



**United States Department of Energy**

**Savannah River Site**

**Scoping Summary  
For the General Separations Area Western  
Groundwater Operable Unit (U)**

**CERCLIS Number: 85**

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**Final**

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### **Key Changes to the Scoping Summary**

<b>SECTION</b>	<b>DESCRIPTION OF CHANGE</b>	<b>RATIONALE FOR CHANGE</b>
4.1 and 4.2	Revised sections to include results from 2014 groundwater sampling.	These changes update the Scoping Summary to include results from sampling in 2014.
Figures A-3, A-4, and A-5	Figures were updated based on the results of 2014 groundwater sampling.	These changes update the Scoping Summary with sampling results from 2014.
Appendix B	Data tables were updated with the results of 2014 groundwater sampling.	These changes update the Scoping Summary with sampling results from 2014.
4.1	A new surface water station and a seep line groundwater piezometer were added for the South plume in September 2014.	Based on agreement from the August 2013 meeting, the new locations improve monitoring for the South plume.

### **Significant Core Team Agreements**

<b>Agreement</b>	<b>Meeting</b>
Locations FGW-023 and FGW-024 will be sampled at least 2 more times and results will be discussed in the 2016 scoping summary. Continued monitoring of these locations will be evaluated.	September 2015
Technetium-99 will be added to the analyte list for the South plume.	September 2014
Sampling data (one event) for new locations, FGW-023 and FGW-024, will be included in the final scoping summary for 2014.	September 2014
At the South plume, the Core Team agreed to move forward with installation of one surface water sample station and one shallow seep line piezometer on a tributary to the west of the Biomass Facility. The need for additional monitoring points will be evaluated based on monitoring results.	August 2013
Sampling of established wells will be performed annually. New monitoring locations added to the OU will be sampled semi-annually until a baseline is established.	August 2013
As documented in the GSA Eastern and Western Groundwater OUs Groundwater Monitoring Optimization White Paper, SRNS-RP-2012-00783, Rev. 1, January 2014, the Core Team agreed to discontinue monitoring at wells FNB-3, FNB-12, FPB-13D, FBP-44D, FBP-46D, FBP-47D, BRR-5D and UTR-7.	August 2013

**Significant Core Team Agreements (continued)**

Agreement	Meeting
As documented in the GSA Eastern and Western Groundwater OUs Groundwater Monitoring Optimization White Paper, SRNS-RP-2012-00783, Rev. 1, January 2014, the Core Team agreed to add alpha and beta/gamma speciation to analyte list for well FGW005C.	August 2013
The Core Team recognized the difficulty of installing a new well down gradient of UTR-18R and agreed that a new well is not needed at this time as long as SRS continues to monitor water at the seep in well UTR-18R.	August 2013
Add one monitoring well in the lower aquifer zone down gradient of FGW-012C, if possible.	August 2012
Add one seepage line and one surface water monitoring location down gradient of FGW-012C along unnamed tributary, if surface water is present.	August 2012
Data are being collected and reported for future evaluation of VOC degradation as a remedial alternative.	August 2011
The Core Team agreed to include information on wells FBP 44D, 46D, and 47D in the August 2011 scoping summary instead of submitting the February 2011 white paper that was agreed to during the June 2010 meeting.	August 2011
FBP 44D, FBP 46D, and FBP 47D can be dry during periods of lower water table. This could represent a data gap if the UTR 18R seepage line piezometer is also dry (monitors the same aquifer zone). UTR 18R typically contains water. Historical data associated with the dry wells will be evaluated with respect to contaminants to determine if modifications to the well network are necessary to define plume extent. The evaluation will be reported in February 2011 as a white paper.	June 2010

## **1.0 PROJECT PHASE AND STATUS**

The *Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) Phase 1 Work Plan for the General Separations Area (GSA) Western Groundwater Operable Unit (OU)*, Revision 1.1, was approved by the United States Environmental Protection Agency (USEPA) and by the South Carolina Department of Health and Environmental Control (SCDHEC) on September 9, 2004. A Field Start was achieved for the OU on September 20, 2004.

In 2007, SRS completed establishment of the groundwater monitoring network. The GSA Western Groundwater OU is currently in a groundwater monitoring program. The purpose of this Scoping Summary is to present the analytical data obtained in 2014 from groundwater monitoring to the Core Team to determine if the monitoring network and analytical suite remain appropriate for continued monitoring. In 2014, concentrations have remained consistent with results from 2013 and continued sampling of the groundwater monitoring network is recommended.

## **2.0 BACKGROUND**

The GSA is located on a topographic ridge near the center of the SRS. The GSA Western Groundwater OU is located in the northwest portion of the GSA on a groundwater divide. It encompasses the groundwater beneath approximately 485.6 hectares (1,200 acres) in F Area. This OU is bordered to the south by the F-Area Hazardous Waste Management Facility and to the east by the Mixed Waste Management Facility (see Figure A-1). Because the OU is located on a groundwater divide, shallow groundwater flows toward both Fourmile Branch (FMB) and Upper Three Runs Creek (UTRC) (see Figure A-2).

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This OU underlies many operating facilities and waste units in and around F Area that are potential sources of contamination. Some of these facilities and units have been investigated during previous Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) characterization work. From these investigations and from review of the existing monitoring well networks, three distinct groundwater plumes have been identified in the Upper Three Runs Aquifer (UTRA). The plumes are identified by geographic reference as the North plume, the West plume, and the South plume.

Some of the operating facilities in the area are undergoing decontamination and decommissioning and will be brought to closure in the near term. Because other facilities will remain active into the future, in September 2005, the Core Team determined:

- It is not appropriate to achieve a Record of Decision on the GSA Western GW OU until all sources of potential contamination are brought to closure (including closure of the F-Area High Level Waste Tanks).
- The most appropriate action at this time is continued groundwater monitoring to ensure that surface water resources are adequately protected.
- If contamination in the groundwater is thought to represent a threat to surface water resources, the Core Team will reconvene to determine if early response actions are required.

SRS characterized the nature and extent of groundwater contamination. The primary groundwater contaminants are volatile organic compounds (VOCs), radionuclides, and nitrate. Tritium, iodine-129, and trichloroethylene (TCE) are sporadically above MCLs at points of groundwater discharge at the seepines. However, concentrations in adjacent surface water are consistently below MCLs.

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### **3.0 LAND USE**

The area encompassed by the GSA Western GW OU is heavily developed with many active industrial facilities. No future residential use of this area is anticipated. Land use of the entire GSA Western GW OU area will be controlled to prevent use of the groundwater that exceeds MCLs. The UTRA and Gordon Aquifer (GA) are not used as a drinking water source at SRS.

### **4.0 SUBUNITS**

The GSA Western GW OU includes the following two subunits:

- Groundwater (i.e., North Plume, West Plume, South Plume), including shallow groundwater discharging to surface at the seep lines
- Surface water

In September 2005, the Core Team determined that soil contamination from the potential source units will be addressed during closure of the individual waste units and operating facilities.

#### **4.1 Groundwater Subunit**

The UTRA is the shallow-most aquifer beneath the GSA Western GW OU and consists of two aquifer zones; the Upper Aquifer Zone (UAZ) and the Lower Aquifer Zone (LAZ). The GA underlies the UTRA and is separated from the UTRA by the Gordon Confining Unit (GCU). Contamination is present only in the UTRA. Previous investigations have demonstrated that within the GSA Western GW OU, the GA is protected by a competent confinement unit (GCU) and contamination is not migrating into the aquifer.

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In 2014, the GSA Western GW OU was under a groundwater monitoring program that consisted of semi-annual sampling of 33 monitoring wells, 4 shallow sampling points at the seep lines (i.e., seepage piezometers), and 4 surface water sampling stations (Table 1 and Figure A-2). Starting in 2014, samples for established wells are collected annually in accordance with Table 1 and new wells are sampled semi-annually until a baseline is established. The results from the 2014 monitoring of the well network are discussed below for the North, West, and South plumes. The analytical data for 2014 are presented in Appendix B.

Beginning in 2011, all locations in the North and West plumes have been sampled for TCE and degradation products. This is necessary to ensure that sufficient data are available to evaluate natural attenuation as a future remedial action. Currently cis-1,2-dichloroethylene is detected in the groundwater; however, concentrations are very low (0.44 ug/L) and below the laboratory analytical quantitation limit (i.e., 1 ug/L). Vinyl chloride is not detected (less than detection limit 0.3 ug/L).

Groundwater contaminants in the UTRA include VOCs, radionuclides, and nitrate. Tritium, TCE, and nonvolatile beta are recognized as the most widespread contaminants in the groundwater at the OU and thus are mapped each year. Other constituents are co-mingled with these primary contaminants. For example, TCE is the primary chlorinated solvent present yet the plume typically also contains limited quantities of tetrachloroethylene (PCE) and trichlorofluoromethane (TCFM) co-located with the TCE. Tritium and nonvolatile beta are the most widespread radioactive contaminants; however, other radionuclides such as iodine-129, strontium-90, uranium-238, etc., are also co-located within these plumes. Thus, mapping of the primary contaminants is useful to evaluate the distribution and nature of the plumes from year to year.

Beginning in the 2011 annual meeting, the TCE plume (Figure A-4) was revised. The value of the contour line was changed from 10 ug/L to the MCL of 5 ug/L.

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Also, the general shape of the plume was modified to reflect the absence of TCE at the wells adjacent to the Old F-Area Seepage Basin (OFASB). This change resulted in two distinct plumes being interpreted (North and West plumes) and the reassignment of well FGW 003C to the West plume monitoring network.

### **North Plume**

The North plume covers an area of approximately 50 acres on the north side of the F-Area industrial facilities. Within this portion of the OU, the water table and the plume are located completely within the LAZ of the UTRA. Groundwater flow in this aquifer is north toward Upper Three Runs Creek and its tributaries. During 2014, groundwater samples were collected from six wells, three seepage piezometers, and two surface water locations. All locations yielded samples in both the first and third quarters.

Previous investigations have shown that elevated concentrations of TCE, gross alpha, and nonvolatile beta are present to the east and north-east of the OFASB. In 2002, depth discrete samples measured TCE concentrations up to 85 ug/L. Elevated concentrations of gross alpha and nonvolatile beta were also detected. Sample locations from this investigation were shown in the November 2005 Scoping Summary. This area of the plume is likely from sources within the F-Area fence line such as facilities associated with the now decommissioned Naval Fuels and the Fabrication Shop located north of F Canyon.

During the 2014 monitoring period, TCE concentrations were the same as in 2013 and ranged between non-detect and 15.2J ug/L. Four monitoring locations detected TCE and only two locations exceeded the MCL (FNB 13 and FNB 15). The maximum concentration detected was 15.2J ug/L at well FNB 13. At adjacent well FNB 15 TCE was 12J ug/L. TCE was not detected above the MCL at the seepage piezometers. The only detections at the seepage occurred at

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piezometer UTR-16 with a concentration of 0.83 ug/L, and UTR-6 with a concentration of 0.31J ug/L. Both PCE and TCFM were also below the MCL in the north plume.

In addition to VOCs, nonvolatile beta, nitrate, iodine-129, strontium-90, and tritium have been present in the UTRA at levels greater than MCLs. In 2014, at most locations, concentrations were similar to levels measured in 2013 and only slightly greater than respective MCLs. Near the OFASB at well FNB 2, concentrations of I-129 were 10.1 pCi/L (2014) versus 8.3 pCi/L (2013) and Sr-90 11.9 pCi/L (2014) versus 12.4 pCi/L (2013). Tritium was highest down gradient of the OFASB at well FNB 15 (35.6 pCi/mL 2014) versus (30.7 pCi/mL 2013). Nitrate exceeded the MCL at only two wells (FNB 13 and FNB 15) and the maximum concentration was 16 mg/L (FNB 15).

In 2014, shallow groundwater discharging at the seepage line was monitored by three seepage line piezometers (UTR 6, 7, and 16). Historically, primarily tritium has been detected near or slightly above the MCL at location UTR 16. However, I-129 has also been sporadically measured above the MCL in the past. During the 2014 sampling at UTR 16, iodine-129 was 2.23J pCi/L (laboratory estimated value below the estimated quantitation limit) and tritium was below the MCL (12 pCi/mL). Levels of I-129 were about the same as measured last year and tritium concentrations were lower than 2013 results. In accordance with the monitoring strategy, surface water samples are also collected near the points of groundwater discharge (i.e., seepage line piezometers). Samples from surface water station UTR 003, the station downstream of piezometer UTR 16, detected iodine-129 (3.31J pCi/L), but the result was “J”-qualified because it was less than the estimated quantitation limit. In the other sample collected from UTR 003 surface water iodine-129 was not detected. Tritium was very low and below the MCL in surface water at 4.42 pCi/mL.

Overall, the 2014 results were similar to last year's results. The data continue to indicate that the plume remains stable to decreasing with respect to extent and concentrations. Surface water is not being impacted above MCLs. Monitoring results for 2014 are provided in Appendix B.

### **West Plume**

The West plume occupies approximately 65 acres on the western side of F Area. The plume is located within both the UAZ and LAZ of the UTRA. Groundwater flow in this area is generally west toward Upper Three Runs Creek. During 2014, groundwater samples were obtained from 13 of 16 wells in the first quarter and 12 of 16 wells in the third quarter. Two of the three wells closest to the seepline (FBP 44D and FBP 47D) were dry during both sampling events and FBP 46D was dry during the third quarter. These locations have historically been dry. In addition, well FBP 1A (LAZ) was out of service in 2014 because it was struck by lightning. At the seepline in 2014, piezometer (UTR 18R) was dry in the first quarter, but a sample was obtained in the third quarter. Sampling results from the monitoring network are included in Appendix B.

Overall, the West plume is comprised primarily of VOCs (PCE, TCE, and TCFM), nitrates, and gross alpha/nonvolatile beta constituents. Based on previous sampling, the isotopes present include iodine-129, strontium-90, technetium-99, uranium-233/234, and uranium-238. In 2014, the data show MCL exceedances for: PCE, TCE, TCFM, nitrates, gross alpha, nonvolatile beta, radium-226, radium-228, strontium-90, tritium, uranium 233/234, and uranium-238. VOCs and nitrates are the most widespread contaminants for the West plume.

VOCs are present beneath the burning rubble pits and up gradient of the pits toward the F-Area facilities. The most prevalent VOCs are TCE and TCFM. The

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highest concentrations of TCE are located at the northwest edge of the F-Area facilities at wells FGW 003C, FGW 005C, FGW 022C, and FBP43DL. In 2014, the maximum TCE concentration was 28 ug/L at well FGW 005C; which is the same concentration as 2013. TCE concentrations at well FGW 005C and adjacent wells (FGW 003C, FGW 022C, and FBP 43DL) have been stable to decreasing over time (see Figure 1). In 2014 in the distal part of the plume, TCE was stable in FBP 13D at approximately 21 ug/L (following an increase from 10 to 19 ug/L in 2013) and at FBP 6D varied between 6.3 and 11.7 ug/L (Figure 2). PCE and TCFM are also present in the Western plume at concentrations consistent with recent results (2014 maximum results 17 and 35.9 ug/L, respectively).

The maximum concentrations of nitrates, gross alpha, and nonvolatile beta are present adjacent to the F-Area facilities and the Inactive Process Sewer Line (IPSL) at LAZ wells FGW 005C and FGW 022C. In 2014, the maximum nitrate concentration was slightly lower than last year at 63 mg/L (FGW 022C). Gross alpha and nonvolatile beta concentrations were slightly higher than results from 2013; gross alpha 1,400 pCi/L (FGW 005C), nonvolatile beta 518 pCi/L (FGW 005C) (2014 results). At well FGW 005C, the specific isotopes associated with the elevated gross alpha are uranium-233/234 (379 pCi/L) and uranium-238 (1,270 pCi/L) and the beta emitting isotopes present are primarily strontium-90 (75 pCi/L) and technetium-99 (150 pCi/L). At the West plume, the concentrations of gross alpha and nonvolatile beta attenuate rapidly with distance away from the F-Area facilities. As shown in Figure A-5, the nonvolatile beta plume terminates approximately half-way between the F-Area fence line and the wetlands of Upper Three Runs Creek, and currently poses no threat to surface water.

In the past, TCE has been detected at piezometer UTR 18R, however, surface water samples collected down gradient from UTR 18R have historically been non-detect for VOCs. In 2014, small amounts of PCE, TCE and TCFM were

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detected in groundwater at UTR 18R. The maximum concentration was 8.5 ug/L for TCE and was above the MCL. PCE was also above the MCL at 5.43 ug/L. UTR 018R is located at the base of a slope in an area of localized groundwater seeps. At this area, the rate of groundwater discharge is so low that standing water is not present year round. Also, the seepage sample point is approximately 600 feet from Upper Three Runs Creek and groundwater discharged to the surface seeps back into the ground or evaporates before reaching the creek. Downgradient of the seep piezometer, the concentration of all constituents were below the MCL at surface water location UTR 005.

Overall, 2014 data continue to indicate that the plumes remain stable with respect to extent and concentrations. Both the VOC and nonvolatile beta plumes terminate prior to discharging at seeps to Upper Three Runs Creek. Monitoring results for 2014 are provided in Appendix B.

Wells FBP 44D, FBP 46D, and FBP 47D have historically been dry since monitoring began for this OU in 2006. These wells were installed at the base of a steep slope up gradient of where groundwater outcrops at a seep. SRS installed the FBP wells in March 1998 as part of the F Area Burning/Rubble Pits OU and they yielded samples in April 1998. Since then water levels have dropped approximately 5 feet and currently the water table is at or below the screened interval. The last sample obtained from these wells was in 1998 with the exception of FBP 47D which was sampled once in 2013 and FBP 46D which was sampled in 2014. These wells are screened in the deepest sandy interval of the LAZ that will yield water for sample collection. The wells are constructed with 5 feet of screen and are terminated approximately 10 feet above the Gordon Confining Unit. The wells were not placed deeper (i.e., directly on top of the Gordon Confining Unit) because the bottom 10 feet of sediments in the LAZ are silt and clay rich and do not readily yield water for collection of samples. In 2013 and 2014 the Core Team agreed to discontinue monitoring at these locations.

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Water at the seep is currently monitored by well UTR 18R which routinely yields samples. This location is about 200 feet down gradient of the FBP wells and has been a reliable sample point, although it can be dry during unusually dry conditions.

### **South Plume**

The South plume covers an area of approximately 55 acres on the south west corner of F Area. The plume is located within the UAZ and LAZ of the UTRA. Groundwater flow in this portion of the OU is generally south west toward Upper Three Runs Creek. During 2014 groundwater samples were collected from 14 wells. The analyte list for monitoring includes nitrates, gross alpha, nonvolatile beta, tritium, iodine-129, radium- 226, radium-228, strontium-90, uranium-233/234, and uranium-238. Technetium-99 will be added to the analyte list for future monitoring starting in 2015. Analytical results are presented in Appendix B.

The South plume consists primarily of tritium and nonvolatile beta constituents. VOCs are not present at the South plume. Specific radionuclides that have been present above MCLs include iodine-129 and strontium-90. SRS believes these constituents are sourced from the RCRA permitted F-Area Inactive Process Sewer Line (FIPSL). Potential sources of contamination include historic releases along sections of the FIPSL. A collapsed section of the FIPSL is known to exist down gradient of the Tank Farm. The collapsed section is shown in Figure A-2. Sampling locations near the collapsed section of the FIPSL are not accessible at this time due to interferences with power lines and active steam lines.

In 2014, nonvolatile beta was the most widespread contaminant detected. It was present at levels exceeding 50 pCi/L in five of the fourteen wells with concentrations ranging from 72.8 pCi/L (BRR-6C) to 541 pCi/L (FTF 28).

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Historically the elevated concentrations have been detected in the area of wells FTF-28 and FSL 5D near the IPSL collapsed section, and also at down gradient well FGW 12C.

In addition to nonvolatile beta activities, a few wells near the IPSL have exceeded the MCL for iodine-129, strontium-90, and tritium. In 2014, iodine-129, radium-226, strontium-90, and tritium exceeded the MCL. The maximum concentrations were: iodine-129 (43.2 pCi/L), radium-226 (5.16 pCi/L), strontium-90 (13.6 pCi/L) and tritium (132 pCi/mL). All of these maximum concentrations occurred in wells along the FIPSL. Historically, both radium-228 and nitrate have also exceeded in at least one well. However, concentrations of radium-228 and nitrate were below MCLs at all sampled wells in the South plume.

Overall, the 2014 data indicate that the plume remains stable with respect to extent and concentrations. Monitoring results are provided in Appendix B.

During the August 2012 Core Team meeting, uncertainties associated with the extent of the South plume in the LAZ and the possibility of the South plume discharging to surface water were discussed. The Core Team recommended investigating a tributary to Upper Three Runs Creek that is located down gradient of well FGW 012C for potential sampling locations. The potential locations investigated included one surface water sample station, one seepage piezometer location, and a location for one new groundwater monitoring well, if needed. A field walk-down was held on April 16, 2013 with representatives from EPA, SCDHEC, and SRS. Based on the walk-down, groundwater discharge to the tributary was determined to begin approximately half-way down its length with the tributary being discharged to the floodplain swamp of Upper Three Runs Creek. The upper reaches of the tributary were dry.

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In September 2014, SRS installed a surface water sample station (FGW-024) near the discharge point to the swamp and in August 2014, a shallow piezometer (FGW-023) to sample groundwater discharging to the surface. Samples were first collected for the South plume constituents in August and September of 2014. Only nitrate-nitrite, radium-226, and tritium were detected and were all well below MCLs. Based on the sampling results, the South plume is not impacting this tributary to Upper Three Runs Creek. Future monitoring at these locations will be determined by the Core Team based on the monitoring results. The new monitoring locations (FGW 23 and FGW 24) are shown on Figures A-2 through A-5 and the results are presented in Appendix B. The monitoring frequency for these new stations will be semi-annual until a baseline is established; the analyte suite is the same as for the rest of the South plume.

#### **F-Area Retention Basin**

Previously the Core Team decided to incorporate the monitoring and reporting for the F-Area Retention Basin in this report. The GSA Western Groundwater OU monitoring network includes sampling at four wells for the F-Area Retention Basin (FRB-1 through FRB-4). The monitoring network is shown on Figure A-2 and details are provided in Table 1. Samples were collected from all of the wells. All results were below MCLs at the F-Area Retention Basin. The analytical data are presented in Appendix B.

#### ***4.1.1 Problem Warranting Action***

- Volatile organic compounds (VOCs), nitrate, and radionuclides in the UTRA are present at levels that exceed the respective MCLs.
  - VOCs and radionuclides have been present in groundwater at the seepage line at levels above the MCLs. In 2014, PCE and TCE exceeded the MCLs at the seepage line (West plume).
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#### ***4.1.2 Remedial Action Objectives***

- Ensure that contaminants in groundwater do not impact surface water at levels that exceed MCLs.
- Prevent human exposure to contaminants in groundwater at levels that exceed MCLs.

#### ***4.1.3 Scope of Problem***

Groundwater contaminants in the UTRA include VOCs, radionuclides, and nitrate. Tritium, TCE, and nonvolatile beta are recognized as the most widespread contaminants in the groundwater at the OU. Figures A-3, A-4, and A-5 show the distribution of these contaminants in the UTRA during 2014.

#### ***4.1.4 Likely Response Actions***

- Continued monitoring of groundwater in the UTRA and at the seepage line on an annual frequency. New wells added to the OU will be sampled semi-annually until a baseline is established.

#### ***4.1.5 Uncertainties***

- There is some uncertainty regarding the potential sources of shallow groundwater contamination due to the number of operating facilities and waste units within the boundaries of the GSA Western GW OU. Individually and collectively, these facilities and waste sites have contaminated the shallow aquifer that underlies this groundwater OU. The closure of the F-Area facilities will manage the uncertainties associated with residual sources. The uncertainty regarding source areas will ultimately be addressed by the F-Area OU remedial investigation (prior to Area Closure). Until then, the impact of the combined sources on groundwater will be tracked by continued groundwater monitoring in the GSA Western GW OU. The well network for
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each plume area, sampling frequency, and specific analyte lists are summarized in Table 1.

## **4.2 Surface Water**

Shallow groundwater within the OU discharges to surface water at the seep lines of Upper Three Runs Creek and Fourmile Branch. The Phase 1 Work Plan specified that if groundwater contamination was detected at the seep lines above the MCLs, then surface water quality would be evaluated. Four surface water sample locations are used to monitor water quality in the groundwater monitoring plan (see Figure A-2). In June 2010, the core team agreed to sample the surface water at the same frequency as the groundwater.

Characterization and monitoring well data show that groundwater contamination exists above MCLs adjacent to surface water at a few locations within the OU. At the North and West plumes groundwater at the seep line has exceeded MCLs for tritium, strontium-90, iodine-129, and VOCs in the past. However, confirmation sampling of the surface water has demonstrated that contaminant levels are below MCLs in the tributaries to Upper Three Runs Creek.

### **4.2.1 Problem Warranting Action**

- No problems warranting action have been identified for surface water at the OU.

### **4.2.2 Remedial Action Objectives**

- To date there were no MCL exceedances in surface water; therefore remedial action objectives are not applicable at this time.

### **4.2.3 Surface Water Scope of Problem Warranting Action**

The GSA Western GW OU contains three distinct areas of groundwater contamination. Since routine monitoring started in 2005, two of these plumes, the North plume and the

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West plume, have been above MCLs in groundwater near the discharge zone to the seep lines. In 2014, the North plume groundwater at the seep line was slightly above MCLs at a concentration of 2.23J pCi/L (iodine-129). At the West plume, PCE and TCE were above the MCL in groundwater at the seep line (5.43 and 8.52 ug/L, respectively). Historically, confirmation sampling of the surface water has demonstrated that contaminant levels have been and continue to be below MCLs in the tributaries to Upper Three Runs Creek.

#### **4.2.4 *Surface Water Likely Response Actions***

- Monitoring of surface water per the schedule in Table 1.

#### **4.2.5 *Uncertainties***

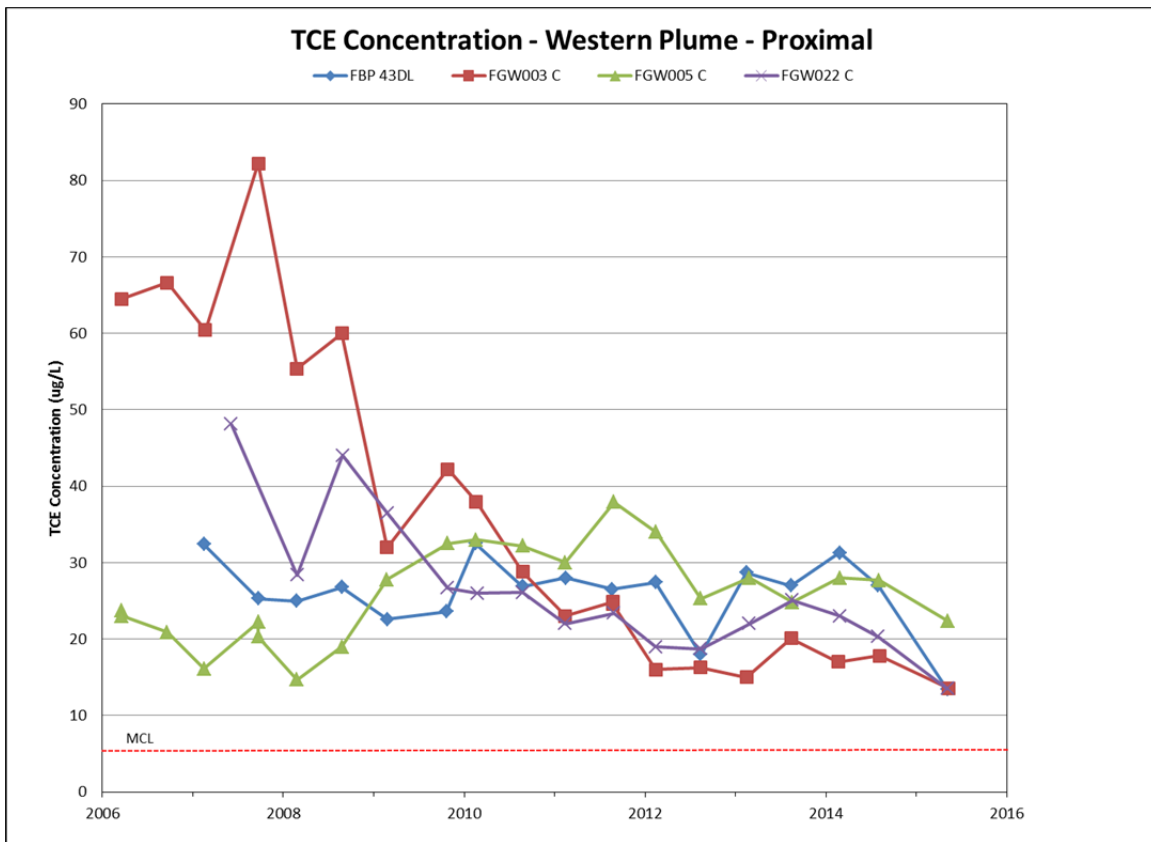
- It is uncertain if surface water of Upper Three Runs Creek and tributaries will be impacted by groundwater discharging from the North and West plumes. At some of the seep line locations contaminants have been detected above the MCL in groundwater. As more data is obtained, trends will be developed as necessary. This uncertainty is managed by monitoring surface water in the tributaries to Upper Three Runs Creek. Sample locations and analytes are summarized in Table 1.

### **5.0 OPERABLE UNIT STRATEGY**

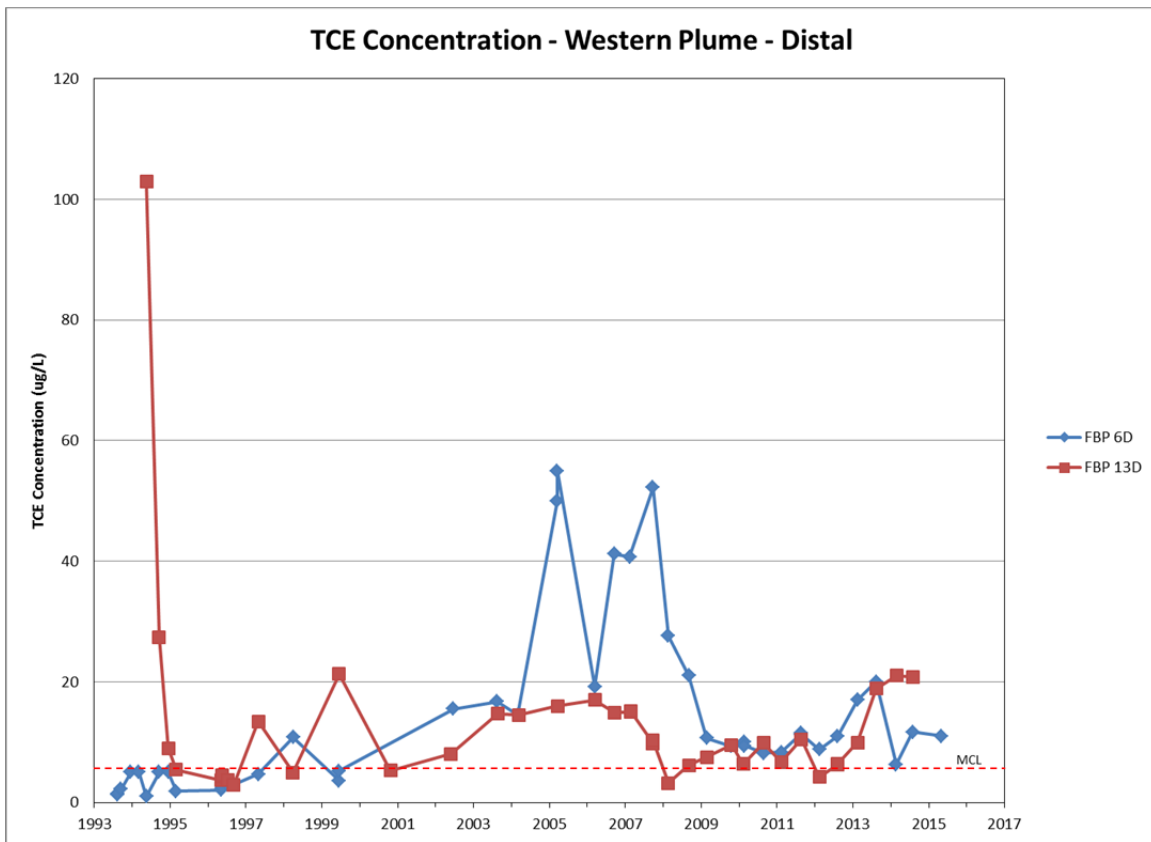
- SRS will sample the monitoring network annually for contaminants of concern until there is a decision to modify the frequency. New monitoring locations added to the OU will be sampled semi-annually until a baseline is established. Evaluation will be based on data trends. This information is reported in an annual update to this scoping summary.
  - SRS will convene the Core Team annually (or as necessary) to review data, re-evaluate the well network, sampling frequency, and analyte list, assess the
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effectiveness of the OU logic, and decide if the monitoring strategy is still appropriate or if changes are required (including the need for immediate action).

- SRS will notify the Core Team promptly if monitoring data indicate a problem that requires immediate action.



**Figure 1. TCE Concentration Near the Source in the West Plume**



**Figure 2. TCE Concentrations in the Distal Part of the West Plume**

**Table 1. Groundwater Monitoring Network**

Plume Description	Aquifer Zone	Well ID	Analyte List
West Plume	UAZ of UTRA	FBP10D, FBP6D, FBP12D, <del>FBP13D</del> , FBP43DL, FSL2D	Nitrate, gross alpha, nonvolatile beta, tritium, and TCL VOCs
	LAZ of UTRA	FBP1A, FBP2A, FBP43C, <del>FBP44D</del> , <del>FBP46D</del> , <del>FBP47D</del> , FGW003C, FGW005C, FGW019C, FGW022C	Alpha and beta/gamma speciation for FGW005C
	Seepine/Surface Water	UTR18R, UTR005	At surface water locations: field parameters for VOC degradation and degradation products
North Plume	LAZ of UTRA	FNB2, <del>FNB3</del> , FNB5, <del>FNB12</del> , FNB13, FNB15	Nitrate, gross alpha, nonvolatile beta, tritium, iodine-129, strontium-90, and TCL VOCs
	Seepine/Surface Water	UTR16, UTR6, <del>UTR7</del> , UTR003, UTR004	
South Plume	UAZ of UTRA	BRR1D, <del>BRR5D</del> , BRR6D, FSL4D, FSL5D, FSL6D, FSL7D, FSB76C, FGW012D	Nitrate, gross alpha, nonvolatile beta, tritium, iodine-129, radium-226, 228, strontium-90, technetium-99, uranium-233/234, 238
	LAZ of UTRA	BRR6C, BRR7C, FTF28, FSL11C, FGW012C	
	Seepine/Surface Water	One new surface water location and one new seepine piezometer	
F Area Retention Basin	UAZ of UTRA	FRB1, FRB2, FRB3, FRB4	Gross alpha, nonvolatile beta, cesium-137, strontium-90, radium-226, TCE

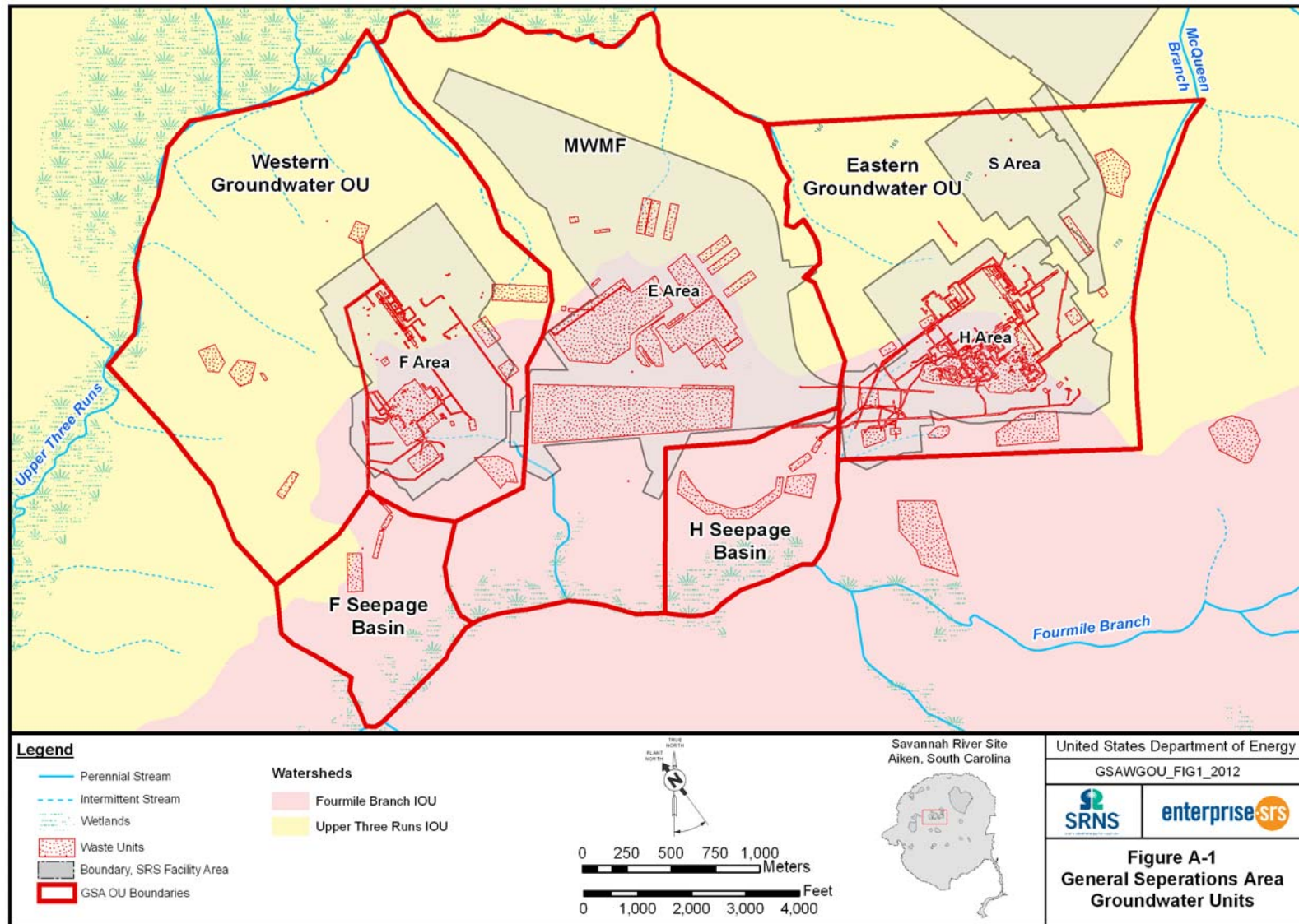
Sampling of the well network is performed annually for existing wells starting in 2014. New monitoring locations added to the OU will be sampled semi-annually until a baseline is established.

Network was revised during the August 2013 scoping meeting based on the Monitoring Optimization White Paper, SRNS-RP-2012-00783, Rev. 1, January 2014, and shows wells removed (strikethrough) from the monitoring network; however, the wells were sampled for a final time in 2014.

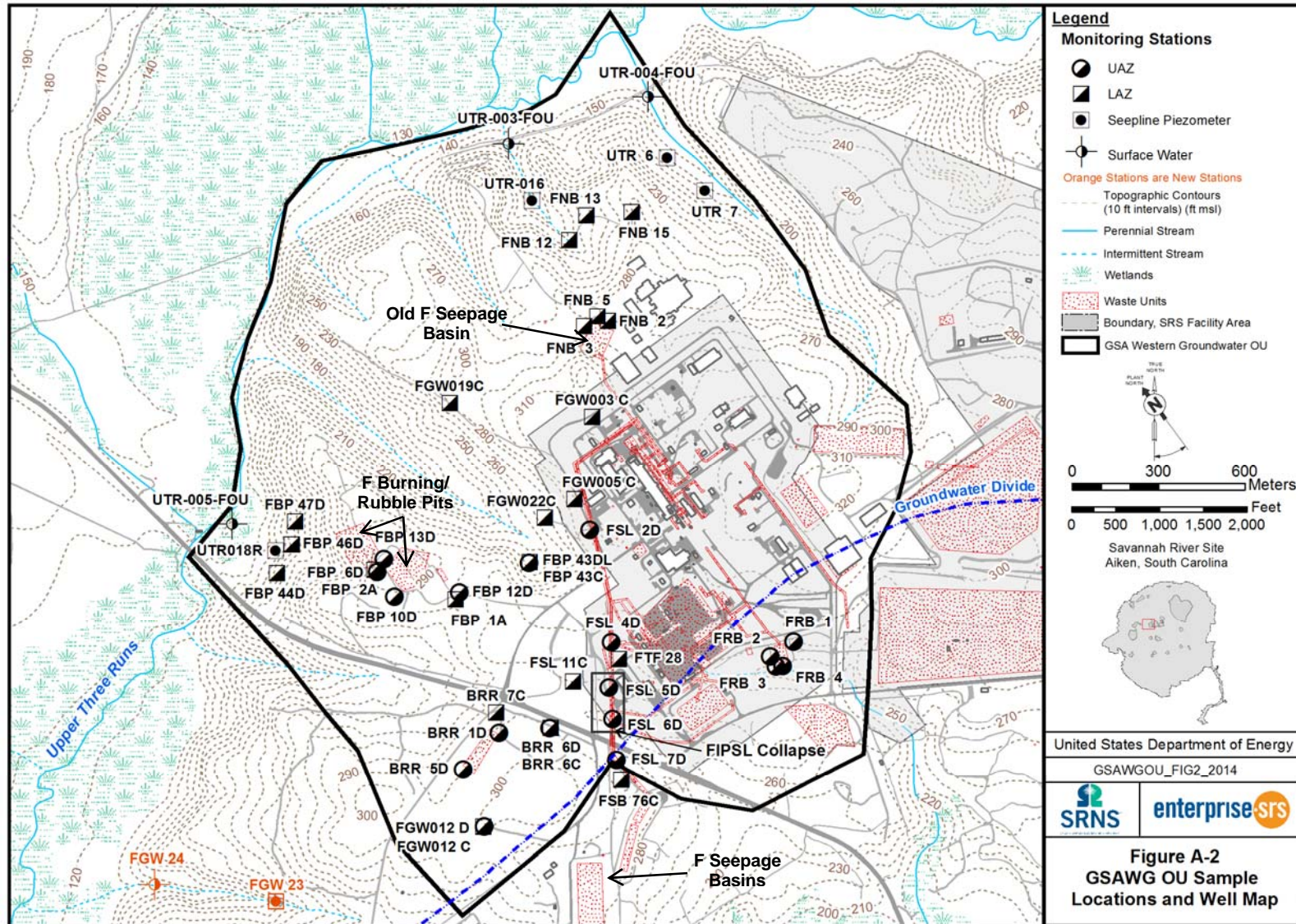
Sample locations are shown on Figure A-2. FBP-45D was abandoned in 2009.

## **Appendix A**

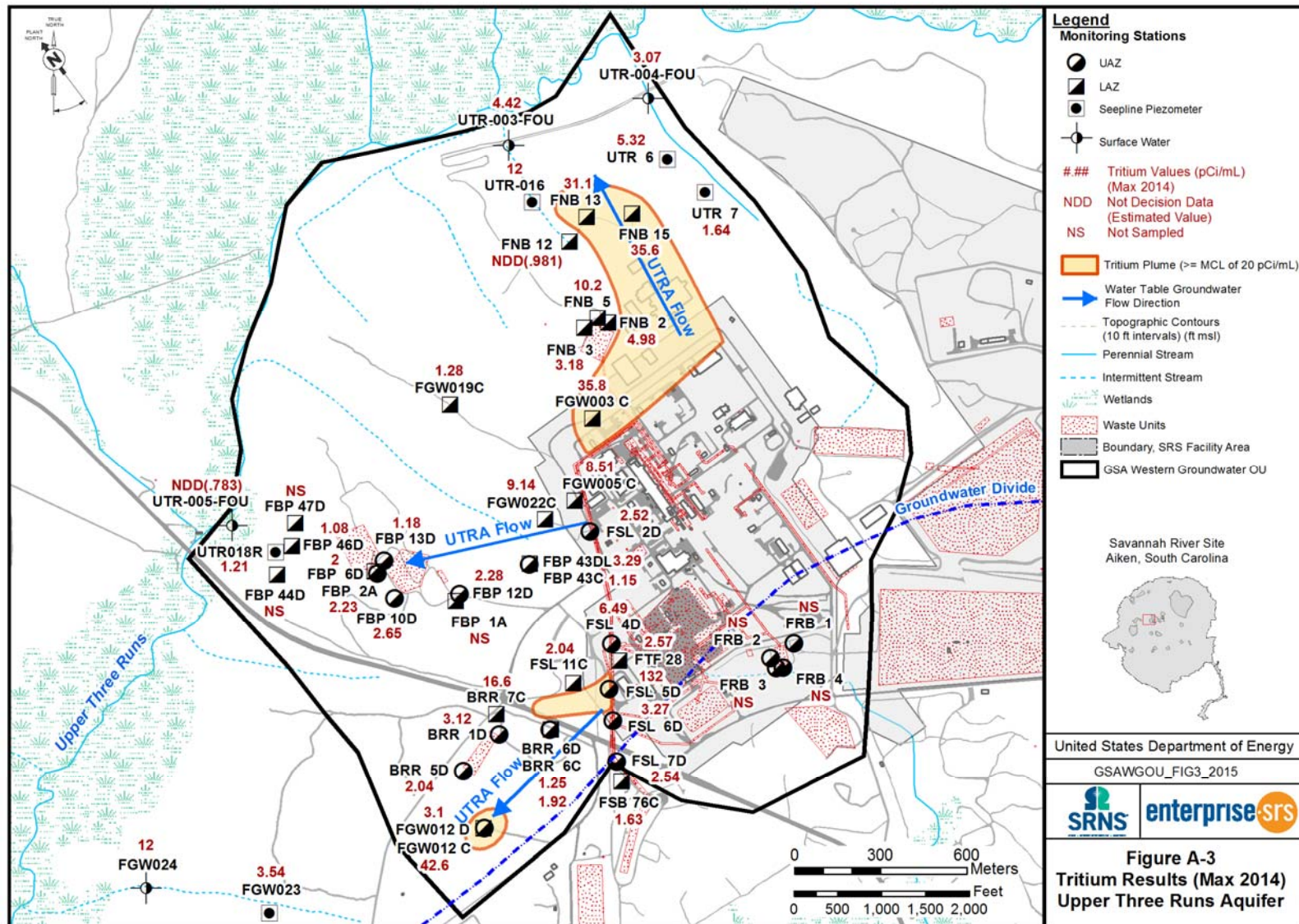
- Figure A-1 Groundwater Operable Units at the General Separations Area
- Figure A-2 GSA Western Groundwater OU Sample Locations and Well Map
- Figure A-3 Tritium Results (2014) Upper Three Runs Aquifer
- Figure A-4 Trichloroethylene Results (2014) Upper Three Runs Aquifer
- Figure A-5 Nonvolatile Beta Results (2014) Upper Three Runs Aquifer



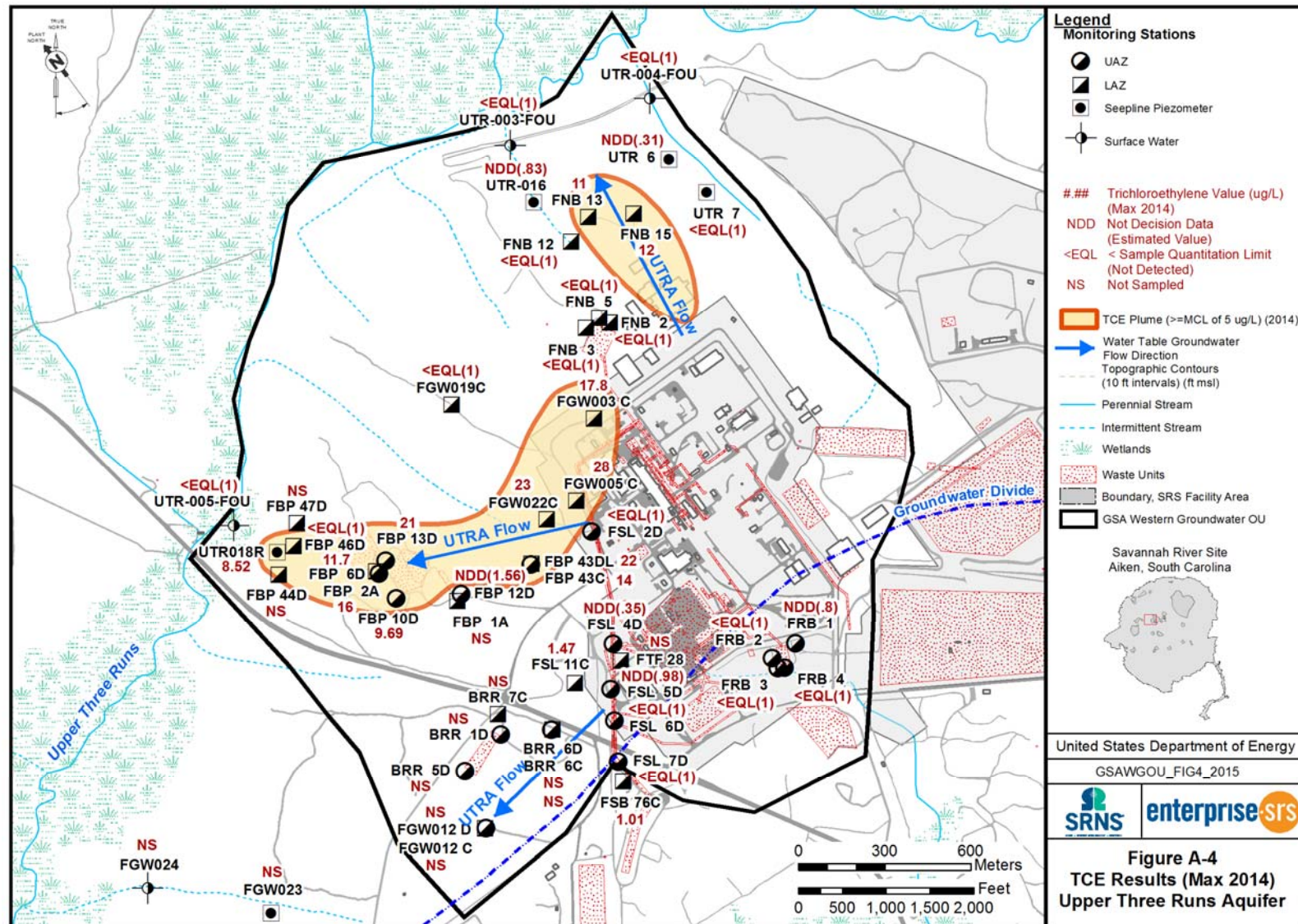




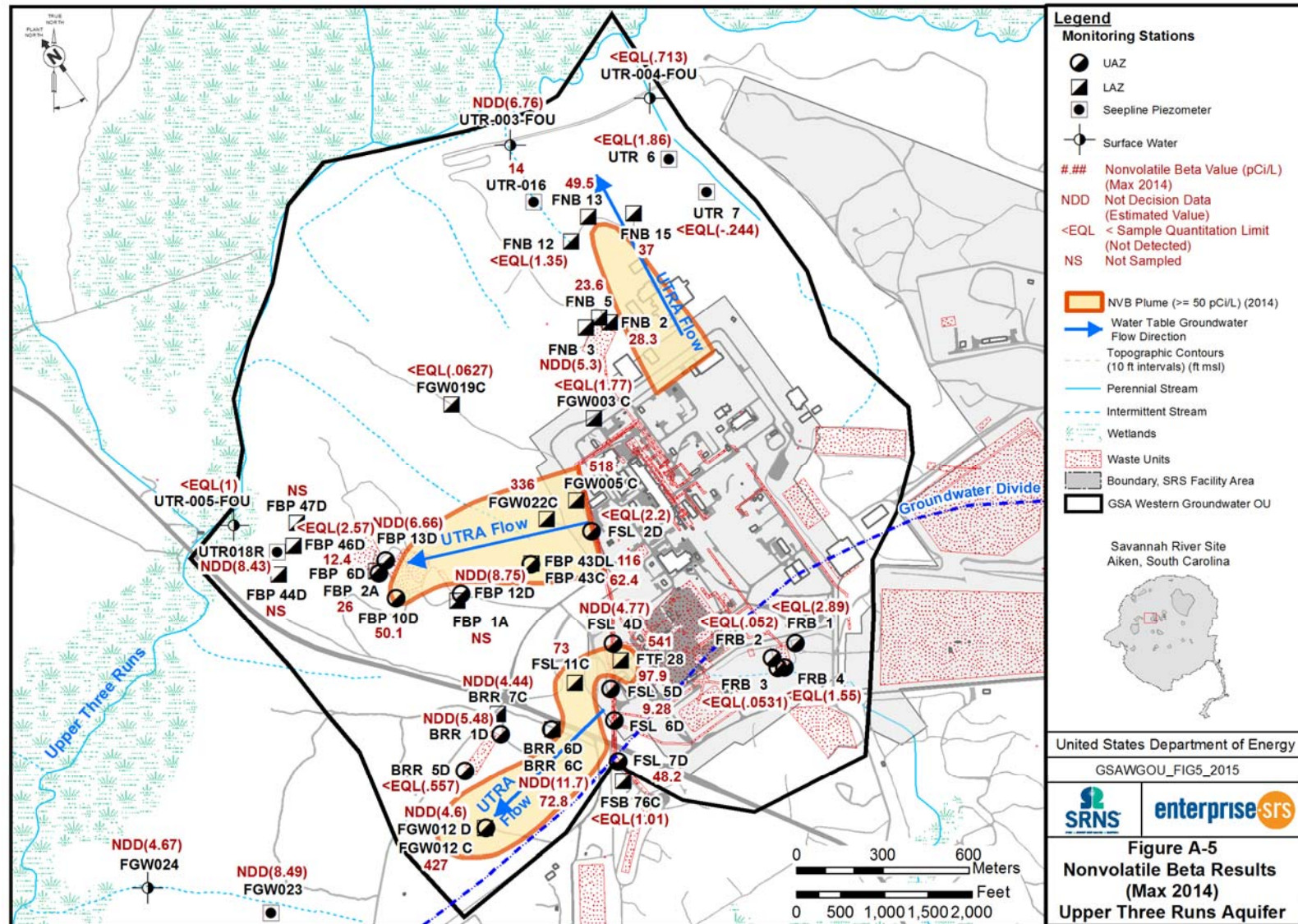












**Appendix B**

**2014 Monitoring Well Results  
Tables B-1 and B-2**

Key to Field Conditions Codes for Data Matrix Tables

<u>Field Code</u>	<u>Explanation</u>
A	Pump is surging excessively; aerated
B	Blank sample was collected
C	Well is continuously pumping
D	Well is dry-no sample or field data collected
E	Equipment blank was collected
I	Well went dry during sampling; field data collected but insufficient water to collect all samples
L	Well went dry before sampling began; only depth to water can be determined
N	Well was not stabilized before sampling began
P	Inaccessibility or mechanical failure prevented sample collection and field analysis of the water
S	No water in standpipe; for water level events only
T	Samples were collected, but some samples were not sent to the laboratory due to high turbidity
W	Unable to sample well because of stabilization or sampling equipment failure; water-level measurements were obtained
X	Well went dry during purging; samples collected after well recovered measurements obtained
0	OK
1	Pump Dry
2	Sampled after recovery
3	Gallons purged through sample port
4	DI water obtained from 772-7B
5	High turbidity
6	Flow meter leaking
7	Pump failure
8	Flow meter not operating
9	# gallons added
10	Well is inaccessible, well cannot be Sampled
11	Well abandoned
12	No water to surface
13	Field measurements only
14	Not all samples were collected
15	Equipment failure
16	No water in standpipe
17	Bailed well
18	Water level tape not long enough
19	Well not sampled, maintenance required
20	Well sampled, maintenance required
21	Measurement Exceeded Criteria



**Table B1. First Quarter GSAWOU 2014  
Monitoring Well Sampling Results**

[illegible][illegible]

Explanation	
[#]	EPA Functional Guideline Code of 'J' was applied to the result, indicating an estimated quantity.
<EQL[EQL]	Constituent was below detection. The sample-specific Estimated Quantitation Limit is in parentheses.
REJ	Result exceeds applicable limit.
[#]	Result Rejected
[#]	Result is less than the applicable limit and without EPA Functional Guideline qualifiers.
NS	Requested to be sampled but was not. See comments as to why not.
<u>Blue Text</u>	Not a required sample analysis.
D	Well is Dry
B	Well is continuously flowing or surface water
X	Well not dry during sampling; samples collected after recovery
X	Sample collection could not be completed due to inaccessibility or mechanical failure
X	Samples were collected but some samples were not sent due to high turbidity



Table B2. Third Quarter GSAWOU 2014  
Monitoring Well Sampling Results

GSA Western GW OU Monitoring Constituents										VOC	
Field Data											
Day-month-year SAMPLE COLLECTION DATE											
pH											
ft											
µS/cm											
mg/L											
°C											
FIELD CONDITIONS											
Constituent											
GWPS Unit											
10											
200											
5											
15											
1											
50											
5											
5											
8											
20											
15											
15											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHYLENE											
1,2,3-TRICHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROBENZENE											
1,2-DICHLOROPROPANE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-DIOXANE											
2-HEXANONE											
ACETONE											
BENZENE											
BROMOCHLOROMETHANE											

Field Data										VOC	
Day-month-year SAMPLE COLLECTION DATE											
pH											
ft											
µS/cm											
mg/L											
°C											
FIELD CONDITIONS											
Constituent											
GWPS Unit											
10											
200											
5											
15											
1											
50											
5											
5											
8											
20											
15											
15											
1,1,1-TRICHLOROETHANE											
1,1,2,2-TETRACHLOROETHANE											
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE											
1,1,2-TRICHLOROETHANE											
1,1-DICHLOROETHANE											
1,1-DICHLOROETHYLENE											
1,2,3-TRICHLOROBENZENE											
1,2,4-TRICHLOROBENZENE											
1,2-DIBROMO-3-CHLOROPROPANE											
1,2-DIBROMOETHANE											
1,2-DICHLOROBENZENE											
1,2-DICHLOROPROPANE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
1,4-DIOXANE											
2-HEXANONE											
ACETONE											
BENZENE											
BROMOCHLOROMETHANE											

Explanation

##	EPA Functional Guideline Code of J was applied to the result, indicating an estimated quantity.
-EQL(##)	Constituent was below detection. The sample-specific Estimated Quantitation Limit is in parentheses.
Result	Result exceeds applicable limit.
REJ	Result Rejected
NS	Result is less than the applicable limit and without EPA Functional Guideline qualifiers.
Blue Text	Requested to be sampled but was not. See comments as to why not.
	Not a required sample analysis.
D	Well is Dry
C	Well is continuously flowing or surface water
X	Well wet dry during sampling, samples collected after recovery
P	Sample collection could not be completed due to inaccessibility or mechanical failure
T	Samples were collected but some samples were not sent due to high turbidity