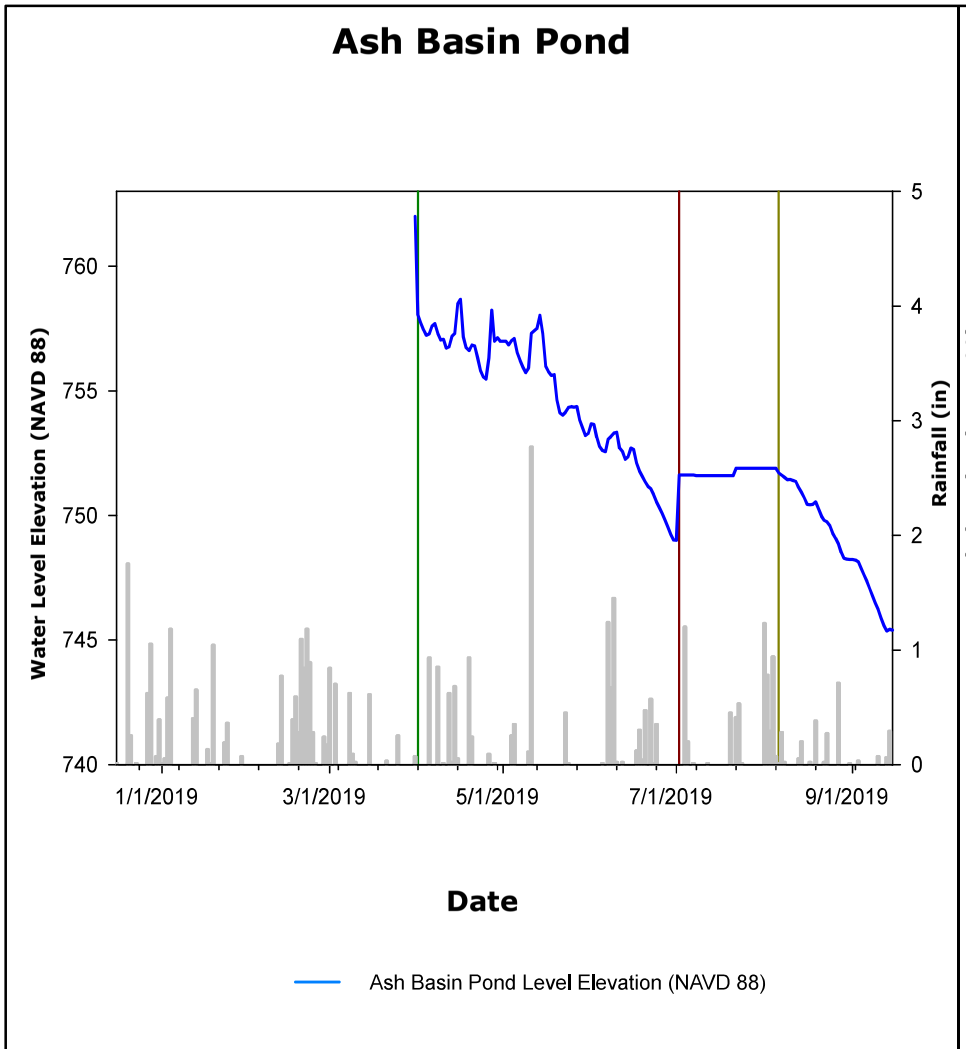

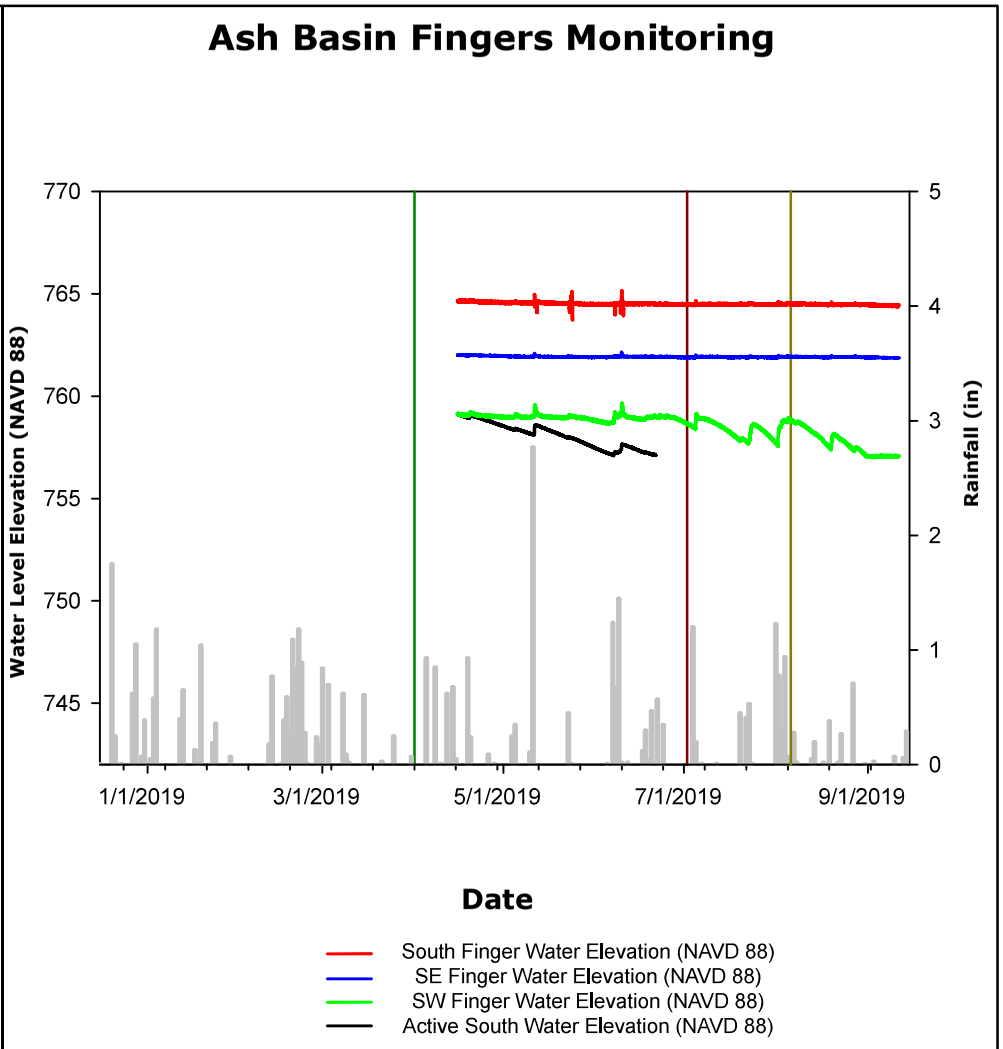

LEGEND

- Decanting Start (03/31/2019)
- Decanting Suspended (06/02/2019)
- Decanting Resumed (08/06/2019)
- Daily Total Rainfall (inches)

Notes:
Water level elevations are measured in feet
NAVD 88 – North American Vertical Datum 1988
in – inches

DUKE ENERGY CAROLINAS

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DRAWN BY: D. AVARD DATE: 10/31/2019
REVISED BY: M. ROZIER
CHECKED BY: T. GRANT
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINNER

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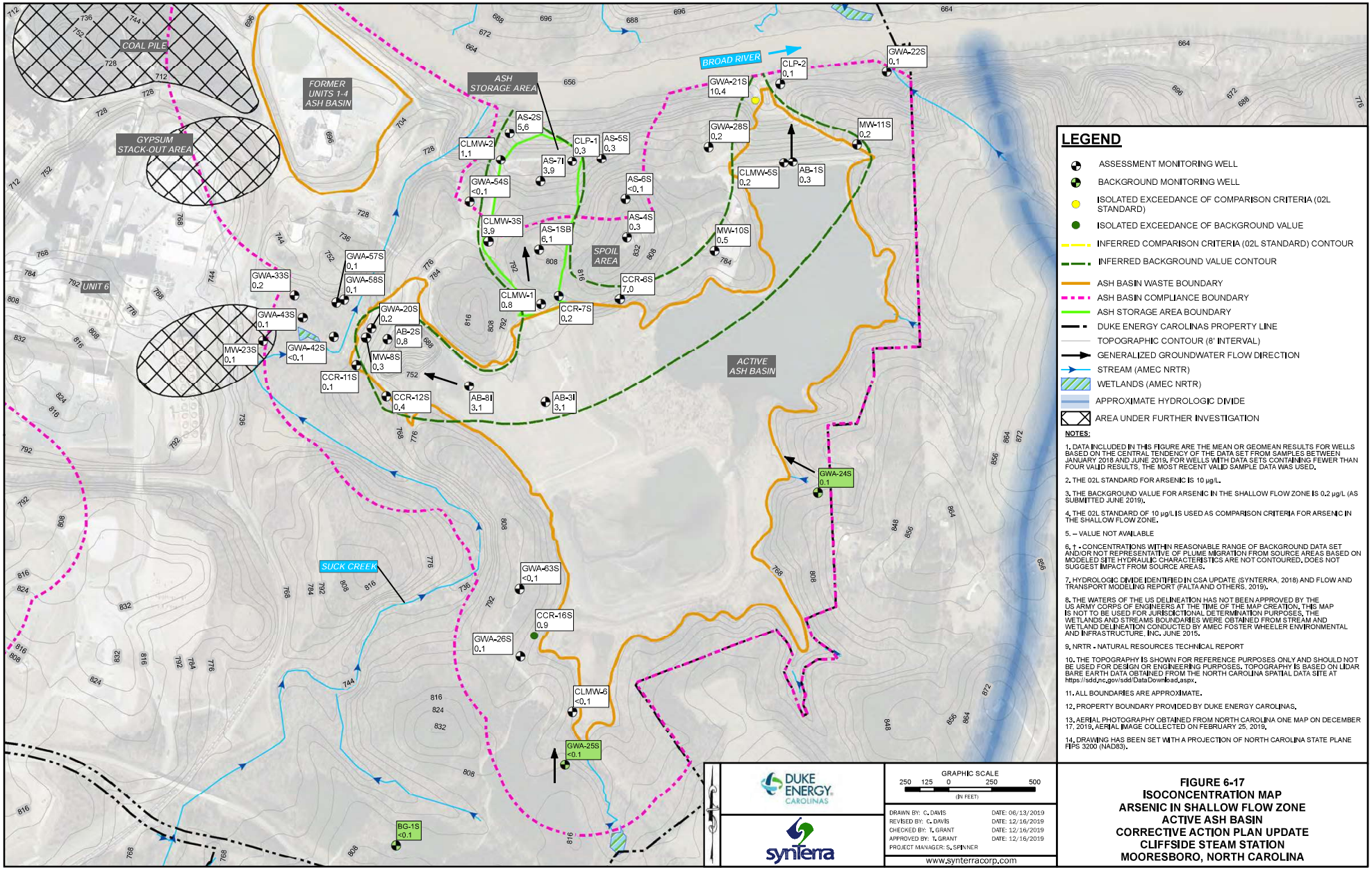
FIGURE 6-16
HYDROGRAPHS – WATER IN BASIN
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NC

Cliffside part III

Nov 05 2020 OFFICIAL COPY



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (02L STANDARD)
- ISOLATED EXCEEDANCE OF BACKGROUND VALUE
- INFERRED COMPARISON CRITERIA (02L STANDARD) CONTOUR
- INFERRED BACKGROUND VALUE CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR ARSENIC IS 10 µg/L.
3. THE BACKGROUND VALUE FOR ARSENIC IN THE SHALLOW FLOW ZONE IS 0.2 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 10 µg/L IS USED AS COMPARISON CRITERIA FOR ARSENIC IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/16/2019
CHECKED BY: T. GRANT	DATE: 12/16/2019
APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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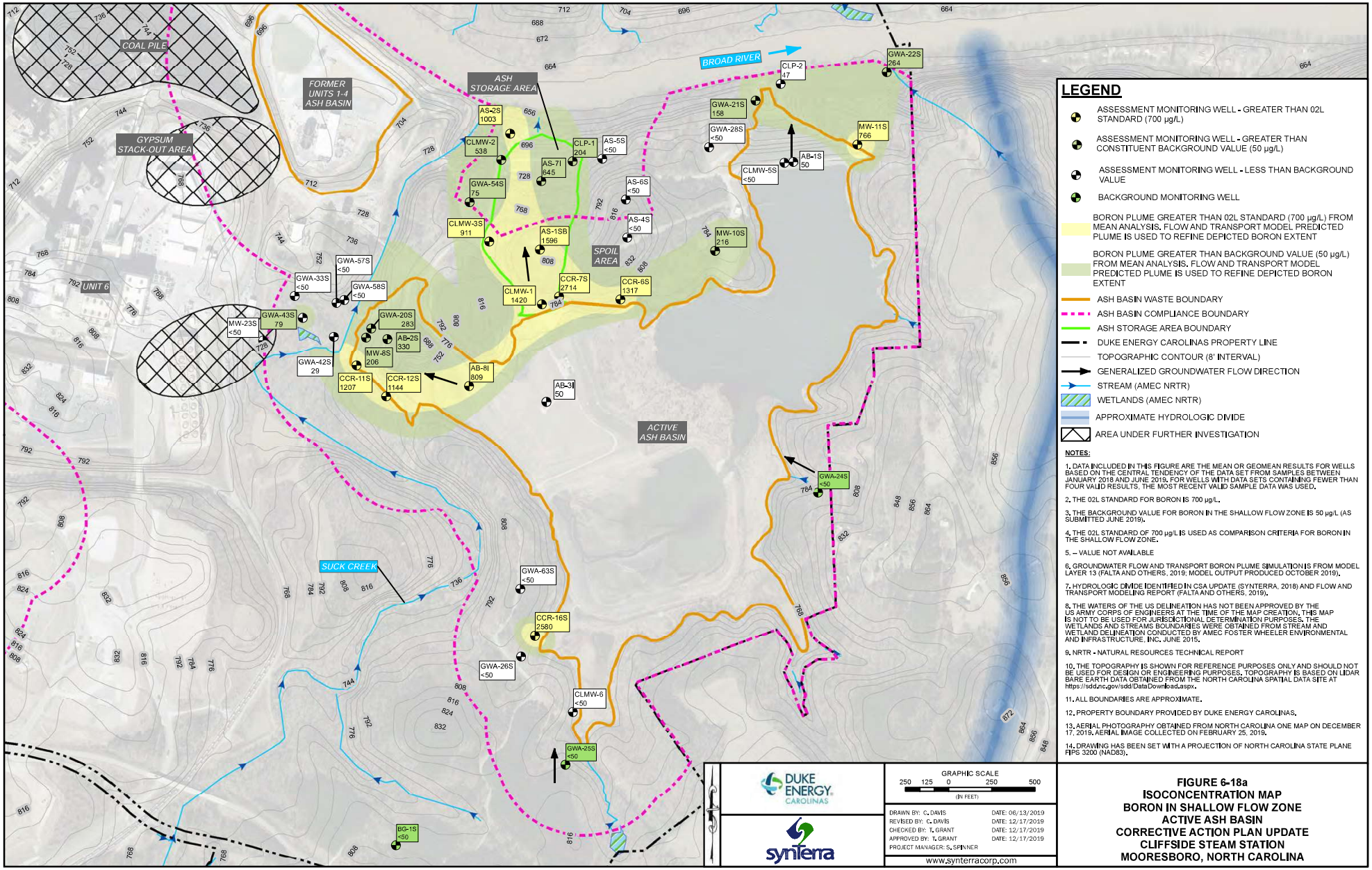
FIGURE 6-17
ISOCONCENTRATION MAP
ARSENIC IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (700 µg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- BORON PLUME GREATER THAN 02L STANDARD (700 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE SHALLOW FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT BORON PLUME SIMULATION IS FROM MODEL LAYER 13 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/17/2019
CHECKED BY: T. GRANT	DATE: 12/17/2019
APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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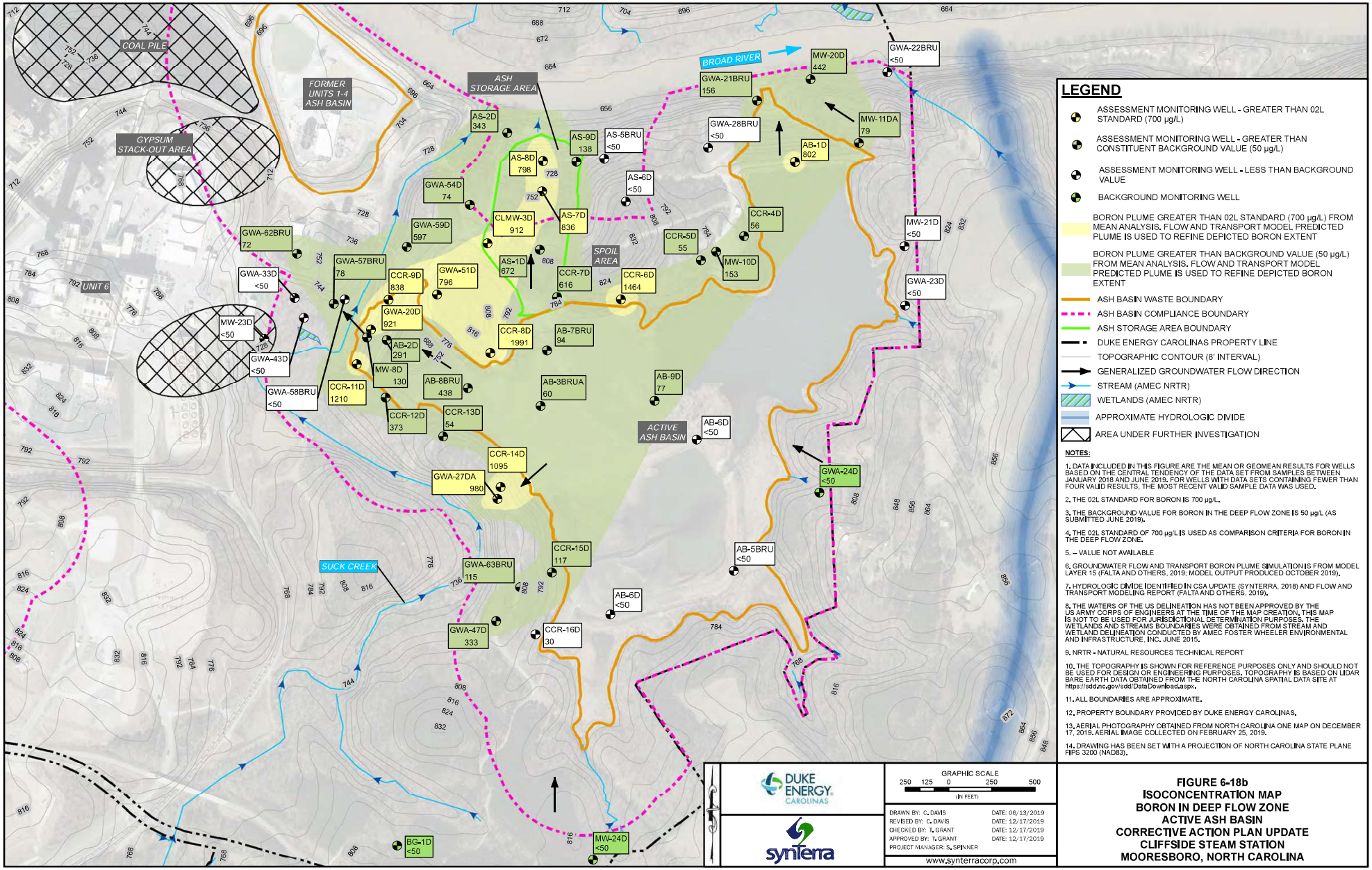
FIGURE 6-18a
ISOCONCENTRATION MAP
BORON IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (700 µg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- BORON PLUME GREATER THAN 02L STANDARD (700 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE DEEP FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT BORON PLUME SIMULATION IS FROM MODEL LAYER 15 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/17/2019
CHECKED BY: T. GRANT	DATE: 12/17/2019
APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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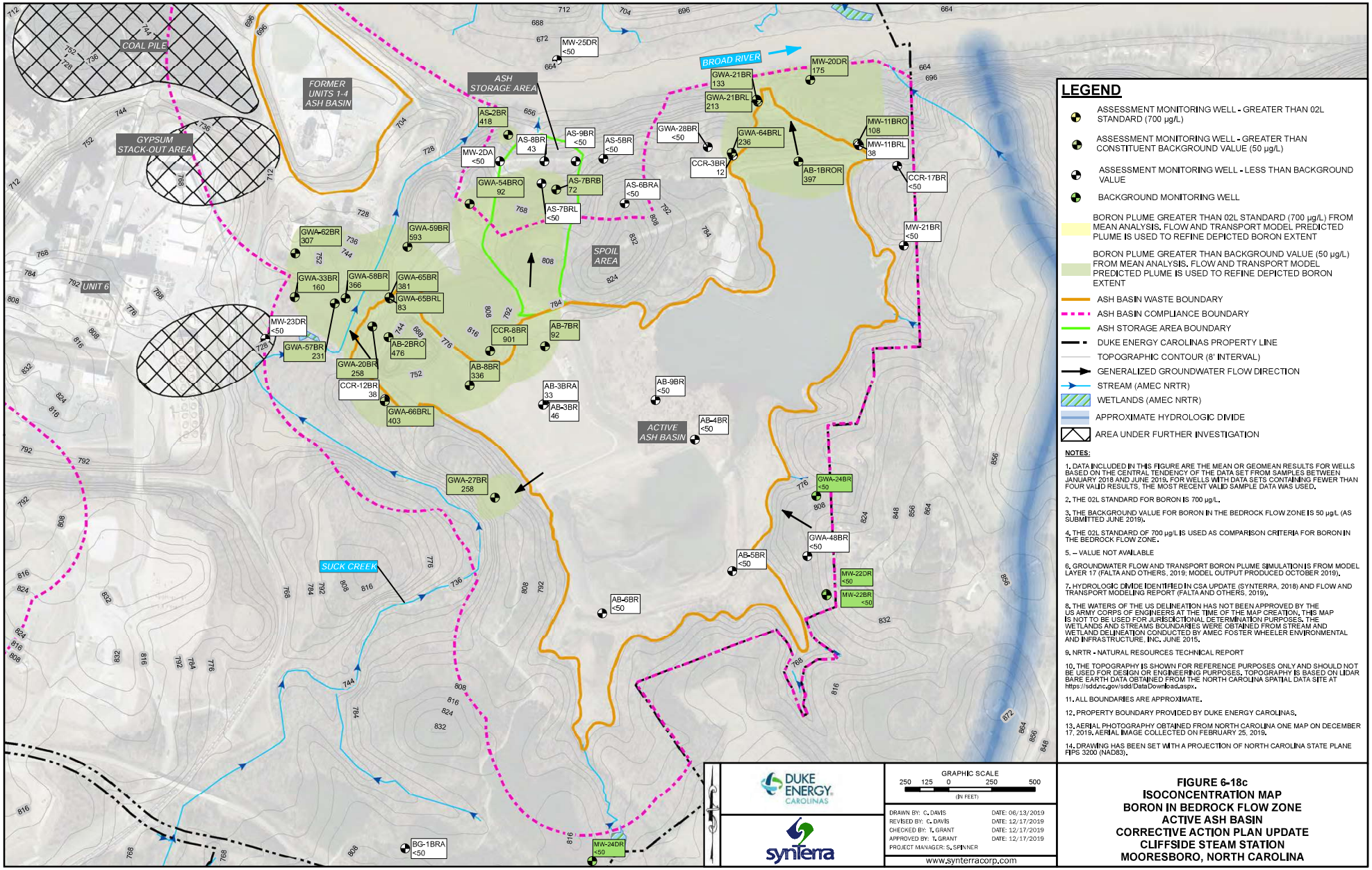
FIGURE 6-18b
ISOCONCENTRATION MAP
BORON IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (700 µg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- BORON PLUME GREATER THAN 02L STANDARD (700 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE BEDROCK FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT BORON PLUME SIMULATION IS FROM MODEL LAYER 17 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/17/2019
CHECKED BY: T. GRANT	DATE: 12/17/2019
APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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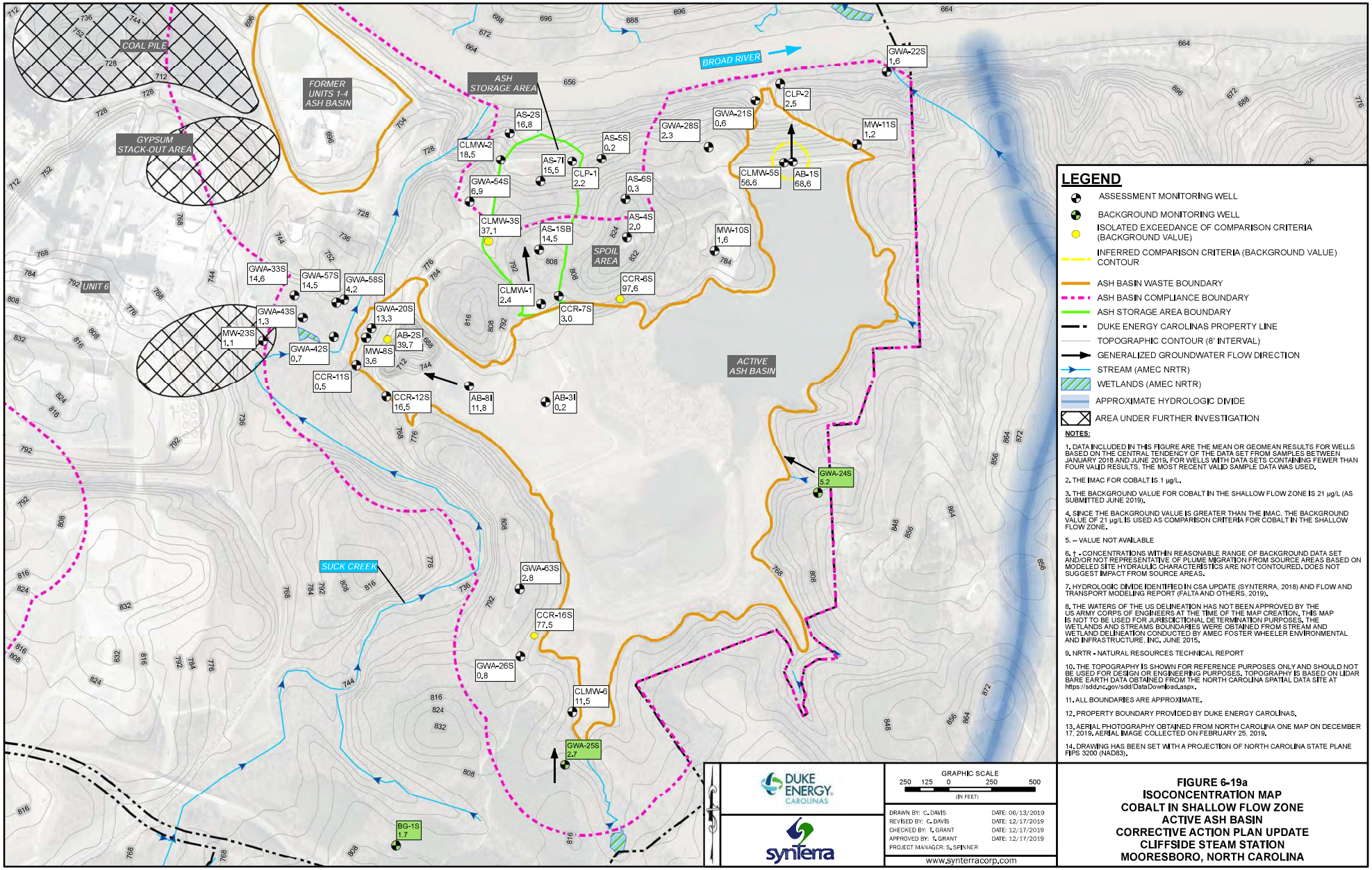
FIGURE 6-18c
ISOCONCENTRATION MAP
BORON IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE IMAC FOR COBALT IS 1 µg/L.
3. THE BACKGROUND VALUE FOR COBALT IN THE SHALLOW FLOW ZONE IS 21 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE IMAC, THE BACKGROUND VALUE OF 21 µg/L IS USED AS COMPARISON CRITERIA FOR COBALT IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION, THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

synterra

GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/17/2019
CHECKED BY: T. GRANT	DATE: 12/17/2019
APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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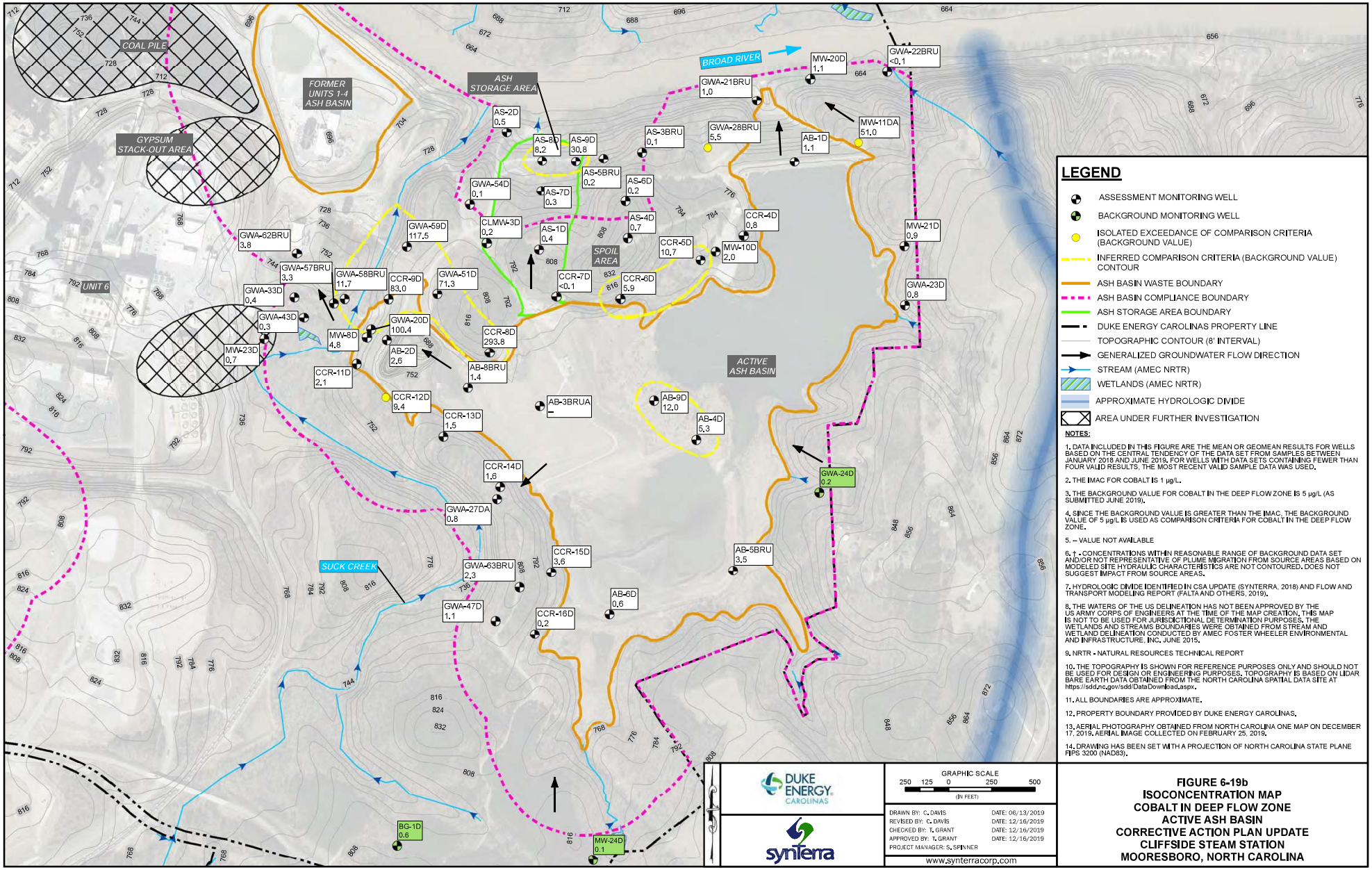
FIGURE 6-19a
ISOCONCENTRATION MAP
COBALT IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE IMAC FOR COBALT IS 1 µg/L.
3. THE BACKGROUND VALUE FOR COBALT IN THE DEEP FLOW ZONE IS 5 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE IMAC, THE BACKGROUND VALUE OF 5 µg/L IS USED AS COMPARISON CRITERIA FOR COBALT IN THE DEEP FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION, THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/16/2019
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PROJECT MANAGER: S. SPINNER	

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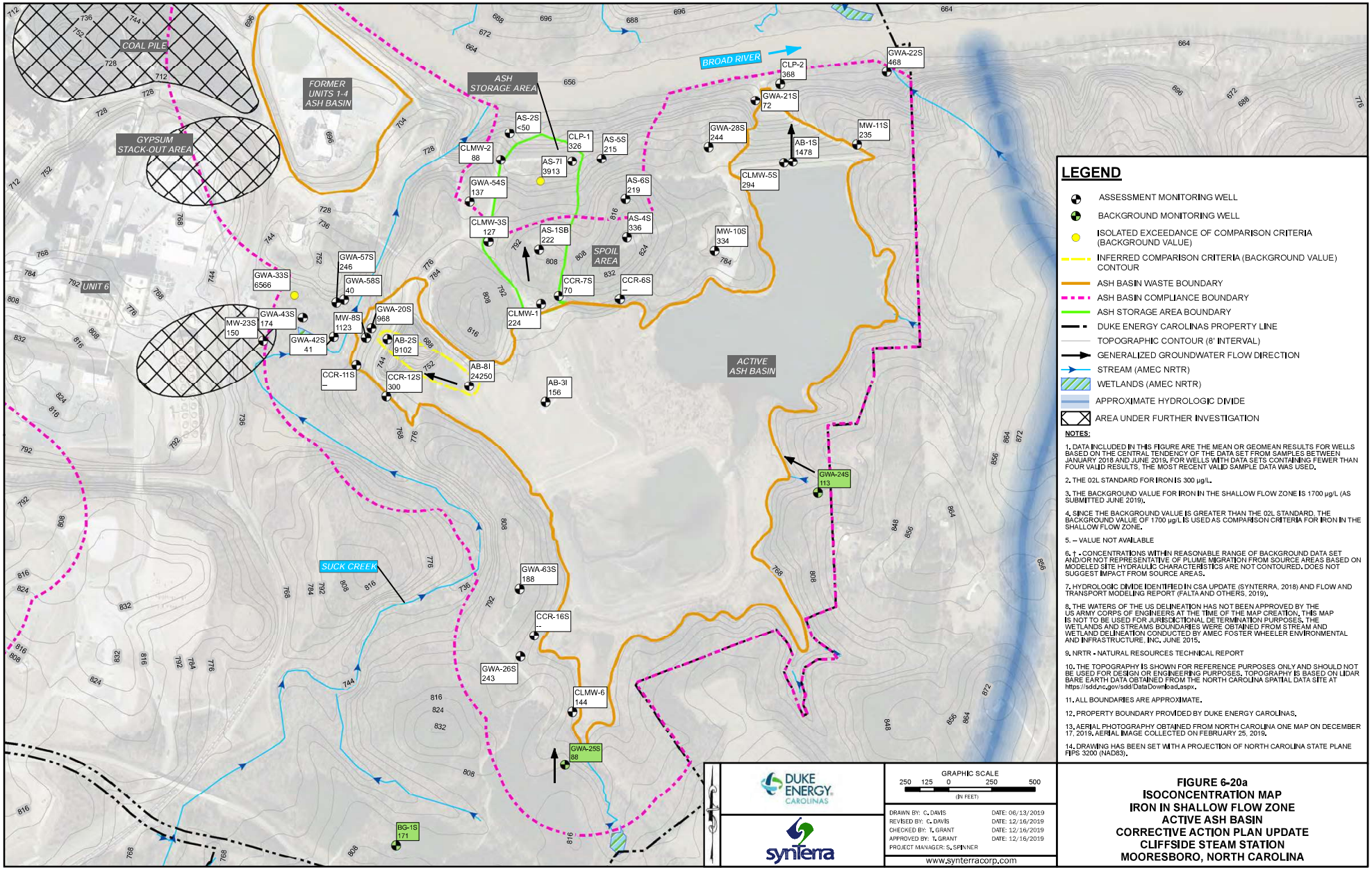
FIGURE 6-19b
ISOCONCENTRATION MAP
COBALT IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE SHALLOW FLOW ZONE IS 1700 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 1700 µg/L IS USED AS COMPARISON CRITERIA FOR IRON IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
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(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
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APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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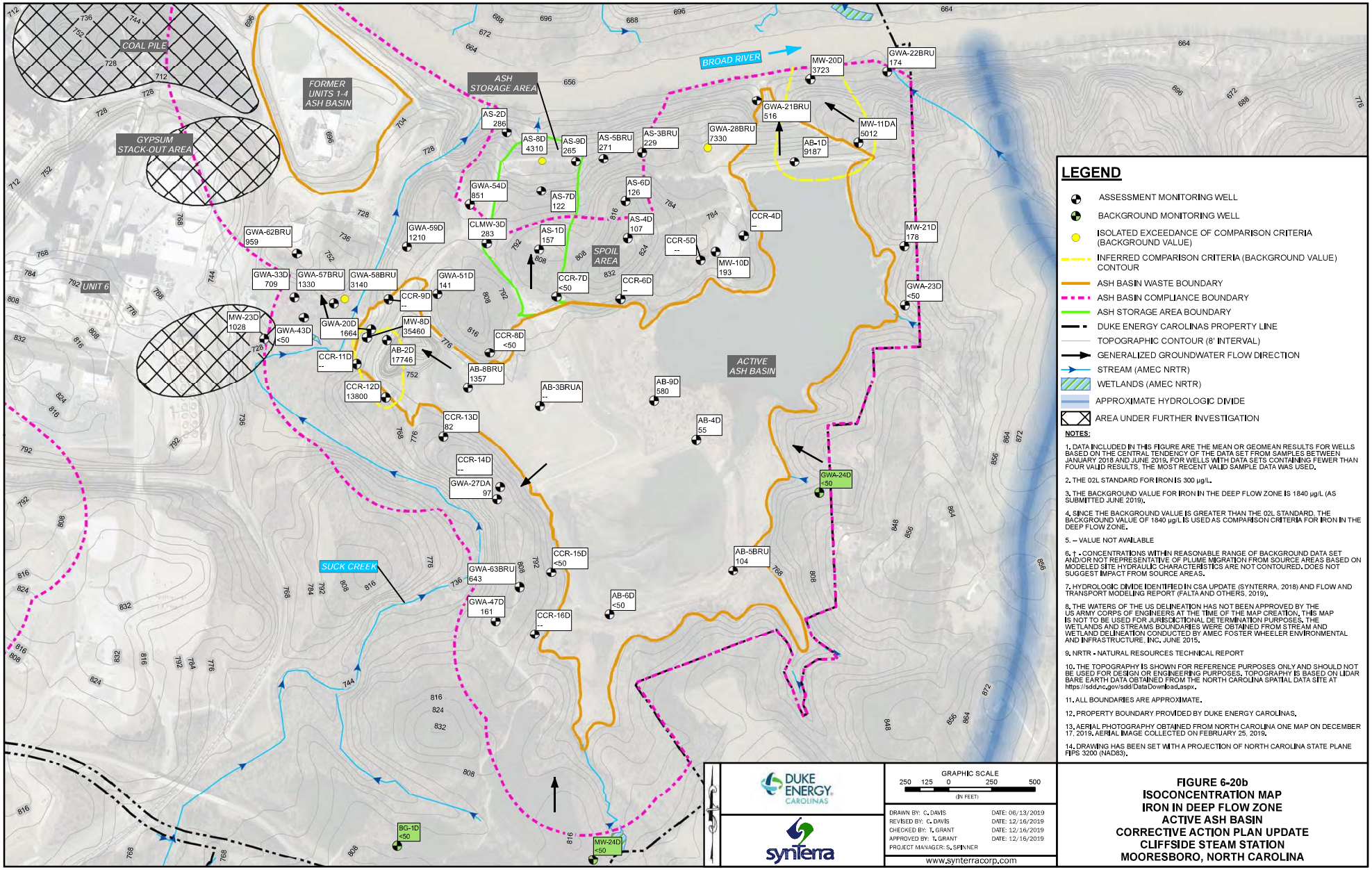
FIGURE 6-20a
ISOCONCENTRATION MAP
IRON IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE DEEP FLOW ZONE IS 1840 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 1840 µg/L IS USED AS COMPARISON CRITERIA FOR IRON IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
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(IN FEET)

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APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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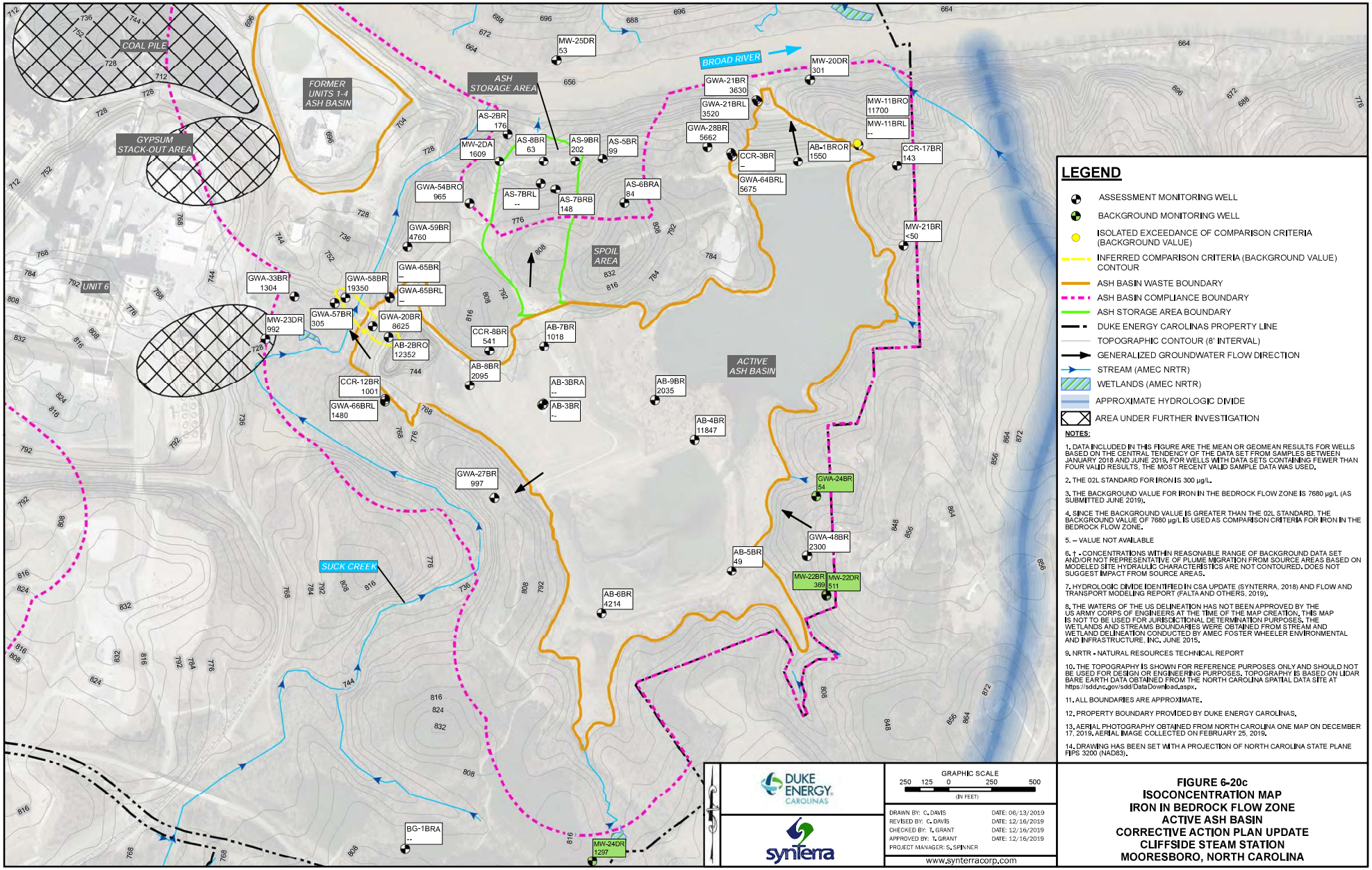
FIGURE 6-20b
ISOCONCENTRATION MAP
IRON IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE BEDROCK FLOW ZONE IS 7680 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 7680 µg/L IS USED AS COMPARISON CRITERIA FOR IRON IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

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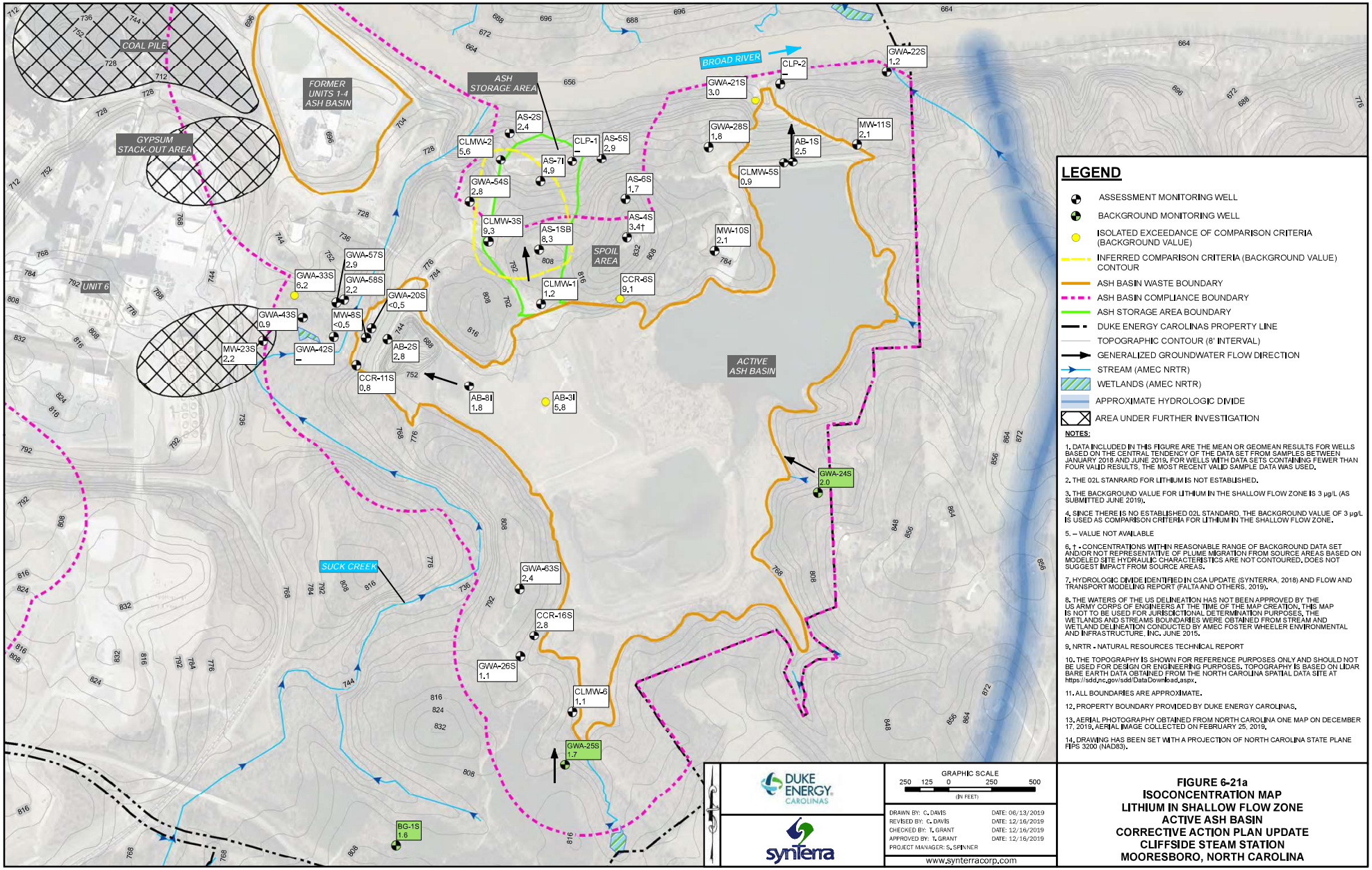
FIGURE 6-20c
ISOCONCENTRATION MAP
IRON IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

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1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANRARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE SHALLOW FLOW ZONE IS 3 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 3 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE SHALLOW FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
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(IN FEET)

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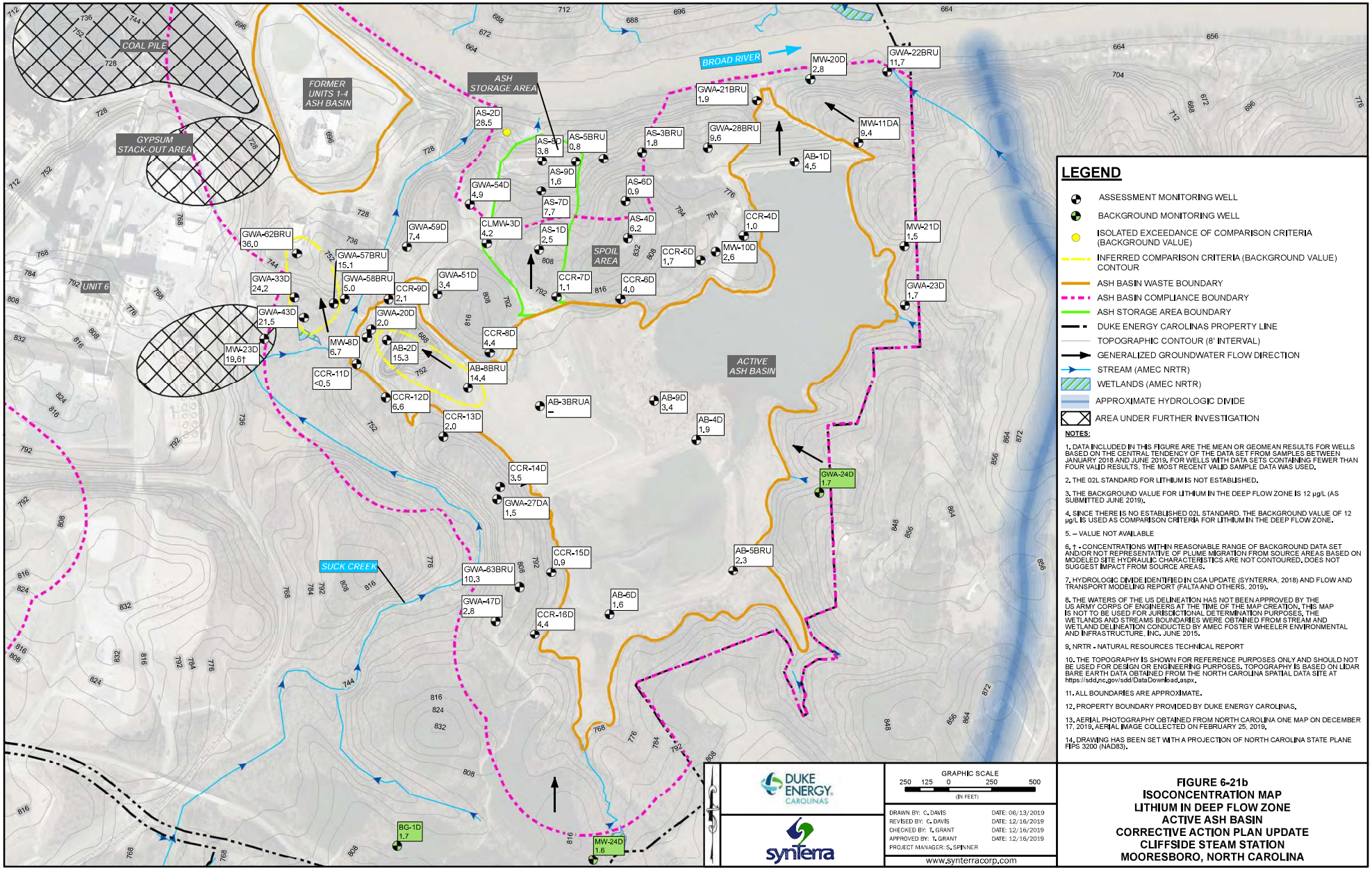
FIGURE 6-21a
ISOCONCENTRATION MAP
LITHIUM IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE DEEP FLOW ZONE IS 12 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 12 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE DEEP FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
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DUKE ENERGY CAROLINAS

synterra

GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

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APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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FIGURE 6-21b
ISOCONCENTRATION MAP
LITHIUM IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

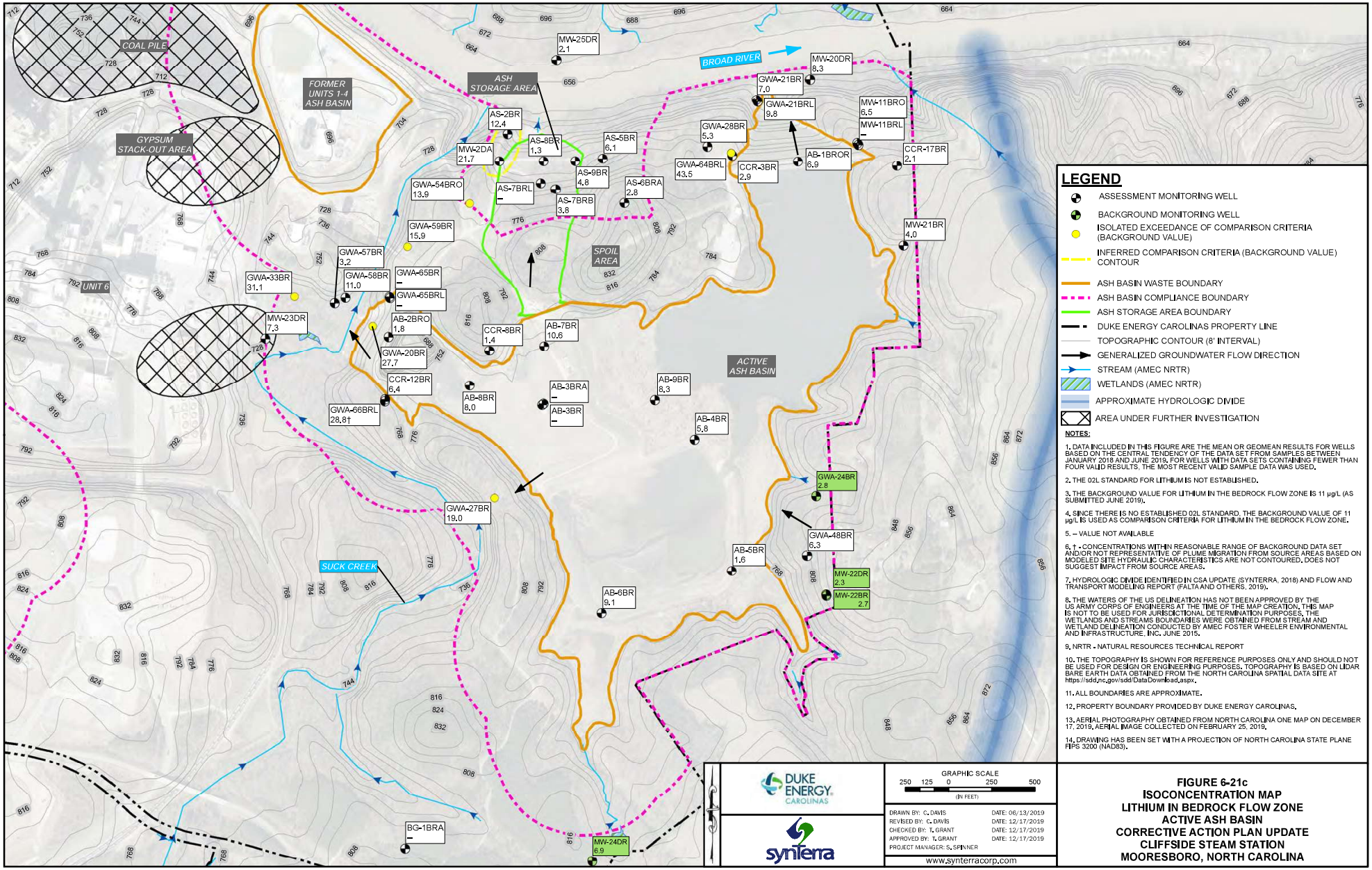
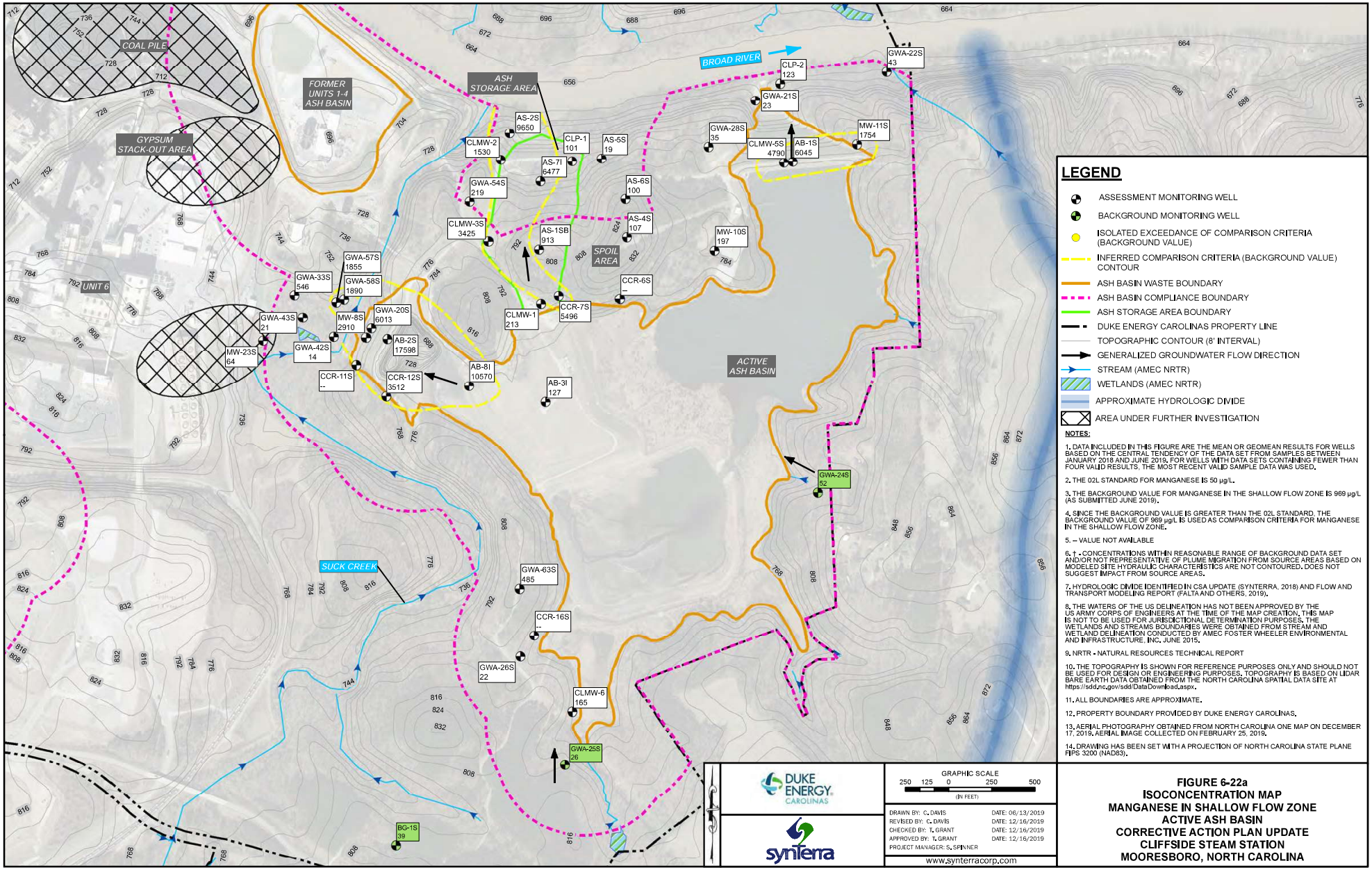


FIGURE 6-21c
ISOCONCENTRATION MAP
LITHIUM IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


COAL PILE
GYPSUM STACK-OUT AREA
FORMER UNITS 1-4 ASH BASIN
ASH STORAGE AREA
BROAD RIVER
SPOIL AREA
ACTIVE ASH BASIN
UNIT 6
SUCK CREEK
AS-2S 9650
CLP-1 101
AS-5S 19
CLMW-2 1530
AS-7I 6477
GWA-54S 219
AS-6S 100
CLMW-3S 3425
AS-1SB 913
AS-4S 107
GWA-57S 1855
GWA-33S 546
GWA-58S 1890
CCR-6S --
CCR-7S 5496
CLMW-1 213
GWA-43S 21
MW-8S 2910
GWA-20S 6013
AB-2S 17598
MW-23S 64
GWA-42S 14
CCR-11S --
CCR-12S 3512
AB-8I 10570
AB-3I 127
GWA-22S 43
CLP-2 123
GWA-21S 23
GWA-28S 35
CLMW-5S 4790
AB-1S 6045
MW-11S 1754
MW-10S 197
GWA-24S 52
GWA-63S 485
CCR-16S --
GWA-26S 22
CLMW-6 165
GWA-25S 26
BG-1S 39
LEGEND
ASSESSMENT MONITORING WELL
BACKGROUND MONITORING WELL
ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
APPROXIMATE HYDROLOGIC DIVIDE
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR MANGANESE IS 50 µg/L.
3. THE BACKGROUND VALUE FOR MANGANESE IN THE SHALLOW FLOW ZONE IS 969 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 969 µg/L IS USED AS COMPARISON CRITERIA FOR MANGANESE IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).
DUKE ENERGY CAROLINAS
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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/16/2019
CHECKED BY: T. GRANT DATE: 12/16/2019
APPROVED BY: T. GRANT DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER
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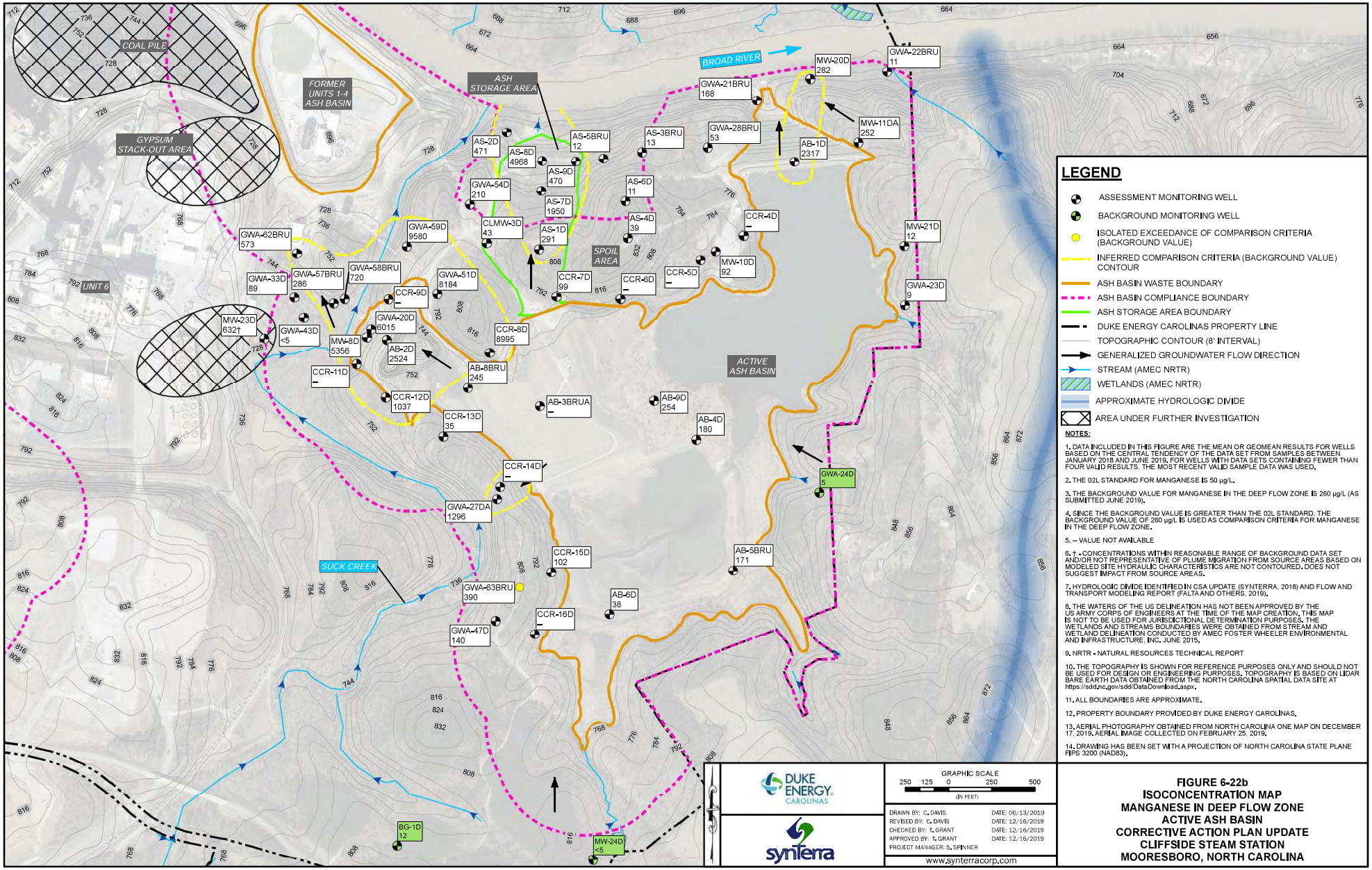
FIGURE 6-22a
ISOCONCENTRATION MAP
MANGANESE IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR MANGANESE IS 50 µg/L.
3. THE BACKGROUND VALUE FOR MANGANESE IN THE DEEP FLOW ZONE IS 260 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 260 µg/L IS USED AS COMPARISON CRITERIA FOR MANGANESE IN THE DEEP FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

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CHECKED BY: T. GRANT	DATE: 12/16/2019
APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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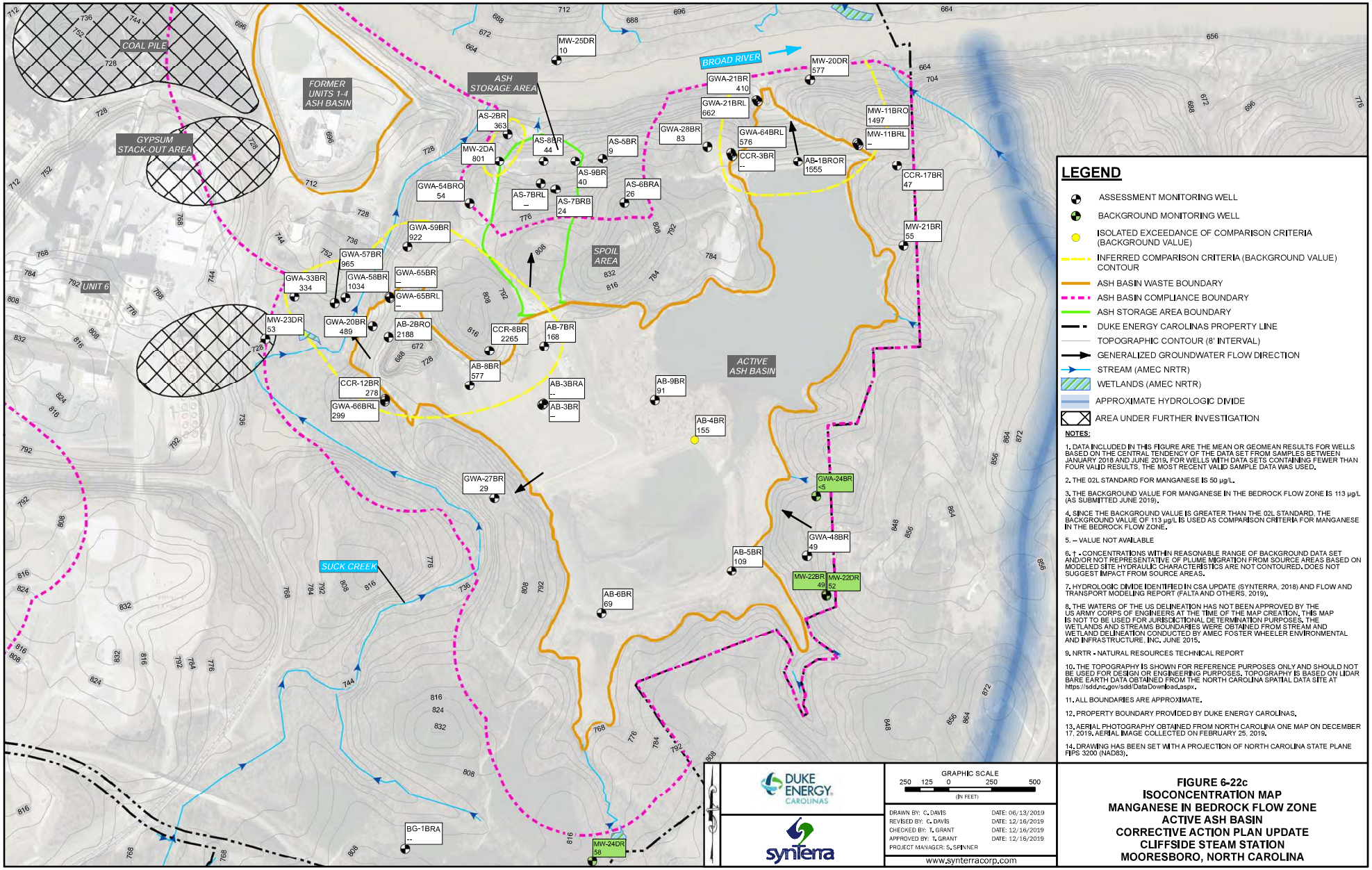
FIGURE 6-22b
ISOCONCENTRATION MAP
MANGANESE IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR MANGANESE IS 50 µg/L.
3. THE BACKGROUND VALUE FOR MANGANESE IN THE BEDROCK FLOW ZONE IS 113 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 113 µg/L IS USED AS COMPARISON CRITERIA FOR MANGANESE IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION, THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

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PROJECT MANAGER: S. SPINNER	

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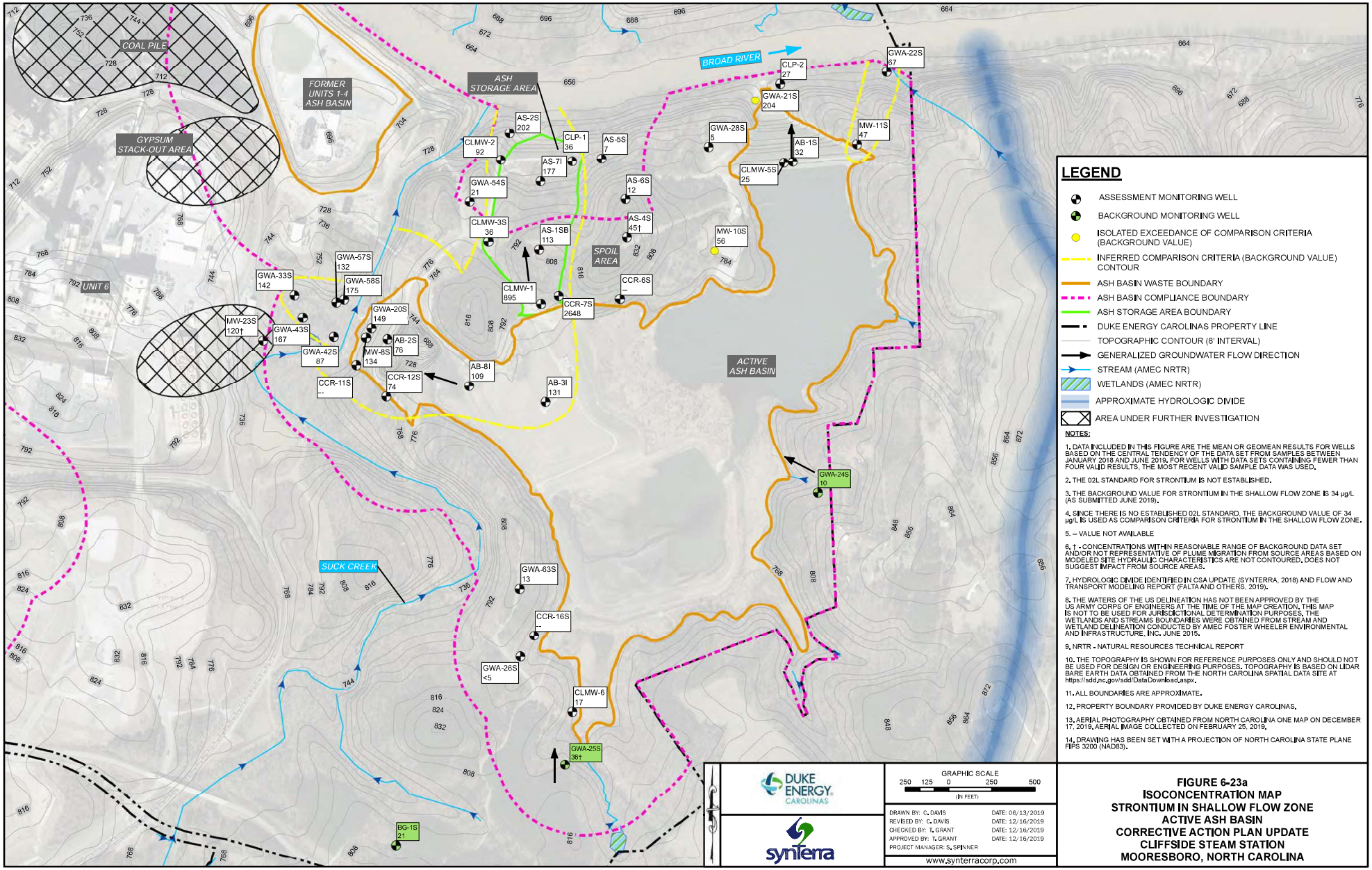
FIGURE 6-22c
ISOCONCENTRATION MAP
MANGANESE IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


COAL PILE
GYPSUM STACK-OUT AREA
FORMER UNITS 1-4 ASH BASIN
ASH STORAGE AREA
BROAD RIVER
SPOIL AREA
ACTIVE ASH BASIN
UNIT 6
SUCK CREEK
AS-2S 202
CLP-1 36
AS-5S 7
CLMW-2 92
AS-7I 177
GWA-54S 21
AS-6S 12
CLMW-3S 36
AS-1SB 113
AS-4S 45†
CLMW-1 895
CCR-6S --
CCR-7S 2648
GWA-57S 132
GWA-58S 175
GWA-33S 142
GWA-20S 149
MW-23S 120†
GWA-43S 167
AB-2S 76
GWA-42S 87
MW-8S 134
CCR-12S 74
CCR-11S --
AB-8I 109
AB-3I 131
GWA-63S 13
CCR-16S --
GWA-26S <5
CLMW-6 17
GWA-25S 36†
BG-1S 21
GWA-22S 67
CLP-2 27
GWA-21S 204
GWA-28S 5
AB-1S 32
MW-11S 47
CLMW-5S 25
MW-10S 56
GWA-24S 10
LEGEND
ASSESSMENT MONITORING WELL
BACKGROUND MONITORING WELL
ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
APPROXIMATE HYDROLOGIC DIVIDE
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR STRONTIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR STRONTIUM IN THE SHALLOW FLOW ZONE IS 34 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 34 µg/L IS USED AS COMPARISON CRITERIA FOR STRONTIUM IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
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10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).
DUKE ENERGY CAROLINAS
synterra
GRAPHIC SCALE
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(IN FEET)
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/16/2019
CHECKED BY: T. GRANT DATE: 12/16/2019
APPROVED BY: T. GRANT DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER
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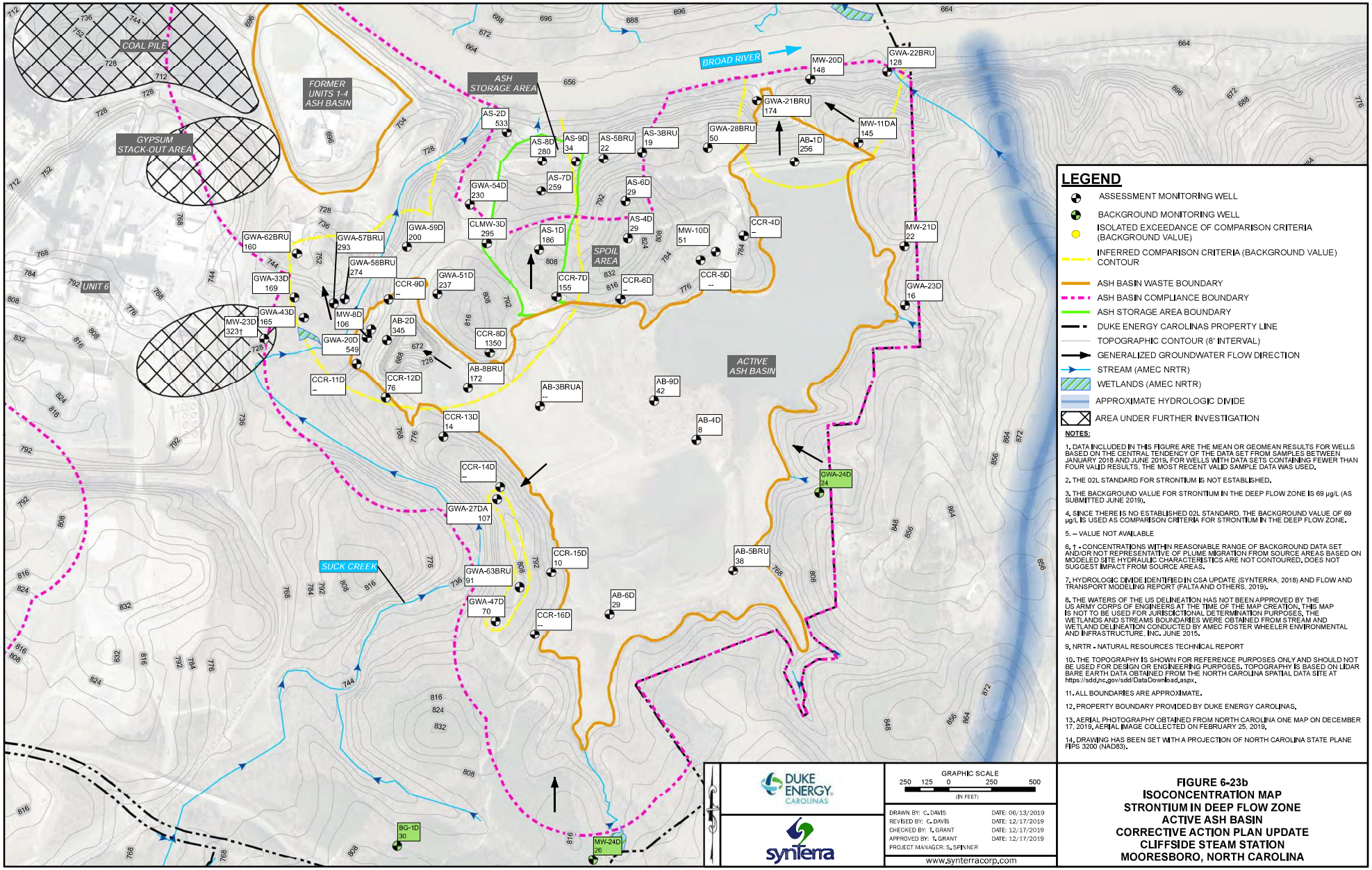
FIGURE 6-23a
ISOCONCENTRATION MAP
STRONTIUM IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR STRONTIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR STRONTIUM IN THE DEEP FLOW ZONE IS 69 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 69 µg/L IS USED AS COMPARISON CRITERIA FOR STRONTIUM IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
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14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

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APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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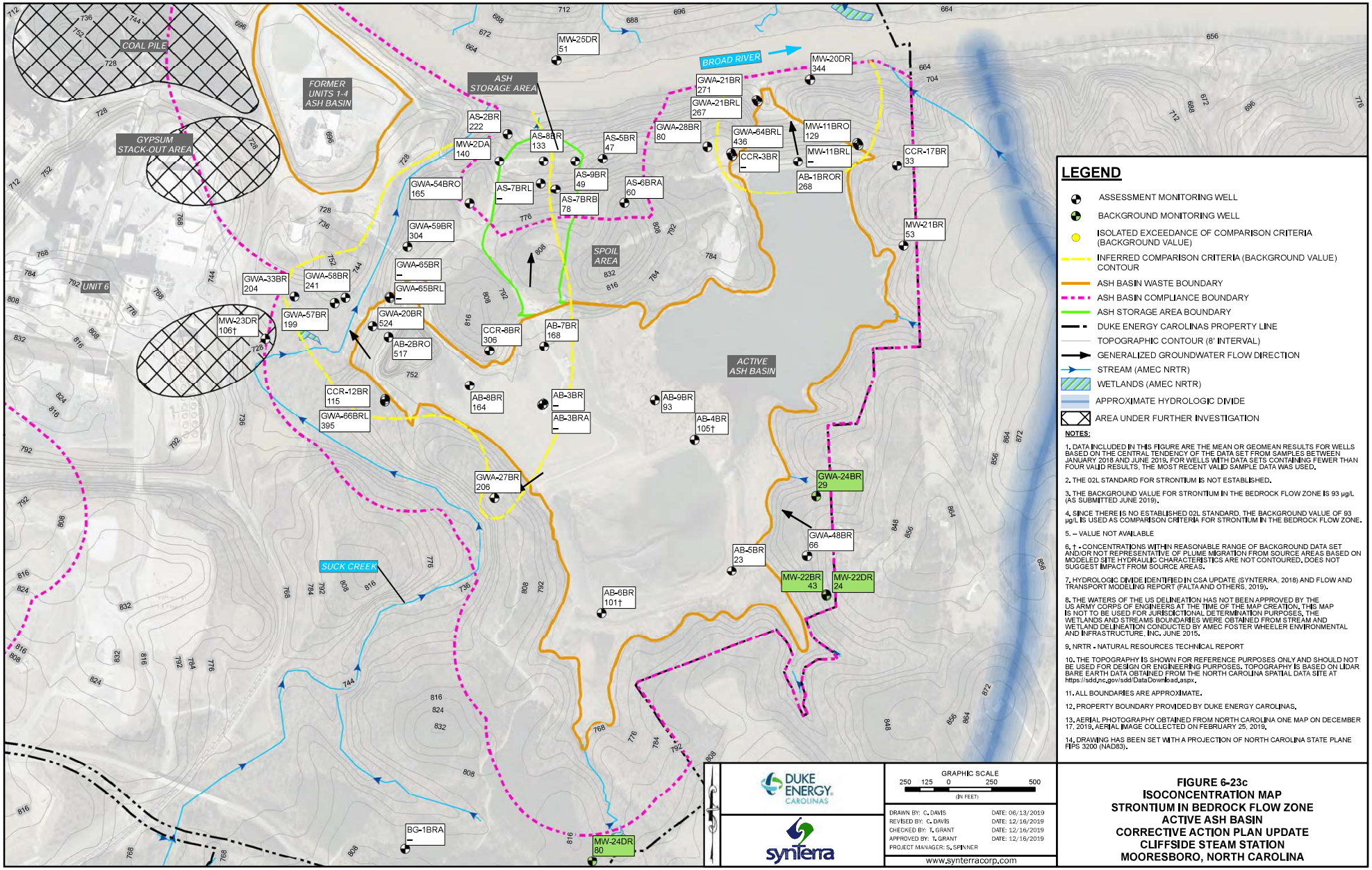
FIGURE 6-23b
ISOCONCENTRATION MAP
STRONTIUM IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

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2. THE 02L STANDARD FOR STRONTIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR STRONTIUM IN THE BEDROCK FLOW ZONE IS 93 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 93 µg/L IS USED AS COMPARISON CRITERIA FOR STRONTIUM IN THE BEDROCK FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
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DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/16/2019
CHECKED BY: T. GRANT	DATE: 12/16/2019
APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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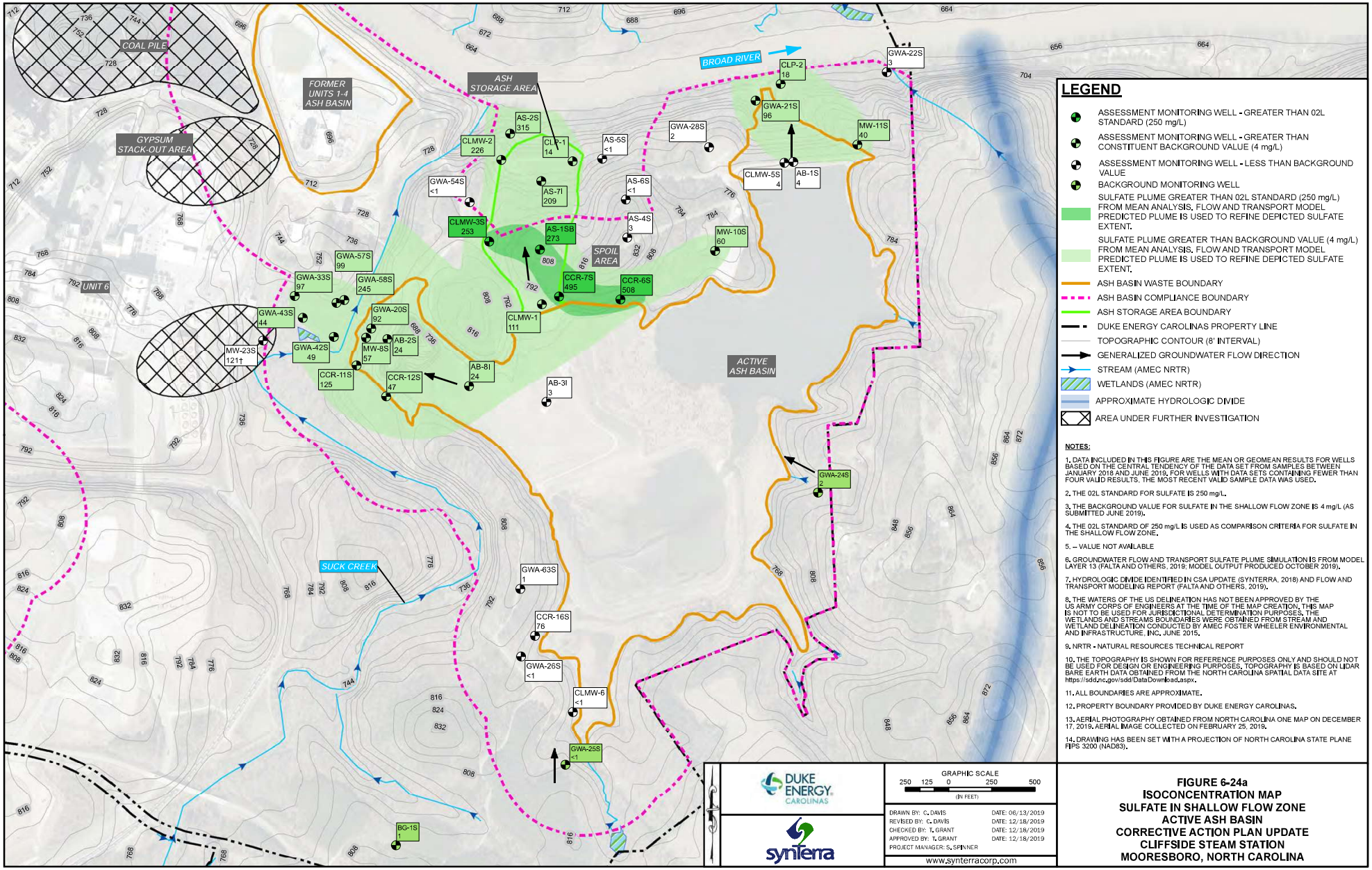
FIGURE 6-23c
ISOCONCENTRATION MAP
STRONTIUM IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (250 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (4 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- SULFATE PLUME GREATER THAN 02L STANDARD (250 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- SULFATE PLUME GREATER THAN BACKGROUND VALUE (4 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR SULFATE IS 250 mg/L.
3. THE BACKGROUND VALUE FOR SULFATE IN THE SHALLOW FLOW ZONE IS 4 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 250 mg/L IS USED AS COMPARISON CRITERIA FOR SULFATE IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT SULFATE PLUME SIMULATION IS FROM MODEL LAYER 13 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC, JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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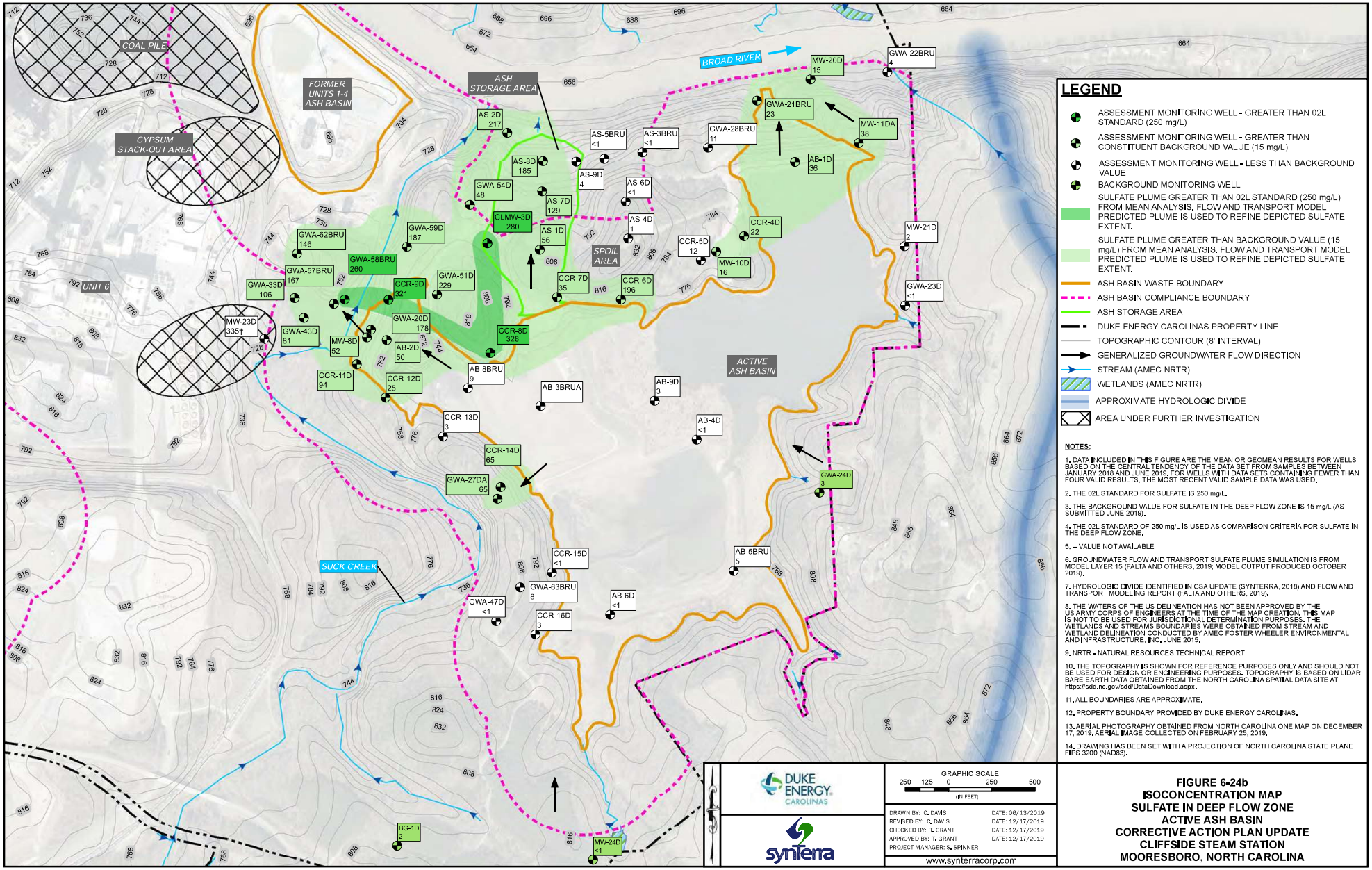
FIGURE 6-24a
ISOCONCENTRATION MAP
SULFATE IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (250 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (15 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- SULFATE PLUME GREATER THAN 02L STANDARD (250 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- SULFATE PLUME GREATER THAN BACKGROUND VALUE (15 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR SULFATE IS 250 mg/L.
3. THE BACKGROUND VALUE FOR SULFATE IN THE DEEP FLOW ZONE IS 15 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 250 mg/L IS USED AS COMPARISON CRITERIA FOR SULFATE IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT SULFATE PLUME SIMULATION IS FROM MODEL LAYER 15 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
10. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/17/2019
CHECKED BY: T. GRANT	DATE: 12/17/2019
APPROVED BY: T. GRANT	DATE: 12/17/2019
PROJECT MANAGER: S. SPINNER	

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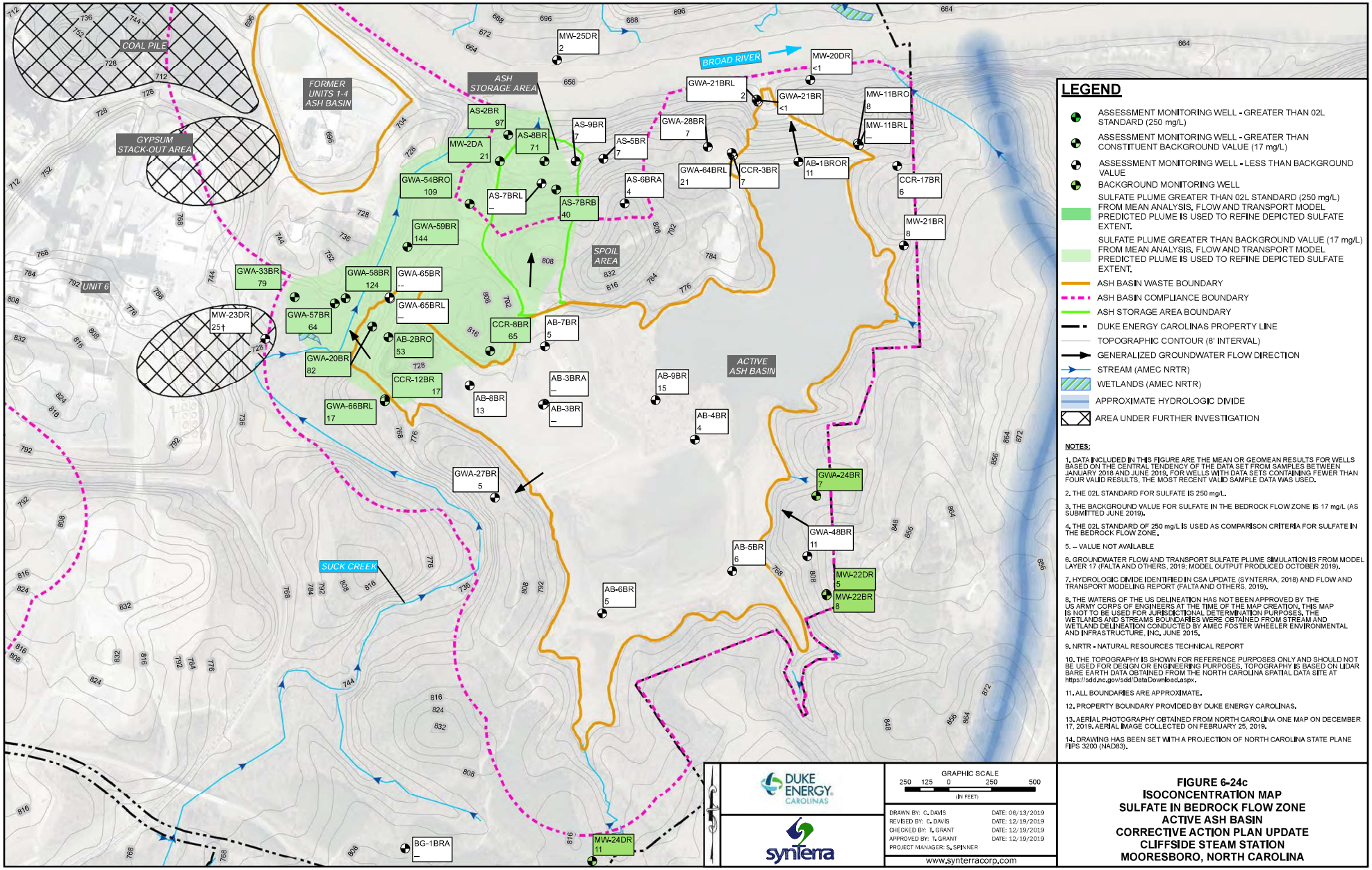
FIGURE 6-24b
ISOCONCENTRATION MAP
SULFATE IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (250 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (17 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- SULFATE PLUME GREATER THAN 02L STANDARD (250 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- SULFATE PLUME GREATER THAN BACKGROUND VALUE (17 mg/L) FROM MEAN ANALYSIS. FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED SULFATE EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR SULFATE IS 250 mg/L.
3. THE BACKGROUND VALUE FOR SULFATE IN THE BEDROCK FLOW ZONE IS 17 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 250 mg/L IS USED AS COMPARISON CRITERIA FOR SULFATE IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT SULFATE PLUME SIMULATION IS FROM MODEL LAYER 17 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC., JUNE 2015.
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/19/2019
CHECKED BY: T. GRANT	DATE: 12/19/2019
APPROVED BY: T. GRANT	DATE: 12/19/2019
PROJECT MANAGER: S. SPINNER	

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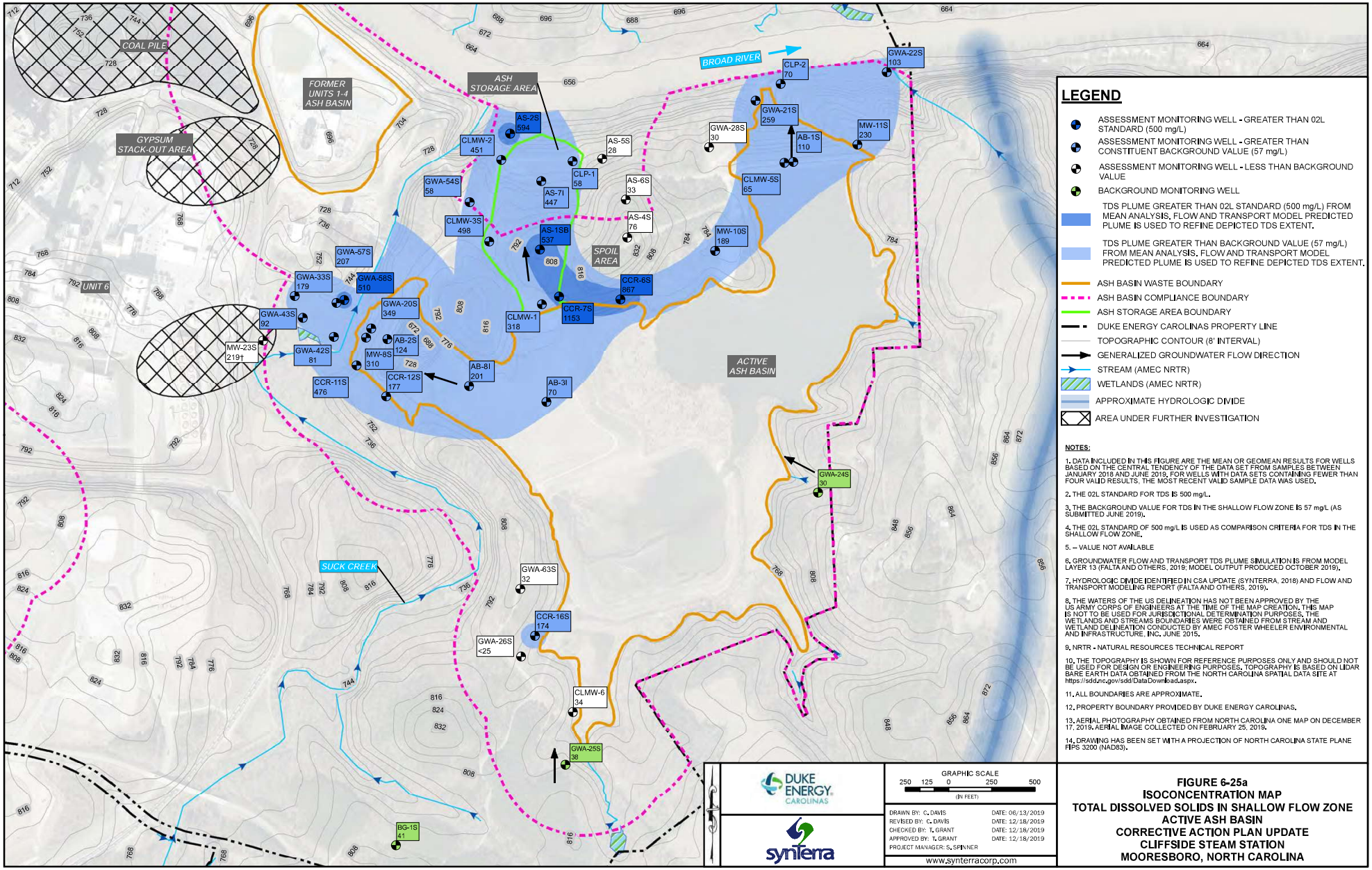
FIGURE 6-24c
ISOCONCENTRATION MAP
SULFATE IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (500 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (57 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- TDS PLUME GREATER THAN 02L STANDARD (500 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- TDS PLUME GREATER THAN BACKGROUND VALUE (57 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR TDS IS 500 mg/L.
3. THE BACKGROUND VALUE FOR TDS IN THE SHALLOW FLOW ZONE IS 57 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 500 mg/L IS USED AS COMPARISON CRITERIA FOR TDS IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT TDS PLUME SIMULATION IS FROM MODEL LAYER 13 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
8. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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11. ALL BOUNDARIES ARE APPROXIMATE.
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14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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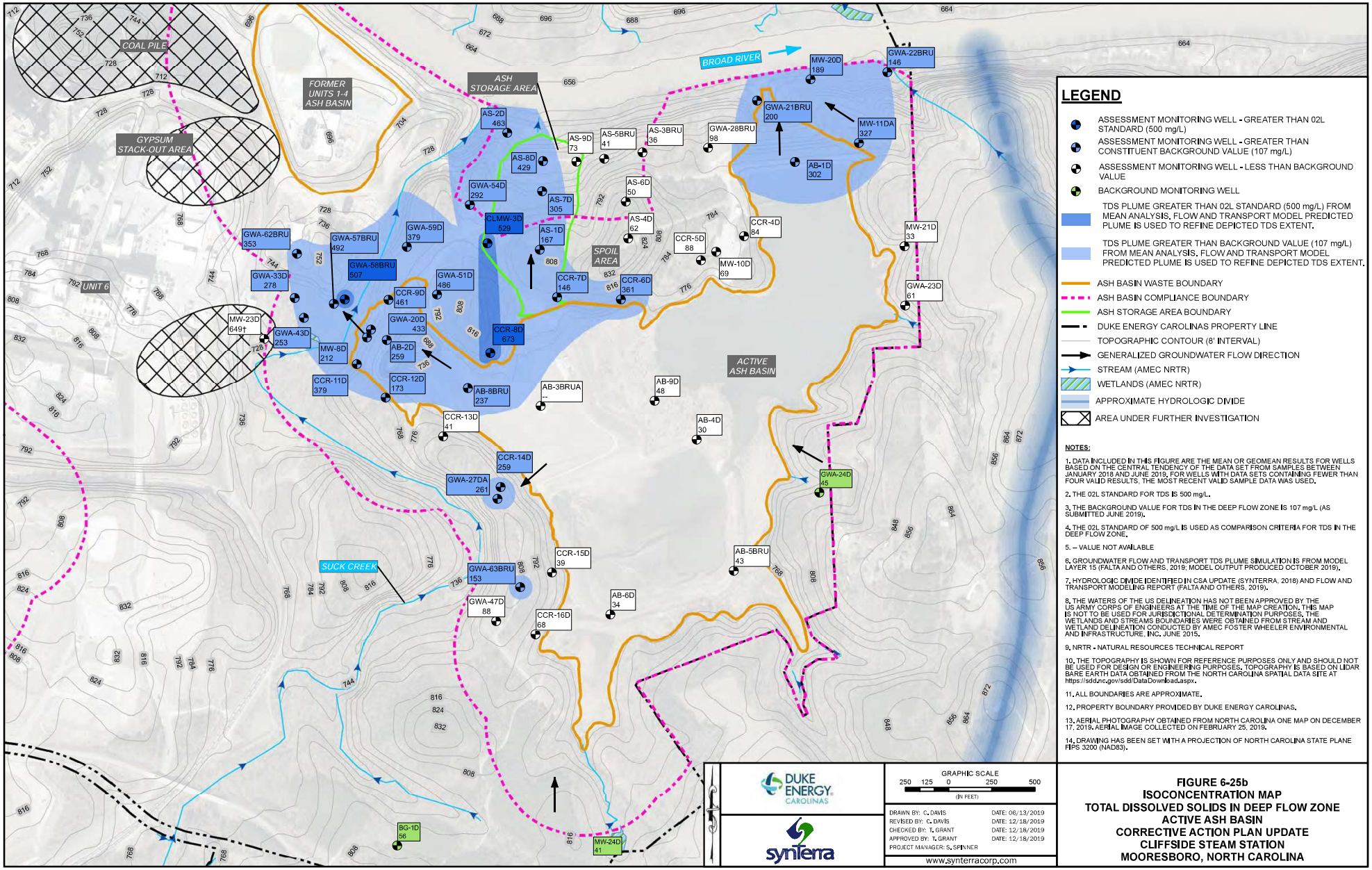
FIGURE 6-25a
ISOCONCENTRATION MAP
TOTAL DISSOLVED SOLIDS IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (500 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (107 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- TDS PLUME GREATER THAN 02L STANDARD (500 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- TDS PLUME GREATER THAN BACKGROUND VALUE (107 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR TDS IS 500 mg/L.
3. THE BACKGROUND VALUE FOR TDS IN THE DEEP FLOW ZONE IS 107 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 500 mg/L IS USED AS COMPARISON CRITERIA FOR TDS IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT TDS PLUME SIMULATION IS FROM MODEL LAYER 15 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
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14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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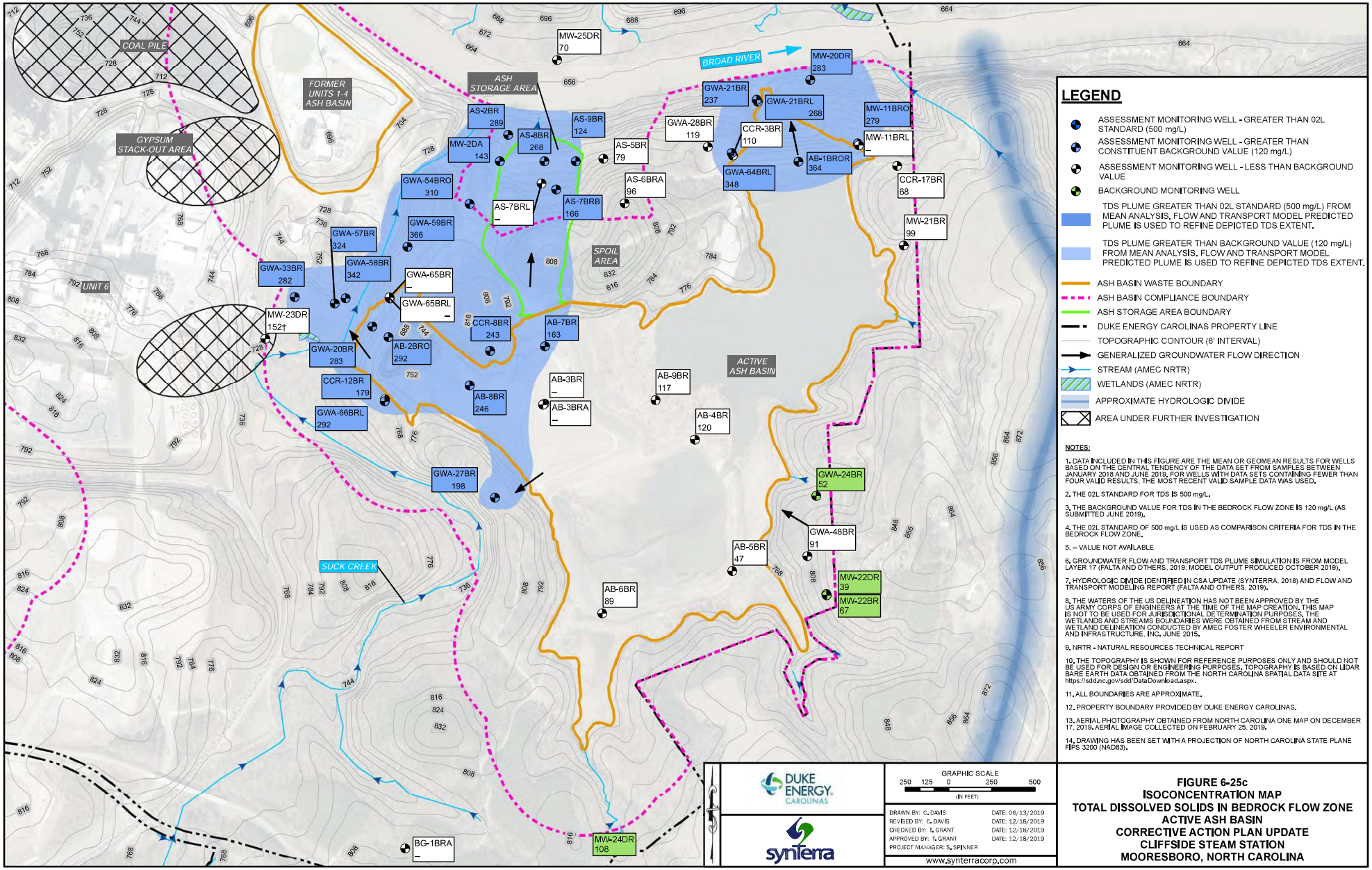
FIGURE 6-25b
ISOCONCENTRATION MAP
TOTAL DISSOLVED SOLIDS IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL - GREATER THAN 02L STANDARD (500 mg/L)
- ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (120 mg/L)
- ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
- BACKGROUND MONITORING WELL
- TDS PLUME GREATER THAN 02L STANDARD (500 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- TDS PLUME GREATER THAN BACKGROUND VALUE (120 mg/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED TDS EXTENT.
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE 02L STANDARD FOR TDS IS 500 mg/L.
3. THE BACKGROUND VALUE FOR TDS IN THE BEDROCK FLOW ZONE IS 120 mg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 500 mg/L IS USED AS COMPARISON CRITERIA FOR TDS IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. GROUNDWATER FLOW AND TRANSPORT TDS PLUME SIMULATION IS FROM MODEL LAYER 17 (FALTA AND OTHERS, 2019; MODEL OUTPUT PRODUCED OCTOBER 2019).
7. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
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DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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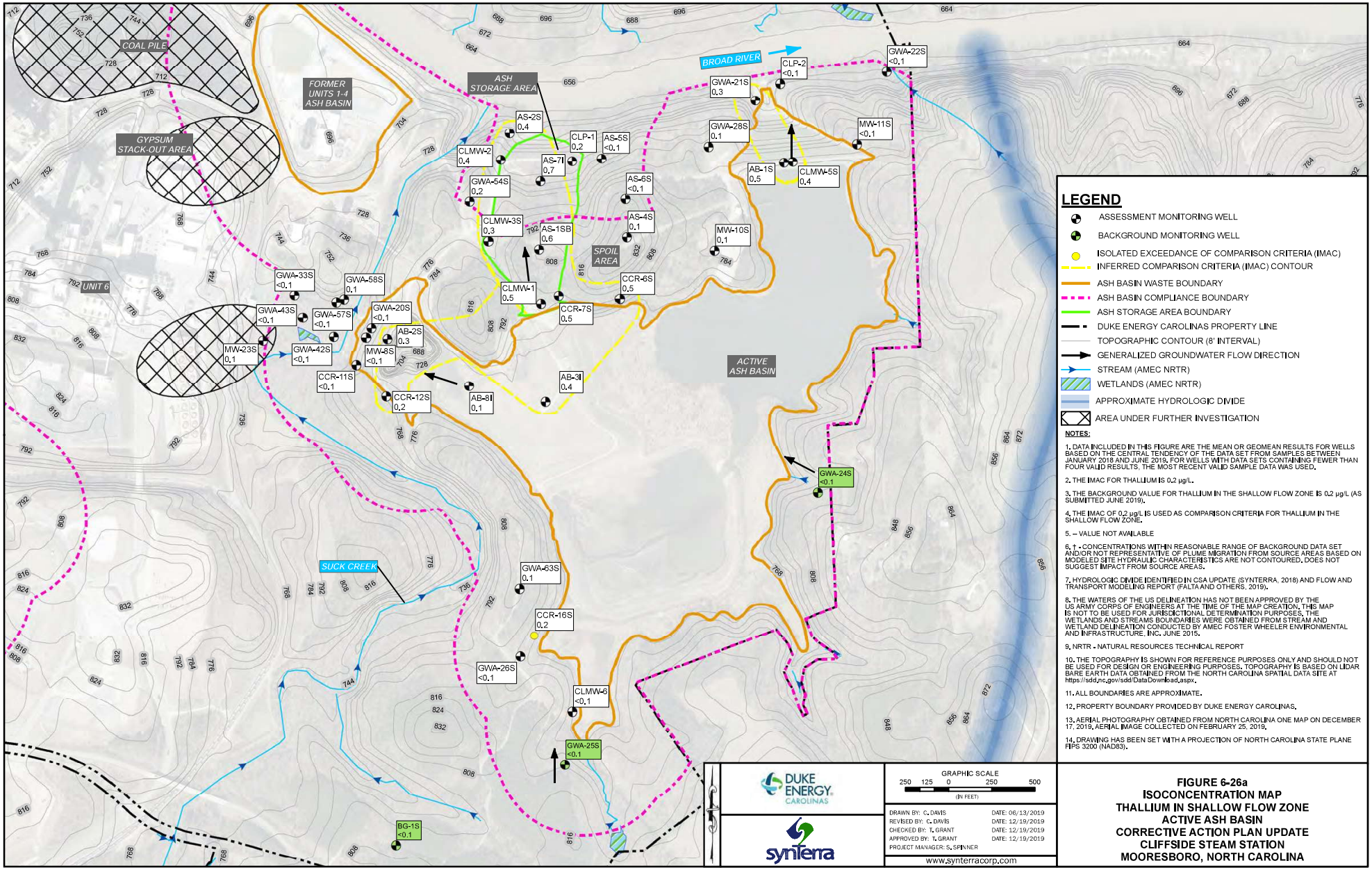
FIGURE 6-25c
ISOCONCENTRATION MAP
TOTAL DISSOLVED SOLIDS IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (IMAC)
- INFERRED COMPARISON CRITERIA (IMAC) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

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2. THE IMAC FOR THALLIUM IS 0.2 µg/L.
3. THE BACKGROUND VALUE FOR THALLIUM IN THE SHALLOW FLOW ZONE IS 0.2 µg/L (AS SUBMITTED JUNE 2019).
4. THE IMAC OF 0.2 µg/L IS USED AS COMPARISON CRITERIA FOR THALLIUM IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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9. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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11. ALL BOUNDARIES ARE APPROXIMATE.
12. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
13. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
14. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

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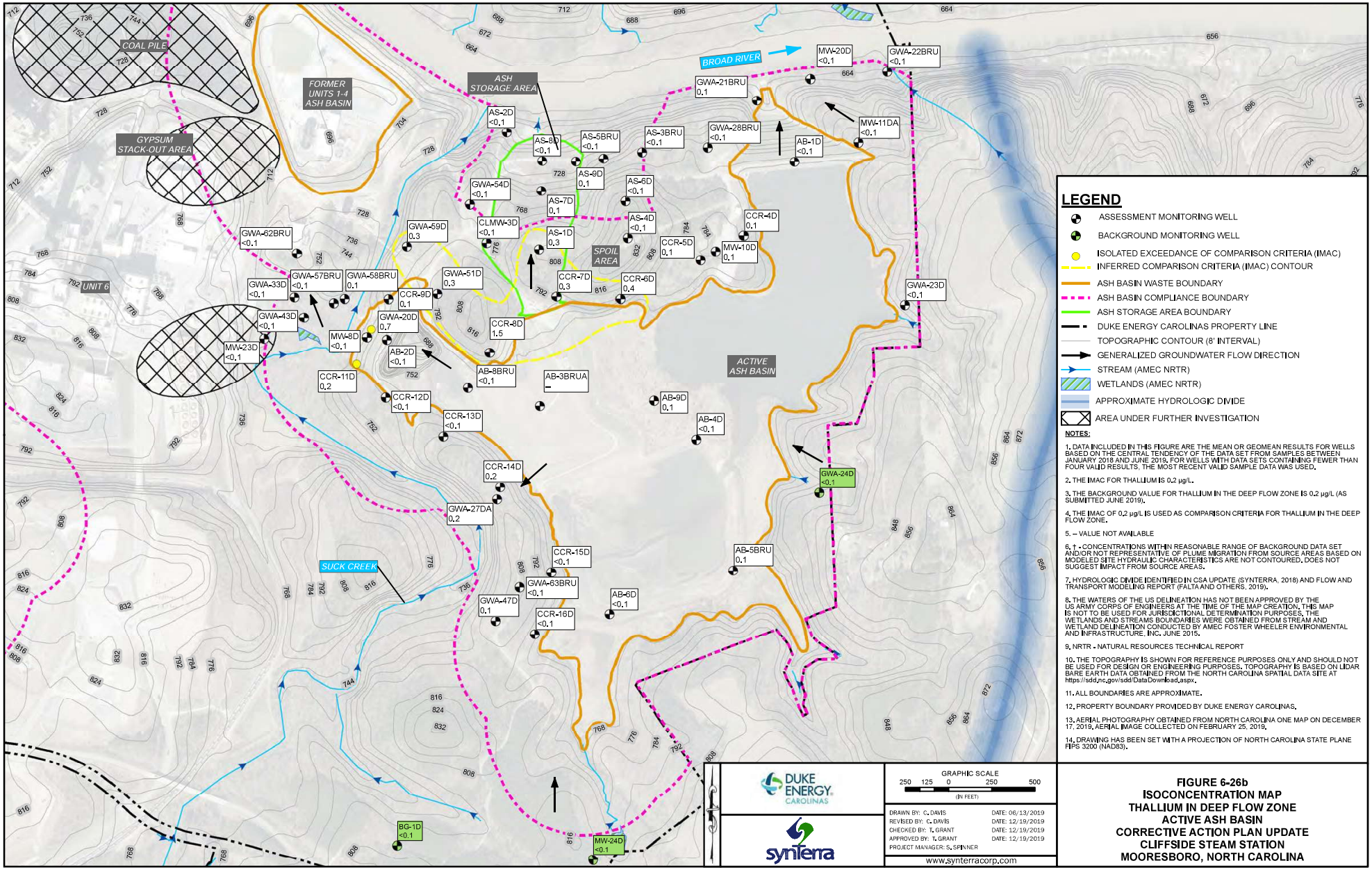
FIGURE 6-26a
ISOCONCENTRATION MAP
THALLIUM IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (IMAC)
- INFERRED COMPARISON CRITERIA (IMAC) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE IMAC FOR THALLIUM IS 0.2 µg/L.
3. THE BACKGROUND VALUE FOR THALLIUM IN THE DEEP FLOW ZONE IS 0.2 µg/L (AS SUBMITTED JUNE 2019).
4. THE IMAC OF 0.2 µg/L IS USED AS COMPARISON CRITERIA FOR THALLIUM IN THE DEEP FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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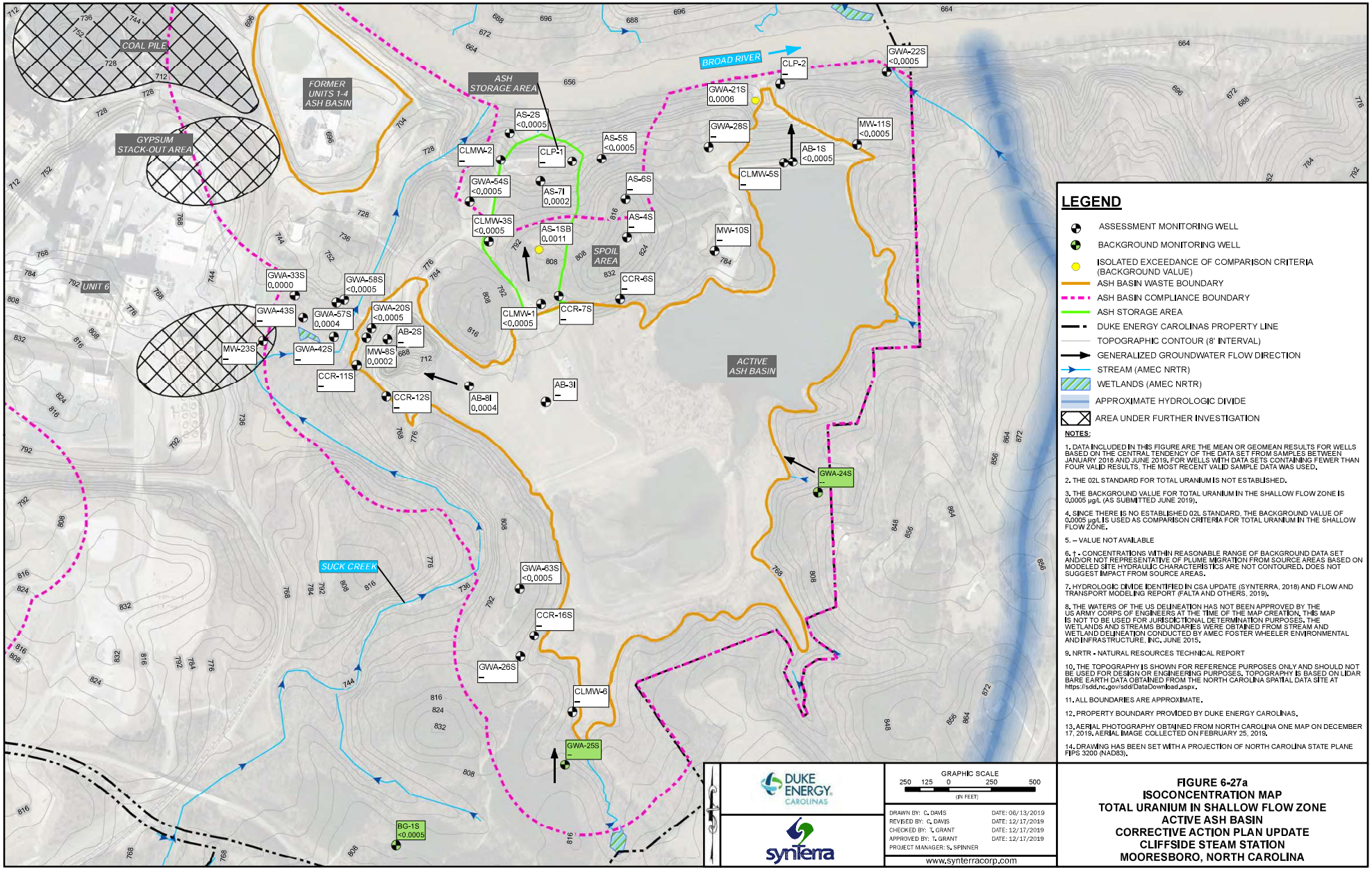
FIGURE 6-26b
ISOCONCENTRATION MAP
THALLIUM IN DEEP FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- APPROXIMATE HYDROLOGIC DIVIDE
- AREA UNDER FURTHER INVESTIGATION

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2. THE 02L STANDARD FOR TOTAL URANIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR TOTAL URANIUM IN THE SHALLOW FLOW ZONE IS 0.0005 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 0.0005 µg/L IS USED AS COMPARISON CRITERIA FOR TOTAL URANIUM IN THE SHALLOW FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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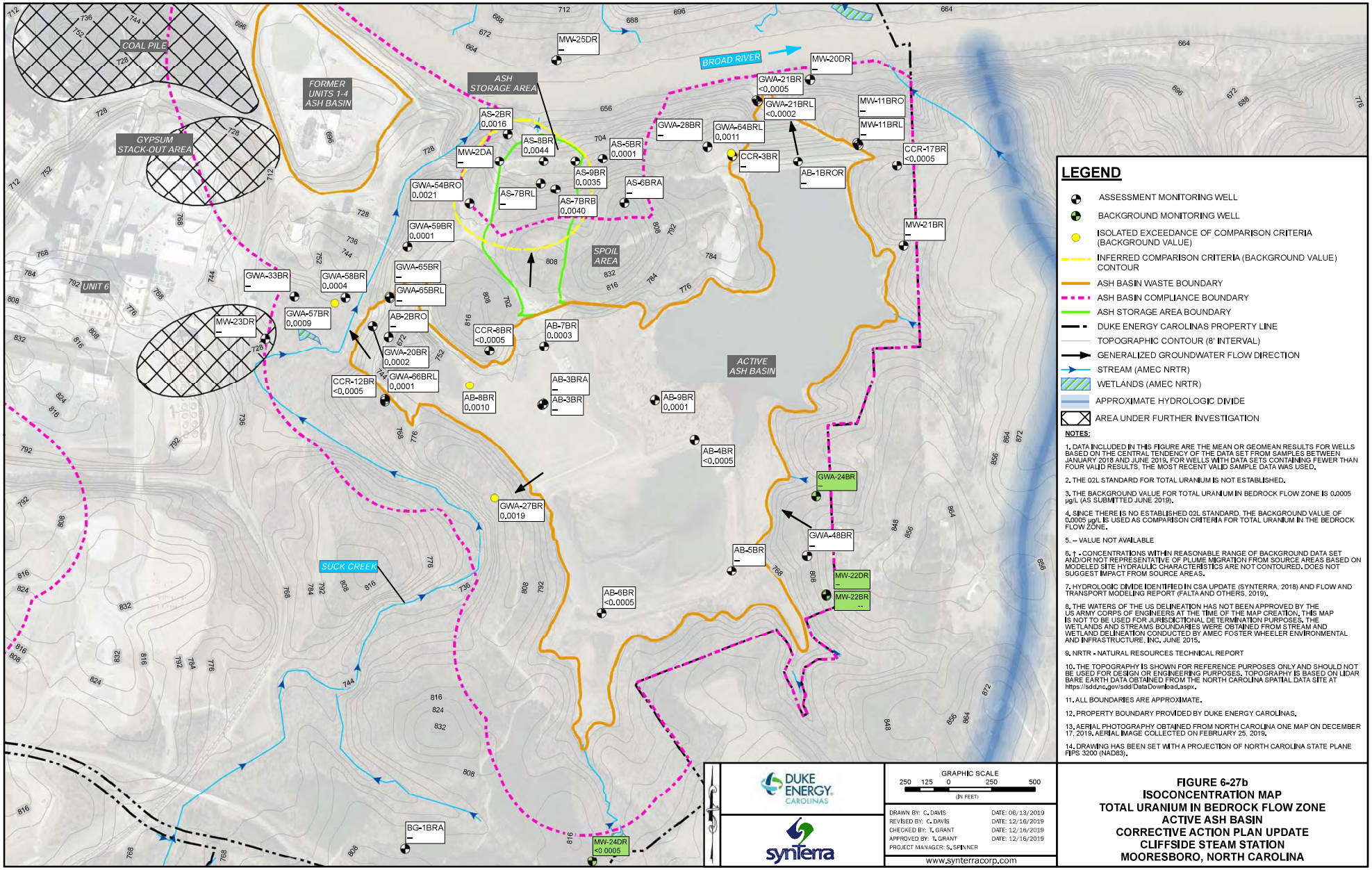
FIGURE 6-27a
ISOCONCENTRATION MAP
TOTAL URANIUM IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
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2. THE 02L STANDARD FOR TOTAL URANIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR TOTAL URANIUM IN BEDROCK FLOW ZONE IS 0.0005 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 0.0005 µg/L IS USED AS COMPARISON CRITERIA FOR TOTAL URANIUM IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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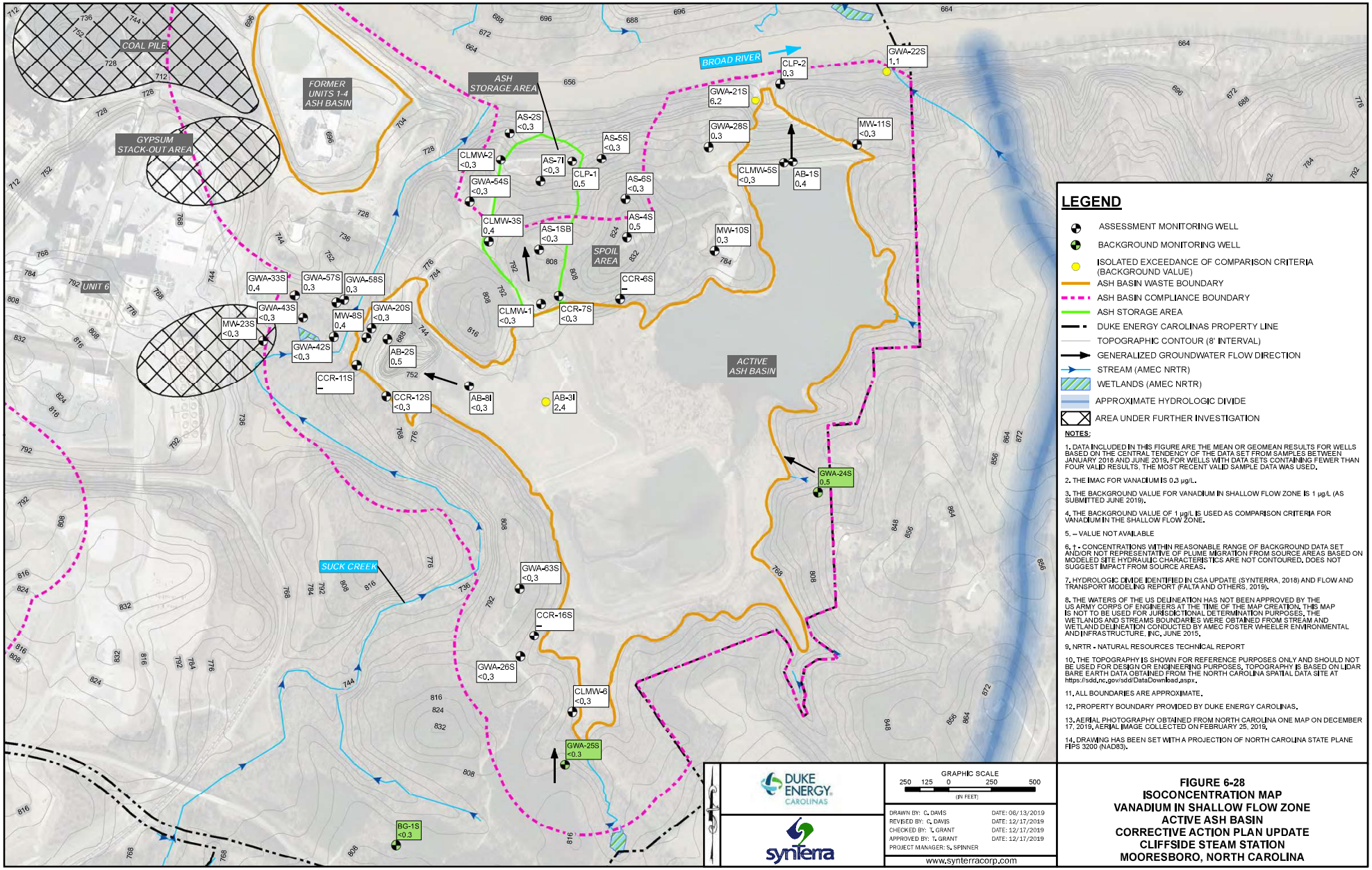
FIGURE 6-27b
ISOCONCENTRATION MAP
TOTAL URANIUM IN BEDROCK FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
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2. THE IMAC FOR VANADIUM IS 0.3 µg/L.
3. THE BACKGROUND VALUE FOR VANADIUM IN SHALLOW FLOW ZONE IS 1 µg/L (AS SUBMITTED JUNE 2019).
4. THE BACKGROUND VALUE OF 1 µg/L IS USED AS COMPARISON CRITERIA FOR VANADIUM IN THE SHALLOW FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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FIGURE 6-28
ISOCONCENTRATION MAP
VANADIUM IN SHALLOW FLOW ZONE
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Note:
*** - Sampling events prior to 1/1/2018**

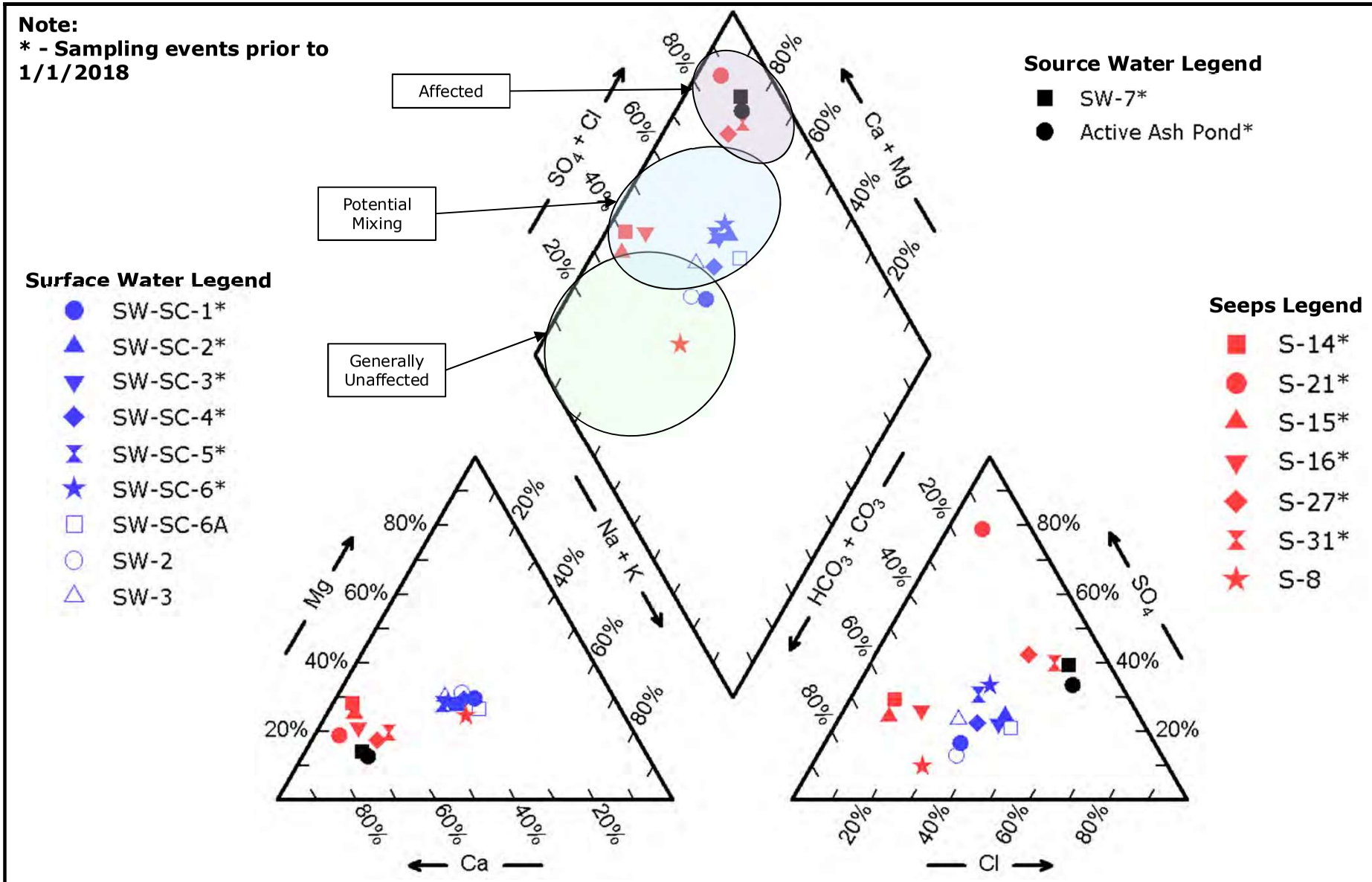

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FIGURE 6-29a
SEEP AND SURFACE WATER QUALITY PIPER DIAGRAMS – SUCK CREEK ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Note:
*** - Sampling events prior to 1/1/2018**

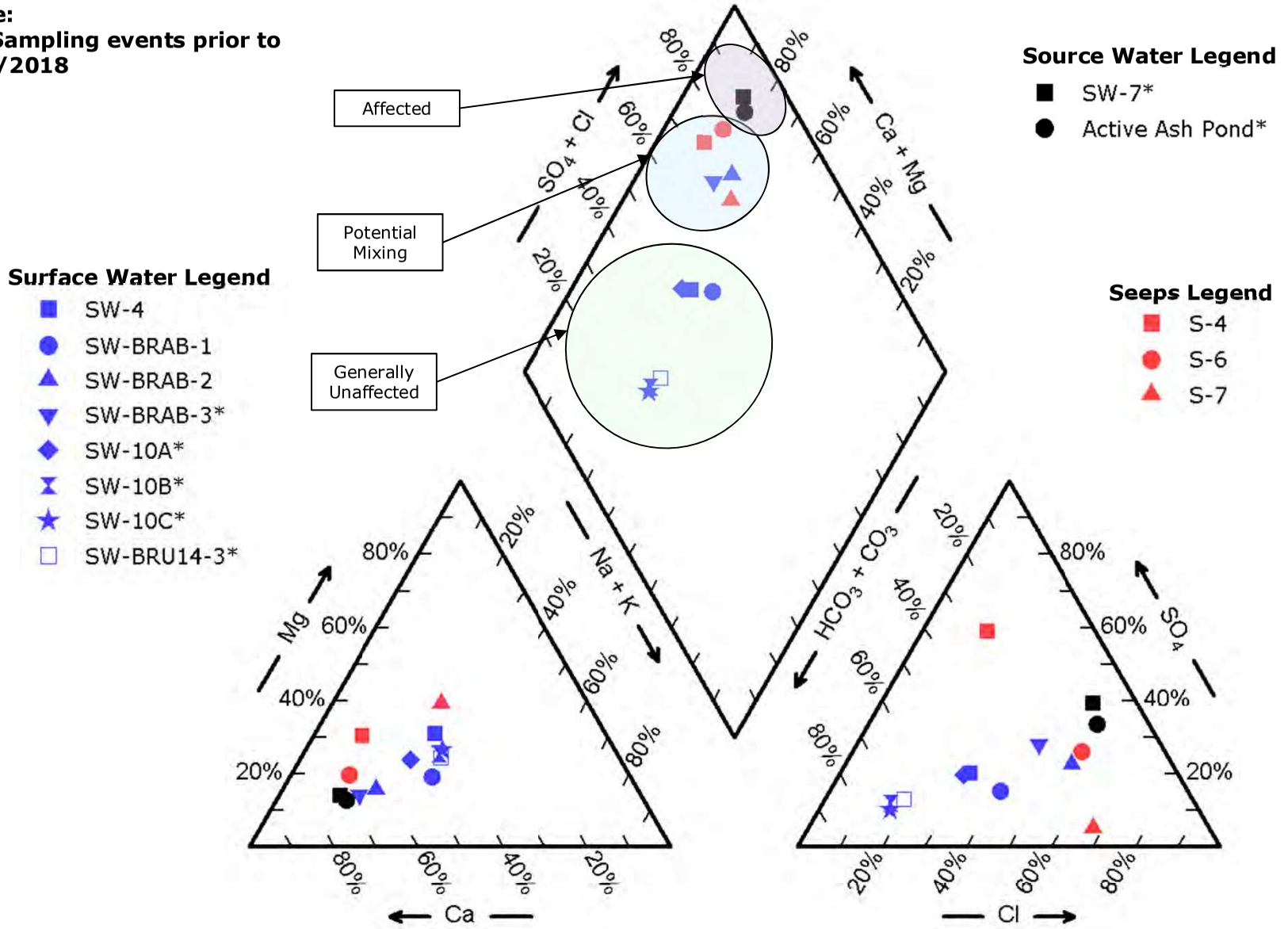

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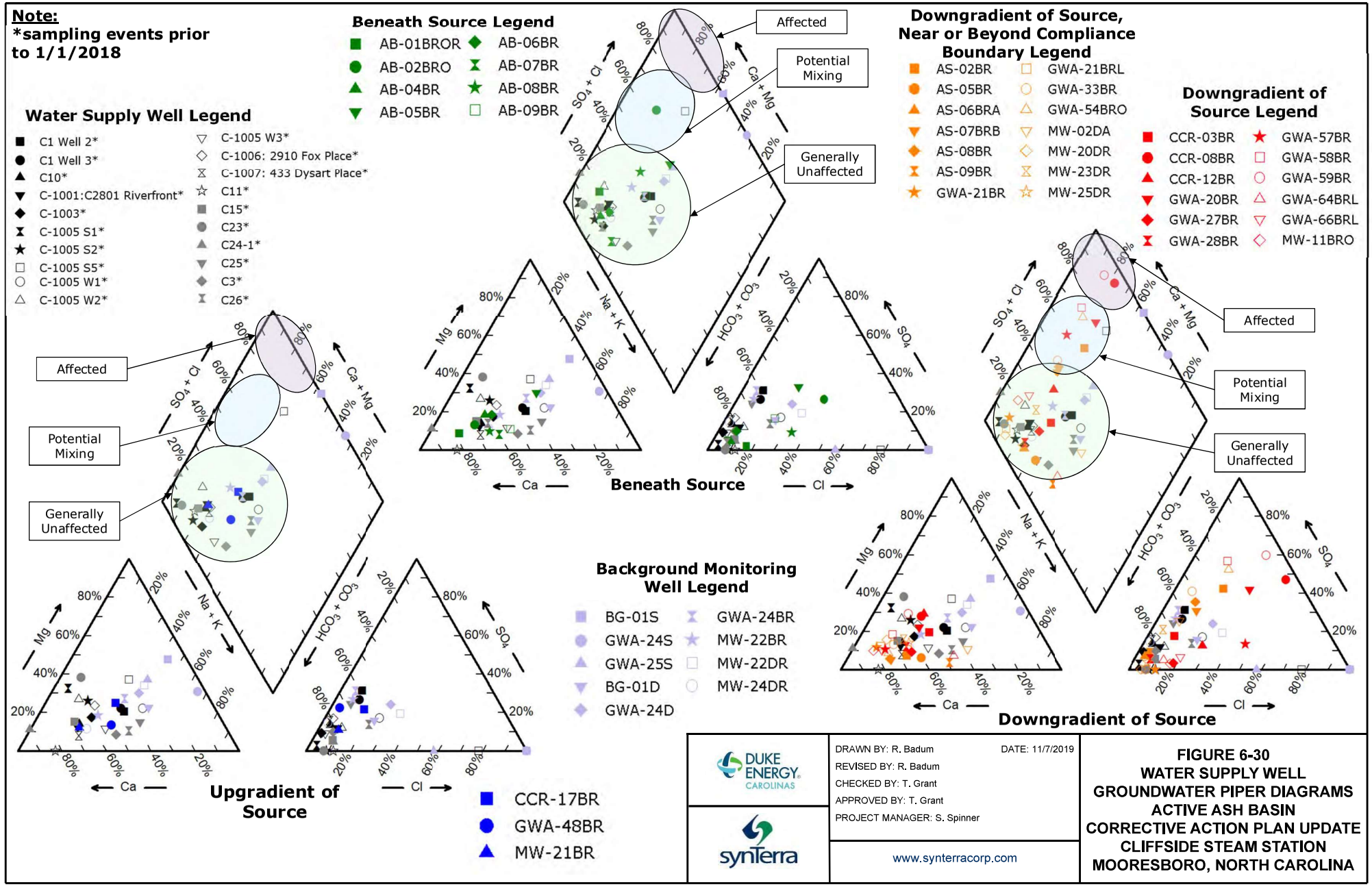
FIGURE 6-29b
SEEP AND SURFACE WATER QUALITY PIPER DIAGRAMS – BROAD RIVER ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


Note:
*sampling events prior to 1/1/2018
Water Supply Well Legend
C1 Well 2*
C1 Well 3*
C10*
C-1001:C2801 Riverfront*
C-1003*
C-1005 S1*
C-1005 S2*
C-1005 S5*
C-1005 W1*
C-1005 W2*
C-1005 W3*
C-1006: 2910 Fox Place*
C-1007: 433 Dysart Place*
C11*
C15*
C23*
C24-1*
C25*
C3*
C26*
Beneath Source Legend
AB-01BROR
AB-02BRO
AB-04BR
AB-05BR
AB-06BR
AB-07BR
AB-08BR
AB-09BR
Affected
Potential Mixing
Generally Unaffected
Downgradient of Source, Near or Beyond Compliance Boundary Legend
AS-02BR
AS-05BR
AS-06BRA
AS-07BRB
AS-08BR
AS-09BR
GWA-21BR
GWA-21BRL
GWA-33BR
GWA-54BRO
MW-02DA
MW-20DR
MW-23DR
MW-25DR
Downgradient of Source Legend
CCR-03BR
CCR-08BR
CCR-12BR
GWA-20BR
GWA-27BR
GWA-28BR
GWA-57BR
GWA-58BR
GWA-59BR
GWA-64BRL
GWA-66BRL
MW-11BRO
Affected
Potential Mixing
Generally Unaffected
Beneath Source
Upgradient of Source
Downgradient of Source
Background Monitoring Well Legend
BG-01S
GWA-24S
GWA-25S
BG-01D
GWA-24D
GWA-24BR
MW-22BR
MW-22DR
MW-24DR
CCR-17BR
GWA-48BR
MW-21BR
Ca
Mg
Na + K
Cl
SO4
SO4 + Cl
Ca + Mg
HCO3 + CO3
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DATE: 11/7/2019
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FIGURE 6-30
WATER SUPPLY WELL
GROUNDWATER PIPER DIAGRAMS
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Figure 6-31

Pourbaix Diagram for Iron-Water System

Included in Section 6 text

Figure 6-32a

Remedial Alternative 2 – System Layout – Groundwater Remediation by Extraction combined with Clean Water Infiltration and Treatment

Provided in separate electronic figure file as a large sheet size

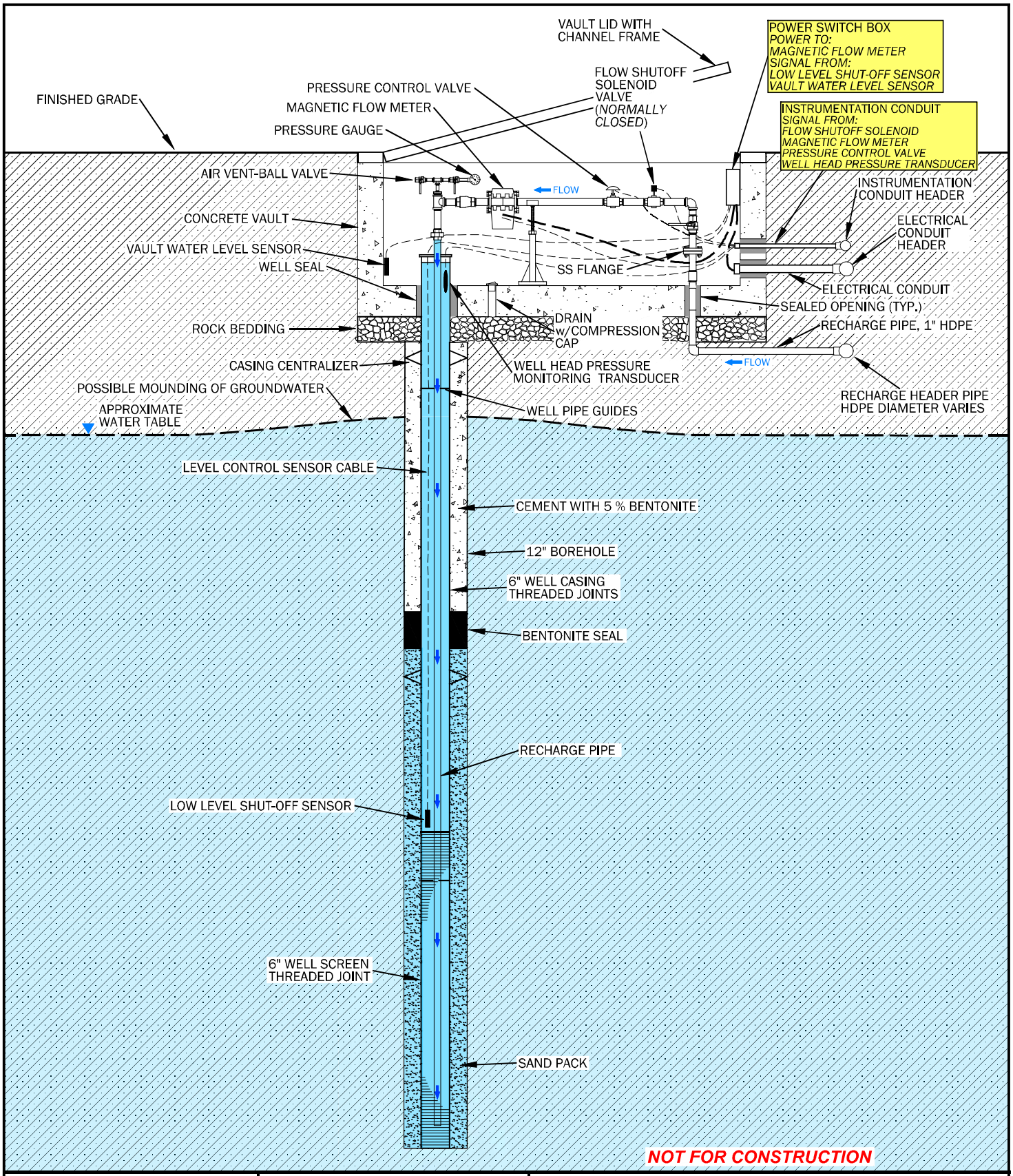

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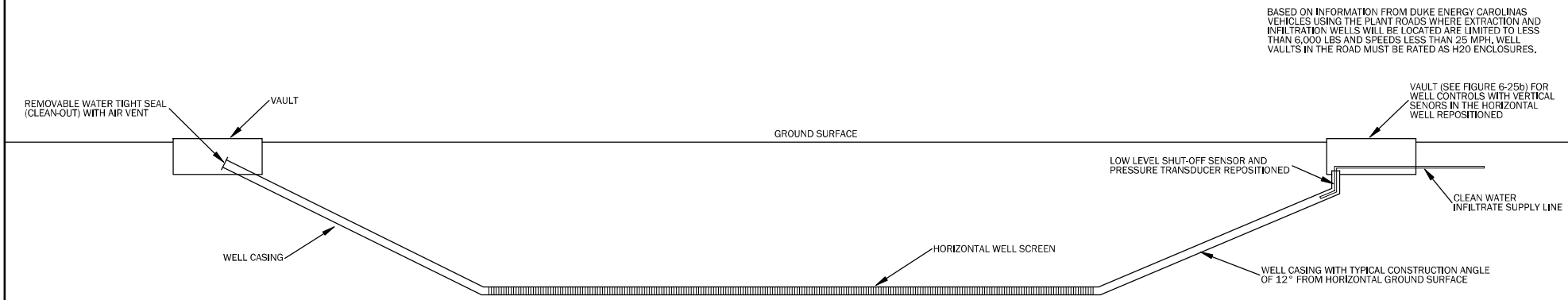
FIGURE 6-32b
REMEDIAL ALTERNATIVE 2
CONCEPTUAL VERTICAL CLEAN WATER INFILTRATION WELL SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION COMBINED WITH CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

BASED ON INFORMATION FROM DUKE ENERGY CAROLINAS VEHICLES USING THE PLANT ROADS WHERE EXTRACTION AND INFILTRATION WELLS WILL BE LOCATED ARE LIMITED TO LESS THAN 6,000 LBS AND SPEEDS LESS THAN 25 MPH. WELL VAULTS IN THE ROAD MUST BE RATED AS H20 ENCLOSURES.



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NOT FOR CONSTRUCTION

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PROJECT MANAGER: C. SUTTELL	

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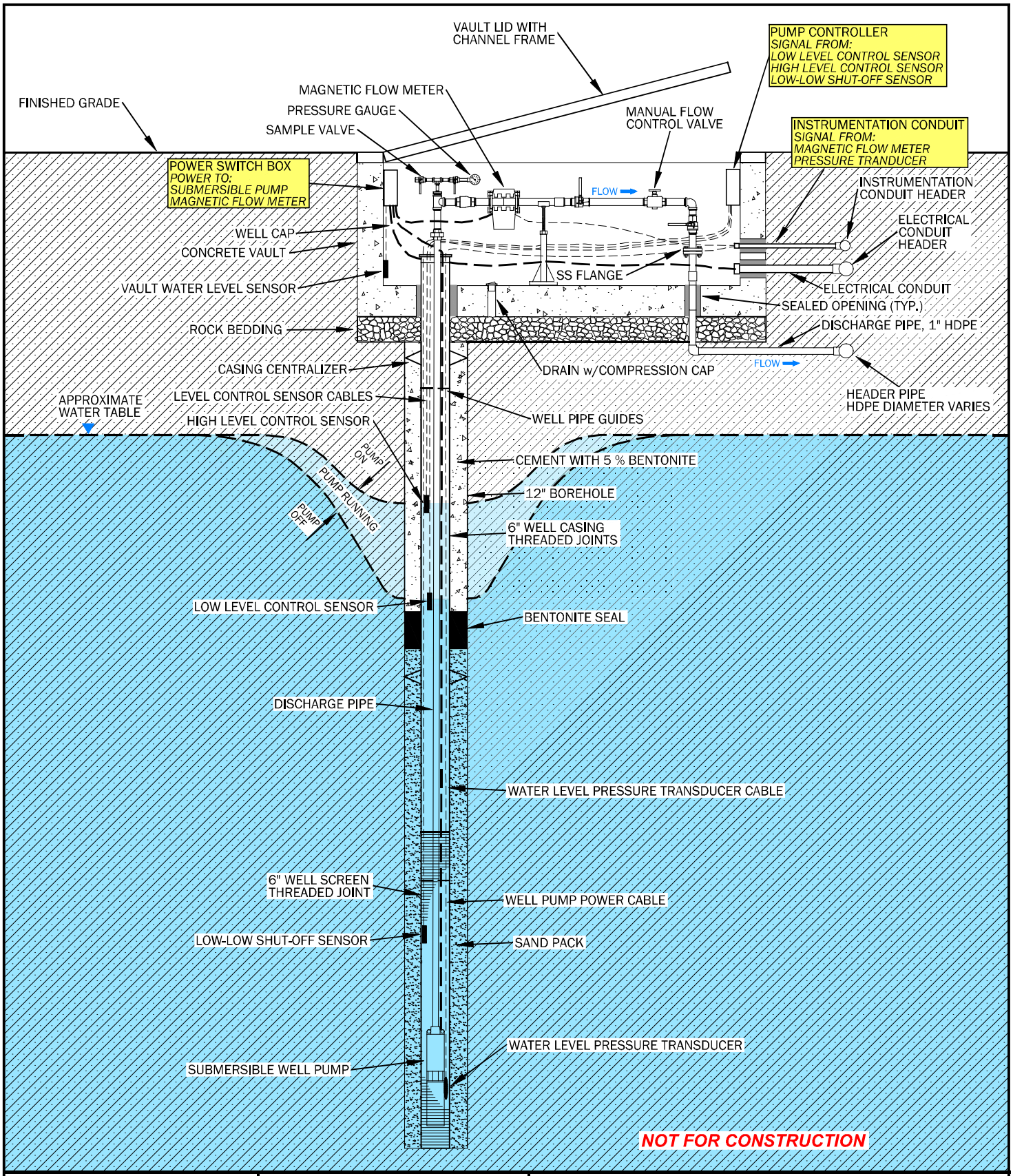
FIGURE 6-32c
REMEDIAL ALTERNATIVE 2
CONCEPTUAL HORIZONTAL CLEAN WATER INFILTRATION WELL SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION COMBINED WITH CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



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NOT TO SCALE

DRAWN BY: J. CHASTAIN DATE: 12/21/2019
REVISED BY: DATE: -
CHECKED BY: J. CLEMMER DATE: 12/21/2019
APPROVED BY: J. CLEMMER DATE: 12/21/2019
PROJECT MANAGER: S. SPINNER

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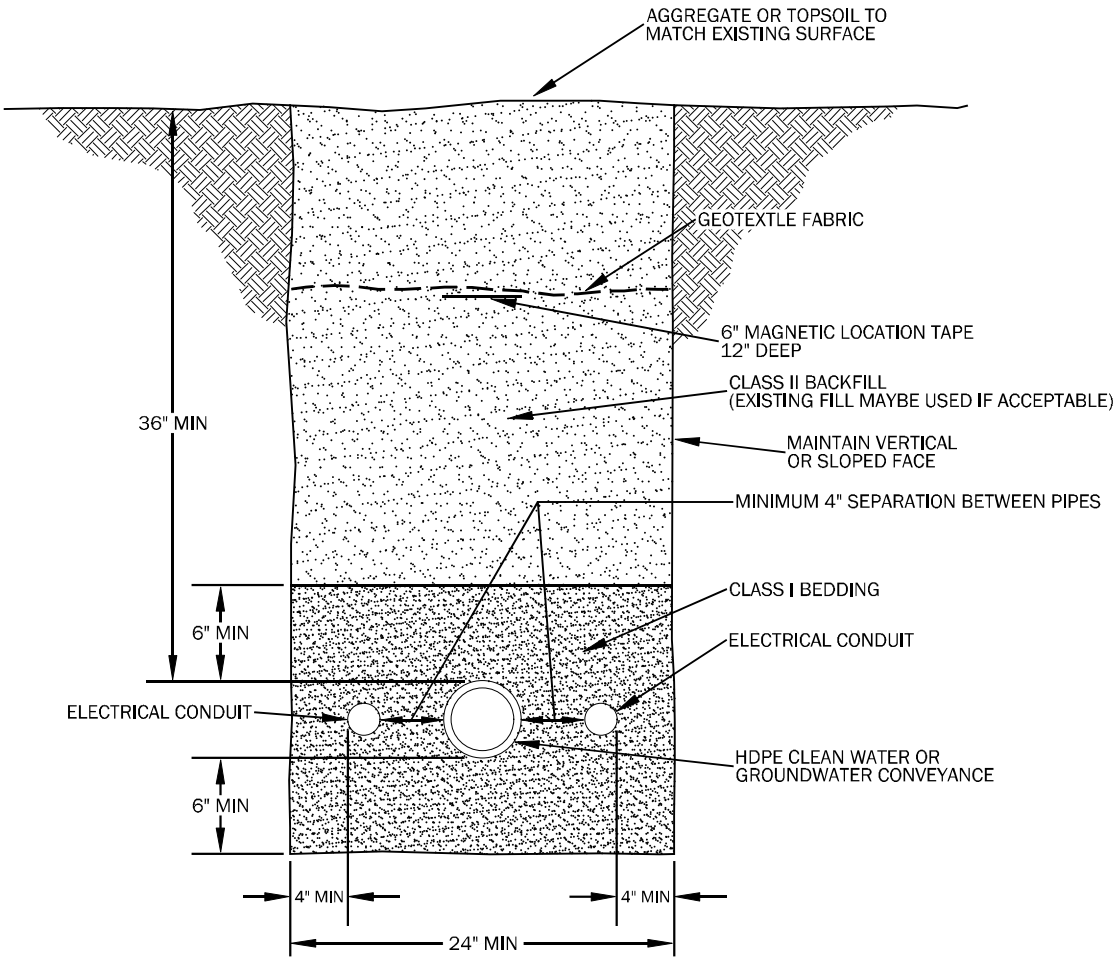
FIGURE 6-32d
REMEDIAL ALTERNATIVE 2
CONCEPTUAL VERTICAL EXTRACTION WELL SCHEMATIC
GROUNDWATER REMEDIATION BY EXTRACTION COMBINED WITH CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



NOTES:

1. 4" MINIMAL HORIZONTAL SEPARATION BETWEEN ALL PIPE AND CONDUIT.
2. 6" VERTICAL SEPARATION WHEN CROSSING OVER ALL PIPE AND CONDUIT.
3. 36" MINIMUM COVER FOR ALL PIPE AND CONDUIT.
4. PLACE BACKFILL AND FILL SOIL MATERIALS IN LAYERS NOT MORE THAN 8" IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HEAVY COMPACTION EQUIPMENT AND NOT MORE THAN 4 INCHES LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND OPERATED TAMPERS.
5. PLACE BACKFILL AND FILL MATERIALS EVENLY ON ALL SIDES OF STRUCTURES TO REQUIRED ELEVATIONS AND UNIFORMLY ALONG THE FULL LENGTH OF EACH STRUCTURE.
6. COMPACT SOIL MATERIALS TO NOT LESS THAN 95 PERCENT OF MAXIMUM DRY UNIT WEIGHT ACCORDING TO ASTM D 698.

NOT FOR CONSTRUCTION

DUKE ENERGY CAROLINAS

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CHECKED BY: J. CLEMMER DATE: 12/26/2019
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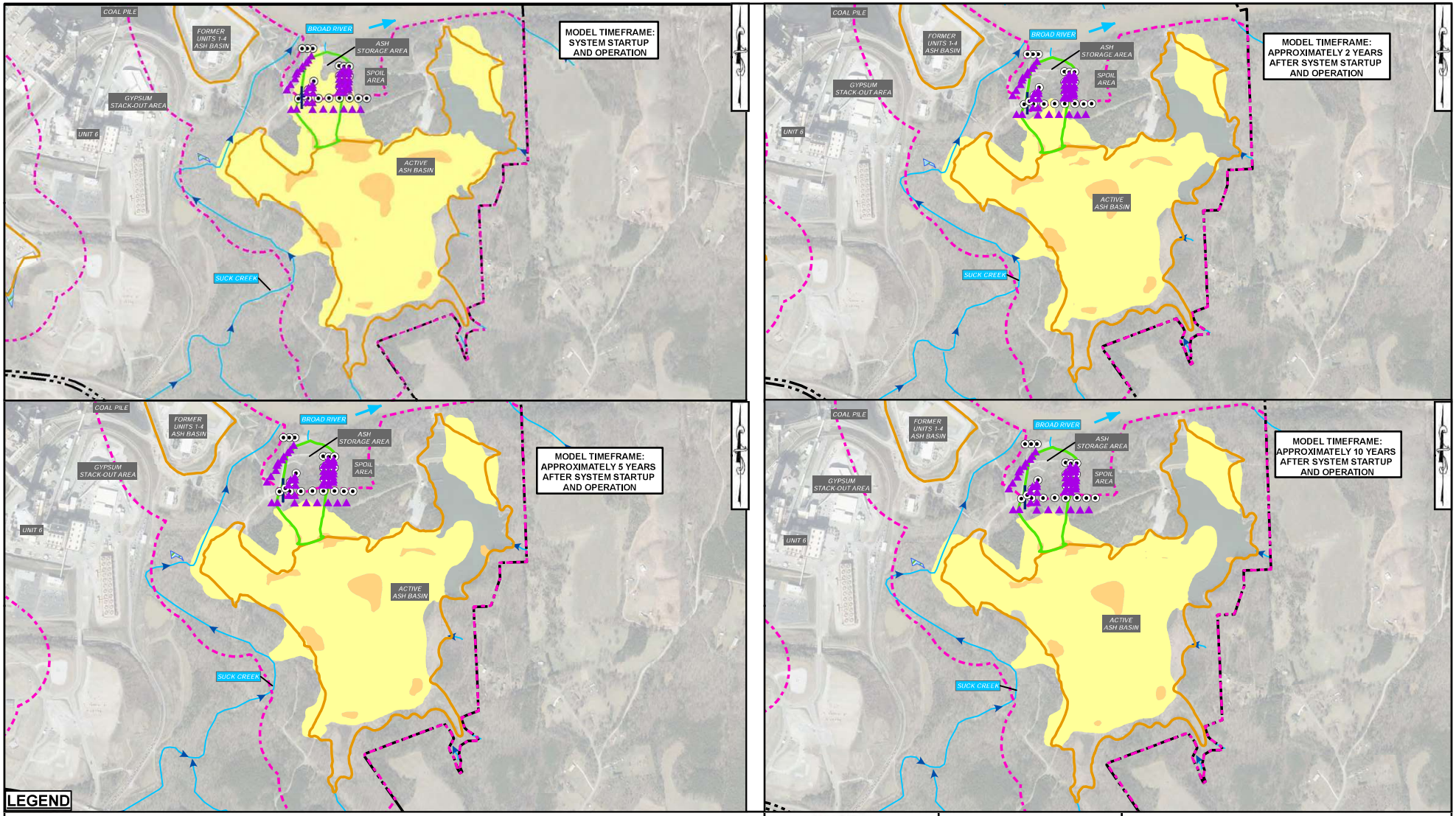
FIGURE 6-32e
REMEDIAL ALTERNATIVE 2
CONCEPTUAL PIPELINE TRENCH DETAIL
REMEDIATION BY EXTRACTION COMBINED WITH CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- PROPOSED EXTRACTION WELL
- PROPOSED CLEAN WATER INFILTRATION WELL
- BORON PLUME GREATER THAN THE USEPA DRINKING WATER EQUIVALENT LEVEL (400ug/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- BORON PLUME GREATER THAN NC 02L STANDARD (700 ug/L) FROM MEAN ANALYSIS, FLOW AND TRANSPORT MODEL PREDICTED PLUME IS USED TO REFINE DEPICTED BORON EXTENT
- PROPOSED CLEAN WATER HORIZONTAL INFILTRATION WELL
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)

NOTES:

1. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
2. NRTR - NATURAL RESOURCES TECHNICAL REPORT
3. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
4. ALL BOUNDARIES ARE APPROXIMATE.
5. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2015.
6. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
800 300 0 800 1,200
(IN FEET)

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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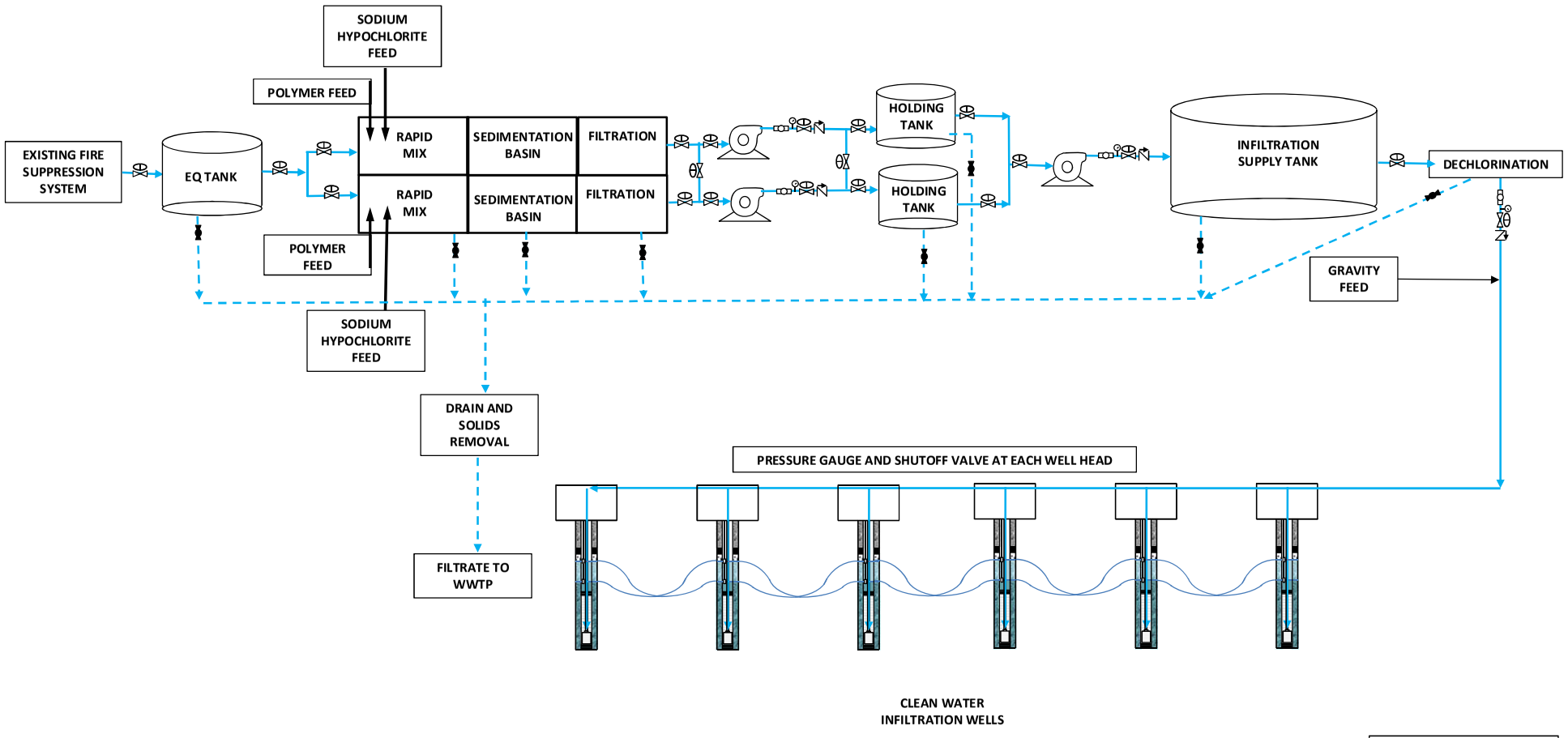
FIGURE 6-32f
REMEDIAL ALTERNATIVE 2 - SIMULATED BORON CONCENTRATION IN ALL FLOW ZONES - GROUNDWATER REMEDIATION BY EXTRACTION COMBINED WITH CLEAN WATER INFILTRATION AND TREATMENT
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



Not to Scale

LEGEND

HH - High high
H - High low
L – Low
TYP - Typical

- Flow totalizer
- Pressure gauge
- SP Sampling port
- Check valve
- Three-way valve
- Ball valve, normally closed
- Rotameter
- Ball valve, normally open
- Diaphragm valve, normally open
- Diaphragm valve, normally closed

DUKE ENERGY CAROLINAS

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REVISED BY: B. GREEN
CHECKED BY: T. GRANT
APPROVED BY: J. CLEMMER
PROJECT MANAGER: S. SPINNER

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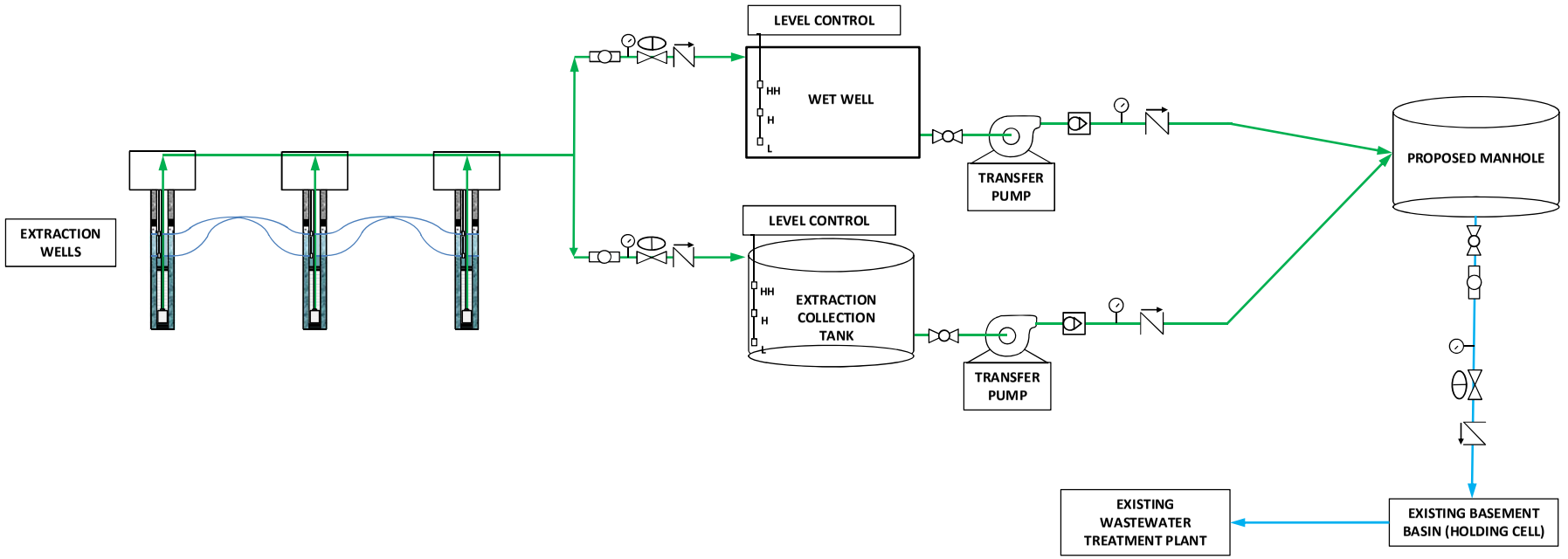
FIGURE 6-33
CONCEPTUAL PROCESS FLOW DIAGRAM
GROUNDWATER CLEAN WATER
INFILTRATION SYSTEM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



Not to Scale

LEGEND

HH - High high
H - High low
L – Low
TYP - Typical

- Flow totalizer
- Pressure gauge
- SP Sampling port
- Check valve
- Three-way valve
- Ball valve, normally closed
- Rotameter
- Ball valve, normally open
- Diaphragm valve, normally open
- Diaphragm valve, normally closed

DUKE ENERGY CAROLINAS

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REVISED BY: B. GREEN
CHECKED BY: T. GRANT
APPROVED BY: J. CLEMMER
PROJECT MANAGER: S. SPINNER

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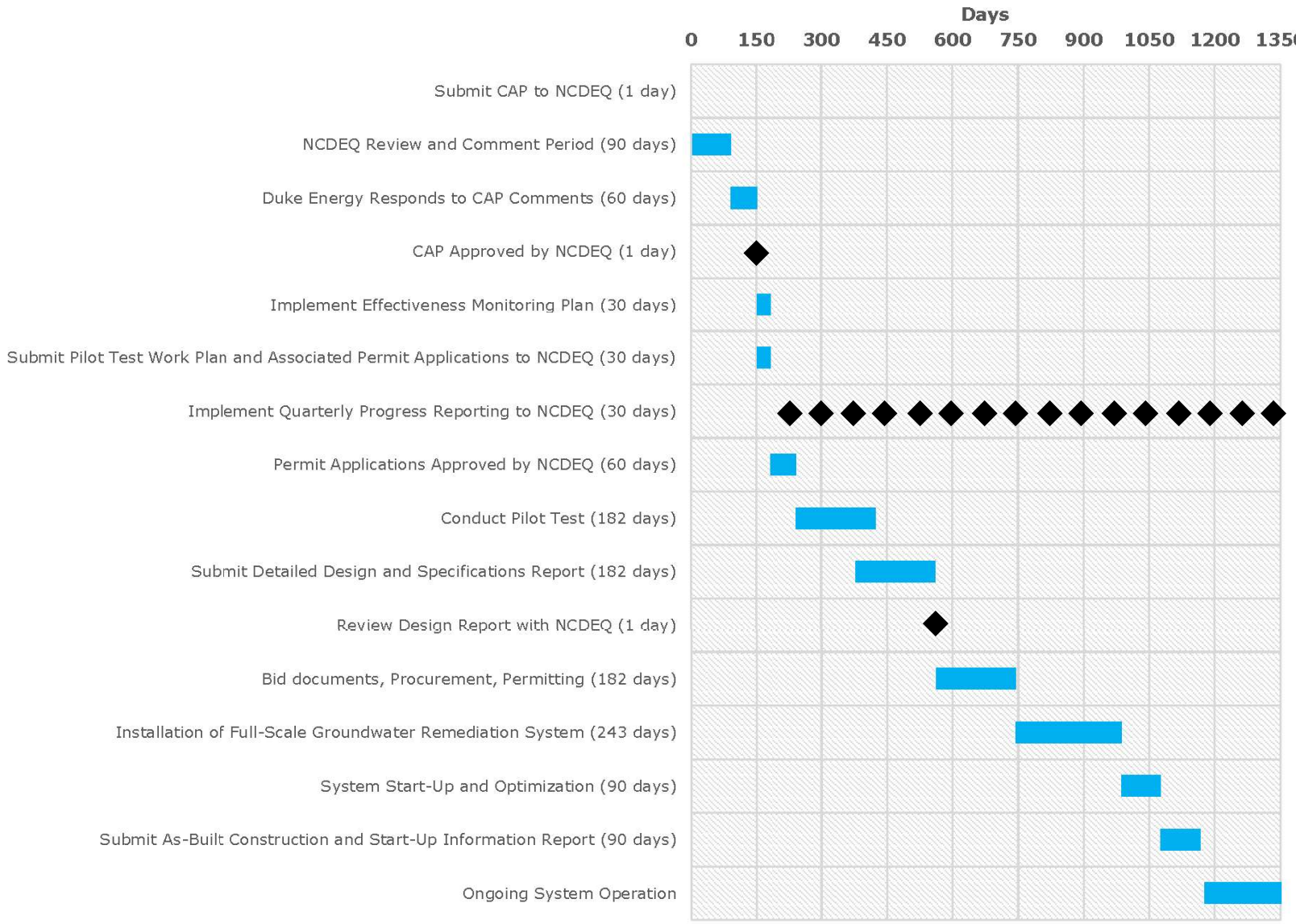
FIGURE 6-34
CONCEPTUAL PROCESS FLOW DIAGRAM
GROUNDWATER EXTRACTON AND TREATMENT SYSTEM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STREAM STATION
MOORESBORO, NORTH CAROLINA



Notes:

* - Either submittal of the Effectiveness Monitoring Plan or the pilot test work plan and permit applications (as applicable) will fulfill section G.S.130A-309.209.(b)(3).

** - Actual time may vary due to a variety of factors including agency review and approvals, weather delays, equipment availability, etc.

DUKE ENERGY CAROLINAS

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REVISED BY:
CHECKED BY: S. WOOD
APPROVED BY: T. GRANT
PROJECT MANAGER: S. SPINNER

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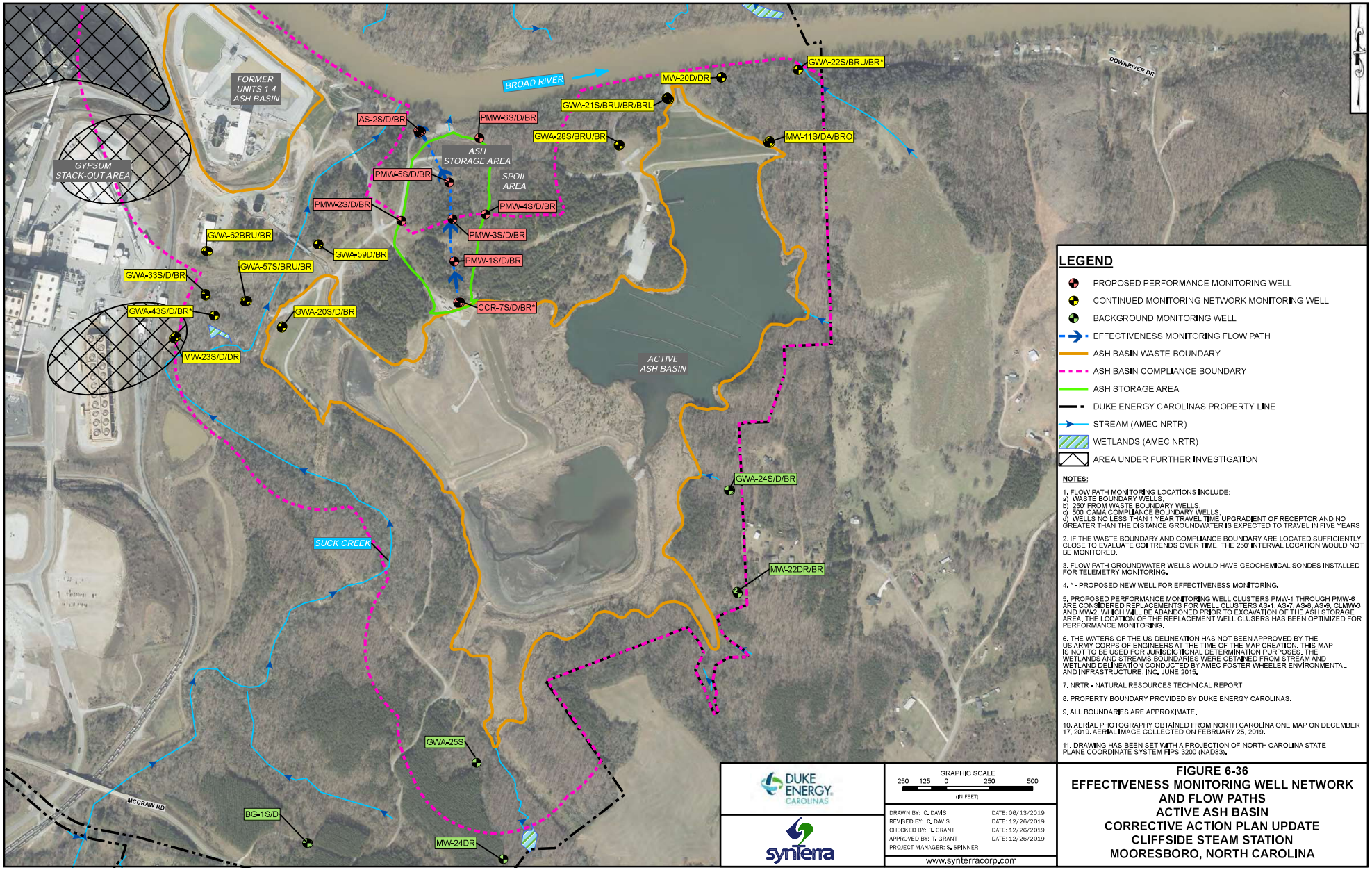
FIGURE 6-35
CAP IMPLEMENTATION GANTT CHART
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


FORMER UNITS 1-4 ASH BASIN
GYPSUM STACK-OUT AREA
BROAD RIVER
ASH STORAGE AREA
SPOIL AREA
ACTIVE ASH BASIN
SUCK CREEK
MCCRAW RD
DOWNRIVER DR
AS-2S/D/BR
PMW-6S/D/BR
GWA-21S/BRU/BR/BRL
GWA-22S/BRU/BR*
MW-20D/DR
GWA-28S/BRU/BR
MW-11S/DA/BRO
PMW-5S/D/BR
PMW-2S/D/BR
PMW-4S/D/BR
PMW-3S/D/BR
PMW-1S/D/BR
CCR-7S/D/BR*
GWA-62BRU/BR
GWA-59D/BR
GWA-57S/BRU/BR
GWA-33S/D/BR
GWA-43S/D/BR*
GWA-20S/D/BR
MW-23S/D/DR
GWA-24S/D/BR
MW-22DR/BR
GWA-25S
BG-1S/D
MW-24DR
LEGEND
PROPOSED PERFORMANCE MONITORING WELL
CONTINUED MONITORING NETWORK MONITORING WELL
BACKGROUND MONITORING WELL
EFFECTIVENESS MONITORING FLOW PATH
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA
DUKE ENERGY CAROLINAS PROPERTY LINE
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. FLOW PATH MONITORING LOCATIONS INCLUDE:
a) WASTE BOUNDARY WELLS.
b) 250' FROM WASTE BOUNDARY WELLS.
c) 500' CAMA COMPLIANCE BOUNDARY WELLS.
d) WELLS NO LESS THAN 1 YEAR TRAVEL TIME UPGRADIENT OF RECEPTOR AND NO GREATER THAN THE DISTANCE GROUNDWATER IS EXPECTED TO TRAVEL IN FIVE YEARS
2. IF THE WASTE BOUNDARY AND COMPLIANCE BOUNDARY ARE LOCATED SUFFICIENTLY CLOSE TO EVALUATE COI TRENDS OVER TIME, THE 250' INTERVAL LOCATION WOULD NOT BE MONITORED.
3. FLOW PATH GROUNDWATER WELLS WOULD HAVE GEOCHEMICAL SONDES INSTALLED FOR TELEMETRY MONITORING.
4. * - PROPOSED NEW WELL FOR EFFECTIVENESS MONITORING.
5. PROPOSED PERFORMANCE MONITORING WELL CLUSTERS PMW-1 THROUGH PMW-6 ARE CONSIDERED REPLACEMENTS FOR WELL CLUSTERS AS-1, AS-7, AS-8, AS-9, CLMW-3 AND MW-2, WHICH WILL BE ABANDONED PRIOR TO EXCAVATION OF THE ASH STORAGE AREA. THE LOCATION OF THE REPLACEMENT WELL CLUSERS HAS BEEN OPTIMIZED FOR PERFORMANCE MONITORING.
6. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
7. NRTR - NATURAL RESOURCES TECHNICAL REPORT
8. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
9. ALL BOUNDARIES ARE APPROXIMATE.
10. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. AERIAL IMAGE COLLECTED ON FEBRUARY 25, 2019.
11. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE COORDINATE SYSTEM FIPS 3200 (NAD83).
DUKE ENERGY CAROLINAS
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GRAPHIC SCALE
250 125 0 250 500
(IN FEET)
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/26/2019
CHECKED BY: T. GRANT DATE: 12/26/2019
APPROVED BY: T. GRANT DATE: 12/26/2019
PROJECT MANAGER: S. SPINNER
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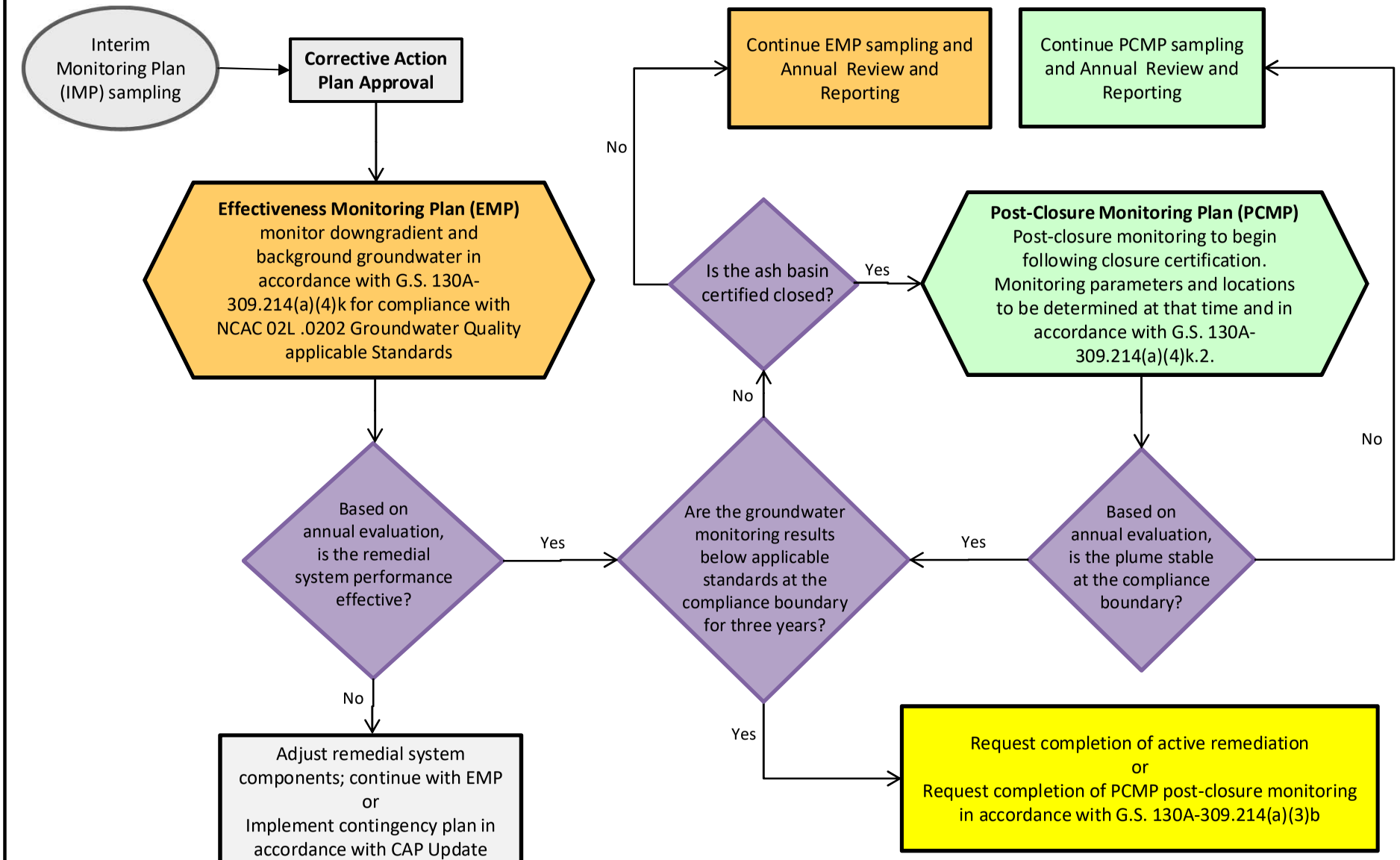
FIGURE 6-36
EFFECTIVENESS MONITORING WELL NETWORK AND FLOW PATHS
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



Notes:

NCAC - North Carolina Administrative Code

02L - NCAC Title 15A, Subchapter 02L. Groundwater Classification and Standards

DUKE ENERGY PROGRESS

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REVISED BY: J. WYLIE & K SHECK	DATE: 12/16/2019
CHECKED BY: T. GRANT	DATE: 12/16/2019
APPROVED BY: S. SPINNER	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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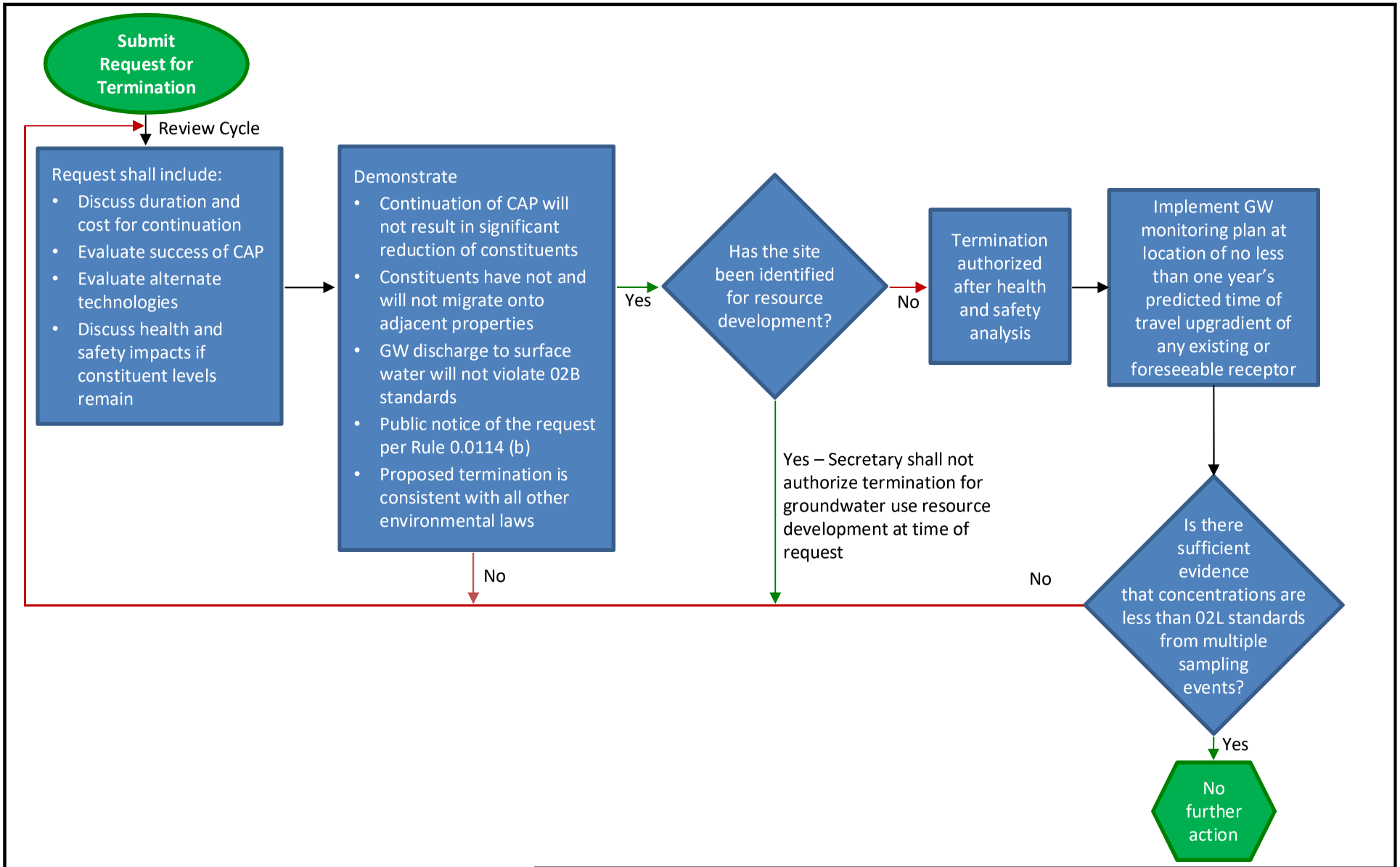
FIGURE 6-37
EFFECTIVENESS MONITORING PLAN WORK FLOW AND OPTIMIZATION FLOW DIAGRAM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



DUKE ENERGY CAROLINAS

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DRAWN BY: K. SHECK DATE: 07/12/2019
REVISED BY: A. ALBERT DATE: 07/12/2019
CHECKED BY: T. PLATING DATE: 07/12/2019
APPROVED BY: T. GRANT DATE: 12/05/2019
PROJECT MANAGER: S. SPINNER

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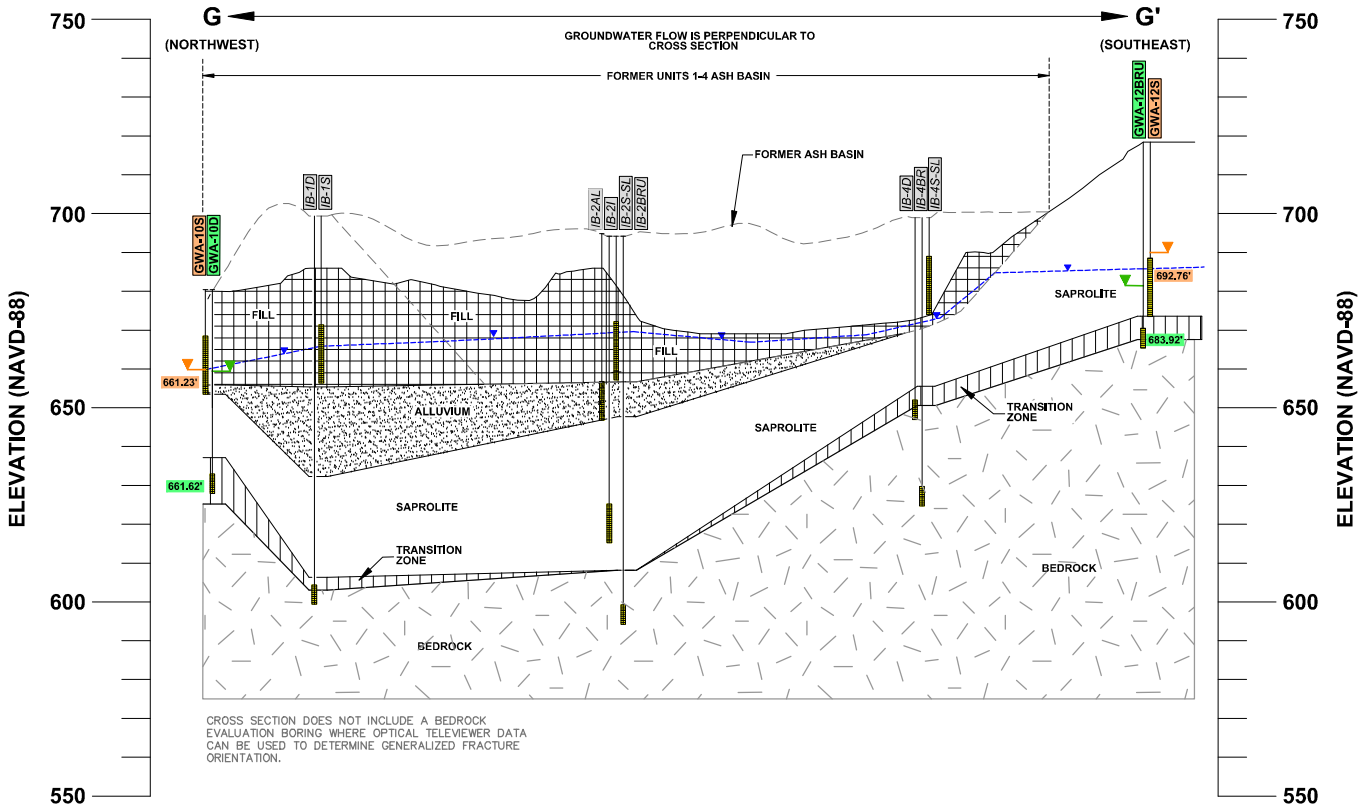
FIGURE 6-38
TERMINATION OF GROUNDWATER REMEDIATION FLOW DIAGRAM
ACTIVE ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Source Area 2
(Former Units 1-4 Ash Basin)

Figure 6-39

Fly Ash and Bottom Ash Interbedded Depiction

Included in Section 6 text



CROSS SECTION LOCATION

LEGEND

- GWA-10S — WELL IN SHALLOW FLOW LAYER
- GWA-10D — WELL IN DEEP FLOW LAYER
- IB-1D — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED GROUNDWATER FLOW DIRECTION
- ASH
- ASH PORE WATER
- FILL
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- ALLUVIUM
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- 661.62' — WATER LEVEL ELEVATION (NAVD 88) (LABEL COLORING BY FLOW ZONE)
- WELL SCREEN
- COMPLIANCE BOUNDARY

NOTES

1. DEPTH TO WATER GAUGED IN MONITORING WELLS ON APRIL 22, 2019.
2. NM - NOT MEASURED DURING 24-HOUR WATER LEVEL EVENT.
3. ALL VERTICAL ELEVATIONS ARE MEASURED IN FEET, NORTH AMERICA VERTICAL DATUM (NAVD) OF 1988.

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0 40 80 160

HORIZONTAL SCALE: 1" = 160'
VERTICAL SCALE: 1" = 32'
5X VERTICAL EXAGGERATION

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REVISED BY: D. KREFSKI	DATE: 10/30/2019
CHECKED BY: T. GRANT	DATE: 10/30/2019
APPROVED BY: S. SPINNER	DATE: 10/30/2019
PROJECT MANAGER: S. SPINNER	

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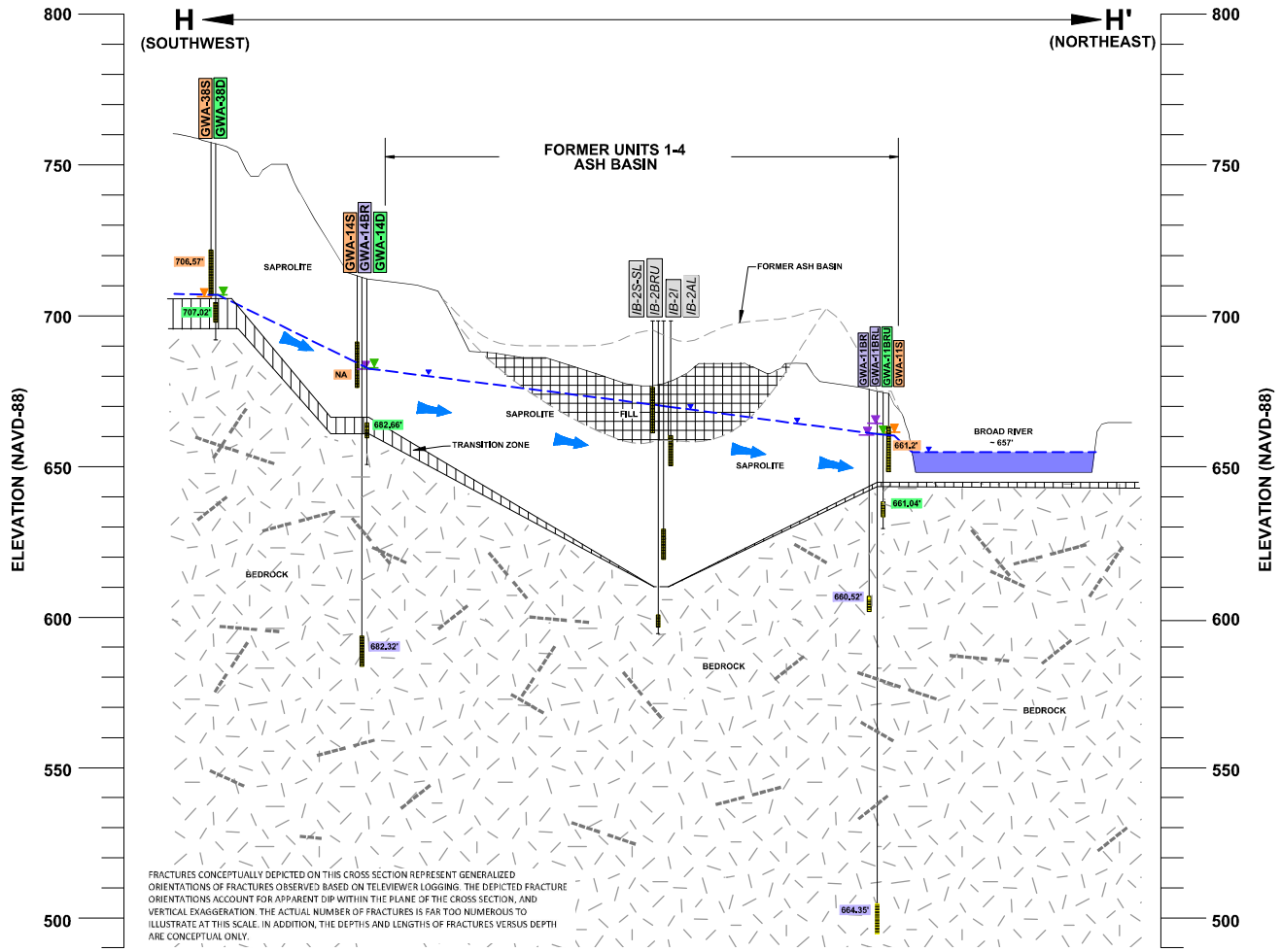
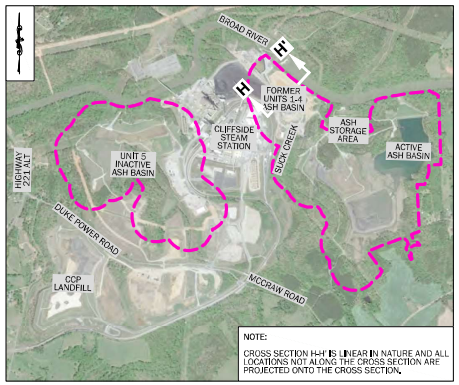
FIGURE 6-40
GENERAL CROSS SECTION G-G'
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA





CROSS SECTION LOCATION

LEGEND

- GWA-14S — WELL IN SHALLOW LAYER
- GWA-14D — WELL IN DEEP LAYER
- GWA-14BR — WELL IN BEDROCK LAYER
- IB-2AL — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED BEDROCK FRACTURE ORIENTATION
- GENERALIZED GROUNDWATER FLOW DIRECTION
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- FILL
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER ELEVATION
- 707.02' — WATER LEVEL ELEVATION (NAVD 88) (LABEL COLORING BY FLOW ZONE)
- WELL SCREEN
- COMPLIANCE BOUNDARY
- NA — NOT AVAILABLE OR NOT MEASURED

NOTES

1. DEPTH TO WATER GAUGED IN MONITORING WELLS ON APRIL 22, 2019.
2. NM - NOT MEASURED DURING 24-HOUR WATER LEVEL EVENT.
3. ALL VERTICAL ELEVATIONS ARE MEASURED IN FEET, NORTH AMERICA VERTICAL DATUM (NAVD) OF 1988.
4. DATA POSTED FROM IB-2 WELLS IS HISTORIC DATA COLLECTED BEFORE WELLS WERE ABANDONED DURING BASIN CLOSURE.

DUKE ENERGY CAROLINAS

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0 50 100 200
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'
5X VERTICAL EXAGGERATION

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REVISED BY: D.KREFSKI	DATE: 10/29/2019
CHECKED BY: T. GRANT	DATE: 10/29/2019
APPROVED BY: S. SPINNER	DATE: 10/29/2019
PROJECT MANAGER: S. SPINNER	

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FIGURE 6-41
GENERAL CROSS SECTION H-H'
FORMER UNITS 1 - 4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

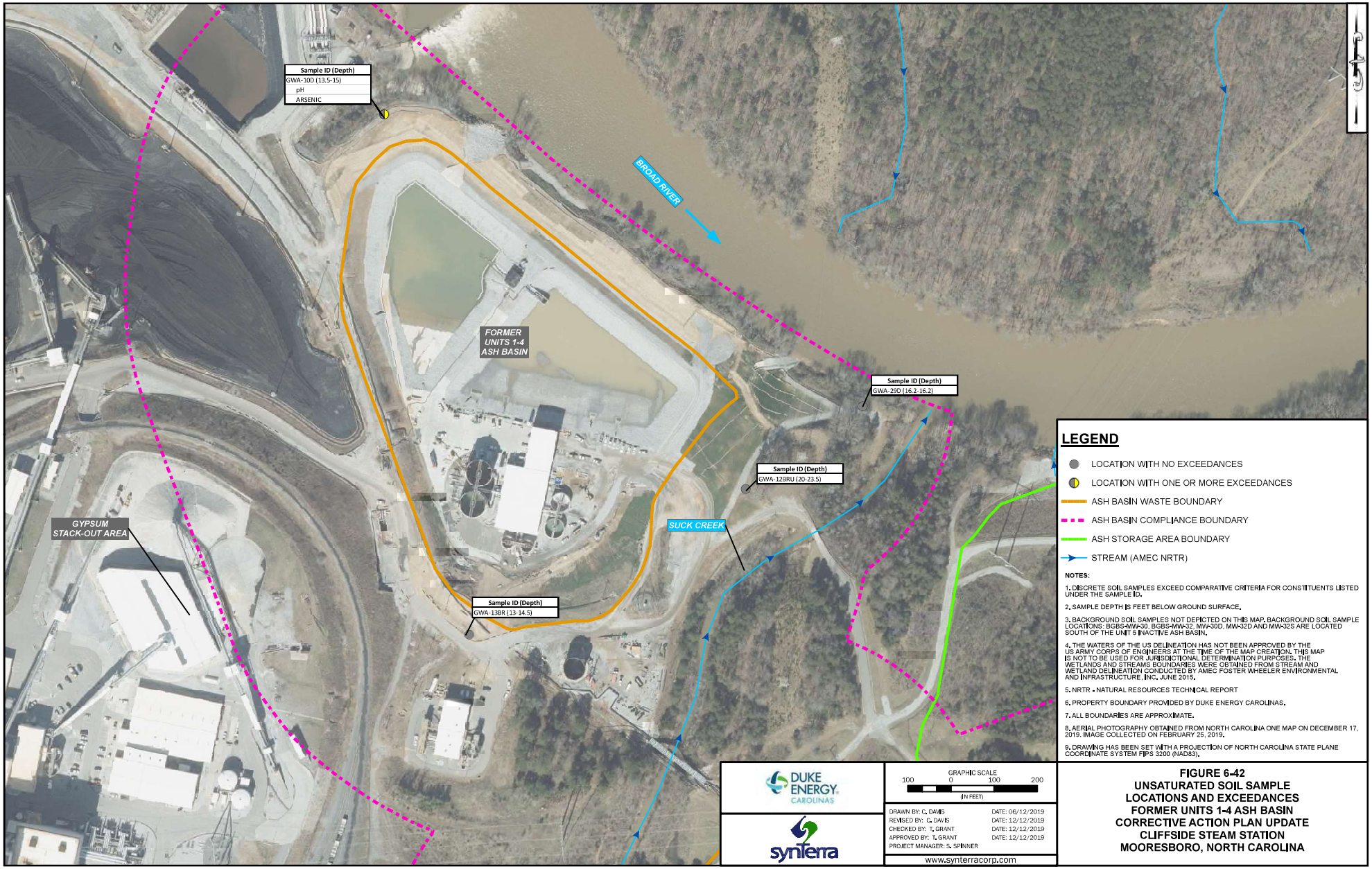
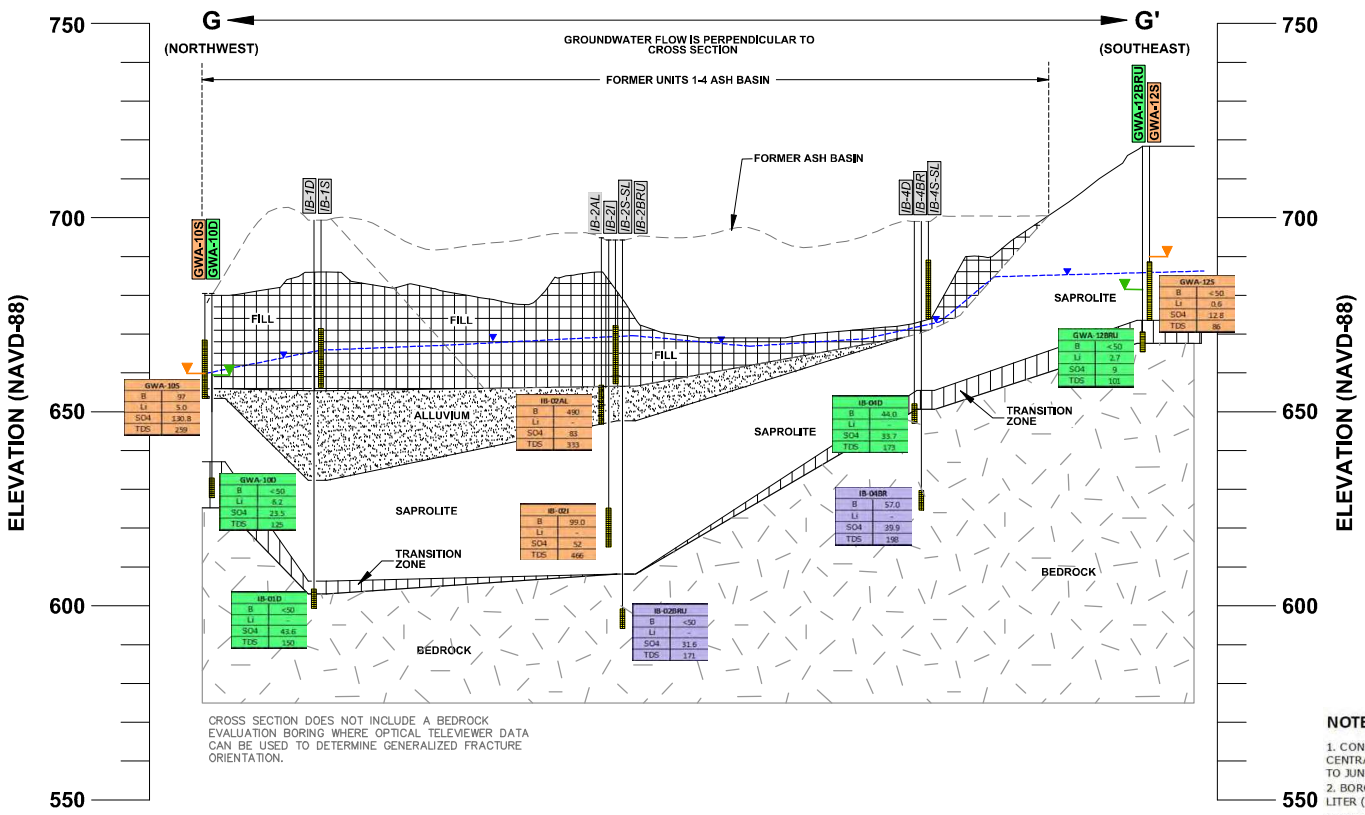


FIGURE 6-42
UNSATURATED SOIL SAMPLE LOCATIONS AND EXCEEDANCES
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



CROSS SECTION DOES NOT INCLUDE A BEDROCK EVALUATION BORING WHERE OPTICAL TELEVIEWER DATA CAN BE USED TO DETERMINE GENERALIZED FRACTURE ORIENTATION.

CROSS SECTION LOCATION

LEGEND

- GWA-10S — WELL IN SHALLOW FLOW LAYER
- GWA-10D — WELL IN DEEP FLOW LAYER
- IB-1D — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED GROUNDWATER FLOW DIRECTION
- ASH
- ASH PORE WATER
- FILL
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- ALLUVIUM
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- MEAN BORON (B) CONCENTRATION (µg/L)
  MEAN LITHIUM (Li) CONCENTRATION (µg/L)
  MEAN SULFATE (SO4) CONCENTRATION (mg/L)
  MEAN TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATION (mg/L)
- WELL SCREEN
- COMPLIANCE BOUNDARY

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCUALTED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. BORON (B) AND LITHIUM (Li) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)
3. SULFATE (SO4) AND TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L)

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	B	Li	SO4	TDS
REPORTING UNITS	µg/L	µg/L	mg/L	mg/L
15A NCAC 02L STANDARD	700	NE	250	500
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)[1]	50	3	4	57
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	50	12	15	107
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	50	11	17	120

[1] - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

NE - NOT ESTABLISHED

DUKE ENERGY CAROLINAS

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0 40 80 160

HORIZONTAL SCALE: 1" = 160'
VERTICAL SCALE: 1" = 32'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/30/2019
REVISED BY: D. KREFSKI	DATE: 10/30/2019
CHECKED BY: T. GRANT	DATE: 10/30/2019
APPROVED BY: S. SPINNER	DATE: 10/30/2019
PROJECT MANAGER: S. SPINNER	

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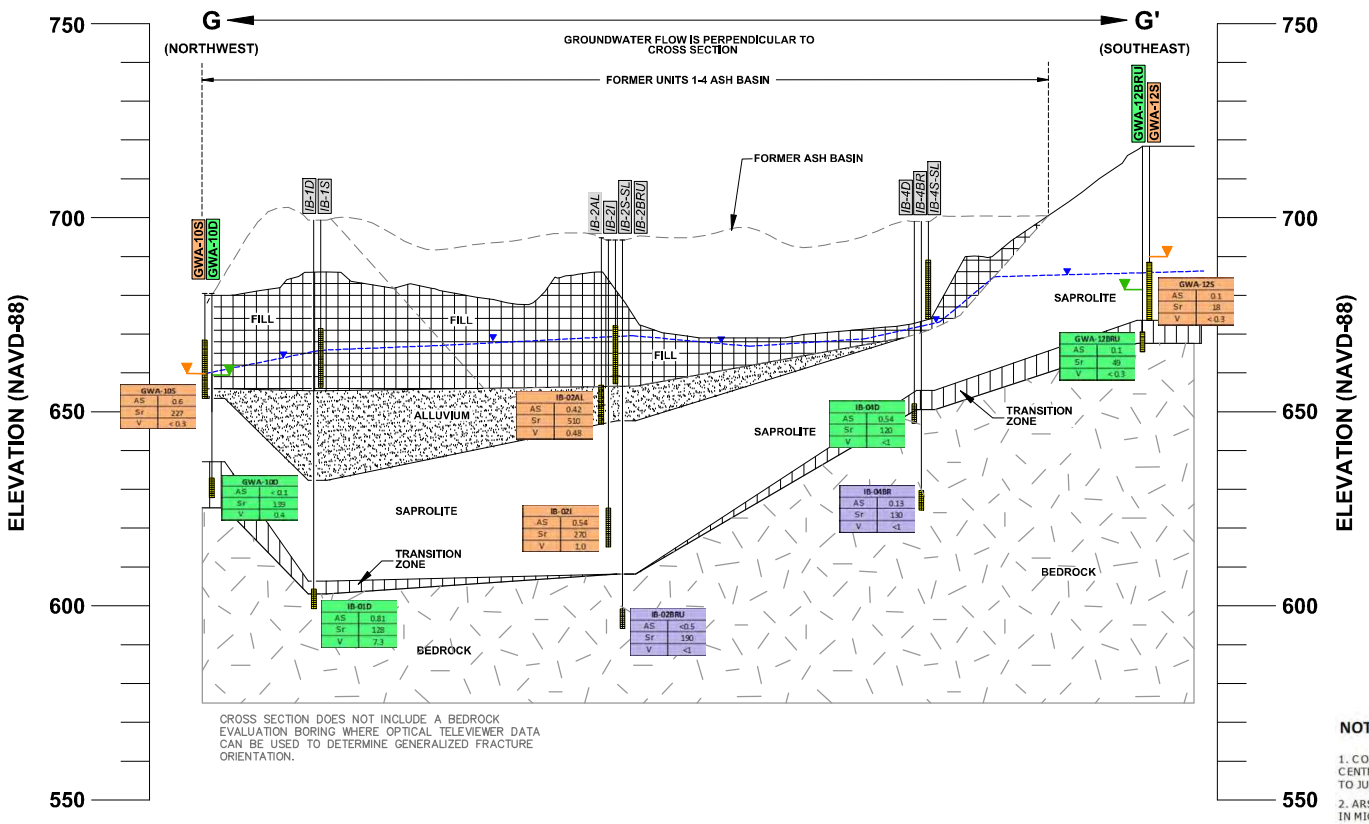
FIGURE 6-43a
GENERAL CROSS SECTION G-G'
CONSERVATIVE GROUP
MEAN OF BORON, LITHIUM, SULFATE AND TOTAL DISSOLVED SOLIDS (TDS)
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



CROSS SECTION LOCATION

LEGEND

- GWA-10S — WELL IN SHALLOW FLOW LAYER
- GWA-10D — WELL IN DEEP FLOW LAYER
- IB-1D — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED GROUNDWATER FLOW DIRECTION
- ASH
- ASH PORE WATER
- FILL
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- ALLUVIUM
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- MEAN ARSENIC (As) CONCENTRATION (µg/L)
  MEAN STRONTIUM (Sr) CONCENTRATION (µg/L)
  MEAN VANADIUM (V) CONCENTRATION (µg/L)
- WELL SCREEN
- COMPLIANCE BOUNDARY

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCUALTED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. ARSENIC (As), STRONTIUM (Sr), AND VANADIUM (V) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L).

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	As	Sr	V
REPORTING UNITS	µg/L	µg/L	µg/L
15A NCAC 02L STANDARD	10	NE	3*
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)[1]	0.2	34	1
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	2	69	11
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	1	93	1

* - IMAC OF THE 15A NCAC 02L STANDARD, APPENDIX 1, APRIL 1, 2013.

1 - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

DUKE ENERGY CAROLINAS

synterra

0 40 80 160
HORIZONTAL SCALE: 1" = 160'
VERTICAL SCALE: 1" = 32'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/30/2019
REVISED BY: D. KREFSKI	DATE: 10/30/2019
CHECKED BY: T. GRANT	DATE: 10/30/2019
APPROVED BY: S. SPINNER	DATE: 10/30/2019
PROJECT MANAGER: S. SPINNER	

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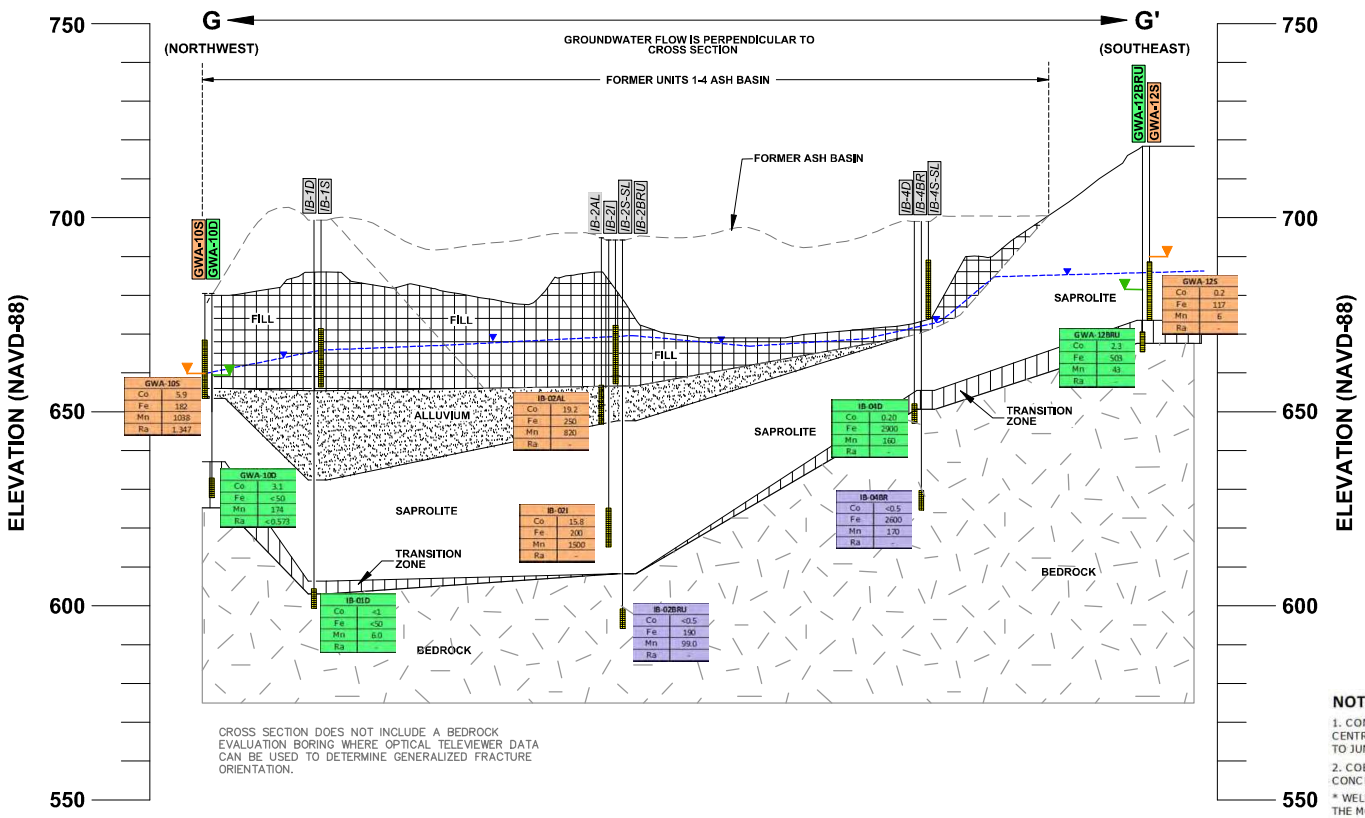
FIGURE 6-43b
GENERAL CROSS SECTION G-G'
NON - CONSERVATIVE GROUP
MEAN OF ARSENIC, STRONTIUM AND VANADIUM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



CROSS SECTION DOES NOT INCLUDE A BEDROCK EVALUATION BORING WHERE OPTICAL TELEVIEWER DATA CAN BE USED TO DETERMINE GENERALIZED FRACTURE ORIENTATION.

CROSS SECTION LOCATION

LEGEND

- GWA-10S — WELL IN SHALLOW FLOW LAYER
- GWA-10D — WELL IN DEEP FLOW LAYER
- IB-1D — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED GROUNDWATER FLOW DIRECTION
- ASH
- ASH PORE WATER
- FILL
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- ALLUVIUM
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- IB-02I (Co 15.8, Fe 200, Mn 1500, Ra -) — MEAN COBALT (Co) CONCENTRATION (µg/L); MEAN IRON (Fe) CONCENTRATION (µg/L); MEAN MANGANESE (Mn) CONCENTRATION (µg/L); MEAN TOTAL RADIUM (Re) CONCENTRATION (µg/L)
- WELL SCREEN
- COMPLIANCE BOUNDARY

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCUALTED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. COBALT (Co), IRON (Fe), MANGANESE (Mn), AND TOTAL RADIUM (Re) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	Co	Fe	Mn	Re
REPORTING UNITS	µg/L	µg/L	µg/L	µg/L
15A NCAC 02L STANDARD	1*	300	50	NE
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)1	21	1700	760	2
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	5	1840	760	2
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	2	7680	232	3

* - IMAC OF THE 15A NCAC 02L STANDARD, APPENDIX 1, APRIL 1, 2013.

1 - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

DUKE ENERGY CAROLINAS

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0 40 80 160

HORIZONTAL SCALE: 1" = 160'
VERTICAL SCALE: 1" = 32'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/30/2019
REVISED BY: D. KREFSKI	DATE: 10/30/2019
CHECKED BY: T. GRANT	DATE: 10/30/2019
APPROVED BY: S. SPINNER	DATE: 10/30/2019
PROJECT MANAGER: S. SPINNER	

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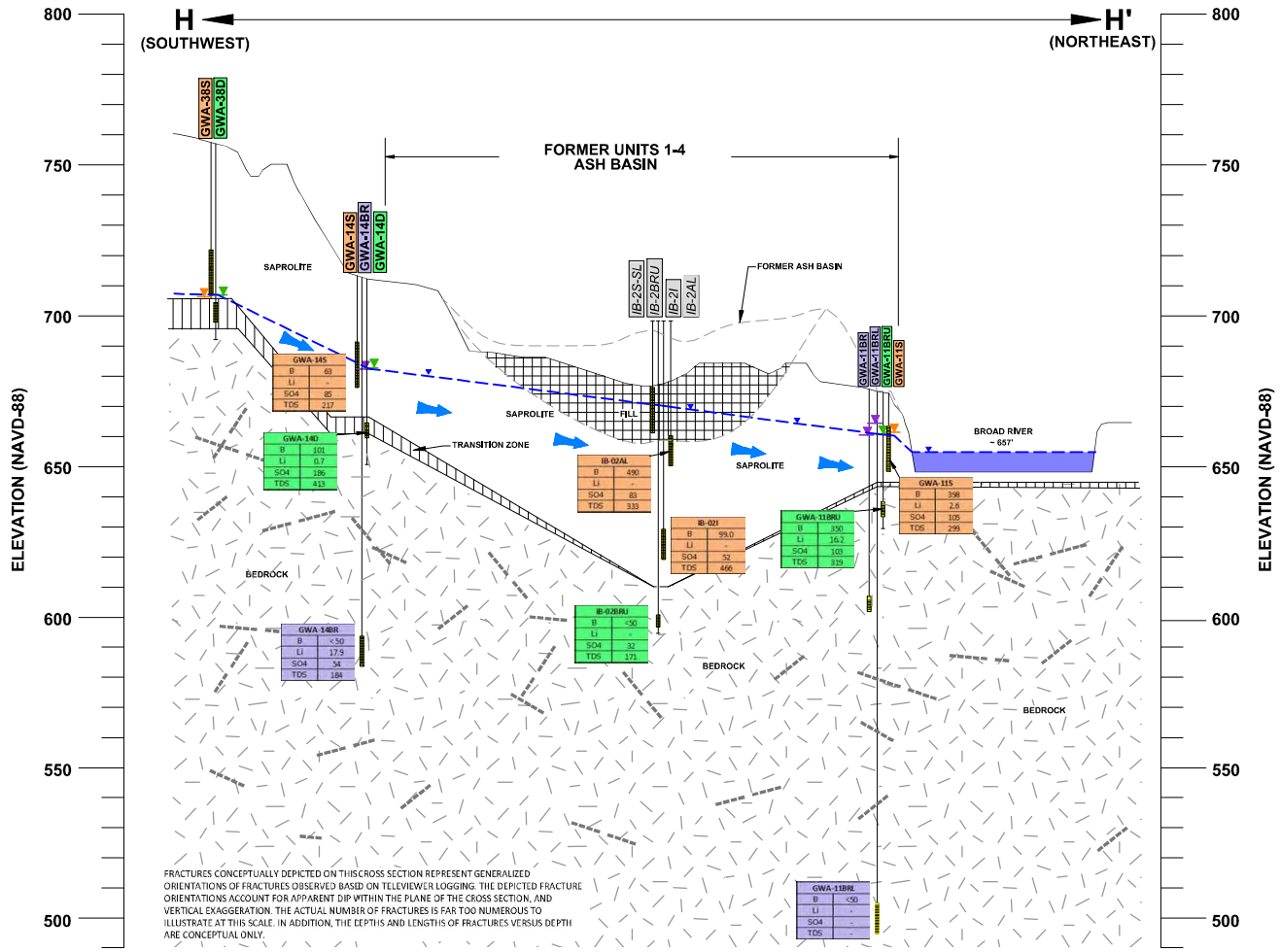
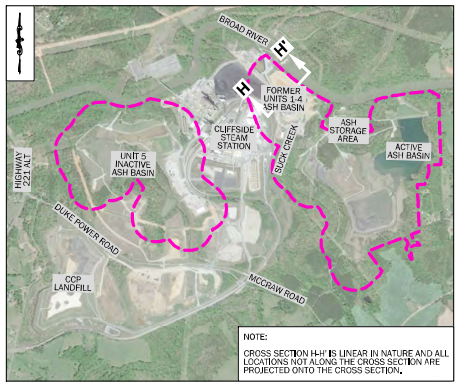
FIGURE 6-43c
GENERAL CROSS SECTION G-G'
VARIABLE GROUP
MEAN OF COBALT, IRON, MANGANESE AND TOTAL RADIUM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA





CROSS SECTION LOCATION

LEGEND

- GWA-14S — WELL IN SHALLOW LAYER
- GWA-14D — WELL IN DEEP LAYER
- GWA-14BR — WELL IN BEDROCK LAYER
- IB-2AL — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED BEDROCK FRACTURE ORIENTATION
- GENERALIZED GROUNDWATER FLOW DIRECTION
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- FILL
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER ELEVATION
- WELL SCREEN
- COMPLIANCE BOUNDARY
- GWA-11BR: B 207, Li 7.2, SO4 67, TDS 322 — MEAN BORON (B) CONCENTRATION (µg/L); MEAN LITHIUM (Li) CONCENTRATION (µg/L); MEAN SULFATE (SO4) CONCENTRATION (mg/L); MEAN TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATION (mg/L)

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCUALTED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. BORON (B) AND LITHIUM (Li) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)
3. SULFATE (SO4) AND TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L)

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	B	Li	SO4	TDS
REPORTING UNITS	µg/L	µg/L	mg/L	mg/L
15A NCAC 02L STANDARD	700	NE	250	500
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)[1]	50	3	4	57
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	50	12	15	107
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	50	11	17	120

[1] - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

NE - NOT ESTABLISHED

DUKE ENERGY CAROLINAS

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0 50 100 200
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/3/2019
REVISED BY: D.KREFSKI	DATE: 10/29/2019
CHECKED BY: T. GRANT	DATE: 10/29/2019
APPROVED BY: S. SPINNER	DATE: 10/29/2019
PROJECT MANAGER: S. SPINNER	

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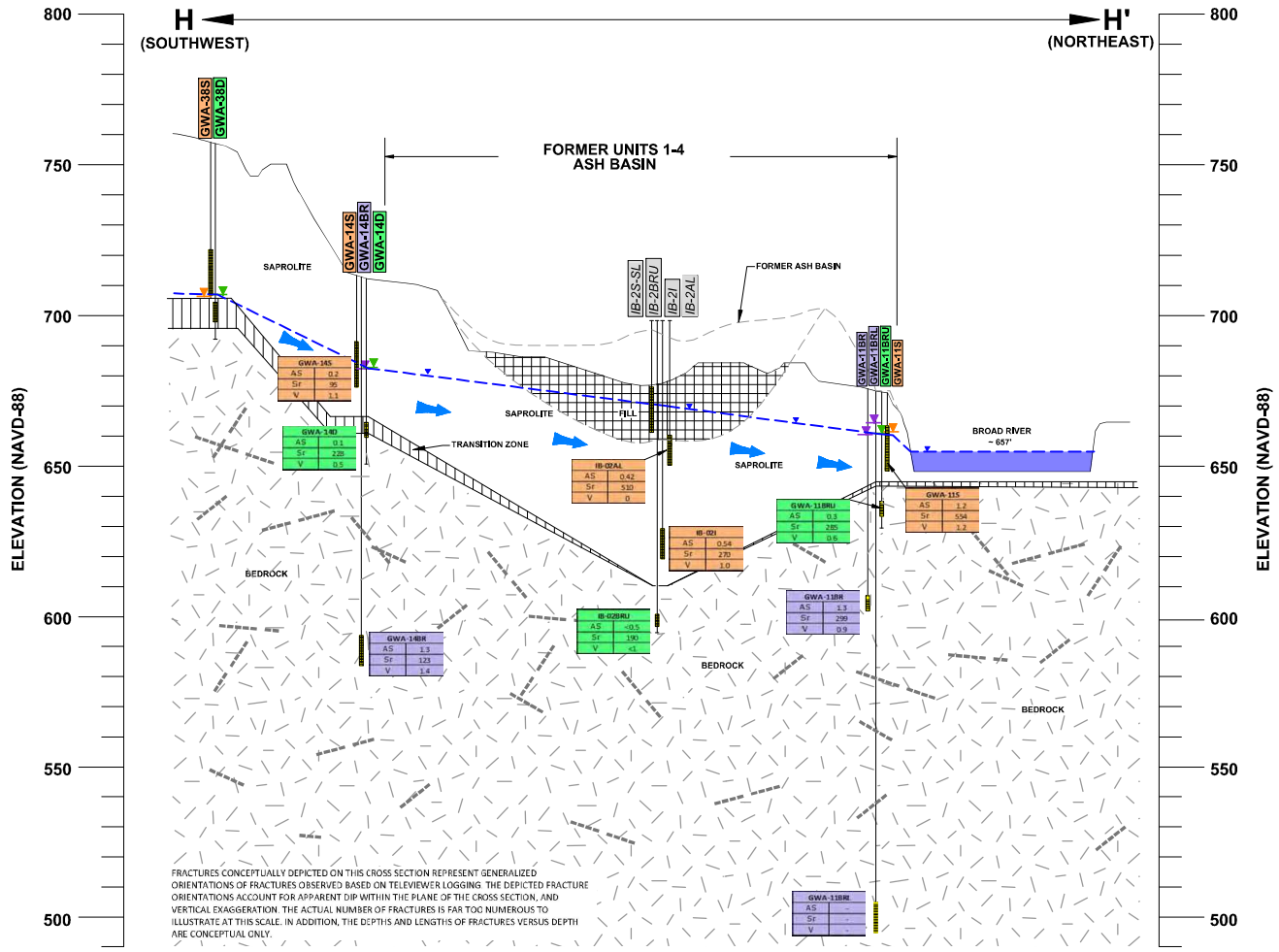
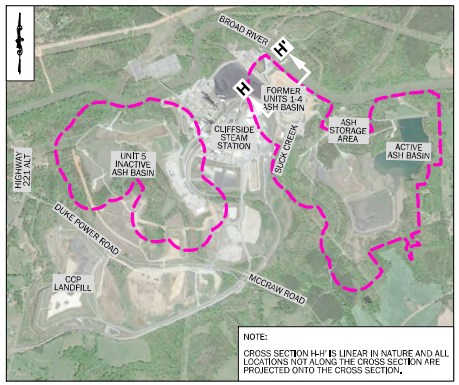
FIGURE 6-44a
GENERAL CROSS SECTION H-H'
CONSERVATIVE GROUP
MEAN OF BORON, LITHIUM, SULFATE AND TOTAL DISSOLVED SOLIDS (TDS)
FORMER UNITS 1 - 4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA





CROSS SECTION LOCATION

LEGEND

- GWA-14S — WELL IN SHALLOW LAYER
- GWA-14D — WELL IN DEEP LAYER
- GWA-14BR — WELL IN BEDROCK LAYER
- IB-2AL — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED BEDROCK FRACTURE ORIENTATION
- GENERALIZED GROUNDWATER FLOW DIRECTION
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- FILL
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER ELEVATION
- WELL SCREEN
- COMPLIANCE BOUNDARY
- MEAN ARSENIC (As) CONCENTRATION (µg/L)
- MEAN STRONTIUM (Sr) CONCENTRATION (µg/L)
- MEAN VANADIUM (V) CONCENTRATION (µg/L)

NOTES:

CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.

2. ARSENIC (As), STRONTIUM (Sr), AND VANADIUM (V) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L).

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	As	Sr	V
REPORTING UNITS	µg/L	µg/L	µg/L
15A NCAC 02L STANDARD	10	NE	3*
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)[1]	0	34	1
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	2	69	11
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	1	93	1

* - IMAC OF THE 15A NCAC 02L STANDARD, APPENDIX 1, APRIL 1, 2013.

1 - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

DUKE ENERGY CAROLINAS

synterra

0 50 100 200
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/3/2019
REVISED BY: D.KREFSKI	DATE: 10/29/2019
CHECKED BY: T. GRANT	DATE: 10/29/2019
APPROVED BY: S. SPINNER	DATE: 10/29/2019
PROJECT MANAGER: S. SPINNER	

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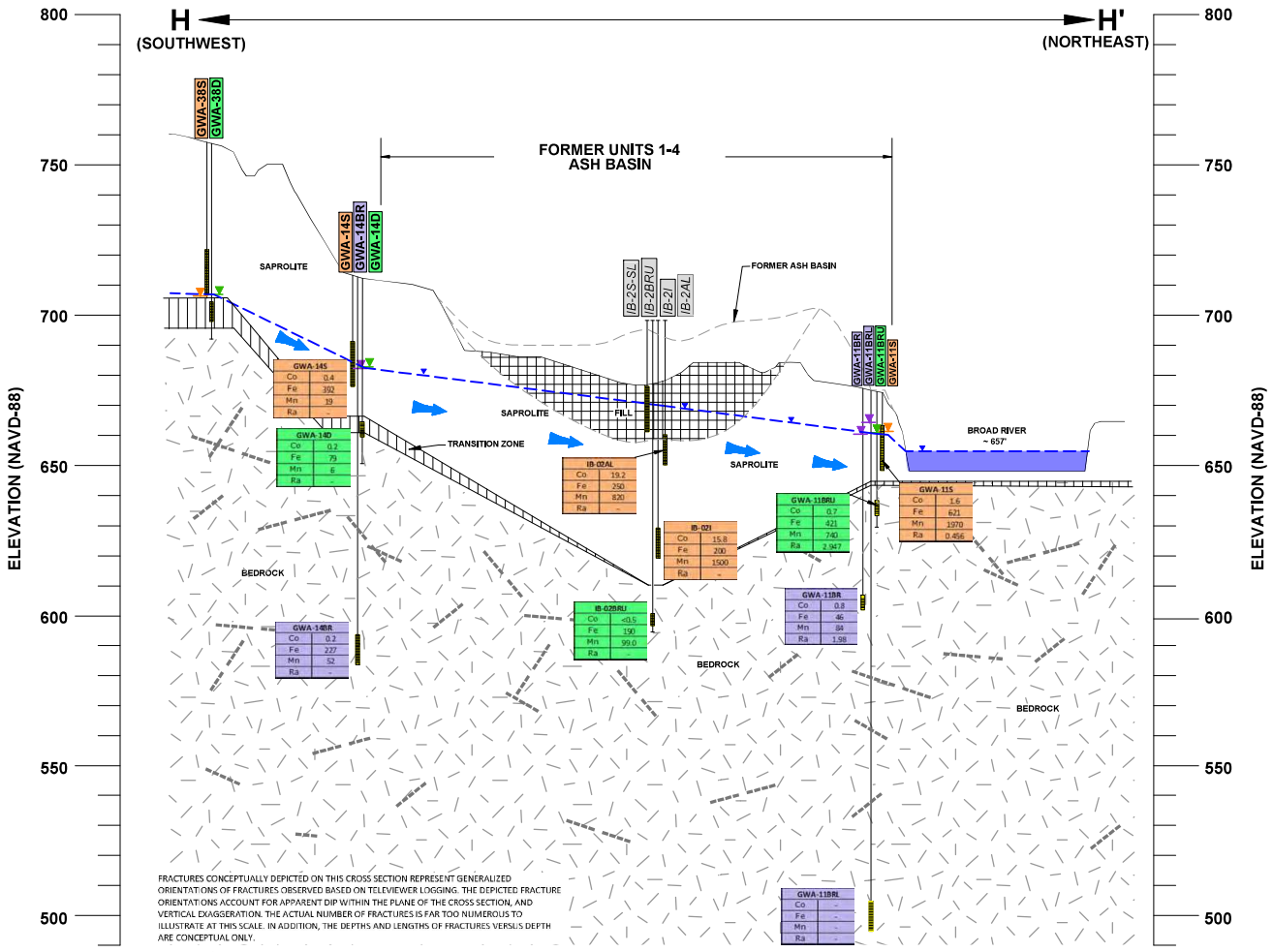
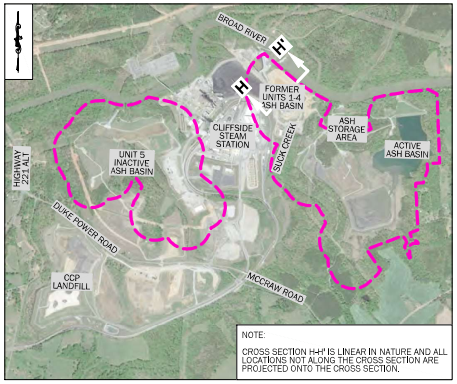
FIGURE 6-44b
GENERAL CROSS SECTION H-H'
NON-CONSERVATIVE GROUP
MEAN OF ARSENIC, STRONTIUM AND VANADIUM
FORMER UNITS 1 - 4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA





CROSS SECTION LOCATION

LEGEND

- GWA-14S — WELL IN SHALLOW LAYER
- GWA-14D — WELL IN DEEP LAYER
- GWA-14BR — WELL IN BEDROCK LAYER
- IB-2AL — ABANDONED WELL/ GEOTECHNICAL BORING
- GENERALIZED WATER TABLE
- GENERALIZED BEDROCK FRACTURE ORIENTATION
- GENERALIZED GROUNDWATER FLOW DIRECTION
- SAPROLITE
- TRANSITION ZONE
- BEDROCK
- FILL
- SHALLOW GROUNDWATER ELEVATION
- DEEP GROUNDWATER ELEVATION
- BEDROCK GROUNDWATER ELEVATION
- WELL SCREEN
- COMPLIANCE BOUNDARY
- MEAN ARSENIC (As) CONCENTRATION (µg/L)
- MEAN STRONTIUM (Sr) CONCENTRATION (µg/L)
- MEAN VANADIUM (V) CONCENTRATION (µg/L)

NOTES:

1. CONCENTRATIONS SHOWN ARE STATISTICAL MEAN CALCUALTED BASED ON CENTRAL TENDENCY OF DATASET USING DATA RANGING FROM JANUARY 2018 TO JUNE 2019.
2. COBALT (Co), IRON (Fe), MANGANESE (Mn), AND TOTAL RADIUM (Re) CONCENTRATIONS ARE IN MICROGRAMS PER LITER (µg/L)

* WELLS WITH DATASETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA UP TO JUNE 2019 WAS USED.

- NO DATA AVAILABLE

ANALYTICAL PARAMETER	Co	Fe	Mn	Re
REPORTING UNITS	µg/L	µg/L	µg/L	µg/L
15A NCAC 02L STANDARD	1*	300	50	5^
BACKGROUND THRESHOLD VALUES (SHALLOW FLOW ZONE)1	21	1700	760	2
BACKGROUND THRESHOLD VALUES (TRANSITION FLOW ZONE)[1]	5	1840	760	2
BACKGROUND THRESHOLD VALUES (BEDROCK FLOW ZONE)[1]	2	7680	232	3

* - IMAC OF THE 15A NCAC 02L STANDARD, APPENDIX 1, APRIL 1, 2013.

^ - FEDERAL MAXIMUM CONTAMINANT LEVEL.

1 - UPDATED BACKGROUND THRESHOLD VALUES WER CALCULATED USING DATA FROM BACKGROUND GROUNDWATER SAMPLES COLLECTED FEBRUARY 2010 TO DECEMBER 2018 AS SUBMITTED IN JUNE 2019.

DUKE ENERGY CAROLINAS

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0 50 100 200

HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'
5X VERTICAL EXAGGERATION

DRAWN BY: J. CHASTAIN	DATE: 10/3/2019
REVISED BY: D.KREFSKI	DATE: 10/29/2019
CHECKED BY: T. GRANT	DATE: 10/29/2019
APPROVED BY: S. SPINNER	DATE: 10/29/2019
PROJECT MANAGER: S. SPINNER	

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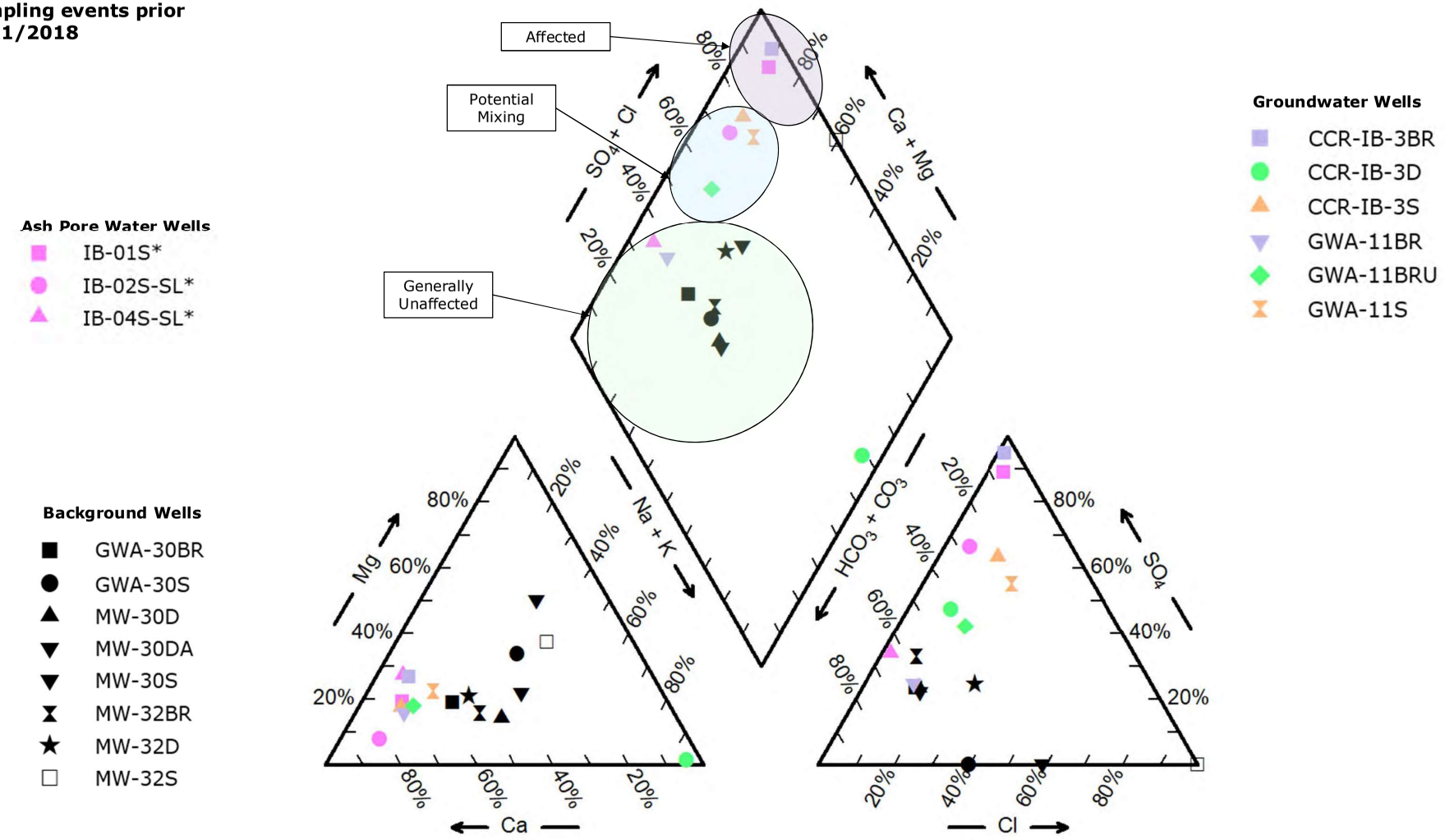
FIGURE 6-44c
GENERAL CROSS SECTION H-H'
VARIABLE GROUP
MEAN OF COBALT, IRON, MANGANESE AND TOTAL RADIUM
FORMER UNITS 1 - 4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

Note:
***sampling events prior to 1/1/2018**



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DRAWN BY: R. Badum DATE: 12/4/2019
REVISED BY:
CHECKED BY: T. Grant
APPROVED BY: T. Grant
PROJECT MANAGER: S. Spinner

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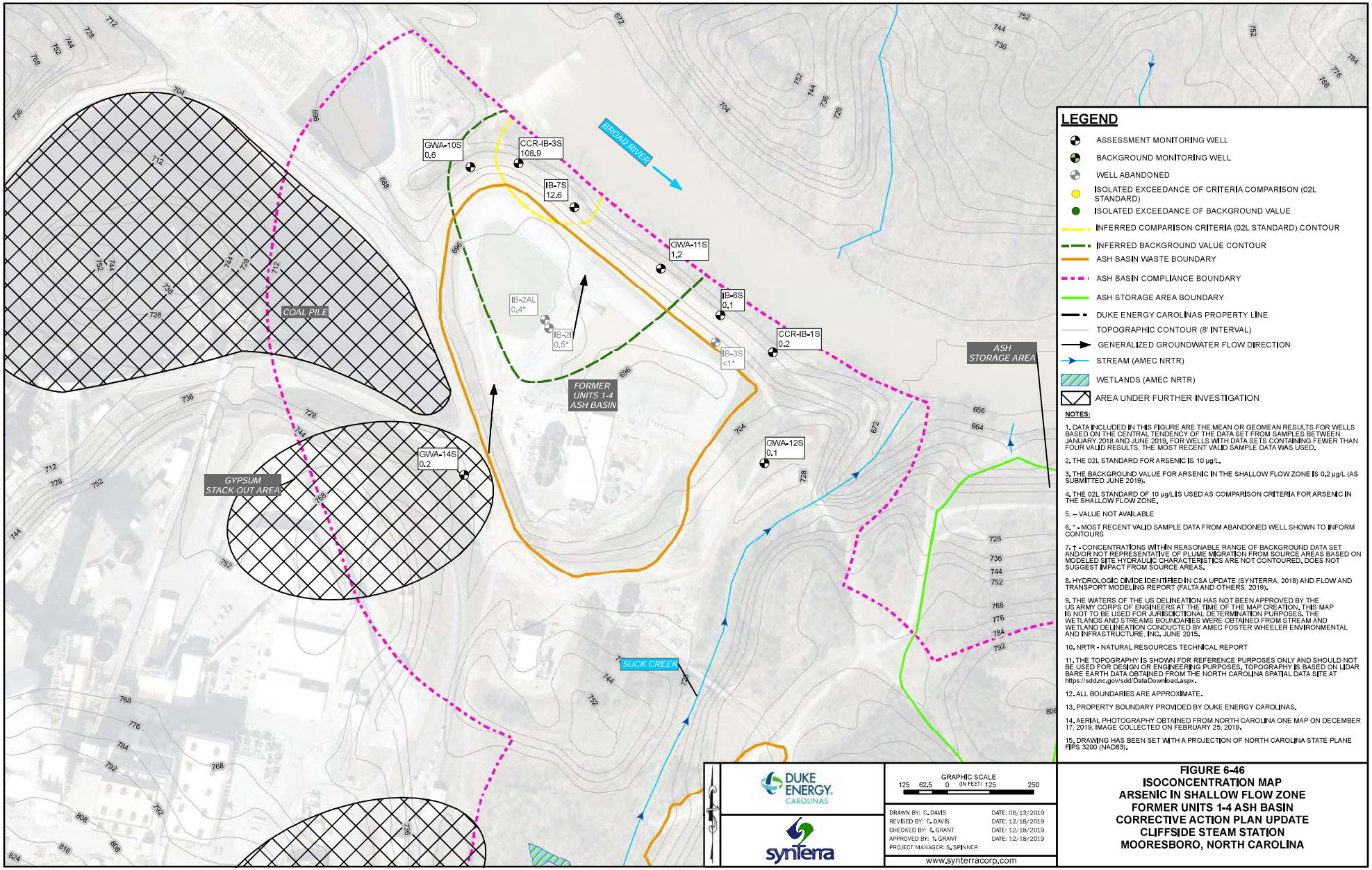
FIGURE 6-45
ASH PORE WATER AND GROUNDWATER PIPER DIAGRAM
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF CRITERIA COMPARISON (02L STANDARD)
- ISOLATED EXCEEDANCE OF BACKGROUND VALUE
- INFERRED COMPARISON CRITERIA (02L STANDARD) CONTOUR
- INFERRED BACKGROUND VALUE CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR ARSENIC IS 10 µg/L.
3. THE BACKGROUND VALUE FOR ARSENIC IN THE SHALLOW FLOW ZONE IS 0.2 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 10 µg/L IS USED AS COMPARISON CRITERIA FOR ARSENIC IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC, JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/18/2019
CHECKED BY: T. GRANT	DATE: 12/18/2019
APPROVED BY: T. GRANT	DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER	

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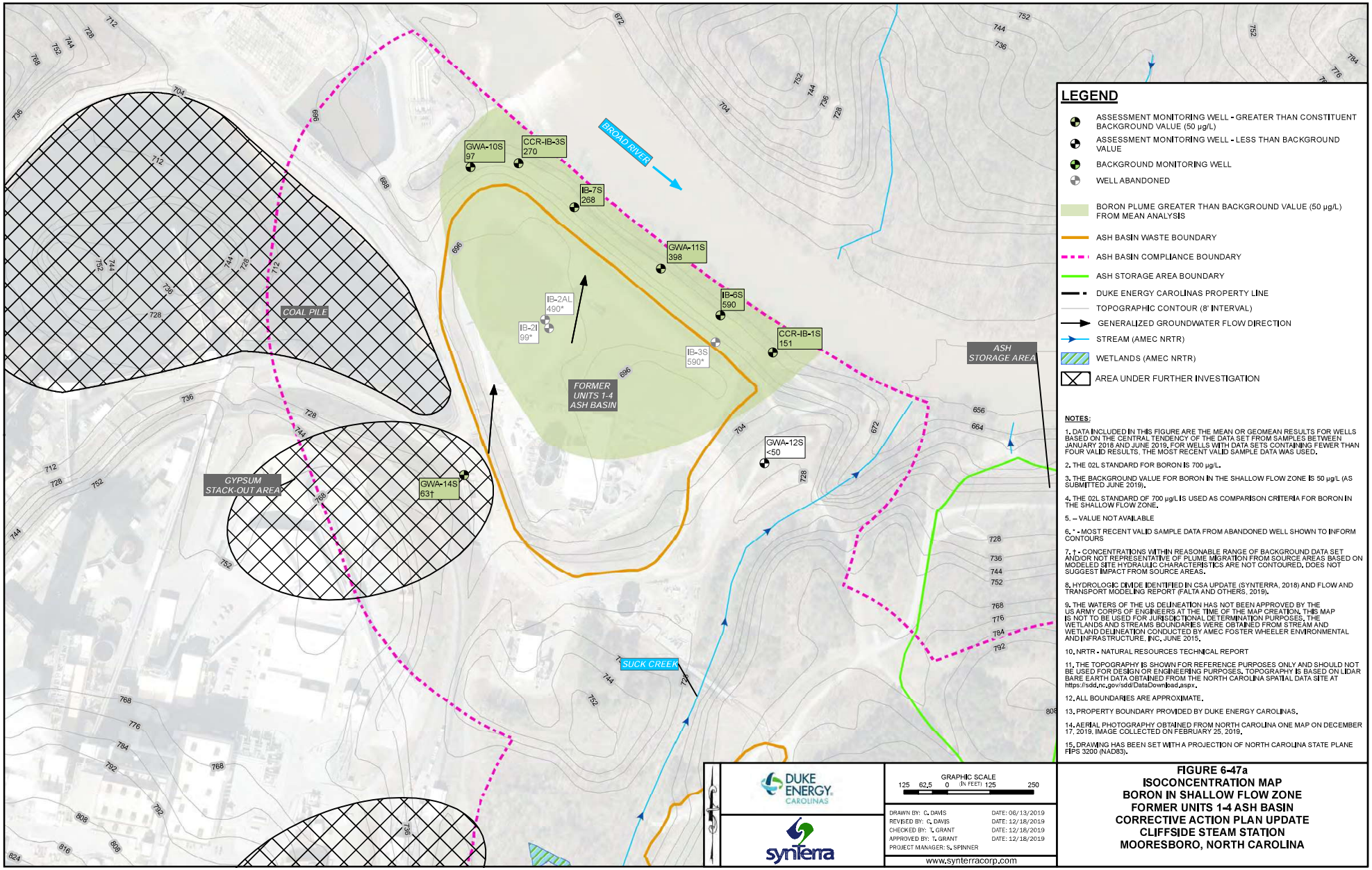
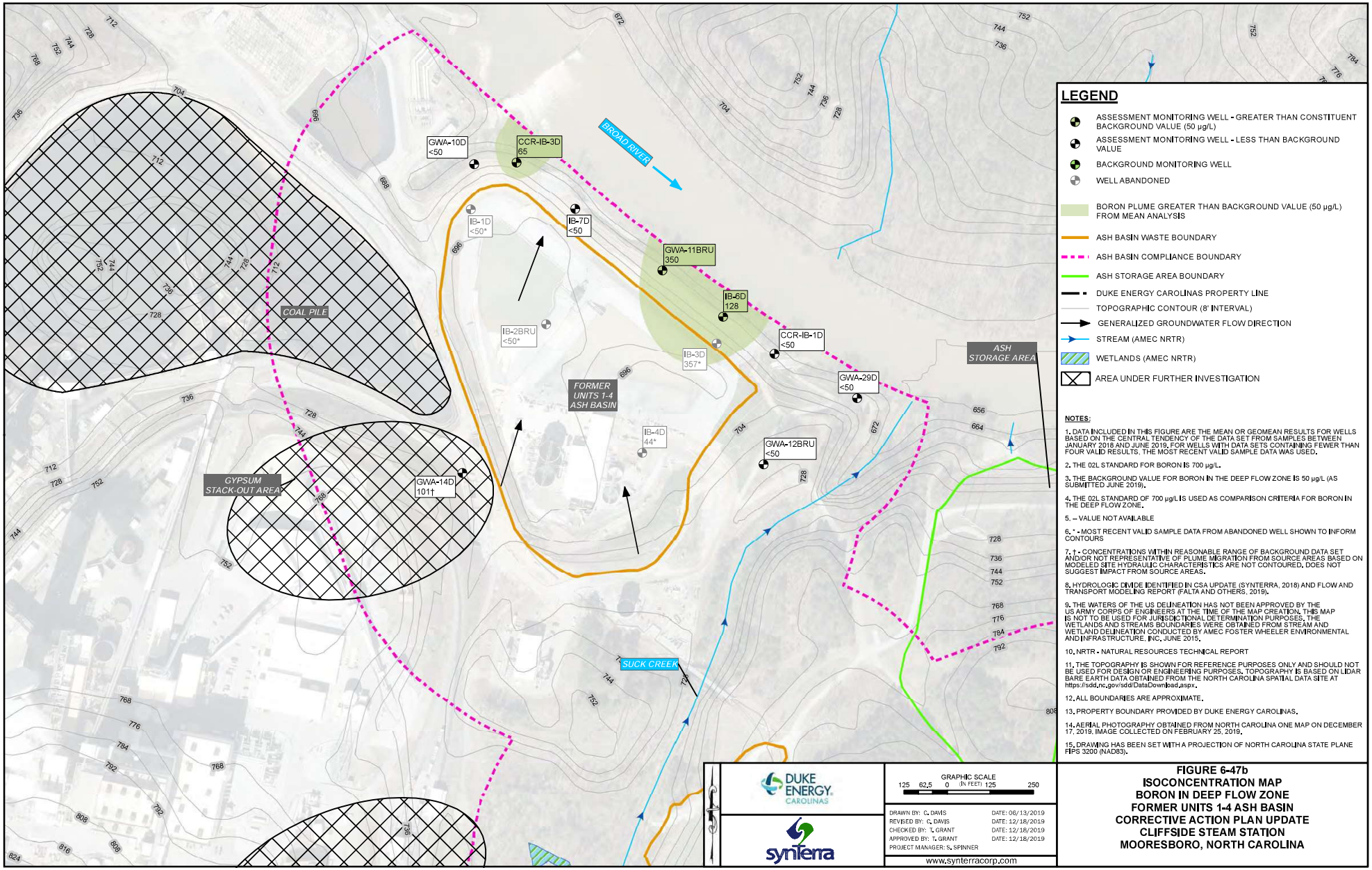
FIGURE 6-46
ISOCONCENTRATION MAP
ARSENIC IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


GWA-10S
97
CCR-IB-3S
270
IB-7S
268
GWA-11S
398
IB-6S
590
CCR-IB-1S
151
IB-2AL
490*
IB-2I
99*
IB-3S
590*
GWA-12S
<50
GWA-14S
63†
BROAD RIVER
SUCK CREEK
COAL PILE
GYPSUM
STACK-OUT AREA
FORMER
UNITS 1-4
ASH BASIN
ASH
STORAGE AREA
LEGEND
ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
BACKGROUND MONITORING WELL
WELL ABANDONED
BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE SHALLOW FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).
DUKE ENERGY. CAROLINAS
synterra
GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/18/2019
CHECKED BY: T. GRANT DATE: 12/18/2019
APPROVED BY: T. GRANT DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER
www.synterracorp.com
FIGURE 6-47a
ISOCONCENTRATION MAP
BORON IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


GWA-10D
<50
CCR-IB-3D
65
BROAD RIVER
IB-1D
<50*
IB-7D
<50
GWA-11BRU
350
IB-6D
128
IB-2BRU
<50*
IB-3D
357*
CCR-IB-1D
<50
GWA-29D
<50
COAL PILE
FORMER UNITS 1-4 ASH BASIN
ASH STORAGE AREA
IB-4D
44*
GWA-12BRU
<50
GYPSUM STACK-OUT AREA
GWA-14D
101†
SUCK CREEK
LEGEND
ASSESSMENT MONITORING WELL - GREATER THAN CONSTITUENT BACKGROUND VALUE (50 µg/L)
ASSESSMENT MONITORING WELL - LESS THAN BACKGROUND VALUE
BACKGROUND MONITORING WELL
WELL ABANDONED
BORON PLUME GREATER THAN BACKGROUND VALUE (50 µg/L) FROM MEAN ANALYSIS
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR BORON IS 700 µg/L.
3. THE BACKGROUND VALUE FOR BORON IN THE DEEP FLOW ZONE IS 50 µg/L (AS SUBMITTED JUNE 2019).
4. THE 02L STANDARD OF 700 µg/L IS USED AS COMPARISON CRITERIA FOR BORON IN THE DEEP FLOW ZONE.
5. – VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).
DUKE ENERGY. CAROLINAS
synterra
GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/18/2019
CHECKED BY: T. GRANT DATE: 12/18/2019
APPROVED BY: T. GRANT DATE: 12/18/2019
PROJECT MANAGER: S. SPINNER
www.synterracorp.com
FIGURE 6-47b
ISOCONCENTRATION MAP
BORON IN DEEP FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

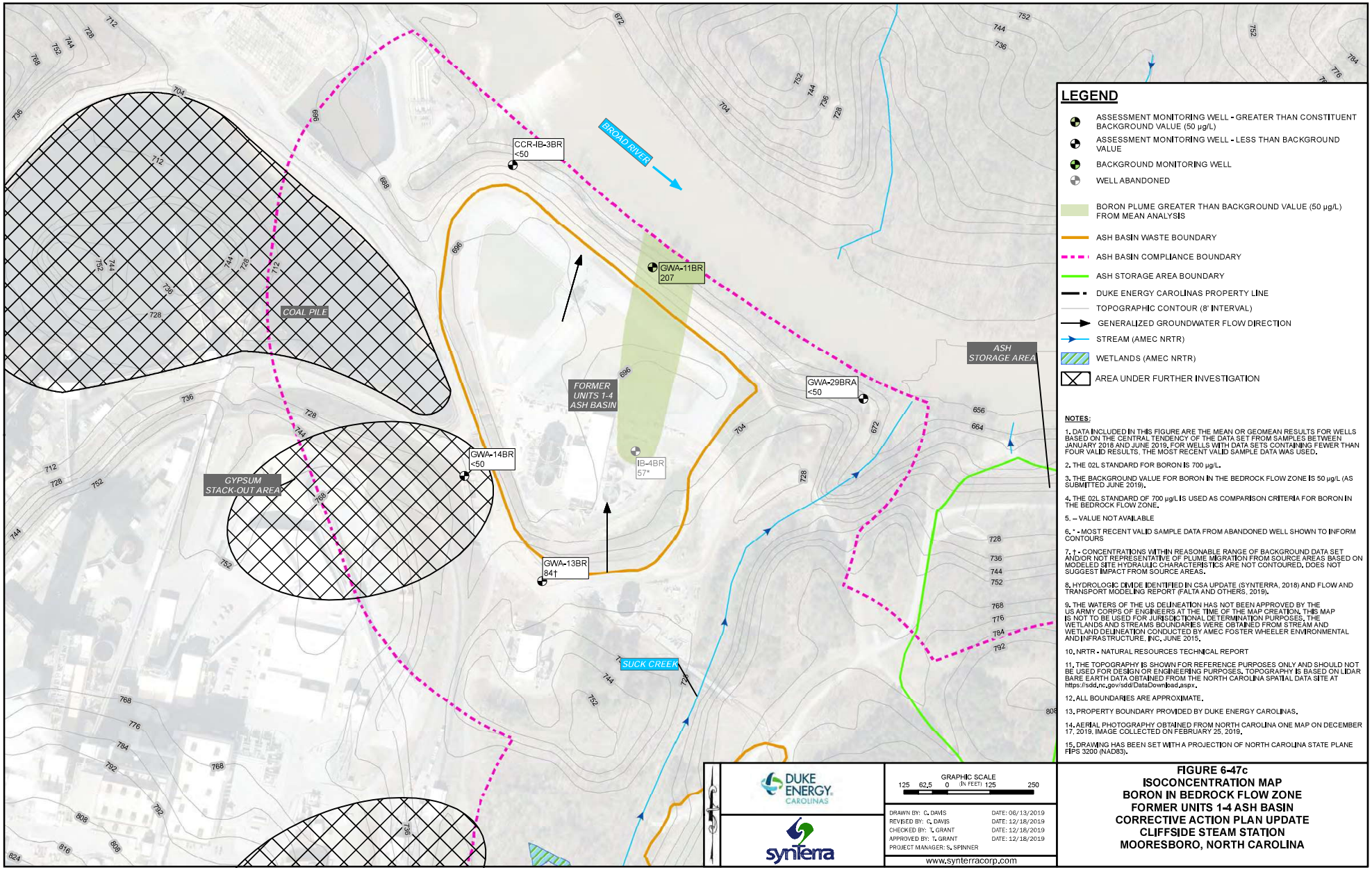
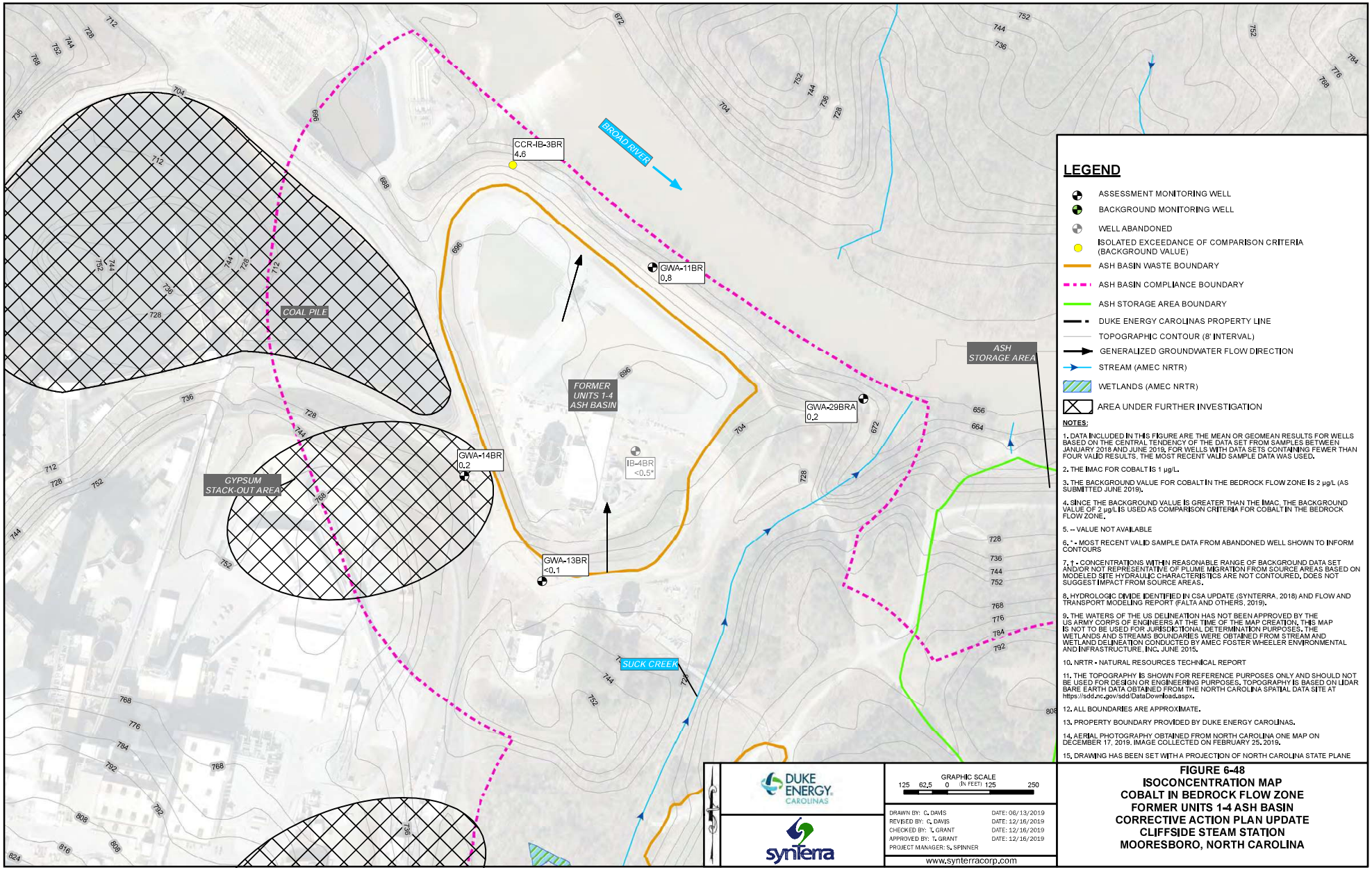


FIGURE 6-47c
ISOCONCENTRATION MAP
BORON IN BEDROCK FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


CCR-IB-3BR
4.6
BROAD RIVER
GWA-11BR
0.8
COAL PILE
FORMER UNITS 1-4 ASH BASIN
ASH STORAGE AREA
GWA-29BRA
0.2
GWA-14BR
0.2
IB-4BR
<0.5*
GYPSUM STACK-OUT AREA
GWA-13BR
<0.1
SUCK CREEK
LEGEND
ASSESSMENT MONITORING WELL
BACKGROUND MONITORING WELL
WELL ABANDONED
ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019, FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE IMAC FOR COBALT IS 1 µg/L.
3. THE BACKGROUND VALUE FOR COBALT IN THE BEDROCK FLOW ZONE IS 2 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE IMAC, THE BACKGROUND VALUE OF 2 µg/L IS USED AS COMPARISON CRITERIA FOR COBALT IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED, DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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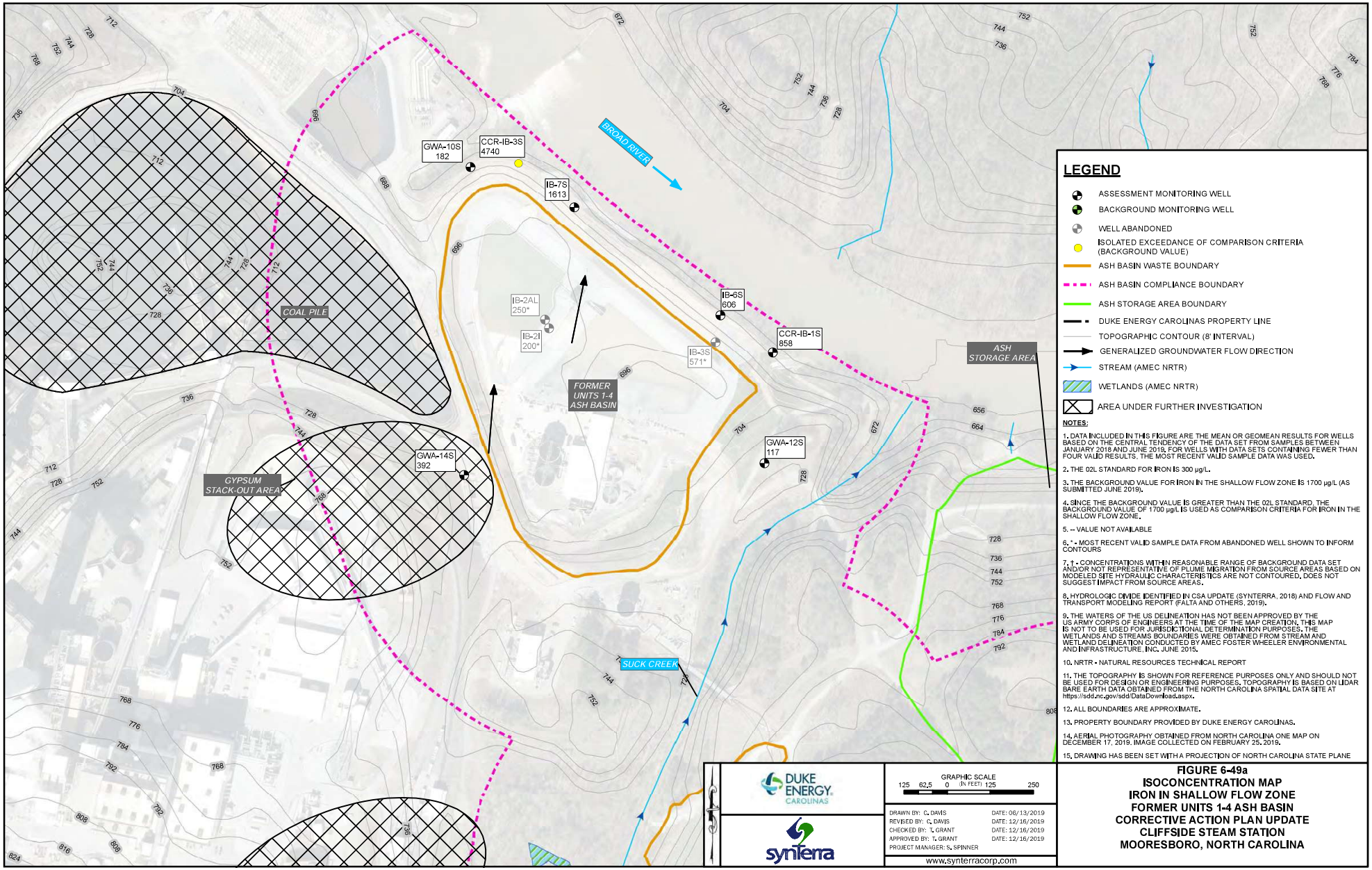
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE
DUKE ENERGY CAROLINAS
synterra
GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/16/2019
CHECKED BY: T. GRANT DATE: 12/16/2019
APPROVED BY: T. GRANT DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER
www.synterracorp.com
FIGURE 6-48
ISOCONCENTRATION MAP
COBALT IN BEDROCK FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


GWA-10S
182
CCR-IB-3S
4740
IB-7S
1613
BROAD RIVER
IB-2AL
250*
IB-2I
200*
IB-6S
606
CCR-IB-1S
858
IB-3S
571*
FORMER
UNITS 1-4
ASH BASIN
ASH
STORAGE AREA
COAL PILE
GWA-14S
392
GYPSUM
STACK-OUT AREA
GWA-12S
117
SUCK CREEK
LEGEND
ASSESSMENT MONITORING WELL
BACKGROUND MONITORING WELL
WELL ABANDONED
ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019, FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE SHALLOW FLOW ZONE IS 1700 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 1700 µg/L IS USED AS COMPARISON CRITERIA FOR IRON IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED, DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
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12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE
DUKE ENERGY CAROLINAS
synterra
GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/16/2019
CHECKED BY: T. GRANT DATE: 12/16/2019
APPROVED BY: T. GRANT DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER
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FIGURE 6-49a
ISOCONCENTRATION MAP
IRON IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

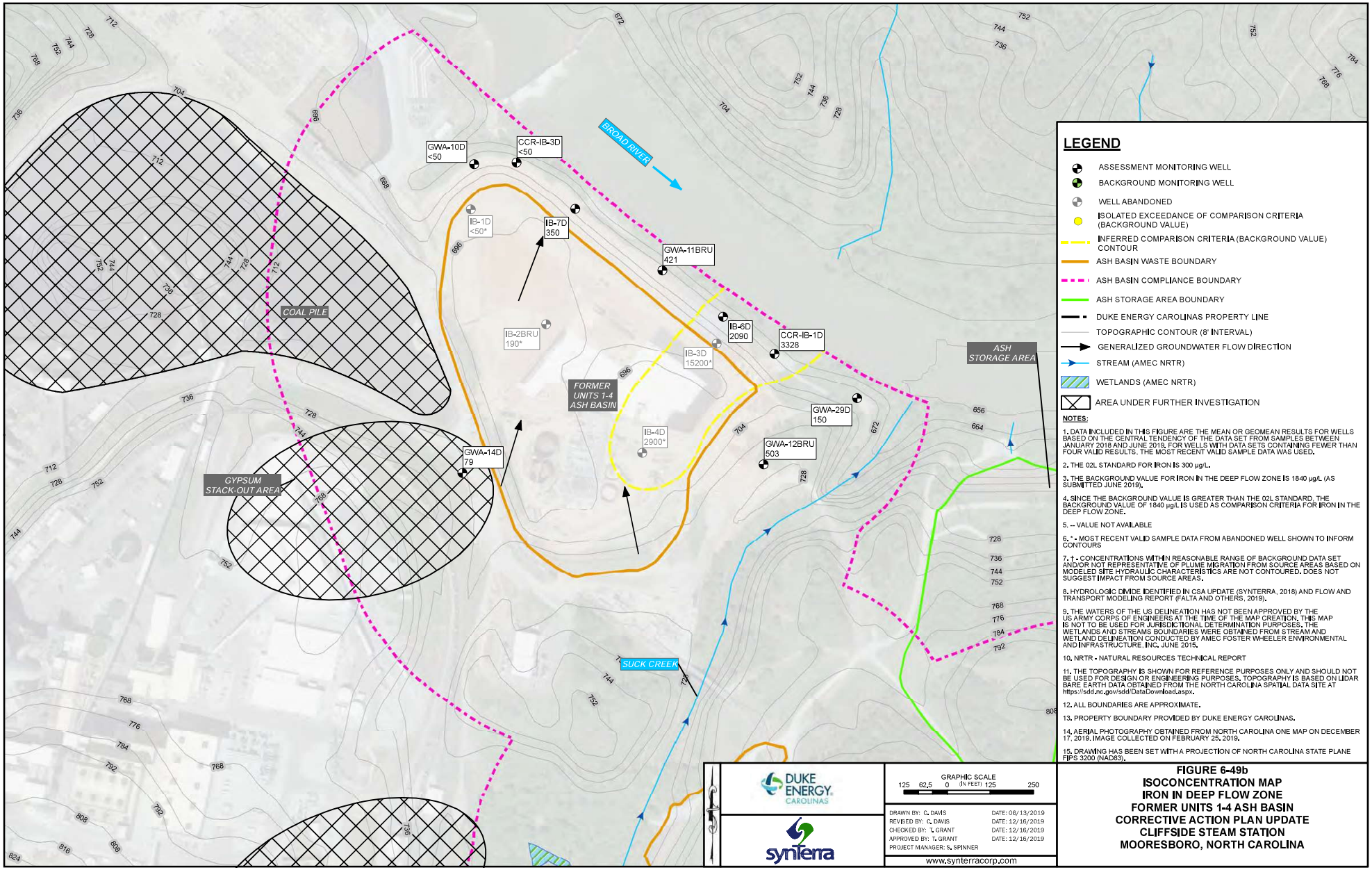
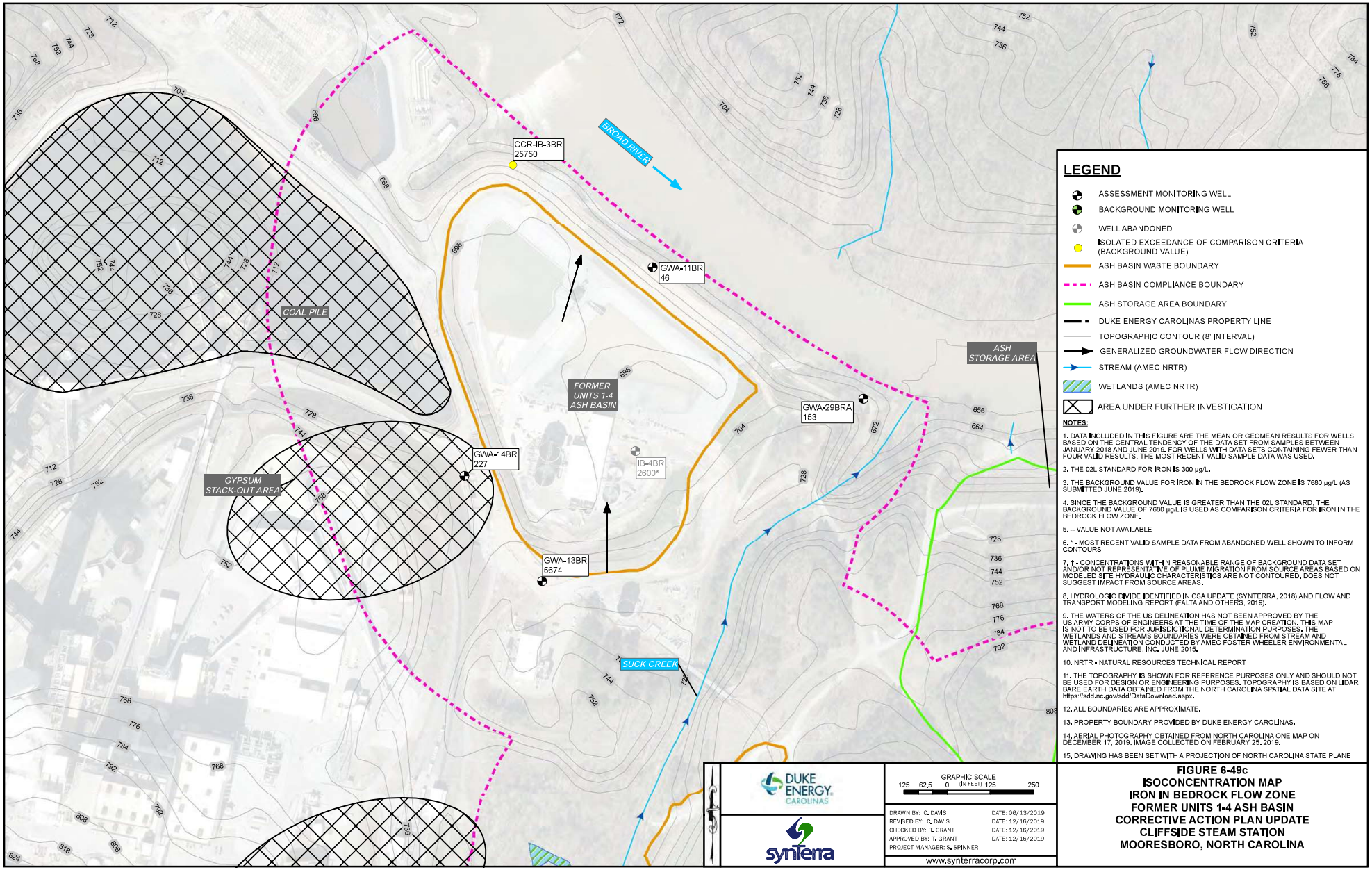


FIGURE 6-49b
ISOCONCENTRATION MAP
IRON IN DEEP FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR IRON IS 300 µg/L.
3. THE BACKGROUND VALUE FOR IRON IN THE BEDROCK FLOW ZONE IS 7680 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THE BACKGROUND VALUE IS GREATER THAN THE 02L STANDARD, THE BACKGROUND VALUE OF 7680 µg/L IS USED AS COMPARISON CRITERIA FOR IRON IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED, DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
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12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE

DUKE ENERGY CAROLINAS

synterra

GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250

DRAWN BY: C. DAVIS	DATE: 06/13/2019
REVISED BY: C. DAVIS	DATE: 12/16/2019
CHECKED BY: T. GRANT	DATE: 12/16/2019
APPROVED BY: T. GRANT	DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER	

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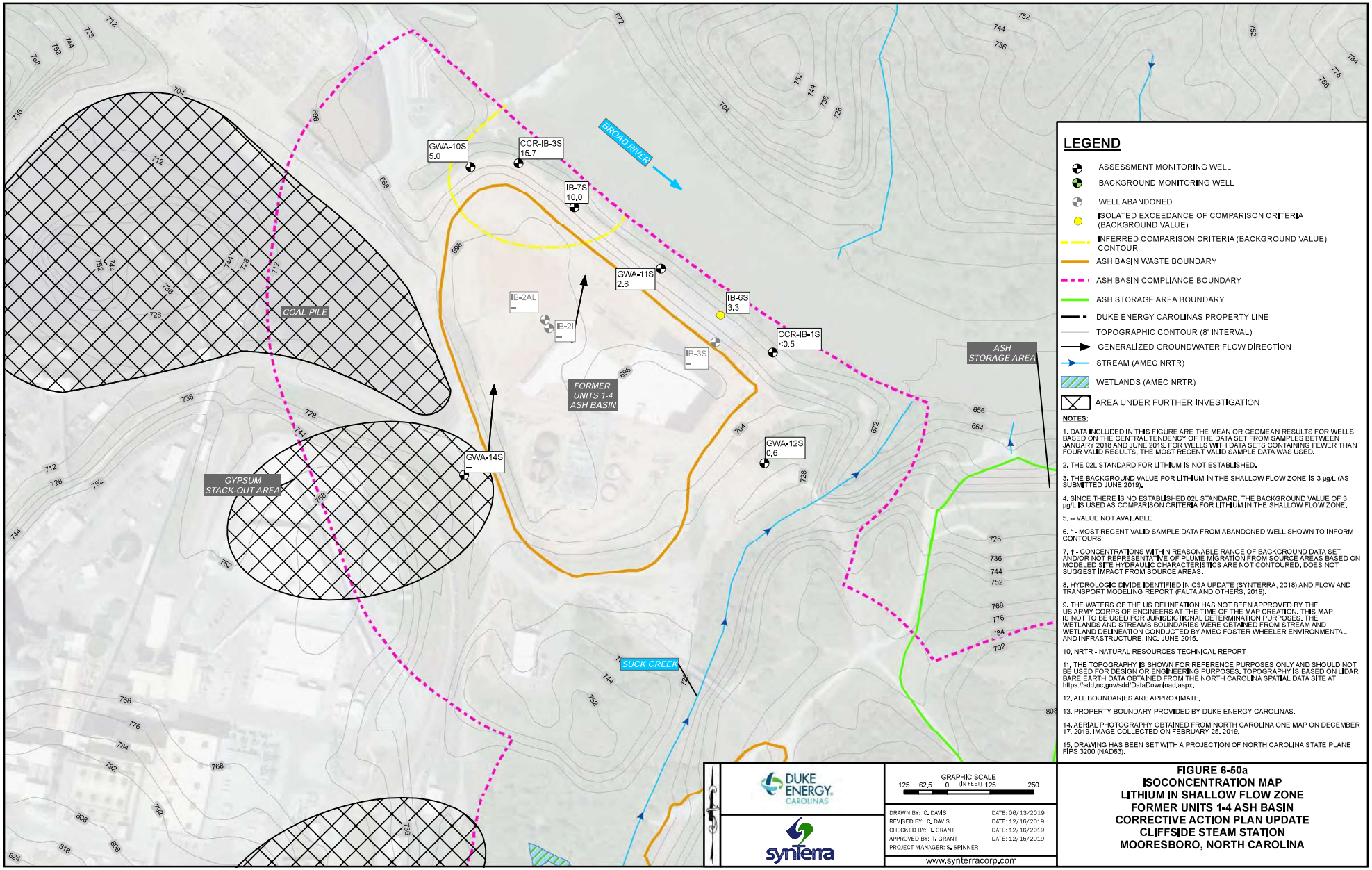
FIGURE 6-49c
ISOCONCENTRATION MAP
IRON IN BEDROCK FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA


GWA-10S
5.0
CCR-IB-3S
15.7
IB-7S
10.0
BROAD RIVER
GWA-11S
2.6
IB-2AL
–
IB-2I
–
IB-6S
3.3
CCR-IB-1S
<0.5
IB-3S
–
COAL PILE
FORMER UNITS 1-4 ASH BASIN
ASH STORAGE AREA
GWA-14S
–
GWA-12S
0.6
GYPSUM STACK-OUT AREA
SUCK CREEK
LEGEND
ASSESSMENT MONITORING WELL
BACKGROUND MONITORING WELL
WELL ABANDONED
ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
ASH BASIN WASTE BOUNDARY
ASH BASIN COMPLIANCE BOUNDARY
ASH STORAGE AREA BOUNDARY
DUKE ENERGY CAROLINAS PROPERTY LINE
TOPOGRAPHIC CONTOUR (8' INTERVAL)
GENERALIZED GROUNDWATER FLOW DIRECTION
STREAM (AMEC NRTR)
WETLANDS (AMEC NRTR)
AREA UNDER FURTHER INVESTIGATION
NOTES:
1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE SHALLOW FLOW ZONE IS 3 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 3 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE SHALLOW FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
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13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).
DUKE ENERGY CAROLINAS
synterra
GRAPHIC SCALE
125 62.5 0 (IN FEET) 125 250
DRAWN BY: C. DAVIS DATE: 06/13/2019
REVISED BY: C. DAVIS DATE: 12/16/2019
CHECKED BY: T. GRANT DATE: 12/16/2019
APPROVED BY: T. GRANT DATE: 12/16/2019
PROJECT MANAGER: S. SPINNER
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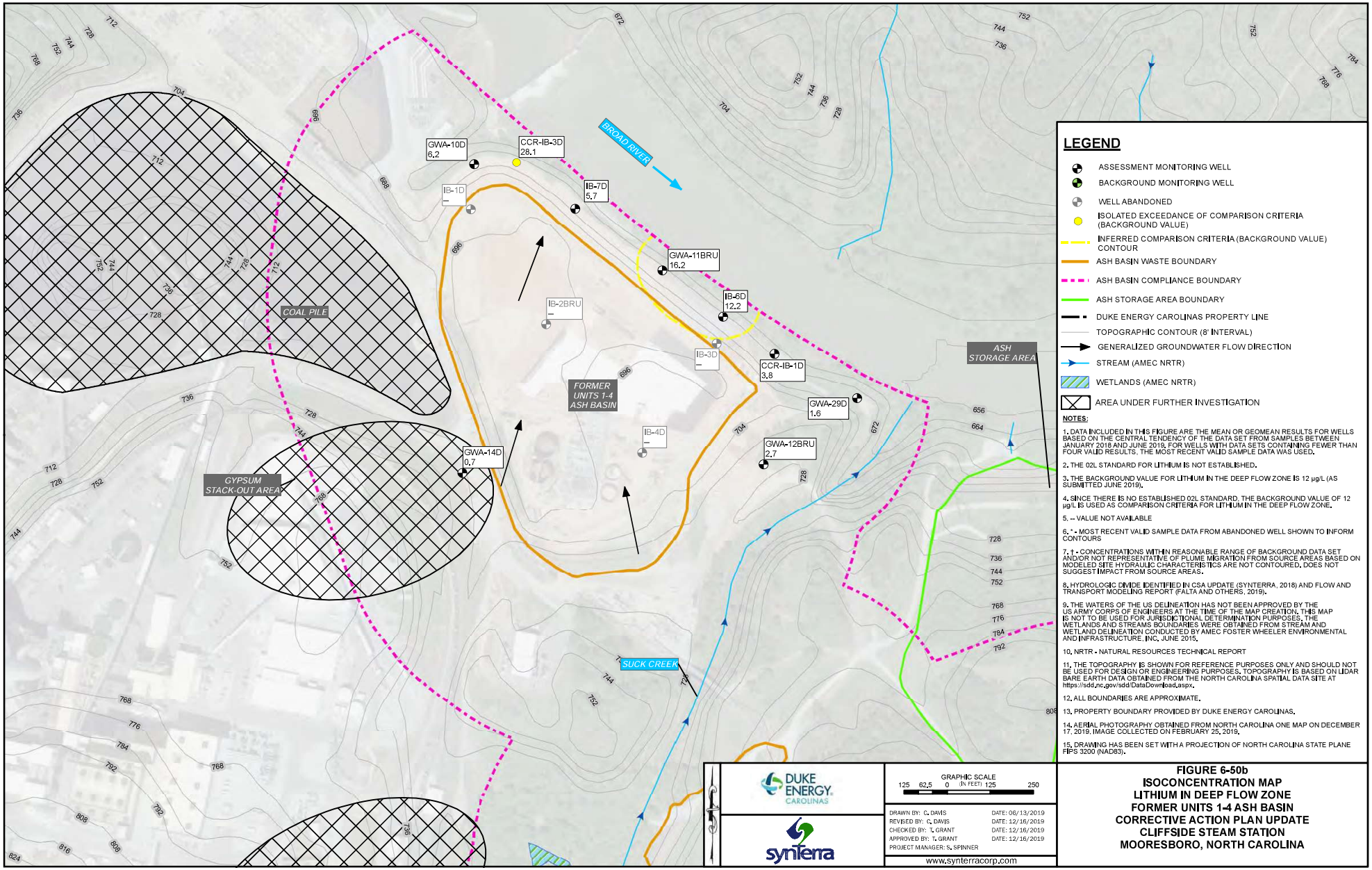
FIGURE 6-50a
ISOCONCENTRATION MAP
LITHIUM IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- INFERRED COMPARISON CRITERIA (BACKGROUND VALUE) CONTOUR
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019. FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE DEEP FLOW ZONE IS 12 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 12 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE DEEP FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC. JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
12. ALL BOUNDARIES ARE APPROXIMATE.
13. PROPERTY BOUNDARY PROVIDED BY DUKE ENERGY CAROLINAS.
14. AERIAL PHOTOGRAPHY OBTAINED FROM NORTH CAROLINA ONE MAP ON DECEMBER 17, 2019. IMAGE COLLECTED ON FEBRUARY 25, 2019.
15. DRAWING HAS BEEN SET WITH A PROJECTION OF NORTH CAROLINA STATE PLANE FIPS 3200 (NAD83).

DUKE ENERGY CAROLINAS

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GRAPHIC SCALE
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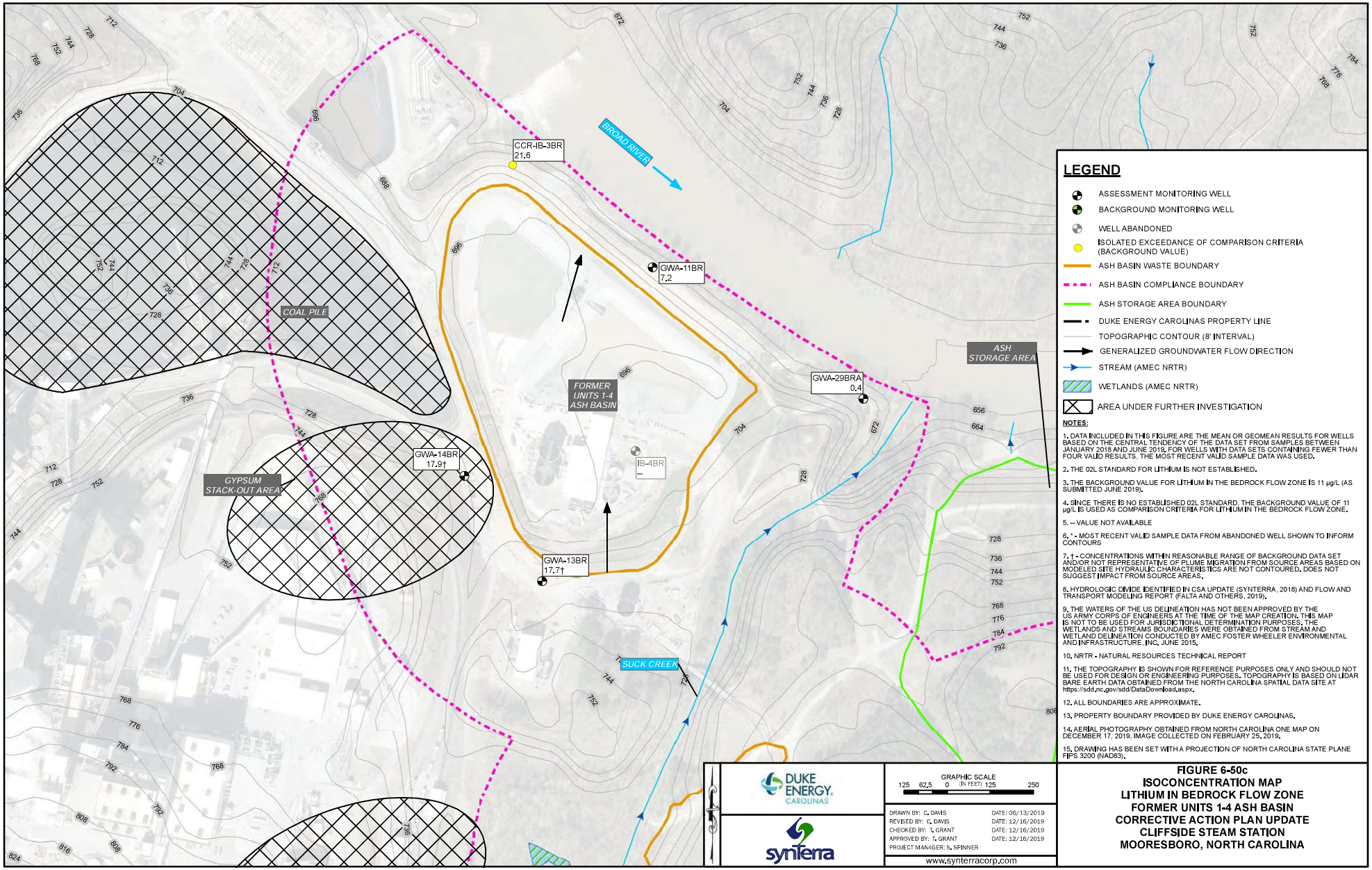
FIGURE 6-50b
ISOCONCENTRATION MAP
LITHIUM IN DEEP FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA



LEGEND

- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- WELL ABANDONED
- ISOLATED EXCEEDANCE OF COMPARISON CRITERIA (BACKGROUND VALUE)
- ASH BASIN WASTE BOUNDARY
- ASH BASIN COMPLIANCE BOUNDARY
- ASH STORAGE AREA BOUNDARY
- DUKE ENERGY CAROLINAS PROPERTY LINE
- TOPOGRAPHIC CONTOUR (8' INTERVAL)
- GENERALIZED GROUNDWATER FLOW DIRECTION
- STREAM (AMEC NRTR)
- WETLANDS (AMEC NRTR)
- AREA UNDER FURTHER INVESTIGATION

NOTES:

1. DATA INCLUDED IN THIS FIGURE ARE THE MEAN OR GEOMEAN RESULTS FOR WELLS BASED ON THE CENTRAL TENDENCY OF THE DATA SET FROM SAMPLES BETWEEN JANUARY 2018 AND JUNE 2019, FOR WELLS WITH DATA SETS CONTAINING FEWER THAN FOUR VALID RESULTS, THE MOST RECENT VALID SAMPLE DATA WAS USED.
2. THE 02L STANDARD FOR LITHIUM IS NOT ESTABLISHED.
3. THE BACKGROUND VALUE FOR LITHIUM IN THE BEDROCK FLOW ZONE IS 11 µg/L (AS SUBMITTED JUNE 2019).
4. SINCE THERE IS NO ESTABLISHED 02L STANDARD, THE BACKGROUND VALUE OF 11 µg/L IS USED AS COMPARISON CRITERIA FOR LITHIUM IN THE BEDROCK FLOW ZONE.
5. -- VALUE NOT AVAILABLE
6. * - MOST RECENT VALID SAMPLE DATA FROM ABANDONED WELL SHOWN TO INFORM CONTOURS
7. † - CONCENTRATIONS WITHIN REASONABLE RANGE OF BACKGROUND DATA SET AND/OR NOT REPRESENTATIVE OF PLUME MIGRATION FROM SOURCE AREAS BASED ON MODELED SITE HYDRAULIC CHARACTERISTICS ARE NOT CONTOURED. DOES NOT SUGGEST IMPACT FROM SOURCE AREAS.
8. HYDROLOGIC DIVIDE IDENTIFIED IN CSA UPDATE (SYNTERRA, 2018) AND FLOW AND TRANSPORT MODELING REPORT (FALTA AND OTHERS, 2019).
9. THE WATERS OF THE US DELINEATION HAS NOT BEEN APPROVED BY THE US ARMY CORPS OF ENGINEERS AT THE TIME OF THE MAP CREATION. THIS MAP IS NOT TO BE USED FOR JURISDICTIONAL DETERMINATION PURPOSES. THE WETLANDS AND STREAMS BOUNDARIES WERE OBTAINED FROM STREAM AND WETLAND DELINEATION CONDUCTED BY AMEC FOSTER WHEELER ENVIRONMENTAL AND INFRASTRUCTURE, INC, JUNE 2015.
10. NRTR - NATURAL RESOURCES TECHNICAL REPORT
11. THE TOPOGRAPHY IS SHOWN FOR REFERENCE PURPOSES ONLY AND SHOULD NOT BE USED FOR DESIGN OR ENGINEERING PURPOSES. TOPOGRAPHY IS BASED ON LIDAR BARE EARTH DATA OBTAINED FROM THE NORTH CAROLINA SPATIAL DATA SITE AT https://sdd.nc.gov/sdd/DataDownload.aspx.
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DUKE ENERGY CAROLINAS

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FIGURE 6-50c
ISOCONCENTRATION MAP
LITHIUM IN BEDROCK FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA

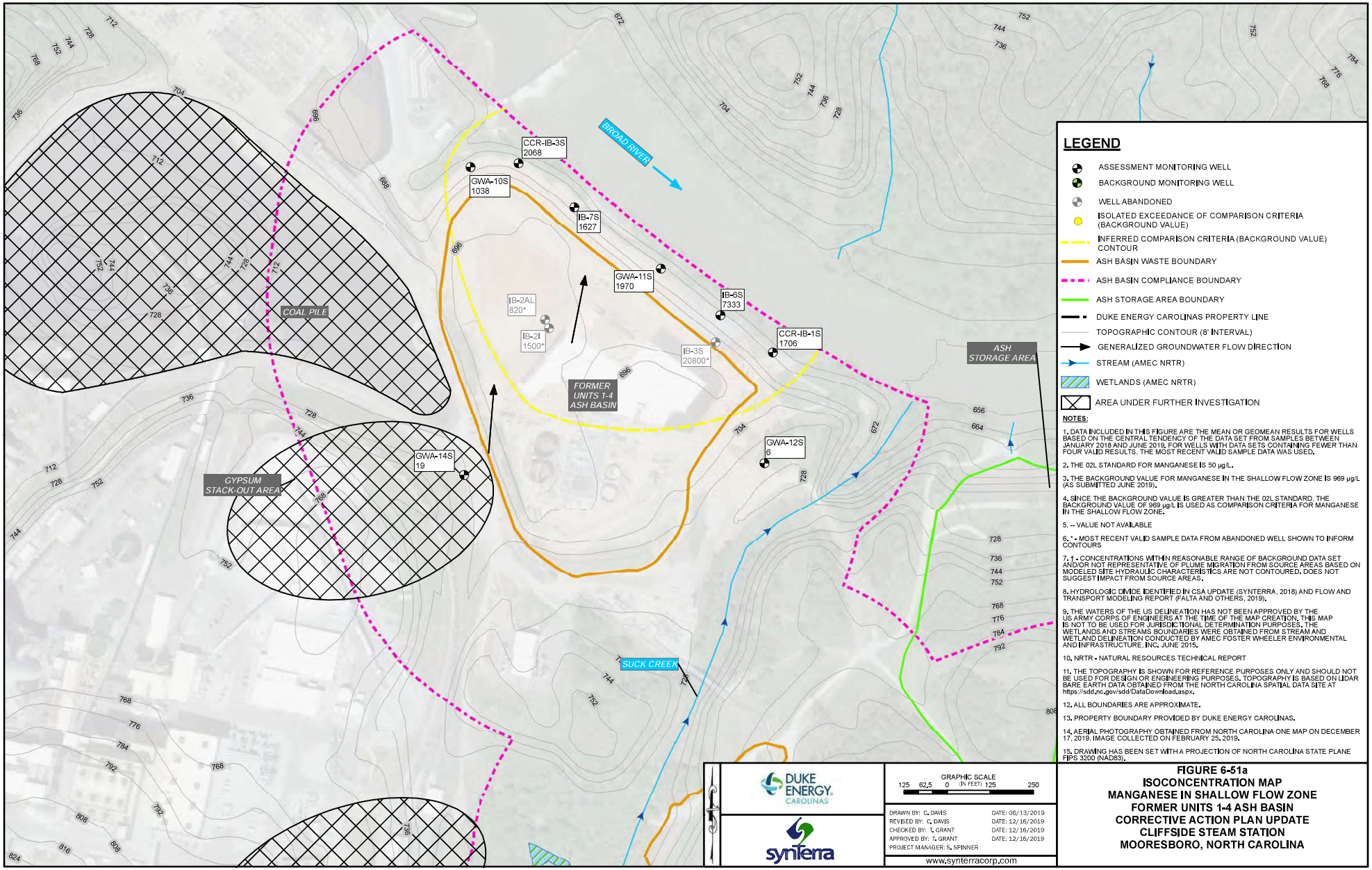

FIGURE 6-51a
ISOCONCENTRATION MAP
MANGANESE IN SHALLOW FLOW ZONE
FORMER UNITS 1-4 ASH BASIN
CORRECTIVE ACTION PLAN UPDATE
CLIFFSIDE STEAM STATION
MOORESBORO, NORTH CAROLINA