: b_%u_%p_%c
	Edit Backup Configuration
Cancel Help	G Back Next >> Einish

Figure 18

🎎 Backup Wizard		×
	Multip To which target(s) do you want to subr Available targets:	<pre>cubic Targets mit the job? Selected targets:</pre>
Cancel Help	9	Back Next > Einish

👯 Oracl	Oracle Enterprise Manager Console, Administrator:SYSMAN, Management Server:jaxoracastnet.mactec.com 📃 🖻 🗙						
	Eile Navigator Object Event Job Tools Configu						CRACLE EnterpriseManager
	⊖-¥K Network	Active History					
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7.0 REFERENCES

Placeholder

8.0 ATTACHMENTS

This SOP does not contain attachments.

TITLE: HARDWARE MAINTENANCE PLAN

Effective			
Date:	3-6-25		
Reviewed by:	Jayde M. Alderman	alderman, jayde (USJA713659)	Digitally signed by alderman, jayde (USJA/13659) DN: cn=alderman, jayde (USJA/13659), our-Active, email=iayde: hompson@wsp.com Date: 2025.03.03 13:24:44 -05'00'
	Data Management, Analys	sis, Interpretation, a	nd Reporting Manager
Reviewed and Approved by:	Marcus O. Stewart QA Manager	Marcad flor	Digitally signed by Stewart, Marcus (USMS719399) Date: 2025.03.03 09:33:36 -05'00'

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Annual Review				
Reviewed by:	Title:	Date:	Signature:	

HARDWARE MAINTENANCE PLAN

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) personnel for the maintenance of computer hardware used to complete tasks for CASTNET, including the CASTNET servers, staff workstations, and WSP corporate servers.

2.0 SCOPE

These processes apply to the maintenance of computer hardware associated with the operation of the CASTNET servers, staff workstations operating the CASTNET Data Management System Application, and the WSP Wide Area Network (WAN) servers.

3.0 SUMMARY

The maintenance of computer hardware used to complete tasks for CASTNET involves the routine evaluation of the various hardware platforms with respect to performance, compatibility, capacity, availability, and speed and the comparison to the latest available technology in order to consider productivity enhancements. Figure 1 illustrates the steps in the annual evaluation of hardware. Preventative maintenance includes utilizing the latest virus protection and defragmenting all hard drives.

Figure 1. Evaluation of Hardware



4.0 MATERIALS

Laptop or personal computer WSP WAN servers: Nutanix Hyperconverged Infrastructure (HCI) Production Cluster Node SQL Server 2022-related software Oracle 19c database-related software Permissions and access to utilized databases

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow, including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 PROCEDURES

6.1 Maintenance of the CASTNET Server

A Nutanix HCI hosts 4 virtual machines for MS SQL Server data, Oracle data, web applications and Campbell's LoggerNet polling software. For more information concerning CASTNET objectives and operation of the DMC, see Appendix 6 of this QAPP.

6.1.1 Routine Hardware Evaluation

Annually, the DMAIRM and DMC staff evaluates the suitability of the hardware platform used for the CASTNET servers. This evaluation includes assessment of the operating system with respect to hardware performance and compatibility. After evaluation of the current server setup and performance, recommendations for modifications and/or upgrades are compiled along with a proposed implementation schedule. For additional information concerning procedures established for changes to hardware configurations, see the CASTNET Quality Management Plan (QMP), which is given as Appendix 8 of this QAPP.

6.1.2 Defragmentation of CASTNET Server Hard Drives

WSP's Information Technology (IT) staff recommends defragmenting all hard drives on servers with Microsoft[®] operating systems on a monthly basis.

6.1.3 Use of Virus Scanning Software on the CASTNET Server

WSP IT uses antivirus software on all servers (including the CASTNET servers). Hard drives are scanned weekly. On a regular basis, all servers on the WSP network (including CASTNET

servers) are automatically updated with new signature files and security patches to allow for detection and removal of new viruses.

6.1.4 Incident Response

If a data breach is suspected, WSP will immediately initiate investigation and implement response action as appropriate. WSP will alert EPA within 3 to 5 days of a suspected data breach.

6.2 Maintenance of User Workstations

6.2.1 Routine Hardware Evaluation

User workstation hardware configurations are evaluated annually by WSP IT staff based on minimum workstation specifications established for the company. Workstations are replaced after approximately three years of use to ensure usability and compatibility with current systems and software.

The DMAIRM works with WSP IT staff to ensure that user workstations will successfully operate the CASTNET Data Management System Application and iCASTNET.

6.2.2 User Workstation Antivirus Software

WSP IT manages the deployment of antivirus signature files and the antivirus scan schedule for all WSP workstations.

6.3 Maintenance of WSP Servers on the WSP WAN

Program servers on the WSP WAN are maintained and managed solely by WSP IT staff, which continually evaluates the hardware configuration of the office servers. Office servers are routinely backed up to a central WSP data center. Scheduled virus scans of hard drives occur weekly. Servers are automatically updated on a regular basis with new security patches.

6.4 Provisions for System Downtime

As much as possible, system downtime is scheduled in advance for periods when activity is minimal. System downtime may be caused by hardware or software upgrades or by other reasons that restrict user access to the CASTNET WSP WAN servers. The following is an example of how such an event would be handled by either the DMAIRM, in the case of the CASTNET server, or the WSP IT staff. If the WSP IT staff is scheduled to update the e-mail system for the company, causing a disruption of server accessibility, a broadcast e-mail is sent to all employees specifying what the update involves, why it is necessary, and when it will be performed. Information concerning possible work-related conflicts is requested in the e-mail. Most updates to either laptops or WSP WAN servers are scheduled for weekend days.

Unscheduled system downtime is communicated first by e-mail, if available, and second by verbal communication. Once all systems are again operational, an e-mail is sent to all users indicating that the problem has been resolved and that the system is once again accessible.

7.0 ATTACHMENTS

This SOP does not contain attachments.

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TITLE: SOFTWARE MANAGEMENT PLAN

3-6-25

Effective

Date:

Prepared by: Christopher M. Rogers Project Manager

Reviewed and Marcus O. Stewart Approved by: QA Manager

Maren O. Har

Digitally signed by Rogers, Christopher (USCR718689) Date: 2025.03.03 10:15:29 -05'00'

Digitally signed by Stewart, Marcus (USMS719399) Date: 2025.03.03 09:40:27 -05'00'

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Annual Review			
Reviewed by:	Title:	Date:	Signature:

SOFTWARE MANAGEMENT PLAN

1.0 PURPOSE

This Software Management Plan (SMP) is furnished to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) staff for acquiring software capabilities and related services through in-house development, commercial off-the-shelf (COTS) purchase, or via subcontract with other software development firms.

The purpose of this SMP is to define CASTNET's software management processes and the responsibilities, standards, procedures, and organizational relationships for all software management activities associated with CASTNET, including software acquisition and development practices, standards, and technical procedures. It further establishes management, engineering, and quality assurance (QA) requirements for providers of software (both internal and external). Throughout this SOP the term "provider" is used to refer to developers and providers of software and software services, regardless of the nature of their organization or their affiliation with CASTNET.

2.0 SCOPE

CASTNET's primary goal is to function effectively as a national, long-term deposition monitoring network that provides information for assessing the effectiveness of current and future emission reductions mandated under the Clean Air Act. To meet this goal, CASTNET was designed to fulfill the following objectives:

- 1. To monitor the status and trends in air quality and atmospheric deposition;
- 2. To provide atmospheric data on the dry deposition component of total acid deposition, rural ground-level ozone (O₃), and other forms of atmospheric pollution that enter the environment as particles and gases; and
- 3. To assess and report on geographic patterns and long-term, temporal trends in ambient air pollutant concentrations and acid deposition.

In order to meet these data and reporting objectives, CASTNET DMC personnel use relational databases that house the data collected by the network and computer programs that validate and analyze these data, including the tools and models used in the validation and analysis processes. Key software components used to perform these tasks:

- The CASTNET databases,
- The iCASTNET data application

These systems comprise the majority of the software used by CASTNET to manage and analyze data and provide analyses. CASTNET's management processes pertaining to the software acquired by CASTNET to satisfy its data analysis and reporting requirements are established by this SMP. It also establishes requirements to be satisfied by the providers of all software purchased, contractually acquired, developed, or maintained for the support or execution of CASTNET. Its provisions apply to all government organizations, in-house activities, and contractors providing software capabilities and/or support to CASTNET. This SMP does not

apply to software or hardware interfaces, capabilities, and schedules that are not specifically developed or modified to support CASTNET, except for those software/hardware interfaces to CASTNET-supported capabilities and schedules for the availability of support.

The term "software," as used in this document, includes code, documentation, associated data, and "firmware," which is software installed in a medium that cannot be dynamically changed. For the purposes of this document, the CASTNET databases are referred to as the "SQL database and the Oracle database," and the data validation and analysis application as the "iCASTNET." Together these components represent the CASTNET data management system.

All systems and software used for CASTNET should be considered Type III, User Owned Information Systems. According to EPA's Office of Information Resource Management (OIRM), Type III systems are unique, standalone systems developed to improve the efficiency or effectiveness of operations for a single user or a small group of users. The CASTNET databases and iCASTNET are used almost exclusively by people working on CASTNET, not by EPA employees or outside users.

3.0 SUMMARY

Various software tools are used to manage, analyze, and model the variety of CASTNET data. Software is an integral part of the project. This SOP provides the procedures for the acquisition, development, review, and testing software achieved through in-house development, COTS purchase, or using outside subcontractors. Figure 1 provides an overview of the steps that need to be completed in order to utilize a new software package on CASTNET.

Figure 1. Implementation of Software Changes



4.0 MATERIALS

Laptop or personal computer SQL Server version 2022 hardware SQL Server-related software Oracle 19c database hardware Oracle 19c database-related software Permissions and access to utilized databases

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow, including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 PROCEDURES

6.1 Planning

Planning is a crucial part of software development and management. Planning for CASTNET software is usually done on an as-needed basis once software requirements are identified. Typically, software requirements are identified through one of two mechanisms. First, users of the current software identify improvements or enhancements that would make existing products more efficient for CASTNET requirements. Second, software requirements change with data requirements and updated technology.

Once changes in software requirements are identified, planning for implementation begins. The planning process is typically a 5-step process:

- 1. Discussion among DMC staff on how best to implement the changes;
- 2. Identification of the best mechanism for implementing the changes (e.g., in-house, COTS, or via subcontract with other software development firms);
- 3. Development of an implementation schedule;
- 4. Determination of cost and funding mechanisms; and
- 5. Assignment of DMC staff responsible for oversight of implementation.

6.1.1 Project Resources

6.1.1.1 Contractor Facilities

The WSP DMC provides the repository for CASTNET data, including raw data that have been collected but not yet validated and data that have been validated using various validation schemes (e.g., Level 1, Level 2, or Level 3). The WSP DMC also provides the hardware, database management software, data security, and computer programming necessary to manage, maintain, and deliver the CASTNET data. The subsections that follow detail the database management system used for CASTNET; validation, verification, and documentation of data; documentation and version control procedures used to develop major computer programming code; and a discussion of the data security procedures used to provide access and system backup for the CASTNET database management system.

6.1.1.2 Laboratory Software

The WSP analytical chemistry laboratory in Gainesville, FL that serves CASTNET is responsible for its own software products. In particular, the laboratory is responsible for application and maintenance of its Laboratory Information Management System (LIMS). The laboratory uses a commercial LIMS called the Element Data System (Element) to manage analytical chemistry from CASTNET and other projects.

6.1.1.3 Government Furnished Equipment, Software, and Services

Government furnished equipment is not currently used by CASTNET to manage data or to develop computer program code. Should government furnished equipment be supplied in the future, this section will be revised accordingly.

6.1.1.4 Personnel

The personnel utilized in the development of software for CASTNET are staff members of the DMC, technical advisors and subcontractors (e.g., for specialty programming on iCASTNET). The DMC staff has overall responsibility for implementing the SMP.

6.1.1.5 Organizations Responsible for Design, Implementation, Configuration Management, Reliability, and Quality Assurance

The DMC staff has overall responsibility for the design, implementation, reliability, and QA of all software managed under this plan. WSP's information technology (IT) group has overall responsibility for hardware configuration management. Software configuration management is the responsibility of the DMC staff. The Gainesville Laboratory is responsible for the LIMS. The Project QA Manger is responsible for QA of information generated by the software utilized for CASTNET.

6.1.2 Review Responsibilities

While review responsibilities belong to the CASTNET Data Management, Analysis, Interpretation, and Reporting Manager (DMAIRM) and DMC staff, overall responsibility resides with the DMAIRM. The CASTNET Project Manager and CASTNET Project QA Manager also review all recommendations from the DMC staff concerning software development. Consensus approval by the Project Manager, the QA Manager, and the DMAIRM is required before software development commences.

6.1.3 Software Development

This section describes the organizational structure, personnel, resources, software development tools, techniques, methodologies, and standards/forms involved in the software management planning process.

6.1.3.1 Organization Structure

The DMAIRM heads the planning process for all software development efforts and oversees the DMC staff. The DMAIRM reports to the Project Manager. The Project QA Manager reviews work products for QA purposes. Figure 2 depicts the organizational structure as it applies to software planning and management:

Figure 2. SMP Organizational Structure for CASTNET



6.1.3.2 Personnel

Personnel involved in the planning process include the DMAIRM and DMC staff, subcontractors, and technical end users. Oversight of all subcontractors' involvement is the responsibility of the Project Manager and the DMAIRM. DMC staff is utilized to plan, test, review, and develop software for CASTNET. Technical end users are involved in planning for enhancements to existing software and for detailing problems with current software products.

6.1.3.3 Resources

Resource planning is the responsibility of the DMAIRM. He provides recommendations to the Project Manager on any resources not readily available through either in-house or subcontracted services that are required to complete software projects. Resource planning occurs annually with an interim review every six months to ensure no pressing resource needs exist.

6.1.3.4 Software Development Tools, Techniques, Methodologies and Standards/Forms

Planning for the acquisition of software development tools, techniques, methodologies, and standards/ forms occurs annually and on an as-needed basis throughout the year.

6.2 Management Controls

The DMAIRM is responsible for the successful management of CASTNET's software acquisitions, including verifying that the software meets project requirements, is delivered on schedule, and is within budget. These management responsibilities also include the development and maintenance of this SMP. Additional responsibilities of the DMAIRM include, but are not restricted to, the following:

- Authorizing and approving all matters pertaining to software acquisitions.
- Reviewing and approving each provider's SMP.
- Ensuring that software size, effort, and schedule re-estimations are made and analyzed at the conclusion of each software development phase.
- Serving as chairperson at all software development phase transition reviews and ensuring that all review items are resolved.
- Reviewing and determining if each life-cycle phase has been successfully completed. If so, then directing the provider to begin the work of the next phase.
- Monitoring provider staffing and staff changes to ensure continuity and sufficiency of expertise needed to meet schedule requirements.
- Reviewing provider progress reports that present current status, accomplishments for the reporting period, planned achievements for the next period, issues, problems, and concerns. Using the information in the reports, the DMAIRM will identify software management problems needing resolution.
- Monitoring the products and processes of any provider's software subcontractors to ensure end-to-end quality. Management of subcontractors is a prime contractor (provider) responsibility.
- Ensuring that provider software is delivered in accordance with the agreed upon schedule.

- Developing and maintaining external interfaces in conjunction with the DMC staff.
- Providing technical direction to software providers and support to contractors, especially on issues that may potentially have long-term effects on system schedules and costs.
- Approving or disapproving waiver requests submitted by providers and assessed by the DMC staff.

6.2.1 Project Schedule, Reviews, and Report Controls

Once software projects are underway, the software project schedule is reviewed and discussed on a weekly basis as part of the WSP CASTNET Coordination Meeting. Deviations from the schedule are noted, and action plans to address schedule deviations are developed. Project reviews and report controls occur on a similar schedule with routine program evaluations held annually.

6.2.1.1 Work Plan

Work plans are not typically prepared for in-house software development projects; however, work performed under subcontract will usually require a work plan. The work plan is reviewed by the DMC staff and DMAIRM, and modifications or changes are discussed with the subcontractor before work can proceed. Once approved, the work plan governs the software development process.

6.2.1.2 Activity Networks and Dependencies

Activity networks and dependencies are not prepared for software developed as a part of CASTNET. The size and scope of CASTNET-related software does not justify the cost of such development.

6.2.1.3 Risk Areas

Risk areas for software developed for CASTNET include catastrophic data loss, virus infection, and network infiltration. These risk areas are managed by the WSP IT group.

6.2.2 Risk Management

6.2.2.1 New Technologies

New technologies are not normally utilized in software developed for CASTNET. Generally, only proven programming techniques, products, and procedures are utilized. New technology may only be utilized after testing and subsequent client approval.

6.2.2.2 Backup – Recovery

Weekly scheduled backups of the SQL Server and Oracle 19c databases are created for all CASTNET-related data. For information that is updated several times per day, daily incremental backups are also performed. After the backups are complete, the files created by the backup process are archived to other severs located in WSP's Gainesville, FL office. The CASTNET database system is comprised of a physical server that hosts two virtual servers, and is located

in the Gainesville, FL office. After the backups are complete, the files created by the database backup process are stored locally on the servers and on three external hard drives used in rotation to permit onsite and offsite backups. Onsite backups are stored in a fire proof safe in a room equipped with an automated fire control system. Gainesville and Jacksonville office servers, used to store project related files, are backed up daily to the cloud, a process that is managed by WSP IT staff.

Critical software and electronic documents are backed up to the Gainesville or Jacksonville office servers, which are backed up daily to the cloud in a system managed by WSP's IT staff. Should a disaster occur that renders the CASTNET server inoperable, the database management software will be rapidly re-loaded onto another server, and the data restored from the archived backup files. WSP estimates that the data management system could be redeployed within 24 hours following a server failure or catastrophic event and, depending on the age of the backups, the database could be fully repaired and in production mode within 24 hours to one week.

Other program-critical software and digital storage is and will continue to be maintained in a similar way. The iCASTNET application is housed on both the Jacksonville and Gainesville office servers, and the current version is backed up daily to the cloud. Therefore, server failure or a catastrophic event will have minimal effect on iCASTNET. Documents and reports prepared for CASTNET are stored on the Jacksonville or Gainesville WSP office server and are subject to the same daily backup procedure. SharePoint, an electronic document management system, is also used to electronically archive these documents.

Although not strictly a data backup system, a Redundant Array of Independent Disks (RAID) subsystem is included in the CASTNET-dedicated server at WSP. A RAID subsystem increases performance and/or provides greater fault tolerance and provides protection against data loss from physical drive failure. The servers use RAID5 with a hot spare disk, which provides a striped set with distributed parity.

6.2.2.3 Manual Procedures and Forms

Manual procedures are not typically used in the development of software products. Documentation of other (i.e., non-software development) manual procedures and forms for data handling is provided in other appendices to this QAPP (e.g., Appendix 1, Field SOP, and Appendix 6, Data SOP).

6.3 Software Product Assurance

CASTNET utilizes a software assurance program that includes QA, verification and validation, quality engineering, safety assurance, and security and privacy assurance. The DMAIRM is responsible for the planning and execution of the software QA program. The following subsections detail CASTNET's software product assurance program and specify software QA requirements for software providers.

Included in each provider's required SMP are details of their software QA program in accordance with the above-stated requirements.

6.3.1 Software Independent Verification and Validation

Whenever possible, independent verification and validation of the software performance is completed. This typically occurs in one of two ways. First, when developing software for iCASTNET, an underlying test database is used to independently confirm the functionality of the software. Second, with regard to the CASTNET database itself, independent audits are performed on a routine basis.

6.3.2 Software Security

All electronic products (software products, databases, and documents) are housed on the WSP wide area network (WAN) or server network and are subject to automated data backup systems, virus protection, and network firewalls.

6.3.3 Software Reliability and Quality Control

Software reliability and quality control are exercised in the testing and review phase. Please see Sections 6.3.7 and 6.3.8 for a review of those procedures.

6.3.4 Software Interface Definition

All software developed for CASTNET must utilize standard Microsoft Windows interface definitions since Windows is the standard interface for WSP.

6.3.5 Software Waivers to Policy and Procedures

The DMC staff reviews all requests for waivers to software policy and procedures. After completing its review, the DMC staff informs the DMAIRM of its recommendation as to whether or not a waiver should be granted. The DOM has sole authority to grant waivers. Requests are accepted infrequently.

6.3.5.1 Permanent Waivers

For software that performs crucial functions, a permanent waiver is only granted after thorough review by DMC staff to ensure that the waiver is necessary. Typically, a permanent waiver is granted only when it would be too time or cost consuming to implement an alternative strategy.

6.3.5.2 Temporary Waivers

For software that performs crucial functions, a temporary waiver is only granted after thorough review by DMC staff to ensure that the waiver is necessary. Typically, a temporary waiver is granted only when project requirements would not be met and a tool under development has not completed testing and review.

6.3.5.3 Tools and Standards Waivers

Tools and standards waivers are only granted when the functionality of an alternative tool is substantially higher or when there is no corresponding functionality in the current standard.

6.3.6 Data Administration

Data administration is handled by the DMC staff, which is responsible for all data administration activities. The WSP DMC is the repository for CASTNET data, including raw data that have been collected but not validated, and data that have been validated using various validation schemes (e.g., Level 1, Level 2, and Level 3). The WSP DMC also provides the hardware, iCASTNET software, data security, and computer programming necessary to manage, maintain, and deliver the CASTNET data. The CASTNET DMC uses Microsoft SQL and Oracle 19c database management systems for maintaining the CASTNET data. These systems provide a robust environment for handling the data and an option for future expansion.

6.3.7 Quality Assurance

The QA program and the testing program (see Section 6.3.8) operate in essentially the same manner since QA during the testing phase reduces problems once the software becomes operational.

6.3.7.1 Program Monitoring

The DMC staff performs all program monitoring.

6.3.7.2 Quality Reviews

Quality reviews are conducted by both the DMC staff and the QA Manager. The QA Manger provides general oversight on the QA process.

6.3.7.3 Reporting and Control

Reporting and control of the QA process as it relates to software development and management resides with the DMAIRM. With the exception of data handling and SOP, QA reports for software development and management are issued on an as-needed basis. QA controls are exercised throughout the development and management process using the iterative feedback mechanisms described in Sections 6.3.7.5 and 6.3.7.6.

6.3.7.4 Reviews

Reviews are conducted by the DMC staff. The types and frequencies of these reviews are discussed in the following subsections. After each type of review is completed, the results of the review, together with any recommendations by the DMC staff, are provided to the DMAIRM.

System Requirements Reviews

With respect to iCASTNET, reviews are conducted monthly during the DMC staff meetings to both ensure that the application is functioning correctly and to develop items for future

enhancement. The database is reviewed annually to ensure proper operation and to evaluate whether or not updates to those components are required.

Preliminary Design Review

Preliminary design reviews are only conducted when major components are added to iCASTNET, or the CASTNET database structure is changed significantly. This review is handled by the DMC staff.

Critical Design Review

Once the preliminary design review is completed, a critical design review is conducted to ensure that changes do not have cascading repercussions for other systems. For example, when database structures are modified, they are evaluated to determine the potential impacts on iCASTNET, and any critical flaws are reviewed and evaluated to minimize change to other systems.

Code Reviews

The DMC staff performs all code reviews. The DMAIRM is notified of any inconsistencies.

6.3.7.5 Development Testing and Evaluation Review

Development testing and evaluation review are iterative processes closely coupled with the operational testing and review phase. The primary difference is that development testing and review reside primarily with the programmers responsible for software development, while operational testing and review reside with some, or even all, of the end users in a "beta" testing phase. The steps used in this process are as follows:

- Low-level programmer testing and review (Level A): A programmer performs a QA check immediately following software modifications. The purpose of this Level A review system is to ensure, at a low level, that code modifications produce the desired software behavior and do not adversely impact the behaviors of other subroutines or code modules. Immediately following modifications, the programmer performs a full compile of the software code and exercises the software features that are immediately affected by the modifications. Level A problems are remedied immediately.
- Mid-level technician/programmer testing and review (Level B): A programmer or technician performs systems tasks to:
 - 1. Exercise routine software features to ensure that the software functions as anticipated;
 - 2. Quantitatively check the software output. These checks may be automated to some degree. These checks are established to exercise functions and features; and
 - 3. Establish one or more sets of standard test data to quantitatively assess the output results.

Level B problems are remedied before proceeding to Level C review. Level C review is part of the operational testing and review cycle.

6.3.7.6 Operational Testing and Evaluation Review

The operational testing and evaluation review is performed as follows:

- High-level end user testing and review (Level C): As a representative of software end users, a scientist or engineer reviews the software. The purpose of this review is to evaluate software ergonomics, exercise software features to ensure the absence of software bugs, and verify the reasonableness of output results.
- Tracking changes: When Level C reviews are complete, no further changes will be made, and the software version will be declared. After closure, or periodically during a software maintenance period, any further changes will be queued until the next round of modifications. Closely related changes (e.g., in the same subroutine or module) will be grouped to enhance the efficiency of the software modification process. As software modifications progress, the results of each step will be recorded.
- Software modification process: For each category of change order, the following steps of the software modification process are completed:
 - 1. Verify or reproduce errors or undesired behaviors;
 - 2. "Trap" errors/behaviors by locating the lines of code that must be modified;
 - 3. Generate a plan for modifications; and
 - 4. Implement modifications. The revised software is then passed for Level A QA review.

The overall process for development and operational testing and review is shown in Figure 3.

Figure 3. Software QA Test and Review Process



6.3.8 Testing

The testing of software follows the procedures outlined in Section 6.3.7.

6.3.8.1 Software Test Plan

Formal software test plans are not developed for CASTNET since the programming for this project is considered to be a Type III system. The DMC staff determines the types of tests necessary to perform on the software before it is deemed usable by non-DMC staff. Testing always includes evaluation runs against the test database.

6.3.8.2 Software Test Description

Section 6.3.7 describes the software test process.

6.3.8.3 Software Test Procedures

The majority of the software test procedures are described in Section 6.3.7 since testing and QA for software prepared for CASTNET are inextricably entwined. See Figure 3 for the overall software test procedure flow.

6.3.8.4 Conducting the Software Test

The DMC staff also tests new, updated, or modified software against a test database that replicates the structure of the production database. The software must perform correctly against the test database prior to release for general use against the production database.

6.3.8.5 Software Test Reports

The DMC staff prepares all software test reports. Because the CASTNET system is a Type III system, software test reports are normally in the form of informal memoranda or e-mails.

6.4 Software Development Procedures

6.4.1 Software Standards and Procedures

Software standards are established based on current EPA standards for developing software applications and WSP IT group standards. In general, software developed for the CASTNET program must conform to normal Microsoft Windows programming conventions.

6.4.2 Software Tools

Software tools used to develop computer software code for CASTNET are COTS software that conforms to Microsoft Windows standards.

6.4.2.1 Commercial and Reusable Software

Whenever possible, commercial software development products are used to develop software. Components used in software development, as well as individual code snippets, are reusable to the largest extent possible.

6.4.2.2 Data Rights and Documentation

Data rights and documentation are maintained by the DMAIRM or his designee. Data rights are granted to software users and developers on an access requirement basis. Individuals and subcontractors are only granted access rights on an as-needed basis. Documentation of data rights resides with DMAIRM or his designee.

6.4.2.3 Certification

All software certification is maintained by the DMAIRM or his designee or by subcontractors (when preparing software). The only exception to this is software registration and licensing information. Software registration and licensing information is maintained by the WSP IT group.

6.4.2.4 Software Test Tools

Software test tools are not used by CASTNET for software testing, with the exception of sample data sets. The software testing procedure is outlined in Sections 6.3.7 and 6.3.8.

6.4.2.5 Software Design

Software design for CASTNET is an iterative process that actively involves the users of iCASTNET software. Software design changes to the database structure or to the MLM code are done solely by the DMAIRM or his designee, the only members of the DMC staff with rights to make these modifications.

Software Design Methodology

As indicated in the preceding section, the design methodology is an iterative process that involves active user feedback on the ergonomics and function of the software. A preliminary design is developed by the DMAIRM or his designee that indicates the functional performance requirements of the software, along with specific ergonomic requirements (if applicable). A beta version of the software is then prepared using the test data set. The beta version is reviewed by the DMC staff not involved in the software development effort. Once that review is complete and any changes or modifications are made and accepted, the software is then tested by a subset of the users to ensure that the performance and ergonomics are satisfactory. Changes made based on this feedback process are implemented, tested, and then returned to those users for final approval. Once final approval is provided, the software is placed into use.
Programming Language

The programming languages used are generally object-oriented, event-driven COTS software packages such as Microsoft[®] Visual Basic[™].

Interface Methodology

The interface design is based on standard Microsoft Windows conventions coupled with an ergonomic review by a subset of users to make sure that the interface is intuitive and easy to use.

Network Methodology

No specific network methodology is required for CASTNET since the network topology for all applications is handled by WSP's IT group. Prior to implementing any new software, the DOM or his designee confirms that the software operates correctly across WSP's network.

6.4.2.6 Software Design and Coding Standards

Software design and coding standards are consistent with standard Microsoft Windows coding standards and design criteria.

6.4.2.7 Firmware

Program code for firmware is not developed for CASTNET by the DMC staff.

6.4.3 Software Configuration Management

WSP uses a version control system for software configuration management.

6.4.3.1 Configuration Identification

WSP's DMC staff has implemented a version control system for programs developed for CASTNET. The system is based on a decimal system. Major changes to programs result in a change to the number to the left of the decimal place (e.g., a major change would be from version 2.1 to 3.0). Changes that result in added capability or functionality, but do not represent a major program change, result in numeric changes to the right of the decimal place. For example, a change in capability to the application could result in a change from 3.0 to 3.1. Changes made to correct bugs or other minor glitches without a resulting functionality change (other than correcting the mistake) result in changes to the right of the decimal place, either as a second decimal (e.g., a change from 3.0.0 to 3.0.1) or at the hundreds decimal place (e.g., version 2.30 to version 2.31).

Documentation Baselines

Computer program code documentation is an important part of producing a high quality, replicable product. As a consequence, WSP develops documentation for computer programmed systems (such as iCASTNET), as well as extensive comments within the program code itself. Documentation within the program code ensures that future researchers and programmers can understand the code. Extensive documentation of iCASTNET was created during its initial

development. Additional program code continues to be documented as it is developed. Documentation of iCASTNET also includes the database tables. The database tables and the data contained in them are also documented within the SQL Server database itself.

Methods and Approach to Standards Implementation

WSP utilizes a decimal based version control system as its major configuration management approach. Methods for corroborating versions of the software and the approach to developing software standards implementation are controlled by the DMC staff.

6.4.3.2 Configuration Control

Since there is not a concurrent software development process (e.g., multiple programmers working on the same software), configuration control for programming is exercised by providing the most current version of the software to the programmer working on the system. The DMC provides the centralized check-in/check-out point for the most current version. For users, the DMC provides the most current version of the software for access to the database.

Configuration Control Flow Diagram

Not applicable.

Forms

No forms are currently used in the configuration management system.

Storage and Release of Master Copies

The DMAIRM or his designee stores and releases all master copies of iCASTNET and the databases.

6.4.3.3 Configuration Reviews

The DMC staff performs all configuration reviews prior to releasing updated versions of software, programs, or databases to users.

7.0 **REFERENCES**

- U.S. Environmental Protection Agency (EPA). 1993. *EPA System Design and Development Guidance, Volumes A, B, and C.* EPA Directive 2182. <u>https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9101IC7H.TXT;</u> <u>https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91017ZQZ.TXT</u>.
- U.S. Environmental Protection Agency (EPA). 1990. *EPA Operation and Maintenance Manual.* EPA Directive 2181. <u>https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9100NWR5.TXT</u>.

8.0 ATTACHMENTS

This SMP does not contain attachments.

TITLE: BASIC LOGGERNET OPERATIONS

Effective

Date: Prepared by:	3-6-25 Christopher M. Rogers	- anno	Digitally signed by Rogers, Christopher (USCR718689) Date: 2025.03.03 10:16:40 -05'00'
	Project Manager	(Digitally signed by Stewart,
Reviewed and	Marcus O. Stewart	Marend Hen	Date: 2025.03.03 09:22:40
Approved by:	QA Manager	0	-05'00'
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- 1.0 Purpose
- 2.0 Scope
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- 4.0 Viewing Data
- 5.0 Up Channels that are Down in Error
- 6.0 Entering New Full Scale and Zero Values for MFC
- 7.0 Review 5-minute and Hourly Data Values
- 8.0 Set Up a New Site in LoggerNet

Annual Review				
Reviewed by:	Title:	Date:	Signature:	

BASIC LOGGERNET OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) Data Management Center (DMC) staff for the basic use of Campbell Scientific's LoggerNet polling Software.

2.0 SCOPE

These processes are applicable to the operation of LoggerNet, particularly focusing on the activities necessary to conduct basic tasks using the software including polling, adding sites, and simple troubleshooting.

3.0 REPOLLING DATA

It will be largely unnecessary to have to repoll data anymore with the Campbell datalogger/Loggernet polling software combination. Currently, loggernet is programmed to poll each Campbell site hourly. If outside of this frequency of polling, repolling is still necessary the following steps can be performed:

- Go to the LoggerNetAdmin toolbar pictured below (Figure 1) and click on Status (third icon from the left).
- This will bring up the second screen pictured below (Figure 2) titled 'Status Monitor'. On this screen, review the information in the 'Coll State' column. A status of "normal" indicates that scheduled polling is occurring as expected. A status of "primary" (not shown on the screen) indicates a first failure in attempting to poll. A status of "secondary" indicates numerous failures in polling at the scheduled time.



Loggle On/Off Reset Device	Collect Now St	op Collection	✓ Tool Comm	Test			
Network Map	Line State	Avg Err %	Coll State	Last Data Coll	Next Data Coll	Vals Last Coll	Vals to Coll
問題BEL116	off line	0%	normal	7/8/2008 12:00:28 PM	7/8/2008 1:00:00 PM	15056	15056
🖾 HOW132	on line	11.91%	normal	7/8/2008 12:11:09 PM	7/8/2008 1:00:00 PM	1217	1217
🖾 ASH135	off line	0%	normal	7/8/2008 12:00:13 PM	7/8/2008 1:00:00 PM	1410	1410
🖾 IRL141	off line	4.01%	normal	7/8/2008 12:00:08 PM	7/8/2008 1:00:00 PM	924	924
🔤 SUM156	off line	0.19%	normal	7/8/2008 12:01:55 PM	7/8/2008 1:01:00 PM	1167	1167
🔤 CDZ171	off line	1.51%	normal	7/8/2008 12:00:11 PM	7/8/2008 1:00:00 PM	1453	1453
🔤 CAT175	off line	98.75%	sched off	6/17/2008 12:30:22 PM		0	0
🖾 HWF187	off line	78.86%	secondary	7/8/2008 9:03:51 AM	7/8/2008 3:01:00 PM	0	0
🔤 PAL190	on line	37.55%	normal	7/8/2008 12:34:06 PM	7/8/2008 1:02:00 PM	2484	2484
🖾 MEC099	off line	99.99%	sched off	7/3/2008 9:00:21 AM		0	0

- When a site in the 'Network Map' column is highlighted by clicking on the site, the first three options (Toggle On/Off, Reset Device, Collect Now) on the menu bar will also be highlighted. Clicking on the 'Toggle On/Off' option will turn the highlighted site on or off from its scheduled polling depending on what the original polling state is at the time. For example, if site CAT175, which is scheduled off (not polling), is highlighted, then clicking the Toggle On/Off option will set site back on for polling again.
- Right clicking on any of the four boxes just to the right of the site ID also provides further information by bringing up a menu of other options. Some of these options are 'communication history' which lists the polling history for the site (see Figure 3). One can also 'collect now' from this feature.
- There are different views in the Status Monitor that can be accessed by clicking on the gray 'Views' button at the bottom right of this screen. The views can be customized for different users and can include different fields from the datalogger's data tables.
- The most straight forward way to repoll a site is to click on the Connect icon (second from the left on the LoggerNet Admin toolbar). The screen below will then come up (Figure 4). Highlight the site to be repolled and click 'connect'. Once connected, go to 'Data Collection' area of this screen and click 'Collect Now'. Figures 5 and 6 show an example of the Connect Screen when a site is connected and the results of repolling data from the site, respectively.





Connect Screen: HOW132 (CR30	00)	_ 🗆 🗙
Ele View Datalogger Tools Help Stations Kevin IP SUM156 HWF187 PAL190 ASH135_Phone IRL141 BEL111 BEL116	Data Collection Collect Now Custom Program Castnet_RMY_V1.3_HDW/132_str.CR3	Clocks Server Date/Time 7/8/2008 1:12:25 PM Station Date/Time 7/8/2008 1:12:30 PM
H0W132 ASH135 CAT175 MEC099 CDZ171 CR3000_2 CR3000	Send Beceive Data Displays Graphs: 1 2 3	Set Station Clock
List Alphabetically	Numeric: 1 2 3 Pause Ports and Flags	Connected: localhost

Figure 6

Summary								
Table	File Name	File Mode	File Format					
AutoCal	D:\RawData\H0W132_AutoCal.dat	Append to File	ASCII, TOA5					
FiveMin	D:\RawData\H0W132_FiveMin.dat	Append to File	ASCII, TOA5					
GasHousekeeping	D:\RawData\H0W132_GasHousekeeping.dat	Append to File	ASCII, TOA5					
Hourly	D:\RawData\H0W132_Hourly.dat	Append to File	ASCII, TOA5					
Recovery	D:\RawData\HDW132_Recovery.dat	Append to File	ASCII, TOA5					
Total number of valu	ies collected: 0	ок V	iew File <u>H</u> elp					

4.0 VIEWING DATA

- Click on the 'View' icon on the LoggerNet Admin toolbar. This will bring up the the list of sites and the type of data available for viewing.
- Click on the site and type of data to be viewed (hourly, five-minute, etc.). Figure 7 illustrates what an hourly data table looks like.

Eia	IIFO	7
FIU	ure	1

Eile <u>V</u> iew <u>H</u> elp						
🖨 📇 🕐 📐 🗚	- 📰 📰 21 📥		Lampbell So			
TIMESTAMP	RECORD	Batt_Volt	precipitation	precipitation f	temperature	temperature_f
"2008-07-06 04:00:00"	1122	12.89	0		11.36	
"2008-07-06 05:00:00"	1123	12.89	0		10.85	
"2008-07-06 06:00:00"	1124	12.89	0		12.16	
"2008-07-06 07:00:00"	1125	12.88	0		15.62	
"2008-07-06 08:00:00"	1126	12.88	0	****	18.99	
"2008-07-06 09:00:00"	1127	12.88	0	****	22.2	
"2008-07-06 10:00:00"	1128	12.87	0		25.19	
"2008-07-06 11:00:00"	1129	12.87	0	****	26.84	
"2008-07-06 12:00:00"	1130	12.87	0	****	27.53	
"2008-07-06 13:00:00"	1131	12.87	0	****	27.95	
"2008-07-06 14:00:00"	1132	12.86	0	****	28.5	
"2008-07-06 15:00:00"	1133	12.86	0		28.71	
"2008-07-06 16:00:00"	1134	12.86	0		27.86	
"2008-07-06 17:00:00"	1135	12.86	0		27.06	
"2008-07-06 18:00:00"	1136	12.86	0		25.82	
"2008-07-06 19:00:00"	1137	12.87	0		24.31	
"2008-07-06 20:00:00"	1138	12.87	0		22.13	
"2008-07-06 21:00:00"	1139	12.87	0		20.26	
"2008-07-06 22:00:00"	1140	12.85	0	****	18.82	
"2008-07-06 23:00:00"	1141	12.85	0		17.75	
"2008-07-07 00:00:00"	1142	12.85	0	****	16.81	
"2008-07-07 01:00:00"	1143	12.86	0	****	16.86	
"2008-07-07 02:00:00"	1144	12.84	0	****	17.37	
"2008-07-07 03:00:00"	1145	12.84	0	****	17.49	
"2008-07-07 04:00:00"	1146	12.86	0	****	17.75	
"2008-07-07 05:00:00"	1147	12.86	0		17.91	
"2008-07-07 06:00:00"	1148	12.86	0		18.03	
"2008-07-07 07:00:00"	1149	12.86	0		18.41	
"2008-07-07 08:00:00"	1150	12.85	0		19.51	
"2008-07-07 09:00:00"	1151	12.86	0		21.21	
"2008-07-07 10:00:00"	1152	12.86	0	** **	23.63	
"2008-07-07 11:00:00"	1153	12.86	0		25.91	
"2008-07-07 12:00:00"	1154	12.86	0	** **	27.82	
"2008-07-07 13:00:00"	1155	12.86	0		28.37	
"2008-07-07 14:00:00"	1156	12.86	0	****	28.84	
"2008-07-07 15:00:00"	1157	12.86	0	****	29.12	
"2008 07 07 16.00.00"	1100	12 05	0		20.42	

5.0 UP CHANNELS THAT ARE DOWN IN ERROR

- Click on the 'Connect' icon on the LoggerNet Admin toolbar. This will bring up the 'Connect screen'.
- On the 'Connect Screen' go to the 'Data displays' area and click on 'Numeric display 1'.
- This will bring up the screen pictured below in Figure 8. The fourth column on this screen shows the status of the channel by listing the parameter and the word 'down'. The white column to the right of this will state either true or false. A false status indicates that the statement 'temperature down' is false. In other words, the temperature channel is not down.
- In order to down a channel go to the white status column and double click so the word true appears. This will then make the statement 'temperature down' a true statement.
- There is also a Down All Channels' option (the first option in this column) where all channels can be downed at once by double-clicking 'false' to 'true'.

HOW132 Num	eric Display 1: Real Ti	ime Monito	oring (Connected)							_ 🗆 ×
	RecNum	4,243,318	Batt Volt	12.78	Temp1 Blower Ba	false			Julian Date	190
6 h A	TimeStamp	13:57:27	Panel Temp	29.24	Temp2 Blower Ba	false			Time	13:57
Auu							Down All Channe	false	Sample Freq A	93698
	wind direction	225.20	wind direction f		wind direction v	3,171.79	wind direction do	false	Sample Freq B	108843
	windspeed	4.30	windspeed f		windspeed v	0.00	windspeed down	false	Cell Pressure	0.00
Delete	shelter temperatur	27.08	shelter temperature f		shelter temperatur	0.16	shelter temperatu	false	Cell Temperature	38.53
	temperature	31.06	temperature f		temperature v	894.16	temperature dow	false	Sample Flow A	0.754
1	temperature2	31.55	temperature2 f		temperature2 v	895.65	temperature2 dov	false	Sample Flow B	0.743
Delete All	temperature delta	-0.49	temperature delta f		temperature delta	0.00	temperature delta	false	03 Background	0.10
	relative humidity	48.10	relative humidity f		relative humidity v	481.05	relative humidity	false	03 Coefficient	1.016
	wetness	0.01	wetness f		wetness v	14.35	wetness down	false	Precip Check	0.00
Oution of L	precipitation	0.00	precipitation f		precipitation v	0.00	precipitation dow	false	Wetness Check	0.00
options	solar radiation	314.88	solar radiation f		solar radiation v	225.56	solar radiation d	false		
	Transfer SR	0.00	transfer sr f		Transfer SR V	184.96	transfer sr down	false	Ozone Date	7-8-2008
	ozone	54.99	ozone f		ozone v	NAN	ozone down	false	Ozone Zero	1.27
<u>S</u> top	Transfer Ozone	0.00	transfer ozone f		Transfer Ozone V	NAN	transfer ozone di	false	Ozone Precision	96.10
	flow rate	1.49	flow rate f		flow rate v	1.522.18	flow rate down	false	Ozone Span	418.70
	so2	0.00	so2 f		so2 v	0.00	so2 down	false		
Help	co	0.00	co f		co v	0.00	co down	false	Ozone Serial Ons	true
Toth	no	0.00	no f		no v	0.00	no down	false	Trace Gas Onsite	false
	nov	0.00	nov f		nov v	0.00	nov down	false	Tekran	
	no diff	0.00	no diff f		no diff v	0.00	no diff down	false	Public, Trace_	Gas_Onsite:
			windspeed scalar f						Flow FullScale	5.000
			sigma theta f						Flow Offset	-0.040
									Calibrator OnSite	false
	AUTOCAL TABLE		HOURLY TABLE		RECOVERY TABLE					
	RecNum	149	RecNum	1.179	RecNum	1			strin	
	TimeStamp	8 00:07:00	TimeStamp	00.00	Flow FullScale	5.000			strin Tekran D3	
	AutoCal BeginTim	8.00.00.00	shelter temperature	26.40	Flow Offset	-0.040			strin Tekran D4	
	AutoCal StartTime	8.00.08.00			Ozone Serial Onsi	true				
	AutoCal Analyte	ozone			Trace Gas Onsite	false				
	AutoCal Mode	snan 5				14100				
	AutoCal Value	96.10								
	AutoCal Expected	90.00								
	AutoCal Value f	00.00			RunAutoCal_Ozone	false	Zero.	false	AutoCal Value	0.00
	Matoour value i		Ozone AutoCal RunN	falco	RunAutoCal SO2	falce	Snan1	false	AutoCal Analyte	0.00
	RunAutoZero, CO	false	SO2 AutoCal RunNex	false	RunAutoCal_CO	false	Snan?	false	AutoCal Mode	
	CO hkg	0.00	NO AutoCal RunNext	false	RunAutoCal NO	false	Span3	false	AutoCal Value f	
	CO AutoZero Valu	0.00		10136	RunAutoCal NPN	falco	Span4	faleo	AutoCal Expected	0.00
	CO Param Saved	false	NO Solenoid	false		10150	Span5	false	AutoCal Include	false
	CO_Param_Saved	Taise	INO_Solenoid	Taise			spans	Taise	Autocal_include	

6.0 ENTERING NEW FULL SCALE AND ZERO VALUES FOR MFC

- New full scale and zero values for the mass flow controller can also be entered from the same numeric display screen as discussed above (Figure 8).
- On the fifth gray column, about halfway down, can be found a'Calibrator Onsite' entry. Set this statement to true by double-clicking on the white column to the right of this entry to make it read true.
- Highlight the white numeric field to the right of the 'Flow Fullscale' entry (two spaces above the 'calibrator onsite' entry) and type in the new full scale value.
- Highlight the white numeric field to the right of the 'Flow Offset' entry (one space above the 'calibrator onsite' entry) and type in the new zero value. Please note that even though the entry says 'offset', it is the zero value that is really implied.
- When finished updating the full scale and zero values, set the calibrator onsite' entry back to false. If this is not done, all values will be flagged with a 'C' flag indicating ongoing calibration.

7.0 REVIEW 5-MINUTE AND HOURLY DATA VALUES

- On the LoggerNet Admin toolbar click on 'View'.
- Next, click 'File' (upper left) and then 'open'. This will bring up the screen below.
- Click on the desired data set to be viewed.

Open		? ×
Look jn: 🗀 RawData	► E 🕈	
Data	🗖 ASH135_GasHousekeeping.c	iat 🛛 🖬 BEL 1
logs	🚾 ASH135_Hourly.dat	🚾 BEL 1
🔁 New Folder	🔤 ASH135_Recovery.dat	📼 BEL 1
📄 sys	國 BEL116_AutoCal.dat	🚾 BEL 1
ASH135_AutoCal.dat	🔤 BEL116_FiveMin.dat	📼 BEL 1
ASH135_FiveMin.dat	🔤 BEL116_GasHousekeeping.d	at 🚾 BEL 1
•		F
File <u>n</u> ame: <mark>*.dat</mark>		<u>O</u> pen
Files of type: Data files (*.dat)	•	Cancel
ESL file name:	<u> </u>	Browse FSL

8.0 SET UP A NEW SITE IN LOGGERNET

- The first step in adding a new site is to launch the SETUP application from the Loggernet Toolbar (Figure 1).
- Shown in the upper left hand corner of Figure 10, click "Add Root" to open the add device Menu.



Figure 10

To add a site using TCP/IP connectivity click "IPPort" (Figure 11). To add a site using a telephone modem connection click "ComPort". Adding the root node opens the Add Device SubMenu (Figure 12). NOTE: The ComPorts and modems available to the server may already be present in the network tree. In this case, skip to creating a new "Phone Remote".

🖋 Add 🛛 🔀
Select a device to add to
LoggerNet
ComPort
TAPIPort
Close

Figure 12

Add X Select a device to add to CON186 - 166,155,73,118
CR500 CR510 CR10 CR10X 21X CR23X CR7X CR5000 CR90000 CR90000 CR90000 CR9000X CR510TD CR10T CR10T CR10T CR10T CR10T CR10T CR23XTD PhoneBase RFBase MD9Base Generic RFBase-TD PakBusPort (Other Loggers) RF400
Close

• The device selected from the SubMenu will be added below whichever node is selected in the network tree. The following figures show the correct hierarchy and naming schemes for TCP/IP (Figure 13) and modem connected sites (Figure 14).

🖻 👺 HWF187 - 166,130,94,4
🖻 🖾 👘 PakBusPort_187
🛄 HWF187

Figure 14



• Selecting the IPPort Root Node will display the configuration options tab show in Figure 15 below. The IP address and port (6785) should be added to the Internet IP Address line.

Figure 15

CON186 - 166,155,73	8,118 : IPPort
Hardware	
Standard	
Communications Enabled	
Internet IP Address	166.155.73.118.6785
Advanced	
🔲 Call-Back Enabled	Cache IP Address
TCP Listen Only	
Extra Response Time	00 s
Delay Hangup	00 s 000 ms
IP Port Used for Call-Back	0
AirLink Device ID	
No problems found with	n settings for the selected device

 Selecting the PhoneRemote Node will display the configuration options tab shown in Figure 16. The site phone number including any external dialing codes should be added to the Phone Number list. Some sites may require a delay to allow for remote switching networks.

PhoneRem	ote_110 : PhoneRemote
Hardware	
Communications	Enabled
Delay (ms)	Phone Number
0	8-1-607-564-7622
	<add number="" phone=""></add>
No problems for	und with settings for the selected device

- The PakBus Node does not require configuration changes for standard sites.
- Selecting the Site Datalogger Node displays the following configuration tabs (Figure 17). The Security Code for the site (59041) should be entered in the hardware tab.

HWF187 : CR3000	
Hardware Schedule Data Files	Clock Program
Standard Communications Enabled	
PakBus Address Advanced	1
Maximum Packet Size	1000
Security Code	59041
Delay Hangup	00 s 000 ms
No problems found with	settings for the selected device

Figure 17

• The data collection schedules and retry intervals are configured differently for TCP/IP and modem connected sites and are shown in the Figures 18 and 19, respectively.

HWF187 : CR3000						
Hardware Schedule Data Files (Clock Program					
Scheduled Collection Enabled						
	Apply to Other Stations					
Base Date 1/ 1/1990	Time 12:20:20 AM					
Collection Interval	0 d 01 h 00 m 00 s 000 ms 🔹					
Primary Retry Interval	0 d 00 h 10 m 00 s 000 ms 📑					
Number of Primary Retries	15					
Secondary Retry Interval	0 d 00 h 30 m 00 s 000 ms 📑					
When the Server's Table Definitions are Invalid Automatically reset changed tables						
No problems found with se	ttings for the selected device					

Figure 19

CTH110_Phone : CR3000						
Hardware Schedule Data Files C	Clock Program					
Scheduled Collection Enabled						
	Apply to Other Stations					
Base	Time					
1/ 1/1990	12:00:00 AM					
Collection Interval	0 d 00 h 05 m 00 s 000 ms 📩					
Primary Retry Interval	0 d 00 h 02 m 00 s 000 ms 📑					
Number of Primary Retries	3					
Secondary Retry Interval	1 d 00 h 00 m 00 s 000 ms 👘					
When the Server's Table Definitions are Invalid Automatically reset changed tables						
No problems found with se	ttings for the selected device					

• The data tables collected will vary depending on the equipment operating at each site. An example of the selected tables is shown in the Figure 20. The Public and Status tables should always be disabled.



• The automated clock adjustment should be configured as shown in Figure 21 on the Clock tab.

HWF187	7 : CR3000						
Hardware Schedu	ule Data Files Clock Program						
Time Zone Offset Automated Clock (00 h 00 m × Check						
I Enabled	Initial Date Initial Time 1/ 1/1990 12:00:00 AM Interval 0 d 01 h 00 m						
Allowed Clock De	Allowed Clock Deviation 01 s						
Clocks Server Clock	Station Date/Time						
	Check Clocks Set Station Clock						
No problems t	found with settings for the selected device						

TITLE: iCASTNET USER HANDBOOK

Effective

Date:	3-6-25					
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Annual Review								
Reviewed by: Title: Date: Signature:								

iCASTNET USER HANDBOOK

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide consistent guidance to WSP USA Inc. (WSP) Clean Air Status and Trends Network (CASTNET) personnel in the use of the iCASTNET system and related information for review of project data.

2.0 SCOPE

The processes described in this SOP are applicable to the use of the iCASTNET system for review of continuous and discrete data for purposes of determining possible problems with data collection and/or equipment at remote CASTNET sites.

3.0 SUMMARY

The iCASTNET system is a web-based information portal that disseminates and displays ozone, trace gas and concentration data. Data analysts as well as field technical staff receive daily email notifications regarding questionable or erroneous data from the previous day. The email notification contains a detailed report of the data in question. A link is provided in body of the notification to the various dashboards. The dashboard enables team members to review factors related to the parameter of interest in real time. Users can generate custom reports using the reporting tools contained in the iCASTNET system.

4.0 MATERIALS

Laptop or personal computer Internet browser software iCASTNET access

5.0 SAFETY

The same level of care and caution should be exercised while using the laptop/computer as would be taken when using any electrically powered device. Keep all cords out of walkways. If needed, use appropriately rated extension cords and surge protectors, and do not overload the electrical circuit. Keep liquids and food away from the computer and keyboard.

Using a computer is a sedentary activity that consists of repetitive motions. Repetitive motion injuries can be avoided by placing the screen, mouse, and keyboard at locations that are comfortable to use and do not cause strain from overreaching. Maintain good posture while using the computer. Take breaks regularly to allow muscles to relax and to promote blood flow, including standing up, briefly walking around the room, and stretching to counteract the repetitive motion activities and extended periods of sitting.

6.0 **PROCEDURES**

6.1 Logging In

To access the program, open iCASTNET from your browser https://gnvweb2.corp.pbwan.net/castnet. The iCASTNET Main Menu will be at the top of the page.

Figure 1. iCASTNET Main Menu



The screen displays tiles that can be selected to perform various tasks as depicted in Figure 1. The screen will be updated based on the tile selected.

Within the task screens, a menu on the left side of the screen will provide navigation to the other tasks (Figure 2).

To return to the Main Menu from task screens at any time, click CASTNET icon on the top right corner of the screen as depicted in Figure 3.

Figure 2. Navigation Menu



Figure 3. Return to Main Menu Icon



6.2 iCASTNET Map

Open iCASTNET and select the Map tile. This option provides a detailed overlay of the sites spanning the United States (Figure 4). A filter in the top right corner of the map allows the user to choose what is visible on the map using the \bigcirc icon. Each option also provides a legend when expanded using the \equiv icon. Clicking on a site on the map provides additional information (Figure 5), including its name and associated agency. It also provides an option to zoom in on the site using the magnifying glass icon. Additionally, clicking on the top right of the map alternates the style between normal and satellite.

Heith Practic Cleans Notice City Cleans Notice City

Figure 4. Map

Figure 5. Additional Site Information



6.2.1 Ticketed Sites

This filter shows the location of ticketed sites by priority level, shown on the map by different colored triangles. The priority levels range from low priority to critical, specified by the legend (Figure 6).

Figure 6. Ticket Sites Legend

 Ticket Sites 	≡
priority	
▲ Critical	
▲ High	
▲ Medium	
Low	
Flagged Sites	=
 All Sites 	=
Radar	≡

6.2.2 Flagged Sites

This filter depicts sites that have been flagged due to an ozone or trace gas failure or alarm, depicted on the map by a colored circle. The legend designates what type of failure each color represents.

6.2.3 All Sites

This option shows the location of all the sites, depicted by a white dot. This is not to be confused with the locations of major cities, which are depicted by white dots with black borders.

6.2.4 Radar

When the radar option is visible, the map depicts weather conditions around the sites.

6.3 iCASTNET Site Information

This option provides detailed information about each site.

6.3.1 Sites Table Editor

This table displays relevant information, such as city, state, latitude, longitude, elevation, land use, etc. for all active and inactive sites in the network (Figure 7). Information for new sites can be added by clicking on the Add New Sites tab at the top left corner of the screen. There is also a Search option box at the top right corner of the screen which is used by typing in either the

letters (ARE) or number (128) corresponding to a site name (ARE128). The up and down arrows next to each header are used to sort the list alphabetically/chronologically by each heading.

Sites																C	ASTNET
															Search:		
ø *	Site	Site 🕴	Active 🕴	InActive 🕴	Agency 🕴	State 🕴	County 🕴	Time Zone ∲	Latitude	Longitude	Elevation 🕴	Map Id 🍦	Land Use 🕴	Terrain	• MLM •	NADP ID	NADP Distance
	ABT147	Abington	domp	w	EPA	СТ	Windham	EA	41.8405	-72.0104	202	Hampton, CT	Urban/Agric	Rolling	Mixed	CT15	0.0236
	ACA416	Acadia NP	dom		NPS	ME	Hancock	EA	44.3771	-68.2608	158		Forest	Rolling	Mixed	ME98	0.3466
	ALB801	Alberta	d		N/A	AB											
	ALC188	Alabama- Coushatta	dom		EPA	ТΧ	Polk	CE	30.7016	-94.674	105		Prairie	Rolling	Yes	TX10	197.72
	ALH157	Alhambra	domp	w	EPA	IL.	Madison	CE	38.869	-89.6228	164	Pocohantas, IL	Agric	Flat	Yes	IL46	0.0782
	ALH257	Alhambra Collocated		domw	EPA	IL	Madison	CE	38.869	-89.6228	164		Agric	Flat	Yes	IL46	0.0782
	ALH557	Alhambra Aerosol		а	EPA	IL	Madison	CE	38.869	-89.6228	164	Pocahontas, IL	Agric	Flat		IL46	0.0782
	ANA115	Ann Arbor	domp	w	EPA	MI	Washtenaw	EA	42.4166	-83.9022	266	Pinckney, MI	Forest	Flat	Mixed	MI52	0.0136
	ANL146	Argonne NL		dom	EPA	IL	DuPage	CE	41.7	-87.99	229	Sag Bridge, IL	Urban/Agric	Rolling	Mixed	IL18	72.8113
	ARE128	Arendtsville	domp	w	EPA	PA	Adams	EA	39.9232	-77.3079	266	Arendtsville, PA	Agric	Rolling	Mixed	PA00	0
	ARE228	Arendtsville Collocated		domw	EPA	PA	Adams	EA	39.9232	-77.3079	266	Arendtsville, PA	Forest	Rolling	Mixed	PA00	0
	ARE528	Arendtsville Aerosol		ain	EPA	PA	Adams	EA	39.9232	-77.3079	266	Arendtsville, PA	Agric	Rolling		PA00	0
	ASH135	Ashland	dom		EPA	ME	Aroostook	EA	46.6038	-68.4132	231	Squa Pan, ME	Agric	Flat	Yes	ME00	42.3797
	ASH235	Ashland Collocated		dom	EPA	ME	Aroostook	EA	46.6038	-68.4132	231	Squa Pan, ME	Agric	Flat	Yes	ME00	42.3797
	BAS601	Basin	dom		BLM	WY	Big Horn	мо	44.28	-108.0411	1242		Prairie	Rolling	Mixed	мтоо	151
	BBE401	Big Bend NP	dom		NPS	тх	Brewster	CE	29.3027	-103.1778	1052		Forest	Complex	Mixed	TX04	0
	BEL116	Beltsville	dom	t	EPA	MD	Prince George's	EA	39.0282	-76.8171	47	Laurel, MD	Range	Flat	Mixed	MD99	0.044
	BEL216	Beltsville Collocated		r	EPA	MD	Prince George's	EA	39.0282	-76.8171	47	Laurel, MD	Range	Flat	Mixed	MD99	0.0457
	BFT142	Beaufort	domp	w	EPA	NC	Carteret	EA	34.8847	-76.6207	5		Agric	Flat	Yes	NC06	0.0424
	BUF603	Buffalo	dm		BLM	WY	Johnson	мо	44.1442	-106.1089	1324		Prairie	Rolling	Mixed	WY99	156
	BVL130	Bondville	domt		EPA	IL	Champaign	CE	40.052	-88.3725	213	Bondville, IL	Agric	Flat	Yes	IL11	0.1624
	BVL530	Bondville Aerosol		а	EPA	IL	Champaign	CE	40.052	-88.3725	213	Bondville, IL	Agric	Flat		IL11	0.1624

Figure 7. Sites Table Editor

6.3.2 iCASTNET Site Photos

Open iCASTNET and select the Site Information tile. Click the option Site Photos. This option allows the user to see photos taken at specific site locations on specific dates (Figure 8). First, select the location using the drop-down menu on the top left next to Site: and then click on a date to expand and view the site photos.

Figure 8. Site photos



6.3.3 *iCASTNET Site Operator*

Open iCASTNET and select the Site Information tile. Click the option Site Operator to see the contact information for the site operators at each location. The user can either use the search bar to locate specific operators or use the \ddagger icon to sort the list alphabetically/chronologically by each heading.

To see more information on an operator, click the eigenvalue information on an operator, click the icon. To print the details, either for the full list or for a specific operator, click the icon.

6.4 iCASTNET Field Operations

6.4.1 *iCASTNET Cell Modem*

Open iCASTNET and select the Field Operations tile. Click the option Cell Modem. The user can see lists of both accounts (6.4.1.1) and hardware (6.4.1.2).

6.4.1.1 Accounts

After clicking the option Cell Modem, the user is taken to the list of Cell Modem Accounts. This provides details about each account.

6.4.1.2 Hardware

To access the list of Cell Modem Hardware, click <u>Go to Hardware</u> in the top right corner of the Accounts page. This shows the hardware used for each modem and the status.

To return to the list of Cell Modem Accounts, click <u>Go to Accounts</u> in the top right corner of the Hardware page.

6.4.2 iCASTNET Enter Observation

Open iCASTNET and select the Field Operations tile. Click the option Enter Observation. This tab allows the user to view and add observations about specific sites by date. After selecting an Observation Date click on a site name to view either the existing list of observations and/or add additional observations for the date selected. The user can also use the Parameter Group filter at the top of the screen to select a parameter to view only those observations pertaining to the selected parameter.

6.4.3 iCASTNET Access Problem Ticket

Open iCASTNET and select the Field Operations tile. Click the Access Problem Ticket option. This task allows the user to view problem tickets regarding specific sites. Filters at the top of the screen (Figure 9), such as Site, Assigned To, Ticket #, and Priority narrow down the results.

Figure 9. Access Problem Ticket Filters

Site SELECT OPTIONS	Assigned To	Ticket #	Parameter Group Non-Infrastructure 🗸	Ticket Status 2 OF 3 SELECTED	Priority SELECT OPTIONS	Quick Date Pick	Ticket From Date Ticket To Date
							LOAD RESET
Display Type: Display Tickets Only	~						

6.4.4 *iCASTNET ERF*

Open iCASTNET and select the Field Operations tile. Click the option for ERF. This allows the user to search for Equipment Request Forms. The search results can be specified by site, requestor, equipment and date range, using the tools to the left of LOAD (Figure 10). An ERF is filled out when a piece of equipment, analyzer, etc. needs to be shipped to a site and serves as a means to initiate shipping activities as well as a tracking mechanism.

Figure 10. ERF Query Screen

Equipment Request Form (ERF)	CASTNET
Site: -ALL- V Requestor: -ALL- V Equipment: -ALL- V Use Date Range: 10/14/2022 10/14/2022 LOAD	
▼ Equipment Requests	
Show 25 v entries EXCEL	
🕴 Site 🕴 Ticket # 🕴 ERF # 🕴 Request Date 👻 Requestor 🕴 Comments 🔍 Action By 🕴 Date of Action 🕴	Items Requested 🛛 🗍
No equipment requests found.	
Showing 0 to 0 of 0 entries	Previous Next

Once loaded, specific reports can be selected and edited using the *icon* to the left of the site name (Figure 11).

Figure 11. ERF Screen by Site and Date Range

uipme	ent Reque	st Form (ERF	F)							CASTNET
Site:	BVL130	✓ Requestor	r: -ALL-	✓ Equipment:	-ALL- ¥	Use Date Range: 05/01/2022 06/3)/2022	LOAD		
Equip	oment Rec	quests								
Show	w 25 🗸	entries EX	CEL							
¢	Site 🕴	Ticket 🛓	ERF # ∲	Request Date	Requestor	Comments	♦ Act	tion 🕴	Date of Action	Items Requested
ø	BVL130	758	1	6/2/2022	Anthony	35ft of four conductor cable for wetness sensor				
1	BVL130	769	1	6/16/2022	Anthony	O3 49i site transfer #000219			C	zone Transfer
Show	wing 1 to	2 of 2 entrie	s						Previo	ous 1 Next
						© 2022 All pights reserved. WSP				

6.5 iCASTNET Weekly Call-In

CASTNET field site operators (FSOs) are required to call-in to the field operations staff every Tuesday to report on site conditions. The information provided by the site operators are recorded in the Call-in Log. To access, open iCASTNET and select the Weekly Call-In tile.

6.7.1 iCASTNET Call-In

From the Weekly Call-In tile, click the option Call-In. This option provides the list of call-ins made on a certain date. The date of interest is entered into the box next to Call-in Date: in the top left corner of the screen by either typing into the box or using the calendar that pops up. The user can also use a search bar in the top right corner. The search option will bring up the call-in entry closest to the specified Call-in date in the Call-in Date box (Figure 12).

Call-Ins														CA	STNET
all-in Date:	10/14/2022	Show	All Sites 🗹	LOAD										+Cre	eate Call-In
PRINT	EXCEL												Search:		
Site 🔺	Date Inserted	Date Updated 🖗	MFC Readout 🖨	Rotameter Reading	Pump Off	Leak Check	TB Check	Wetness Check	Ozone Zero	Ozone Span	Ozone Precision Ozone Check	Das Flow	Desiccant Level \$	Supplies 🝦	User 🔶
	10/11/2022	10/11/2022 10:31	1.505	1.5	0	0.001			-0.1	-1.28	-1	1.5	100% (Blue)		Michael
ALC188	10/14/2022	10/14/2022 13:39	1.534	1.5	-0.003	0.003			-0.63	3.37	2.42	1.49	50%		Heidi
ALH157	10/11/2022	10/11/2022 10:02	1.505	1.5	0.019	0.02			-0.592	-0.87	-1.94	1.5	100% (Blue)		Tyler
#ANA115	10/11/2022	10/11/2022 11:14							-0.2	-2.9	-0.02		50%		Heidi
ARE128	10/11/2022	10/11/2022 15:30	1.511	1.5	0.031	0.007			-0.01	0.61	0.68	1.5	25%		Tyler
ASH135															
#BFT142	10/14/2022	10/14/2022 13:31	1.506	1.5	0.001	0						1.5			Heidi
#BVL130	10/11/2022	10/11/2022 12:21	1.48	1.5	0	0.01	0.10	0.99	-0.43	1.16	3.39	1.51	100% (Blue)	1-2 micron filters	Heidi
#BWR139	10/11/2022	10/11/2022 16:39	1.51	1.6	0	-0.001			0.59	-0.3	0.22	1.5	75%		Anthony
CAD150	10/11/2022	10/11/2022 11:43	1.478	1.55	-0.009	-0.007			-0.8	-1.4	-2.1	1.5	100% (Blue)		Tyler
CAT175															
CDR119															
#CDZ171															
CHE185	10/11/2022	10/11/2022 15:22	1.52	1.5	-0.002	0	0.10	1.00	0.7	80.2	28.4	1.496			Heidi
	10/11/2022	10/11/2022 10:20	1.52	1.4	0	0.002			-0.37	-0.05	-0.49	1.5	75%		Michael
CND125	10/11/2022	10/11/2022	1 580	1.5	0.004	0.04			0.06	2.68	2.26	1.5	50%		Michael

Figure 12. Call-in Screen

The user can also print the list or export it to an Excel spreadsheet by pressing the associated icons above the list.

To record the information reported by FSOs click on the pencil icon to the left of the site ID that the FSO is calling from. This action will bring up a blank table (Figure 13) that can then be filled out with values reported by the FSO. Click the SAVE button to save all information recorded. This table also displays any Site Operator Requests, previous call-in information, equipment requests, and problem tickets associated with the site in question.

Weekly Call-Ins CASTNET									
BACK TO CALL-INS									
Site: ALH157 V LOAD SAVE SITE OPERATOR									
Entered By: Selma Inserted On; 10/10/2022	MFC Readout:	Rotometer Reading: Pump Off: Lead Check TB Check: Check Oron	Desiccant Select-						
Supplies:	Ozone Zero:	Ozone Span: Ozone Precision: Cear Check Min Shelter Temp: 24.3 Max Shelter Temp: 27.79							
Comments:									
▼ Requests									
💠 💠 Requested By 💠 Request E	⊕ ♦ Requested By ⊕ Request Date ▼								
Showing 0 to 0 of 0 entries									
• Call-ins									
Equipment Requests									
Tickets Ticket # Date Closed Priority	Assigned To 🕴 Parameter 🕴 Parameter Group 🕴	Description 🔶	Entered By 🔶 Date Inserted 🗍						
✓ 81 09/19/2013 O Low H	Heidi Internal-Walls and Floor 2-Infrastructure	Little of dry rot at the edge of floor and walls. On 03/25/15 AQS reports a soft spot in the center of the floor.Comment about floor soft spot repeated on 03/31/16, 03/17/17, 09/14/18. 03/29/2019, 09/20/20	Anna 09/19/2013						
	Aichael External-Towers 2-Infrastructure	Flow tower leg is broken at ground level.	Michael 07/19/2022						
	Anna Internal-Walls and Floor 2-Infrastructure	Some water damage from the water under the counter. Tape was missing to cover open old inlet for wires. New tape put over. The same comment repeated on 09/03/21. Some rotting below hole for	Anna 05/04/2021						

Figure 13. Call-in Information Documentation Screen

6.5.2 iCASTNET Site Operator Contact Request

From the Weekly Call-In tile, click the option Site Operator Contact Request. This option allows a user to request contact with a site operator. To do this, select a site from the drop-down menu, enter the date of request, enter short description for the request, and click LOAD, (Figure 14). The request will show up in the Call-in log under the Requests section.

Figure 14.	Site Operator	Contact Request
------------	---------------	------------------------

Site Operator Contact Request							
Site: MEC097 V LOAD							
Date: 10/25/2022 Request By: Marcus This is an example. Description:							

6.5.3 *iCASTNET* Supply Report

From the Weekly Call-In tile, Click the option for Supply Report. This option allows the user to generate reports of supplies requested by FSO(s) during the call-ins (Figure 15). To generate a supply report, select the site(s) and date to run the report for and choose the Supplies option to generate Supplies report. After clicking **RUN REPORT**, a PDF file with the report will be generated. There is also an option to generate a Comments report to view any comments that may have been generated.

Figure 15. Supply Report

Supply Report		CASTNET	•
Select Site : Date : All Sites	●Supplies OComments © All rights reserved. <u>Wood</u>	RUN REPORT]

6.6 Continuous Data Review

This task provides graphs for data review of different parameters. The graphs plot data for specific sites for specific date ranges. To use the graphs, select a parameter (ozone, trace gas, nitro train or small footprint) to review and then a site from the dropdown list on the left side of the screen. The screen will be updated with all the available information regarding the selected site. Use the dropdown list to select the start and end dates, if different than what is currently displayed and click GO to update the screen.

By hovering the mouse over a point on a graph a tooltip will show certain information depending on the parameter selected, for example, for ozone the date, value, expected value, percent difference and flagging information will be displayed. Value points on the graph are color coded based on flagging.

6.6.1 iCASTNET Small Footprint

Open iCASTNET and select the Continuous Data Review tile (Figure 16). Click the option Small Footprint and select a site from the pull-down menu labeled 'Site', select a date range from the 'Start Date' and 'End Date' pulldown menus and click GO. The graphs generated show data for filter pack flow, battery voltage for the data logger, and ambient temperature for the selected time period (Figure 17).









6.6.2 iCASTNET Trace Gas Review

Open iCASTNET and select the Continuous Data Review tile. Click the option Trace Gas Review. Select a site and date range and click GO. The graphs generated display ambient concentration values for trace gases measured at the site, QC results, and shelter temperature (Figure 18).



Figure 18. Trace Gas Graphs





6.6.3 iCASTNET Nitro Train

Open iCASTNET and select the Continuous Data Review tile. Under the Nitro Train option select either 'Ambient' or 'QC'. This section provides an overview for site(s) with the nitro train trace gas analyzers. The 'QC' option (Figure 19) provides graphs of zero, span, precision and converter efficiency values for a selected date range.

The 'Ambient' option (Figure 20) displays concentration values for a selected date range for measured and calculated parameters.



Figure 19. QC Graph



Figure 20. Ambient Graph

6.6.4 *iCASTNET Ozone*

Open iCASTNET and select the Continuous Data Review tile. Click the Ozone option to display detailed ozone information. The ozone menu has three options:

- Ozone Review
- Technical Ozone Review
- Ozone Completeness

6.6.4.1 Ozone Review

The Ozone Review tab shows span, precision and zero values for the site analyzer for the selected time period. Bench and shelter temperatures for a selected time period for are also displayed for both the site O_3 transfer and site O_3 analyzer. Acceptance limits for span are $\pm 7\%$ of 225 ppb expected. Acceptance limit for precision are $\pm 7\%$ of 60 ppb expected. Zero acceptance limits are ± 3 ppb. The acceptance range for bench temperature is 24°C to 40°C; and the acceptance range for shelter temperature is 20°C to 30°C. There is an option to display the graphs as percent difference rather than actual concentration values. (Figure 21).



Figure 21. Ozone Review

6.6.4.2 Technical Ozone Review

Technical Ozone Review (Figure 22) provides time series data on instrument flow rate, pressure, lamp level and intensity for both the primary and transfer analyzers.


Figure 22. Technical Ozone Review

6.7 iCASTNET Continuous Data Validation

6.7.1 iCASTNET Met Data Editor

Open iCASTNET and select the Continuous Data Validation tile. Click the Met Data Editor option. This section allows the user to invalidate data from specific sites at specific times as a result of instrument malfunction or failed calibration results. To select the desired data, use the filters at the top to select a site and date/time range. Once the selected block of data populates the table validation occurs by clicking on the pencil icon at the very left of a data record. This will bring up an Edit table/box where the action(s) to be taken are selected for the target parameter (Figure 23). Actions consist of selecting a flag from the Flag drop down menu that corresponds to the parameter in question. Once a flag is selected then a Reason for flagging the data point must be selected from the Reason drop down menu to the right of the Flag box.

Figure 23. Met Data Editor Screen with Edit Box

et Data Editor										CASTNET
T142 From:	07/01/2022	2 00:00 T	o: 07/31/2022 23:	00						🗹 Show / Hide
Site ID St	art Date	E	End Date	Quick Dat	te Pick					
BFT142 ¥ 07	//01/2022 0	• 00:00	07/31/2022 23:00	v	v Go	ARCHIVE	GC SD MRC			
reen Data fou	nd a total of	9 Errors	MotDoto Editory Edito							
CEL CHART	ADD PAGING	HIGHLIGHT	MetData Eultor: Eults					•	Search:	
						_	_			
Site 🔺 🖊 🖺 🤊	Date 🍦	Temp	Site ID: BFT142	Date/Time :	07/01/2022	00:00 SAVE	CLOSE			
3FT142 🖋 🖿 🤊	7/1/22 00:00	22.7								
SFT142 🖋 🖿 🤊	7/1/22 01:00	22.2	TEMPERATURE:	22.66	Flag: No Flag 🗸	Reason:		~		
FT142 🖋 🖿 🤊	7/1/22 02:00	22.1	FLOW RATE:	1.5	Flag: No Flag Y	Reason:		~		
FT142 🖋 🖿 🤊	7/1/22 03:00	21.9	OZONE:	6.827	Flag: No Flag Y	Reason:		~		
FT142 🖋 🖿 🤊	7/1/22 04:00	21.7	SHELTER TEMPERATURE	25.77	Flag: No Flag V	Reason:				
FT142 🖋 🖿 Ͽ	7/1/22 05:00	22.0	SHEER_REPERTONE	23.77	ridgi [No Flag ♥	1003011				
FT142 🖋 🗎 Ͽ	7/1/22 06:00	24.4	0.00			2010				
FT142 🖋 🗎 Ͽ	7/1/22 07:00	26.4 -	15.24 -	1	1.50 -	25.7 -				
FT142 🖋 🗎 Ͽ	7/1/22 08:00	26.5 -	20.64 -	1	1.50 -	25.6 -				
FT142 🖋 🗎 Ͽ	7/1/22 09:00	25.2 -	19.32 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 10:00	26.1	18.89 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 11:00	26.5	19.92 -	1	1.50 -	25.5 -				
FT142 🖋 🖹 🤊	7/1/22 12:00	26.2 -	18.19 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 13:00	26.3 -	20.85 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 14:00	26.0 -	24.58 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 Ͽ	7/1/22 15:00	25.9 -	28.38 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 Ͽ	7/1/22 16:00	25.7 -	28.51 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 17:00	25.7 -	24.11 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 18:00	25.6	20.00 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 19:00	24.8	15.91 -	1	1.50 -	25.6 -				
FT142 🖋 🖹 🤊	7/1/22 20:00	24.2	11.50 -	1	1.50 -	25.8 -				
FT142 🖋 🖿 🤊	7/1/22 21:00	23.7 -	8.15 -	1	1.50 -	25.5 -				
FT142 🖋 🖿 Ͽ	7/1/22 22:00	23.7 -	11.39 -	1	1.50 -	25.8 -				
FT142 🖋 🖿 Ͽ	7/1/22 23:00	24.2 -	13.33 -	1	1.50 -	25.7 -				
FT142 🖋 🖿 Ͽ	7/2/22 00:00	24.4 -	13.52 -	1	1.50 -	25.8 -				
FT142 🖋 🖿 🤊	7/2/22 01:00	24.2 -	10.09 <	1	1.50 -	25.6 -				
FT142 🖋 🖿 Ͽ	7/2/22 02:00	24.6 -	13.26 Y	1	1.50 -	25.6 -				
SFT142 🖋 🖿 🤊	7/2/22 03:00	24.4 -	14.45 -	1	1.50 -	25.9 -				
SFT142 🖋 🖿 🧿	7/2/22 04:00	23.5 -	19.09 -	1	1.50 -	25.5 -				

If a validation action will apply to multiple hours or days of data then the GC (global change) function can be used. The GC button is found at the top of the screen to the right of the archive button.

The Archive button enables the user to archive data for selected sites, month and year from Level 1 data to Level 2 after validation for the selected sites and month has been completed (Figure 24).

Figure 24. Archive Screen

 ✓ ABT147 ✓ ALC188 ✓ ALH157 ✓ ANA115 ✓ ARE128 ✓ ASH135 ✓ BEL116 ✓ BFT142 ✓ BVL130
 BWR139 CAD150 CAT175 CDR119 CDZ171 CHE185 CKT136 ARCHIVE AS LEVEL = '2'

The SD (Screen Data) button to the right of the archive button gives the user the option to apply screening criteria to the selected data to help identify questionable values.

By clicking the MRC (Manage Reason Codes) button the user can add a new reason for validation actions if the reasons already provided in the Edits box (see Figure 23) are not adequate.

There are also options to pull the data table into excel, view the data page by page rather than by scrolling, and to highlight the edits made to the data by clicking on the Highlight Edits button. These buttons are located under Site ID, Start Date, End Date boxes.

6.7.2 iCASTNET Trace Gas Editor

Open iCASTNET and select the Continuous Data Validation tile. Click the option for Trace Gas Editor. This functions similarly to the Met Data Editor (6.7.1), except it is used for sites that have trace gas analyzers.

6.7.3 iCASTNET Met Data Strip Chart

Open iCASTNET and select the Continuous Data Validation tile. Click the option Met Data Strip Chart.

6.7.4 iCASTNET Met Data Daily Review Report

Open iCASTNET and select the Continuous Data Validation tile. Click the option Data Daily Review Report.

6.8 iCASTNET Laboratory Data Review

Open iCASTNET and select the Laboratory Data Review tile. This option allows the user to access and input the laboratory data from the various sites.

6.8.1 *iCASTNET SSRF Entry Form*

Open iCASTNET and select the Laboratory Data Review tile. Click the option SSRF Entry Form. This task allows users to double enter, edit, and search for Site Status Report Forms (SSRF). To do so, enter in the Site and Filter Pack ID#. If an SSRF has already been double entered for this site and filter pack ID# then an SSRF screen labeled Final SSRF on the upper left corner will come up showing the entered information (Figure 25).

-	
SSRF Entry Form	
-	
Site: ABT147 Filter Pack#: 2205001 - 01	QUERY CLEAR FILTERS
Final SSRF	
Filter Pack Information	
Filter On Date/Time	Filter Off Date/Time
Date/Time: 02/01/22 10:45	02/08/22 09:54
MFC (Pump Off):	0
MFC Leak Check (LPM):	0.002
DAS Flow (LPM): 1.5	1.5
Rotameter (LPM): 1.51	1.55
Elapsed Time: 166.2	
Return Shinment Prenared By: Richard W. Eve	
Return Sinpinent Prepared by. Richard W. Eve	
Lab Use Only:	
Lab Tech Receipt: Elaine Valcourt	ADD NEW TECH
Receipt Date: 02/14/22	
Lab Comments:	
Present Site Observation	% Leaves Dropped
~	76-100 🗸
Heidi % Leaves Fall Color	% Leaves Green
0-25 🗸	0-25 🗸
Field Notes:	
UPDATE FINAL CLOSE	

Figure 25. SSRF Entry Form

If an SSRF has not yet been entered for this site and filter pack ID# then a blank SSRF screen labeled 1st Entry on the upper left corner will come up. Data entry personnel can then enter the required information on this screen and click the ADD ENTRY 1 button located on the bottom left of the screen to save the entry.

If an SSRF requires 2nd entry, a small screen will pop up titled 'Double Entry Record'. This screen enables the user to either select the 1st entry (for editing purposes) or to select the 2nd entry option for finalizing the double-entry process. Second entry is only done for filter pack on off dates and times.

6.8.2 *iCASTNET Import EDDs*

Open iCASTNET and select the Laboratory Data Review tile. Click the option Import EDDs. This allows for the importation of lab data from chosen files (Figure 26).

Figure 26. Import EDDs

Lab Data	
Add files:	
Choose Files No file chosen	
UPLOAD	

6.8.3 iCASTNET Concentration Report

Open iCASTNET and select the Laboratory Data Review tile. Click the Concentration Report option. This provides a report of analyte concentrations determined by analysis of the filter pack. The user can select specific sites from the dropdown list on the left (Figure 27). This list can also be filtered to EPA or NPS/BLM sites. The top right section of the screen allows the user to select a specific time range, whether by quarter, month, week, or year. The bottom section allows the user to specify what kind of report to run as well as whether to export it as an Excel file or as a PDF.



Figure 27. Concentration Report

6.8.4 iCASTNET Total Microgram Review

Open iCASTNET and select the Laboratory Data Review tile. Click the option for Total Microgram Review. This tab provides an overall report on analyte concentrations measured at each site during a specific week of the year (Figure 28). Flagged parameters for review at a given site are indicated by a highlighted color, designated by the legend on the bottom.

The buttons labeled CY, CYS, Filter Pack and Outlier Grid provide the user with further options. The CY (compare years) button provides the ability to compare concentrations from the past 1 to 5 years for the selected week. The number of years to compare can be selected from the drop-down menu located to the immediate left of the CY button. The CYS (compare years and sites) button provides the option to compare concentrations for the designated number of years for sites that are geographically close to each other.

The Filter Pack button is used to run a screening program to locate FPs with either erroneous date and time off data or FPs with too much time between FP change outs. The OUTLIER GRID button displays the concentrations table only for those sites flagged as having outliers for the week in question.

	Week of Year :	08	• Year: 2022 •	Offse	t % :	30 🗸	LOA	Use Year	No. of s :	3 🗸	СУ	C Y S	FILTER	PA	CK		OUTLI	ER GRID	
	Site ID	Lab Key	Date On	Code	Hours	TSO4	fig TNO3	flg TNH4	fig Ca	flg Mg	flg Na	flg K	flg Cl	flg	NSO4	fig	NHNO3	flg WSO	2 flg
Θþ	ABT147	2208001-01	02/22/2022	T1, T4, W3	165	0.72	0.72	0.26	0.065	0.031	0.392	0.048	0.367		0.08		0.48	0.23	
ΘĐ	ACA416	2208003-01	02/22/2022	T4, W3	169	0.69	0.39	0.20	0.049	0.052	0.467	0.034	0.633		0.10		0.14	0.22	
Ð	ALC188	2208004-01	02/24/2022	T4, W3 12	112	0.80	0.21	0.26	0.074	0.012	0.071	0.066	0.050	U	0.25		0.44	0.33	_
ΘĐ	ALH157	2208001-02	02/22/2022	T1, T4	169	0.99	2.88	1.01	0.327	0.033	0.184	0.044	0.138		0.22		0.53	0.50	
ÐÐ	ANA115	2208001-03	02/22/2022	T1, T4, W3	168	0.75	1.94	0.64	0.305	0.064	0.162	0.023	0.208		0.34		0.28	0.55	
ΘĐ	ARE128	2208001-04	02/22/2022	T1, T4, W3	170	1.16	1.48	0.69	0.205	0.034	0.123	0.032	0.074		0.21		0.56	0.56	
ΘĐ	ASH135	2208001-05	02/22/2022	T4, W1, W3	214	0.76	0.45	0.26	0.068	0.029	0.177	0.062	0.160		0.15		0.16	0.19	
ΘĐ	BAS601	2208005-01	02/22/2022	T1, T4	146	1.08	1.09	0.64	0.083	0.017	0.073	0.035	0.033		0.28		0.15	1.70	
€₽	BBE401	2208003-02	02/23/2022	T1, T4	168	1.34	0.72	0.47	0.941	0.052	0.126	0.067	0.018		0.06		0.86	0.82	
ΘĐ	BEL116	2208001-06	02/22/2022	T1, T4, W1	171	0.98	1.03	0.46	0.150	0.037	0.188	0.139	0.055		0.13		0.56	0.38	
ΘĐ	BFT142	2208001-07	02/22/2022	T1, T4, W3	168	1.57	1.64	0.42	0.156	0.200	1.634	0.090	2.184		0.19		0.17	0.24	
E.	BUF603	2208005-02	02/22/2022	Т4	167	0.49	0.18	0.20	0.069	0.014	0.039	0.016	0.017	U	0.07		0.43	0.32	
Ð	BVL130	2208001-08	02/22/2022	T1, T4	168	1.02	2.93	1.04	0.276	0.034	0.121	0.034	0.123		0.38		0.35	0.48	
EÐ.	BWR139	2208001-09	02/22/2022	T1, T4, W3	167	1.16	1.07	0.53	0.108	0.037	0.235	0.050	0.132		0.19		0.54	0.55	
Ð,	CAD150	2208001-10	02/22/2022	T4	168	1.35	0.91	0.61	0.187	0.019	0.056	0.056	0.033	U	0.16		0.76	0.19	
EÐ.	CAN407	2208003-03	02/24/2022	T1, T4 12	119	0.47	0.67	0.19	0.278	0.044	0.123	0.055	0.071		0.05	U	0.49	0.17	
Ð	CAT175	2208001-11	02/22/2022	T1, T4, W3	164	0.70	0.50	0.31	0.087	0.015	0.106	0.071	0.089		0.07	U	0.36	0.16	
ÐÐ	CDR119	2208001-12	02/22/2022	T1, T4, W3	168	1.39	0.55	0.55	0.164	0.021	0.052	0.044	0.033	U	0.22		1.04	0.56	
Ð	CDZ171	2208001-13	02/22/2022	T1, T4	167	1.58	1.72	0.98	0.217	0.025	0.070	0.043	0.033	U	0.47		1.12	0.88	
ÐÐ	CHA467	2208003-04	02/22/2022	T1, T4	167	0.42	0.42	0.18	0.317	0.041	0.107	0.060	0.064		0.03	U	0.27	0.27	
Ð	CHE185	2208004-02	02/22/2022	T1, T4	169	1.14	2.35	0.81	0.560	0.041	0.100	0.068	0.033	U	0.08		0.73	0.25	
Ð	CKT136	2208001-14	02/22/2022	T1, T4, W3	167	1.32	0.71	0.60	0.149	0.017	0.055	0.035	0.033	U	0.24		1.09	0.50	
Ð	CND125	2208001-15	02/22/2022	T1, T4, W1,	167	1.19	1.05	0.31	0.094	0.057	0.434	0.084	0.051		0.14		0.47	0.26	
Ð	CNT169	2208001-16	02/22/2022	T4, N1	168	0.28	0.10	0.11	0.040	0.009	0.018	0.009	0.017	U	0.03		0.16	0.10	
Ð	COW137	2208001-17	02/22/2022	T1, T4, W3	161	0.81	0.41	0.26	0.070	0.028	0.180	0.071	0.039		0.07	U	0.20	0.11	
Ð	CTH110	2208001-18	02/22/2022	T1, T4, W3	161	0.88	0.97	0.45	0.138	0.023	0.160	0.030	0.185		0.18		0.30	0.27	<mark>.</mark> ,
REI Mi	D Faileo n/Max	d	YELLOW Faile Dev.	d Lowe	r/Upp	er Std.	Gf ag co	REEN F gregate mpariso	iewer thi in DRYC	an 9 reco HEM_SUM	rds includ MMARY us	led in the sed for th	: quarterl ie	ly	CYA Swit	IN tch	Possib	le Filter	

Figure 28. Total Microgram Review

6.8.5 iCASTNET QC Type Analysis

Open iCASTNET and select the Laboratory Data Review tile. Click the QC Type Analysis option. The user can then select the type of QC sample desired (field blank, lab blank, reference sample, replicate, etc.), the dates of interest, type of graph to plot (auto, minimum, maximum) and the analyte of interest which are listed by filter type (Teflon, nylon, cellulose) (Figure 29). The graph is then generated by clicking on the Refresh button located at the bottom left of screen next to the Export button. The graphs generated can be downloaded by clicking the Export button.



Figure 29. QC Type Analysis Screen

6.9 iCASTNET Equipment Inventory

Open iCASTNET and select the Equipment Inventory tile. This provides a comprehensive record of the equipment used by the sites and maintained at the Gainesville office (Figure 30). Each row represents a different piece of equipment, with columns that provide additional information designated by headings. On the top right corner of the screen there are options to add new equipment to the list, conduct an end of year rollover, and generate site-specific equipment reports

Below those options, there is a search tool for specific equipment. The Select Site: option allows the user to select a specific site. The Search By: option allows the user to search using a CNET Number, Model Number, Bar Code, or Serial #. The Group By: option allows the user to search by Site ID or status.

In the equipment list table, there are various filters to limit what appears on the list. To use these filters, a user must type into one of the text boxes below the headings and then click the ricon.

Above the filters, on the top right side of the equipment table screen, click **Export To Excel** to create a copy of the list in Excel.

The equipment list provides options to edit each record using the \checkmark icon and track changes made to each record using the icon.

Figure 3	0. Equ	ipment	Inventory
----------	---------------	--------	-----------

											A	DD NE	W EQUIPI	MENT END	OF YEAR	ROLLOVER	REPORTS
Sel	ect Site : /	All Sites 👻 Se	earch y:	~						SI	ARCH]			Gro	up By: None	• •
	Site ID	Description Bac	t Mama	Carial #	CNET #	Parroda	Cort. Fr	wight	Voucher #	Data Parajuari	Total Cort	Condition	Manufacture	ar Model	LIOM O	Direction	<u>Export To Ex</u>
								-				Condition					
	Y	Y	Y	Y	Y	Y	Y	Ϋ́	Y	Y	Y			Y	Y	Y Y	
1	NIC001	D-MODEM, CELLULAR AIR	RLINK GX440	CA13063011910	06989		\$890.00	\$19.00	C44605	12/18/2013	\$909.00	1	Sierr	AIRLINK GX440	EA	1	Campbell Scientific
	NIC001	F-TOWER, FOLDING B AT-	-516D-1	N/A		000785	\$3,610.00	\$539.00	C24104	09/12/2012	\$4,149.00	4	Aluma	AT-516D-1	EA	1	Aluma Tower
	NIC001	D-DATA LOGGER CR8	850-ST-SW-NC	23268		000801	\$1,845.00	\$39.00	C34103	09/19/2012	\$1,884.00	4	Campb	CR850-ST-SW-NC	EA	1	Campbell Scientific
	NIC001	M-SENSOR, TEMPERATUR 413	342VC	TS08895	04943		\$332.00	\$5.00	C010	05/10/2004	\$337.00	7	RM Yo	41342VC	EA	1	RM Young
	NIC001	F-CONTROLLER, MASS F AX-	-MC-SSLPM-D	54751		000644	\$1,189.00	\$3.00	C310	07/30/2010	\$1,192.00	4	Apex	AX-MC-SSLPM-D	EA	1	W.L. Schoonover
	UND002	M-SENSOR, TEMPERATUR 413	342	6702	04688		\$294.00	\$4.00	C063	02/01/2002	\$298.00	7	RM Yo	41342	EA	1	RM Young
	UND002	F-TOWER, FOLDING B AT-	-516D-1	N/A		000778	\$3,610.00	\$539.00	C24104	08/27/2012	\$4,149.00	4	Aluma	AT-516D-1	EA	1	Aluma Tower
/ III	UND002	D-DATA LOGGER CR8	850-ST-SW-NC	23269		000802	\$1,845.00	\$39.00	C34103	09/19/2012	\$1,884.00	4	Campb	CR850-ST-SW-NC	EA	1	Campbell Scientific
	UND002	D-MODEM, CELLULAR AIR	RLINK GX440	CA13281084610	06982		\$823.00	\$10.00	C34103	10/03/2012	\$833.00	4	Sierr	AIRLINK GX440	EA	1	Mobile Pro Wireless
2 1	UND002	F-CONTROLLER, MASS F AX-	-MC-10SLPM-D	48097		000528	\$1,318.00	\$10.00	C092	08/25/2009	\$1,328.00	7	Apex	AX-MC-10SLPM-D	EA	1	W.L. Schoonover
2 1	KICOUS	M-SENSOR, TEMPERATOR 413	342VC	10176	06112		\$342.00	\$5.00	C141-2	05/02/2006	\$347.00		RM YO	41342VC	EA	1	RM Young
	KICOUS	F-TOWER, FOLDING B AT-	-5160-1	N/A		000814	\$3,525.00	\$500.00	C44604	11/25/2013	\$4,025.00	1	Aluma	AI-5160-1	EA	1	Aluma Tower
	KIC003	D-DATA LOGGER CR	850-51-5WHNC	28382	00000	000816	\$1,773.00	\$19.00	C44605	12/18/2013	\$1,792.00		Campo	CR850-ST-SW-WC	EA	1	Campbell Scientific
	NC005	D-MODEM, CELLOLAR AIR	CINK GA440	CR15555114610	00000		\$890.00	\$28.00	C44104	01/08/2014	\$918.00		Sierr	AIRLINK GA440	EA .	1	Campbell Scientific
	REDU04	E TOWER FOI DING R	542VC	24067	00900	000813	\$342.00	\$25.00	C44604	11/26/2013	\$307.00	1	Aluma	41542VC	EA.	1	RM Young
2 6	DED004	D DATA LOCCER CR	SEO ET EM NC	20202		000815	\$5,525.00	\$300.00	C44004	17/25/2015	\$4,025.00	1	Cameb	CREED ST SWINC	EA.	1	Comphell Scientific
2 B	RED004	E-CONTROLLER MASS E AV	AAC-10ELDM-D-DCVEE/EM	150522		000857	\$1,775.00	\$20.00	0000211	05/16/2017	\$1,755.00	4	Alica	AV-MC-10SI PM-D-DCV/6E/E	LA.	1	WI Schoogener
2	RED004	DWODEM CELLULAR AIR	NINK GY440	CA13082009910	06950	000037	#850.00	\$14.00	C34107	02/08/2013	\$973.00	1	Siarr	AIRLINK GY440	F4	1	Mobile Pro Wirelerr
/	NETOOS	E-TOWER FOLDING B ATJ	516D-1	N/A	00000	000839	\$3,525,00	\$187.00	C44517	01/02/2015	\$3,712,00	1	Aluma	4T-516D-1	FA	1	Aluma Tower
2 D	NPT005	M-SENSOR TEMPERATUR 413	347	6695	04681	000000	\$294.00	\$4.00	0063	02/01/2002	\$298.00	7	RM Yo	41342	EA	1	RM Young
/	NPT005	M-WIND GENERATOR SOL	UAIRBR7-12V	10214040026		000832	\$1.145.00	\$27.00	C44615	10/24/2014	\$1 172.00	1	Air B	SOLIAIRBR7-12V	FA	1	altE Store
/	NPT005	D-MODEM CELLULAR AIR	NK GX440	CA13063046710	06990		\$890.00	\$19.00	C44605	12/18/2013	\$909.00	1	Sierr	AIRLINK GX440	EA	1	Campbell Scientific
/	NPT006	S-ENCLOSURE OUTDOOR 423	3 SP	4660-1		000845	\$6.575.00	\$430.00	C000915	06/23/2016	\$7.005.00	1	Ekto	423 SP	EA	1	Ekto
2 B	NPT006	A-COMPRESSOR AIR PC7	70/4	000815300		000626	\$800.00	\$28.00	C606	03/22/2010	\$828.00	4	Werth	PC70/4	EA	1	Werther International

6.10 iCASTNET Materials Inventory

Open iCASTNET and select the Materials Inventory tile. This option allows the user to track the stock of materials.

6.10.1 Home

After selecting the Materials Inventory tile, the user is taken to the Materials Inventory Home Page (Figure 31). This provides navigation to the functions of the iCASTNET Materials Inventory. There is also a message center to display and provide access to important notifications.

Figure 31. Materials Inventory Home Page

ICASTNET - MATERIALS I	INVENTORY				
Welcome					Thursday, June 30, 2022
HOME VENDOR PARTS ORDER	SIGN IN SIGN OUT ADJUST STOCK I	NACTIVE PARTS REPORTS			
VENDORS	PARTS	ORDERS	SIGN IN	ADJUST STOCK	
Message Center					
22 Parts are Under Stocked - Click Her	re to View Details				
Recent SignIn PO Number is 0001269	631 and Modified on 6/29/2022 12:49:43 PM C	ick Here to go for Link			
Recent SignOut Number is 645 and M	odified on 6/29/2022 12:46:38 PM Click Here to	go for Link			
Recent Order Number is CC 2022.06.	20 and Modified on 6/20/2022 3:51:58 PM <u>Click</u>	Here to go for Link			

6.10.2 Vendor

This function provides a list of vendors to buy materials from. The search bar allows the user to locate vendors. Using the dropdown menu, the user can search by Vendor Name, Vendor Number, Phone Number, Street, City, State, or Zip Code. Multiple filters can be applied simultaneously using <u>Add Filter</u>.

The user can also add a vendor to the list using the <u>Add New Vendor</u> option in the top right corner.

6.10.3 Parts

This function provides the list of parts and their current stock (Figure 32). Red text indicates that a part is either low in inventory or out of stock.

Parts Search E Add Filte	iy: Part Number	Search For:	Search							@ Add New	Part
										Export To Ex	el
	Part Number 🔺	Description	Vendor Name	Cost	In Stock	Units	Order Qty	Reorder Qty V	endor PartNumber 1	Vendor PartNumber 2	
/ 0	1001-002	FILTER, 47MM INLET OZONE, 5 MICRONS	Savillex	\$4.69	397	63		200 4	50-47-4		^
1	1001-002A	FILTER, 47 MM, MEMBRANE, 1-2 MICRON	Saviliex	\$4.74	60	ea		50 4	50-47-3		
/ 0	1001-003	PROPELLER	RM Young Company	\$38.00	10	ea		5 0	8254		
1	1001-011	BALSTON FILTER # 9933-05-DQ	Classic Controls	\$25.00	55	ca		50 9	933-05-DQ		
/ 0	1001-011A	BALSTON FILTER, LARGE	Classic Controls	\$34.10	5	ea		1 9	933-11-DX		
1 0	1001-017	FIRST-AID KIT	Staples	\$9.88	0	63		5 2	85466		
4 100											

Figure 32. Parts Screen

The search bar allows the user to locate parts. Using the dropdown menu, the user can search by Part Number, Part Description, or Vendor Name. Multiple filters can be applied simultaneously using Add Filter.

The user can also add a part to the list using the <u>Add New Part</u> option in the top right corner.

The user can edit a part using the \swarrow icon or delete it from the list using the \Box icon. Additionally, the list can be copied to Excel using the Export to Excel option.

6.10.4 Orders

This function provides the list of orders for materials, both open and closed.

The search bar allows the user to locate orders. Using the dropdown menu, the user can search by Order Number, Order Date, or Part Number. Multiple filters can be applied simultaneously using <u>Add Filter</u>.

The user can also add an order to the list using the <u>Add New Order</u> option in the top right corner.

The user can edit an order using the \swarrow icon or delete it from the list using the $\overline{10}$ icon.

6.10.5 Sign In

This function provides a list of when materials were signed in.

The search bar allows the user to locate materials. Using the dropdown menu, the user can search by PO Number, PO Date, or Sign In Date. Multiple filters can be applied simultaneously using <u>Add Filter</u>.

The user can edit an item on the list using the 🖍 icon.

6.10.6 Sign Out

This function provides a list of when materials were signed out.

The search bar allows the user to locate materials. Using the dropdown menu, the user can search by Part Number, Part Description, Sign Out Date, or Sign Out Number. Multiple filters can be applied simultaneously using <u>Add Filter</u>.

The user can edit an item on the list using the 🥓 icon or delete it from the list using the 🔟 icon.

6.10.7 Adjust Stock

This function allows the user to adjust the listed stock of a material in the inventory (Figure 33). To do this, select the part from the drop-down menu, enter the date of when the adjustment is made, list how much is in stock and the quantity, enter any additional notes, and save.

Figure 33. Adjust Stock

Parts :	Select Part	 ▼ 0,
Date :	6/30/2022	
InStock :		
Quantity :		
Notes:		
		 //

6.10.8 Inactive Parts

This function provides the list of inactive parts in the inventory.

The search bar allows the user to locate parts. Using the dropdown menu, the user can search by Part Number, Part Description, or Vendor Name. Multiple filters can be applied simultaneously using <u>Add Filter</u>.

The user can edit a part on the list using the 🦯 icon.

6.10.9 Reports

This function allows a user to generate reports on Parts Stocked, N/A Parts, Sign Out Detail List, Sign In Detail List, Parts Understocked, Inventory, Total Inventory Cost, and Annual Physical.

These reports can be filtered using similar search bars as the other functions.

6.11 iCASTNET Additional Reports

Click the Additional Reports tile on the iCASTNET Main Menu to display database driven reports (Figure 34).





6.11.1 Selecting sites for reports

Click *Select* under Select Site(s) to select a monitoring site(s) from the dropdown list. Reports can be generated using all sites or specific sites.

6.11.2 Selecting date information

There are two ways to update the dates used in the reports:

- You can select a day or multiple days using the calendar in the middle of the screen under Select Day(s).
- You can select a date range using the start date and end date boxes to the right of the calendar under Select Date Range.

Unless specified, the default date range used for reports is from the previous day until the current date and time.

6.11.3 Reports

There are numerous reports available for viewing as excel files. These reports are listed under the calendar.

Data Reporter: The Data Reporter lists site names, dates and results for selected sites and dates that failed basic screening criteria for ozone, filter pack flow, and temperature parameters. (Figures 35).

Figure 35. Data Reporter

Records S	Screened by Auto	mated Process							
Site	Date	Parameter	Original	Flg	New	Flg	Editor	Reason	
		<u> </u>	+			-			
	I	<u>I</u>							
Records A	Adjusted by Auton	nated Process					_		
Site	Date	Parameter	Original	Flg	New	Flg	Editor	Reason	
		1			1				
Flow Rate Site	Criteria	Assumed Flow	Flow Rate	Diff	Flg		1		
Flow Rate Site HOX148	Criteria Date 10/12/22 15:00	Assumed Flow	Flow Rate	Diff -94.8	Flg		<u> </u>		
Flow Rate Site HOX148 HOX148	Criteria Date 10/12/22 15:00 10/12/22 16:00	Assumed Flow 1.5 1.5	Flow Rate 0.1 0.0	Diff -94.8 -98.5	Flg		1		
Flow Rate Site HOX148 HOX148 HOX148	Criteria Date 10/12/22 15:00 10/12/22 16:00 10/12/22 17:00	Assumed Flow 1.5 1.5 1.5	Flow Rate 0.1 0.0 1.1	Diff -94.8 -98.5 -26.7	Flg		.1	I	
Flow Rate Site HOX148 HOX148 HOX148 KEF112	Criteria Date 10/12/22 15:00 10/12/22 16:00 10/12/22 17:00 10/12/22 4:00	Assumed Flow 1.5 1.5 1.5 1.5	Flow Rate 0.1 0.0 1.1 1.3	Diff -94.8 -98.5 -26.7 -11.4	Flg		1		
Flow Rate Site HOX148 HOX148 HOX148 KEF112 KEF112	Criteria Date 10/12/22 15:00 10/12/22 16:00 10/12/22 17:00 10/12/22 4:00 10/12/22 5:00	Assumed Flow 1.5 1.5 1.5 1.5 1.5 1.5	Flow Rate 0.1 0.0 1.1 1.3 1.3	Diff -94.8 -98.5 -26.7 -11.4 -14.9	Flg		1		
Flow Rate Site HOX148 HOX148 HOX148 KEF112 KEF112 KEF112	Criteria Date 10/12/22 15:00 10/12/22 16:00 10/12/22 17:00 10/12/22 4:00 10/12/22 5:00 10/12/22 6:00	Assumed Flow 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Flow Rate 0.1 0.0 1.1 1.3 1.3 1.2	Diff -94.8 -98.5 -26.7 -11.4 -14.9 -17.7	Flg		1		

Filter Pack Elapsed Time: This report displays the difference between the number of hours the filter pack is expected to run during a normal week of operation versus the actual time the filter pack ran and is used as a diagnostic tool to spot operational problems related to the filter pack.

Monthly Parameter: This report displays either the ozone or shelter temperature values for a site for the selected month and year (Figure 36). The GO button defaults to ozone. To view shelter temperature the Shelter Temperature Report button must be clicked. Reports produced are in pdf format.



Monthly Parameter Report	
<	
Select Site:	ABT147 Y
Select Month:	
Jun 🖌	
2022 ~	
GO	
OZONE REPORT	SHELTER TEMPERATURE REPORT
>	

6.11.4 Recovery Raw Report:

This report lists the instrument settings by site, date, parameter, and calibration personnel (Figure 37).

Figure 37.	Recovery	Raw Report
------------	----------	------------

-			Rec	overy Raw	
SITE ID	DATE	PARAMETER	VALUE	CALIBRATOR	UPDATE DATE
UMA009	5/20/22 7:13	alpha_t1	0.0038	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	enable_auto_	0	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	enable_mode	1	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	flow_setpt	3.013	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	<pre>l3_intercept</pre>	-0.15	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	13_slope	0.9931	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	prog_sig	55281	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	pump_on	0	TEW	5/20/22 11:20
UMA009	5/20/22 7:13	ro_t1	1000.8	TEW	5/20/22 11:20

6.11.5 Ticket Reports:

The four Ticket Reports clustered in the middle all deal with equipment/analyzer issues/problems at the sites and are more commonly referred to as problem ticket reports. The All Ticket report lists all problems at a site for a designated date range, the Open Ticket report lists problems still needing to be resolved and the Closed Ticket report will retrieve problems that have been resolved. The Ticket Surveillance report lists all open tickets by site and priority level (Figure 38).

Critical P	riority Ticke	ets		
No tickets.				
High Pric	ority Tickets			
Site	Ticket #	Days Open	Parameter	Action
DUK008	287	11	TNX	We should be working with FSO this week.
KEF112	428	3	FLOW_RATE	FSO replaced balston filter on 10/11.
Medium I	Priority Tick	ets		
Site	Ticket #	Days Open	Parameter	Action
EGB181	72	76	COMMUNICATION	IS Hourly data was received on 9/21.
SUM156	385	8	FLOW_RATE	FSO reported erroneous readings on 10/4/22. MFC was tared and flows normal. FSO on 10/11/22 report
ALC188	427	8	OZONE	FSO was unable to replace pump on 10/07. One of the baseplate thumb screw heads was stripped.
_ow Prio	rity Tickets			
Site	Ticket #	Days Open	Parameter	Action
CNT169	349	15	FLOW_RATE	Priority has been changed from Medium to Low
New Tick	ets			
Site	Ticket #	Days Open	Parameter	Action
BVL130	806	1	NOY	5.8 PPB Zero and 24% Level4 failures. Expected 14.9, response 18.6
VPI120	478	1	OZONE	-18.9% Level4 failure. Expected 59, response 47
NPT006	163	1	OZONE	BFSO reset the switch and router. Site is now polling and all data collected.
IRL141	445	1	OTHER EQUIPMENT	sending new 20slpm mfc #000721

Figure 38. Ticket Surveillance Report

The eight reports listed across the bottom of the screen, except for the shelter and bench temperature reports, all deal with either ozone or trace gas quality control check results. Figure 39 below is an example of an Ozone Failure report.

		Ozo	ne Report	10/2/22 - 10/9/22	2		
Criteria/Flag	Alarms						
SITE ID	START DATE	END DATE	TYPE	EXPECTED	VALUE	VALUE F	DIFF
BFT142	10/5/22 01:51	10/5/22 01:58	level 1	220.7	25.75		-88.333
BFT142	10/5/22 02:04	10/5/22 02:11	level 4	60.72	28.55		-52.981
BFT142	10/5/22 02:11	10/5/22 02:18	zero	24.35	30.06		-5.71
BFT142	10/5/22 02:50	10/5/22 02:58	level 1	223.7	25.28		-88.699
BFT142	10/5/22 02:58	10/5/22 03:07	level 4	58.62	25.27		-56.892
BFT142	10/5/22 03:07	10/5/22 03:14	zero	20.32	24.79		-4.47
BFT142	10/6/22 01:50	10/6/22 01:57	level 1	231.3	14.47		-93.744
BFT142	10/6/22 02:04	10/6/22 02:11	level 4	61.64	13.52		-78.066
BFT142	10/6/22 02:12	10/6/22 02:19	zero	14.54	17.87		-3.33
BFT142	10/6/22 02:53	10/6/22 03:01	level 1	226.2	17.6		-92.219
BFT142	10/6/22 03:03	10/6/22 03:10	level 4	61.3	17.25		-71.86
BFT142	10/6/22 03:11	10/6/22 03:18	zero	14.97	18.36		-3.39
BVL130	10/2/22 01:47	10/2/22 01:55	level 1	230.3	205.6		-10.725
BVL130	10/3/22 01:57	10/3/22 02:04	level 4	58.6	42.44		-27.577
BVL130	10/3/22 02:04	10/3/22 02:12	zero	-0.123	-4.649		4.526
BVL130	10/8/22 02:10	10/8/22 02:17	zero	-0.122	-8.25		8.128
ESP127	10/6/22 01:58	10/6/22 02:06	level 4	59.85	52.01		-13.099
ESP127	10/7/22 01:56	10/7/22 02:03	level 4	58.76	53.91		-8.254
IRL141	10/2/22 02:39	10/2/22 02:47	level 5	38.17	38.31		0.367
PND165	10/2/22 02:24	10/2/22 02:32	level 4	49.93	50.28		0.701
PND165	10/2/22 02:37	10/2/22 02:45	level 5	42.19	43.23		2.465
VIN140	10/2/22 02:31	10/2/22 02:39	level 5	48.06	47.66		-0.832
VPI120	10/4/22 02:09	10/4/22 02:16	zero	-0.218	-5.51		5.292

Figure 39. Ozone Failure Report

6.11.6 Bench Temperature report

This report summarizes failures of ozone bench temperature criteria by number of failures per site as well as listing the failing bench temperature values in 15-minute increments. See Figure 40 for an example.

C	J 🖬 ") + (" + ⊖)	÷		BenchtempReport	aspx [Read-C	only] [Comp	atibility Mode] - Microsoft	Excel			_			- 6 -	x
<u> </u>	Home Insert	Page Layout Forn	nulas Data Revie	w View											0 -	■ X
ſ	Cut	Arial • 12	• A * * = = =	Wrap	Text	Custom	*					× 💼	Σ AutoSum	*	A	
Pa	ste	B I U	<u></u> = = =	I 🖅 🗐 🔜 Merge	& Center 💌	\$ - %	• •.0 .00 •.€ 00. •	Conditional	Format	Cell	Insert De	elete Format	Fill -	Sort &	Find &	
	Clipboard 🕞	Font	6	Alignment	G	Num	ber 🕞	Formatting	Styles	Styles *	, c	Tells	E	diting	Select *	
	A1 👻 💿	<i>f</i> _≭ Bench Tem	perature Report													×
-	A	B Bench Ter	C mperature Report	D	EF	G		J	K	L	M	N	0	Ρ	Q	
1		Denen rei	inperature report													
2	Number of Failures	s for Each Site														
3	SITE ID	PARAMETER	FLG	TOTAL												
4	SUM156	I3_benchtemp	Failure	21												-
0	SUM156	ozone_benchtemp	Failure	52												
7					1											
8	Criteria															
9	SITE ID	DATE TIME	PARAMETER	FLG	TEMPE	RATURE										
10	SUM156	8/27/14 00:00	I3_benchtemp	Failure	41.73											
11	SUM156	8/27/14 00:15	I3_benchtemp	Failure	41.52											
12	SUM156	8/27/14 00:30	I3_benchtemp	Failure	41.33											
13	SUM156	8/27/14 00:45	I3_benchtemp	Failure	41.14											
14	SUM156	8/27/14 01:00	I3_benchtemp	Failure	40.94											
15	SUM156	8/27/14 01:15	I3_benchtemp	Failure	40.77											
16	SUM156	8/27/14 01:30	I3_benchtemp	Failure	40.59											
17	SUM156	8/27/14 01:45	I3_benchtemp	Failure	40.75											
18	SUM156	8/27/14 02:00	I3_benchtemp	Failure	42.2											
19	SUM156	8/27/14 02:15	I3_benchtemp	Failure	42.9											
20	SUM156	8/27/14 02:30	I3_benchtemp	Failure	42.16											
21	SUM156	8/27/14 02:45	I3_benchtemp	Failure	41.48											
22	SUM156	8/27/14 03:00	I3_benchtemp	Failure	40.92											
23	SUM156	8/27/14 10:15	I3_benchtemp	Failure	40.55											
24	SUM156	8/27/14 10:30	I3_benchtemp	Failure	41.04											
25	SUM156	8/27/14 10:45	I3_benchtemp	Failure	41.51											
26	SUM156	8/27/14 11:00	I3_benchtemp	Failure	41.97											
27	SUM156	8/27/14 11:15	I3_benchtemp	Failure	42.36											-
H 4	▶ ► BenchTempRe	port 🧐	•		•											
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	🍠 🔚 🕻											EN	é · 4	∏ ♦)	8/28/20	014

Figure 40. Bench Temperature Report

6.11.7 Shelter Temperature Report

Report summarizes number of missing records, failures, and alarms by site as well as listing each hour by site with either an alarm, failure or missing flag. See Figure 41 for an example report.

A	В	С	D	E F	G	Н	1	J	K	L	M	Ν	0
1	Shelter	Temperature Report											
Number of Rec	ords Missing for Ea	ich Site		-									
SITE ID	FLG	TOTAL	1										
4 ABT147	M	6	1										
ALC188	M	7											
7 ALH157	M	7	1										
ANA115	M	6											
9 ARE128	м	6	1										
ASH135	M	6	1										
11 BEL116	M	6	1										
12 BFT142	м	6											
13 BVL130	м	7											
BWR139	м	6											
15 CAD150	M	7											
16 CDR119	м	6											
17 CDZ171	м	6											
18 CKT136	м	6											
19 CND125	м	6											
20 CNT169	м	8											
21 COW137	м	6											
22 CTH110	M	6	1										
23 CVL151	M	7	-										
DCP114	M	6	1										
ESP127	M	/	4										
GAS153	M	ь 	4										
27 GIH161	M	/	4										
28 HOW191	M	6	4										
29 HOX148	M	<u>ь</u>	4										
ShelterTer	mpFailureReport ⁄ 🐑	7	·			14							•

Figure 41. Shelter Temperature Report

The four SEND boxes at the top right corner of the screen (Figure 35) will send an email notification to project personnel that these reports are available with the full report attached to the email as an excel file.

6.12 Other Utilities

Open iCASTNET and select the Other Utilities tile. This section contains various types of information for administrative and managerial staff (Figure 42).

Figure 42. Other Utilities

Menu	
HOME	
CONTINUOUS DATA REVIEW	~
CONTINUOUS DATA VALIDATION	~
LABORATORY DATA REVIEW	~
FIELD OPERATIONS	~
WEEKLY CALL-IN	~
EQUIPMENT INVENTORY	
MATERIALS INVENTORY	
ADDITIONAL REPORTS	
OTHER UTILITIES	^
ADMIN	~
PROJECTS	
USERS	
GRID COLUMN CONFIGURATION	
SCHEDULE HISTORY	
AQS	
INVOICES	
PROCEMUS	

7.0 **REFERENCES**

Placeholder

8.0 ATTACHMENTS

This SOP does not contain attachments.