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SAUGET AREA 2,
SAUGET, ILLINOIS

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY REPORT VOLUME 5

Appendices H through N

Prepared for

Sauget Area 2 Sites Group
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APPENDIX H

Data Validation Reports

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____20209031_____ **Fraction:** ___VOCs – Air Samples_____

Lab: __Severn Trent-Austin_____ **Project Name:** ___Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____October 22, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method (TO-15) employed.

Major Anomalies: The LCS/LCSD recoveries for cis-1,3-dichloropropene (56% and 57%), styrene (44% and 44%), and o-xylene (49% and 50%) were less than the lower control limit in the LCS/LCSD pair for batch # 37930. The LCS/LCSD recoveries for chlorobenzene (60%), cis-1,3-dichloro-propene (56% and 60%), styrene (43% and 47%), and o-xylene (48% and 52%) were less than the lower control limit in the second LCS/LCSD pair (Batch # 37933). The LCS/LCSD recoveries for cis-1,3-dichloropropene (60% and 58%), styrene (46% and 45%), and o-xylene (52% and 51%) were less than the lower control limit in the third LCS/LCSD pair (Batch # 37951). Positive detections for these compounds in the associated samples were flagged "J, l" and non-detects were flagged "R, l". Positive chlorobenzene detections in samples SQ6VC082802-D111 and SQ6VC082802R096 (the original result from the 9/11/02 analysis) were flagged "UR, zl" due to a combination of method blank contamination and LCS recovery failure. The percent completeness for this analysis was less than the control limit (i.e., 95%) at 92.1%.

Minor Anomalies: The method blank (batch # 37930, analyzed on 9/10/02) contained acetone at 0.0650 ppbv, chlorobenzene at 0.0108 ppbv, and toluene at 0.00860 ppbv. The method blank (batch # 37933, analyzed on 9/11/02) contained chlorobenzene at 0.0122 ppbv, ethyl benzene at 0.00420 ppbv, and toluene at 0.00940 ppbv. The method blank (batch # 37951, analyzed on 9/12/02) contained acetone at 0.170 ppbv, chlorobenzene at 0.0126 ppbv, and toluene at 0.00900 ppbv. Positive detections less than ten times (for acetone) or five times (for others) the blank concentration, were flagged "U, z" in the associated samples. The trip blank, SQ7VC082802B116, contained toluene at 0.0147 ppbv. This result was previously flagged "U, z" due to method blank contamination. Therefore, this result was not used to assess the associated samples. The continuing calibration verification (CCV) analyzed on 9/10/02 at 11:30 displayed a %R greater than the upper control limit (i.e., 130%) for acetone at 139%. The CCV analyzed on 9/11/02 at 10:20 displayed a %R greater than the upper control limit for acetone at

138%. The CCV analyzed on 9/12/02 at 11:45 displayed a %R greater than the upper control limit for acetone at 160%. Positive acetone results, except those previously flagged due to method blank contamination, were flagged "J, c" in the associated samples. Field duplicates displayed %RPDs greater than the control limit (i.e., 50%) for acetone (81%) and 2-butanone (80%) in one field duplicate pair (SO4VC082502R060 and SO4VC082502D065). Positive acetone and 2-butanone results, except those previously flagged due to blank and/or calibration failure, were flagged "J, f" in the Site O samples. Field duplicates displayed a %RPD greater than the control limit for methylene chloride (116%) in another field duplicate pair (SQ6VC082802R096 and SQ6VC082802D111). Positive methylene chloride results were flagged "J, f" in the Site Q samples. Several positive 2-butanone results were flagged "F" by the laboratory to indicate that these results may display matrix interference or co-elution with other compound(s). These results, except those previously flagged due to field duplicate imprecision, were flagged "J, w".

Correctable Anomalies: None.

Comments: The laboratory set the reporting limits to 0.0 ppbv for all target compounds. Positive detections between the reporting limit and the method detection limit (MDL) were reported and flagged "U" by the laboratory. The "U" flag indicates that the result was less than the sample specific MDL. Since any results less than the MDL should be considered non-detects, the results and "U" flags were crossed-out and replaced with "ND" flags by the reviewer. The "ND" flag indicates that the target compound was not detected at the specified reporting limit (0.0 ppbv). The "ND" flag should be re-defined as not detected at the specified method detection limit.

Sample SQ6VC082802R096 was originally analyzed on 9/11/02 and re-analyzed on 9/12/02 by the laboratory. There is no clear reason why this sample was analyzed twice. Both results were reported. Since the re-analyzed results match better with the field duplicate sample SQ6VC082802D111, the re-analyzed results should be used for data interpretation. The original results were crossed-out by the reviewer.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _SAI11A – TCLP Waste__ **Fraction: __VOCs, SVOCs, Pesticide, PCBs,___ __Herbicide and Metals_____**

Lab: _____STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: ___Jason Ai_____ **Date: _____March 6, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, one TCLP blank, 0709T, contained chloromethane at 0.025 mg/L and benzene at 0.0025 mg/L. The method blank analyzed on 07/18/02 contained methylene chloride at 0.0084 mg/L. Positive chloromethane and methylene chloride results less than 5X or 10X (for methylene chloride) the blank concentration were flagged U, z" at the reporting limits in the associated samples. Since positive benzene results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 7/12/02 at 12:14 displayed %Ds greater than the control limit (i.e., 20%) for bromomethane at -34.9%, chloroethane at -31.0%, acetone at 46.9%, 2-butanone at 63.3%, 1,2-dichloro-ethane at 23.1%, 4-methyl-2-pentanone at 78.7%, trans-1,3-dichloropropene at 22.3%, 1,1,2-trichloroethane at 27.9%, 2-hexanone at 75.5%, dibromochloromethane at 21.8%, and 1,1,2,2-tetrachloroethane at 39.2%. Since the associated sample is a QC sample (TCLP blank), no data qualifying action was taken. The CCV analyzed on 7/17/02 at 12:22 displayed %Ds greater than the control limit for bromomethane at -27.6%, chloroethane at -20.9%, acetone at 56.5%, 2-butanone at 67.3%, 4-methyl-2-pentanone at 70.3%, trans-1,3-dichloropropene at 22.3%, 1,1,2-trichloroethane at 26.9%, 2-hexanone at 74.0%, dibromochloromethane at 26.7%, bromoform at 26.1%, and 1,1,2,2-tetrachloroethane at 39.4%. Positive results were flagged "J, c" in the associated samples. Acetone and 2-butanone results in sample WASTE-O-3-9'-T were flagged "UJ, c". Since all other non-detects have %D failures less than 50%, which was not serious enough to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 7/18/02 at 10:46 displayed %Ds greater than the control limit for bromomethane at -33.1%, chloroethane at -24.2%, acetone at 27.8%, 2-butanone at 42.1%, 4-methyl-2-pentanone at 55.0%, 2-hexanone at 53.4%, dibromochloro-methane at 20.7%, and 1,1,2,2-tetrachloroethane at 29.2%. Positive results were flagged "J, c" and 2-butanone

non-detect results were flagged "UJ, c" in the associated samples. The MS/MSD recoveries were greater than the upper control limit (i.e., 167%) for 2-butanone at 186% and 184%. Since the parent sample is not collected from project site (non-client sample) and 2-butanone results were previously flagged due to calibration failure, no additional data qualifying action was taken. The LCS recovery was greater than the upper control limit (i.e., 167%) for 2-butanone at 184%. Since 2-butanone results in the associated samples were previously flagged due to calibration failure, no additional data qualifying action was taken. The toluene results in samples WASTE-S-2-6'-T and WASTE-S-1-6'-T exceeded the linear range of the calibration curve. The toluene results in samples WASTE-S-2-6'-T and WASTE-S-1-6'-T were flagged "J, q". Since toluene is not a TCLP target compound, these two samples were not diluted or re-analyzed by the laboratory. Reporting limits were raised by a factor of 2 in samples WASTE-S-2-6'-T, WASTE-S-1-6'-T, WASTE-O-3-9'-T, and WASTE-O-2-7'-T due to dilutions (abundance of target compounds).

For the SVOC analyses, one fluid blank contained bis(2-ethylhexyl)phthalate at 0.0062 mg/L. Positive bis(2-ethylhexyl)phthalate results were flagged "U, z" at the reporting limit in the associated samples. The initial calibration analyzed on 7/12/02 displayed a correlation coefficient less than the control limit for 2,4-dinitrophenol at 0.9889. This compound was not detected in the associated samples and was flagged "UJ, r". The CCV analyzed on 7/16/02 at 08:21 displayed %Ds greater than the control limit (i.e., 20%) for 3,3'-dichlorobenzidine (-22.8%), indeno(1,2,3-cd)pyrene (-28.9%), and surrogate 2,4,6-tribromophenol (-21.4%). The CCV analyzed on 7/16/02 at 20:24 displayed %Ds greater than the control limit for 3,3'-dichlorobenzidine (-21.0%), benzo(k)fluoranthene (44.6%), and indeno-(1,2,3-cd)pyrene (-35.4%). Since these compounds were either not detected in the associated samples, not used for data interpretation, or were surrogates, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Base/neutral surrogates were not recovered (0%) in two diluted samples WASTE-O-1-COMP-T-DL (DF=5) and WASTE-O-1-COMP-T-DUP-DL (DF=5). Since the base/neutral results in these two diluted samples are not to be used for data interpretation, no data qualifying action was taken. The isophorone result in sample WASTE-S-2-COMP-T exceeded the linear range of the calibration curve and was flagged "J, q". Since isophorone is not a TCLP target compound, this sample was not diluted or re-analyzed by the laboratory. Several results in samples WASTE-S-1-COMP-T, WASTE-O-3-COMP-T, WASTE-O-1-COMP-T, and WASTE-O-1-COMP-T-DUP exceeded the linear range of the calibration curve and were flagged "J, q". These samples were diluted by factors of 5 or 10 and reanalyzed by the laboratory. The results from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for surrogates 2,4-DCAA (-27.5%),

tetrachloro-m-xylene (TCMX, -18.6%), and decachloro-biphenyl (DCBP, -16.0%) on the primary column and for 2,4-DCAA (-26.2%) on the confirmation column were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/11/02 at 11:23. The %Ds for TCMX (-21.3%) and 2,4-DCAA (-28.0%) on the primary column and for methoxychlor (20.8%) and 2,4-DCAA (-25.2%) on the confirmation column were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/11/02 at 17:33. The positive methoxychlor result in sample WASTE-O-3-COMP-T was flagged "J, c". Since other outliers are surrogates, no data qualifying action was taken. The DCBP surrogate recovery in sample WASTE-O-1-COMP-T (21%) was less than the lower control limit (i.e., 30%) on the primary column. Since all other surrogate recoveries were in control, no data qualifying action was taken. The DCBP and TCMX surrogate recoveries in sample WASTE-O-1-COMP-T-DUP (26% and 29%, respectively) were less than the lower control limit (i.e., 30%) on the primary column. Positive results were flagged "J, s" and non-detects were flagged "UJ, s" in this sample. The internal standard peak area for bromonitrobenzene was greater than the QC limit (i.e., 50-150%) in samples WASTE-O-1-COMP-T (229.7%) and WASTE-O-1-COMP-T-DUP (234.9%). Since no target compounds were detected in these two samples, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., 40%) for most of positive detections. These results, except those previously flagged due to calibration failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low. Samples WASTE-O-1-COMP-T and WASTE-O-1-COMP-T displayed internal standard %Rs greater than the upper control limit (i.e., 150%) on the primary column for bromonitrobenzene at 229.7% and 234.9%, respectively. Since target compounds were not detected in these two samples and the internal standard peak area was not used for quantitation, no data flags were applied.

For the PCB analyses, the monochlorobiphenol result in sample WASTE-O-3-COMP-T exceeded the linear range of the calibration curve. The positive monochlorobiphenol result in this sample was flagged "J, q". This sample was diluted by a factor of 2 and reanalyzed by the laboratory. The monochlorobiphenol result from the dilution analysis should be used for data interpretation.

For the herbicide analyses, the %D for 2,4,5-T (16.3%) on the primary column were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/23/02 at 14:12. Positive 2,4,5-T results in the associated samples were flagged "J, c". The %Ds for 2,4-D (18.6%), pentachlorophenol (17.5%), 2,4,5-TP (17.7%), and 2,4,5-T (16.9%) on the primary column were greater than the criterion for the continuing calibration analyzed on 7/26/02 at 12:51. The %Ds for dicamba (15.6%), pentachlorophenol (18.0%), and 2,4,5-TP (16.6%) on

the primary column were greater than the criterion for the continuing calibration analyzed on 7/26/02 at 17:21. Positive results for these compounds were flagged "J, c" in the associated samples. Since non-detect results for these compounds had acceptable %Ds on the alternate column, no data qualifying action was taken. The 2,4-DCAA surrogate recoveries on the confirmation column were greater than the upper control limit (i.e., 133%) in samples WASTE-O-1-COMP-T (2150%), WASTE-O-1-COMP-T-DUP (2500%), WASTE-S-1-COMP-T (5500%), and WASTE-O-3-COMP-T (2500%). Positive results, except those previously flagged due to calibration failure, were flagged "J, s" in these samples. Several results in samples WASTE-O-1-COMP-T, WASTE-O-1-COMP-T-DUP, and WASTE-O-3-COMP-T exceeded the linear range of the calibration curve. Since these results were previously flagged due to calibration and/or surrogate recovery failures, no additional data qualifying action was taken. These samples were diluted by factors of 10 or 20 and reanalyzed by the laboratory. The results from the dilution analysis should be used for data interpretation. The pentachlorophenol results in samples WASTE-S-1-COMP-T and WASTE-O-2-COMP-T exceeded the linear range of the calibration curve and were flagged "J, q" unless previously flagged due to surrogate recovery failure. The pentachloro-phenol result in diluted sample WASTE-O-3-COMP-TDL still exceeded the linear range of the calibration curve. Since this result was previously flagged due to calibration failure, no further data qualifying action was taken. Since pentachloro-phenol is not a TCLP target compound, these samples were re-analyzed with dilution by the laboratory. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., 40%) for several positive detections. These results, except those previously flagged due to calibration or surrogate recovery failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, four continuing calibration verifications (CCVs) displayed %Rs for calcium greater than the upper control limit (i.e., 110%) at 111% (CCV3) and 113% (CCV4, CCV5, and CCV6). Positive calcium results were flagged "J, c". The final CRDL percent recovery for lead (130%) was greater than the upper control limit (i.e., 120%). Since this recovery was marginally outside the control limit, no data qualifying action was taken. The preparation blanks contained aluminum at –0.12808 mg/L and –0.14242 mg/L, calcium at 0.50252 mg/L and 2.99788 mg/L, magnesium at 0.09817 mg/L, selenium at –0.08336 mg/L, thallium at –0.07113 mg/L, and zinc at 0.05972 mg/L. Aluminum was also detected in three continuing calibration blanks (CCBs) at –0.01770 mg/L (CCB4), -0.01849 mg/L (CCB5), and –0.01586 mg/L (CCB6). Selenium was also detected in CCB6 at –0.00717 mg/L. Positive aluminum results in the associated samples were flagged "J, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since the action levels for

aluminum and selenium (five times the absolute blank concentration) were less than the reporting limits, non-detects for aluminum and selenium were judged not affected by the reviewer and no data qualifying action was taken. Thallium was not detected in the associated samples and non-detects were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. The positive zinc result in sample WASTE O-2-COMP-T was flagged "U, P" at the reporting limit. Since calcium and magnesium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Beryllium was detected in the initial calibration blank (ICB) at 0.00022 mg/L, CCB5 at –0.00027 mg/L, and CCB6 at –0.00026 mg/L. Since beryllium was not detected in the associated samples and the action levels (five times the absolute blank concentration) were much less than the reporting limit (0.040 mg/L), non-detects for beryllium were judged not affected by the reviewer and no data qualifying action was taken. Cadmium was detected in CCB5 at 0.00109 mg/L and CCB6 at 0.00087 mg/L. Cobalt was detected in CCB4 at 0.00129 mg/L and CCB5 at 0.00106 mg/L. Copper was detected in CCB6 at 0.00107 mg/L. Positive detections for cadmium, cobalt, and copper less than five times the blank concentration were flagged "U, o" at the reporting limit. Lead was detected in the ICB at –0.00158 mg/L. The positive lead result in sample WASTE-O-3-COMP-T was flagged "J, o". Since other lead results were either greater than five times the blank concentration or non-detects (the reporting limit was much greater than the action level), no data qualifying action was taken. Barium, calcium, manganese, thallium, and vanadium were also detected in CCBs at low levels. Since these analyte results in the associated samples were either non-detects or greater than five times the blank concentration, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: In the original data package (SAII11), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds by the laboratory. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

An MS/MSD analyses was not performed on these TCLP waste samples. Given that the majority of LCS/LCSD results associated with this SDG were acceptable, and no major matrix interference was observed in the chromatographs associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of anomalies discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAI17A_____ **Fraction:** __TCLP VOCs, SVOCs, Pest., PCBs,_ __Herb.,_Metals, _____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____March 11, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the herbicides analyses, surrogate 2,4-DCAA was not recovered (0%) on the confirmation column in sample WATE-R-4-COMP-T. Positive results were flagged "J,s" and non-detects were flagged "R,s". The percent completeness was less than the QC limit (i.e., 90%) at 79.5%.

Minor Anomalies: For the VOC analyses, the TCLP blank, 0717T, contained chloromethane at 0.039 mg/L, methylene chloride at 0.026 mg/L, 2-butanone at 0.040 mg/L, and 4-methyl-2-pentanone at 0.058 mg/L. The method blank analyzed on 07/30/02 contained chloromethane at 0.0053 mg/L and methylene chloride at 0.047 mg/L. The method blank analyzed on 07/31/02 contained methylene chloride at 0.025 mg/L. Positive results in the associated samples less than 5X or 10X (for common contaminants) the blank concentration were flagged "U, z" for results greater than the reporting limit or flagged "U, z" at the reporting limits for results less than the reporting limit. The CCV analyzed on 7/30/02 at 0829 displayed %Ds greater than the control limit for chloromethane at -21.5% and acetone at 25.7%. The positive acetone result in sample WASTE-R-2-20' was flagged "J, c". Since acetone was not detected in other samples and this anomaly was only marginally outside the control limit (i.e., <50%), no data qualifying action was taken for acetone non-detects. Since positive chloromethane results in the associated samples were flagged as non-detect due to method blank contamination, no further data qualifying action was taken. The CCV analyzed on 7/31/02 at 1314 displayed %Ds greater than the control limit for bromomethane at -49.0%, acetone at 50.7%, 2-butanone at 52.8%, 4-methyl-2-pentanone at 61.4%, 2-hexanone at 62.8%, dibromochloro-methane at 22.7%, bromoform at 22.3%, and 1,1,2,2-tetrachloroethane at 37.4%. The positive acetone result in sample WASTE-R-2-20' was flagged "J, c" and the non-detect result for 2-hexanone was flagged "UJ, c". Since positive 2-butanone and 4-methyl-2-pentanone results in sample WASTE-R-2-20' were previously flagged due to method blank contamination, no further data qualifying action was taken. Since all other compounds were not detected in the associated samples and the anomaly was only

marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The MS recovery (174%) and the %RPD (40%) were greater than the QC limit for 2-butanone. Since the MSD and LCS recoveries were in control, no data qualifying action was taken.

For the SVOC analyses, the fluid blank, 0718G-DFB, contained benzo(k)-fluoranthene at 0.0043 mg/L, indeno(1,2,3-cd)pyrene at 0.015 mg/L, dibenzo(a,h)-anthracene at 0.014 mg/L, and benzo(g,h,i)perylene at 0.017 mg/L. The fluid blank, 0718G-DFB2, contained indeno(1,2,3-cd)pyrene at 0.0086 mg/L, dibenzo-(a,h)anthracene at 0.0077 mg/L, and benzo(g,h,i)perylene at 0.010 mg/L. Positive results in the associated samples were flagged "U, z" at the reporting limits. All base/neutral surrogates were not recovered (0%) in diluted sample WASTE-R-4-COMP-TDL (DF=5). Since only three target compounds from acid fraction will be used for data interpretation, no data qualifying action was taken. One acid surrogate and all three base/neutral surrogates were not recovered (0%) in diluted sample WASTE-R-3-22-FTDL (DF=5). Eleven positive results were flagged "J, s" and should be used for data interpretation. All other results were crossed-out by the reviewer and should not be used for data interpretation. All surrogates were diluted out in samples WASTE-R-2-COMP-TDL (DF=25) and WASTE-R-1-COMP-TDL (DF=10). No data qualifying action was taken for these two samples since the dilution factors were greater than or equal to 10. Several compounds exceeded the calibration range and were flagged "E" by the laboratory. These results were flagged "J, q". The associated samples were re-analyzed at different dilution factors and the majority of the results were within the calibration range. The 2,4-dichlorophenol result in sample WASTE-R-2-COMP-TDL and 2,4-dichlorophenol, 4-chloroaniline, and 4-nitroaniline results in sample WASTE-R-3-22FTDL still exceeded the calibration range. These results, except those previously flagged due to surrogate recovery failure, were flagged "J, q". Since these compounds are not TCLP target compounds, these samples were not re-analyzed at greater dilutions by the laboratory. Results from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for alpha-BHC (-18.5%), delta-BHC (-18.4%), 4,4'-DDD (-16.6%) and surrogate tetrachloro-meta-xylene (TCMX, -20.0%) on the primary column and methoxychlor (38.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibrations analyzed on 7/22/02 at 1436. The %Ds for alpha-BHC (-17.6%), delta-BHC (-16.5%), and surrogates 2,4-DCAA (-18.2%) and TCMX (-21.0%) on the primary column and methoxychlor (43.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 7/22/02 at 2019. Since these compounds had acceptable %Ds on the other column and no positive results were reported in the associated samples, no data qualifying action was taken. The %Ds for methoxychlor (25.8% and 20.6%) on both columns, for

4,4'-DDE (-23.9%) and surrogate TCMX (-16.2%) on the primary column, and for 4,4'-DDT (18.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/2/02 at 1517. The %Ds for endrin (16% and 17%), 4,4'-DDT (19.8% and 26.1%), methoxychlor (44.7% and 42.0%), endrin ketone (19.1% and 21.3%), and surrogate 2,4-DCAA (-19.5% and -15.8%) on both columns; for heptachlor (18.6%), dieldrin (16.0%), 4,4'-DDD (19.7%), and endosulfan sulfate (19.7%) on the confirmation column; and for surrogate TCMX (-15.5%) were greater than the criterion for the continuing calibration analyzed on 8/3/02 at 0038. In sample WASTE-R-4-COMP-T, the positive result for methoxychlor was flagged "J,c" and non-detects for endrin, 4,4'-DDT, and endrin ketone were flagged "UJ,c". Since all other results were either non-detect or the compounds met criteria on the alternate column, or was a surrogate, no data qualifying action was taken. The recoveries for surrogate TCMX were less than the QC limit (i.e., 30-150%) in samples 0718P-RMB (13% and 15%), 0718P-RFB (18% and 10%), and 0718P-RMBLCS (27%). No action was required since these are QC samples. The recovery for surrogate TCMX was less than the QC limit (i.e., 30-150%) in sample WASTE-R-3-22FT (25%). Since other surrogate recoveries were acceptable, no data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., < 40%) for most of the positive detections. These results were flagged "J, g" unless previously flagged due to other anomalies.

For the herbicide analyses, the fluid blank, 0719N-SFB1, contained pentachlorophenol at 0.0046 mg/L. The fluid blank, 0719N-SFB2, contained pentachlorophenol at 0.0072 mg/L. Since pentachlorophenol results in the associated samples were either non-detect or greater than five times the blank concentration, no data qualifying action was taken. The %D for pentachlorophenol (16.9%) on the primary column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/25/02 at 0743. The positive pentachlorophenol result was flagged "J, c" in sample WASTE-R-4-COMP-T. The %Ds for MCPP (19.4%), 2,4-D (16.7%), and pentachlorophenol (15.5%) on the primary column were greater than the criterion for the continuing calibration analyzed on 8/2/02 at 1242. The %Ds for MCPP (18.9%) and 2,4-D (15.7%) on the primary column and for 2,4-DB (-16.9%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/2/02 at 23:07. Positive 2,4-D results were flagged "J, c" in the associated samples. Since all other results were non-detect in the associated samples and %Ds for these compounds met criteria on the alternate column, no data qualifying action was taken. Surrogates were diluted out in samples WASTE-R-2-COMP-T (DF=100) and WASTE-R-1-COMP-T (DF=100). No data qualifying action was taken for these two samples since the dilution factors were greater than 10. Surrogate recoveries for 2,4-DCAA (22% and 22%) were less than the lower control limit (i.e., 30%) in the method blank (0719N-SMB). Since this sample is a QC sample, no data

qualifying action was taken. The %RPD between the primary and confirmation column for pentachlorophenol in sample WASTE-R-4-COMP-T (120.7%) and 2,4-D in sample WASTE-R-3-22FT (42.4%) was greater than the acceptance limit (i.e., < 40%). These two results were previously flagged due to calibration failure and no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for aluminum (122%), arsenic (132%), and thallium (134%) and the final CRDL percent recoveries for aluminum (122%) and arsenic (79%) were outside control limit (i.e., 80-120%). Since these recoveries were only marginally outside the control limit, no data qualifying action was taken. The preparation blanks displayed positive detections for aluminum at 0.29142 mg/L and 0.42040 mg/L, calcium at 0.19944 mg/L and 0.25940 mg/L, copper at 0.01123 mg/L, and potassium at 0.24756 mg/L. Aluminum and copper were also detected in the initial calibration blanks (ICBs) and/or continuing calibration blanks (CCBs) at low levels. Aluminum results less than five times the blank concentration were flagged "U, p" at the reporting limit. Positive copper results less than five times the blank concentration were flagged "U, o" at the reporting limit. Since calcium and potassium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Chromium was detected in CCB5 at 0.00197 mg/L. The positive result in sample WASTE-R-3-22FT was flagged "U, o" at the reporting limit. Manganese and thallium were detected in several CCBs at low levels. Since manganese and thallium results were either greater than five times the blank concentration or non-detects, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: In the original data package (SAII17), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds by the laboratory. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

An MS/MSD pair was not performed on the client sample for SVOC, pesticide, PCB, and herbicide fractions. Given that the majority of LCS/LCSD results associated with this SDG were acceptable, and no major matrix interference was observed in the chromatographs associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. It should also be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Except for data flagged "R", all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAI21A_____ **Fraction:** __TCLP VOCs, SVOCs, Pest., PCBs,_ __Herb., and Metals_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____March 11, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the TCLP blank, 0724T, contained chloromethane at 0.026 mg/L, acetone at 0.49 mg/L, methylene chloride at 0.026 mg/L, 2-butanone at 0.067 mg/L, toluene at 0.0079 mg/L, and 2-hexanone at 0.024 mg/L. The TCLP blank, 0726T, contained chloromethane at 0.044 mg/L and methylene chloride at 0.021 mg/L. The method blank analyzed on 07/29/02 contained chloromethane at 0.0073 mg/L and methylene chloride at 0.023 mg/L. Positive results in the associated samples less than 5X or 10X (for common contaminants) the blank concentration were flagged "U, z" for results greater than the reporting limit or flagged "U, z" at the reporting limits for results less than the reporting limit. The CCV analyzed on 7/29/02 at 11:06 displayed %Ds greater than the control limit (i.e., <20%) for acetone at 52.3%, methylene chloride at 25.6%, 2-butanone at 33.1%, 4-methyl-2-pentanone at 25.5%, 2-hexanone at 34.0%, and dibromo-chloromethane at 31.4%. Acetone was not detected in the associated samples and non-detect results were flagged "UJ, c". Positive 4-methyl-2-pentanone results were flagged "J, c" in the associated samples. Since all other compounds in the associated samples were either non-detect or were flagged as non-detect due to blank contamination and the anomalies were only marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The MS recovery and the %RPD for the MS/MSD analyses was greater than the QC limit for 2-butanone at 168% and 40%, respectively. The LCS recovery for 2-butanone was also greater than the QC limit (i.e., 167%) at 176%. The positive 2-butanone result was previously flagged in the associated sample due to method blank contamination and no further data qualifying action was taken.

For the TCLP SVOCs analyses, the fluid blank, 0723F-DFB, contained benzo(k)-fluoranthene at 0.0050 mg/L, indeno(1,2,3-cd)pyrene at 0.013 mg/L, dibenzo(a,h)-anthracene at 0.0090 mg/L, and benzo(g,h,i)perylene at 0.012 mg/L. Positive results in the associated samples were flagged "U, z" at the reporting

limit.

For the pesticide analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for 4,4'-DDT (-15.7%) and surrogate tetrachloro-meta-xylene (TCMX, -16.0%) on the primary column, and surrogate 2,4-DCAA (-26.4% and -33.4%) on both columns for the continuing calibration analyzed on 7/26/02 at 10:09. The continuing calibration %Ds were greater than the QC limit for heptachlor (21.5%) on the primary column, for 4,4'-DDT (-16.0%), methoxychlor (-22.9%), and surrogate decachlorobiphenyl (DCBP, -17.8%) on the confirmation column, and for surrogate 2,4-DCAA (-23.2% and -38.3%) on both columns for the continuing calibration analyzed on 7/26/02 at 2120. Since all results for 4,4'-DDT, heptachlor, and methoxychlor were non-detect, the compound met criteria on the alternate column, or was a surrogate, no data qualifying action was taken. The recovery for surrogate DCBP on the confirmation column was less than the QC limit (i.e., 30-150%) in the LCS/LCSD pair (28% and 26%, respectively) and in the field sample WASTE-P-3-COMP-T (29%). No action is required based on one surrogate failure in each sample and no data flags were applied. The recoveries for surrogate tetrachloro-m-xylene were less than the QC limit (i.e., 30-150%) on both columns in sample Fluid Blank (27% and 26%). Since the surrogate recoveries were acceptable in most of the field samples, this was considered to be an isolated situation. No data qualifying action was taken.

For the herbicide analyses, the CCV analyzed on 7/27/02 at 14:11 displayed a %D greater than the control limit (i.e., <15%) on the confirmation column for 2,4-DB at -16.9%. The positive 2,4-DB result in sample WASTE-P-3-COMP-T was flagged "J, c". The pentachlorophenol result in sample WASTE-P-3-COMP-T exceeded the linear range of the calibration curve and was flagged "J, q". Since pentachlorophenol is not a TCLP target compound, this sample was not re-analyzed with dilution by the laboratory. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., 40%) for 2,4,5-T and 2,4-DB in sample WASTE-P-3-COMP-T. These results, except those previously flagged due to calibration failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (59%) and lead (128%), and the final CRDL percent recovery for lead (124%) were outside the control limit (i.e., 80-120%). Positive results for arsenic were flagged "J,w" and non-detects were flagged "UJ,w" in the associated samples. Since the lead recoveries were only marginally outside the control limit, no data qualifying action was taken. The preparation blank displayed positive detections for aluminum at 0.16862 mg/L, calcium at 0.29223 mg/L, copper at 0.01193 mg/L, and magnesium at 0.06510 mg/L. Aluminum, calcium, and copper were also

detected in the initial calibration blank and/or continuing calibration blanks (CCBs) at low levels. Aluminum and copper results less than five times the blank concentration were flagged "U, p" at the reporting limit. Since calcium and magnesium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Manganese and thallium were detected in several CCBs at low levels. Since manganese and thallium results were either greater than five times the blank concentration or non-detects, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: In the original data package (SAII21), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds by the laboratory. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

An MS/MSD pair was not performed on the client sample for SVOC, pesticide, and herbicide fractions. Given that the majority of LCS/LCSD results associated with this SDG were acceptable, and no major matrix interference was observed in the chromatographs associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. It should also be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAI26A – TCLP Waste__ **Fraction: __VOCs, SVOCs, Pesticide, PCBs,___ __Herbicide and Metals_____**

Lab: _Severn Trent-Savannah_____ **Project Name: _____Sauget Area 2_____**

Reviewer: _____JA_____ **Date: _____March 10, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the TCLP VOCs analyses, the TCLP blank, 0724T, contained chloromethane at 0.026 mg/L, acetone at 0.49 mg/L, methylene chloride at 0.026 mg/L, 2-butanone at 0.067 mg/L, and toluene at 0.0079 mg/L. The TCLP blank, 0726T, contained chloromethane at 0.044 mg/L and methylene chloride at 0.021 mg/L. The method blank analyzed on 07/29/02 contained chloromethane at 0.0073 mg/L and methylene chloride at 0.023 mg/L. The method blank analyzed on 07/30/02 contained chloromethane at 0.0053 mg/L and methylene chloride at 0.047 mg/L. The method blank analyzed on 07/31/02 contained methylene chloride at 0.025 mg/L. Positive chloromethane, acetone, methylene chloride, 2-butanone, and toluene results less than 5X or 10X (for common contaminants) the blank concentration were flagged "U, z" or "U, z" at the reporting limits in the associated samples. Since other compounds were either greater than five times the blank concentration or non-detect in the associated samples, no data qualifying action was taken. The CCV analyzed on 7/29/02 at 1106 displayed %Ds greater than the control limit (i.e. <20%) for acetone at 52.3%, methylene chloride at 25.6%, 2-butanone at 33.1%, 4-methyl-2-pentanone at 25.5%, 2-hexanone at 34.0%, dibromochloromethane at 31.4%. Positive acetone results were flagged "J, c" and non-detects were flagged "UJ, c". Positive 2-butanone and 4-methyl-2-pentanone results, except those previously flagged due to method blank contamination, were flagged "J, c" in the associated samples. Since all other compounds in the associated sample were either non-detect or flagged as non-detect due to blank contamination and the anomalies were only marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The CCV analyzed on 7/30/02 at 0829 displayed %Ds greater than the control limit for chloromethane at -21.5% and acetone at 25.7%. The positive acetone result in sample WASTE-Q-6-15 was flagged "J, c". The CCV analyzed on 7/31/02 at 1314 displayed %Ds greater than the control limit for bromomethane at -49.0%,

acetone at 50.7%, 2-butanone at 52.8%, 4-methyl-2-pentanone at 61.4%, 2-hexanone at 62.8%, dibromochloromethane at 22.7%, bromoform at 22.3%, and 1,1,2,2-tetrachloroethane at 37.4%. Positive 4-methyl-2-pentanone and 2-butanone results were flagged "J, c" and non-detect results for acetone and 2-hexanone were flagged "UJ, c" in the associated samples. Since all other compounds were not detected in the associated samples and the anomalies were only marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The MS displayed a %R greater than the upper control limit (i.e., 167%) for 2-butanone at 168%. The MS/MSD pair displayed a %RPD greater than the control limit (i.e., 31%) for 2-butanone at 40%. Since the MSD met criteria, no data qualifying action was taken. The LCS analyzed on 7/29/02 displayed a %R greater than the upper control limit (i.e., 167%) for 2-butanone at 176%. Since associated sample results were previously flagged due to other QC failures, no data qualifying action was taken.

For the TCLP SVOCs analyses, the fluid blank, 0723F-DFB, contained benzo(k)fluoranthene at 0.0050 mg/L, indeno(1,2,3-cd)pyrene at 0.013 mg/L, dibenzo(a,h)anthracene at 0.0090 mg/L, and benzo(g,h,i)perylene at 0.012 mg/L. The fluid blank, 0724A-DFB, contained indeno(1,2,3-cd)pyrene at 0.0043 mg/L, dibenzo(a,h)anthracene at 0.0040 mg/L, and benzo(g,h,i)perylene at 0.0052 mg/L. Since these compounds were not detected in the associated samples, no data qualifying action was taken. The CCV analyzed on 7/28/02 at 1048 displayed a %D greater than the control limit (i.e., 20%) for 2,4-dinitrophenol at 33.8%. Since this compound was not detected in the associated samples and the anomaly was only marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The MS displayed a %R less than the lower control limit (i.e. 49%) for hexachlorobenzene at 48%. Since the MSD and LCS met criteria, no data qualifying action was taken. Pentachlorophenol exceeded the linear range in sample WASTE-Q-2-COMP-T and was flagged "J, q". This sample was diluted by a factor of 2 and re-analyzed and the pentachlorophenol result from the dilution analysis was within calibration range. It is recommended that the re-analyzed pentachlorophenol result be used for data interpretation.

For the TCLP pesticides analyses, the CCV analyzed on 8/3/02 at 2052 displayed %Ds greater than the control limit (i.e. <15%) on both columns for delta-BHC at -17.0% and -16.6% and for surrogate tetrachloro-meta-xylene (TCMX) at -36.6% and -24.5%; on the primary column for alpha-BHC at -19.7%, for gamma-BHC at -16.8%, for heptachlor epoxide at -18.2%, and for 4,4'-DDT at 28.4%; and on the confirmation column for surrogate 2,4-DCAA at -17.2%. The CCV analyzed on 8/4/02 0722 displayed %Ds greater than the control limit on both columns for 4,4'-DDT at 29.0% and 16.1%; on the primary column for heptachlor at 19.9% and for surrogate TCMX at -22.3%; and on the confirmation column for endosulfan sulfate at 15.5% and for surrogate 2,4-DCAA at 16.0%. Delta-BHC

and 4,4'-DDT were not detected in the associated samples and were flagged "UJ, c". The positive heptachlor result in sample WASTE-P-2-COMP-T was flagged "J, c". Since all other results were non-detect, and the analyte met criteria on the alternate column or was a surrogate, no data qualifying action was taken. Surrogate TCMX displayed %Rs less than the lower control limit on both columns for samples method blank (0723P-MFB) at 25% and 29%, WASTE-Q-4-COMP-T at 24% and 27%, for WASTE-P-2-COMP-T at 26% and 28%, and for the WASTE-Q-2-COMP-TMSD at 0% and 0%. For the method blank and the MSD, since these are QC samples and the other surrogates met criteria, no data qualifying action was taken. In samples WASTE-Q-4-COMP-T and WASTE-P-2-COMP-T, all results, except those previously flagged due to calibration failures, were flagged "UJ, s". The MSD displayed %Rs less than the lower control limit for heptachlor at 0%, for heptachlor epoxide at 0%, and for endrin at 32%. The MS/MSD pair displayed %RPDs greater than the control limit for gamma-BHC at 41%, for heptachlor at 200%, for heptachlor epoxide at 200%, and for endrin at 88%. Since the poor MSD recoveries for several analytes were due to possible poor extraction efficiency, the MS was used for data interpretation. Since the MS met criteria, no data qualifying action was taken. Sample WASTE-P-2-COMP-T displayed a %RPD greater than the control limit (i.e. <40%) between columns for heptachlor at 102.2%. Since this result was previously flagged due to calibration failure, no further data qualifying action was taken.

For the TCLP herbicides analyses, the CCV analyzed on 7/27/02 at 1411 displayed a %D greater than the control limit (i.e., <15%) on the confirmation column for 2,4-DB at -16.9%. Since 2,4-DB was not detected in the associated samples and the %D met criteria on the alternate column, no data qualifying action was taken. The pentachlorophenol result in sample WASTE-Q-2-COMP-T exceeded the linear range of the calibration curve and was flagged "J, q". Since pentachlorophenol is not a TCLP target compound, this sample was not diluted or re-analyzed by the laboratory. The RPD between the primary and confirmation columns was greater than the acceptance limit (i.e., 40%) for 2,4,5-T in sample WASTE-Q-2-COMP-T. This result was flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the TCLP metals analyses, the initial CRDL percent recoveries for lead (66%), sodium (75%), and thallium (138%) and the final CRDL recovery for aluminum (124%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blanks displayed positive detections for aluminum at 0.31130 mg/L and 0.3132 mg/L, calcium at 0.30531 mg/L and 0.25897 mg/L, copper at 0.00986 mg/L and 0.01061 mg/L, iron at 0.26535 mg/L, magnesium at 0.06646 mg/L, thallium at 0.06052 mg/L, and zinc at 0.10943 mg/L. Aluminum and copper were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at

low levels. Aluminum, copper, iron, thallium, and zinc results less than five times the blank concentration were flagged "U, p" for results greater than the reporting limit or "U, p" at the reporting limit for results less than the reporting limit. Since calcium and magnesium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Lead was detected in CCB5 at -0.00226 mg/L. Since all positive lead results were greater than five times the absolute blank concentration, no data qualifying action was taken. Since the action level for lead (five times the absolute blank concentration) was less than the reporting limit (0.20 mg/L), non-detects for lead were judged by the reviewer to be not affected and no data qualifying action was taken. Manganese was detected in three CCBs at low levels. Since manganese results were greater than five times the blank concentration, no data qualifying action was taken. The MS recovery for zinc (44%) was less than the lower control limit (i.e., 75-125%) in the WASTE-Q-2-COMP-T MS/MSD pair. Positive zinc results were flagged "J, m" in the associated samples. The RPD for potassium was greater than the acceptance limit in the WASTE-Q-2-COMP-T laboratory duplicate set. The serial dilution %D was greater than the QC limit (i.e., 10%) for potassium at 11.4%. Positive potassium results were flagged "J, s" in all samples. The field duplicates displayed %RPDs greater than the control limit (i.e., 100%) for iron (198.4%), manganese (102.3%), and zinc (111.1%). Iron and manganese results, except those previously flagged due to method blank contamination, were flagged "J, f" in the parent samples WASTE-Q-8-COMP-T and WASTE-Q-8-COMP-T-DUP. Since all zinc results were previously flagged due to other QC failures, no additional data flags were applied.

Correctable Anomalies: None.

Comments: In the original data package (SAII26), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of anomalies discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAI31A_____ **Fraction:**_TCLP-VOCs, SVOCs, Pest., PCBs,_ _Herb., Metals_____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____March 11, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the TCLP VOCs analyses, the TCLP blank, 0730T, contained chloromethane at 0.054 mg/L, methylene chloride at 0.030 mg/L, 2-butanone at 0.067 mg/L, 4-methyl-2-pentanone at 0.053 mg/L, 2-hexanone at 0.072 mg/L, and 1,1,2,2-tetrachloroethane at 0.0066 mg/L. The method blank analyzed on 07/31/02 contained methylene chloride at 0.025 mg/L. Positive chloromethane, methylene chloride, and 4-methyl-2-pentanone results in the associated samples less than 5X or 10X (for common contaminants) the blank concentration were flagged "U, z" for results greater than the reporting limit or "U, z" at the reporting limits for results less than the reporting limit. Since other compounds were not detected in the associated samples, no data qualifying action was taken. The CCV analyzed on 7/31/02 at 1314 displayed %Ds greater than the control limit for bromomethane at -49.0%, acetone at 50.7%, 2-butanone at 52.8%, 4-methyl-2-pentanone at 61.4%, 2-hexanone at 62.8%, dibromochloromethane at 22.7%, bromoform at 22.3%, and 1,1,2,2-tetrachloroethane at 37.4%. Acetone, 4-methyl-2-pentanone, 2-butanone, and 2-hexanone results, except those previously flagged due to blank contamination, were flagged "UJ, c" in the associated samples. Since all other compounds were not detected in the associated sample and the anomalies was only marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The MS/MSD pair displayed a %RPD greater than the control limit (i.e., 31%) for 2-butanone at 35%. Since the MS and MSD met criteria, no data qualifying action was taken.

For the TCLP SVOCs analyses, the CCV analyzed on 8/5/02 at 1337 displayed a %D greater than the control limit (i.e., 20%) for indeno(1,2,3-cd)pyrene at -28.5%. The CCV analyzed on 8/9/02 at 1527 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether at -33.4% and 2,4-dinitrophenol at 26.2%. Since these compounds were not detected in the associated samples and

the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The diluted sample WASTE-Q-11-COMP-TDL (DF=4) displayed surrogate %Rs less than the lower control limit for nitrobenzene-d5 at 0% and for terphenyl-d14 at 0%. Since these surrogates are base/neutral surrogates and the only compound of interest, pentachlorophenol, is in the acid fraction, no data qualifying action was taken. Pentachlorophenol exceeded the calibration range in sample WASTE-Q-11-COMP-T and was flagged "J,q". The sample was re-analyzed at a higher dilution and pentachlorophenol was within the calibration range. It is recommended that the re-analyzed pentachlorophenol result be used for data interpretation.

For the TCLP pesticides analyses, the CCV analyzed on 8/6/02 at 1428 displayed a %D greater than the control limit (i.e., <15%) on the confirmation column for surrogate tetrachloro-meta-xylene (TCMX) at -17.6%. The CCV analyzed on 8/7/02 at 0236 displayed %Ds greater than the control limit on the primary column for aldrin at 15.7% and on the confirmation column for surrogate TCMX at -19.3%. Aldrin was not detected in the associated samples. Since aldrin results had an acceptable %D on the alternate column and the TCMX is a surrogate, no data qualifying action was taken. The LCS (0731P-JMPLCS) displayed surrogate %Rs less than the lower control limit on both columns for decachlorobiphenyl (DCBP) at 28% and 25%. Since this is a QC sample and target compound recoveries in the LCS were in control, no data qualifying action was taken. Sample WASTE-Q-11-COMP-T displayed an internal standard (IS) greater than the upper control limit (i.e. 150%) for bromonitrobenzene at 164%. Since the sample was non-detect, no data qualifying action was taken.

For the TCLP herbicides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for MCPP (18.6%) on the primary column, for MCPA (19.3%) on the confirmation column, and for dalapon (22.3% and 17.6%) on both columns for the continuing calibration analyzed on 8/8/02 at 1037. The continuing calibration %Ds were greater than the QC limit for MCPP (23.1%) and dinoseb (17.3%) on the primary column and for dalapon (20.5% and 19.1%) and MCPA (18.4% and 24.4%) on both columns for the continuing calibration analyzed on 8/8/02 at 2018. Dalapon and MCPA were not detected in the associated samples and non-detect results were flagged "UJ, c". Since MCPP and dinoseb were not detected in the associated samples and had acceptable %Ds on the alternate column, no data qualifying action was taken. The continuing calibration %Ds were greater than the QC limit for MCPP (17.1%) on the primary column; for dinoseb (15.7%) on the confirmation column; and for 2,4-DB (18.2% and 20.7%) on both columns for the continuing calibration analyzed on 8/13/02 at 1601. Since the associated sample is a QC sample, no data qualifying action was taken. Surrogate 2,4-DCAA displayed %Rs greater than the upper control limit (i.e. 133%) on the confirmation column for samples WASTE-Q-11-COMP-T at

700% and for the method blank (0802N-SFB) at 170%. Positive pentachlorophenol result in sample WASTE-Q-11-COMP-T was flagged "J, s". Since the other sample is a QC sample, no data qualifying action was taken. The pentachlorophenol result in sample WASTE-Q-11-COMP-T exceeded the calibration range and was flagged "E" by the laboratory. Since this result was previously flagged due to surrogate recovery failure, no further data qualifying action was taken. Since pentachlorophenol is not a TCLP target compound, this sample was not diluted further or re-analyzed by the laboratory.

For the TCLP metals analyses, the initial and final CRDLs displayed %Rs outside the control limit (i.e., 80-120%) for arsenic at 138%, selenium at 132% and 122%, and thallium at 62%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for aluminum at 0.10966 mg/L, antimony at 0.05592 mg/L, beryllium at 0.00516 mg/L, calcium at 0.12293 mg/L, lead at 0.0222 mg/L, magnesium at 0.06767 mg/L, and zinc at 0.03827 mg/L and negative detections for cobalt at -0.00775 mg/L and thallium at -0.04344 mg/L. Aluminum, beryllium, cobalt, magnesium, and thallium were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Positive aluminum, antimony, and beryllium results in the associated samples were flagged "U, p" at the reporting limit. The positive cobalt result in sample WASTE-Q-12-COMP-T was flagged "J, p" and the thallium non-detect results in the associated samples were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since calcium, lead, magnesium, and zinc results in the associated samples were either greater than five times the blank concentration or non-detects, no data qualifying action was taken. Arsenic, barium, chromium, copper, and magnesium were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Since these results in the associated samples were either greater than five times the blank concentration or non-detects, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: In the original data package (SAII31), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds by the laboratory. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. It should also be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAI38A_____ **Fraction:** _TCLP - VOCs, SVOCs, Pest., PCBs, __Herb., Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____March 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the TCLP herbicide analyses, surrogate 2,4-DCAA was not recovered (0%) on the confirmation column for sample WASTE-Q-1-COMP-T. The positive results were flagged "J, s" and the non-detect results were flagged "R, s". The 2,4-D and pentachlorophenol results in this sample exceeded the linear range of the calibration curve. Since 2,4-D and pentachlorophenol results were previously flagged due to surrogate recovery failure, no additional data flags were applied. This sample was diluted by a factor of 10 and re-analyzed by the laboratory and the pentachlorophenol result still exceeded the calibration range. Since pentachlorophenol is not a TCLP target compound, this sample was not further diluted or re-analyzed by the laboratory. The pentachlorophenol result in the diluted sample was flagged "J, q". Surrogate 2,4-DCAA was diluted out in this diluted sample. No data qualifying action was taken for this diluted sample since the dilution factor was equal to 10. The dilution results for 2,4-D, pentachlorophenol, and non-detects in the original analysis ("R" flagged due to surrogate failure) should be used for data interpretation.

Minor Anomalies: For the TCLP VOC analyses, one TCLP blank, 0805T, contained chloromethane at 0.074 mg/L, methylene chloride 0.023 mg/L, 1,1-dichloroethane at 0.065 mg/L, chloroform at 0.0039 mg/L, 1,1,1-trichloroethane at 0.0029 mg/L, benzene at 0.0053 mg/L, 1,2-dichloroethane at 0.0081 mg/L, 1,2-dichloropropane at 0.0061 mg/L, bromodichloromethane at 0.0034 mg/L, trans-1,3-dichloropropane at 0.0029 mg/L, 1,1,2-trichloroethane at 0.0068 mg/L. 1,1,2,2-tetrachloroethane at 0.0079 mg/L, and xylene at 0.0043 mg/L. The method blank analyzed on 8/9/02 contained methylene chloride at 0.026 mg/L. Positive chloromethane, methylene chloride, benzene, 1,2-dichloroethane, and 1,1,2,2-tetrachloroethane results in the associated samples less than 5X or 10X (for methylene chloride) the blank concentration were flagged "U, z" for results greater than the reporting limit or

flagged "U, z" at the reporting limits for results less than the reporting limit. Since all other compounds were not detected in the associated samples, no data qualifying action was taken. The initial calibration analyzed on 8/5-6/02 displayed correlation coefficients less than the control limit (i.e., 0.990) for chloroethane at 0.9878, 2-hexanone at 0.9878, and 1,1,2,2-tetrachloroethane at 0.9890. These compounds were not detected in the associated samples and were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/9/02 at 09:51 displayed a %D greater than the control limit (i.e. 20%) for chloromethane at -26.0%, acetone at -35.4%, 2-butanone at -32.2%, 4-methyl-2-pentanone at -23.5%, 2-hexanone at -25.3%, and bromoform at -29.5%. Since these compounds were either not detected in the associated samples or flagged as non-detects due to method blank contamination, and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The RPDs for 2-butanone were greater than the control limit (i.e. 31%) in the WASTE-Q-9-8 MS/MSD pair (42%) and in the WASTE-Q-10-8 MS/MSD pair (43%). Since the MS and MSD recoveries met criteria and 2-butanone was not detected in the associated samples, no data qualifying action was taken.

For the TCLP SVOC analyses, the CCV analyzed on 8/16/02 at 10:30 displayed a %D greater than the control limit (i.e. 20%) for surrogate 2,4,6-tribromophenol at 25.8%. Since this compound is a surrogate, no data qualifying action was taken. Two base/neutral surrogates, nitrobenzene-d5 and 2-fluorobiphenyl, were not recovered (0%) in sample WASTE-Q-1-COMP-T (DF=5). Since the dilution factor is less than 10, positive base/neutral results were flagged "J, s" and non-detects were flagged "UJ, s". All base/neutral surrogates and two acid surrogates were diluted out in the diluted sample WASTE-Q-1-COMP-TDL (DF=10). No data qualifying action was taken for this diluted sample since the dilution factor was greater than or equal to 10. The 2,4-dichlorophenol and pentachlorophenol results in sample WASTE-Q-1-COMP-T exceeded the calibration range and were flagged "E" by the laboratory. These two results were flagged "J, q". This sample was re-analyzed at a higher dilution factor and the 2,4-dichlorophenol result still exceeded the calibration range. Since 2,4-dichlorophenol is not a TCLP target compound, this sample was not further diluted or re-analyzed by the laboratory. The 2,4-dichlorophenol result in the diluted sample was flagged "J, q". The 2,4-dichlorophenol and pentachlorophenol results from the dilution analyses should be used for data interpretation. The field duplicates displayed an absolute difference greater than the control limit (i.e., two times the reporting limit, 0.10 mg/L) for 2,4-dichlorophenol at 0.2 mg/L. Based on professional judgement, affected 2,4-dichlorophenol results, except those previously flagged due to other QC failures, were flagged "J, f" for positive detections or "UJ, f" for non-detects.

For the TCLP pesticides analyses, the %Ds for surrogates 2,4-DCAA (-16.0%) and tetrachloro-m-xylene (TCMX, -16.7%) on the primary column, and for alpha-BHC (-33.0%), delta-BHC (-30.2%), 4,4'-DDE (-28.9%), TCMX (-23.0%) and surrogate decachlorobiphenyl (DCBP, 28.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/9/02 at 22:09. The %Ds for 4,4'-DDT (16.0%), 2,4-DCAA (-20.6%) and TCMX (-21.0%) on the primary column, and for alpha-BHC (-32.8%), delta-BHC (-29.4%), 4,4'-DDE (-29.9%), 2,4-DCAA (-17.3%), TCMX (-23.6%) and DCBP (-20.2%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/10/02 at 08:11. These target compounds were not detected in the associated samples. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The method blank (0801O-IMB) displayed a surrogate %R less than the lower control limit (i.e., 30%) on the confirmation column for DCBP at 26%. Since this is a QC sample and all other surrogate recoveries were in control, no data qualifying action was taken. The LCS (0801O-IMBLCS) displayed surrogate %Rs less than the lower control limit on both columns for DCBP at 22% and 18%. Since this is a QC sample and target compound recoveries in the LCS were in control, no data qualifying action was taken. The TCMX surrogate recovery on the confirmation column (16%) and the DCBP surrogate recoveries on both columns (27% and 11%) in sample WASTE-Q-1-COMP-T were less than the lower control limit. All results in this sample were flagged "UJ, s". Sample WASTE-Q-1-COMP-T displayed an internal standard (IS) greater than the upper control limit (i.e. 150%) for bromonitrobenzene at 346.1%. Since the sample was non-detect, no data qualifying action was taken.

For the TCLP herbicides analyses, the %Ds for dalapon (20.9% and 20.4%) and MCPA (21.9% and 31.3%) on both columns and for MCPP (24.4%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/7/02 at 23:24. The %Ds for dalapon (22.3% and 17.6%) on both columns, for MCPP (18.6%) on the primary column, and for MCPA (19.3%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/8/02 at 10:37. The %Ds for dalapon (20.5% and 19.1%) and MCPA (18.4% and 24.4%) on both columns and for MCPP (23.1%) on the primary column were greater than the criterion for the continuing calibration analyzed on 8/8/02 at 20:18. Dalapon and MCPP were not detected in the associated samples and non-detects were flagged "UJ, c"; unless previously flagged due to surrogate recovery failure. Since the MCPA was not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The %D for 2,4-D (17.8%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/5/02 at 02:34. The positive 2,4-D results in the diluted sample WASTE-Q-1-COMP-TDL was flagged "J, c". The %Ds for 2,4-DB (18.2% and 20.7%) on

both columns, for MCPP (17.1%) on the primary column, and for dinoseb (15.7%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/13/02 at 16:01. The %Ds for 2,4-D (16.4% and 20.3%) and 2,4,5-TP (16.2% and 19.1%) on both columns, for dalapon (17.0%), dicamba (20.2%), MCPP (26.3%), MCPA (17.1%), pentachlorophenol (23.7%), and 2,4,5-T (17.8%) on the primary column, and for 2,4-DB (17.8%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/16/02 at 11:07. The %D for dalapon (-15.5%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 8/17/02 at 00:39. Since the associated samples are QC samples, no data qualifying action was taken. The field duplicates displayed an absolute difference greater than the control limit (i.e., two times the reporting limit, 0.050 mg/L) for pentachlorophenol at 0.072 mg/L. Based on professional judgement, affected pentachlorophenol results, except those previously flagged due to other QC failures, were flagged "J, f".

For the TCLP metals analyses, the initial CRDL percent recovery for thallium (67%) and the final CRDL recoveries for aluminum (123%) and sodium (76%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank displayed positive detections for aluminum at 0.2176 mg/L, calcium at 0.44348 mg/L, copper at 0.00883 mg/L, and magnesium at 0.09452 mg/L and negative detections for selenium at -0.07281 mg/L and thallium at -0.04388 mg/L. Aluminum, calcium, copper, and magnesium were also detected in the initial calibration blank and/or continuing calibration blanks (CCBs) at low levels. Aluminum and copper results less than five times the blank concentration were flagged "U, p" at the reporting limit. Since calcium and magnesium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The thallium results in the associated samples were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since the action levels for selenium (five times the absolute blank concentration) was less than the reporting limit (0.50 mg/L), non-detects for selenium were judged by the reviewer to be not affected and no data qualifying action was taken. Iron was detected in one CCB at 0.04843 mg/L. The positive iron result in sample WASTE-Q-1-COMP-T was flagged "U, o". Manganese and vanadium were detected in several CCBs at low levels. Since manganese and vanadium results were either greater than five times the blank concentration or non-detects, no data qualifying action was taken. The MS/MSD recoveries for copper (45% and 45%), lead (1328% and 1327%), and zinc (-29% and -29%) were outside the control limit (i.e., 75-125%) in the WASTE-Q-10-COMP-T MS/MSD pair. Positive copper, lead, and zinc results, except those previously flagged due to blank contamination, were flagged "J, m" in the associated samples. The post-digestion spike recoveries for these three

analytes were in control. The RPD for iron (34.3%) was greater than the acceptance limit (i.e., 20%) in this MS/MSD pair. Since all iron results in the associated samples were either non-detect or flagged as non-detect due to blank contamination, no data qualifying action was taken. The field duplicates displayed an absolute difference greater than the control limit (i.e., two times the reporting limit, 0.40 mg/L) for lead at 0.45 mg/L. Since all lead results were previously flagged due to MS/MSD recovery failure, no additional data flags were applied.

Correctable Anomalies: None.

Comments: In the original data package (SAII38), only TCLP compounds were considered target compounds and used to spike the MS/MSD and LCS samples. All QC review focused on these TCLP compounds by the laboratory. No corrective action was taken for any QC failures on non-TCLP compounds. Upon client request, this data package was revised to provide the full list of target compounds (TCL) or target analytes (TAL) for each sample. Precision and accuracy for these non-TCLP compounds cannot be assessed and the data user should use these data with caution.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.:__SAII02_____ **Fraction:__VOCs, SVOCs, Pest, PCBs, Herbs, Methane, Wet Chem, Metals_**

Lab:___STL, Savannah____ **Project Name:__Sauget Area 2_____**

Reviewer:__RA_____ **Date:____November 7, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied, the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the USEPA National Functional Guidelines for Data Review, modified to reflect the level of review requested, the specifics of the analytical method employed, and provisions of the approved project-specific QAPP.

Major Anomalies: The initial and continuing calibration RRFs were less than the QC limit (i.e. 0.05) for acetone for the initial calibration analyzed on 6/12/02 (0.0468), and the continuing calibrations analyzed on 6/20/02 (0.039) and 6/21/02 (0.04). All associated sample results were non-detects and were flagged "R,c."

Minor Anomalies: For the SVOC analyses, the initial calibration %RSDs were greater than the QC limit (i.e., 15%) for 2,4-dinitrophenol (44.2%) and 4,6-dinitro-2-methylphenol (39.7%) for the initial calibration analyzed on 6/28/02. No positive results were reported for these compounds and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The continuing calibration %Ds were greater than the QC limit (i.e., 20%) for 2,4-dinitrophenol (24.7%) for the continuing calibration analyzed on 6/23/02 and 2,6-dinitrotoluene (20.5%), 2,4-dinitrophenol (33.5%), 4-nitrophenol (24.1%), and 2,4-dinitrotoluene (26.9%) for the continuing calibration analyzed on 6/22/02. No positive results were reported for these compounds and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The internal standard area for perylene-d12 (208%) was greater than the QC limit (i.e., 50-200%) in sample GW-UAA-3-34FT-R. No positive results were reported for the associated compounds and no data qualifying action was required. This sample was re-analyzed. However, all the internal standard areas were greater than the QC limit for the re-analyses. The original sample result should be used for data interpretation.

For the pesticides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for endrin aldehyde on both columns (-24.2%/-19%) for the continuing calibration analyzed on 6/19/02. Associated sample results were non-detects and were flagged "UJ,c". The continuing calibration %Ds were greater than the QC limit (i.e., 15%) for 4,4,-DDD (20.3%) and 4,4-DDT (19.3%) on the confirmation column for the

continuing calibration analyzed on 6/19/02. No action was required since the %D was acceptable on the primary column and no positive results were reported.

For the herbicides analyses, the %RPDs for the LCS/LCSD analyses were greater than the QC limit (i.e., 28%) for MCPA (44%), (i.e., 34%) for pentachlorophenol (50%), and (i.e., 43%) for 2,4-DB (61%). No positive results were reported and no data qualifying action was required.

For the methane analyses, the MS/MSD recoveries were less than the QC limit (i.e., 75-125%) at 49% and 39%, respectively. No data qualifying action is required based on MS/MSD failure and no data flags were applied.

For the metals analyses, the CRDL recovery was less than the QC limit (i.e., 80-120%) for iron (70%/74%) and selenium (52%). The positive selenium result was flagged "J,c" in the associated sample. The iron failure was not serious enough (i.e., < 60%) to affect the sample results. No further data qualifying action was required. The method blank contained aluminum at 0.0371 mg/L, calcium at 0.0129 mg/L, and mercury at – 0.000074 mg/L. Positive aluminum results less than 5 times the blank concentration were flagged "U,p" in the associated samples. Positive calcium results were greater than 5 times the blank concentration and no data qualifying action was required. Mercury non-detects were flagged "UJ,p" in the associated samples. The ICBs contained aluminum at 34.1 ug/L and thallium at - 51.2 ug/L. Aluminum results were previously flagged in the associated samples and no further data qualifying action was required. Positive thallium results less than 5 times the blank concentration were flagged "J,o" in the associated samples. The CCBs contained silver at – 0.77 ug/l and thallium at 6.75 ug/L. Silver non-detects were flagged "UJ,o" in the associated samples. Thallium results were previously flagged in the associated samples and no further data qualifying action was required.

Correctable Anomalies: None.

Comments: None.

Signed:_____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII03_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 7, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, acetone displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) in the initial calibration (ICAL) at 0.0468 and in the CCV analyzed on 6/20/02 at 09:51 at 0.03905 and in the CCV analyzed on 6/21/02 at 10:19 at 0.0406. All associated sample results were flagged "R,c".

The CCV analyzed on 7/5/02 at 09:44 displayed a %D greater than the control limit for 2,4-dinitrophenol at 88.7%. Since the anomaly for 2,4-dinitrophenol was greater than 80%, associated sample results which were non-detect were flagged "R,c".

Minor Anomalies: For the SVOCs analyses, the method blank analyzed on 6/28/02 displayed positive detections for benzo(k)fluoranthene at 1.0 ug/L and for indeno(1,2,3-cd)pyrene at 0.92 ug/L. Associated sample results with positive detections less than 5x the amount found in the blank were raised to the detection limit and flagged "U,z". The ICAL analyzed on 6/27/02 displayed an r^2 value less than the control limit (0.990) for 2,4-dinitrophenol at 0.989. The ICAL analyzed on 6/28/02 displayed an r^2 value less than the control limit for 2,6-dinitrotoluene at 0.989. Associated sample results were non-detect and were flagged "UJ,r". The ICAL analyzed on 6/28/02 displayed %RSDs greater than the control limit (i.e. 15%) for 2,4-dinitrophenol at 44.3% and for 4,6-dinitro-2-methylphenol at 39.7%. The CCV analyzed on 6/22/02 at 12:17 displayed %Ds greater than the control limit (i.e. 20%) for 2,6-dinitrotoluene at 20.5%, for 2,4-dinitrophenol at 33.5%, for 4-nitrophenol at 24.1%, and for 2,4-dinitrotoluene at 26.9%. The CCV analyzed on 6/23/02 at 11:36 displayed a %D greater than the control limit for 2,4-dinitrophenol at 24.7%. The CCV analyzed on 6/28/02 at 00:03 displayed a %D greater than the control limit for dinoseb at -22.8%. The CCV analyzed on 6/29/02 at 10:25 displayed a %D greater than the control limit for dinoseb at -38.3%. The CCV analyzed on 7/5/02 at 09:44 displayed %Ds greater than the

control limit for 4-nitrophenol at 24.7%, for 4,6-dinitro-2-methylphenol at 52.8%, and for hexachlorobenzene at -24.1 %. All ICAL and CCV anomalies which displayed recoveries only marginally outside the limit which were less than 50% and were non-detect; hence, it is the professional judgment of the data reviewer that no further data qualifying action be taken. Since the CCV anomaly for 4,6-dinitro-2-methylphenol analyzed on 7/5/02 was greater than 50%, associated sample results were non-detect and were flagged "UJ,c". Several diluted samples displayed surrogate recoveries at 0%. Since the samples, except GW-UAA-3-84, were analyzed at dilutions greater than 10, no data qualifying action was taken. Sample GW-UAA-3-84 was analyzed at a 5x dilution. The only compound of interest, 4-chloroaniline, was flagged "J,s". Sample 0617G-JMBLCS displayed a %R greater than the control limit for internal standard phenanthrene-d10 at 202%. Since this is a QC sample, no data qualifying action was required. Samples GW-UAA-3-84, GW-UAA-3-94, GW-UAA-3-104, GW-UAA-3-116, and GW-UAA-3-114 contained analytes which exceeded the calibration range. These analytes were flagged "J,q". These samples were re-analyzed at dilutions and the analytes were within calibration range. It is recommended that the reanalyzed analytes be used for data interpretation.

For the pesticides analyses, sample GW-UAA-3-64 displayed a %R less than the lower control limit (i.e. 30%) for surrogate tetrachloro-meta-xylene (TMX) on the primary column at 28%. Since the other surrogates met criteria, no data qualifying action was taken. Sample GW-UAA-3-104 displayed a %R less than the lower control limit for surrogate decachlorobiphenyl (DCBP) on both columns at 26% and 24%. Associated analytes were non-detect and flagged "UJ,s". Sample GW-UAA-3-116 displayed %Rs less than the lower control limit on both columns for surrogates 2,4-DCAA at 24% and 28% and for surrogate DCBP at 17% and 14%. The associated sample with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". The CCV analyzed on 6/18/02 at 14:56 displayed a %D greater than the control limit (i.e. 15%) on the confirmation column for surrogate 2,4-DCAA at -16.3%. The CCV analyzed on 6/19/02 at 02:16 displayed %Ds greater than the control limit on the primary column for endrin aldehyde at -24.2% and for 2,4-DCAA at -23.2% and on the confirmation column for 4,4'-DDD at 20.3%, for 4,4'-DDT at 19.3%, for endrin aldehyde at -19.0%, and for 2,4-DCAA at -22.8%. Since analytes except endrin aldehyde either met criteria on the other column or was a surrogate (2,4-DCAA), no data qualifying action was taken. Endrin aldehyde was flagged "UJ,c" in sample GW-UAA-3-64. The CCV analyzed on 6/25/02 at 23:05 displayed %Ds greater than the control limit for surrogate 2,4-DCAA on both the primary and confirmation column at -17.1% and -19.8%. The CCV analyzed on 6/26/02 at 05:18 displayed %Ds greater than the control limit on the primary column for endosulfan II at 21.1%, for endrin ketone at 16.8%, for 2,4-DCAA at -16.0%, and for decachlorobiphenyl (DCBP) at 39.0% and displayed %Ds greater than the control limit on the confirmation column for

heptachlor epoxide at -26.5%, for endrin aldehyde at -19.8%, for endrin ketone at 96.7%, and for 2,4-DCAA at -18.6%. Since analytes, except endrin ketone, either met criteria on the other column or was a surrogate (2,4-DCAA), no data qualifying action was taken. Endrin ketone was flagged "UJ,c" in the associated sample. The CCV analyzed on 6/28/02 at 10:59 displayed %Ds greater than the control limit on the primary column for 2,4-DCAA at -15.8% and displayed %Ds greater than the control limit on the primary column for 2,4-DCAA at -21.3% and for tetrachloro-meta-xylene at -15.3%. The CCV analyzed on 6/28/02 at 22:13 displayed %Ds greater than the control limit on the primary column for 4,4'-DDT at -20.9%, for methoxychlor at -15.5%, and for 2,4-DCAA at -24.9% and displayed %Ds greater than the control limit on the confirmation column for 4,4'-DDT at -21.7%, for endrin aldehyde at -15.2%, and for 2,4-DCAA at -26.7%. Since this sample was previously flagged for surrogate anomalies, no further data qualifying action was taken. The LCSD displayed a %R less than the lower control limit for delta-BHC at 44%. Since the LCS met criteria, no data qualifying action was taken. The LCS/LCSD pair displayed %RPDs greater than the control limit for endrin at 34%, for 4,4'-DDE at 22%, and for alpha-chlordane at 20%. Since the LCS and LCSD met criteria, no data qualifying action was taken. Samples GW-UAA-3-104 and GW-UAA-3-116 displayed %RPDs between the primary and confirmation column for gamma-BHC, beta-BHC, and heptachlor. These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low.

For the herbicides analyses, the CCV analyzed on 6/20/02 at 11:17 displayed a %D greater than the control limit (i.e. 15%) on the confirmation column for 2,4-DB at 26.7%. The CCV analyzed on 6/20/02 at 20:16 displayed %Ds greater than the control limit on the rear column for dicamba at -18.3% and for 2,4-DB at 16.0%. Since the analytes met criteria on the front column, no data qualifying action was taken. The LCS/LCSD pair displayed %RPDs greater than the control limit for MCPA at 44%, for pentachlorophenol at 50%, and for 2,4-DB at 61%. Since the LCS and LCSD met criteria, no data qualifying action was taken. Samples GW-UAA-3-104 and GW-UAA-3-116 displayed %RPDs greater than the control limit between the primary and confirmation column for 2,4-D. 2,4,5-TP, and 2,4-DB. These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low.

For the metals analyses, the CRDL displayed %Rs greater than the control limit (i.e. 120%) for iron at 127% and for lead at 129%. The CRDL also displayed a %R less than the lower control limit (i.e. 80%) for arsenic at 79%. Since these results were marginally outside the control limits, no data qualifying action was taken. The ICB, CCBs, and the prep blank displayed positive detections for

several analytes. The only affected sample results were copper and vanadium. All associated sample results with positive detections less than 5x the blank concentrations were all less than the reporting limit. The affected copper and vanadium results were raised to the reporting limit and flagged "U,z". The ICB, prep blank, and CCBs displayed negative detections for several analytes. The only affected sample results were silver, arsenic, mercury, and beryllium. All associated sample results were non-detect. The affected silver, arsenic, mercury, and beryllium results were flagged either "UJ,z" or "UJ,p". The MS/MSD displayed %Rs less than the lower control limit for iron at 36% and 25%. Since the amount found in the parent sample was greater than 4x the amount of the spiking concentration, no data qualifying action was taken.

For the dissolved gases analyses, the initial calibration displayed an r^2 value less than the control limit (i.e. 0.990) for methane at 0.986. All associated sample results were flagged "J,r".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable, except those flagged "R", for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.:__SAII05_____ **Fraction:__VOCs, SVOCs, Pest, PCBs, Herbs, Methane, Wet Chem, Metals_**

Lab:___STL, Savannah____ **Project Name:__Sauget Area 2_____**

Reviewer:__RA_____ **Date:____November 7, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied, the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the USEPA National Functional Guidelines for Data Review, modified to reflect the level of review requested, the specifics of the analytical method employed, and provisions of the approved project-specific QAPP.

Major Anomalies: The initial and continuing calibration RRFs were less than the QC limit (i.e. 0.05) for acetone for the initial calibration analyzed on 6/12/02 (0.0468), and the continuing calibration analyzed on 6/26/02 (0.0405). All associated sample results were non-detects and were flagged "R,c."

For the SVOC analyses, the LCS recoveries were less than the QC limit (i.e., 10-144%) for 3,3-dichlorobenzidine at 0% for the LCS analyzed on 7/13/02 and 7/16/02. The LCSD recoveries for this compound were in control on both analyses. The %RPDs for the LCS/LCSD analysis were greater than the QC limit (i.e., 72%) at 200%. All associated sample results were non-detects and were flagged "R,l."

Minor Anomalies: For the VOC analyses, the continuing calibration %D was greater than the QC limit (i.e., 20%) for bromomethane (-28.7%) for the continuing calibration analyzed on 6/26/02. No positive results were reported for this compound and the failure was not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The MSD percent recoveries were greater than the QC limit for 4-methyl-2-pentanone (i.e., 50-150%) at 180% and for 2-hexanone (i.e., 48-155%) at 180% and for 1,1,2,2-tetrachloroethane (i.e., 67-133%) at 142%. The %RPDs were greater than the QC limit for bromomethane (i.e, 33%) at 69%, chloroethane (i.e., 34%) at 38%, carbon disulfide (i.e., 23%) at 24%, 2-butanone (i.e., 31%) at 42%, 2-hexanone (i.e., 36%) at 40%, and 1,1,2,2-tetrachloroethane (i.e., 22%) at 24%. Since these failures were marginally outside the QC limit and the LCS recoveries for these compounds were in control, no data qualifying action was required.

For the SVOC analyses, the initial calibration %RSD was greater than the QC limit (i.e., 15%) for benzo (k) fluoranthene (15.212%) for the initial calibration analyzed on

6/30/02. No positive results were reported for these compounds and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The continuing calibration %Ds were greater than the QC limit (i.e., 20%) for 4-nitrophenol (31.4%) and benzo (k) fluoranthene (-25.9%) for the continuing calibration analyzed on 7/2/02 and bis (2-chloroisopropyl) ether (24%), 2-nitroaniline (30.3%), 4-nitrophenol (36.1%), 2,4-dinitrotoluene (21.3%), 4-nitroaniline (24.3%), pentachlorophenol (20.3%), and indeno (1,2,3-cd) pyrene (20.8%) for the continuing calibration analyzed on 7/16/02. No positive results were reported for these compounds and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The %RPD for the LCS/LCSD analyses was greater than the QC limit for 4-chloroaniline (i.e., 67%) at 72%. No positive results were reported and no data qualifying action was required.

For the pesticides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for methoxychlor (16.2%) on the primary column, and heptachlor (23.2%) on the confirmation column for the continuing calibration analyzed on 6/28/02 at 1132. The continuing calibration %D was also greater than the QC limit (i.e., 15%) for heptachlor (17.1%) on the confirmation column for the continuing calibration analyzed on 6/28/02 at 1854. The continuing calibration %D was greater than the QC limit (i.e., 15%) for heptachlor (15.2%) on the confirmation column for the continuing calibration analyzed on 7/2/02 at 1233. The continuing calibration %Ds were also greater than the QC limit (i.e., 15%) for 4,4-DDE (16.6%), 4,4-DDD (21.8%), endosulfan II (15.7%), endrin ketone (21.5%) on the primary column and heptachlor (25.8%) on the confirmation column for the continuing calibration analyzed on 7/3/02 at 0009. Since these compounds met criteria on the other column and were not detected in the associated samples, no data qualifying action was required. The %RPDs for the LCS analyses were greater than the QC limit for gamma-chlordane (i.e., 18%) at 21%, for endrin (i.e., 25%) at 31%, and endosulfan II (i.e., 22) at 25%. No positive results were reported and no data qualifying action was required. The %D between the two columns was greater than the QC limit (i.e., 40%) for gamma-BHC (84.7%) in sample GW-UAA-1-60FT. This result was flagged "J,g" in this sample. It should be noted that the laboratory reported the lower of the two values due to potential matrix interference. This result may be biased low.

For the herbicides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for 2,4-DB (16.7%/20.3%) on both columns for the continuing calibration analyzed on 6/25/02 at 1711. Non-detects were flagged "UJ,c" for 2,4-DB. The continuing calibration %Ds were greater than the QC limit (i.e., 15%) for 2,4-DB (19.9%/20.5%) on both columns for the continuing calibration analyzed on 7/2/02 at 2059. Non-detects were flagged "UJ,c" in the associated samples. The LCS recovery was greater than the QC limit (i.e., 10-100%) for 2,4,5-TP at 105%. No positive results were reported and no data qualifying action was required. The method blank analyzed on 6/25/02 contained 2,4-D at 0.22 ug/L. The positive 2,4-D result less than 5 times the blank concentration was flagged "U,z" at the reporting limit in sample GW-UAA-1-

60FT. The %RPDs for the LCS/LCSD analyses were greater than the QC limit (i.e., 28%) for MCPA (32%), (i.e., 34%) for pentachlorophenol (50%), and (i.e., 43%) for 2,4-DB (46%). No positive results were reported and no data qualifying action was required. The %D between the two columns was greater than the QC limit (i.e., 40%) for 2,4-D (40.6%) in sample GW-UAA-1-60FT. This result was previously flagged and no further data qualifying action was required.

For the metals analyses, the method blank contained negative results for aluminum, arsenic, and cobalt. Positive results less than 5 times the blank concentration were flagged "J,p" and non-detects were flagged "UJ,p" in the associated samples. The method blank also contained positive results for barium, beryllium, calcium, thallium, and silver. Positive results less than 5 times the blank concentration were flagged "U,p" in the associated samples. The initial and continuing calibrations also contained negative results for mercury, calcium, arsenic and aluminum. Non-detects not previously flagged due to other failures were flagged "UJ,o" in the associated samples. The initial and continuing calibrations also contained positive results for aluminum, beryllium, barium, manganese, copper, silver, and vanadium. Positive results not previously flagged due to other failures were flagged "U,o" in the associated samples. The LCS recovery was greater than the QC limit (i.e., 80-120%) for beryllium at 121%. The positive beryllium results were previously flagged due to method blank contamination and no further data qualifying action was required. The MS/MSD recoveries were greater than the QC limit (i.e., 75-125%) for potassium (160%/157%). Positive results were flagged "J,m" in both samples. The serial dilution %D was greater than the QC limit (i.e., 10%) for aluminum at 19.5%. Positive results were flagged "J,s" in both samples.

Correctable Anomalies: None.

Comments: None.

Signed:_____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII06_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 12,2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, acetone displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) in the initial calibration (ICAL) at 0.0468 and in the CCV analyzed on 6/27/02 at 09:41 at 0.03769. All associated sample results were flagged "R,c".

Minor Anomalies: For the VOCs analyses, the MSD displayed %Rs greater than the upper control limit for 4-methyl-2-pentanone at 180%, for 2-hexanone at 180%, and for 1,1,2,2-tetrachloroethane at 142%. The MS/MSD pair displayed %RPDs greater than the control limit for bromomethane at 69%, for chloroethane at 38%, for carbon disulfide at 24%, for 2-butanone at 42%, for 2-hexanone at 40%, and for 1,1,2,2-tetrachloroethane at 24%. Since all MS recoveries met criteria, no data qualifying action was taken. Samples GW-UAA-1-100FT, GW-UAA-1-110FT, GW-UAA-1-90FT, and GW-UAA-2-50FT displayed analytes with concentrations greater than the calibration range. These analytes were flagged "J,q". These samples were reanalyzed at dilutions and the analytes were within calibration range. It is recommended that the reanalyzed results be used for data interpretation.

For the SVOCs analyses, the method blank analyzed 7/3/02 displayed positive detections for di-n-butylphthalate at 1.0 ug/L and for bis (2-ethylhexyl) phthalate at 9.6 ug/L. Since all associated sample results were non-detect, no data qualifying action was taken. The CCV analyzed on 7/3/02 at 14:32 displayed a %D greater than the control limit (i.e. 20%) for 4-nitrophenol at 23.1%. The CCV analyzed on 7/5/02 at 07:41 displayed %Ds greater than the control limit for 2,4-dinitroohenol at 25%, for 4-nitrophenol at 39%, for pyrene at -23.4%, and for benzo(k)fluoranthene at -25.1%. Since all associated sample results were non-detect and the affected analytes were only marginally outside the control limit, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 6/29/02 at 14:39 displayed a %D greater than the control limit (i.e. 15%) for surrogate 2,4-DCAA at -21.4% on the primary column and for surrogate tetrachloro-meta-xylene (TMX) at -19.3% on the confirmation column. The CCV analyzed on 6/30/02 at 00:53 displayed %Ds greater than the control limit for surrogate 2,4-DCAA at -20.2% on the primary column and for heptachlor at 16.8%, for surrogate 2,4-DCAA at -20.9%, and for surrogate TMX at -16.2% on the confirmation column. The CCV analyzed on 7/1/02 at 10:40 displayed %Ds greater than the control limit for surrogates 2,4-DCAA at -22.0% and for TMX at -16.6% on the primary column and for heptachlor at 20.4% and for surrogate 2,4-DCAA at -20.6% on the confirmation column. The CCV analyzed on 7/1/02 at 22:06 displayed %Ds greater than the control limit for endrin aldehyde at -16.5% and for surrogate 2,4-DCAA at -22.1% on the primary column and for heptachlor at 18.2% and for surrogate 2,4-DCAA at -18.1% on the confirmation column. The CCV analyzed on 7/2/02 at 12:33 displayed %Ds greater than the control limit for 2,4-DCAA at -21.9% on the primary column and at -18.0% on the confirmation column. The CCV analyzed on 7/3/02 at 00:09 displayed %Ds greater than the control limit for 4,4'-DDE at 16.6%, for 4,4'-DDD at 21.8%, for endosulfan II at 15.7%, for endrin ketone at 21.5%, and for surrogate decachlorobiphenyl (DCBP) at 16.2% and for heptachlor at 25.8% and for surrogate 2,4-DCAA at -17.2% on the confirmation column. Since the above mentioned anomalies were either surrogates or the affected analytes met criteria on the other column or the associated sample results were non-detect, no data qualifying action was taken. Sample 0621Q-MB displayed a %R less than the lower control limit for surrogate TMX on the confirmation column at 28%. Sample GW-UAA-O-1-56 displayed a %R less than the lower control limit for surrogate DCBP at 28% on the confirmation column. Sample GW-UAA-2-20FT displayed a %R less than the lower control limit for surrogate TMX on the confirmation column at 28%. Since the other surrogate met criteria, no data qualifying action was taken. Sample GW-UAA-O-1-110FT displayed %Rs less than the lower control limit for surrogates TMX at 26% and for DCBP at 28% on the confirmation column. Sample GW-UAA-1-100FT displayed %Rs less than the lower control limit for surrogates TMX at 26% and DCBP at 26% on the confirmation column. Associated analytes with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Samples GW-UAA-O-1-16, GW-UAA-O-1-56, GW-UAA-1-100FT, and GW-UAA-1-110FT displayed %RPDs greater than the control limit (i.e. 40%) for several compounds. These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low.

For the herbicides analyses, the CCV analyzed on 6/25/02 at 17:11 displayed a %D greater than the control limit (i.e. 15%) on the primary and confirmation

column for 2,4-DB at 16.7% and 20.3%, respectively. All associated sample results were flagged "UJ,c". The method blank displayed a positive detection for 2,4-D at 0.22 ug/L. Since all associated sample results were non-detect, no data qualifying action was taken. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,4,5-TP at 105% and 105%. Since all associated sample results were non-detect, no data qualifying action was taken. Sample GW-UAA-O-1-56 displayed a %RPD greater than the control limit between the primary and confirmation column for analyte 2,4,5-T at 50%. The analyte was flagged "J,g". The MS/MSD displayed %Rs greater than the upper control limit for MCPP at 350% and 325%, for MCPA at 250% and 275%, for 2,4,5-TP at 132% and 128% and for 2,4-DB at 325% and 300%. For MCPP, MCPA, and 2,4-DB, since the LCS met criteria, no data qualifying action was taken on associated samples. For 2,4,5-TP, although the LCS also displayed recoveries greater than the control limit, since associated sample results were non-detect, no data qualifying action was taken.

For the metals analyses, the initial and final CRDLs analyzed on 6/27/02 displayed %Rs greater than the upper control limit (i.e. 120%) for lead at 126% and 134%. The final CRDL analyzed on 7/2/02 displayed a %R greater than the upper control limit for antimony at 122%. The initial CRDL analyzed on 7/2/02 displayed a %R less than the lower control limit (i.e. 80%) for thallium at 74%. Since these recoveries are only slightly outside the control limit, no data qualifying action was taken. The final CRDL analyzed on 6/27/02 displayed a %R greater than the upper control limit for thallium at 141%. Since associated sample results are non-detect, no data qualifying action was taken. The initial CRDL analyzed on 7/12/02 displayed a %R less than the lower control limit for selenium at 54%. Since associated sample results were previously flagged for calibration blank contamination, no further data qualifying action was taken. Several analytes displayed positive detections in prep blanks and CCBs. Associated sample results with positive detections less than 5x the amount found in the blank were raised to the reporting limit and were flagged "U,o". Several analytes displayed negative detections in associated CCBs, prep blanks, and ICBs. Associated sample results with positive detections less than 5x the absolute value found in the blank contaminations were flagged "J,o"; non-detects were flagged "UJ,o". The post digestion spike displayed %Rs greater than the upper control limit for calcium at 161% and for lead at 141%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution added, no data qualifying action was taken.

For the dissolved gases analyses, the initial calibration displayed an r^2 value less than the control limit (i.e. 0.990) for methane at 0.986. All associated sample results were flagged "J,r". Samples GW-UAA-1-100FT and GW-UAA-1-110FT displayed concentrations greater than the calibration range. These samples were

reanalyzed at dilutions and were within calibration range. It is recommended that the diluted sample results be used for data interpretation.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable, except those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII07_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __ Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____August 19, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The MS/MSD recoveries for 3,3'-dichlorobenzidine (0% and 0%) were less than the lower control limit (i.e., 10%) in the GW-AA-O-2-23 MS/MSD pair. The MS and MSD samples were reanalyzed by the laboratory and displayed similar results (0% and 0%). 3,3'-dichlorobenzidine results in the associated samples were flagged "R, m".

Minor Anomalies: For the VOC analyses, the continuing calibration analyzed on 6/27/02 at 10:34 displayed a %D greater than the control limit (i.e., 20%) for bromomethane at -25.2%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The continuing calibration analyzed on 6/28/02 at 08:40 displayed %Ds greater than the control limit (i.e., 20%) for bromomethane at -66.2%, 1,2-dichloroethane at -21.3%, and styrene at -23.5%. Bormomethane results in the associated samples were flagged "UJ, c". Since 1,2-dichloroethane and styrene were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Chloromethane was detected in the method blank at 0.40 µg/L. Since this compound was not detected in the associated samples, no data qualifying action was taken. 1,1-Dichloroethene was detected in one trip blank (TB062002) at 0.36 µg/L. The positive 1,1-dichloroethene result in sample GW-UAA-2-90FT was flagged "U, y" at the reporting limit. Trichloroethane was detected in one trip blank (TB062102) at 0.61 µg/L. Toluene was detected in one trip blank (TB062102-02) at 0.54 µg/L. Since trichloroethane and toluene were not detected in the associated samples, no data qualifying action was taken. Reporting limits were raised due to dilutions in samples GW-UAA-2-60FT (DF=10), GW-UAA-2-70FT (DF=10), GW-UAA-2-80FT (DF=10), GW-UAA-2-90FT (DF=20), GW-UAA-2-100FT (DF=20), GW-UAA-2-110FT (DF=20), and GW-UAA-2-120FT (DF=5).

For the SVOC analyses, the continuing calibration analyzed on 7/5/02 at 07:41

displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (25.0%), 4-nitrophenol (39.0%), pyrene (-23.4%), and benzo(k)fluoranthene (-25.1%). The continuing calibration analyzed on 7/16/02 at 13:23 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroisopropyl)ether (24.0%), 2-nitroaniline (30.3%), 3-nitroaniline (21.9%), 4-nitrophenol (36.1%), 2,4-dinitro-toluene (21.3%), 4-nitroaniline (24.3%), and indeno(1,2,3-cd)pyrene (20.8%). The continuing calibration analyzed on 7/17/02 at 19:02 displayed a %D greater than the control limit (i.e., <20%) for 2-nitroaniline (30.3%). The positive 4-nitrophenol result in sample GW-AA-O-2-23 was flagged "J, c". Since all other compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. All base/neutral surrogates and one acid surrogate (phenol-d5) were not recovered (0%) in one diluted sample GW-UAA-2-100FT-DL (DF=5). The surrogate recoveries for 2-fluorophenol (130%), phenol-d5 (140%), nitrobenzene-d5 (144%), and 2-fluorobiphenyl (142%) were greater than the upper control limit in one diluted sample GW-UAA-2-120FT-DL (DF=5). Positive 1,4-dichloro-benzene results in these two diluted samples were flagged "J, s". Since all other results were not used for data interpretation, no data qualifying action was taken. The RPD for n-nitrosodiphenylamine (51%) was greater than the acceptance limit in the GW-AA-O-2-23 MS/MSD pair. The MS and MSD samples were reanalyzed by the laboratory and displayed a similar result (44%). Since MS and MSD recoveries for n-nitrosodiphenylamine were in control, no data qualifying action was taken. The internal standard peak areas for 1,4-dichlorobenzene-d4 (222%) and naphthalene-d8 (216%) were greater than the QC limit (i.e., 50-200%) in one QC sample GW-AA-O-2-23-MSDRE. The internal standard peak area for 1,4-dichlorobenzene-d4 (200.1%) was slightly greater than the QC limit (i.e., 50-200%) in one QC sample GW-AA-O-2-23-MSRE. Since there two samples are QC samples, no data qualifying action was taken. 1,4-dichlorobenzene results in samples GW-UAA-2-90FT, GW-UAA-2-100FT, GW-UAA-2-110FT, and GW-UAA-2-120FT exceeded the linear range of the calibration curve. 1,4-dichlorobenzene results in these samples were flagged "J, q". These four samples were diluted and reanalyzed by the laboratory. 1,4-dichlorobenzene results from the dilution analysis should be used for data interpretation.

For the pesticide analyses, the %Ds for methoxychlor (-16.3%) and 2,4-DCAA (-23.3%) on the primary column and for endrin aldehyde (-16.2%), 2,4-DCAA (-26.0%), and decachlorobiphenyl (DCBP, -17.3%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/3/02 at 13:49. The %D for 2,4-DCAA (-25.9%) on the primary column and for endrin aldehyde (-16.1%), 2,4-DCAA (-30.7%), tetrachloro-m-xylene (TCMX, -16.2%), and DCBP (-17.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed

on 7/3/02 at 23:34. These target compounds were not detected in the associated samples. Since these outliers either had an acceptable %D on the alternate column or for the other surrogates, no data qualifying action was taken. The DCBP surrogate recoveries in samples GW-AA-O-2-53 (20% and 19%) and GW-AA-O-2-53DUP (17% and 16%) were less than the lower control limit (i.e., 30%). Positive results were flagged "J,s" and non-detects were flagged "UJ, s" in these two samples. The DCBP surrogate recovery in sample GW-AA-O-2-13 (26%) was less than the lower control limit (i.e., 30%). Since all other surrogate recoveries were in control, no data qualifying action was taken. The %RPDs between primary and confirmatory columns for alpha-BHC (168.2%) and delta-BHC (158.7%) in sample GW-AA-O-2-53DUP; and for beta-BHC (162.3%) in sample GW-UAA-2-100FT; and for alpha-BHC (169.6%), delta-BHC (159.8%), and heptachlor (42.8%) in sample GW-AA-O-2-53 were greater than the acceptance limit (i.e., < 40%). The positive beta-BHC result in sample GW-UAA-2-100FT was flagged "J, g". Since results in samples GW-AA-O-2-53DUP and GW-AA-O-2-53 were previously flagged due to surrogate recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %Ds for 2,4-DB (-22.0% and -19.3%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/3/02 at 17:53. Positive 2,4-DB results were flagged "J, c" and non-detects were flagged "UJ, c" in the associated samples. The MS recovery for MCPP (198%) and the MSD recovery for 2,4,5-TP (105%) were greater than the upper control limit in the GW-AA-O-2-93FT MS/MSD pair. The LCS recoveries for dalapon (98%) and 2,4,5-TP (102%) were greater than the upper control limit. Positive 2,4,5-TP results were flagged "J, l" in the associated samples. Since MCPP and dalapon were not detected in the associated samples, no data qualifying action was taken. The RPD between primary and confirmatory columns for 2,4-DB in sample GW-AA-O-2-53 (117.8%) was greater than the acceptance limit (i.e., 40%). The %RPDs between primary and confirmatory columns for 2,4,5-TP in samples GW-AA-O-2-53DUP (118.6%), GW-UAA-2-100FT (149.8%), and GW-AA-O-2-53 (121.1%) were greater than the acceptance limit (i.e., 40%). Since these results were previously flagged due to continuing calibration failure or LCS recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for lead (134%) and thallium (122%) and the final CRDL percent recoveries for iron (71%), lead (132%), sodium (68%), thallium (126%) were outside the control limit (i.e., 80-120%). Since these recoveries were marginally outside the control limits, no data qualifying action was taken. Aluminum was detected in the preparation blank

(PB) at 11.95 µg/L, the initial calibration blank (ICB) at 31.03 µg/L, and two continuing calibration blanks (CCBs) at concentrations of 11.74 µg/L (CCB3) and 16.91 µg/L (CCB4). Barium was detected in CCB3 at 0.91 µg/L and CCB4 at 0.89 µg/L. Calcium was detected in the PB at 9.0 µg/L and CCB4 at 27.36 µg/L. Copper was detected in CCB3 at 0.93 µg/L and CCB4 at 1.10 µg/L. Manganese was detected in CCB3 at 1.6 µg/L and CCB4 at 0.92 µg/L. Potassium was detected in CCB3 at 31.05 µg/L. Silver was detected in the PB at 0.85 µg/L. Thallium was detected in the PB at 4.11 µg/L and CCB3 at 5.84 µg/L. Aluminum, copper, and silver results less than five times the blank concentration were flagged "U, p" or "U, o" at reporting limits in the associated samples. Since barium, calcium, manganese, potassium, and thallium results were either greater than five times the blank concentration or non-detects in the associated samples, no data qualifying action was taken. The MS recoveries for calcium and magnesium and the MSD recovery for calcium were greater than the upper control limits (i.e., 125%). The post-digestion spike recoveries for calcium, iron, and magnesium, were less than the lower control limits. Since these concentrations in the parent sample (non-client sample) were greater than four times the spiking concentration, no data qualifying action was taken.

For the methane analyses, the correlation coefficient on the FID detector for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples. The MS/MSD recoveries for methane (0% and 12%) were less than the lower control limit (i.e., 75%) in the GW-AA-O-2-93FT MS/MSD pair. Since all methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The methane result from FID detector in sample GW-UAA-2-60FT exceeded the linear range of the calibration curve. Since this methane result was previously flagged due to initial calibration failure, no additional data flags were applied. The methane result form the TCD detector was also reported by the laboratory. The methane result from the TCD detector should be used for data interpretation.

For carbon dioxide determination, field duplicates displayed poor precision at 123.7% RPD. Positive carbon dioxide results were flagged "J, f".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Except 3,3'-dichlorobenzidine data, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII08_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____August 19, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticide analyses, the MS/MSD recoveries for endrin aldehyde (0% and 0%) were less than the lower control limit in the GW-AA-O-2-93FT.MS/MSD pair. All endrin aldehyde non-detect results were flagged "R, m".

Minor Anomalies: For the VOC analyses, the continuing calibration analyzed on 7/1/02 at 09:57 displayed a %D greater than the control limit (i.e., 20%) for chloromethane at 27.5%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MSD recovery for chlorobenzene (60%) was less than the control limit (i.e., 72-127%) in the GW-AA-O-2-93FT MS/MSD pair. Since MS recovery and relative percent difference (RPD) were in control, no data qualifying action was taken. Reporting limits were raised due to dilution (high chlorobenzene conc.) in samples GW-UAA-2-124FT (DF=20), GW-AA-O-2-93FT (DF=5), GW-AA-O-2-83FT (DF=2), GW-AA-0-2-103FT (DF=5), GW-AA-O-2-113FT (DF=10), and GW-AA-O-2-121FT (DF=5).

For the SVOC analyses, the continuing calibration analyzed on 7/14/02 at 09:40 displayed a %D greater than the control limit (i.e., <20%) for dinoseb (-37.8%). The continuing calibration analyzed on 7/15/02 at 20:07 displayed %Ds greater than the control limit (i.e., <20%) for hexachlorocyclopentadiene (-20.6%), 4-nitrophenol (35.1%), 2,4-dinitrotoluene (23.1%), and 4-nitroaniline (31.7%). The continuing calibration analyzed on 7/17/02 at 19:02 displayed a %D greater than the control limit (i.e., <20%) for 2-nitroaniline (30.3%). Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. All base/neutral surrogates were not recovered (0%) in one diluted sample GW-UAA-2-124FT-DL (DF=5). The positive 1,4-dichlorobenzene result in this diluted sample was flagged "J, s". Since all other results were not used for data interpretation, no data qualifying action was taken. The MS/MSD recoveries for 3,3'-dichlorobenzidine (9% and 6%) were less than the lower control limit (i.e.,

10%) in the GW-AA-O-2-93FT MS/MSD pair. The MS and MSD samples were reanalyzed by the laboratory and displayed similar results (4% and 0%). The RPD for n-nitrosodiphenylamine (27%) was greater than the acceptance limit in the reanalysis. Since LCS/LCSD recoveries for 3,3'-dichlorobenzidine and n-nitrosodiphenylamine were in control, no data qualifying action was taken. The internal standard peak area for acenaphthene-d10 (47.6%) was less than the QC limit (i.e., 50-200%) in one QC sample GW-AA-O-2-93Ft-MS. This sample was re-analyzed by the laboratory and displayed acceptable internal standard peak area. No data qualifying action was taken. The 1,4-dichlorobenzene result in sample GW-UAA-2-124FT exceeded the linear range of the calibration curve. The 1,4-dichlorobenzene result in this sample was flagged "J, q". This sample was diluted by a factor of 5 and reanalyzed by the laboratory. The 1,4-dichlorobenzene result from the dilution analysis should be used for data interpretation.

For the pesticide analyses, the %Ds for 2,4-DCAA (-22%) and tetrachloro-m-xylene (TCMX, -16.6%) on the primary column and for heptachlor (20.4%) and 2,4-DCAA (-20.6%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/1/02 at 10:40. The %Ds for endrin aldehyde (-16.5%) and 2,4-DCAA (-22.1%) on the primary column and for heptachlor (18.2%) and 2,4-DCAA (-18.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/1/02 at 22:06. The %Ds for 4,4'-DDE (16.6%), 4,4'-DDD (21.8%), endosulfan II (15.7%), endrin ketone (21.5%), and decachlorobiphenyl (DCBP, 16.2%) on the primary column and for heptachlor (25.8%) and 2,4-DCAA (-17.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/3/02 at 00:09. The %Ds for 2,4-DCAA (-23.4%) on the primary column and for heptachlor (17.4%) and 2,4-DCAA (-15.9%) on confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/3/02 at 12:07. These compounds were not detected in the associated samples. Since these outliers either had an acceptable %D in other column or surrogates, no data qualifying action was taken. The DCBP surrogate recoveries in samples GW-UAA-2-123FT (20% and 22%), GW-AA-O-2-93FT (20% and 17%), GW-AA-O-2-93FT-MS (28%), GW-AA-O-2-93FT-MSD (28% and 26%), and GW-AA-O-3-68FT (12% and 12%) were less than the lower control limit (i.e., 30%). Positive results were flagged "J,s" and non-detects, except endrin aldehyde which was previously flagged due to MS/MSD recovery failure, were flagged "UJ, s". The MS/MSD recoveries for alpha-BHC (240% and 230%) were greater than the upper control limit (i.e., 131%) in the GW-AA-O-2-93FT.MS/MSD pair. The RPD for gamma-BHC (34%) was greater than the acceptance limit (i.e., < 26%). Since positive results for these two compounds in the associated samples were previously flagged due to surrogate recovery failure, no additional data flags were applied. The RPDs between primary and confirmatory columns for beta-BHC in

samples GW-UAA-2-124FT (41.9%) and GW-AA-O-3-68FT (64.7%) and for gamma-BHC in sample GW-AA-O-2-93FT (130.9%) were greater than the acceptance limit (i.e., < 40%). Since these results were previously flagged due to surrogate recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %Ds for 2,4-DB (-22.0% and -19.3%) on both columns were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/3/02 at 17:53. Positive 2,4-DB results were flagged "J, c" and non-detects were flagged "UJ, c" in the associated samples. The 2,4-DCAA surrogate recovery on the primary column (138%) was greater than the upper control limit (i.e., 133%) in sample GW-AA-O-3-68FT. Positive results in this sample were flagged "J, s". The MS recovery for MCPP (198%) and the MSD recovery for 2,4,5-TP (105%) were greater than the upper control limit in the GW-AA-O-2-93FT MS/MSD pair. Since the MSD recovery for MCPP and the MS recovery for 2,4,5-TP were in control, no data qualifying action was taken. The LCS recoveries for dalapon (98%) and 2,4,5-TP (102%) were greater than the upper control limit. Since these two compounds were not detected in the associated samples, no data qualifying action was taken. The RPDs between primary and confirmatory columns for 2,4-DB in samples GW-UAA-2-124FT (40%) and GW-AA-O-2-93FT (92.8%) were greater than the acceptance limit. Since these two results were previously flagged due to continuing calibration failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for lead (135%) and thallium (122%) and the final CRDL percent recovery for thallium (137%) were greater than the upper control limit (120%). Since these two analytes were not detected in the associated samples, no data qualifying action was taken. Aluminum was detected in the preparation blank (PB) at 11.6 µg/L, the initial calibration blank (ICB) at 31.0 µg/L, and two continuing calibration blanks (CCBs) at concentrations of 16.9 µg/L (CCB3) and 9.91 µg/L (CCB4). Barium was detected in four CCBs at concentrations ranging from 0.397 µg/L to 0.893 µg/L. Calcium was detected in the PB at 13.0 µg/L and four CCBs at concentrations ranging from 9.23 µg/L to 28.2 µg/L. Copper was detected in the PB at 1.1 µg/L and five CCBs at concentrations ranging from 0.848 µg/L to 1.1 µg/L. Manganese was detected in three CCBs at concentrations ranging from 0.648 µg/L to 0.919 µg/L. Thallium was detected in the PB at 5.08 µg/L and four CCBs at concentrations ranging from 3.73 µg/L to 5.51 µg/L. Aluminum and copper results less than five times the blank concentration were flagged "U, p" at reporting limits in the associated samples. Since barium, calcium, manganese, and thallium results were either greater than five times the blank concentration or

non-detects in the associated samples, no data qualifying action was taken. The MS recoveries for calcium, iron, and sodium and the MSD recovery for calcium were less than the lower control limits. The post-digestion spike recoveries for calcium, iron, magnesium, and sodium were less than the lower control limits. Since these concentration in the parent sample, GW-AA-O-2-93FT, were greater than four times the spiking concentration, no data qualifying action was taken. The %D for potassium (10.8%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (GW-AA-O-3-28FT). The positive potassium result in parent sample GW-AA-O-3-28FT was flagged "J, s". Since the %D result for potassium in another serial dilution analysis (GW-AA-O-2-93FT) was in control, no data flags applied to the associated samples.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples. The MS/MSD recoveries for methane (0% and 12%) were less than the lower control limit (i.e., 75%) in the GW-AA-O-2-93FT MS/MSD pair. Since all methane results were previously flagged due to initial calibration failure, no additional data flags were applied.

For the sulfate analyses, the MS recovery for sulfate (73%) was less than the lower control limit (i.e., 75%) in the GW-AA-O-2-93FT MS/MSD pair. Since sulfate concentration in the parent sample was greater than four times the spiking concentration, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Except endrin aldehyde data, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.:__SAII09_____ **Fraction:__VOCs, SVOCs, Pest, PCBs, Herbs, Methane, Wet Chem, Metals_**

Lab:___STL, Savannah____ **Project Name:__Sauget Area 2_____**

Reviewer:__RA_____ **Date:____November 7, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied, the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the USEPA National Functional Guidelines for Data Review, modified to reflect the level of review requested, the specifics of the analytical method employed, and provisions of the approved project-specific QAPP.

Major Anomalies: For the pesticide analyses, the recoveries for surrogate decachlorobiphenyl (13%/9%) were less than the QC limit (i.e., 30-150%) in sample GW-AA-0-3-108FT. Positive results were flagged "J,s" and non-detects were flagged "R,s". It should be noted that percent completeness was less than the QC limit (i.e., 95%) at 70% due to this failure.

Minor Anomalies: For the VOC analyses, the continuing calibration %D was greater than the QC limit (i.e., 20%) for 2-butanone (21.2%) in the continuing calibration analyzed on 7/3/02. The positive 2-butanone result was flagged "J,c" in sample GW-AA-S-1-84FT. The method blank (IP0703MB) contained carbon disulfide at 0.59 ug/L and method blank (IP0705MB) contained methylene chloride at 0.58 ug/l. No positive results were reported in the associated samples and no data qualifying action was required. Trip blank TB-062602 contained methylene chloride at 0.29 ug/l and chlorobenzene at 0.46 ug/L. The positive methylene chloride result in sample GW-AA-0-3-108FT, and the positive chlorobenzene result in sample GW-AA-S-1-34FT were flagged "U,y".

For the SVOC analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 20%) for hexachlorocyclopentadiene (-20.6%), 4-nitrophenol (35.1%), and 4-nitroaniline (31.7%) for the continuing calibration analyzed on 7/15/02, bis(2-chloroisopropyl)ether (24%), 2-nitroaniline (30.3%), 3-nitroaniline (21.8%), 4-nitrophenol (36.1%), 2,4-dinitrotoluene (21.3%), 4-nitroaniline (24.3%), pentachlorophenol (-20.3%), and indeno(1,2,3-cd)pyrene (20.8%) for the continuing calibration analyzed on 7/16/02, and 2-nitroaniline (30.3%) and pentachlorophenol (-20.4%) for the continuing calibration analyzed on 7/17/02. No positive results were reported for these compounds and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was required. The internal standard areas were greater than the QC limit for 1,4-dichlorobenzene-d4, naphthalene-d8, and acenaphthene-d10 in sample GW-AA-S-1-24FT. Positive results were flagged "J,i" in

the associated compounds. This sample was re-analyzed, however, all internal standard areas were greater than the QC limit for the re-analyses. The original sample results should be used for data interpretation.

For the pesticides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for methoxychlor (-19.1%/-19.8%) on both columns for the continuing calibration analyzed on 7/9/02 at 1614. All associated sample results were non-detects and were flagged "UJ,c". The recoveries for surrogate decachlorobiphenyl (20%/16%) were less than the QC limit (i.e., 30-150%) in sample GW-AA-S-1-24FT. Positive results were flagged "J,s" and non-detects were flagged "UJ,s". The %D between the two columns was greater than the QC limit (i.e., 40%) for delta-BHC (98.4%) in sample GW-AA-S-1-24FT, and gamma-BHC (61.2%) and beta-BHC (43.5%) in sample GW-AA-0-3-108FT. These results were previously flagged due to surrogate failure and no data qualifying action was required. It should be noted that the laboratory reported the lower of the two values due to potential matrix interference.

For the herbicides analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for MCPP (18%/15.6%) on both columns, and pentachlorophenol (16.7%), 2,4,5-TP (20%) and 2,4,5-T (17%) on the primary column for the continuing calibration analyzed on 7/21/02 at 0305. Non-detects were flagged "UJ,c" for MCPP in all samples, and the positive 2,4,5-TP result was flagged "J,c: in sample GW-AA-0-3-108FT. The continuing calibration %D was greater than the QC limit (i.e., 15%) for 2,4,5-TP (18.6%) on the confirmation column for the continuing calibration analyzed on 7/21/02 at 1034. The associated sample result was previously flagged and no data qualifying action was required. The LCS/LCSD recoveries were greater than the QC limit (i.e., 10-100%) for 2,4,5-TP (102%/112%). The LCS recovery was greater than the QC limit (i.e., 10-100%) for 2,4,5-TP at 115%. The associated sample results were previously flagged and no data qualifying action was required. The %D between the two columns was greater than the QC limit (i.e., 40%) for 2,4,5-TP (164%) in sample GW-AA-0-3-108FT. This result was previously flagged and no data qualifying action was required. It should be noted that the laboratory reported the lower of the two values due to potential matrix interference.

For methane analyses, the initial calibration correlation coefficient was less than the QC limit (i.e., 0.990) at 0.986 for the initial calibration analyzed on 6/12/02. All associated sample results were positive and were flagged "J,r".

For the metals analyses, the CRDL recoveries were greater than the QC limit (i.e., 80-120%) for thallium (143%) and lead (122%) and less than the QC limit for mercury (78%). No positive results were reported for thallium and no data qualifying action was required. The failures for lead and mercury were not serious enough (i.e., < 60% or > 140%) to affect the sample results. No data qualifying action was required. The method blank contained negative results for aluminum, arsenic, cobalt, and thallium. Positive results less than 5 times the blank concentration were flagged "J,p" and non-

detects were flagged "UJ,p" in the associated samples. The method blank also contained positive results for beryllium, calcium, and magnesium. Positive results less than 5 times the blank concentration were flagged "U,p" in the associated samples. The initial and continuing calibrations also contained negative results for silver, thallium, cobalt, and aluminum. Non-detects not previously flagged due to other failures were flagged "UJ,o" in the associated samples. The initial and continuing calibrations also contained positive results for beryllium, barium, calcium, copper, magnesium, manganese, thallium, lead, and vanadium. Positive results not previously flagged due to other failures were flagged "U,o" in the associated samples. The MS/MSD percent recoveries were greater than the QC limit (i.e., 75-125%) for aluminum (218%/245%) and silver (134%/135%). Positive results were flagged "J,m" unless previously flagged due to other failures.

Correctable Anomalies: None.

Comments: It should be noted that detection limits were raised in several samples due to dilutions.

Signed:_____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII10_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 22, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the method blank analyzed on 7/5/02 displayed a positive detection for methylene chloride at 0.31 ug/L. Associated sample results with positive detections less than 5x the amount found in the blank were raised to the reporting limit and flagged "U,z". The trip blanks (trip blank 070102 and trip blank 070202) displayed a positive detection for styrene at 0.36 ug/L and 0.22 ug/L, respectively. Since associated sample results did not displayed any positive detections for styrene, no data qualifying action was taken. Equipment blank, Hose Water, displayed positive detections for chloroform at 47 ug/L, for bromodichloromethane at 8.6 ug/L, and for dibromochloromethane at 1.1 ug/L. Since associated sample results did not displayed any positive detections for these compounds, no data qualifying action was taken. The ICAL analyzed on 7/4/02 displayed a %RSD greater than the control limit (i.e. 15%) for bromomethane at 27.9%. The CCV analyzed on 7/5/02 at 10:25 displayed a %D greater than the control limit for bromomethane at 41.2%. Since the %D and the %RSD were marginally outside the control limit and associated sample results were non-detect, no data qualifying action was taken.

For the SVOCs analyses, the CCV analyzed on 7/22/02 at 18:44 displayed %Ds greater than the control limit (i.e. 20%) for bis (2-chloroethyl)ether at 22.9%, for indeno(1,2,3-cd)pyrene at 32.2%, and for benzo(g,h,i)perylene at 26.0%. Associated sample results with positive detections were flagged "J,c". The CCV analyzed on 7/24/02 at 08:56 displayed %Ds greater than the control limit for bis (2-chloroethyl)ether at -21.9%, for bis (2-chloroisopropyl)ether at 21.4%, for n-nitroso-di-propylamine at 27.9%, for 2,4-dinitrophenol at 24.9%, for 4-nitrophenol at 24.3%, and for 4,6-dinitro-2-chlorophenol at 27.6%. Since the only sample associated with the CCV was a method blank, no data qualifying action

was taken.
For the pesticides analyses, the CCV analyzed on 7/10/02 at 10:28 displayed %Ds greater than the control limit (i.e. 15%) for heptachlor at -17.6%, for surrogate 2,4-DCAA at -27.6%, and for surrogate tetrachloro-meta-xylene (TMX) at -21.5% on the primary column and for surrogate 2,4-DCAA at -25.9% on the confirmation column. The CCV analyzed on 7/10/02 at 15:47 displayed %Ds greater than the control limit on the primary column for surrogate 2,4-DCAA at -30.4%, and for surrogate TMX at -22.2%, and on the confirmation column for surrogate 2,4-DCAA at -25.9% and for methoxychlor at 20.6%. Since either the anomalies were QC analytes or associated sample results were non-detect, no data qualifying action was taken. Sample GW-AA-S-3-132FT displayed a %R less than the lower control limit for surrogate decachlorobiphenyl (DCBP) on the primary column at 26%. Since the other surrogate met criteria, no data qualifying action was taken. The LCS/LCSD displayed a %RPD greater than the control limit for methoxychlor at 46%. Since the LCS and LCSD met criteria, no data qualifying action. Sample GW-AA-S-3-132FT displayed a %RPD greater than the control limit between primary and confirmation column for gamma-BHC at 107.7% and for beta-BHC at 46.7%. Gamma-BHC and beta-BHC were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low.

For the herbicides analyses, equipment blank, Hose Water, displayed a positive detection for dicamba at 0.21 ug/L and for 2,4-D at 0.36 ug/L. Since all associated sample results were non-detect, no data qualifying action was taken. The CCV analyzed on 7/21/02 at 03:05 displayed %Ds greater than the control limit (i.e. 15%) on the primary column for MCPP at 18%, for PCP at 16.7%, for 2,4,5-TP at 20%, for 2,4,5-T at 17%, and for dinoseb at 29.5% and on the confirmation column for MCPP at 15.6%. The CCV analyzed on 7/21/02 at 10:34 displayed %Ds greater than the control limit on the primary column for 2,4,5-TP at 18.6% and for dinoseb at 27.2%. The CCV analyzed on 7/23/02 at 14:12 displayed a %D greater than the control limit on the primary column for 2,4,5-T at 16.3%. The associated sample result analyzed on 7/21/02 for MCPP was flagged "UJ,c". The associated positive sample result analyzed on 7/23/02 for 2,4,5-TP was flagged "J,c". Since all other anomalies were either non-detect or met criteria on the confirmation column, no data qualifying action was taken. The LCSs displayed %Rs greater than the upper control limit for 2,4,5-TP at 115% and 105%. Since all associated sample results were either non-detect or previously flagged for other anomalies, no data qualifying action was taken. Sample GW-AA-S-3-132FT displayed a %RPD greater than the control limit between columns for 2,4,5-TP at 58.8%. Since the analyte was previously flagged. No further data qualifying action was taken. It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual

concentration and may be biased low.

For the metals analyses, the prep blank displayed a positive detection for beryllium (Be) at 0.00044 mg/L and negative detections for arsenic (As) at -0.00372 mg/L and for cobalt (Co) at -0.00087 mg/L. Associated sample results were non-detect and were flagged "UJ,p". CCB3 displayed positive detections for barium (Ba) at 0.0166 mg/L, for Be at 0.00067 ug/L, for calcium (Ca) at 0.01617 mg/L, for copper (Cu) at 0.00128 mg/L, for manganese (Mn) at 0.00132 mg/L, and for vanadium (V) at 0.0017 mg/L. CCB4 displayed positive detections for Ba at 0.00179 mg/L, for Be at 0.00025 mg/L, for Cu at 0.00158 mg/L, for Mn at 0.00152 mg/L, for silver (Ag) at 0.00114 mg/L, for thallium (Tl) at 0.00386 mg/L, and for V at 0.00198 mg/L. Associated sample results less than 5x the amount found in the blank were less than the reporting limit. These results were raised to the reporting limit and flagged "U,o". Equipment blank, Hose Water, displayed positive detections for aluminum (Al) at 0.016 mg/L, for Ba at 0.072 mg/L, for Be at 0.00067 mg/L, for Ca at 68 mg/L, for Cu at 0.015 mg/L, for iron (Fe) at 0.073 mg/L, for magnesium (Mg) at 20 mg/L, for Mn at 0.011 mg/L, for potassium (K) at 4 mg/L, for sodium (Na) at 26 mg/L, for V at 0.0024 mg/L, and for zinc (Zn) at 0.074 mg/L. Associated sample results with positive detections at or above the reporting limit less than 5x the amount found in the blank were flagged "U,x". Associated sample results less than the reporting limit less than 5x the amount found in the blank were raised to the reporting limit and flagged "U,x". The MS/MSD analyzed on 7/8/02 displayed %Rs greater than the upper control limit for silver at 134% and 135%. The MSD displayed %Rs less than the reporting limit for calcium at 67% and for magnesium at 23%. Since the MS/MSD was not from the same site, no data qualifying action was taken. The post-digestion spike displayed %Rs less than the lower control limit for iron at 38% and for calcium at 24%. Since the amount found in the parent sample was greater than 4x the amount spiked, no data qualifying action was taken.

For the dissolved gases analyses, the initial calibration displayed an r^2 value less than the control limit (i.e. 0.990) for methane at 0.986. All associated sample results were flagged "J,r". The equipment blank, Hose Water, displayed a positive detection for methane at 1 mg/L. Since the associated sample results were greater than 5x the amount found in the blank, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: For the VOCs, herbicides, metals, and methane analyses, trace level contamination was detected in the equipment blank, Hose Water. Since these contaminants in the VOCs, herbicides, and methane analyses were either not

detected or greater than 5x the amount found in the blank, there should be no impact on the data quality. However, the field team should stop using hose water to clean equipment.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII11 – TCLP Waste__ **Fraction: __VOCs, SVOCs, Pesticide, PCBs,___ __Herbicide and Metals_____**

Lab: _____STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____August 19, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the continuing calibration analyzed on 7/12/02 at 12:14 displayed %Ds greater than the control limit (i.e., 20%) for 2-butanone at 63.3% and 1,2-dichloroethane at 23.1%. The continuing calibration analyzed on 7/17/02 at 12:22 displayed a %D greater than the control limit for 2-butanone at 67.3%. The continuing calibration analyzed on 7/18/02 at 10:46 displayed a %D greater than the control limit for 2-butanone at 42.1%. Since 1,2-dichloroethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. All 2-butanone results were flagged "J, c" or "UJ, c". The MS/MSD recoveries were greater than the upper control limit (i.e., 167%) for 2-butanone at 186% and 184%. Since the parent sample is not collected from project site (non-client sample) and 2-butanone results were previously flagged due to calibration failure, no additional data qualifying action was taken. The LCS recovery was greater than the upper control limit (i.e., 167%) for 2-butanone at 184%. Since 2-butanone results in the associated samples were previously flagged due to calibration failure, no additional data qualifying action was taken. Reporting limits were raised by a factor of 2 in samples WASTE-S-2-6'-T, WASTE-S-1-6'-T, WASTE-O-3-9'-T, and WASTE-O-2-7'-T due to dilutions (abundance of target compounds).

For the SVOC analyses, the continuing calibration analyzed on 7/16/02 at 08:21 displayed a %D greater than the control limit (i.e., 20%) for 2,4,6-tribromophenol (-21.4%). Since this compound is a surrogate and the %D failure was not serious enough (i.e., > 50%) to affect associated sample results, no data qualifying action was taken. Base/neutral surrogates were not recovered (0%) in two diluted samples WASTE-O-1-COMP-T-DL (DF=5) and WASTE-O-1-COMP-T-DUP-DL (DF=5). Since the base/neutral results in these two diluted samples are not to be used for data interpretation, no data qualifying action was taken. Pentachloro-

phenol results in samples WASTE-S-1-COMP-T, WASTE-O-3-COMP-T, WASTE-O-1-COMP-T, and WASTE-O-1-COMP-T-DUP exceeded the linear range of the calibration curve. Positive pentachlorophenol results in these four samples were flagged "J, q". These samples were diluted by factors of 5 or 10 and reanalyzed by the laboratory. Pentachlorophenol results from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for 2,4-DCAA (-27.5%), tetrachloro-m-xylene (TCMX, -18.6%), and decachloro-biphenyl (DCBP, -16.0%) on the primary column and for 2,4-DCAA (-26.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/11/02 at 11:23. The %Ds for TCMX (-21.3%) and 2,4-DCAA (-28.0%) on the primary column and for methoxychlor (20.8%) and 2,4-DCAA (-25.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/11/02 at 17:33. The positive methoxychlor result in sample WASTE-O-3-COMP-T was flagged "J, c". Since other outliers are surrogates, no data qualifying action was taken. The DCBP surrogate recovery in sample WASTE-O-1-COMP-T (21%) was less than the lower control limit (i.e., 30%) on the primary column. Since all other surrogate recoveries were in control, no data qualifying action was taken. The DCBP and TCMX surrogate recoveries in sample WASTE-O-1-COMP-T-DUP (26% and 29%, respectively) were less than the lower control limit (i.e., 30%) on the primary column. Positive results were flagged "J, s" and non-detects were flagged "UJ, s" in this sample. The internal standard peak area for bromonitro-benzene was greater than the QC limit (i.e., 50-150%) in samples WASTE-O-1-COMP-T (229.7%) and WASTE-O-1-COMP-T-DUP (234.9%). Since no target compounds were detected in these two samples, no data qualifying action was taken. The RPDs between primary and confirmatory columns for gamma-BHC (76.2%) and heptachlor (50.0%) in sample WASTE-S-2-COMP-T and for methoxychlor (58.8%) in sample WASTE-O-3-COMP-T were greater than the acceptance limit (i.e., 40%). These results, except those previously flagged due to calibration failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, the monochlorobiphenol result in sample WASTE-O-3-COMP-T exceeded the linear range of the calibration curve. The positive monochlorobiphenol result in this sample was flagged "J, q". This sample was diluted by a factor of 2 and reanalyzed by the laboratory. The monochlorobiphenol result from the dilution analysis should be used for data interpretation.

For the herbicide analyses, the %Ds for 2,4-D (18.6%) and 2,4,5-TP (17.7%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/26/02 at 12:51. The %D for 2,4,5-TP

(16.6%) on the primary column was greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/26/02 at 17:21. Positive 2,4-D results were flagged "J, c" in the associated samples. 2,4,5-TP was not detected in the associated samples. Since the 2,4,5-TP had acceptable %Ds on the confirmation column, no data qualifying action was taken. The 2,4-DCAA surrogate recoveries on the confirmation column were greater than the upper control limit (i.e., 133%) in samples WASTE-O-1-COMP-T (2150%), WASTE-O-1-COMP-T-DUP (2500%), WASTE-S-1-COMP-T (5500%), and WASTE-O-3-COMP-T (2500%). Positive results in these samples were flagged "J, s". 2,4-D results in samples WASTE-O-1-COMP-T, WASTE-O-1-COMP-T-DUP, and WASTE-O-3-COMP-T exceeded the linear range of the calibration curve. Since these positive 2,4-D results were previously flagged due to surrogate recovery failures, no additional data qualifying action was taken. These samples were diluted by factors of 10 or 20 and reanalyzed by the laboratory. 2,4-D results from the dilution analysis should be used for data interpretation. The RPDs between primary and confirmatory columns for 2,4,5-TP in samples WASTE-O-1-COMP-T (168.5%), WASTE-O-1-COMP-T-DUP (162.6%), and WASTE-O-3-COMP-T (164.2%) were greater than the acceptance limit. Since these results were previously flagged due to surrogate recovery failures, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the final CRDL percent recovery for lead (130%) was greater than the upper control limit (i.e., 120%). Since this recovery was marginally outside the control limit, no data qualifying action was taken. Selenium was detected in the preparation blank (PB) at -0.08336 mg/L and one continuing calibration blank (CCB6) at -0.00717 mg/L. Lead was detected in the initial calibration blank (ICB) at -0.00158 mg/L. Lead and selenium non-detect results in the associated samples were flagged "UJ, p" or "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Barium was detected in CCB6 at 0.00123 mg/L. Cadmium was detected in CCB5 at 0.00109 mg/L and CCB6 at 0.00087 mg/L. Since barium and cadmium results were either greater than five times the blank concentration or non-detects in the associated samples, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: MS/MSD analyses were not performed on these TCLP waste samples. Given that the majority of LCS/LCSD results associated with this SDG are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of anomalies discussed above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII12_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____September 10, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973 at 0.0487. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "R,c".

For the SVOCs analyses, sample SOIL-0-2-6' displayed a large number of analytes with concentrations less than the reporting limit. After further review of the chromatogram, it is possible that the large number of detections is due to possible instrument carryover. The laboratory was asked to re-analyze the sample, but was informed that the sample had been discarded. All associated sample results were flagged "R,Q".

For the PCBs analyses, the MS/MSD displayed %Rs less than the lower control limit for trichlorobiphenyl at 0% and 0%, for tetrachlorbiphenyl at 0% and 0%, and for pentachlorobiphenyl at 12% and 0%, Associated sample results with positive detections were flagged "J,m", unless previously flagged for internal standard anomalies; non-detects were flagged "R,m".

Minor Anomalies: For the VOCs analyses, the CCV analyzed on 7/11/02 at 09:09 displayed a %D greater than the control limit (i.e. 20%) for methylene chloride at -32.6%. The CCV analyzed on 7/15/02 at 08:29 displayed a %D greater than the control limit for 1,1-dichloroethane at 30.6%. The positive 1,1-dichloroethane result in sample SOIL-S-1-6' was flagged "J,c". Sample SOIL-0-1-6' displayed a %R greater than the upper control limit (i.e. 135%) for surrogate 4-bromofluorobenzene at 138%. Sample SOIL-S-1-6' displayed a %R less than the lower control limit (i.e. 58%) for surrogate dibromofluoromethane at 32%. Since the affected samples were analyzed at dilutions greater than 10x, no data qualifying action was taken. The LCS/LCSD displayed a %RPD greater than the control limit for methylene

chloride at 34%. Since the LCS and LCSD met criteria, no data qualifying action was taken. The field duplicate displayed %RPDs greater than the control limit for toluene at 166%, for benzene at 175%, for methyl isobutyl ketone at 154%, for chlorobenzene at 138%, for ethylbenzene at 152%, and mixed xylenes at 143%. Affected sample results were flagged "J,f". Samples SOIL-0-2-6', SOIL-0-3-6', and SOIL-S-1-6' displayed analytes that exceeded the calibration range. These analytes were flagged "J,q". These samples were re-analyzed at greater dilutions and the analytes were within calibration range, except for the benzene result in sample SOIL-0-3-6', which was non-detect. It is recommended that the re-analyzed results for these analytes be used for data interpretation, except for the benzene result. The original result for benzene should be used for data interpretation.

For the SVOCs analyses, the CCV analyzed on 7/24/02 at 08:30 displayed a %D greater than the control limit (i.e. 20%) for 4-nitrophenol at 24.7%. Since there were no samples associated with this analyte, no data qualifying action was taken. The MS/MSD analyzed displayed %Rs less than the lower control limit for n-nitrosodiphenylamine at 40% and 50%. The MS also displayed %Rs less than the lower control limit for dimethylphthalate at 45%, for butyl benzyl phthalate at 49%, for benzo(a)anthracene at 49%, and for chrysene at 50%. The MS/MSD displayed %RPDs greater than the control limit for 1,2-dichlorobenzene at 27%, for 3-nitroaniline at 40%, and for dibenzo(a,h)anthracene at 26%. Since the MS, MSD, or other QC data met specified criteria, no data qualifying action was taken. Most of the MS/MSD and RPD recoveries were outside the control limit due to most of the analytes being diluted out in the SOIL-0-1-6' MS/MSD pair. No data qualifying action was taken. Several samples displayed surrogate %RS at 0%. Since these samples were analyzed at dilutions greater than 10x, no data qualifying action was taken. Sample SOIL-0-1-6' displayed an internal standard %R greater than the control limit (i.e. 200%) for phenanthrene-d10 at 214%. Affected analytes with positive detections were flagged "J,n". Field duplicates displayed %RPDs greater than the control limit for 1,4-dichlorobenzene at 136% and for 1,2-dichlorobenzene at 131%. Affected analytes were flagged "J,f". Samples SOIL-0-3-6' and SOIL-0-1-6' displayed analytes with concentrations greater than the calibration range. These samples were re-analyzed at greater dilutions and the analytes were within calibration range. It is recommended that the reanalyzed analytes be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 7/12/02 at 10:59 displayed a %D greater than the control limit (i.e. 15%) on both the primary column and the confirmation column for surrogate 2,4-DCAA at -24.7% and -27.8%. The CCV analyzed on 7/12/02 at 19:08 displayed %Ds greater than the control limit on the primary column for surrogate 2,4-DCAA at -24.2% and on the confirmation

column for surrogates 2,4-DCAA at -23.5% and for surrogate tetrachloro-meta-xylene (TMX) at -15.2%. The CCV analyzed on 7/15/02 at 16:42 displayed %Ds greater than the control limit on the primary column for endrin aldehyde at -23.3% and for surrogate 2,4-DCAA at -22.4% and on the confirmation column for surrogate 2,4-DCAA at -30.3%, for heptachlor at 23.5%, and for endosulfan II at 16.1%. The CCV analyzed on 7/15/02 at 20:56 displayed %Ds greater than the control limit on the primary column for heptachlor at -15.5%, for surrogate 2,4-DCAA at -23.7%, and for surrogate TMX at -15.6% and on the confirmation column for heptachlor at 28.8% and for surrogate 2,4-DCAA at -29.3%. Since all associated sample results were either non-detect or were surrogates, no data qualifying action was taken. The method blank analyzed on 7/12/02 displayed a surrogate less than the lower control limit on the primary column for 2,4-DCAA at 26%. Since this sample is a QC sample, no data qualifying action was taken. Sample SOIL-0-1-6' displayed a %R greater than the upper control limit (i.e. 50%) for internal standard bromonitrobenzene at 60.6%. Positive detections, except those flagged due to dual column imprecision or concentrations exceeding the linear range, in this affected sample were flagged "J,n". The MS/MSD displayed %RPDs greater than the control limit for endrin at 34%, for 4,4'-DDT at 28%, and for methoxychlor at 43%. Since the MS and the MSD met criteria, no data qualifying action was taken. All samples in this SDG displayed %RPDs greater than the control limit between the primary and confirmation column for several analytes. These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low. The field duplicates displayed %RPDs between the two samples greater than the control limit for beta-BHC at 131%, for heptachlor at 137%, and for delta-BHC at 107%. Affected analytes were flagged "J,f"; unless previously flagged for dual column imprecision anomalies. Sample SOIL-0-1-6' displayed analytes which exceeded the calibration range for beta-BHC and for aldrin. These analytes were flagged "J,q". The sample was re-analyzed at a greater dilution and these analytes were within calibration range. It is recommended that the re-analyzed sample results be used for data interpretation.

For the PCBs analyses, the MS/MSD displayed %Rs less than the lower control limit for monochlorobiphenyl at 16% and 16%, for hexachlorobiphenyl at 26% and 19%, for heptachlorbiphenyl at 25% and 29%, and for octachlorobiphenyl at 28% and 31%. Since the %Rs were affected by matrix effect and the LCS met criteria, no data qualifying action was taken. Sample SOIL-0-1-6' displayed a %R greater than the upper control limit (i.e. 130%) for internal standard phenanthrene-d10 at 138.5%. Affected analytes with positive detections were flagged "J,n".

For the herbicides analyses, The CCV analyzed on 8/1/02 at 22:38 displayed %Ds greater than the control limit (i.e. 15%) on the confirmation column for 2,4-DB at

-19.8%. The CCV analyzed on 8/2/02 at 12:42 displayed %Ds greater than the control limit on the primary column for MCPP at 19.4%, for 2,4-D at 16.7%, and for PCP at 15.5% and on the confirmation column for 2,4-DB at -15.2%. The CCV analyzed on 8/6/02 at 20:25 displayed a %D greater than the control limit on the confirmation column for MCPP at 15.5%. Since associated sample results were non-detect, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit on the primary column for PCP at -21.3%, for 2,4,5-TP at -23.8%, for 2,4,5-T at -25.4%, for 2,4-DB at -27.0%, for dinoseb at -24.4% and on the confirmation column for PCP at -19.7%, for 2,4,5-TP at -21.9%, for 2,4,5-T at -23.4%, for 2,4-DB at -18.0%, and for dinoseb at -23.0%. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on the primary column for PCP at -18.5%, for 2,4,5-TP at -22.1%, for 2,4,5-T at -22.2%, for 2,4-DB at -20.1%, and for dinoseb at -22.0% and on the confirmation column for PCP at -20.2%, for 2,4,5-TP at -23.3%, for 2,4,5-T at 24.2%, for 2,4-DB at -16.2%, and for dinoseb at -23.8%. Since the analytes displayed negative %Ds, indicating a decrease in instrument sensitivity, affected sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". The method blank prepped on 7/25/02 displayed a positive detection for pentachlorophenol (PCP) at 59 ug/kg. Associated sample results with positive detections not affected by any other anomalies less than 5x the amount found in the blank were flagged "U,z". Positive PCP results affected by the CCV anomalies were flagged "UJ,c,z". The LCS displayed a %R less than the lower control limit for PCP at 0%. Since the LCS was prepared with the same water used for the method blank that displayed the positive detection for PCP at 59 ug/kg, which affected the %R, no further data qualifying action was taken. Sample SOIL-0-2-6' displayed a %R less than the lower control limit for surrogate 2,4-DCAA on the confirmation column at 0%. Since the surrogate on the primary column met criteria and the surrogate on the confirmation column was affected by matrix effect, no data qualifying action was taken. Several samples displayed %RPDs between columns which were greater than the control limit (i.e. 40%). Affected analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low. The field duplicates displayed a %RPD greater than the control limit for analyte 2,4-D at 150%. Affected analytes were flagged "J,f". Samples SOIL-0-2-6' and SOIL-S-1-6' displayed analytes that exceeded the calibration range. These analytes were flagged "J,q". These samples were re-analyzed at greater dilutions and the analytes were within calibration range. It is recommended that the re-analyzed results be used for data interpretation.

For the metals analyses, the serial dilution displayed %RPDs greater than the control limit (i.e. 10%) for nickel at 11% and for K at 10.6%. Associated sample results were flagged "J,s". An initial CRDL displayed a %R greater than the

control limit (i.e. 120%) for arsenic at 132%. CRDLs displayed %Rs less than the lower control limit for lead at 78%, 74%, and 78% and for thallium at 69%. Since these results were slightly outside the control limit (i.e. >60%), no data qualifying action was taken. The prep blank displayed positive detections for aluminum (Al) at 2.86 mg/kg, for chromium (Cr) at 0.0875 mg/kg, for potassium (K) at 1.93 mg/kg, and for sodium (Na) at 18.8 mg/kg. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,p". The prep blank displayed negative detections for arsenic (As) at -0.373 mg/kg, for cadmium (Cd) at -0.7 mg/kg, for cobalt (Co) at -0.058 mg/kg, and for thallium (Tl) at -0.557 mg/kg. Associated sample results with positive detections 5x the absolute amount found in the blank were flagged "J,p"; non-detects were flagged "UJ,p". The ICB displayed a positive detection for Al at 24.1 ug/L. CCB5 and CCB6 displayed positive detections for Al at 26.7 ug/L and 29.0 ug/L, for barium (Ba) at 1.21 ug/L and 1.35 ug/L, for Cr at 1.22 ug/L and 1.17 ug/L, for manganese (Mn) at 1.26 ug/L and 1.44 ug/L, and for vanadium (V) at 1.50 ug/L and 1.27 ug/L. CCB6 displayed a positive detection for copper (Cu) at 1.38 ug/L. Since all associated sample results were either greater than 5x the amount found in the blank or non-detect, no data qualifying action was taken. MSs displayed %Rs less than the lower control limit for mercury at -195% and 0%. The post digestion spike displayed %Rs less than the lower control limit for AL at 34%, for Ca at 58%, for Fe at -130%, and for Mg at 74%. Since the amount found in the parent sample was greater than 4x the amount of the spiking concentration, no data qualifying action was taken. The field duplicates displayed a %RPD greater than the control limit for zinc at 101.5%. Affected sample results were flagged "J,f". Mercury displayed a %RPD between laboratory duplicates at 40.8%. Affected sample results were flagged "J,k".

Correctable Anomalies: None.

Comments: For the SVOCs analyses, sample SOIL-0-2-6' displayed a large number of analytes with concentrations less than the reporting limit. After further review of the chromatogram, it is possible that the large number of detections is due to possible instrument carryover. The laboratory was asked to re-analyze the sample, but was informed that the sample had been discarded. This data set was rejected and the data should not be used for data interpretation. The "Q" qualifier flag signifies that the results are probably from carryover from a previous sample, and the results are biased high.

For the SVOCs, sample SOIL-0-1-6' and SOIL-0-1-6'DL were extracted down to a final volume of 10ml, instead of the normal 1ml. This changes the dilution factor written on the Form I, but does not change the final dilution factor used for final calculations.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII13_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____September 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 and continuing calibration analyzed on 7/15/02 08:29 displayed relative response factors (RRFs) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973 at 0.0487 and 0.0456, respectively. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "R,c". The LCS, 2P0715MBLCS, displayed a %R less than the control limit (i.e., 23%) for bromomethane at 13%. The RPD for bromomethane (142%) was greater than the acceptance limit (i.e., 79%). The bromomethane result in sample WASTE-O-3-9' was flagged "R, l". Since all other associated samples are dilution samples and bromomethane results were not used for data interpretation, no data qualifying action was taken.

For the PCBs analyses, the SOIL-O-2-6' MS/MSD pair displayed %Rs less than the lower control limit for trichlorobiphenyl at 0% and 0%, for tetrachloro-biphenyl at 0% and 0%, and for pentachlorobiphenyl at 12% and 0%. Associated sample results with positive detections were flagged "J, m" and non-detects were flagged "R, m".

For the herbicide analyses, sample WASTE-S-2-COMP was re-extracted grossly exceeding the holding time by 16 days to verify laboratory contamination. Associated sample results with positive detections were flagged "J, h" and non-detects were flagged "R, h".

Minor Anomalies: For the VOCs analyses, the CCV analyzed on 7/15/02 at 08:29 displayed a %D greater than the control limit (i.e. 20%) for 1,1-dichloroethane at 30.6%. The positive 1,1-dichloroethane result in sample WASTE-S-1-6' was flagged "J,c". The CCV analyzed on 7/15/02 at 17:33 displayed a %D greater than the control limit for carbon disulfide at -22.6%. Since this compound was not detected in the

associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The method blank, 1O0715MB, displayed a positive detection for toluene at 86 µg//kg. Since all positive toluene results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Surrogates were diluted out in several samples. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The LCS/LCSD pair, 2P0715MBLCS, displayed %Rs greater than the upper control limit for acetone (LCS=160%) and 2-hexanone (LCSD=130%). Since acetone and 2-hexanone were not detected in the associated samples, no data qualifying action was taken. All waste samples displayed one to three compounds that exceeded the calibration range. These compounds were flagged "J, q". These samples were re-analyzed at greater dilutions and the compounds were within calibration range. The dilution sample WASTE-O-3-9'DL was analyzed outside the holding time by one day. The chlorobenzene result in this dilution sample was flagged "J, h". Since all other results were not used for data interpretation, no data qualifying action was taken. It is recommended that the re-analyzed results for these compounds be used for data interpretation.

For the SVOCs analyses, the CCV analyzed on 7/24/02 at 08:30 displayed a %D greater than the control limit (i.e. 20%) for 4-nitrophenol at 24.7%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. All surrogates were not recovered (0%) in one diluted sample WASTE-O-1-COMP (DF=5). Positive results were flagged "J, s" and non-detects were flagged "UJ, s" in sample WASTE-O-1-COMP. Surrogates were also diluted out in several samples. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for n-nitrosodiphenylamine at 40% and 50%. The MS also displayed %Rs less than the lower control limit for dimethylphthalate at 45%, for butyl benzyl phthalate at 49%, for benzo(a)-anthracene at 49%, and for chrysene at 50%. The MS/MSD displayed %RPDs greater than the control limit for 1,2-dichlorobenzene at 27%, for 3-nitroaniline at 40%, and for dibenzo(a,h)anthracene at 26%. Since the MS, MSD, or other QC data met specified criteria, no data qualifying action was taken. Most of the MS/MSD and RPD recoveries were outside the control limit due to most of the analytes being diluted out in the SOIL-0-1-6' MS/MSD pair. No data qualifying action was taken. Samples WASTE-O-3-COMP, WASTE-S-2-COMP, and WASTE-O-1-COMP displayed one to five compounds that exceeded the calibration range. These results, except those previously flagged due to surrogate recovery failure, were flagged "J, q". These samples were re-analyzed at greater dilutions and the results were within calibration range. The dilution sample WASTE-O-1-COMP was analyzed outside the analytical holding time by nine

days. The pentachlorophenol result in this dilution sample was flagged "J, h". Since all other results were not used for data interpretation, no data qualifying action was taken. It is recommended that the re-analyzed results for these compounds be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 7/11/02 at 11:05 displayed %Ds greater than the control limit (i.e. 15%) for heptachlor (-15.5%), 4,4'-DDT (-25.7%), endrin aldehyde (-16.8%), methoxychlor (-23.7%), and 2,4-DCAA (-22.9%) on the primary column and for heptachlor (18.8%), methoxychlor (-17.7%), and 2,4-DCAA (-22.8%) on the confirmation column. The CCV analyzed on 7/11/02 at 19:45 displayed %Ds greater than the control limit on the primary column for heptachlor (-23.1%), 4,4'-DDT (-34.9%), methoxychlor (-22.1%), 2,4-DCAA (-23.1%), and tetrachloro-m-xylene (TCMX, -15.7%) and on the confirmation column for 4,4'-DDT (-23.6%), methoxychlor (-25.7%), 2,4-DCAA (-28.7%), and tetrachloro-m-xylene (TCMX, -16.7%). The CCV analyzed on 7/16/02 at 11:48 displayed %Ds greater than the control limit for 2,4-DCAA (-25.1%) and TCMX (-15.5%) on the primary column and for heptachlor (16.1%) and 2,4-DCAA (-34.5%) on the confirmation column. The CCV analyzed on 7/16/02 at 15:59 displayed %Ds greater than the control limit for 2,4-DCAA (-23.5%) on the primary column and for heptachlor (38.7%) and 2,4-DCAA (-28.7%) on the confirmation column. Methoxychlor results in the associated samples were flagged "UJ, c". Positive detections for these compounds were flagged "J, c". Sample WASTE-O-2-COMP displayed a surrogate greater than the upper control limit (i.e., 150%) on the confirmation column for TCMX at 220%. Since all other surrogate recoveries were in control, no data qualifying action was taken. Surrogates were diluted out in all other samples. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Sample WASTE-O-1-COMP displayed a %R greater than the upper control limit (i.e. 50%) for internal standard bromonitrobenzene at 192%. Positive detections, except those flagged due to continuing calibration failure, were flagged "J, n" in this affected sample. The MS/MSD analyses were performed on sample WASTE-O-3-COMP. Because of the abundance of target compounds, the MS and MSD were analyzed at a 100 times dilution. All surrogate and spiking compounds were diluted out. Therefore, the MS/MSD summary form was not provided in this data package. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low. Aldrin, beta-BHC, heptachlor epoxide, dieldrin, and 4,4'-DDT results in sample WASTE-O-1-COMP exceeded the linear range of the calibration curve. These results were previously flagged due to internal standard failure, and no additional data flags were applied. This sample was diluted by a factor of 500 and

reanalyzed by the laboratory. The results from the dilution analysis should be used for data interpretation.

For the PCB analyses, the SOIL-O-2-6' MS/MSD pair displayed %Rs less than the lower control limit for monochlorobiphenyl at 16% and 16%, for hexachlorobiphenyl at 26% and 19%, for heptachlorobiphenyl at 25% and 29%, and for octachlorobiphenyl at 28% and 31%. Since the %Rs were affected by matrix and the LCS recoveries met criteria, no data qualifying action was taken. The internal standard peak areas for phenanthrene-d10 were greater than the upper control limit (i.e. 130%) in samples WASTE-O-1-COMP (212%) and WASTE-O-1-COMPDL (131%). Since phenanthrene-d10 was not used for quantitation, data quality has not been impacted and no data qualifying action was taken. Monochlorobiphenyl, dichlorobiphenyl, and trichlorobiphenyl results in sample WASTE-O-1-COMP exceeded the linear range of the calibration curve. These results, except those previously flagged due to MS/MSD recovery failure, were flagged "J, q" in sample WASTE-O-1-COMP. This sample was diluted by a factor of 1000 and re-analyzed by the laboratory. The results from the dilution analysis should be used for data interpretation.

For the herbicides analyses, the CCV analyzed on 8/1/02 at 10:17 displayed a %D greater than the control limit (i.e. 15%) on the primary column for MCPP at 16.4%. The CCV analyzed on 8/1/02 at 22:38 displayed a %D greater than the control limit (i.e. 15%) on the confirmation column for 2,4-DB at -19.8%. The CCV analyzed on 8/2/02 at 12:42 displayed %Ds greater than the control limit on the primary column for MCPP at 19.4%, for 2,4-D at 16.7%, and for PCP at 15.5%. Since these compounds were either not detected in the associated sample or not used for data interpretation, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit on the primary column for PCP at -21.3%, for 2,4,5-TP at -23.8%, for 2,4,5-T at -25.4%, for 2,4-DB at -27.0%, for dinoseb at -24.4% and on the confirmation column for PCP at -19.7%, for 2,4,5-TP at -21.9%, for 2,4,5-T at -23.4%, for 2,4-DB at -18.0%, and for dinoseb at -23.0%. Since the associated sample is a QC sample (Method Blank), no data qualifying action was taken. The method blank prepped on 7/25/02 displayed a positive detection for pentachlorophenol (PCP) at 59 µg/kg. The method blank prepped on 7/31/02 displayed a positive detection for pentachlorophenol (PCP) at 16 µg/kg. Positive PCP results less than five times the amount found in the blank were flagged "U, z". The positive PCP result in sample WASTE-S-2-COMP was flagged "UR, z, h" due to the combination of method blank contamination and holding time violation. Except for sample WASTE-S-2-COMP, all surrogates were diluted out (DF=100 to 5000). No data qualifying action was taken since dilution factors were all greater than 10. The MS/MSD analyses were performed on sample WASTE-O-1-COMP. Because of the abundance of target compounds, the MS and MSD were analyzed at a 5000

times dilution. All surrogate and spiking compounds were diluted out. Therefore, the MS/MSD summary form was not provided in this data package. The LCS, 0710O-SMBLCS, displayed a %R less than the lower control limit (i.e., 10%) for PCP at 0%. Since the LCS was prepared with the same water used for the method blank that displayed the positive detection for PCP at 59 µg/kg, which affected the %R calculation, no further data qualifying action was taken. The LCS, 0731N-SMBLCS, displayed a %R greater than the upper control limit (i.e., 150%) for PCP at 209%. Since the PCP result in the associated sample was rejected due to holding time violation, no additional data flags were applied. The RPDs between primary and confirmatory columns for 2,4-D in sample WASTE-S-2-COMP (97.5%) and for 2,4,5-T in samples WASTE-S-2-COMP (63.6%), WASTE-O-1-COMP (78.6%), and WASTE-O-2-COMP (48.3%) were greater than the acceptance limit. These results, except those flagged due to holding time violation, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (132%), lead (78%), and thallium (69%) were outside the control limit (i.e., 80-120%). Since these recoveries were marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 2.68 mg/kg, arsenic at -0.373 mg/kg, cadmium at -0.07 mg/kg, chromium at 0.0875 mg/kg, cobalt at -0.058 mg/kg, potassium at 1.93 mg/kg, sodium at 18.8 mg/kg, and thallium at -0.557 mg/kg. Thallium non-detect results were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Aluminum, barium, chromium, copper, manganese, and vanadium were detected in the initial calibration blank and/or continuing calibration blanks at low level. Since these results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. Samples WASTE-O-3-COMP, WASTE-O-2-COMP, and WASTE-O-1-COMP displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. Samples WASTE-S-1-COMP and WASTE-S-2-COMP displayed calcium concentrations greater than 50% of the calcium concentration in ICSA samples. The positive cadmium results in samples WASTE-O-3-COMP and WASTE-O-2-COMP were flagged "J, n". Since all other affected results either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (67% and 67%), calcium (157% and 146%), magnesium (134% and 175%) and manganese (39% and 64%) were outside the control limits in one non-client MS/MSD pair. Since the parent sample is a non-client sample, no data qualifying action was taken. The post-digestion spike analysis was performed on client samples WASTE-O-1-COMP

and WASTE-O-3-COMP and recoveries for these compounds were in control. The RPD for mercury (40.8%) was greater than the acceptance limit (i.e., 35%) in SOIL-S-1-6' MS/MSD pair (in SDG: SAII12). Positive mercury results in the associated samples were flagged "J, d". The %D for zinc (11.7%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (WASTE-O-1-COMP). Positive zinc results in the associated samples were flagged "J, s".

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, most of the samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. Except those rejected data point, all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII14_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____August 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The VOC LCS recovery analyzed on 7/12/02 displayed a %R less than the lower control limit (i.e., 40%) for bromomethane at 32%. The bromomethane result in sample GW-AA-O-1-86 was flagged "R, l".

The base/neutral surrogates for nitrobenzene-d5 (30%) and 2-fluorobiphenyl (26%) were less than the lower control limits in sample GW-AA-O-2-124. All base/neutral results in sample GW-AA-O-2-124 were flagged "UJ, s". This sample was re-extracted (grossly exceeding the hold time) and re-analyzed to confirm the original results. Positive results were flagged "J, h" and non-detects were flagged "R, h" in this re-extracted sample. The original sample results should be used for data interpretation.

For the herbicide analyses, pentachlorophenol was detected in the method blank at 0.34 µg/L. Positive pentachlorophenol results in associated samples, except in sample GW-AA-P-1-24FT, were flagged "U, z" at the reporting limit. Since the pentachlorophenol result in sample GW-AA-P-1-24FT was greater than the reporting limit and also greater than five times the blank concentration, this sample was re-extracted (grossly exceeding the hold time) and re-analyzed to confirm the laboratory blank contamination. Trace amounts of pentachlorophenol was detected in this re-extracted sample and was flagged "J, h". This pentachlorophenol result should be used for data interpretation. All other herbicide results in the re-extracted sample were flagged "R, h" and should not be used for data interpretation.

Minor Anomalies: For the VOC analyses, the continuing calibration analyzed on 7/11/02 at 10:04 displayed %Ds greater than the control limit (i.e., 20%) for chloromethane at 28.7%, bromomethane at -26.7%, and dibromofluoromethane at 30.3%. Positive chloromethane results in the associated samples were flagged "J, c". Since other compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying

action was taken. The MSD recovery for 2-butanone (180%) was greater than the control limit (i.e., 42-167%) in the GW-AA-P-1-64FT MS/MSD pair. The relative percent difference (RPD) for 2-butanone (68%) was also greater than the acceptance limit (i.e., 31%). Since MS and LCS recoveries were in control, no data qualifying action was taken. The trip blank, associated with COC 027813, contained 1,1-dichloroethane at 0.44 μg/L, methylene chloride at 0.39 μg/L, toluene at 0.38 μg/L, and ethyl benzene at 0.20 μg/L. The positive methylene chloride result in sample GW-AA-O-1-96 was flagged "U, y" at the reporting limit. Since all other compounds were not detected in the associated sample, no data qualifying action was taken. The LCS recovery analyzed on 7/12/02 displayed a %R greater than the upper control limit (174%) for acetone at 180%. Since acetone was not detected in sample GW-AA-O-1-86, no data qualifying action was taken. Reporting limits were raised due to dilutions (high chlorobenzene conc.) in samples GW-AA-O-1-96 (DF=20) and GW-AA-O-1-86 (DF=5).

For the SVOC analyses, the continuing calibration analyzed on 7/24/02 at 08:56 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (-21.9%), bis(2-chloroisopropyl)ether (21.4%), n-nitroso-di-n-propylamine (27.9%), 2,4-dinitrophenol (24.9%), 4-nitrophenol (24.3%), and 4,6-dinitro-2-methylphenol (27.6%). The continuing calibration analyzed on 7/26/02 at 01:07 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (25.5%), bis(2-chloroisopropyl)ether (25.4%), isophorone (20.7%), n-nitroso-di-n-propylamine (31.1%), 2-nitroaniline (27.7%), 2,4-dinitrophenol (26.8%), 4-nitrophenol (37.2%), 4-nitroaniline (20.7%), and 4,6-dinitro-2-methylphenol (20.7%). The continuing calibration analyzed on 7/26/02 at 14:20 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (-25.6%), benzo(k)fluoranthene (33.3%), and indeno(1,2,3-cd)pyrene (25.8%). The continuing calibration analyzed on 7/28/02 at 07:36 displayed a %D greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (22.9%). The continuing calibration analyzed on 7/29/02 at 08:17 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (22.8%), 2,4-dinitrophenol (24.9%), 4,6-dinitro-2-methylphenol (23.1%), benzo(k)fluoranthene (21.2%), indeno(1,2,3-cd)pyrene (21.1%), and benzo(g,h,i)perylene (21.8%). Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS/MSD recoveries for acenaphthylene (28% and 28%), hexachlorobenzene (39% and 47%) and 3,3'-dichlorobenzidine (7% and 5%) were less than the lower control limits in the GW-AA-P-1-64FT MS/MSD pair. The RPDs for bis(2-chloroisopropyl)ether (24%), bis(2-chloroethoxy)methane (21%), and nitrobenzene (23%), were greater than the acceptance limits. This MS/MSD pair was re-analyzed by the laboratory and displayed similar results. Since LCS recoveries

for these compounds were in control and these compounds were not detected in the associated samples, no data qualifying action was taken.
For the pesticide analyses, the %Ds for endosulfan sulfate (24.5%) and methoxychlor (16.7%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/17/02 at 10:01. The %Ds for tetrachloro-m-xylene (TCMX, -15.7%) and decachlorobiphenyl (DCBP, -16.6%) on the primary column and for TCMX (-16.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/17/02 at 15:45. The %Ds for endosulfan sulfate (22.4%), methoxychlor (18.3%), and TCMX (-16.2) on the primary column and for endosulfan sulfate (15.6%) and TCMX (-18.3%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/17/02 at 21:46. Endosulfan sulfate results, except those flagged due to surrogate recovery failure, were flagged "UJ, c" in the associated samples. All other compounds were not detected in the associated samples. Since these outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. The DCBP surrogate recoveries in samples GW-AA-O-2-124 (15% and 14%) were less than the lower control limit (i.e., 30%). The TCMX surrogate recoveries in samples GW-AA-P-1-24FT-DUP (20% and 20%) were less than the lower control limit (i.e., 30%). All results in these two samples were flagged "J, s" or "UJ, s". The MS/MSD recoveries for delta-BHC (140% and 180%) and endrin ketone (130% and 155%) and the MSD recoveries for gamma-chlordane (130%), alpha-chlordane (130%), 4,4'-DDT (160%), endosulfan sulfate (180%), and methoxychlor (185%) were greater than the upper control limits in the GW-AA-P-1-64FT.MS/MSD pair. The RPDs for beta-BHC (42%), gamma-chlordane (26%), alpha-chlordane (26%), and 4,4'-DDE (22%) were greater than the acceptance limits. Since these compounds were not detected in the associated samples, no data qualifying action was taken. The RPDs between primary and confirmatory columns for alpha-BHC in sample GW-AA-O-2-124 (161.1%) and for heptachlor in sample GW-AA-P-1-64FT (70.8%) were greater than the acceptance limit (i.e., < 40%). The heptachlor result in sample GW-AA-P-1-64FT was flagged "J, g". Since the alpha-BHC result in sample GW-AA-O-2-124 was previously flagged due to surrogate recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %D for 2,4-DB (-19.8%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/1/02 at 22:38. The %Ds for MCPP (19.4%), 2,4-D (16.7%), and pentachlorophenol (15.5%) on the primary column were greater than the criterion for the continuing calibration analyzed on 8/2/02 at 12:42. The %Ds for MCPP (18.9%) and 2,4-D (15.7%) on the primary column and for 2,4-DB (-16.9%) on the confirmation column were greater than the criterion for the

continuing calibration analyzed on 8/2/02 at 23:07. Since the positive pentachlorophenol result in the re-extracted sample GW-AA-P-1-24FT was previously flagged due to holding time violation, no additional data flags were applied. All other outliers either had an acceptable %D on the alternate column. No data qualifying action was taken. The LCS recovery for pentachlorophenol (190%) was greater than the upper control limit (i.e., 110%). Since the pentachlorophenol result in the associated sample was previously flagged due to holding time violation, no additional data flags were applied. The RPDs between primary and confirmatory columns for 2,4,5-TP in sample GW-AA-O-2-124 (51.6%) and for dichlorprop in sample GW-AA-P-1-64FT (132.2%) were greater than the acceptance limit. These two results were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the CRDL percent recoveries for aluminum (124%, 136%, and 124%), selenium (127% and 145%), sodium (74%, 66%, and 69%), and thallium (73%, 134%, 73%, and 78%) were outside the control limit (i.e., 80-120%). Since the positive selenium result in sample GW-AA-O-2-124 was previously flagged due to method blank contamination, no additional data flags were applied. Since all other recoveries were marginally outside the control limits, no data qualifying action was taken. Aluminum was detected in two preparation blanks (PBs) at 35.5 µg/L and 38.4 µg/L, three initial calibration blanks (ICBs) at 25.6 µg/L, 31.0 µg/L, and 37.0 µg/L, and seven continuing calibration blanks (CCBs) at concentrations ranging from 15.6 µg/L to 38.8 µg/L. Positive results in samples GW-AA-P-1-24FT and GW-AA-P-1-24FT-DUP were flagged "U, p" at the reporting limit. Arsenic was detected in two preparation blanks (PBs) at -4.52 µg/L and -5.2 µg/L and one ICB at -3.07 µg/L. Arsenic results less than five times the absolute blank concentration were flagged "J, p" or "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Copper was detected in three CCBs at concentrations ranging from 1.20 µg/L to 1.46 µg/L. Positive copper results in samples GW-AA-P-1-24FT and GW-AA-P-1-64FT were flagged "U, o" at the reporting limit. Selenium was detected in the PB at 5.42 µg/L and three CCBs at concentrations ranging from 6.21 µg/L to 8.58 µg/L. The positive selenium result in sample GW-AA-O-2-124 was flagged "U, p" at the reporting limit. Thallium was detected in the PB at -3.94 µg/L and three CCBs at concentrations ranging from 4.22 µg/L to 4.89 µg/L. The positive thallium result in sample GW-AA-P-1-64FT was flagged "U, o" at the reporting limit. All other thallium non-detect results were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Barium, cobalt, and manganese were detected in several CCBs at low levels. Since barium, cobalt, and manganese results were either greater than five times the blank concentration or non-detects in the associated samples, no data qualifying action

was taken. The MS/MSD recoveries for potassium (126% and 126%) were slightly greater than the upper control limit (i.e., 125%). The post-digestion spike recovery for potassium was in control. Positive potassium results in the associated samples were flagged "J, m".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples. The %D for methane (22.8%) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/17/02 at 07:47. Since all methane results were previously flagged due to initial calibration failure, no additional data flags were applied.

For the nitrate-N analyses, the nitrate-N was detected in the method blank at 0.0177 mg/L. Since the nitrate-N was not detected in the associated samples, no data qualifying action was taken. The MS/MSD recoveries for nitrate-N (36% and 39%) were less than the lower control limit (i.e., 75%) in the GW-AA-P-1-64FT MS/MSD pair. All nitrate-N results in the associated samples were flagged "UJ, m".

Correctable Anomalies: None.

Comments: Sample GW-AA-P-1-44FT was not analyzed for SVOC due to a laboratory logging error. This sample will be re-collected and re-analyzed for SVOCs only. Data will be provided in a future data package. For the alkalinity analyses, all samples were diluted by a factor of five due to high calcium carbonate concentrations. For the sulfate analyses, sample GW-AA-O-2-124 was analyzed at a 1:20 dilution and all other samples were analyzed at 1:10 dilution.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Except one bromomethane data point, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII15_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____August 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the SVOC analyses, sample GW-AA-S-1-54DUP was extracted outside the hold time by one day. Positive results were flagged "J, h" and non-detects were flagged "UJ, h" in this sample. Three surrogate recoveries were less than the lower control limits in this sample. Since all results were previously flagged due to holding time violation, no additional data flags were applied. This sample was re-extracted (grossly exceeding the hold time) and re-analyzed to confirm the original results. All results in the re-extracted sample were flagged "R, h" and should not be used for any data interpretation. The original results in sample GW-AA-S-1-54DUP should be used for data interpretation.

Minor Anomalies: For the VOC analyses, the continuing calibration analyzed on 7/17/02 at 07:34 displayed a %D greater than the control limit (i.e., 20%) for bromomethane at -23.2%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The relative percent difference (RPD) for bromomethane (60%) was greater than the acceptance limit (i.e., 33%) in the GW-AA-P-1-94FT MS/MSD pair. Since MS/MSD and LCS recoveries were in control, no data qualifying action was taken. The trip blank, TB-071002-02, contained methylene chloride at 0.32 µg/L, toluene at 0.76 µg/L, and chlorobenzene at 0.62 µg/L. The trip blank, TB-071002 (16:00), contained chloromethane at 0.56 µg/L and trichloroethene at 0.52 µg/L. The positive methylene chloride result in sample GW-AA-P-1-120FT and the positive trichloroethene result in sample GW-AA-O-1-120 were flagged "U, y" at the reporting limit. Since all other compounds were either not detected in the associated sample or had concentration greater than five times the blank concentration, no data qualifying action was taken. The chlorobenzene result in sample GW-AA-P-1-120FT (DF=10) exceeded the linear range of the calibration curve. The chlorobenzene result in this sample was flagged "J, q". This sample was diluted by a factor of 20 and reanalyzed by the laboratory. The chlorobenzene result from the dilution analysis should be used for data interpretation.

Reporting limits were raised due to dilution (high chlorobenzene conc.) in samples GW-AA-P-1-104FT (DF=25), GW-AA-P-1-120FT (DF=10 and 20), GW-AA-O-1-120 (DF=2.5), GW-AA-P-10114FT (DF=25), GW-AA-O-1-106 (DF=10), and GW-AA-O-1-116 (DF=10).

For the SVOC analyses, the initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.987. 2,4-Dinitrophenol results, except those previously flagged due to holding time violation, were flagged "UJ, r" in the associated samples. The continuing calibration analyzed on 7/26/02 at 01:07 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (25.5%), isophorone (20.7%), bis(2-chloroisopropyl)ether (25.4%), 2-nitroaniline (27.7%), n-nitroso-di-n-propylamine (31.1%), 2,4-dinitrophenol (26.8%), 4-nitrophenol (37.2%), 4-nitroaniline (20.7%), and 4,6-dinitro-2-methylphenol (20.7%). The continuing calibration analyzed on 8/5/02 at 10:15 displayed %Ds greater than the control limit for 2,4-dinitrophenol (-33.3%) and 4,6-dinitro-2-methylphenol (-26.0%). Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The surrogate recovery for phenol-d5 (24%) was less than the lower control limit (i.e., 25%) in sample GW-AA-P-1-120FT. Since all other surrogate recoveries in this sample were in control, no data qualifying action was taken. The MS/MSD recoveries for 3,3'-dichlorobenzidine (2% and 0%) and the MSD recovery for nitrobenzene (48%) were less than the lower control limits in the MS/MSD pair from non-client sample). Twenty-three RPDs in this MS/MSD pair were greater than the acceptance limits. Since the parent sample is not a client sample and LCS recoveries for these compounds were in control, no data qualifying action was taken. The RPDs for 1,3-dichlorobenzene (35%), bis(2-chloroethoxy)methane (25%), 2-chloronaphthalene (27%), dibenzofuran (26%), fluorene (24%), 4-chlorophenyl-phenylether (29%), and benzo(b)fluoranthene (35%) were greater than the acceptance limits in the LCS/LCSD pair. The positive 1,3-dichlorobenzene result in sample GW-AA-O-1-106 was flagged "J, l". Since LCS/LCSD recoveries were in control and all other compounds were not detected in the associated samples, no data qualifying action was taken. Samples GW-AA-P-1-104FT and GW-AA-S-1-44 were extracted using half of normal sample volume (500 ml) due to limited sample volume available. The reporting limits in these two samples were raised by a factor of 2.

For the pesticide analyses, the %Ds for endosulfan sulfate (24.5%) and methoxychlor (16.7%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/17/02 at 10:01. The %Ds for tetrachloro-m-xylene (TCMX, -15.7%) and decachlorobiphenyl (DCBP, -16.6%) on the primary column and for TCMX (-16.2%) on the confirmation

column were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/17/02 at 15:45. The %Ds for endosulfan sulfate (22.4%), methoxychlor (18.3%), and TCMX (-16.2) on the primary column and for endosulfan sulfate (15.6%) and TCMX (-18.3%) on the confirmation column were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/17/02 at 21:46. Endosulfan sulfate results, except those flagged due to surrogate recovery failure, were flagged "UJ, c" in the associated samples. All other compounds were not detected in the associated samples. Since these outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. The DCBP surrogate recoveries in sample GW-AA-O-1-120 (18% and 20%) were less than the lower control limit (i.e., 30%). Positive results were flagged "J, s" and non-detects were flagged "UJ,s" in this sample. The TCMX surrogate recovery (26%) on the confirmation column was less than the lower control limit (i.e., 30%) in sample GW-AA-P-1-104FT. Since all other surrogate recoveries were in control, no data qualifying action was taken. The MS/MSD recoveries for delta-BHC (140% and 180%) and endrin ketone (130% and 155%) and the MSD recoveries for gamma-chlordane (130%), alpha-chlordane (130%), 4,4'-DDT (160%), endosulfan sulfate (180%), and methoxychlor (185%) were greater than the upper control limits in the GW-AA-P-1-64FT.MS/MSD pair (from SDG: SAII14). The RPDs for beta-BHC (42%), gamma-chlordane (26%), alpha-chlordane (26%), and 4,4'-DDE (22%) were greater than the acceptance limits. Since these compounds were not detected in the associated samples, no data qualifying action was taken. The RPDs between primary and confirmatory columns for alpha-chlordane in samples GW-AA-P-1-104FT (118.2%) and GW-AA-P-1-120FT (125.4%) and for alpha-BHC in sample GW-AA-O-1-120 (153.2%) were greater than the acceptance limit (i.e., < 40%). The alpha-chlordane results in these two samples were flagged "J, g". Since the alpha-BHC result in sample GW-AA-P-1-120 was previously flagged due to surrogate recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %D for pentachlorophenol (16.9%) on the primary column was greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 7/25/02 at 07:43. Positive pentachlorophenol results were flagged "J, c" in the associated samples. The method blank, 0717N-SMB, contained 2,4-D at 0.39 μg/L, pentachlorophenol at 0.64 μg/L, and 2,4,5-T at 0.16 μg/L. Positive 2,4-D and 2,4,5-T results in the associated samples were flagged "U, z" or "U, z" at the reporting limit. Since positive pentachlorophenol results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for aluminum (135%),

thallium (68%), and mercury (70%) and the final CRDL recoveries for iron (69%), selenium (72%), and sodium (69%) were outside the control limit (i.e., 80-120%). Since all recoveries were marginally outside the control limits, no data qualifying action was taken. Aluminum was detected in the preparation blank (PB) at 19.3 µg/L, the initial calibration blank (ICB) at 58.3 µg/L, and two continuing calibration blanks (CCBs) at 18.4 µg/L (CCB3) and 14.3 µg/L (CCB4). Positive results in samples GW-AA-P-1-120FT and GW-AA-O-1-120 were flagged "U, p" at the reporting limit. Arsenic was detected in the PB at -3.01 µg/L and the ICB at -3.57 µg/L. Thallium was detected in the PB at -5.73 µg/L Arsenic and thallium results in the associated samples were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Copper was detected in the PB at 2.19 µg/L, CCB3 at 2.28 µg/L, and CCB4 at 2.20 µg/L. Positive copper results in samples GW-AA-P-1-120FT and GW-AA-P-1-120 were flagged "U, p" at the reporting limit. Barium, calcium, iron, manganese, and potassium were detected in the PB and several CCBs at low levels. Since these results were either greater than five times the blank concentration or non-detects in the associated samples, no data qualifying action was taken.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples.

For the nitrate-N analyses, the MS/MSD recoveries for nitrate-N (36% and 39%) were less than the lower control limit (i.e., 75%) in the GW-AA-P-1-64FT MS/MSD pair (from SDG: SAII14). All nitrate-N results in the associated samples were flagged "UJ, m".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Except SVOC data points in re-extracted sample GW-AA-S-1-54DUP, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII16_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____September 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 (RRF=0.0487) and three continuing calibrations analyzed on 7/15/02 19:57 (RRF=0.0395), 7/22/02 09:45 (RRF=0.0416), and 7/25/02 16:17(RRF=0.0417) displayed relative response factors (RRFs) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973. All associated sample results were non-detects and were flagged "R, c".

For pesticides analyses, the DCBP surrogate recoveries in sample SOIL-R-2-6 (5% and 4%) were less than the lower control limit (i.e., 30%). Positive results, except those previously flagged due to calibration failure, were flagged "J, s" and non-detects were flagged "R,s" in this sample.

Minor Anomalies: For the VOCs analyses, the continuing calibration verifications (CCVs) analyzed on 7/15/02 at 09:53 and 7/16/02 at 17:08 displayed %Ds greater than the control limit (i.e. 20%) for methylene chloride at -30.9% and -40.0%, respectively. Since the positive methylene chloride result in sample SOIL-O-1-0.5 was not used for data interpretation, no data qualifying action was taken. No data qualification was assigned to non-detect results since the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values. The CCV analyzed on 7/22/02 at 09:45 displayed a %D greater than the control limit for 1,1-dichloroethane at 31.4%. The CCV analyzed on 7/25/02 at 16:17 displayed a %D greater than the control limit for 2-hexanone at -20.7%. Since these two compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The method blank, 2O0715MB, displayed positive detections for trichloroethene at 61 µg//kg and toluene at 200 µg//kg. The method blank, 1M0716MB, displayed positive detections for 4-methyl-2-pentanone (MIBK) at 0.62 µg//kg and 2-hexanone at 1.9 µg//kg. The 2-hexanone result in sample SOIL-R-2-6 and the MIBK result in

sample SOIL-R-4-6' were flagged "U, z" at the reporting limit. Since trichloroethene was not detected in the associated samples and the toluene result in sample SOIL-O-1-0.5 was not used for data interpretation, no data qualifying action was taken. All surrogate recoveries were greater than the upper control limit in sample SOIL-O-1-0.5. This sample may have been inadvertently spiked with twice the routine amount of surrogate spike solution. The high methylene chloride result in this sample may have been introduced from the methanol used to preserve the sample. These sample results were crossed-out by the reviewer and should not be used for data interpretation. This sample was re-analyzed outside the hold time by 2 days and displayed acceptable surrogate recoveries and was free of methylene chloride contamination. All results were flagged "J, h" or "UJ, h". The re-analyzed sample results should be used for data interpretation. The med-level LCS recoveries for 1,1-dichloroethane were greater than the upper control limit (i.e., 129%) at 150% (2O0715MB) and 132% (1O0722MB). Since this compound was not detected in the associated samples, no data qualifying action was taken. Sample SOIL-R-2-6 displayed a 1,2-dichloroethane result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed on 7/22/02 at a greater dilution (med-level) and the 1,2-dichloroethane result was within the calibration range. The high methylene chloride result in this diluted sample may have been introduced from the methanol used to preserve the sample. This diluted sample result was crossed-out by the reviewer and should not be used for data interpretation. This sample was re-analyzed on 7/25/02 and displayed an acceptable 1,2-dichloroethane result free of methylene chloride contamination. The positive 1,2-dichloroethane result from the last analysis (7/25/02) should be used for data interpretation. The high methylene chloride result in sample SOIL-R-3-6FT may have been introduced from the methanol used to preserve the sample. This sample was re-analyzed on 7/25/02 and was free of methylene chloride contamination. The methylene chloride result from the re-analyzed sample (7/25/02) should be used for data interpretation.

For the SVOCs analyses, the initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.987. 2,4-Dinitrophenol was not detected in the associated samples and non-detects were flagged "UJ, r". The initial calibration analyzed on 8/10/02 displayed correlation coefficients less than the control limit for 2,6-dinitrotoluene at 0.987, 3-nitroaniline at 0.988, and 4-nitroaniline at 0.986. Since the associated sample is a QC sample, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 8/1/02 at 22:19 displayed a %D greater than the control limit (i.e. 20%) for 4-chloroaniline at –34.8%. The CCV analyzed on 8/4/02 at 12:05 displayed a %D greater than the control limit for bis(2-chloro-isopropyl)ether at –20.9%. The continuing calibration verification (CCV) analyzed on 8/9/02 at 12:21 displayed %Ds greater than the control limit for 4-nitrophenol at –21.2%, hexachlorocyclopentadiene at –27.8%, 2,4-dinitro-

phenol at 23.2%, and 4,6-dinitro-2-methylphenol at 26.6%. Since these compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogates were diluted out in samples SOIL-S-1-0.5 (DF=40) and SOIL-S-1-0.5DL (DF=400). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Sample SOIL-S-1-0.5 displayed a pentachlorophenol (PCP) result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed at a greater dilution and the result was within the calibration range. It is recommended that the diluted PCP result be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 7/22/02 at 18:41 displayed a %D greater than the control limit (i.e. 15%) for decachlorobiphenyl (DCBP, -15.6%) on the primary column. The CCV analyzed on 7/23/02 at 04:22 displayed %Ds greater than the control limit on the primary column for 4,4-DDT (-18.2%) and on the confirmation column for 4,4'-DDD (24.2%) and endosulfan sulfate (23.4%). Positive 4,4'-DDD and 4,4'-DDT results in the associated samples were flagged "J, c". Endosulfan sulfate was not detected in the associated samples. Since other outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. The CCV analyzed on 8/2/02 at 15:17 displayed %Ds greater than the control limit on the primary column for methoxychlor (25.8%) and tetrachloro-m-xylene (TCMX, -16.2%) and on the confirmation column for 4,4'-DDT (18.5%) and methoxychlor (20.6%). The CCV analyzed on 8/3/02 at 00:38 displayed %Ds greater than the control limit on the primary column for endrin (16.0%), 4,4'-DDT (19.8%), methoxychlor (44.7%), endrin ketone (19.1%), 2,4-DCAA (-19.5%), and TCMX (-15.5%); and on the confirmation column for heptachlor (18.6%), dieldrin (16.0%), endrin (17.0%), 4,4'-DDD (19.7%), 4,4'-DDT (26.1%), endosulfan sulfate (19.7%), methoxychlor (42.0%), endrin ketone (21.3%), and TCMX (-15.8%). Endrin, methoxychlor, 4,4'-DDT, and endrin ketone results in the associated samples were flagged "J, c" for positive detections and "UJ, c" for non-detects. Since other outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. The CCV analyzed on 8/22/02 at 11:11 displayed %Ds greater than the control limit on the primary column for endrin ketone (16.7%), 2,4-DCAA (-20.3), and TCMX (-16.1%) and on the confirmation column for 4,4'-DDE (17.0%), endrin (15.9%), 4,4'-DDT (15.6%), endosulfan sulfate (15.5%), and 2,4-DCAA (-18.5%). The CCV analyzed on 8/22/02 at 14:07 displayed %Ds greater than the control limit on the primary column for endrin (19.3%), 4,4'-DDT (20.7%), methoxychlor (15.9%), endrin ketone (20.9%), and 2,4-DCAA (-20.2%); and on the confirmation column for 4,4'-DDE (18.6%), endrin (20.6%), 4,4'-DDT (24.9%), endrin aldehyde (16.3%), endosulfan sulfate (18.0%), and 2,4-DCAA (-16.9%). Since associated samples are QC samples, no data qualifying action was taken. Samples SOIL-O-2-0.5,

SOIL-O-1-0.5, and SOIL-R-3-6FT displayed recoveries greater than the upper control limit (i.e., 150%) on the confirmation column for DCBP at 263%, 889%, and 1526%, respectively. Since all other surrogate recoveries were in control, no data qualifying action was taken. The TCMX surrogate recoveries in sample SOIL-R-1-0.5 (26% and 29%) were less than the lower control limit (i.e., 30%). All results, except those previously flagged due to calibration failure, were flagged "J, s" for positive detections or "UJ, s" for non-detects. Surrogates were diluted out in several samples. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Due to the abundance of target compounds in the parent sample (SOIL-O-3-0.5), the MS and MSD were analyzed at a dilution of 10. All spiking compounds were diluted out and, therefore, the MS/MSD summary form was not provided in this data package. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, the surrogates in samples SOIL-O-1-0.5 (DF=500), SOIL-S-1-0.5 (DF=500), and SOIL –S-1-0.5DL (DF=1000) were diluted out. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The internal standard peak areas for chrysene-d12 were greater than the upper control limit (i.e. 130%) in samples SOIL-R-2-6 (145%) and SOIL-R-3-0.5FT (139%). Positive detections in these two samples were flagged "J, n". The trichlorobiphenyl result in sample SOIL-S-1-0.5 exceeded the linear range of the calibration curve. This result was flagged "J, q". This sample was diluted by a factor of 1000 and re-analyzed by the laboratory. The result from the dilution analysis should be used for data interpretation.

For the herbicides analyses, the method blank prepped on 7/22/02 displayed a positive detection for 2,4-D at 4.7 µg/kg and pentachlorophenol (PCP) at 1.8 µg/kg. Positive 2,4-D and PCP results less than five times the amount found in the blank were flagged "U, z", or, "U, z" at the reporting limit (RL) when the reported result was less than the RL. The CCV analyzed on 7/26/02 at 12:51 displayed %Ds greater than the control limit (i.e. 15%) on the primary column for 2,4-D at 18.6%, PCP at 17.5%, 2,4,5-TP at 17.7%, and 2,4,5-T at 16.9%. The CCV analyzed on 8/1/02 at 22:38 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at -19.8%. The CCV analyzed on 8/2/02 at 12:42 displayed %Ds greater than the control limit on the primary column for MCPP at 19.4%, for 2,4-D at 16.7%, and for PCP at 15.5%. The CCV analyzed on 8/10/02 at 10:46 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at 20.6%. Positive results in the associated samples were flagged "J, c". Surrogates were diluted out in several samples.

Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Due to the abundance of target compounds in the parent sample (SOIL-O-3-0.5), the MS and MSD were analyzed at a dilution of 500. All spiking compounds were diluted out and, therefore, the MS/MSD summary form was not provided in this data package. The LCS recovery for 2,4-D (172%) was greater than the upper control limit (i.e., 153%) at 172%. Since all positive 2,4-D results were previously flagged due to continuing calibration failure or method blank contamination, no additional data flags were applied. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., 40%) in several samples. These results, except those flagged due to C. Cal. failure or method blank contamination, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (125%), selenium (127%), sodium (74%), and thallium (73% and 55%) and the final CRDL recoveries for aluminum (124%), selenium (145%), and sodium (66%) were outside the control limit (i.e., 80-120%). Thallium results in samples SOIL-R-3-6FT, SOIL-R-3-0.5FT, SOIL-R-4-0.5FT, and SOIL-R-4-6' were flagged "UJ, w". Since positive selenium results were previously flagged due to preparation blank contamination, no additional data flags were applied. Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blanks contained aluminum at 2.95 mg/kg and 2.64 mg/kg, arsenic at 0.341 mg/kg and –0.354 mg/kg, barium at 0.789 mg/kg, beryllium at 0.0161 mg/kg, cadmium at -0.056 mg/kg, calcium at 2.43 mg/kg, chromium at 0.126 mg/kg, cobalt at 0.151 mg/kg, lead at 0.268 mg/kg, magnesium at 1.87 mg/kg, manganese at 0.201 mg/kg, potassium at 4.08 mg/kg, selenium at 0.532 mg/kg, sodium at 18.7 mg/kg, and vanadium at 0.161 mg/kg. Positive selenium results in samples SOIL-S-2-0.5 and SOIL-O-1-0.5 were flagged "U, p" or "U, p" at the reporting limit. Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Aluminum, arsenic, barium, cadmium, potassium and selenium were detected in the initial calibration blank and/or continuing calibration blanks at low level. Positive cadmium results in samples SOIL-R-3-0.5FT, SOIL-R-4-0.5FT, and SOIL-R-4-6' were flagged "U, o" at the reporting limit. Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples, except sample SOIL-S-2-0.5, displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. Since positive cadmium results in the associated samples were flagged "J, m" due to MS/MSD recovery failure, no additional data flags were applied. Since all other affected results either greater than five times the ICSA concentration or non-detects, no data flags were applied.

The MS/MSD recoveries for antimony (61%), barium (129%), cadmium (73%), lead (205%), potassium (140% and 246%), sodium (136% and 129%), and vanadium (153%) were outside the control limits in the SOIL-R-3-6FT MS/MSD pair. These analytes were all detected in the associated samples and were flagged "J, m". The post-digestion spike analysis was performed on client samples SOIL-O-2-0.5, SOIL-R-3-0.5FT, and SOIL-S-2-0.5; and recoveries for these compounds were in control. The RPD for aluminum (23.9%), lead (32.0%), magnesium (34.9%), potassium (29.2%), vanadium (28.4%), and zinc (46.7%) were greater than the acceptance limit in the SOIL-R-3-6FT MS/MSD pair. Positive results, except those previously flagged due to MS/MSD recovery failure, were flagged "J, d". The MS/MSD recoveries for antimony (32% and 34%), chromium (177%), copper (183%), lead (71%), and zinc (144%) were outside the control limit in one non-client MS/MSD pair. The RPDs for chromium (22.3%), iron (22.4%), and manganese (24.3%) were greater than the acceptance limit. Since the parent sample is a non-client sample, no data qualifying action was taken. The %Ds for cobalt (13.6% and 12.8%) were greater than the acceptance limit (i.e., <10%) in two serial dilution analyses (SOIL-S-2-0.5 and SOIL-O-2-0.5). Positive cobalt results in the associated samples were flagged "J, s".

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, most of the samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. Except those rejected data point, all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII18_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____September 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 (RRF=0.0487) and three continuing calibrations analyzed on 7/22/02 09:45 (RRF=0.0416), 7/23/02 10:06 (RRF=0.0420), and 7/25/02 16:17(RRF=0.0417) displayed relative response factors (RRFs) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973. All acetone results were flagged "J, c" for positive detections and "R, c" for non-detects.

For the SVOC analyses, the LCS/LCSD recoveries for n-nitrosodiphenylamine (48% and 48%) and butylbenzylphthalate (54% and 54%) were less than the lower control limits in the LCS/LCSD pair. This LCS/LCSD pair was re-analyzed on 7/29/02. The LCS recoveries for n-nitrosodiphenylamine (48%) and chrysene (54%) were less than the lower control limits. Chrysene and n-nitrosodiphenylamine results in the associated samples were flagged "J, l" for positive detections and "R, l" for non-detects.

Minor Anomalies: For the VOCs analyses, the continuing calibration verifications (CCVs) analyzed on 7/22/02 at 09:45 displayed a %D greater than the control limit for 1,1-dichloroethane at 31.4%. The CCV analyzed on 7/25/02 at 16:17 displayed a %D greater than the control limit for 2-hexanone at -20.7%. Since these two compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The method blank, 1O0723MB, displayed positive detections for chloromethane at 84 µg//kg and ethyl benzene at 27 µg//kg. The chloromethane result in sample WASTE-R-1-19FT was flagged "U, z" at the reporting limit. Since ethyl benzene results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The methanol preserved samples were possibly contaminated with methylene chloride. All samples were re-analyzed from bulk containers for confirmation. Methylene

chloride results in all original samples were crossed-out by the reviewer and should not be used for data interpretation. Methylene chloride results from re-analyzed samples should be used for data interpretation. Surrogates were diluted out in all samples. Since the affected samples were analyzed at dilutions greater than 10 (DF from 400 to 5000), no data qualifying action was taken. The med-level LCS recoveries for 1,1-dichloroethane were greater than the upper control limit (i.e., 129%) at 132% (1O0722MB) and 132% (1O0723MB). The positive 1,1-dichloroethane result in sample WASTE-R-1-19FT was flagged "J, l". Sample WASTE-R-3-22FT displayed a trichloroethene result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed on 7/23/02 at a greater dilution and the trichloroethene result was within the calibration range. The high methylene chloride result in this diluted sample may have been introduced from the methanol used to preserve the sample. This diluted sample result was crossed-out by the reviewer and should not be used for data interpretation. This sample was re-analyzed on 7/25/02 (from a bulk container) and displayed an acceptable trichloroethene result free of methylene chloride contamination. The positive trichloroethene result from the last analysis (7/25/02) should be used for data interpretation.

For the SVOCs analyses, the continuing calibration verification (CCV) analyzed on 8/5/02 at 10:15 displayed %Ds greater than the control limit for 2,4-dinitrophenol at –33.3%, 2,4-dinitrotoluene at -20.5%, and 4,6-dinitro-2-methyl-phenol at -26.0%. The CCV analyzed on 8/5/02 at 10:44 displayed a %D greater than the control limit for dinoseb at –24.8%. Since these compounds in the associated sample were not used for data interpretation, no data qualifying action was taken. Surrogates were diluted out in all samples (DF from 10 to 500). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Sample WASTE-R-2-COMP displayed a 2,4-dichlorophenol result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed on 7/30/02 at a greater dilution (DF=500) and the result was within the calibration range. The internal standard peak area for perylene-d12 (42.2%) was less than the lower control limit (i.e., 50%) in this diluted sample. These diluted sample results were crossed-out by the reviewer and should not be used for data interpretation. The diluted sample was re-analyzed on 8/5/02 and displayed a chrysene-d12 internal standard peak area less than the control limit at 48.9%. Since the 2,4-dichlorophenol result was not quantified based on either perylene-d12 or chrysene-d12, no data qualifying action was taken. It is recommended that the second diluted 2,4-dichlorophenol result (higher value) be used for data interpretation. Sample WASTE-R-4-COMP displayed phenol and 2,4,6-trichlorophenol results that exceeded the calibration range. These two results were flagged "J, q". This sample was re-analyzed at a greater dilution (DF=40) and these two results were within the calibration range. It is recommended that the diluted phenol and 2,4,6-trichlorophenol results be used for

data interpretation.

For the pesticides analyses, the CCV analyzed on 8/2/02 at 15:17 displayed %Ds greater than the control limit on the primary column for methoxychlor (25.8%) and tetrachloro-m-xylene (TCMX, -16.2%) and on the confirmation column for 4,4'-DDT (18.5%) and methoxychlor (20.6%). The CCV analyzed on 8/3/02 at 00:38 displayed %Ds greater than the control limit on the primary column for endrin (16.0%), 4,4'-DDT (19.8%), methoxychlor (44.7%), endrin ketone (19.1%), 2,4-DCAA (-19.5%), and TCMX (-15.5%); and on the confirmation column for heptachlor (18.6%), dieldrin (16.0%), endrin (17.0%), 4,4'-DDD (19.7%), 4,4'-DDT (26.1%), endosulfan sulfate (19.7%), methoxychlor (42.0%), endrin ketone (21.3%), and TCMX (-15.8%). Positive heptachlor, dieldrin, and endosulfan sulfate results in the associated samples were flagged "J, c". Endrin, methoxychlor, 4,4'-DDT, and endrin ketone results in the associated samples were flagged "J, c" for positive detections and "UJ, c" for non-detects. Since other outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. The CCV analyzed on 8/6/02 at 14:28 displayed a %D greater than the control limit on the confirmation column for TCMX (17.6%). The CCV analyzed on 8/7/02 at 02:36 displayed %Ds greater than the control limit on the primary column for aldrin (15.7%) and on the confirmation column for TCMX (-19.3%). Since all outliers either had an acceptable %D on the other column or were surrogates, no data qualifying action was taken. Surrogates were diluted out in all samples (DF from 100 to 200). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Due to the abundance of target compounds in the parent sample (WASTE-R-4-COMP), the MS and MSD were analyzed at a dilution of 100. All spiking compounds were diluted out and, therefore, the MS/MSD summary form was not provided in this data package. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in all samples (DF from 10 to 100). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken.

For the herbicides analyses, the method blank prepped on 7/22/02 displayed a positive detection for 2,4-D at 4.7 µg/kg and pentachlorophenol (PCP) at 1.8 µg/kg. Positive PCP results less than five times the amount found in the blank were flagged "U, z", or, "U, z" at the reporting limit (RL) when the reported result was less than the RL. Since 2,4-D results in the associated samples were greater

than five times the blank concentration, no data qualifying action was taken. The CCV analyzed on 8/1/02 at 22:38 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at -19.8%. The CCV analyzed on 8/2/02 at 12:42 displayed %Ds greater than the control limit on the primary column for MCPP at 19.4%, for 2,4-D at 16.7%, and for PCP at 15.5%. Since associated samples were QC samples, no data qualifying action was taken. The CCV analyzed on 8/8/02 at 10:37 displayed %Ds greater than the control limit on both columns for MCPP at 18.6% and 19.3% and dalapon at 22.3% and 17.6%. The CCV analyzed on 8/8/02 at 20:18 displayed %Ds greater than the control limit on the primary column for MCPP at 23.1%, dalapon at 20.5%, and MCPA at 18.4%; and on the confirmation column for MCPP at 24.4% and dalapon at 19.1%. MCPP and dalapon results in the associated samples were flagged "UJ, c". Since MCPA was not detected in the associated samples and CCV had an acceptable %D on the confirmation column, no data qualifying action was taken. The CCV analyzed on 8/13/02 at 16:01 displayed %Ds greater than the control limit on the primary column for MCPP at 17.1% and 2,4DB at 18.2%; and on the confirmation column for 2,4-DB at 20.7%. Since MCPP and 2,4-DB results were not used for data interpretation in the associated sample WASTE-R-4-COMPDL, no data qualifying action was taken. Surrogates were diluted out in all samples (DF from 20 to 4000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Due to the abundance of target compounds in the parent sample (WASTE-R-3-COMP), the MS and MSD were analyzed at a dilution of 500. All spiking compounds were diluted out and, therefore, the MS/MSD summary form was not provided in this data package. The LCS recovery for 2,4-D was greater than the upper control limit (i.e., 153%) at 172%. Since the LCS was prepared with the same water used for the method blank that displayed the positive detection for 2,4-D at 23.5 µg/kg, which affected the %R, no further data qualifying action was taken. Sample WASTE-R-4-COMP displayed a 2,4-D result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed at a greater dilution (DF=50) and the diluted result was within the calibration range. It is recommended that the diluted 2,4-D result be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., 40%) for PCP in all samples. These PCP results, except those flagged due to method blank contamination, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, mercury was analyzed outside the holding time by two to three days for samples WASTE-R-2-COMP and WASTE-R-3-COMP. Positive mercury results in these two samples were flagged "J, h". The initial CRDL percent recoveries for aluminum (124%), selenium (74%), and thallium (134%) and the final CRDL recoveries for lead (78%), selenium (125%), and sodium (78%) were outside the control limit (i.e., 80-120%). Since all recoveries were

only marginally outside the control limits, no data qualifying action was taken. The CRDL percent recoveries for mercury (79% and 65%) were less than the lower control limit (i.e., 80-120%). Since associated mercury results were previously flagged due to holding time violation, no additional data flags were applied. The preparation blank contained aluminum at 2.5462 mg/kg, barium at 0.0421 mg/kg, cadmium at -0.0599 mg/kg, calcium at 2.6774 mg/kg, and sodium at 23.4188 mg/kg. Positive cadmium results in samples WASTE-R-1-COMP, WASTE-R-2-COMP, and WASTE-R-4-COMP were flagged "J, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Aluminum, barium, calcium, chromium, copper, magnesium, manganese, thallium, and vanadium were detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Mercury was detected in the ICB and several CCBs at concentration ranging from -0.066 µg/L to -0.099 µg/L. Since all results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples, except sample WASTE-R-4-COMP, displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. Since positive cadmium results in the associated samples were flagged "J, p" due to preparation blank failure, no additional data flags were applied. Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (61%), lead (205%), magnesium (413% and 142%), potassium (128% and 150%), sodium (127%), and vanadium (132%) were outside the control limits in the SOIL-R-3-6FT MS/MSD pair. These analytes, except antimony, were all detected in the associated samples and were flagged "J, m". Antimony results in the associated samples were flagged "UJ, m". The post-digestion spike analysis was performed and recoveries for these compounds were in control. The RPDs for antimony (26.29%), calcium (28.85%), lead (32.0%), magnesium (40.4%), manganese (25.6%), and zinc (45.4%) were greater than the acceptance limit in the SOIL-R-3-6FT MS/MSD pair. Positive results, except those previously flagged due to MS/MSD recovery failure, were flagged "J, d". The post-digestion spike recovery for mercury (73%) was less than the control limit (i.e., 85%) in sample WASTE-R-3-COMP. The mercury result in this sample was determined by a single point method of standard addition. No data qualifying action was taken. The %D for mercury (27.16%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (WASTE-R-3-COMP). Since the positive mercury result was previously flagged due to holding time violation, no additional data flags were applied.

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, most of the samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised. The SVOC extraction date was incorrectly listed on the Form I for sample WASTE-R-1-COMP (7/19/02 instead of 7/22/02). The correct extraction date was entered on the Form Is by the reviewer.
Sample identification WASTE-R-3-COMP was incorrectly assigned as WASTE-R-3-22FT on the chain-of-custody (COC) form for all non-volatile analyses. This error was found by the field crew after the laboratory logged-in this sample as WASTE-R-3-22FT. The correction was not made by the laboratory. The incorrect sample ID was crossed-out and the correct sample ID was entered by the reviewer.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. Except those rejected data point, all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII19_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____RA_____ **Date: _____September 26, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, the relative response factors (RRFs) in the initial (0.0428) and continuing calibration (0.0487, 0.0469, 0.04156) for acetone were less than the QC limit (i.e., 0.05). Positive results were flagged "J,c" unless previously flagged due to trip blank contamination and non-detects were flagged "R,c" in the associated samples.

Minor Anomalies: For the VOC analyses, trip blank, TB-7/15/02 contained acetone at 11 ug/L and tetrachloroethane at 0.5 ug/L. Positive results were flagged "U,y" at the reporting level in the associated samples. The continuing calibration analyzed on 7/18/02 displayed %Ds greater than the control limit (i.e., 20%) for acetone at 21.9% and 1,1-dichloroethane at 34.5%, and the continuing calibration analyzed on 7/22/02 displayed a %D greater than the control limit (i.e., 20%) for 1,1-dichloroethane at 31.4%. Acetone results were previously flagged due to initial calibration failure and no additional data flags were applied. Since 1,1-dichloroethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS recovery for 1,1-dichloroethane (142%) was greater than the control limit (i.e., 51-140%). The MS/MSD relative percent difference (RPDs) for vinyl chloride (41%), 1,1-dichloroethene (31%) and carbon disulfide (36%) were also greater than the upper control limit (i.e., 21%, 30% and 23%, respectively). Since MSD and LCS recoveries were in control, no data qualifying action was taken. Chlorobenzene exceeded the calibration range in sample GW-AA-S-1-114 and was flagged "E" by the laboratory. This result was flagged "J,q". This sample was re-analyzed at a dilution factor of 5 with acceptable results and the result from dilution analysis should be used for this compound for data interpretation.

For the SVOC analyses, the initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.987. All associated sample results were non-detects and were flagged "UJ, r". The continuing calibration analyzed on 7/31/02 displayed a%D greater than the

control limit (i.e., <20%) for 2,4-dinitrophenol (28.2%). All associated sample results were previously flagged due to initial calibration failure and no additional data flags were applied.

For the pesticide analyses, the recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) in samples GW-AA-S-1-104 (26%, 28%), GW-AA-S-1-64 (26%, 28%), and GW-AA-S-1-124 (24%, 24%). All associated sample results were non-detect and were flagged "UJ,s".

For the herbicide analyses, the method blank contained 2,4-D at 0.39 µg/L, pentachlorophenol at 0.64 µg/L, and 2,4,5-T at 0.16 µg/L. Positive pentachlorophenol results in the associated samples were flagged "U, z" or "U, z" at the reporting limit. No positive results were reported for 2,4-D and 2,4,5-T and no data qualifying action was taken. The %D for pentachlorophenol (16.9%) on the primary column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/25/02 at 0743. Positive pentachlorophenol results were previously flagged due to method blank contamination and no additional data flags were applied.

For the metal analyses, the initial CRDL percent recovery for aluminum (124%), the final CRDL percent recoveries for lead (78%) and sodium (78%), and the initial and final CRDL recoveries for selenium (74%, 125%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, copper and thallium and a negative result for selenium. Positive aluminum and copper results were flagged "U, p" at the reporting limit. Positive results were flagged "J,p" and non-detects were flagged "UJ,p" for selenium in the associated samples. No positive results were reported for thallium and no data qualifying action was taken. The calibration blanks contained positive results for arsenic, barium, copper, manganese, thallium, and vanadium; and negative results for magnesium and mercury. Positive arsenic, barium, copper, manganese, thallium, and vanadium results less than 5 times the blank concentration results were flagged "U, o" at the reporting limit. Mercury non-detects were flagged "UJ,o". Magnesium results were greater than 5 times the blank concentration and no data qualifying action was taken. The serial dilution %D was greater than the QC limit (i.e., 10%) for zinc at 17.3%. Positive zinc results were flagged "J,s" in all samples.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. Except for data flagged as unusable, R, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII20_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____RA_____ **Date: _____October 16, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the herbicides analyses, the LCS recovery for 2,4-D (2%) was less than the QC limit (i.e., 11-154%). All associated sample results were non-detects and were flagged "R,l". The percent completeness was less than the QC limit (i.e., 95%) at 90%.

Minor Anomalies: For the VOC analyses, the method blank contained chloromethane at 0.39 ug/L. Positive results were flagged "U,z" or "U,z" at the reporting level in the associated samples. Trip blank, TB-7-16-02 contained chloromethane at 0.4 ug/L, vinyl chloride at 0.28 ug/L, 1,1-dichloroethene at 0.4 ug/L, carbon disulfide at 0.28 ug/L, toluene at 0.42 ug/L, and 1,2-dichloroethene at 0.38 ug/L. The positive chloromethane result was previously flagged due to method blank contamination. No further data qualifying action was taken. Positive results were flagged "U,y" or "U,y" at the reporting level for the other compounds in the associated samples. The %RPD for the MS/MSD analyses was greater than the QC limit (i.e., 21%) for vinyl chloride at 29%. The MS/MSD and LCS recoveries were acceptable and no data qualifying action was taken. Chlorobenzene exceeded the calibration range in several samples and was flagged "E" by the laboratory. Chlorobenzene was flagged "J,q" in the associated samples. These samples were re-analyzed at a dilution factor of 2 with acceptable results and the result from dilution analysis should be used for data interpretation. The difference between carbon disulfide results was greater than two times the reporting limit for the field duplicate pair AA-Q-1-60/ AA-Q-1-60DUP. The positive carbon disulfide result was flagged "J,f" in sample AA-Q-1-60.

For the SVOC analyses, the method blank analyzed on 8/1/02 contained positive results for thirty one compounds at trace levels. The associated sample results were non-detect for all compounds except 1,2-dichlorobenzene. The positive 1,2-dichlorobenzene results were flagged "U,z" at the reporting level in samples GW-11-Q-1-90 and GW-11-Q-1-100. The initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-

dinitrophenol at 0.987. All associated sample results were non-detects and were flagged "UJ, r". The continuing calibration analyzed on 7/27/02 displayed a %D greater than the control limit (i.e., <20%) for bis(2-chloroisopropyl)ether at 21.8%. The continuing calibration analyzed on 7/29/02 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroethyl)ether (22.8%), 2,4-dinitrophenol (24.9%), 4,6-dinitro-2-methylphenol (23.1%), benzo(k)fluoranthene (21.2%), indeno(1,2,3-cd)pyrene (21.1%), and benzo(g,h,i)perylene (21.8%). The continuing calibration analyzed on 8/1/02 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (23.2%) and indeno(1,2,3-cd)pyrene (25.9%). All associated sample results were non-detects and the failures were not serious enough (i.e. > 50%) to affect the non-detects. No data qualifying action was taken. The recovery for surrogate terphenyl-d14 was less than the QC limit (i.e., 14-148%) at 13% in the MS sample. No action was required since this is a QC sample. The %RPD for the LCS/LCSD analyses was greater than the QC limit (i.e., 32%) for benzo(b)fluoranthene at 38%. The positive benzo(b)fluoranthene result was flagged "J,d" in sample GW-AA-Q-1-80.

For the pesticide analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) on the primary column for alpha-BHC (17%) and 4,4-DDE (26%) for the continuing calibration analyzed on 7/30/02 at 1733 and for alpha-BHC (17.6%), 4,4-DDE (31.6%), and 4,4-DDD (15.6%) for the continuing calibration analyzed on 7/30/02 at 2344. No positive results were reported for these compounds in the associated samples and no data qualifying action was taken since the %Ds were acceptable on the alternate column. The recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) in samples GW-AA-Q-1-80 (19% and 20%) and GW-AA-S-2-118 1/2 (24% and 24%). Positive results were flagged "J,s" and non-detects were flagged "UJ,s". The recoveries for surrogate tetrachloro-m-xylene were less than the QC limit (i.e., 30-150%) in the method blank (18%) and LCS (17%) samples. No action was required since these are QC samples, and this was found to be an isolated situation. The %RPDs for the LCS/LCSD analyses were greater than the QC limit for alpha-chlordane (20%), 4,4-DDE (22%) and 4,4-DDT (28%). No positive results were reported for these compounds in the associated samples and no data qualifying action was taken. The %RPDs between the two columns were greater than the QC limit (i.e., 40%) for gamma-BHC and heptachlor in sample GW-AA-Q-1-80, and beta-BHC in sample GW-AA-S-2-118 1/2. These results were previously flagged due to surrogate failure and no further data qualifying action was required.

For the herbicide analyses, the method blank contained 2,4-D at 3.7 µg/L and pentachlorophenol at 0.2. µg/L. The positive pentachlorophenol result in sample GW-AA-Q-1-80 was flagged "U, z" at the reporting limit. No positive results were reported for 2,4-D and no data qualifying action was taken. The %Ds for

2,4-DB (20.5%) on the confirmation column for the continuing calibration analyzed on 7/31/02 at 2102, for MCPP (16.4%) on the primary column and 2,4-DB (15.4%) on the confirmation column for the continuing calibration analyzed on 8/1/02 at 1017, and 2,4-DB (19.8%) on the confirmation column for the continuing calibration analyzed on 8/1/02 at 2238 were greater than the criterion (i.e., %D $\leq$ 15%). No positive results were reported for these compounds in the associated samples and no data qualifying action was taken since the %Ds were acceptable on the alternate column. The %RPDs between the two columns were greater than the QC limit (i.e., 40%) for pentachlorophenol in sample GW-AA-Q-1-80, and 2,4,5-TP in sample GW-AA-S-2-118 1/2. The positive pentachlorophenol result in sample GW-AA-Q-1-80 was previously flagged due to method blank contamination and no additional data flags were applied. The positive 2,4,5-TP result in sample GW-AA-S-2-118 1/2 was flagged "J,g".

For the metal analyses, the initial CRDL percent recoveries for aluminum (135%) and thallium (68%), and the final CRDL percent recoveries for iron (69%), selenium (72%), and sodium (69%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, copper and calcium and negative results for arsenic, potassium and thallium. The positive copper result less than 5 times the blank contamination was flagged "U, p" at the reporting limit in sample GW-AA-S-2-78. Positive results less than 5 times the blank contamination were flagged "J,p" and non-detects were flagged "UJ,p" for arsenic, potassium and thallium in the associated samples. The calibration blanks contained positive results for aluminum, barium, copper, manganese, thallium, and vanadium; and negative results for arsenic and potassium at low levels. All associated sample results were greater than 5 times the blank contamination and no data qualifying action was required. Several analytes were detected in the ICSA initial and final analyses at low levels. No action was required since the concentration of aluminum, iron, calcium, and magnesium in the field samples were less than half of their corresponding concentrations in the ICSA solutions.

For the methane analyses, the correlation coefficient for the initial calibration analyzed on 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987. Positive methane results were flagged "J, r" in the associated samples.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. It should also be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Except for data flagged as unusable, "R", all data, as qualified, are usable for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII21_____ **Fraction:** __**TCLP VOCs, SVOCs, Pest., PCBs, Herb., and Metals**_____

Lab: ___**STL – Savannah**_____ **Project Name:** _____**Sauget Area II**_____

Reviewer: _____**RA**_____ **Date:** _____**October 16, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the continuing calibration %D was greater than the QC limit (i.e., 15%) for 2-butanone (33.1%) in the continuing calibration analyzed on 7/29/02. The positive 2-butanone result was flagged "J,c" in sample WASTE-P-1-15. The MS recovery and the %RPD for the MS/MSD analyses was greater than the QC limit for 2-butanone at 168% and 40%, respectively. The LCS recovery for 2-butanone was also greater than the QC limit at 176%. The positive 2-butanone result was previously flagged in the associated sample due to calibration failure and no further data qualifying action was taken.

For the pesticide analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 15%) for heptachlor (21.5%) on the primary column, and methoxychlor (22.9%) on the confirmation column for the continuing calibration analyzed on 7/26/02 at 2120. No positive results were reported for these compounds in the associated samples and no data qualifying action was taken since the %Ds were acceptable on the alternate column. The recovery for surrogate decachlorobiphenyl was less than the QC limit (i.e., 30-150%) in sample WASTE-P-3-COMP-T (29%). No action is required based on one surrogate failure and no data flags were applied. The recoveries for surrogate tetrachloro-m-xylene were less than the QC limit (i.e., 30-150%) on both columns in sample Fluid Blank (27% and 26%). Since the surrogate recoveries were acceptable in most of the field samples, this was considered to be an isolated situation. No data qualifying action was taken.

For the herbicide analyses, the method blank contained 2,4-D at 0.018 mg/L. Positive 2,4-D results were flagged "U, z" at the reporting limit in samples WASTE-P-3-COMP-T and WASTE-P-1-COMP-T.

For the metal analyses, the initial CRDL percent recoveries for arsenic (59%) and lead (128%), and the final CRDL percent recovery for lead (124%) were outside the control limit (i.e., 80-120%). Positive results were flagged "J,w" and non-detects were flagged "UJ,w" for arsenic in the associated samples. Since the lead recoveries were only marginally outside the control limits, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that detection limits were raised in several samples due to dilutions. It should also be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII23_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 9, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973 at 0.0487. The CCV analyzed on 7/22/02 at 09:45 displayed a RRF less than the control limit for acetone at 0.04156. The CCV analyzed on 7/23/02 at 19:24 displayed a RRF less than the control limit for acetone at 0.04672. The CCV analyzed on 7/25/02 at 16:17 displayed an RRF less than the control limit for acetone at 0.04167. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "R,c".

Minor Anomalies: For the VOCs analyses, the CCV analyzed on 7/22/02 at 09:45 displayed a %D greater than the control limit for 1,1-dichloroethane at 31.4%. The CCV analyzed on 7/22/02 at 11:34 on instrument MSM5972 displayed %Ds greater than the control limit for bromomethane at 21.8% and for methylene chloride at -43.0%. The CCV analyzed on 7/23/02 at 19:24 displayed %Ds greater than the control limit for 1,1-dichloroethane at 49.8% and for 1,2-dichloroethene (Total) at 32.4%. The CCV analyzed on 7/25/02 at 16:17 displayed a %D greater than the control limit for 2-hexanone at -20.7%. Since the associated sample results were non-detect and the anomalies were only marginally outside the control limit (i.e. < 50%), no data qualifying action was taken. Method blank, 1M0722MB, analyzed on 7/22/02 displayed positive detections for 2-butanone at 1.8 ug/kg, for 4-methyl-2-pentanone at 0.62 ug/kg, and for 2-hexanone at 1.9 ug/kg. Associated sample results with positive detections less than 10x the amount found in the blank were flagged "U,z" at the reporting limit. The LCS/LCSD analyzed for low level soils displayed %RPDs greater than the control limit for acetone at 32%, for methylene chloride at 44%, and for 2-hexanone at 47%. Associated sample results with positive detections not previously flagged for calibration anomalies were flagged "J,l". The LCS analyzed for medium/high level soils displayed a %R greater than the upper control limit for 1,1-dichloroethane at 132%. Since

associated sample results were non-detect, no data qualifying action was taken. Samples WASTE-P-1-15' and WASTE-P-4-17' were re-analyzed due to the possibility that methylene chloride was a suspected contaminant from a bulk container during the first analysis. It is recommended that the re-analyzed sample results for methylene chloride be used for data interpretation.

For the SVOCs analyses, the all samples were analyzed at dilutions which caused surrogates to be diluted out. No data qualifying action was taken on these samples.

For the pesticides analyses, the CCV analyzed on 8/9/02 at 11:52 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for alpha-BHC at -18.5%, for delta-BHC at -22.9%, for 4,4'-DDE at -25.3%, and for surrogate tetrachloro-meta-xylene (TMX) at -18.2% and on the confirmation column for alpha-BHC at -24.2% and for delta-BHC at -24.6%. The CCV analyzed on 8/9/02 at 17:49 displayed %Ds greater than the control limit on the primary column for alpha-BHC at -20.1%, for heptachlor at -21.9%, for delta-BHC at -26.7%, for alpha-chlordane at -17.8%, for 4,4'-DDE at -34.7%, for endosulfan II at -15.8%, for 4,4'-DDT at -17.1%, for surrogate TMX at -16.2%, for surrogate decachlorobiphenyl (DCBP) at -22.2% and on the confirmation column for alpha-BHC at -24.8%, for heptachlor at -18.2%, for delta-BHC at -28.2%, for 4,4'-DDT at -16.2%, for heptachlor epoxide at -15.4%, and for surrogate DCBP at -19.4%. Associated sample results for alpha-BHC, delta-BHC, heptachlor, and for 4,4'-DDT with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since all other analytes met criteria on the alternate column, and were either non-detects or surrogates, no data qualifying action was taken. All samples were analyzed at dilutions which caused surrogates to be diluted out. No data qualifying action was taken. Sample WASATE-P-4-COMP displayed a %R greater than the upper control limit (i.e. 150%) for internal standard bromonitrobenzene at 185%. Positive detections, except those flagged due to calibration anomalies, were flagged "J,n". All samples in this SDG displayed %RPDs greater than the control limit between the primary and confirmation column for several analytes. These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These results may be biased low.

For the PCBs analyses, the MS/MSD displayed %Rs greater than the upper control limit for trichlorobiphenyl at 160% and 260%, for pentachlorobiphenyl at 260% and 530%, and for hexachlorobiphenyl at 200% and 270%. The MSD displayed a %R greater than the upper control limit for tetrachlorobiphenyl at 200%. Since the amount found in the parent sample was greater than 4x the spiking amount, no data qualifying action was taken. All samples were analyzed at dilutions which caused the surrogates to be diluted out. No data qualifying

action was taken.

For the herbicides analyses, the CCV analyzed on 8/3/02 at 07:41 displayed %Ds greater than the control limit (i.e. 15%) on the primary column for MCPP at 22.2%, for MCPA at 16.1%, and for 2,4-D at 15.7% and on the confirmation column for 2,4-DB at -21.5%. The CCV analyzed on 8/3/02 at 19:27 displayed %Ds greater than the control limit on the primary column for MCPP at 18.8% and for 2,4-D at 18.8%, and on the confirmation column for 2,4-DB at -16.3%. Since associated sample results were non-detect, no data qualifying action was taken. The CCV analyzed on 8/15/02 at 12:06 displayed %Ds greater than the control limit on the primary column for MCPP at 18.0%, for 2,4-DB at 16.7%, and for dinoseb at 21.3%, and on the confirmation column for MCPP at 16.6%, for 2,4-DB at 16.2%, and for dinoseb at 21.5%. The CCV analyzed on 8/15/02 at 22:00 displayed %Ds greater than the control limit for MCPP at 16.8%, and on the confirmation column for MCPA at 23.0%, for 2,4-D at 16.1%, and for 2,4-DB at 17.0%. Since the only compound of interest in these analyses was pentachlorophenol, no data qualifying action was taken. Sample WASTE-P-1-COMP displayed a surrogate recovery on the confirmation column of 0%. Since the surrogate met criteria on the primary column, positive detections were flagged "J,s"; non-detects were flagged "UJ,s", unless previously flagged for linear range exceedance. Several samples displayed %RPDs between columns which were greater than the control limit (i.e. 40%). Affected analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may be biased low. Sample WASTE-P-1-COMP displayed pentachlorophenol exceeding the calibration range. This analyte was flagged "J,q". This sample was re-analyzed at a greater dilution and the analyte was within calibration range. It is recommended that the re-analyzed result be used for data interpretation.

For the metals analyses, the serial dilution displayed absolute differences greater than the control limit (i.e. 10%) for nickel at 11% and for K at 10.6%. Associated sample results were flagged "J,s". An initial CRDL displayed a %R less than the lower control limit (i.e. 80%) for arsenic at 59%. Associated sample results with positive detections were flagged "J,w"; non-detects were flagged "UJ,w". CRDLs displayed %Rs less than the lower control limit for lead at 66% and for sodium at 75%. CRDLs displayed %Rs greater than the upper control limit for lead at 128% and 124%, for thallium at 138%, and for aluminum at 124%. Since these results were only slightly outside the control limit, no data qualifying action was taken. The prep blank displayed detections for barium (Ba) at 0.182 mg/kg, for chromium (Cr) at 0.095 mg/kg, for sodium (Na) at 34.086 mg/kg, for potassium (K) at 3.403 mg/kg, and for cadmium (Cd) at -0.045 mg/kg. Since associated sample results were greater than 5x the amount found in the blank, no data

qualifying action was taken. The ICBs displayed positive detections for Al at 28.74 ug/L and 39.56 ug/L. Ba displayed positive detections in CCB4, CCB5, and CCB6 analyzed on 7/25 and in CCB3, CCB4, and CCB5 analyzed on 7/29 ranging from 0.75 ug/L to 0.95 ug/L. CCB3, CCB4, and CCB5 analyzed on 7/29 displayed positive detections for Al ranging from 41.77 ug/L to 51.64 ug/L.CCB5 analyzed on 7/25 displayed a positive detection for calcium (Ca) at 26.19 ug/L.CCB4 analyzed on 7/29 displayed a positive detection for arsenic (As) at 5.14 ug/L. CCB5 analyzed on 7/25 and CCB4 and CCB5 analyzed on 7/29 displayed positive detections for chromium (Cr) ranging from 0.78 ug/L to 1.3 ug/L. CCB4 analyzed on 7/29 displayed a positive detection for cobalt (Co) at 0.57 ug/L. CCB5 and CCB6 analyzed on 7/25 displayed positive detections for magnesium (Mg) at 8.51 ug/L and 8.5 ug/L and for potassium (K) at 14.36 ug/L and 16.33 ug/L. CCB4 and CCB5 analyzed on 7/29 displayed positive detections for thallium (Tl) at 5.39 ug/L and 6.01 ug/L and for vanadium (V) at 1.16 ug/L and 1.08 ug/L. Since all associated sample results were greater than 5x the amount found in the blank, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit (i.e. 125%) for Al at 851% and 1000%, for Ca at 164% and 514%, for iron (Fe) at 411% and 574%, and for Mg at 153% and 513%. Since the amount found in the parent sample was greater than 4x the amount of the spiking solution, no data qualifying action was taken. The MSD displayed a %R less than the lower control limit (i.e. 75%) for manganese (Mn) at 19%. Since the amount found in the parent sample was greater than 4x the amount of the spiking solution, no data qualifying action was taken. The MSD displayed a %R greater than the upper control limit for K at 130%. Since the MS met criteria, no data qualifying action was taken. Mercury displayed %Rs less than the lower control limit in the MS/MSD at -192% and 49%. The %RPD also was greater than the control limit at 102%. Since the amount found in the parent sample was greater than 4x the amount of the spiking solution and the parent sample was not from the same site, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for antimony (Sb) at 39% and 40%. Since the MS/MSD was not from the same site, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data, except those flagged "R", are usable as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII25_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____October 21, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the LCSD recovery for alpha-chlordane (52%) was less than the lower control limit (i.e., 55%). Positive results were flagged "J, l" and non-detects were flagged "R, l".

For the herbicide analyses, the extraction holding time was grossly exceeded (by 15 days) in sample GW-AA-Q-2-80 RE. Positive results were flagged "J, h" and non-detects were flagged "R, h". This had no impact on the quality of data since the results from this sample will not be used for data interpretation. The LCS recovery for 2,4-D (2%) was less than the lower control limit (i.e., 11%). Positive results were flagged "J, l" and non-detects were flagged "R, l" unless previously flagged due to other failures.

Minor Anomalies: For the VOC analyses, the method blank analyzed on 7/24/02 contained chloromethane at 0.39 ug/L and the method blank analyzed on 7/25/02 contained chlorobenzene at 0.78 ug/L. Positive results in the associated samples were flagged "U, z" at the reporting limit. Trip blank TB-071802-KH contained chloromethane at 0.25 ug/L, trichloroethene at 0.67 ug/L, and chlorobenzene at 0.71 ug/L which was previously flagged due to method blank contamination. Trip blank TB-226B-KH contained chloromethane at 0.62 ug/L. No positive results were reported in the associated samples and no data qualifying action was required. The continuing calibration verification (CCV) analyzed on 7/25/02 at 0927 displayed a %D greater than the control limit (i.e. 20%) for bromomethane at 21.5%. Since all associated sample results were non-detects and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The acetone result in sample GW-AA-R-1-48 and the chlorobenzene result in sample GW-AA-Q-3-50 exceeded the linear range of the calibration curve. These results were flagged "J, q". These samples were diluted and reanalyzed by the laboratory. The acetone and chlorobenzene results from the dilution analysis should be used for data interpretation.

For the SVOC analyses, the method blank analyzed on 8/1/02 contained positive results for 40 compounds at low levels. Positive phenol, 1,2-dichlorobenzene and 2,4,6-trichlorophenol results less than 5 times the blank concentration in the associated samples were flagged "U, z" at the reporting limit. Since 2,4-dichlorophenol and 2,4,6-trichlorophenol results in sample GW-AA-Q-20-80FT, phenol and 2,4-dichlorophenol results in sample GW-AA-Q-2-6, and the 2,4-dichlorophenol result in sample GW-AA-Q-2-70 were greater than 5 times the blank concentration, no data qualifying action was taken. Since the holding time was grossly exceeded after the lab discovered this issue, and the impact to the data quality is minimal, the laboratory reported the SVOC results without any corrective action. The initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.987. All associated sample results were non-detects and were flagged "UJ, r". The continuing calibration analyzed on 8/1/02 at 0926 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (-23.2%) and indeno(1,2,3-cd)-pyrene (-25.9%). The continuing calibrations analyzed on 8/1/02 at 2219 displayed a %D greater than the control limit for 4-chloroaniline (-34.8%). The continuing calibration analyzed on 8/9/02 at 1221 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-27.8%), 2,4-dinitrophenol (23.2%), 4-nitrophenol (21.2%), and 4,6-dinitro-2-methylphenol (26.6%). The continuing calibration analyzed on 8/9/02 at 1256 displayed a %D greater than the control limit for dinoseb (39.3%). The continuing calibration analyzed on 8/12/02 at 0845 displayed a %D greater than the control limit for hexachlorocyclopentadiene (27.1%). The continuing calibration analyzed on 8/13/02 at 1016 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (39.1%), 2,4-dinitrophenol (32%), 4,6-dinitro-2-methylphenol (25%), and indeno(1,2,3-cd)pyrene (21.3%). The continuing calibration analyzed on 8/13/02 at 1058 displayed a %D greater than the control limit for dinoseb (35.8%). The continuing calibration analyzed on 8/14/02 at 0900 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether (22.9%) and hexachlorocyclopentadiene (41.8%). The continuing calibration analyzed on 8/14/02 at 0933 displayed a %D greater than the control limit for dinoseb (35.7%). All associated sample results were non-detects and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The %RPD for the LCS/LCSD analyses was greater than the QC limit (i.e., 33-132%) for benzo(b)fluoranthene at 38%. No positive results were reported and no data qualifying action was taken. Surrogates were diluted out in samples GW-AA-R-1-28 (DF=50), GW-AA-R-1-28DL (DF=100), GW-AA-R-1-48 (DF=50), and AA-R-1-48DL (DF=500). No data qualifying action was required since the dilution factors were greater than 10. Several compounds exceeded the linear range of the calibration curve in several samples and were flagged "E" by the laboratory. These results were flagged "J, q". These samples

were diluted and reanalyzed by the laboratory. The results from the dilution analyses should be used for data interpretation.

For the pesticides analyses, the %D for 4,4-DDT (15.7%) on the primary column; was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/26/02 at 1009. The %Ds for heptachlor (21.5%) on the primary column; and for 4,4'-DDT (16%) and methoxychlor (22.9%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 7/26/02 at 2120. All associated sample results were non-detects and since these compounds had an acceptable %D on the alternate column, no data qualifying action was taken. The recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) in samples GW-AA-Q-2-80 (20% and 15%), GW-AA-0-3-128 (16% and 11%), and GW-AA-R-1-28 (22%). No positive results were reported in samples GW-AA-Q-2-80 and GW-AA-0-3-128, and non-detects were flagged "UJ,s". No action is required based on one surrogate failure and no data flags were applied to sample GW-AA-R-1-28. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for several compounds in sample GW-AA-R-1-28. These results were flagged "J,g". It should be noted that the lower result between two columns was reported by the laboratory.

For the herbicide analyses, the method blank extracted on 7/23/02 contained 2,4-D at 3.7 ug/L and pentachlorophenol at 0.2 ug/L. Positive results less than 5 times the blank concentration were flagged "U,z" or "U,z" at the reporting limit. The %D for 2,4-DB (20.5%) on the primary column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/31/02 at 2102. The %Ds for MCPP (16.4%) on the primary column and 2,4-DB (15.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/1/02 at 1017. The %D for 2,4-DB (19.8%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 8/2102 at 2238. The %Ds for dalapon (25.3%) and pentachlorophenol (16.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/20/02 at 1940. Positive results were previously flagged in the associated samples and no further data qualifying action was required. The 2,4-D result in sample GW-AA-Q-2-80 exceeded the linear range of the calibration curve. Since this result was previously flagged due to method blank contamination, no additional data flags were applied. The result from the dilution analysis should be used for data interpretation. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for several compounds. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory.

For the metal analyses, the initial and final CRDL percent recoveries for thallium (67% and 67%) and iron (69% and 122%), the initial CRDL recoveries for aluminum (135%) and arsenic (125%), and the final CRDL recoveries for selenium (72%) and sodium (69%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, calcium and copper. Positive copper results less than 5 times the blank concentration were flagged "U,p" at the reporting limit. The method blank contained negative results for arsenic, potassium and thallium. Non-detects were flagged "UJ,p". The calibration blanks contained aluminum, barium, calcium, copper, manganese, and iron at low levels and negative results for arsenic. Positive aluminum, barium, calcium, copper, manganese, and iron results were greater than 5 times the blank concentration and no data qualifying action was required. Arsenic results were previously flagged and no further data qualifying action was required. The serial dilution %Ds were greater than the QC limit (i.e., 10%) for aluminum (15%) and zinc (15.1%). Positive results were flagged "J,s".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on the flame ionization detector (FID). Positive methane results reported from the FID were flagged "J, r" in the associated samples. The %D for methane (22.6%) on the FID detector was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 7/31/02. The associated sample results were previously flagged due to initial calibration failure and no further data qualifying action was required. The methane result in sample GW-AA-R-1-28 exceeded the linear range of the calibration curve. Since these methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The methane results reported from TCD detector should be used for data interpretation.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Except for data flagged "R", these data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII26_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 10, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the TCLP VOCs analyses, the CCV analyzed on 7/29/02 at 11:06 displayed a %D greater than the control limit (i.e. <20%) for 2-butanone at 33.1%. Since associated sample results were non-detect and the anomaly was only marginally outside the control limit (i.e. <50%), no data qualifying action was taken. The CCV analyzed on 7/31/02 at 13:14 displayed a %D greater than the control limit for 2-butanone at 52.8%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". The MS displayed a %R greater than the upper control limit (i.e. 167%) for 2-butanone at 168%. The MS/MSD pair displayed a %RPD greater than the control limit (i.e. 31%) for 2-butanone at 40%. Since the MSD met criteria, no data qualifying action was taken. The LCS analyzed on 7/29/02 displayed a %R greater than the upper control limit (i.e. 167%) for 2-butanone at 176%. Since associated sample results were non-detect, no data qualifying action was taken.

For the TCLP SVOCs analyses, analyte pentachlorophenol exceeded the linear range in sample WASTE-Q-2-COMP-T and was flagged "J,q". The sample was re-analyzed and pentachlorophenol was within calibration range. It is recommended that the re-analyzed pentachlorophenol result be used for data interpretation. The MS displayed a %R less than the lower control limit (i.e. 49%) for hexachlorobenzene at 48%. Since the MSD and LCS met criteria, no data qualifying action was taken.

For the TCLP pesticides analyses, the CCV analyzed on 8/3/02 at 20:52 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for gamma-BHC at -16.8%, for heptachlor epoxide at -18.2%, and for surrogate tetrachloro-meta-xylene (TCMX) at 36.6%; and on the confirmation column for TCMX at -24.5% and for surrogate 2,4-DCAA at -17.2%. The CCV analyzed on 8/4/02

displayed %Ds greater than the control limit on the primary column for heptachlor at 19.9% and for surrogate TCMX at -22.3%; and on the confirmation column for surrogate 2,4-DCAA at 16.6%. Since either all results were non-detect, the analyte met criteria on the alternate column, or was a surrogate, no data qualifying action was taken. Surrogate TCMX displayed %Rs less than the lower control limit on both columns for samples method blank at 25% and 29%, WASTE-Q-4-COMP-T at 24% and 27%, for WASTE-P-2-COMP-T at 26% and 28%, and for the MSD at 0% and 0%. Surrogate 2,4-DCAA displayed %Rs less than the lower control limit in the MSD at 5% and 4%. For the method blank and the MSD, since these are QC samples and the other surrogates met criteria, no data qualifying action was taken. For the waste samples, all results were non-detect and were flagged "UJ,s". The MSD displayed %Rs less than the lower control limit for heptachlor at 0%, for heptachlor Epoxide at 0%, and for endrin at 32%. The MS/MSD pair displayed %RPDs greater than the control limit for gamma-BHC at 41%, for heptachlor at 200%, for heptachlor epoxide at 200%, and for endrin at 88%. Since the MSD displayed poor recoveries for several analytes due to possible poor injection or extraction efficiency, the MS was used for data interpretation. Since the MS met criteria, no data qualifying action was taken. Sample WASTE-P-2-COMP-T displayed a %RPD greater than the control limit (i.e. <40%) between columns for heptachlor at 102.2%. The analyte was flagged "J,g".

For the TCLP herbicides analyses, the fluid blank displayed a positive detection for 2,4-D at 0.018 mg/L. The 2,4-D result in sample WASTE-Q-2-COMP-T was flagged "U,z" at the reporting limit.

For the TCLP metals analyses, the initial CRDL displayed a %R less than the lower control limit (i.e. >80%) for lead at 66%. Since this result is only marginally outside the control limit, no data qualifying action was taken. CCB3 and CCB5 displayed negative detections for lead at -0.00152 mg/L and -0.00226 mg/L. Associated sample results with positive detections less than 5x the absolute amount found in the blank were flagged "J,o"; non-detects were flagged "UJ,o".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII27_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 16, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the pesticides analyses, the LCS (0729P-RMBLCS) displayed %Rs less than the lower control limit for alpha-chlordane at 30% and for 4,4'-DDE at 28%. Associated sample results with positive detections were flagged "J,l"; non-detects were flagged "R,l". The laboratory had analyzed an LCS on 7/26 with acceptable results and assumed that because this LCS met criteria, that the anomalies in the LCS analyzed on 7/29/02 were marginal and the data associated with the LCS were acceptable. Because of this explanation, URS was not advised of the LCS issue.

For the herbicides analyses, surrogate 2,4-DCAA displayed %Rs less than the lower control limit on both columns for sample SOIL-Q-8-6 at 11% and 8%, and for sample SOIL-Q-8-6DUP at 11% and 2%. Associated sample results with positive detections were flagged "J,s" (except for PCP, which was flagged for calibration anomalies) and non-detects were flagged "R,s". Samples SOIL-Q-8-6 and SOIL-Q-8-6DUP were re-extracted outside the recommended holding time (i.e. 14 days) due to the original analysis low surrogate recoveries. The re-extracted samples displayed surrogate recoveries meeting criteria. Affected analytes with positive detections were flagged "J,h"; non-detects were flagged "UJ,h". It is recommended that the re-extracted sample results be used for data interpretation.

Minor Anomalies: For the VOCs analyses, sample SOIL-Q-8-6DLRE was analyzed outside the recommended holding time (i.e. 14 days) due to possible contamination in the first dilution analysis. Chlorobenzene and total xylene results, the only analytes of interest in the re-analysis, were flagged "J,h". It is recommended that the re-analyzed dilution analysis be used for data interpretation. The method blank analyzed on 7/24/02 displayed positive detections for 4-methyl-2-pentanone at 0.65 ug/kg and for 2-hexanone at 2.0 ug/kg. The method blank analyzed on 7/25/02 displayed positive detections for 4-methyl-2-pentanone at 0.58 ug/kg and

for 2-hexanone at 2.0 ug/kg. The mid-level method blank analyzed on 7/30/02 displayed positive detections for benzene at 250 ug/kg, for trichloroethene at 220 ug/kg, for toluene at 240ug/kg, for chlorobenzene at 260 ug/kg, and for 1,1-dichloroethene at 160 ug/kg. Sample results associated with the 4-methyl-2-pentanone results from 7/25 were flagged "U,z" at the reporting limit. The diluted chlorobenzene result from SOIL-Q-8-6 was flagged "U,z". All other associated sample results were either greater than 5x the amount found in the blank, not target analytes, or non-detect and no data qualifying action was taken. The initial calibration analyzed on 7/11/02 on instrument MSO5973 displayed a relative response factor (RRF) less than the control limit (i.e. <0.05) for acetone at 0.0487. Instrument MSO5973 displayed RRFs less than the control limit in the CCVs analyzed on 7/23/02 at 19:24 at 0.04672, on 7/29/02 at 18:13 at 0.04034, on 7/30/02 at 10:00 at 0.04486, and on 8/5/02 at 09:22 at 0.04065. The positive acetone result in sample SOIL-Q-2-6 was flagged "J,c". Since acetone was not a compound of concern in all other associated samples analyzed on this instrument, no data qualifying action was taken. The CCV analyzed on 7/23/02 at 09:48 on instrument MSM5972 displayed a %D greater than the control limit (i.e. 20%) for methylene chloride at -42.5%. The CCV analyzed on 7/23/02 at 19:24 on instrument MSO5973 displayed %Ds greater than the control limit for 1,1-dichloroethane at 49.8% and for 1,2-dichloroethene (total) at 32.4%. The CCV analyzed on 7/24/02 at 10:15 on instrument MSM5972 displayed %Ds greater than the control limit for chloromethane at -21.9% and for methylene chloride at -44.6%. The CCV analyzed on 7/25/02 at 13:26 displayed %Ds greater than the control limit for bromomethane at 39.3% and for methylene chloride at -40.1%. The CCV analyzed on 7/29/02 at 18:13 displayed %Ds greater than the control limit for chloromethane at -26.9% and for 1,1-dichloroethane at 30.8%. The CCV analyzed on 7/30/02 displayed a %D greater than the control limit for 1,1-dichloroethane at 32.0%. Since all associated sample results were non-detect and the anomalies were only marginally outside the control limit, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 09:22 displayed %Ds greater than the control limit for 1,1-dichloroethane at 50.5%, for 2-hexanone at -20.9%, for tetrachloroethene at 26.3%, for dibromochloromethane at 22.7%, for 1,2-dichloroethene (total) at 35.7%, and for surrogate dibromofluoromethane at 22.3%. Since all analytes were either not analytes of concern for this date or a QC analyte, no data qualifying action was taken. Surrogate 4-bromofluorobenzene displayed %Rs less than the lower control limit in samples SOIL-Q-4-0.5RE at 62%, for SOIL-Q-2-0.5 at 58%, and for SOIL-Q-2-0.5RE at 50%. Associated sample results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". The LCS (2O0729LCS) displayed %Rs greater than the upper control limit for acetone at 170% and for 1,1-dichloroethane at 136%. The LCS (1O0730LCS) displayed %Rs greater than the upper control limit for 1,1-dichloroethane at 136% and for 2-hexanone at 130%. The LCS (1O0805LCS) displayed a %D greater than the upper control limit for 1,1-dichloroethane at 136%. Since associated sample results were either non-detect or previously

flagged, no data qualifying action was taken. Sample SOIL-Q-4-0.5 displayed an internal standard (IS) %R less than the lower control limit (i.e. 50%) for chlorobenzene-d5 at 41%. Sample SOIL-Q-8-6 displayed an IS less than the lower control limit for chlorobenzene-d5 at 36%. Analytes associated with the IS with positive detections were flagged "J,n"; non-detects were flagged "UJ,n". Samples SOIL-Q-2-0.5, SOIL-Q-4-0.5RE, and SOIL-Q-2-0.5RE contained IS %Rs less than the lower control limit. Since these samples were previously flagged for other anomalies, no further data qualifying action was taken. Sample duplicates SOIL-Q-7-0.5 and SOIL-Q-7-0.5-DUP displayed %RPDs greater than the control limit (i.e. 100%) for acetone 175% and for chlorobenzene at 136%. Sample duplicates SOIL-Q-8-6 displayed a %RPD greater than the control limit for ethylbenzene at 148%. Associated sample results with positive detections were flagged "J,f", unless previously flagged for other anomalies.

For the SVOCs analyses, the CCV analyzed on 8/8/02 at 10:34 displayed a %D greater than the control limit (i.e. 20%) for 4-nitrophenol at -24.7%. The CCV analyzed on 8/9/02 at 12:21 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -27.8%, for 2,4-dinitrophenol at 23.2%, for 4,6-dinitro-2-methylphenol at 26.6%, 4-nitrophenol at -21.2%, and for dinoseb at 39.3%. The CCV analyzed on 8/13/02 at 10:16 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -39.1%, for 2,4-dinitrophenol at 32.0%, for 4,6-dinitro-2-methylphenol at 25.0%, for indeno(1,2,3-cd)pyrene at -21.3%, and for dinoseb at 35.8%. The CCV analyzed on 8/14/02 at 09:00 displayed %Ds greater than the control limit for bis (2-chloroethyl) ether at 22.9%, for hexachlorocyclopentadiene at -41.8%, and for dinoseb at 35.7%. The CCV analyzed on 8/15/02 at 22:24 displayed %Ds greater than the control limit for bis (2-chloroethyl) ether at 24.6%, for hexachlorocyclopentadiene at -41.2%, and for dinoseb at 24.9%. Since all associated sample results were non-detect and the anomalies were only marginally outside the control limit (i.e. <50%), no data qualifying action was taken, except the indeno(1,2,3-cd)pyrene positive result in sample SOIL-P-2-0.5, which was flagged "J,c". Several samples displayed surrogate recoveries less than the lower control limit. Samples SOIL-Q-2-6DL, SOIL-P-2-6, and SOIL-Q-7-6 displayed surrogate recoveries of 0% at 5x dilutions. Because of the nature of the samples and the matrix effect, the surrogates may have been impacted by interferences causing the surrogates not to be recovered. Because of this and based on professional judgment, associated analytes with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Since other samples were analyzed at dilutions at 10x or greater, no data qualifying action was taken. The MS/MSD and the re-analyzed MS/MSD displayed %Rs less than the lower control limit for several analytes. Since many of the anomalies were only slightly outside the control limit and the LCS met criteria for these analytes, no data qualifying action was taken. The 4-chloroaniline result in sample SOIL-Q-2-6 and the 1,4-dichlorobenzene result in sample SOIL-P-2-6 exceeded the calibration range and were flagged "J,q". These

samples were re-analyzed at dilutions and the compounds of interest were within the calibration range. It is recommended that the re-analyzed results for those compounds be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 8/3/02 at 10:23 displayed %Ds greater than the control limit (i.e. 15%) for methoxychlor at 18.7%, for endrin ketone at 18.4%, and for surrogate 2,4-DCAA at 16.2% on the primary column; and for methoxychlor at 26.5%, for endrin ketone at 19.6%, for 4,4'-DDT at 16.5%, and for endosulfan sulfate at 17.9% on the confirmation column. Associated sample results with positive detections for methoxychlor and endrin ketone were flagged "J,c"; non-detects were flagged "UJ,c". Since the other anomalies either met criteria on the alternate column or were surrogates, no data qualifying action was taken. The CCV analyzed on 8/3/02 at 19:33 displayed %Ds greater than the control limit for heptachlor at -17.6%, for endosulfan I at -18.9%, for 4,4'-DDT at -16.7%, for methoxychlor at 17.9%, and for surrogate decachlorobiphenyl (DCBP) at -22.0% on the primary column; and for surrogate DCBP at -19.9% on the confirmation column. The CCV analyzed on 8/8/02 at 21:19 displayed %Ds greater than the control limit for delta-BHC at -16.1%, for 4,4'-DDE at -16.3%, for methoxychlor at 22.5%, and for surrogate 2,4-DCAA at -17.3% on the primary column; and for alpha-BHC at -16.4% on the confirmation column. Since either the associated sample results were non-detect, the analyte met criteria on the alternate column, or the anomaly was a surrogate, no data qualifying action was taken. Sample 0729P-RMBLCS displayed %Rs less than the lower control limit on both columns for surrogate 2,4-DCAA at 26% and 24%, for tetrachloro-meta-xylene (TMX) at 26% and 26%, and for DCBP on the confirmation column at 29%. Since this a QC sample and the LCS %Rs for target analytes were generally acceptable, no data qualifying action was taken. Sample SOIL-Q-6-6 displayed %Rs less than the lower control limit on both columns for surrogates 2,4-DCAA at 26% and 28% and for TMX at 22% and 28%. Associated sample results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s", unless previously flagged for other anomalies. Sample SOIL-Q-8-0.5 displayed %Rs less than the lower control limit on the primary column for 2,4-DCAA at 24% and for TMX at 27%. Since the surrogates met criteria on the alternate column, 2,4-DCAA is only a monitoring analyte (i.e. non-target analyte), and there is evidence of possible matrix interference on the primary column, no data qualifying action was taken. Sample SOIL-Q-2-0.5 displayed a %R greater than the upper control limit on the confirmation column for surrogate DCBP at 161%. Since all other surrogates met criteria, no data qualifying action was taken. Other samples displayed surrogate recoveries outside the control limit. Since these samples were analyzed at dilutions which may have caused the surrogate to be diluted out, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit at 164% and 260% and a %RPD greater than the control limit for methoxychlor at 45%. Since associated sample results were non-detect, no data qualifying action was taken. The MS displayed %Rs greater

than the upper control limit for 4,4'-DDD at 192% and for endrin aldehyde at 133%. The MSD displayed a %R greater than the upper control limit for endrin ketone at 123%. The MS/MSD pair displayed %Rs greater than the upper control limit for beta-BHC at 549% and 496%, for gamma-chlordane at 549% and 441%, for 4,4'-DDE at 338% and 284%, for dieldrin at 421% and 338%, and for 4,4'-DDT at 1147% and 873%. Associated sample results with positive detections were flagged "J,m", unless previously flagged for other anomalies. The MS displayed a %R less than the lower control limit for endosulfan II at 6%. The MS/MSD pair displayed %RPDs greater than the control limit for endosulfan II at 70%, 4,4'-DDD at 67%, for endrin at 122%, and for endrin ketone at 83%. Associated sample results with positive detections for endosulfan II and endrin were flagged "J,d", unless previously flagged for other anomalies. Several samples displayed %RPDs between columns greater than the control limit (i.e. 40%). These analytes were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may be biased low. Field duplicates for SOIL-Q-7-0.5 displayed a %RPD greater than the control limit (i.e. 100%) for 4,4'-DDT and were flagged "J,f". Samples SOIL-P-2-6 and SOIL-Q-8-0.5 displayed internal standard %Rs greater than the upper control limit (i.e. 150%) for IS bromonitrobenzene at 520% and 161%. Affected analytes with positive detections were flagged "J,n".

For the PCBs analyses, the MS/MSD displayed %Rs less than the lower control limit for all analyses except trichlorobiphenyl in the MSD due to matrix interference. Since the MS/MSD was analyzed at a 10x dilution, the LCS was the only QC sample used for quality control and no data qualifying action was taken. Several samples displayed surrogate recoveries outside the control limits. Sample SOIL-Q-8-0.5 was analyzed at a dilution factor of 5 and displayed a surrogate recovery of 0%. Because of the nature of the sample and the matrix effect, the surrogate may have been impacted by interferences which may have caused the surrogate not to be recovered. Because of this, associated analytes with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Since other samples were analyzed at dilutions greater than 10x which may have caused the surrogates to be diluted out, no data qualifying action was taken. Samples SOIL-Q-8-6 and SOIL-Q-8-6DUP displayed internal standard (IS) %Rs greater than the upper control limit (i.e. 130%) for IS chrysened-d12 at 156% and 156%, respectively. Affected analytes with positive detections were flagged "J,n". Sample SOIL-Q-8-6DUP displayed a %R greater than the upper control limit for IS phenanthrene-d10 at 142%. Since this IS is used for monitoring purposes only, no further data qualifying action was taken. Field duplicates SOIL-Q-7-0.5 displayed %RPDs greater than the control limit (i.e. 100%) for trichlorobiphenyl at 103% and for tetrachlorobiphenyl at 105% and associated sample results with positive detections were flagged "J,f", unless previously flagged for other anomalies.

For the herbicides analyses, method blank 0819Q-SMB displayed a positive detection for pentachlorophenol at 1.6 ug/kg. Since associated sample results were greater than 5x the amount found in the blank, no data qualifying action was taken. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on both columns for pentachlorophenol at -18.5% and -20.2%; for 2,4,5-TP at -23.8% and -23.3%; for 2,4,5-T at -22.2% and -24.2%; and for 2,4-DB at -20.1% and -16.2%. The CCV analyzed on 8/15/02 at 12:06 displayed %Ds greater than the control limit on both columns for 2,4-DB at 16.7% and 16.2%. Associated sample results with positive detections were flagged "J,c"; non-detects were previously flagged for surrogate failures and no further data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit (i.e. 15%) on both columns for pentachlorophenol at -21.3% and -19.7%; for 2,4,5-TP at -23.8% and -21.9%; for 2,4,5-T at -25.4% and -23.4%; and for 2,4-DB at -27.0% and -18.0%. The CCV analyzed on 8/6/02 at 20:25 displayed a %D greater than the control limit for MCPA on the confirmation column at 15.5%. The CCV analyzed on 8/12/02 at 15:18 displayed %Ds greater than the control limit for MCPP at 18.4%, for dichloroprop at 18.5%, and for pentachlorophenol at 15.9% on the primary column; and for MCPA at 20.5%, for 2,4-D at 19.1%, and for 2,4-DB at 23.4% on the confirmation column. The CCV analyzed on 8/15/02 at 12:06 displayed a %D greater than the control limit for MCPP at 18.0% on the primary column; and for MCPA at 16.6% on the confirmation column. The CCV analyzed on 8/15/02 at 22:00 displayed a %D greater than the control limit for MCPP at 16.8% on the primary column; and for MCPA at 23.0%, for 2,4-D at 16.1%, and for 2,4-DB at 17.0% on the confirmation column. The CCV analyzed on 8/16/02 at 12:18 displayed a %D greater than the control limit for 2,4-DB at -23.6% on the primary column and for MCPP at -15.7% on the confirmation column. The CCV analyzed on 8/17/02 at 00:39 displayed a %D greater than the control limit for dalapon at -15.5% on the confirmation column. The CCV analyzed on 8/23/02 at 15:03 displayed a %D greater than the control limit for MCPP at -16.9% on the primary column. Since either the analyte met criteria on the alternate column or did not have any samples associated with the anomaly, no data qualifying action was taken. Sample SOIL-Q-7-6 displayed %Rs greater than the upper control limit for surrogate 2,4-DCAA on both columns at 378% and 157%. Associated sample results with positive detections were flagged "J,s". Three other samples displayed surrogate %Rs outside the control limit. Since these samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The LCS (0728N-SMBLCS) displayed a %R greater than the upper control limit for MCPP at 133%. Associated sample results with positive detections were flagged "J,l". Several samples displayed %RPDs between columns greater than the control limit (i.e. 40%) and were flagged "J,g"; unless previously flagged for other anomalies. Field duplicates SOIL-Q-7-0.5 displayed a %RPD greater than the control limit (i.e. 2x the RL) for 2,4-DB. Associated sample results were non-detect and flagged

"UJ,f", unless previously flagged for other anomalies.

For the metals analyses, the CRDL displayed %Rs greater than the upper control limit (i.e. 120%) for thallium (Tl) at 127%, 121%, and 124% and for aluminum (Al) at 134%. The CRDL displayed %Rs less than the lower control limit (i.e. 80%) for Tl at 76% and for selenium (Se) at 65%. Since these recoveries were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for Al at 1.1527 mg/kg, for chromium (Cr) at 0.14681 mg/kg, for iron (Fe) at 10.606 mg/kg, for magnesium (Mg) at 0.89039 mg/kg, and for sodium (Na) at 27.03194 mg/kg. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,p". The prep blank also displayed a negative detection for Se at -0.83426 mg/kg. Associated sample results with positive detections less than 5x the absolute amount found in the blank were flagged "J,p"; non-detects were flagged "UJ,p". Al displayed positive detections in the ICB, CCB3, CCB4, and CCB5 at values ranging from 0.01034 mg/L to 0.03536 mg/L. Barium (Ba) displayed positive detections in CCB3, CCB4, and CCB5 ranging from 0.00062 mg/L to 0.00087 mg/L. Calcium (Ca) displayed positive detections in CCB3 and CCB4 at 0.06288 mg/L and 0.04012 mg/L, respectively. Cadmium (Cd) displayed positive detections in the ICB and CCB5 at 0.00072 mg/L and 0.00038 mg/L. Cr displayed positive detections in the ICB, CCB3, CCB4, and CCB5 ranging from 0.0008 mg/L to 0.00137 mg/L. Cobalt (Co) displayed positive detections in the ICB and CCB5 at 0.00095 mg/L and 0.00072 mg/L, respectively. CCB3 also displayed positive detections for copper (Cu) at 0.00156 mg/L and for Mg at 0.01107 mg/L; CCB4 displayed a positive detection for Tl at 0.00617 mg/L; and CCB5 displayed positive detections for Mg at 0.01105 mg/L, for manganese (Mn) at 0.0017 mg/L, for Tl at 0.00801 mg/L, and for vanadium (V) at 0.00099 mg/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,o" at the reporting limit. CCB5 displayed a negative detection for potassium (K) at -0.01722 mg/L. Since all associated sample results were greater than 5x the absolute amount found in the blank, no data qualifying action was taken. The laboratory duplicate displayed a %RPD greater than the control limit (i.e. 35%) for zinc at 50.6%. Associated sample results with positive detections were flagged "J,k". The MS/MSD displayed %Rs less than the lower control limit (i.e. 75%) for antimony (Sb) at 65% and 65%, for Cu at 60% and 50%, and for lead (Pb) at 60% and 38%. Mn displayed a %R less than the lower control limit in the MS at 58% while displaying a %R greater than the upper control limit in the MSD at 128%. Associated sample results with positive detections were flagged "J,m"; non-detects were flagged "UJ,m". The MS/MSD displayed %Rs greater than the upper control limit for K at 178% and 142%. Associated sample results with positive detections were flagged "J,m". The MS/MSD displayed %Rs either greater than or less than the control limit for Al at 427% and -145%, for Ca at 13379% and 20636%, for Fe at -2770% and -4212%, for Mg at 831% and 1206%, and for zinc (Zn) at 221% and -147%. Since the

amount found in the parent sample was greater than 4x the spiking amount, no data qualifying action was taken. Mercury displayed %Rs less than the lower control limit at -192% and 49% and an RPD greater than the control limit at 102%. Since the MS/MSD pair was not from the same site, no data qualifying action was taken. The serial dilution displayed a %RPD greater than the control limit (i.e. 10%) for Co at 11.1%. Associated sample results with positive detections were flagged "J,s". Field duplicates SOIL-Q-7-0.5 displayed %RPDs greater than the control limit (i.e. 100% or 2x the RL) for barium at 110.5%, for Zn at 139.6%, and for Hg at 183.8%. Positive Ba and Hg results were flagged "J,f"; non-detects were flagged "UJ,f" in associated samples. Since zinc was previously flagged for lab duplicate imprecision, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: For the herbicides analyses, the MS/MSD was analyzed at a 25x dilution. Since all analytes were diluted out and did not recover, the MS/MSD data was not included in the data package.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data, except those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII28_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____October 10, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 (RRF=0.0487) and one continuing calibration analyzed on 7/29/02 18:13 (RRF=0.0403) displayed relative response factors (RRFs) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973. All acetone results were flagged "J, c" for positive detections and "R, c" for non-detects in the associated samples.

For the pesticides analyses, the LCS recovery for 4,4'-DDE (25%) was less than the lower control limit (i.e., 34%) in one LCS sample (0726Q-RMB-LCS). The 4,4'-DDE results in the associated samples were flagged "J, l" for positive detections and "R, l" for non-detects.

Minor Anomalies: For the VOCs analyses, the Encore samplers for sample WASTE-P-2-6' and WASTE-Q-8-7 were received by the laboratory three days after sample collection. The methanol preservation hold time was exceeded by one day. All results in sample WASTE-P-2-6', except acetone result (previously flagged due to acetone RRF failure), were flagged "J, h" for positive detections or "UJ, h" for non-detects. Since samples WASTE-Q-8-7 and WASTE-Q-8-7DL were analyzed from a bulk container (did not use the Encore samplers) and results may be biased low, all results were flagged "J, Q" for positive detections or "UJ, Q" for non-detects. The continuing calibration verification (CCV) analyzed on 7/23/02 at 09:48 displayed a %D greater than the control limit (i.e., 20%) for methylene chloride at -42.5%. The CCV analyzed on 7/25/02 at 13:26 displayed %Ds greater than the control limit for bromomethane at 39.3% and methylene chloride at -40.1%. The CCV analyzed on 7/29/02 at 18:13 displayed %Ds greater than the control limit for chloromethane at -26.9% and 1,1-dichloroethane at 30.8%. Positive chloromethane and 1,1-dichloroethane results in the associated samples were flagged "J, c". Since other compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-

detect values, no data qualifying action was taken. The method blank, 1M0725MB, displayed positive detections for 4-methyl-2-pentanone (MIBK) at 0.58 µg//kg and 2-hexanone at 2.0 µg//kg. Since these two compounds were not detected in the associated samples, no data qualifying action was taken. The med-level LCS recoveries (2O0729MBLCS) for acetone (170%) and 1,1-dichloroethane (136%) were greater than the upper control limit. Since positive acetone and 1,1-dichloroethane results was previously flagged due to other QC failures, no additional data flags were applied. The internal standard peak areas for 1,4-difluorobenzene (37.5%) and chlorobenzene-d5 (29.4%) were less than the lower control limit (i.e., 50%) in sample WASTE-Q-8-7. Since all VOC results were previously flagged due to other QC failures, no additional data flags were applied. Sample WASTE-Q-7-9 displayed a chlorobenzene result that exceeded the calibration range. Sample WASTE-Q-8-7 displayed toluene, ethylbenzene, and xylene (total) results that exceeded the calibration range. These results, except those previously flagged due to other QC failure, were flagged "J, q". Those two samples were re-analyzed at a greater dilution and these results were within the calibration range. It is recommended that the diluted chlorobenzene result in sample WASTE-Q-7-9, and diluted toluene, ethylbenzene, and xylene (total) results in sample WASTE-Q-8-7 be used for data interpretation.

For the SVOCs analyses, the CCV analyzed on 8/8/02 at 10:34 displayed a %D greater than the control limit (i.e., 20%) for 4-nitrophenol at –24.7%. The CCV analyzed on 8/9/02 at 12:21 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -27.8%, 2,4-dinitrophenol at 23.2%, 4-nitrophenol at -21.2%, and 4,6-dinitro-2-methylphenol at 26.6%. The CCV analyzed on 8/10/02 at 14:19 displayed %Ds greater than the control limit for hexachloro-cyclopentadiene at 48.9%, 2,4-dinitrophenol at 54.1%, 2,4-dinitrotoluene at 28.0%), 4-nitroaniline at 21.1%, and 4,6-dinitro-2-methylphenol at 31.3%. The CCVs analyzed on 8/9/02 at 12:56 (39.3%), 8/10/02 at 14:48 (44.9%), 8/13/02 at 10:58 (35.8%), and 8/14/02 09:33 (35.7%) displayed %Ds greater than the control limit for dinoseb. The CCV analyzed on 8/12/02 at 08:45 displayed a %D greater than the control limit for hexachlorocyclopentadiene at –27.1%. The CCV analyzed on 8/13/02 at 10:16 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -39.1%, 2,4-dinitrophenol at 32.0%, and indeno-(1,2,3-cd)pyrene at -21.3%. The CCV analyzed on 8/14/02 at 09:00 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -41.8% and bis(2-chloroethyl)ether at 22.9%. The 2,4-dinitrophenol result in sample WASTE-Q-8-COMP was flagged "UJ, c". The positive indeno(1,2,3-cd)pyrene result was flagged "J, c" in sample WASTE-Q-2-COMP. Since all other compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Two base/neutral surrogates, nitrobenzene-d5 and 2-fluoro-biphenyl, were not recovered (0%) in a diluted sample WASTE-Q-4-COMP

(DF=4). All surrogates were not recovered in diluted sample WASTE-P-2-COMP (DF=5). All base/neutral results in sample WASTE-Q-4-COMP and all results in sample WASTE-P-2-COMP were flagged "J, s" for positive detections or "UJ, s" for non-detects. All non-detects results in these two samples would normally (at no dilution) be classified as unusable. Since these two samples were analyzed under dilutions and surrogates have potential to be diluted out, non-detect results should be usable based on reviewer's professional judgement. All results in this sample were flagged "J, s" for positive detections or "UJ, s" for non-detects. Two base/neutral surrogates, nitrobenzene-d5 and 2-fluoro-biphenyl, were not recovered (0%) in a diluted sample WASTE-Q-6-COMP-DUPDL (DF=2). All base/neutral surrogates were not recovered (0%) in a diluted sample WASTE-Q-6-COMPDL (DF=4). Positive phenanthrene and pyrene results in the diluted sample WASTE-Q-6-COMPDL and the positive phenanthrene result in the diluted sample WASTE-Q-6-COMP-DUPDL were flagged "J, s". Since all other compounds in the associated samples were not used for data interpretation, no data qualifying action was taken. Surrogates were diluted out in samples WASTE-Q-4-COMP (DF =10) and WASTE-P-2-COMPDL (DF=20). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The MS recoveries for 2,4,6-trichlorophenol (40%), dimethylphthalate (40%), n-nitroso-diphenyl-amine (40%), butylbenzylphthalate (46%), benzo(a)anthracene (39%), chrysene (44%), and benzo(b)fluoranthene (38%), and the MSD recoveries for 2,4-dinitro-phenol (7%) and benzo(a)-anthracene (53%) were less than the lower control limit in the SOIL-Q-6-0.5 MS/MSD pair (in SDG: SAII27). The RPDs for 1,2-dichlorobenzene (25%), 1,2,4-trichlorobenzene (24%), and bis(2-ethylhexyl)-phthalate (24%) were greater than the acceptable limits. This MS/MSD pair was re-analyzed by the laboratory and displayed similar recoveries. The MS/MSD recoveries for naphthalene (132%), acenaphthylene (41%), dimethylphthalate (41% and 39%), n-nitroso-diphenylamine (39% and 39%), butylbenzylphthalate (49% and 51%), benzo(a)-anthracene (45% and 43%), and chrysene (48% and 45%) were outside the control limit in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). Since the recoveries were not critically low, the vast majority of recoveries were acceptable, and the LCS recoveries in the associated extraction batch were in control, no data qualifying action was taken. Sample WASTE-Q-2-COMP displayed a 4-chloro-aniline result that exceeded the calibration range. Sample WASTE-P-2-COMP displayed a 1,4-dichlorobenzene result that exceeded the calibration range. Sample WASTE-Q-6-COMP displayed pentachlorophenol, phenanthrene, and pyrene results that exceeded the calibration range. Sample WASTE-Q-6-COMP-DUP displayed pentachlorophenol and phenanthrene results that exceeded the calibration range. These results, except those previously flagged due to other QC failure, were flagged "J, q". These samples were re-analyzed at a greater dilution and these results were within the calibration range. It is recommended that results from the dilution analyses be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 8/8/02 at 21:19 displayed %Ds greater than the control limit on the primary column for delta-BHC (-16.1%), 4,4'-DDE (-16.3%), methoxychlor (22.5%), and 2,4-DCAA (-17.3%), and on the confirmation column for alpha-BHC (-16.4%). Positive alpha-BHC, delta-BHC, and methoxychlor results in the associated samples were flagged "J, c". Since positive 4,4'-DDE results were previously flagged due to LCS recovery failure, no additional data flags were applied. The CCV analyzed on 8/15/02 at 13:56 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-20.6%), delta-BHC (-23.0%), 4,4'-DDE (-33.0%), endrin ketone (20.4%), tetrachloro-m-xylene (TCMX, -25.6%), and decachlorobiphenyl (DCBP, -25.0%); and on the confirmation column for alpha-BHC (-24.7%), delta-BHC (-24.9%), methoxychlor (37.9%), and TCMX (-21.6%). The CCV analyzed on 8/15/02 at 18:41 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-16.6%), delta-BHC (-23.3%), 4,4'-DDE (-35.5%), 4,4'-DDD (-16.6%), endosulfan II (-18.9%), 4,4'-DDT (-19.8%), TCMX (-19.7%), and DCBP (-27.7%); and on the confirmation column for alpha-BHC (-20.8%), delta-BHC (-24.9%), and DCBP (-20.8%). Positive alpha-BHC, 4,4'-DDT, methoxychlor, and endrin ketone results in the associated samples were flagged "J, c". The delta-BHC results in the associated samples were flagged "UJ, c". Since positive 4,4'-DDE results were previously flagged due to LCS recovery failure, no additional data flags were applied. Since all other results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. Surrogates were diluted out in most of the samples (DF from 10 to 200). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The MS/MSD recoveries for beta-BHC (648% and 595%), gamma-chlordane (648% and 541%), 4,4'-DDE (438% and 384%), diendrin (520% and 438%), 4,4-DDD (192%), endosulfan II (6%), 4,4'-DDT (1247% and 972%), endrin aldehyde (133%), methoxychlor (164% and 260%) and endrin ketone (123%) were outside the control limit in the SOIL-Q-6-0.5 MS/MSD pair (in SDG: SAII27). The RPDs for alpha-chlordane (53%), 4,4'-DDD (67%), endrin (122%), endosulfan II (70%), methoxychlor (45%), and endrin ketone (83%) were greater than the acceptable limit. Since most of the LCS recoveries in the associated extraction batch were in control, no data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in most of the samples (DF from 10 to 100). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Most of the MS/MSD recoveries

were less than the lower control limits due to matrix interference in the SOIL-Q-6-0.5 MS/MSD pair (in SDG: SAII27). The low recoveries or no recoveries may be attributed to the 10X dilution required to minimize the matrix interference. The MS/MSD recoveries for trichlorobiphenyl (220% and 250%), tetrachlorobiphenyl (550% and 660%), pentachlorobiphenyl (890% and 500%), and hexachloro-biphenyl (290% and 660%) were greater than the upper control limits in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). Since the matrix used for the MS/MSD analysis (soil) was different than the sample matrix (waste) contained in this SDG and the LCS recoveries in the associated extraction batch were in control, no data qualifying action was taken. Sample WASTE-Q-4-COMP displayed a %R greater than the upper control limit (i.e. 130%) for internal standard chrysene-d12 at 130.4%. Since the internal standard %R was only slightly greater than the upper control limit, no data qualifying action was taken. The field duplicates displayed %RPDs between the two samples greater than the control limit for trichloro-biphenyl at 107.7%, for penta-chlorobiphenyl at 151.2%, and for hexachloro-biphenyl at 171.3%. Affected positive results were flagged "J, f" in the associated samples. The data user is advised that the PCB sample results may display more than usual bias or variability and should be used with caution.

For the herbicides analyses, the method blank prepped on 7/29/02 displayed positive detections for MCPA at 100 µg/kg and pentachlorophenol (PCP) at 4.0 µg/kg. Positive PCP results in samples WASTE-Q-7-COMP and WASTE-Q-4-COMP were flagged "U, z" at the reporting limit (RL). Since MCPA was not detected in the associated samples and PCP results in other samples were greater than five times the blank concentration, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit (i.e., 15%) on both columns for PCP at -21.3% and -19.7%, 2,4,5-TP at -23.8% and -21.9%, 2,4,5-T at -25.4% and -23.4%, and 2,4-DB at -27.0% and -18.0%. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on both columns for PCP at -18.5% and -20.2%, 2,4,5-TP at -22.1% and -23.3%, 2,4,5-T at -22.2% and -24.2%, and 2,4-DB at -20.1% and -16.2%. 2,4,5-TP, 2,4,5-T, and 2,4-DB results in the associated samples were flagged "J, c" for positive detections or "UJ, c" for non-detects. Since PCP results were previously flagged due to method blank contamination, no additional data flags were applied. The CCV analyzed on 8/13/02 at 16:01 displayed %Ds greater than the control limit on the primary column for MCPP at 17.1% and for 2,4-DB at 18.2% and on the confirmation column for 2,4-DB at 20.7%. The 2,4-DB result in sample WASTE-Q-8-COMP was flagged "UJ, c". The CCV analyzed on 8/16/02 at 12:18 displayed %Ds greater than the control limit on the primary column for 2,4-DB at -23.6% and on the confirmation column for MCPP at -15.7%. The CCV analyzed on 8/17/02 at 00:39 displayed a %D greater than the control limit on the confirmation column for dalapon at -15.5%. Since these compounds were not

detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. Surrogates were diluted out in several samples (DF from 20 to 2000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. PCP was not recovered (0%) due to matrix interference in the SOIL-Q-6-0.5 MS/MSD pair (in SDG: SAII27). Since the PCP concentration in the parent sample was greater than four times the spiking concentration, no data qualifying action was taken. The RPD for dichlorprop (47%) was greater than the acceptable limit (i.e., 40%). Since this compound was not detected in the associated samples, no data qualifying action was taken. The LCS recovery for PCP was greater than the upper control limit (i.e., 150%) at 197%. Since the LCS was prepared with the same water used for the method blank that displayed the positive detection for PCP at 4.0 µg/kg, which affected the %R calculation, no further data qualifying action was taken. Sample WASTE-Q-2-COMP displayed a PCP result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed at a greater dilution (DF=2000) and the diluted result was within the calibration range. It is recommended that the diluted PCP result be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., 40%) for 2,4-D (44.4%) and 2,4,5-T (71.2%) in sample WASTE-Q-7-COMP. These results, except those flagged due to calibration failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for aluminum (124%) and thallium (73%), and the final CRDL recoveries for aluminum (136%), sodium (69%), and thallium (78%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 2.21 mg/kg, arsenic at -0.452 mg/kg, cadmium at -0.043 mg/kg, chromium at 0.135 mg/kg, iron at 59.0 mg/kg, magnesium at 0.690 mg/kg, mercury at -0.00645 mg/kg, sodium at 21.2 mg/kg, and thallium at -0.574 mg/kg. All thallium results were flagged "J, p" or "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Aluminum, barium, chromium, potassium, and thallium were detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Since all results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. The positive cadmium results in samples WASTE-Q-7-COMP and WASTE-Q-8-COMP were flagged "J, n". All antimony results, except WASTE-Q-2-COMP, were flagged "J, n" for positive

detections or "UJ, n" for non-detects. Positive selenium results in sample WASTE-Q-6-COMP-DUP and WASTE-P-2-COMP were flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (74%), calcium (170% and 158%), chromium (180%), copper (186%), magnesium (147% and 156%), manganese (167% and 646%), sodium (172% and 205%), and zinc (57% and 3201%) were outside the control limits in one non-client MS/MSD pair. The RPDs for aluminum (56.9%), chromium (55.8%), copper (58.8%), iron (170%), manganese (102.6%), and zinc (172.7%) were greater than the acceptance limit. Since the parent sample is a non-client sample, no data qualifying action was taken. The post-digestion spike analysis was performed and recoveries for these compounds were in control. The %D for zinc (12.3%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (WASTE-Q-4-COMP). Positive zinc results were flagged "J, s".

Correctable Anomalies: Positive PCB results in sample WASTE-Q-8-COMP were incorrectly reported on the Form I. These positive results should be non-detects. These results were correctly reported in the EDD. The revised Form I was received from the laboratory.

Comments: Due to the abundance of target compounds, most of the samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII30_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____October 4, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, the initial calibration analyzed on 7/11/02 (RRF=0.0487) and one continuing calibration analyzed on 8/5/02 15:20 (RRF=0.0350) displayed relative response factors (RRFs) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973. Associated sample results with positive detections were flagged "J, c" and non-detects were flagged "R, c".

For the SVOC analyses, the MS/MSD recoveries for 3,3'-dichlorobenzidine (6% and 0%) were less than the lower control limits in one non-client MS/MSD pair. The RPDs for 4-chloroaniline (81%) and 3,3'-dichlorobenzidine (200%) were greater than the acceptance limits. The LCS recoveries for bis(2-chloroethoxy)-methane (17%), 4-chloroaniline (9%), 3,3'-dichlorobenzidine (0%) and carbazole (35%) were less than the lower control limits. This LCS was re-analyzed by the laboratory and displayed similar recoveries. Positive detections for these four compounds were flagged "J, l" and non-detects were flagged "R, l" in the associated samples.

For the pesticides analyses, the LCS recovery for delta-BHC (50%) was less than the lower control limit (i.e., 53%). The non-detected delta-BHC result in sample GW-AA-Q-4-80 was flagged "R, l". Since the positive delta-BHC result in sample GW-AA-R-1-131 was flagged due to calibration failure, no additional data flags were applied.

For the herbicides analyses, the LCS recoveries for dalapon (0%), dichlorprop (24%), and 2,4-DB (38%) were less than the lower control limit. Positive detections for these three compounds in the associated samples were flagged "J, l" and non-detects were flagged "R, l". The percent completeness was less than the control limit (i.e., 95%) at 74%.

Minor Anomalies: For the VOC analyses, the initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for bromomethane at

0.987. Bromomethane non-detect results in the associated samples were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/6/02 at 18:04 displayed a %D greater than the control limit (i.e. 20%) for bromomethane at -23.0%. Since bromomethane results in the associated samples were previously flagged due to initial calibration failure, no additional data flags were applied. The method blank, 2O0805MB, displayed a positive detection for methylene chloride at 1 µg/L. Positive methylene chloride results in the associated samples were flagged "U, z" at the reporting limit. The trip blank, TB072202, displayed positive detections for methylene chloride at 1.3 µg/L and styrene at 0.37 µg/L. The trip blank, TB072302-1, displayed positive detections for chloromethane at 0.28 µg/L and styrene at 2.3 µg/L. Positive chloromethane results in samples GW-AA-R-1-131 and GW-AA-R-1-118 were flagged "U, y" at the reporting limit. The methylene chloride result in trip blank TB072202 was previously flagged due to method blank contamination, therefore, this data was not used to assess the associated samples. Since styrene was not detected in the associated samples, no data qualifying action was taken. The MS recovery for bromoethane (152%) was greater than the control limit (i.e., 40-141%) in the GW-AA-Q-4-80 MS/MSD pair. Since bromomethane was not detected in the associated samples, no data qualifying action was taken. Sample GW-AA-R-1-58DL displayed an internal standard %R less than the lower control limit (i.e. 50%) for 1,2-dichloroethane-d4 at 47.2%. Since only the acetone result in this diluted sample will be used for data interpretation, and the acetone result was previously flagged due to calibration RRF failure, no additional data flags were applied. The acetone results in samples GW-AA-R-1-58, GW-AA-R-1-68, and GW-AA-R-1-118 and the chlorobenzene result in sample GW-AA-R-1-128 exceeded the linear range of the calibration curve. The acetone and chlorobenzene results in these samples, except those previously flagged due to calibration RRF failure, were flagged "J, q". These samples were diluted and reanalyzed by the laboratory. The acetone and chlorobenzene results from the dilution analysis should be used for data interpretation. Reporting limits were raised due to dilutions in samples GW-AA-R-1-78 (DF=50), GW-AA-R-1-58 (DF=50), GW-AA-R-1-68 (DF=50), GW-AA-R-1-88 (DF=10), GW-AA-R-1-131 (DF=20), GW-AA-R-1-128 (DF=10), GW-AA-R-1-98 (DF=10), GW-AA-R-1-108 (DF=50), and GW-AA-R-1-118 (DF=20).

For the SVOC analyses, the initial calibration analyzed on 7/31/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.987. Since the associated samples are QC samples, no data qualifying action was taken. The initial calibration analyzed on 8/10/02 displayed three correlation coefficients less than the control limit for 2,6-dinitrotoluene at 0.987, 3-nitroaniline at 0.989, and 4-nitroaniline at 0.986. These three compounds were not detected in the associated samples and were flagged "UJ, r". The initial calibration analyzed on 8/23/02 displayed three correlation coefficients less than the control limit for pentachlorophenol at 0.988, butylbenzylphthalate at 0.989,

and bis(2-ethylhexyl)phthalate at 0.988. These three results in samples GW-AA-Q-4-80RE and GW-AA-Q-4-60 were flagged "J, r" for positive detections, or, "UJ, r" for non-detects. Since these three results in sample GW-AA-Q-4-70RE were not used for data interpretation, no data qualifying action was taken. The continuing calibration analyzed on 8/1/02 at 09:26 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (-23.2%) and indeno(1,2,3-cd)-pyrene (-25.9%). The continuing calibrations analyzed on 8/4/02 at 12:58 (21.7%), 8/12/02 at 21:29 (40.0%), 8/13/02 at 10:58 (35.8%), and 8/14/02 09:33 (35.7%) displayed %Ds greater than the control limit for dinoseb. The continuing calibration analyzed on 8/4/02 at 12:05 displayed a %D greater than the control limit for bis(2-chloroisopropyl)ether (-20.9%). The continuing calibration analyzed on 8/12/02 at 20:58 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-31.1%), 2,4-dinitrophenol (63.1%), 4-nitro-aniline (22.0%), 2,4-dinitrotoluene (29.1%), and 4,6-dinitro-2-methylphenol (38.7%). The continuing calibration analyzed on 8/13/02 at 10:16 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-39.1%), 4,6-dinitro-2-methylphenol (25.0%), 2,4-dinitrophenol (32.0%), and indeno(1,2,3-cd)pyrene (-21.3%). The continuing calibrations analyzed on 8/14/02 at 00:06 (25.2%) and 8/16/02 at 10:30 (25.8%) displayed %Ds greater than the control limit for 2,4,6-tribromophenol (surrogate). The continuing calibration analyzed on 8/14/02 at 09:00 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether (22.9%) and hexachlorocyclopentadiene (-41.8%). The continuing calibration analyzed on 8/26/02 at 11:58 displayed %Ds greater than the control limit for butylbenzylphthalate (29.2%) and bis(2-ethylhexyl)phthalate (25.1%). 2,4-Dinitro-phenol results in samples GW-AA-Q-4-70 and GW-AA-Q-4-90 were flagged "UJ, c". Since all other compounds were either not detected in the associated samples or were surrogates, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Sample GW-AA-Q-4-80 displayed three internal standard %Rs less than the lower control limit (i.e. 50%) for phenanthrene-d10 (48.1%), chrysene-d12 (43.9%), and perylene-d12 (29.3%). This sample was re-analyzed by the laboratory and displayed two internal standard %Rs less than the lower control limit for chrysene-d12 (40.2%) and perylene-d12 (39.8%). Since the re-analyzed sample displayed better internal standard recoveries, the original data were crossed-out by the reviewer and should not be used for data interpretation. Affected results, except those previously flagged due to other QC failures, were flagged "UJ, n" in the re-analyzed sample. Sample GW-AA-Q-4-70 displayed an internal standard %R less than the lower control limit for perylene-d12 (43.3%). Affected results were flagged "UJ, n" in sample GW-AA-Q-4-70. This sample was re-analyzed by the laboratory and displayed three internal standard %Rs less than the lower control limit for phenanthrene-d10 (43.6%), chrysene-d12 (36.7%) and perylene-d12 (41.3%). Since the original sample displayed better internal standard recoveries, the re-analyzed sample data were crossed-out by the reviewer

and should not be used for data interpretation. Sample GW-AA-R-1-128 displayed two internal standard %Rs greater than the upper control limit (i.e., 200%) for naphthalene-d8 (206.8%) and acenaphthene-d10 (208.9%). Affected positive results in sample GW-AA-R-1-128 were flagged "J, n". The 4-chloroaniline results in all nine Site R samples and phenol results in samples GW-AA-R-1-88 and GW-AA-R-1-108 exceeded the linear range of the calibration curve. These results, except those previously flagged due to LCS recovery failure, were flagged "J, q". These samples were diluted and reanalyzed by the laboratory. The 4-chloroaniline and phenol results from the dilution analysis should be used for data interpretation.

For the pesticides analyses, the %Ds for heptachlor (-17.6%), endosulfan I (-18.9%), 4,4'-DDT (-16.7%), methoxychlor (17.9%), and decachlorobiphenyl (DCBP, -22.0%) on the primary column; and for DCBP (-19.9%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/3/02 at 19:33. The %Ds for heptachlor (-32.5%), gamma-chlordane (-20.2%), alpha-chlordane (-17.8%), endosulfan II (-20.4%), 4,4'-DDT (-28.3%), endrin aldehyde (-20.1%), endosulfan sulfate (-16.4%), and DCBP (-31.2%) on the primary column; and for heptachlor (-36.7%), gamma-chlordane (-15.7%), 4,4'-DDT (-35.9%), endrin aldehyde (-17.2%), methoxychlor (-21.0%), endrin ketone (-15.8%), and DCBP (-29.3%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/4/02 at 08:29. Heptachlor, gamma-chlordane, 4,4'-DDT, and endrin aldehyde results in samples GW-AA-Q-3-80, GQ-AA-Q-3-80-DUP, and GW-AA-Q-4-80 were flagged "UJ, c". All other compounds were not detected in the associated samples. Since these other results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The %Ds for delta-BHC (-17.4%), 4,4'-DDE (-26.6%), tetrachloro-m-xylene (TCMX, -18.7%) and DCBP (-22.7%) on the primary column; and for alpha-BHC (-18.5%), delta-BHC (-19.2%), and methoxychlor (-15.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/16/02 at 11:42. The %Ds for delta-BHC (-17.7%), 4,4'-DDE (-25.6%), dieldrin (16.3%), 4,4'-DDT (-17.3%), endrin ketone (15.7%), TCMX (-19.8%), and DCBP (-18.2%) on the primary column; and for alpha-BHC (-20.3%), delta-BHC (-20.5%), dieldrin (19.1%), and endrin (17.1%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/16/02 at 18:01. Positive delta-BHC and dieldrin results in samples GW-AA-R-1-78 and GW-AA-R-1-131 were flagged "J, c", and non-detects were flagged "UJ, c". Positive alpha-BHC, methoxychlor, and endrin ketone results in samples GW-AA-R-1-78 and GW-AA-R-1-131 were flagged "J, c". All other compounds were not detected in the associated samples. Since these other results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The TCMX surrogate recoveries on both columns in samples

GW-AA-Q-3-80 (22% and 26%) and GW-AA-Q-3-80-DUP (22% and 24%) were less than the lower control limit (i.e., 30%). The TCMX surrogate recovery on the primary column (28%), and the DCBP surrogate recoveries on both columns (16% and 19%) in sample GW-AA-Q-4-80 were less than the lower control limit. The TCMX surrogate recovery on the confirmation column (480%), and the DCBP surrogate recoveries on the confirmation column (17%) in sample GW-AA-R-1-78 were outside the control limit (i.e., 30-150%). The TCMX surrogate recovery on the confirmation column (158%), and the DCBP surrogate recoveries on both columns (12% and 18%) in sample GW-AA-R-1-131 were outside the control limit. All results in these five samples, except those previously flagged due to calibration and LCS recovery failures, were flagged "J, s" or "UJ, s". The RPDs for alpha-BHC (43%), gamma-BHC (32%), heptachlor (27%), aldrin (27%), gamma-chlordane (25%), and alpha-chlordane (24%) were greater than the acceptance limits in one non-client MS/MSD pair. Since the parent sample is a non-client sample and all results in the associated samples were previously flagged due to other QC failures, no additional data flags were applied. Sample GW-AA-Q-4-80 displayed an internal standard %R slightly greater than the upper control limit (i.e., 150%) for bromonitrobenzene (150.6%). Since all results in sample GW-AA-Q-4-80 were previously flagged due to other QC failures, no additional data flags were applied. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %Ds for MCPP (18.9%) and 2,4-D (15.7%) on the primary column, and for 2,4-DB (-16.9%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/2/02 at 23:07. The %Ds for MCPP (22.2%), MCPA (16.1%), and 2,4-D (15.7%) on the primary column, and for 2,4-DB (-21.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/3/02 at 07:41. The %Ds for 2,4-DB (-23.6%) on the primary column, and for MCPP (-15.7%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/16/02 at 12:18. The %D for dalapon (-15.5%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 8/17/02 at 00:39. Positive MCPP, MCPA, and 2,4-D results in the associated samples were flagged "J, c". Since dalapon and 2,4-DB results were previously flagged due to LCS recovery failure, no additional data flags were applied. The MS recovery for 2,4,5-TP (105%) was greater than the upper control limit (i.e., 100%) in one non-client MS/MSD pair. Since the MSD and LCS recoveries for this compound were in control, no data qualifying action was taken. The dichloroprop result in sample GW-AA-R-1-78 exceeded the linear range of the calibration curve. Since this result was previously flagged

due to LCS recovery failure, no additional data flags were applied. Because of sample matrix (high dichloroprop concentration), target compound 2,4-D could not be quantitated for this sample. The 2,4-D result was denoted with a "F" data qualifier by the laboratory. This sample was diluted by a factor of 5 and reanalyzed by the laboratory. The dichloroprop and 2,4-D results from the dilution analysis should be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for thallium (127%) and the final CRDL recoveries for aluminum (134%), selenium (65%), and thallium (121%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Antimony was detected in one continuing calibration blank (CCB6) at 0.0052 mg/L. Arsenic was detected in the initial calibration blank (ICB) at –0.00319 mg/L, CCB5 at 0.00379 mg/L and CCB6 0.00371 mg/L. Cadmium was detected in the ICB at 0.00072 mg/L. Cobalt was detected in the ICB at 0.00095 mg/l and CCB4 at 0.00090 mg/L. Thallium was detected in the ICB at 0.00506 mg/L, CCB4 at 0.0053 mg/L, CCB5 at 0.00532 mg/L, and CCB6 at 0.00737 mg/L. Positive antimony, arsenic, cadmium, cobalt, and thallium results less than five times the blank concentration were flagged "U, o" for results greater than the reporting limit, or, "U, o" at the reporting limit for results less than the reporting limit. Aluminum, barium, magnesium, and manganese were also detected in the preparation blank, ICB and CCBs at low levels. Since these analyte results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MSD recovery for potassium (129%) was greater than the upper control limit (i.e., 125%) in one client MS/MSD pair (in SDG: SAII29). Positive potassium results in the associated samples were flagged "J, m". The post-digestion spike recovery for potassium was in control. The %D for potassium (10.4%) was slightly greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (GW-AA-R-1-78). Since potassium results in the associated samples were previously flagged due to MS/MSD recovery failure, no additional data flags were applied. The field duplicates displayed a absolute difference greater than the control limit (i.e., two times the reporting limit, 0.0004 mg/L) for mercury at 0.00047 mg/L. Affected mercury results were flagged "J, f" for positive detections or "UJ, f" for non-detects.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on

the flame ionization detector (FID). Positive methane results reported from the FID were flagged "J, r" in the associated samples. The %D for methane (20%) on the thermo-conductivity detector (TCD) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/1/02 at 09:44. Positive methane results reported from TCD were flagged "J, c". The MS/MSD recoveries for methane (50% and 50%) were less than the lower control limit (i.e., 75%) in one non-client Ms/MSD pair. Since all methane results were previously flagged due to other QC failure, no additional data flags were applied. The methane results in samples GW-AA-R-1-78, GW-AA-R-1-131, and GW-AA-Q-4-80 exceeded the linear range of the calibration curve. Since these methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The methane results reported from TCD detector should be used for data interpretation. The field duplicates displayed a RPD greater than the control limit (i.e., 50%) for methane at 56.7%. Since all methane results were previously flagged due to other QC failure, no additional data flags were applied.

For the nitrate-N analyses, the MS/MSD recoveries for nitrate-N (24% and 17%) were less than the lower control limit (i.e., 75%) in the GW-AA-R-1-78 MS/MSD pair. Positive nitrate-N results in the associated samples were flagged "J, m" and non-detects were flagged "UJ, m".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII31_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 9, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the TCLP VOCs analyses, the CCV analyzed on 7/31/02 at 13:14 displayed a %D greater than the control limit (i.e. 20%) for 2-butanone at 52.8%. Associated sample results were non-detect and flagged "UJ,c". The MS/MSD pair displayed a %RPD greater than the control limit (i.e. 31%) for 2-butanone at 35%. Since the MS and MSD met criteria, no data qualifying action was taken.

For the TCLP SVOCs analyses, pentachlorophenol (PCP) exceeded the calibration range in sample WASTE-Q-11-COMP-T and was flagged "J,q". The sample was re-analyzed at a higher dilution and PCP was within the calibration range. It is recommended that the re-analyzed PCP result be used for data interpretation. Re-analyzed sample WASTE-Q-11-COMP-T displayed surrogate %Rs less than the lower control limit for nitrobenzene-d5 at 0% and for terphenyl-d14 at 0%. Since these surrogates are base/neutral surrogates and the only compound of interest, PCP, is in the acid fraction, no data qualifying action was taken.

For the TCLP pesticides analyses, the LCS (0731P-JMPLCS) displayed surrogate %Rs less than the lower control limit on both columns for decachlorobiphenyl (DCBP) at 28% and 25%. Since this is a QC sample and target compound recoveries in the LCS were in control, no data qualifying action was taken. Sample WASTE-Q-11-COMP-T displayed an internal standard (IS) greater than the upper control limit (i.e. 150%) for bromonitrobenzene at 164%. Since the sample was non-detect, no data qualifying action was taken.

For the TCLP herbicides analyses, surrogate 2,4-DCAA displayed %Rs greater than the upper control limit (i.e. 133%) on the confirmation column for samples WASTE-Q-11-COMP-T at 700% and for 0802N-SFB at 170%. Since the

surrogate met criteria on the primary column and the samples were either non-detect or a QC sample, no data qualifying action was taken.

For the TCLP metals analyses, the CRDLs displayed %Rs greater than the upper control limit for arsenic (As) at 138% and for selenium (Se) at 132% and 122%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed a positive detection for lead (Pb) at 22.2 ug/L. The positive result in sample WASTE-Q-12-COMP-T was flagged "U,p". CCB4 and CCB5 displayed positive detections for arsenic, barium, and chromium at low levels. Since associated sample results were either non-detect or greater than 5x the amount found in the blank, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAII32_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____October 17, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the VOC analyses, the relative response factors (RRFs) for acetone were less than the control limit (i.e. 0.05) for the initial calibration analyzed on 7/11/02 at 0.0487 and two continuing calibrations analyzed on 7/29/02 18:13 at 0.04034 and on 8/5/02 0922 at 0.04065. The acetone result in sample SOIL-Q-12-6 was flagged "R, c". Since acetone results in other associated samples, SOIL-Q-11-6DL and SOIL-Q-12-6DL, were not used for data interpretation, no data flags were applied.

For the pesticides analyses, the LCS recoveries for alpha-chlordane (30%) and 4,4'-DDE (28%) were less than the lower control limit. Positive results were flagged "J, l" and non-detects were flagged "R, l" in the associated samples. All other LCS recoveries were within the control limits but at the low end. The surrogate recoveries for tetrachloro-m-xylene (26% and 26%) and decachloro-biphenyl (29%) were less than the lower control limit (i.e., 30%) in this LCS sample. The low recoveries may be attributed to low extraction efficiency. Since surrogate recoveries in the associated field samples were all diluted out, the extraction efficiency in this analytical batch cannot be completely assessed. The data user should be aware that all pesticide data may be biased low.

Minor Anomalies: For the VOC analyses, the continuing calibration verification (CCV) analyzed on 7/26/02 10:56 displayed a %D greater than the control limit (i.e., 20%) for methylene chloride at -41.0%. The CCV analyzed on 7/29/02 18:13 displayed %Ds greater than the control limit for chloromethane at -26.9% and 1,1-dichloro-ethane at 30.8%. These three compounds were not detected in the associated samples. Since the failures were not serious enough (i.e., > 50%) to affect the non-detect values, no further data qualifying action was taken. The CCV analyzed on 8/5/02 09:22 displayed %Ds greater than the control limit for 1,1-dichloro-ethane at 50.5%, tetrachloroethene at 26.3%, 2-hexanone at -20.9%,

dibromo-chloromethane at 22.7%, total 1,2-dichloroethene at 35.7%, and surrogate dibromo-fluoromethane at 22.3%. Since these results in the associated sample, SOIL-Q-12-6DL, were not used for data interpretation, no data flags were applied. The medium level LCS recoveries analyzed on 7/29/02 were greater than the QC limit for acetone at 170% and 1,1-dichloroethane at 136%. The medium level LCS recovery analyzed on 8/5/02 was greater than the QC limit for 1,1-dichloroethane at 136%. The positive 1,1-dichloroethane result in sample SOIL-Q-11-6 was flagged "J, l". No positive results were reported for acetone in the associated samples and no data qualifying action was taken. The chlorobenzene result in sample SOIL-Q-11-6 and the toluene, ethyl benzene, and xylene results in sample SOIL-Q-12-6 exceeded the calibration range and were flagged "E" by the laboratory. These results were flagged "J, q". These two samples were diluted and reanalyzed by the laboratory. Results from the dilution analyses should be used for the affected compounds. Field duplicates displayed %RPD or absolute difference greater than the control limit for chlorobenzene (difference > 2X RL) and xylene (RPD at 115%). Xylene and chlorobenzene results in the associated samples were flagged "J, f".

For the SVOC analyses, the CCV analyzed on 8/10/02 14:19 displayed %Ds greater than the control limit (i.e. 20%) for hexachlorocyclopentadiene at -48.9%, 2,4-dinitrophenol at 54.1%, 2,4-dinitrotoluene at 28.0%, 4-nitroaniline at 21.1%, and 4,6-dinitro-2-methylphenol at 31.3%. The CCVs analyzed on 8/10/02 at 14:48 (44.9%) and 8/14/02 09:33 (35.7%) displayed %Ds greater than the control limit for dinoseb. The CCV analyzed on 8/12/02 at 08:45 displayed a %D greater than the control limit for hexachlorocyclopentadiene at –27.1%. The CCV analyzed on 8/14/02 at 09:00 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -41.8% and bis(2-chloroethyl)ether at 22.9%. The 2,4-dinitrophenol results in samples SOIL-Q-11-0.5 and SOIL-Q-11-0.5-DUP were flagged "UJ, c". Since other compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The surrogate 2-fluoro-biphenyl recovery (25%) was less than the control limit (i.e., 30%) in sample SOIL-Q-11-0.5DUP. Since all other surrogate recoveries were in control, no data qualifying action was taken. Surrogates were not recovered (0%) in samples SOIL-Q-11-6 (DF=20) and SOIL-Q-11-6DL (DF=100). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The MS/MSD recoveries for naphthalene (132%), dimethylphthalate (41% and 39%), n-nitrosodiphenylamine (39% and 39%), butylbenzylphthalate (49% and 51%), benzo(a)anthracene (45% and 43%), and chrysene (48% and 45%) were outside the QC limit in the SOIL-Q-12-6 MS/MSD pair. No action was required since the LCS recoveries were acceptable and the vast majority of MS/MSD recoveries were in control. The bis(2-ethylhexyl)-phthalate result in sample SOIL-Q-11-0.5 and the pentachlorophenol result in sample SOIL-Q-11-6

exceeded the calibration range and were flagged "E" by the laboratory. These results were flagged "J, q". These two samples were diluted and reanalyzed by the laboratory. Results from the dilution analyses should be used for the affected compounds. Field duplicates displayed %RPDs greater than the control limit for phenanthrene at 113% and bis(2-ethylhexyl)phthalate at 102%. These two results, except those previously flagged due to other QC failures, were flagged "J, f" in the associated samples.

For the pesticides analyses, the CCV analyzed on 8/3/02 at 10:23 displayed %Ds greater than the control limit (i.e. 15%) for methoxychlor (18.7%), endrin ketone (18.4%), and 2,4-DCAA (-16.2%) on the primary column; and for 4,4'-DDT (16.5%), endosulfan sulfate (17.9%), methoxychlor (26.5%), and endrin ketone (19.6%) on the confirmation column. Since associated samples are QC samples, no data qualifying action was taken. The CCV analyzed on 8/3/02 at 19:33 displayed %Ds greater than the control limit on the primary column for heptachlor (-17.6%), endosulfan I (-18.9%), 4,4'-DDT (-16.7%), methoxychlor (17.9%), and decachlorobiphenyl (DCBP, -22.0%); and on the confirmation column for DCBP (-19.9%). The CCV analyzed on 8/4/02 at 08:29 displayed %Ds greater than the control limit on the primary column for heptachlor (-32.5%), gamma-chlordane (-20.2%), alpha-chlordane (-17.8%), endosulfan II (-20.4%), 4,4'-DDT (-28.3%), endrin aldehyde (-20.1%), endosulfan sulfate (-16.4%), and DCBP (-31.2%); and on the confirmation column for heptachlor (-36.7%), gamma-chlordane (-15.7%), 4,4'-DDT (-35.9%), endrin aldehyde (-17.2%), methoxychlor (-21.0%), endrin ketone (-15.8%), and DCBP (-29.3%). Positive results for these compounds were flagged "J, c" in the associated samples. All non-detects for heptachlor, gamma-chlordane, 4,4'-DDT and endrin aldehyde were flagged "UJ, c" in the associated samples. The CCV analyzed on 8/21/02 at 13:38 displayed %Ds greater than the control limit on the primary column for endrin (16.2%), 4,4'-DDT (18.2%), endrin ketone (18.9%), 2,4-DCAA (-20.1%), and tetrachloro-m-xylene (TCMX, -15.9%); and on the confirmation column for alpha-BHC (-15.8%), heptachlor (18.1%), 4,4'-DDE (17.4%), endrin (19.0%), 4,4'-DDT (24.8%), endrin aldehyde (19.2%), endosulfan sulfate (18.0%), and 2,4-DCAA (-17.8%). The CCV analyzed on 8/21/02 at 18:35 displayed %Ds greater than the control limit on the primary column for methoxychlor (19.2%) and 2,4-DCAA (-20.1%); and on the confirmation column for endrin (15.5%) and 2,4-DCAA (-16.1%). Positive results for these compounds were flagged "J, c" in sample SOIL-Q-12-6. The non-detect result for endrin was flagged "UJ, c" in sample SOIL-Q-12-6. Surrogates were diluted out in all samples. Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Due to matrix interference in the parent sample SOIL-Q-12-6, the MS and MSD were analyzed at a dilution of 10. Because of the level of dilution required, spiking compounds were not recovered; therefore, MS/MSD summary form was not provided in this data package. Samples SOIL-Q-12-6MS and SOIL-Q-12-6MSD

displayed %Rs greater than the upper control limit (i.e., 150%) for internal standard bromonitrobenzene at 158.6% and 161.2%. Since these two samples are QC samples, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out for samples SOIL-Q-11-0.5 (DF=10), SOIL-Q-11-0.5DUP (DF=10), and SOIL-Q-11-6 (DF=10). Since the affected samples were analyzed at dilutions equal to 10, no data qualifying action was taken. The MS/MSD recoveries for trichlorobiphenyl (190% and 240%), tetrachlorobiphenyl (550% and 660%), pentachlorobiphenyl (890% and 780%), hexachlorobiphenyl (340%) were greater than the QC limit in the SOIL-Q-12-6 MS/MSD pair. The RPD for hexachlorobiphenyl (85%) was greater than the acceptance limit (i.e., 50%). No action was required since the LCS recoveries were acceptable.

For the herbicides analyses, the method blank prepped on 7/29/02 displayed a positive detection for pentachlorophenol (PCP) at 4.0 µg/kg. Since all positive PCP results were greater than five times the blank concentration, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit (i.e. 15%) on both columns for PCP at -21.3% and -19.7%, 2,4,5-TP at -23.8% and -21.9%, 2,4,5-T at -25.4% and -23.4%, and 2,4-DB at -27.0% and -18.0%. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on both columns for PCP at -18.5% and -20.2%, 2,4,5-TP at -22.1% and -23.3%, 2,4,5-T at -22.2% and -24.2%, and 2,4-DB at -20.1% and -16.2%. Positive results in samples SOIL-Q-11-0.5-DUP and SOIL-Q-12-0.5 were flagged "J, c" and non-detects were flagged "UJ, c". The CCV analyzed on 8/17/02 at 00:39 displayed a %D greater than the control limit on the confirmation column for dalapon at -15.5%. The CCV analyzed on 8/17/02 at 11:54 displayed a %D greater than the control limit on the primary column for 2,4-DB at -24.0%. The CCV analyzed on 9/5/02 at 02:34 displayed a %D greater than the control limit on the confirmation column for 2,4-D at 17.8%. Since these compounds were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The recoveries for surrogate 2,4-DCAA on the confirmation column in sample SOIL-Q-11-0.5-DUP (629%), SOIL-Q-12-6 (360%), SOIL-Q-12-6MS (315%), and SOIL-Q-12-6MSD (337%) were greater than the upper control limit (i.e., 189%). Positive results, except those previously flagged due to calibration failure, were flagged "J, s" in samples SOIL-Q-11-0.5-DUP and SOIL-Q-12-6. Since the other two samples are QC samples, no data qualifying action was taken. Surrogates were diluted out in samples SOIL-Q-11-0.5 (DF=20), SOIL-Q-11-6 (DF=1000),

and SOIL-Q-11-0.5-DUPDL (DF=20). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. PCP was not recovered (0%) due to matrix interference (high PCP concentration in parent sample) in the SOIL-Q-12-6 MS/MSD pair. The LCS recovery for PCP was greater than the upper control limit (i.e., 150%) at 197%. PCP was detected in all associated samples and positive detections were flagged "J, l". The RPD for dichloroprop (47%) was greater than the acceptance limit (i.e., 40%). Since both MS and MSD recoveries were in control, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for several positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for lead (66%), sodium (75%), and thallium (138% and 127%), and the final CRDL percent recoveries for aluminum (124%) and thallium (121% and 73%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained aluminum at 2.767 mg/kg, cadmium at -0.038 mg/kg, chromium at 0.103 mg/kg, potassium at 1.457 mg/Kg, sodium at 39.848 mg/Kg. Positive sodium results less than five times the blank concentration were flagged "U, p". The positive cadmium result in sample SOIL-Q-12-6 was flagged "J, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum, arsenic, barium, cadmium, chromium, copper, thallium, and vanadium were detected in the initial calibration blank and/or continuing calibration blanks at low levels. Since the results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples displayed calcium and/or iron concentrations greater than 50% of the calcium and iron concentration in ICSA samples. Since the positive cadmium result in sample SOIL-Q-12-6 was previously flagged due to method blank contamination, no additional data flags were applied. All selenium results were flagged "J, n" for positive detections or "UJ, n" for non-detects. The positive vanadium result in sample SOIL-Q-11-6 was flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (45% and 45%) and potassium (134% and 144%) were outside the control limits (i.e., 75-125%) in the SOIL-Q-12-6 MS/MSD pair. The post-digestion spike recoveries were in control. All antimony and potassium results were positive and were flagged "J, m" in the associated samples. The %D for potassium (12.3%) was greater than the acceptance limit (i.e., <10%) in the serial dilution sample. Since potassium results were previously flagged due to

MS/MSD recovery failure, no additional data flags were applied.

Correctable Anomalies: None.

Comments: Sample SOIL-Q-12-6 was designated for the MS/MSD analyses. Due to the abundance of target VOC compounds in the parent sample, it was analyzed at a 1000X dilution. The spike compounds would have been diluted out, therefore, the MS/MSD analyses were not performed for VOC analyses.

Due to the abundance of target compounds, several samples were analyzed at dilutions for organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. Except for the rejected data points (i.e., "R" flags), all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII33_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____October 17, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the pesticides analyses, the LCS recoveries for alpha-chlordane (30%) and 4,4'-DDE (28%) were less than the lower control limit. Positive results were flagged "J, l" and non-detects were flagged "R, l" in the associated samples. All other LCS recoveries were within the control limits but at the lower end. The surrogate recoveries for tetrachloro-m-xylene (26% and 26%) and decachloro-biphenyl (29%) were less than the lower control limit (i.e., 30%) in this LCS sample. The low recoveries may be attributed to low extraction efficiency. Since surrogate recoveries in the associated field samples were all diluted out, the extraction efficiency in this analytical batch cannot be completely assessed. The data user should be aware that all pesticide data may be biased low and that this data should be used with caution.

Minor Anomalies: For the VOC analyses, the relative response factors (RRFs) for acetone were less than the control limit (i.e. 0.05) for the initial calibration analyzed on 7/11/02 at 0.0487 and the continuing calibration analyzed on 8/5/02 0922 at 0.04065. Since the acetone result in associated sample, WASTE-Q-11-8DL, was not used for data interpretation, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 7/26/02 10:56 displayed a %D greater than the control limit (i.e., 20%) for methylene chloride at -41.0%. Methylene chloride was not detected in the associated samples. Since this failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 8/5/02 09:22 displayed %Ds greater than the control limit for 1,1-dichloro-ethane at 50.5%, tetrachloroethene at 26.3%, 2-hexanone at -20.9%, dibromochloro-methane at 22.7%, total 1,2-dichloroethene at 35.7%, and surrogate dibromo-fluoromethane at 22.3%. Since these results in associated sample, WASTE-Q-11-8DL, were not used for data interpretation, no data flags were applied. The medium level LCS recovery analyzed on 8/5/02 was greater than the QC limit for 1,1-dichloroethane at 136%. Since the 1,1-dichloroethane result in associated sample WASTE-Q-11-8DL was not used for data

interpretation, no data qualifying action was taken. Chlorobenzene, ethyl benzene, and total xylene results in sample WASTE-Q-11-8 exceeded the calibration range and were flagged "E" by the laboratory. These results were flagged "J, q". This sample was diluted and reanalyzed by the laboratory. Results from the dilution analyses should be used for the affected compounds.

For the SVOC analyses, the initial calibration analyzed on 8/25/02 displayed three correlation coefficients less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9873, for 4,6-dinitro-2-methylphenol at 0.9873, and for dinoseb at 0.9869. Since these results in associated sample WASTE-Q-11-COMPDL were not used for data interpretation, no data qualifying action was taken. The CCV analyzed on 8/10/02 14:19 displayed %Ds greater than the control limit (i.e. 20%) for hexachlorocyclopentadiene at -48.9%, 2,4-dinitrophenol at 54.1%, 2,4-dinitrotoluene at 28.0%, 4-nitroaniline at 21.1%, and 4,6-dinitro-2-methyl-phenol at 31.3%. Since the associated samples were QC samples, no data qualifying action was taken. The CCVs analyzed on 8/10/02 at 14:48 (44.9%) and 8/26/02 12:36 (25.1%) displayed %Ds greater than the control limit for dinoseb. The CCV analyzed on 8/12/02 at 08:45 displayed a %D greater than the control limit for hexachlorocyclopentadiene at –27.1%. The CCV analyzed on 8/23/02 at 15:53 displayed %Ds greater than the control limit for hexachlorocyclopentadiene at -23.9% and 4-nitroaniline at 22.2%. Since these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 8/26/02 12:36 displayed %Ds greater than the control limit (i.e. 20%) for 2-nitroaniline at 30.0%, 3-nitroaniline at 29.0%, 2,4-dinitrophenol at 31.9%, 4-nitrophenol at 21.9%, 4-nitroaniline at 21.9%, and 4,6-dinitro-2-methylphenol at 26.6%. Since these results in associated sample, WASTE-Q-11-COMPDL, were not used for data interpretation, no data qualifying action was taken. The surrogate 2-fluoro-biphenyl recovery (24%) was less than the control limit (i.e., 30%) in sample WASTE-Q-12-COMP. Since all other surrogate recoveries were in control, no data qualifying action was taken. Surrogates were not recovered (0%) in samples WASTE-Q-11-COMP (DF=10) and WASTE-Q-11-COMPDL (DF=100). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The MS/MSD recoveries for naphthalene (132%), dimethyl-phthalate (41% and 39%), n-nitrosodiphenylamine (39% and 39%), butylbenzyl-phthalate (49% and 51%), benzo(a)anthracene (45% and 43%), and chrysene (48% and 45%) were outside the QC limit in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). No action was required since the failures were not critically low (i.e., <10%), the vast majority of MS/MSD recoveries were acceptable, and the LCS recoveries were acceptable. The pentachlorophenol result in sample WASTE-Q-11-COMP exceeded the calibration range and was flagged "E" by the laboratory. This result was flagged "J, q". This sample was diluted by a factor of 100 and reanalyzed by the laboratory. The pentachlorophenol result from the dilution analyses should be

used for data interpretation.

For the pesticides analyses, the CCV analyzed on 8/3/02 at 10:23 displayed %Ds greater than the control limit (i.e. 15%) for methoxychlor (18.7%), endrin ketone (18.4%), and 2,4-DCAA (-16.2%) on the primary column; and for 4,4'-DDT (16.5%), endosulfan sulfate (17.9%), methoxychlor (26.5%), and endrin ketone (19.6%) on the confirmation column. The CCV analyzed on 8/3/02 at 19:33 displayed %Ds greater than the control limit on the primary column for heptachlor (-17.6%), endosulfan I (-18.9%), 4,4'-DDT (-16.7%), methoxychlor (17.9%), and decachlorobiphenyl (DCBP, -22.0%); and on the confirmation column for DCBP (-19.9%). The CCV analyzed on 8/4/02 at 08:29 displayed %Ds greater than the control limit on the primary column for heptachlor (-32.5%), gamma-chlordane (-20.2%), alpha-chlordane (-17.8%), endosulfan II (-20.4%), 4,4'-DDT (-28.3%), endrin aldehyde (-20.1%), endosulfan sulfate (-16.4%), and DCBP (-31.2%); and on the confirmation column for heptachlor (-36.7%), gamma-chlordane (-15.7%), 4,4'-DDT (-35.9%), endrin aldehyde (-17.2%), methoxychlor (-21.0%), endrin ketone (-15.8%), and DCBP (-29.3%). Since associated samples are QC samples, no data qualifying action was taken. The CCV analyzed on 8/28/02 at 12:34 displayed %Ds greater than the control limit on the primary column for dieldrin (15.5%), 4,4'-DDD (17.1%), methoxychlor (21.7%), endrin ketone (17.3%); and on the confirmation column for alpha-BHC (-20.9%) and endosulfan sulfate (15.6%). The CCV analyzed on 8/28/02 at 21:19 displayed %Ds greater than the control limit on the primary column for alpha-chlordane (18.5%), dieldrin (19.5%), endrin (20.1%), 4,4'-DDD (36.0%), 4,4'-DDT (-16.4%), endrin aldehyde (-26.1%), methoxychlor (16.3%), and endrin ketone (18.7%); and on the confirmation column for alpha-BHC (-18.9%), endosulfan I (15.6%), dieldrin (16.2%), endrin (16.7%), 4,4'-DDD (29.5%), endosulfan II (15.9%), endrin aldehyde (-25.1%), and endosulfan sulfate (17.9%). Positive results for these compounds, except those previously flagged due to LCS recovery failure, were flagged "J, c" in sample WASTE-Q-12-COMP. The non-detect result for 4,4'-DDD was flagged "UJ, c" in sample WASTE-Q-12-COMP. The CCV analyzed on 8/29/02 at 16:41 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-16.8%) and delta-BHC (-18.9%); and on the confirmation column for alpha-BHC (-25.0%). The CCV analyzed on 8/30/02 at 00:20 displayed %Ds greater than the control limit on the primary column for 4,4'-DDD (20.0%), 4,4'-DDT (-21.0%), and endrin aldehyde (-23.1%); and on the confirmation column for alpha-BHC (-21.1%), 4,4'-DDD (16.4%), 4,4'-DDT (-16.5%), and endrin aldehyde (-26.1%). Positive results for these compounds were flagged "J, c" in samples WASTE-Q-11-COMP, WASTE-Q-12-COMP-DUP, and WASTE-Q-12-COMPDL (for 4,4'-DDT only). The non-detect results for alpha-BHC, 4,4'-DDD, and endrin aldehyde were flagged "UJ, c" in samples WASTE-Q-11-COMP and WASTE-Q-12-COMP-DUP. Surrogates were diluted out in all samples. Since the affected samples were analyzed at dilutions greater than

10, no data qualifying action was taken. Due to matrix interference in the parent sample SOIL-Q-12-6 (in SDG: SAII32), the MS and MSD were analyzed at a dilution of 10. Because of the level of dilution required, spiking compounds were not recovered; therefore, MS/MSD summary form was not provided in this data package. Sample WASTE-Q-12-COMP displayed a %R greater than the upper control limit (i.e., 150%) on the confirmation column for internal standard bromonitrobenzene at 154.4%. Positive detections, except those previously flagged due to other QC failure, were flagged "J, n" in this affected sample. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low. Field duplicates displayed absolute differences greater than the control limit (difference < 2X RL) for 4,4'-DDE, endrin aldehyde, endosulfan sulfate, and endrin ketone. Endosulfan sulfate and endrin ketone results in sample WASTE-Q-12-COMP-DUP were flagged "J, f". Since all other results were previously flagged due to other QC failures in the associated samples, no additional data flags were applied.

For the PCB analyses, surrogates were diluted out for samples SOIL-Q-11-0.5 (DF=10), SOIL-Q-11-0.5DUP (DF=10), and SOIL-Q-11-6 (DF=10). Since the affected samples were analyzed at dilutions equal to 10, no data qualifying action was taken. The MS/MSD recoveries for trichlorobiphenyl (190% and 240%), tetrachlorobiphenyl (550% and 660%), pentachlorobiphenyl (890% and 780%), hexachlorobiphenyl (340%) were greater than the QC limit in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). The RPD for hexachlorobiphenyl (85%) was greater than the acceptance limit (i.e., 50%). No action was required since the LCS recoveries were acceptable. Samples WASTE-Q-11-COMP (151.4%), WASTE-Q-12-COMP (139.8%), and WASTE-Q-12-COMP-DUP (135.8%) displayed %Rs greater than the upper control limit (i.e., 130%) for internal standard chrysene. Positive detections were flagged "J, n" in these three samples.

For the herbicides analyses, the method blank prepped on 7/29/02 displayed a positive detection for pentachlorophenol (PCP) at 5.3 µg/kg. Since all positive PCP results were greater than five times the blank concentration, no data qualifying action was taken. The CCV analyzed on 8/5/02 at 22:19 displayed %Ds greater than the control limit (i.e. 15%) on the primary column for dicamba at 27.2%, MCPP at 25.5%, MCPA at 16.2%, dichloroprop at 15.5%, 2,4-D at 17.8%, and 2,4'-DCAA at 29.3%; and on the confirmation column for dalapon at -18.1%, dichloroprop at -16.6%, 2,4-D at -16.4%, PCP at -23.9%, 2,4,5-TP at -25.5%, 2,4,5-T at -27.9% and 2,4-DB at -29.5%. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on the primary column for dalapon at 30.2%, dicamba at 31.9%, MCPP at 30.6%, MCPA at 20.6%, dichloroprop at 17.8%, 2,4-D at 19.6%, and 2,4'-DCAA at 31.9%; and on the

confirmation column for dichloroprop at -16.9%, 2,4-D at -17.4%, PCP at -24.3%, 2,4,5-TP at -26.9%, 2,4,5-T at -28.7% and 2,4-DB at -28.0%. Dichlorprop, 2,4-D, and PCP results in associated samples WASTE-Q-12-COMP and WASTE-Q-12-COMP-DUP were flagged "J, c" for positive detections and "UJ, c" for non-detects. Surrogates were diluted out in samples WASTE-Q-11-COMP (DF=200) and WASTE-Q-11-COMPDL (DF=2500). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. PCP was not recovered (0%) due to matrix interference (high PCP concentration in parent sample) in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). The LCS recovery for PCP was greater than the upper control limit (i.e., 150%) at 197%. PCP was detected in all associated samples and positive detections, except those previously flagged due to calibration failure, were flagged "J, l". The RPD for dichloroprop (47%) was greater than the acceptance limit (i.e., 40%). Since both MS and MSD recoveries were in control, no data qualifying action was taken. The pentachlorophenol result in sample WASTE-Q-11-COMP exceeded the calibration range and was flagged "E" by the laboratory. Since this result was previously flagged due to LCS recovery failure, no additional data flags were applied. This sample was diluted by a factor of 2500 and reanalyzed by the laboratory. The pentachlorophenol result from the dilution analyses should be used for data interpretation.

For the metal analyses, the initial CRDL percent recoveries for lead (66%), sodium (75%), and thallium (138%), and the final CRDL percent recoveries for aluminum (124%) and thallium (73%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained aluminum at 2.767 mg/kg, cadmium at -0.038 mg/kg, chromium at 0.103 mg/kg, potassium at 1.457 mg/Kg, and sodium at 39.848 mg/Kg. Positive sodium results less than five times the blank concentration were flagged "U, p". Since other results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Aluminum, arsenic, barium, chromium, copper, mercury, potassium, and vanadium were detected in the initial calibration blank and/or continuing calibration blanks at low levels. Since the results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples displayed iron concentrations greater than 50% of the calcium and iron concentration in ICSA samples. All selenium results were flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (45% and 45%) and potassium (134% and 144%) were outside the control limits (i.e., 75-125%) in the SOIL-Q-12-6 MS/MSD pair (in SDG: SAII32). The post-digestion spike recoveries were in control. All antimony and potassium results were positive and were flagged "J, m" in the associated samples. The RPD for mercury (36.42%) was greater than

the acceptance limit (i.e., 35%) in the SOIL-Q-1-6 MS/MSD pair (in SDG: SAII39). Positive mercury results were flagged "J, d". The %D for zinc (11.0%) was greater than the acceptance limit (i.e., <10%) in the serial dilution sample. Positive zinc results were flagged "J, s" in the associated samples.

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, several samples were analyzed at dilutions for organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. Except for rejected data points, all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII34_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____October 16, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the trip blanks, TB072402-RSL and TB072402-RSLDUP, displayed a positive detection for styrene at 2.3 µg/L and 2.2 µg/L, respectively. The positive styrene result in sample GW-AA-Q-7-74-DUP was flagged "U, y". The trip blank displayed a positive detection for chloromethane at 0.23 µg/L. Positive chloromethane results in the associated samples were flagged "U, y" at the reporting limit. The initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for bromomethane at 0.987. Bromomethane was not detected in the associated samples and non-detects were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/7/02 at 12:18 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at -27.6% and bromomethane at -40.9%. The positive chloromethane result in sample Trip Blank was flagged "J, c". Since all other chloromethane and bromomethane results in the associated samples were previously flagged due to other QC failures, no additional data flags were applied. The relative percent differences (RPDs) for 2-butanone (36%), chloroform (28%), ethyl benzene (19%), 1,1,2,2-tetrachloroethane (25%), and 1,2-dichloroethene (total, 25%) were greater than the acceptance limits in the GW-AA-UAA-4-30 MS/MSD pair. Since the MS/MSD recoveries for these compounds were in control, no data qualifying action was taken.

For the SVOC analyses, the method blank, 0729F-EMB, displayed positive detections for indeno(1,2,3-cd)pyrene at 1.1 µg/L, dibenzo(a,h)anthracene at 1.3 µg/L, and benzo(g,h,i)perylene at 1.5 µg/L. Positive results in the associated samples were flagged "U, z" at the reporting limit. The CCVs analyzed on 8/14/02 at 09:33 and 8/14/02 22:53 displayed %Ds greater than the control limit (i.e., <20%) for dinoseb at 35.7% and 24.9%, respectively. The CCV analyzed on 8/14/02 at 09:00 displayed %Ds greater than the control limit for bis(2-chloro-ethyl)ether (22.9%) and hexachlorocyclopentadiene (-41.8%). The CCV analyzed

on 8/14/02 at 22:24 displayed %Ds greater than the control limit for bis(2-chloro-ethyl)-ether (24.6%), hexachlorocyclopentadiene (-41.2%), and nitrobenzene-d5 (21.7%). Since all compounds were either not detected in the associated samples or were surrogates, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the %Ds for 2,4-DCAA (-16.6%) on the primary column; and for heptachlor (20.1%), 2,4-DCAA (-16.8%), tetrachloro-m-xylene (TCMX, -23.0%), decachlorobiphenyl (DCBP, -21.8%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/2/02 at 15:36. The %Ds for 2,4-DCAA (-17.5%) on the primary column; and for heptachlor (31.4%), 2,4-DCAA (-19.6%), TCMX (-22.7%), DCBP (-18.2%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/3/02 at 02:54. The positive heptachlor result in sample GW-AA-Q-7-64 was flagged "J, c". The DCBP surrogate recoveries in sample GW-AA-Q-7-24 (15% and 13%) and in the laboratory control sample (22% and 18%) were less than the lower control limit. No target compounds were detected in sample GW-AA-Q-7-24 and these non-detects were flagged "UJ, s". Since the laboratory control sample is a QC sample and all LCS recoveries were in control, no data qualifying action was taken. The TCMX surrogate recovery on the confirmation column (24%) and DCBP recoveries (14% and 10%) on both columns were less than the lower control limit in sample GW-AA-Q-7-64. All results, except those previously flagged due to calibration failure, were flagged "UJ, s". The DCBP surrogate recovery on the confirmation column (28%) was less than the lower control limit in sample GW-AA-UAA-4-20DUP. Since only one recovery was slightly outside the control limit and all other surrogate recoveries were in control, no data qualifying action was taken. The RPDs for alpha-BHC (43%), gamma-BHC (32%), heptachlor (27%), aldrin (27%), gamma-chlordane (25%), and alpha-chlordane (24%) were greater than the acceptance limits in the GW-AA-UAA-4-20 MS/MSD pair. Since the MS/MSD recoveries were in control for these compounds, no data qualifying action was taken. The RPD between primary and confirmation columns for heptachlor in sample GW-AA-Q-7-64 (50.0%) was greater than the acceptance limit (i.e., < 40%). Since this result was previously flagged due to calibration failure, no additional data flags were applied. It should be noted that the lower result was reported by the laboratory. This result may be biased low.

For the herbicide analyses, the %D for MCPA (15.5%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/6/02 at 20:25. The %Ds for dalapon (25.3%) and MCPA (23.6%) on the primary column and for dalapon (18.4%), MCPP (-15.8%), and MCPA (18.8%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/7/02 at 08:36. Dalapon and MCPA

were not detected in the associated samples and were flagged "UJ, c". Since MCPP was not detected in the associated samples and these results had an acceptable %D on the alternate column, no data qualifying action was taken. The LCS recovery for pentachlorophenol (PCP) was greater than the upper control limit (i.e., 110%) at 145%. Since PCP was not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for lead (124%) and sodium (66%) were outside the control limit (i.e., 80-120%). Since the recoveries for lead and sodium were only marginally outside the control limits, no data qualifying action was taken. Aluminum was detected in the preparation blank (PB) at 0.02999 mg/L, in the initial calibration blank (ICB) at 0.03520 mg/L, and in three continuing calibration blanks at 0.03595 mg/L (CCB3), 0.04131 mg/L (CCB4), and 0.03621 mg/L (CCB5). Copper was detected in CCB3 at 0.00105 mg/L, CCB4 at 0.00167 mg/L, and CCB5 at 0.00125 mg/L. Selenium was detected in the ICB at 0.00508 mg/L, CCB3 at 0.00731 mg/L, and CCB5 at 0.00471 mg/L. Positive aluminum, copper, and selenium results less than five times the blank concentration were flagged "U, o" at the reporting limit in the associated samples. Zinc was detected in the PB at 0.00417 mg/L. All positive zinc results were flagged "U, p" for results greater than the reporting limit or "U, p" at the reporting limit for results less than the reporting limit. Arsenic was detected in the ICB at -0.00368 mg/L. Thallium was detected in the ICB at -0.00411 mg/L and CCB5 at -0.00554 mg/L. Arsenic and thallium results were flagged "J, o" for positive detections or "UJ, o" for non-detects due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Barium, calcium, iron, magnesium, and manganese were also detected in the PB, ICB and/or CCBs at low level. Since the results for these analytes in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

For the methane analyses, the correlation coefficient for the initial calibration analyzed on 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on the flame ionization detector (FID). Positive methane results in the associated samples were flagged "J, r". The %D for methane (20.0%) on the thermo-conductivity detector (TCD) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/1/02 at 09:44. Positive methane results reported from the TCD were flagged "J, c". The methane result in sample GW-AA-Q-7-64 exceeded the linear range of the calibration curve. Since this methane result was previously flagged due to initial calibration failure, no additional data flags were applied. The methane results reported from the TCD detector should be used for data interpretation. The MS/MSD recoveries for methane (50% and 50%) were less than the lower control limit (i.e., 75%) in the GW-AA-UAA-4-20 MS/MSD pair. Since all methane results were previously flagged due to other QC

failure, no additional data flags were applied. The field duplicates displayed a RPD greater than the control limit (i.e., 50%) for methane at 130.8%. Since all methane results were previously flagged due to other QC failures, no additional data flags were applied.

For the nitrate-N analyses, the MS/MSD recoveries (47% and 44%) were less than the lower control limit (i.e., 75%) in the GW-AA-UAA-4-60 MS/MSD pair (in SDG: SAII36). All nitrate-N results in the associated samples were flagged "UJ, m".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII36_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____October 25, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticide analyses, the LCS/LCSD recoveries were less than the QC limit (i.e., 46-131%) for alpha-BHC (43% and 38%). The LCSD recovery for 4,4-DDE was also less than the QC limit (i.e., 48-145%) at 42%. Positive results were previously flagged due to calibration failure and no data qualifying action was taken. Non-detects were flagged "R",l" in the associated samples.

Minor Anomalies: For the VOC analyses, the trip blank TB072502-RSL contained chloromethane at 0.34 ug/L and ethylbenzene at 0.88 ug/L. Positive results less than five times the blank concentration were flagged "U,y" for results greater than the RL, and "U,y" at the reporting limit for results less than the RL. The initial calibration correlation coefficient for bromomethane (0.987) was less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/1/02. All associated sample results were non-detects and were flagged "UJ,r". The continuing calibration %D was greater than the QC limit (i.e., 20%) for chloromethane (-38.2%) for the continuing calibration analyzed on 8/7/02 at 2230. The positive chloromethane result in the trip blank was flagged "J,c".

For the SVOC analyses, the method blank contained indeno (1,2,3-cd) pyrene at 0.7 ug/L, dibenzo (a,h) anthracene at 0.58 ug/L, and benzo (g,h,i) perylene at 0.65 ug/L. Positive results less than five times the blank concentration were flagged "U,z" at the reporting limit. The initial calibration correlation coefficients for 2,6-dinitrotoluene (0.986), 3-nitroaniline (0.988), and 4-nitroaniline (0.986) were less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/10/02. All associated sample results were non-detects and were flagged "UJ,r". The %D was greater than the QC limit (i.e., 20%) for 2,4-dinitrophenol (25.5%) for the continuing calibration analyzed on 8/13/02 at 1035. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The recovery for surrogate 2-fluorobiphenyl (35%) was less than the lower control limit in sample GW-AA-UAA-4-70. No action is required based on one surrogate

failure and no data flags were applied. Three base-neutral surrogates in sample GW-AA-Q-6-24DL (DF = 4), and surrogate terphenyl-d14 in samples GW-AA-Q-6-24-DUP DL (DF = 4), GW-AA-Q-6-34 DL (DF = 4), and GW-AA-Q-6-24-DUPFILTERED DL (DF = 4) were diluted out. Positive results were flagged "J,s" and non-detects were flagged "UJ,s". Several compounds exceeded the calibration range in several samples and were flagged "E" by the laboratory. These results were flagged "J,q". These samples were re-analyzed at different dilution factors and the results from the dilution analyses should be used for data interpretation. The %RPDs were greater than the QC limit (i.e., 50%) for naphthalene (51%) in the field duplicate pair, GW-AA-Q-6-24/ GW-AA-Q-6-24 DUP, for phenol (95%) in the field duplicate pair, GW-AA-Q-6-34/ GW-AA-Q-6-34DUP, and for naphthalene (52%) and 2-methylnaphthalene (60%) in the field duplicate pair, GW-AA-Q-6-24FILTER/ GW-AA-Q-6-24FILTER DUP. These results were flagged "J,f".

For the pesticide analyses, the %Ds for alpha-BHC (-16.5% and –21.9%) on both columns, 4,4-DDE (-16.6%) and endrin ketone (16.3%) on the primary column and delta-BHC (-19.7%), 4,4-DDT (16.3%), endrin aldehyde (15.9%), and endosulfan sulfate (18.3%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/19/02 at 1835. The %Ds for alpha-BHC (-16.5% and –22.3%), endrin (17.7% and 19.3%), 4,4-DDT (22.7% and 29.1%), and methoxychlor (37.1% and 20.0%) on both columns, 4,4,-DDE (-15.5%) and endrin ketone (21.4%) on the primary column, delta-BHC (-20.4%), endrin ketone (21.4%), endosulfan sulfate (20.6%), and endrin aldehyde (20.6%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/20/02 at 0054. Positive results were flagged "J,c" and non-detects were flagged "UJ,c" for alpha-BHC, endrin, 4,4-DDT and methoxychlor in the associated samples. Positive results were flagged "J,c" for the other compounds in the associated samples. No data flags were applied to the non-detects for the other compounds since the recoveries were acceptable on the alternate column. The MS/MSD recoveries for alpha-BHC (32% and 44%) and the MS recoveries for gamma-BHC (38%) and delta-BHC (49%) were less than the QC limit. The %RPDs for alpha-BHC (32%), gamma-BHC (40%), heptachlor (39%), gamma-chlordane (23%), alpha-chlordane (24%), endosulfan I (28%), 4,4-DDE (28%), and endrin ketone (26%) were greater than the QC limit. Alpha-BHC and 4,4-DDE results were previously flagged due to LCS failure and no further data qualifying action was required. The MS and or MSD and LCS recoveries were acceptable for the other compounds and no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., < 40%) for several compounds in several samples. These results were flagged "J,g".

For the herbicide analyses, the %D for MCPA (15.5%) on the confirmation

column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/6/02 at 2025. The %Ds for dalapon (25.3% and 18.4%) and MCPA (23.6% and 18.8%) on both columns, and MCPP (-15.8%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/7/02 at 0836. Positive results were flagged "J,c" and non-detects were flagged "UJ,c" for MCPA and dalapon the associated samples. All associated sample results were non-detects for MCPP and no data qualifying action was required since the %D was acceptable on the alternate column. The LCS recovery for pentachlorophenol (145%) was greater than the QC limit (i.e., 11-110%). No positive results were reported and no data qualifying action was required.

For the metal analyses, the initial CRDL percent recoveries for lead (124%) and sodium (66% and 76%) and the final CRDL percent recoveries for sodium (78%) and thallium (67%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, copper and zinc and negative results for calcium and thallium. Positive results less than 5 times the blank concentration were flagged "U,p" at the reporting limit for aluminum, copper and zinc. Thallium non-detects were flagged "UJ,p" in all samples. Calcium results were greater than 5 times the blank concentration and no data qualifying action was required. The initial and continuing calibration blanks also contained negative results for arsenic, calcium, magnesium and thallium and positive results for selenium, manganese, aluminum, barium, thallium, calcium and magnesium at low levels. All associated sample results were either previously flagged due to method blank contamination or were greater than 5 times the blank concentration and no data qualifying action was required. The MS/MSD recoveries for the filtered samples were greater than the QC limit (i.e., 75-125%) for aluminum (140% and 140%) and potassium (128% and 126%). Positive results were flagged "J,m" unless previously flagged due to other failures. The serial dilution %D was greater than the QC limit (i.e., 10%) for aluminum (22.6%). Positive results were flagged "J,s".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.986 for instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. No MS/MSD recoveries were calculated. No data qualifying action was required since the sample concentration was greater than 4 times the spiking amount. Methane exceeded the calibration range in all samples and was flagged "E" by the laboratory. These results were previously flagged due to calibration failure, and no data qualifying action was taken. The results from the TCD detector should be used.

For the wet chemistry analyses, the %RPD was greater than the QC limit (i.e., 50%) for CO2 (67%) in the field duplicate pair, GW-AA-Q-6-24/ GW-AA-Q-6-24 DUP. These results were flagged "J,f".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII37_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____October 25, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the SVOC analyses, the MS/MSD recoveries for 3,3'-dichlorobenzidine (0% and 2%) were less than the lower control limit (i.e., 10%) in the GW-AA-Q-6-54 MS/MSD pair. The MSD recovery for nitrobenzene (48%) was less than the lower control limit (i.e., 50%). This MS/MSD pair displayed 24 of 64 RPDs greater than the acceptance limit. This MS/MSD pair was re-analyzed and displayed similar results (MS and MSD recoveries for 3,3'-dichlorobenzidine at 3% and 6%, respectively). All 3,3'-dichlorobenzidine results in the associated samples were flagged "R, m". Since the MS recovery for nitrobenzene was in control and the MS/MSD recoveries for other RPD outliers were in control, no further data qualifying action was taken.

Minor Anomalies: For the VOC analyses, the trip blank displayed a positive detection for styrene at 2.3 μg/L. Since this compound was not detected in the associated samples, no data qualifying action was taken. The trip blank, TB072902-RSL, displayed positive detections for chloromethane at 0.18 μg/L and benzene at 0.29 μg/L. Positive chloromethane and benzene results less than five times the blank concentration were flagged "U, y" at the reporting limit in the associated samples. The initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for bromomethane at 0.987. Bromomethane non-detect results in the associated samples were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/8/02 at 10:13 displayed %Ds greater than the control limit (i.e. 20%) for bromomethane at -38.8% and acetone at 20.5%. The continuing calibration verification (CCV) analyzed on 8/9/02 at 21:03 displayed %Ds greater than the control limit for chloromethane at -27.2% and bromomethane at -26.3%. Positive acetone results in samples GW-AA-Q-6-74 and GW-AA-Q-1-50 were flagged "J, c". Since bromomethane results in the associated samples were previously flagged due to initial calibration failure, no additional data flags were applied. Since chloromethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to

affect the non-detect values, no data qualifying action was taken. The MS/MSD recoveries for benzene (0% and 20%) were less than the lower control limit (62%) in the GW-AA-Q-6-54 MS/MSD pair. Since the benzene concentration in the parent sample was greater than four times the spiking concentration and the LCS recovery for benzene was in control, no data qualifying action was taken.

For the SVOC analyses, the CCV analyzed on 8/5/02 at 10:15 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (-33.3%), 2,4-dinitrotoluene (-20.5%), and 4,6-dinitro-2-methylphenol (-26.0%). The CCV analyzed on 8/15/02 at 11:29 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether (25.7%), hexachlorocyclopentadiene (-44.2%), and 2,4-dinitrophenol (24.6%). The CCVs analyzed on 8/5/02 at 10:44 and 8/15/02 at 12:00 displayed %Ds greater than the control limit for dinoseb at -24.8% and 41.9%, respectively. The CCV analyzed on 8/28/02 at 14:38 displayed a %D greater than the control limit for bis(2-ethylhexyl)phthalate (24.8%). The CCV analyzed on 8/29/02 at 09:19 displayed %Ds greater than the control limit for 2,4-dinitrophenol (-26.2%), 4,6-dinitro-2-methylphenol (-23.4%), and dinoseb (-20.6%). Since these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Sample GW-AA-Q-6-54MSRE displayed %Rs greater than the upper control limit (i.e., 200%) for internal standards chrysene-d12 (264.3%) and perylene-d12 (262.4%). Since this re-analyzed QC sample results were used to confirm the original MS/MSD analysis and not used for data interpretation, no data qualifying action was taken.

For the pesticides analyses, the %D for surrogate tetrachloro-m-xylene (TCMX, -17.6%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/6/02 at 14:28. The %Ds for aldrin (15.7%) on the primary column and the surrogate TCMX (-19.3%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/7/02 at 02:36. The positive aldrin result in sample GW-AA-Q-6-64 was flagged "J, c". Since TCMX is a surrogate, no data qualifying action was taken. The DCBP surrogate recoveries on both columns in samples GW-AA-Q-6-110 (24% and 22%), GW-AA-UAA-4-113 (26% and 22%), and GW-AA-Q-1-50 (20% and 14%) were less than the lower control limit (i.e., 30%). All results in these three samples were flagged "J, s" for positive detections or "UJ, s" for non-detects. The DCBP surrogate recoveries on the confirmation column in the method blank (20%) and sample GW-AA-UAA-4-100 (28%) were less than the lower control limit (i.e., 30%). Since all other surrogate recoveries were in control, no data qualifying action was taken. The RPD for 4,4'-DDE (20%) was greater than the acceptance limit (i.e., 18%) in the LCS/LCSD pair. Since both LCS and LCSD recoveries were in control and 4,4'-DDE was not detected in the associated samples, no data qualifying action was taken. The RPDs between

primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicide analyses, the method blank prepped on 8/1/02 displayed a positive detection for pentachlorophenol (PCP) at 0.24 µg/L. Positive PCP results were flagged "U, z" at the reporting limit in the associated samples. The CCV analyzed on 8/6/02 at 09:31 displayed %Ds greater than the control limit on both columns for PCP at -18.5% and -20.2%, 2,4,5-TP at -22.1% and -23.3%, 2,4,5-T at -22.2% and -24.2%, and 2,4-DB at -20.1% and -16.2%. These compounds were not detected in the associated samples and non-detects were flagged "UJ, c". The CCV analyzed on 8/6/02 at 20:25 displayed a %D greater than the control limit on the confirmation column for MCPA at 15.5%. Since MCPA was not detected in the associated samples and this result had an acceptable %D on the alternate column, no data qualifying action was taken. The recovery for surrogate 2,4-DCAA on the primary column in sample GW-AA-Q-1-50 (275%) was greater than the upper control limit (i.e., 133%). Positive results, except those previously flagged due to calibration failure, were flagged "J, s" in this sample. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results detected in sample GW-AA-Q-1-50. Since these results were previously flagged due to calibration failure or surrogate recovery failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for iron (79%) and selenium (123%), and the final CRDL percent recoveries for iron (79%), lead (124%), and selenium (129%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 0.02207 mg/L and calcium at 0.01840 mg/L. Positive aluminum results in the associated samples less than five times the blank concentration were flagged "U, p" at the reporting limits. Since calcium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Copper was detected in four continuing calibration blanks (CCBs) at concentrations ranging from 0.00082 mg/L (CCB4) to 0.00106 mg/L (CCB5). Positive copper results in samples GW-AA-Q-6-64-filtered and GW-AA-Q-6-110-filtered were flagged "U, o" at the reporting limit. Vanadium was detected in CCB3 at 0.00119 mg/L, CCB4 at 0.00125 mg/L, and CCB5 at 0.00106 mg/L. Positive vanadium results in samples GW-AA-UAA-4-100-filtered, GW-AA-UAA-4-113-filtered, and GW-AA-Q-1-50-filtered were flagged "U, o" at the reporting limit. Aluminum, Barium, calcium, magnesium, and manganese were also detected in the initial calibration blank (ICB) and/or CCBs at low levels.

Since these analyte results in the associated samples were either previously flagged due to preparation blank contamination or were greater than five times the blank concentration, no data qualifying action was taken. The MS/MSD recoveries for aluminum (184% and 156%), potassium (127% in MS), and sodium (129% in MS) were greater than the upper control limit (i.e., 125%) in the GW-AA-Q-6-64 MS/MSD pair. Positive aluminum, potassium, and sodium results in the associated samples were flagged "J, m". The post-digestion spike recoveries were in control.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on the flame ionization detector (FID). Positive methane results in the associated samples were flagged "J, r". The %D for methane (24.9%) on the FID detector was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/6/02 at 13:25. Since all methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The MS/MSD recoveries for methane (66% and 74%) were less than the lower control limit (i.e., 75%) in one non-client MS/MSD pair. Since the parent sample is a non-client sample and the LCS recovery was in control, no data qualifying action was taken. The methane results in samples GW-AA-Q-6-64, GW-AA-Q-6-110, and GW-AA-Q-6-104 exceeded the linear range of the calibration curve on the FID detector. Since these methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The methane results reported from the thermo-conductivity detector (TCD) should be used for data interpretation.

For the nitrate-N analyses, the MS/MSD recoveries (40% and 41%) were less than the lower control limit (i.e., 75%) in the GW-AA-Q-6-64 MS/MSD pair. Positive nitrate-N results in the associated samples were flagged "J, m" and non-detects were flagged "UJ, m".

For the sulfate analyses, the MS/MSD recoveries (68% and 68%) were less than the lower control limit (i.e., 75%) in one non-client Ms/MSD pair. Since the parent sample is a non-client sample and the LCS recovery was in control, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the

rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII38_____ **Fraction: _TCLP - VOCs, SVOCs, Pest., PCBs, __Herb., Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____JA_____ **Date: _____October 24, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the TCLP herbicide analyses, surrogate 2,4-DCAA was not recovered (0%) on the confirmation column for sample WASTE-Q-1-COMP-T. The positive 2,4-D result was flagged "J, s" and the non-detect 2,4,5-TP result was flagged "R, s". The 2,4-D result in this sample exceeded the linear range of the calibration curve. Since this 2,4-D result was previously flagged due to surrogate recovery failure, no additional data flags were applied. This sample was diluted by a factor of 10 and re-analyzed by the laboratory. Surrogate 2,4-DCAA was diluted out in this diluted sample. No data qualifying action was taken for this diluted sample since the dilution factor was equal to 10. The 2,4-D and 2,4,5-TP results from the dilution analysis should be used for data interpretation.

Minor Anomalies: For the TCLP VOC analyses, the continuing calibration verification (CCV) analyzed on 8/9/02 at 09:51 displayed a %D greater than the control limit (i.e. 20%) for 2-butanone at -32.2%. Since 2-butanone was not detected in the associated samples, and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The RPDs for 2-butanone were greater than the control limit (i.e. 31%) in the WASTE-Q-9-8 MS/MSD pair (42%) and in the WASTE-Q-10-8 MS/MSD pair (43%). Since the MS and MSD recoveries met criteria and 2-butanone was not detected in the associated samples, no data qualifying action was taken.

For the TCLP SVOC analyses, two base/neutral surrogates, nitrobenzene-d5 and 2-fluorobiphenyl, were diluted out (0%) in sample WASTE-Q-1-COMP-T (DF=5). Positive base/neutral results were flagged "J, s" and non-detects were flagged "UJ, s" in sample WASTE-Q-1-COMP-T. All base/neutral surrogates and two acid surrogates were diluted out in the diluted sample WASTE-Q-1-COMP-TDL (DF=10). No data qualifying action was taken for this diluted sample since the dilution factor was greater than or equal to 10. The pentachlorophenol result in sample WASTE-Q-1-COMP-T exceeded the

calibration range and was flagged "E" by the laboratory. This result was flagged "J, q". This sample was re-analyzed at a higher dilution factor with acceptable results. The pentachlorophenol result from the dilution analyses should be used for data interpretation.

For the TCLP pesticides analyses, the %Ds for 2,4-DCAA (-16.0%) and tetrachloro-m-xylene (TCMX, -16.7%) on the primary column, and for alpha-BHC (-33.0%), delta-BHC (-30.2%), 4,4-DDE (-28.9%), TCMX (-23.0%) and decachlorobiphenyl (DCBP, 28.2%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/9/02 at 22:09. The %Ds for 4,4'-DDT (16.0%), 2,4-DCAA (-20.6%) and TCMX (-21.0%) on the primary column, and for alpha-BHC (-32.8%), delta-BHC (-29.4%), 4,4-DDE (-29.9%), 2,4-DCAA (-17.3%), TCMX (-23.6%) and DCBP (-20.2%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/10/02 at 08:11. These target compounds were not detected in the associated samples. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The method blank (0801O-IMB) displayed a surrogate %R less than the lower control limit (i.e., 30%) on confirmation column for DCBP at 26%. Since this is a QC sample and all other surrogate recoveries were in control, no data qualifying action was taken. The LCS (0801O-IMBLCS) displayed surrogate %Rs less than the lower control limit on both columns for DCBP at 22% and 18%. Since this is a QC sample and target compound recoveries in the LCS were in control, no data qualifying action was taken. The TCMX surrogate recovery on the confirmation column (16%) and the DCBP surrogate recoveries on both columns (27% and 11%) in sample WASTE-Q-1-COMP-T were less than the lower control limit. All results in this sample were flagged "UJ, s". Sample WASTE-Q-1-COMP-T displayed an internal standard (IS) greater than the upper control limit (i.e. 150%) for bromonitrobenzene at 346.1%. Since the sample was non-detect, no data qualifying action was taken.

For the TCLP herbicides analyses, the %Ds for 2,4-D (16.4% and 20.3%) and 2,4,5-TP (16.2% and 19.1%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/16/02 at 11:07. Since the associated samples are QC samples (MS/MSD), no data qualifying action was taken. The %D for 2,4-D (17.8%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/5/02 at 02:34. The positive 2,4-D result in the diluted sample, WASTE-Q-1-COMP-TDL, was flagged "J, c".

For the TCLP metals analyses, the preparation blank displayed a positive detection for selenium at -72.8 μg/L. The selenium results in the associated samples were flagged "UJ, p" due to the possibility of a negative drift in the

instrument that may give rise to a detection limit with a low bias. The MS/MSD recoveries for lead (1328% and 1327%) were greater than the upper control limit (i.e., 125%) in the WASTE-Q-10-COMP-T MS/MSD pair. Positive lead results in the associated samples were flagged "J, m". The post-digestion spike recovery for lead was in control. The field duplicates displayed an absolute difference greater than the control limit (i.e., two times the reporting limit, 0.40 mg/L) for lead at 0.45 mg/L. Since all lead results were previously flagged due to MS/MSD recovery failure, no additional data flags were applied.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII39_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 22, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the initial calibration analyzed on 7/11/02 on instrument SMO5973 displayed a relative response factor (RRF) less than the control limit (i.e. <0.05) for acetone at 0.0487. The CCV analyzed on 8/5/02 at 09:22 on instrument MSO5973 displayed a RRF less than the control limit for acetone at 0.04065. Associated sample results displayed positive detections and were flagged "J,c". The CCV analyzed on 8/5/02 also displayed %Ds greater than the control limit (i.e. <20%) for 1,1-dichloroethane at 50.5%, for tetrachloroethene at 26.3%, for 2-hexanone at -20.9%, for dibromochloromethane at 22.7%, and for 1,2-dichloroethene (total) at 35.7%. Associated sample results with positive detections were flagged "J,c". Non-detect 1,1-dichloroethane results were flagged "UJ,c". The CCV analyzed on 7/31/02 at 08:04 on instrument MSM5972 displayed %Ds greater than the control limit for bromomethane at 43.3%, for acetone at 25.6%, and for methylene chloride at -32.6%. Since all associated sample results were non-detect and the anomalies were only marginally outside the control limit, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the control limit for toluene at 252% and 252%, for tetrachloroethene at 214% and 214%, for chlorobenzene at 176% and 172%, for ethylbenzene at 138% and 141%, for xylene (total) at 182% and 193%, and in the MSD for 1,1-dichloroethane at 138%. Since the majority of MS/MSD results were acceptable and the LCS met criteria for these compounds, or, these compounds were previously flagged for other anomalies, no data qualifying action was taken. The mid-level LCS displayed a %R greater than the upper control limit for 1,1-dichlorothane at 136%. Since the positive 1,1-dichloroethane result was previously flagged for CCV anomalies, no further data qualifying action was taken.

For the SVOC analyses, sample SOIL-Q-9-0.5 was extracted past the recommended holding time (i.e. 14 days) by three days. Analytes with positive detections were flagged "J,h"; non-detects were flagged "UJ,h". The CCV analyzed on 8/16/02 at 00:50 displayed %Ds greater than the control limit (i.e. <20%) for bis (2-chloroethyl) ether at 27.7%, for hexachlorocyclopentadiene at -49.4%, for 4,6-dinitro-2-methylphenol at 21.9%, and for dinoseb at 44.0%, which was analyzed on 8/16/02 at 01:47. The CCV analyzed on 8/30/02 at 09:50 displayed %Ds greater than the control limit for bis (2-chloroisopropyl) ether at 22.3%, for 4,6-dinitro-2-methylphenol at -29.4%, and for dinoseb at -21.4%. Since the associated sample results were non-detect and the anomalies were only marginally outside the control limit, no data qualifying action was taken. The CCV analyzed on 8/16/02 at 18:09 displayed %Ds greater than the control limit for bis (2-chloroethyl) ether at 21.0%, for hexachlorocyclopentadiene at -40.7%, for 2,4-dinitrophenol at 24.5%, for 4,6-dinitro-2-methylphenol at 22.2%, and for dinoseb at 51.1%, which was analyzed on 8/16/02 at 18:42. Associated non-detect dinoseb results were flagged "UJ,c". Since all other analytes were non-detect and the anomalies were only marginally outside the control limit, no data qualifying action was taken. Samples SOIL-Q-1-6, SOIL-Q-1-6DL, SOIL-Q-9-6, and SOIL-Q-10-0.5-DUP displayed surrogate recoveries less than the lower control limit at 0%. Since these samples were analyzed at dilutions greater than 10x, no data qualifying action was taken. Pentachlorophenol exceeded the calibration range in sample SOIL-Q-1-6 and was flagged "J,q". The sample was re-analyzed at a dilution and pentachlorophenol was within calibration range. It is recommended that the re-analyzed pentachlorophenol result be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 8/28/02 at 12:34 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for dieldrin at 15.5%, for 4,4'-DDD at 17.1%, for methoxychlor at 21.7%, and for endrin ketone at 17.3% and on the confirmation column for alpha-BHC at -20.9% and for endosulfan sulfate at 15.6%. Since the analytes met criteria on the alternate column, no data qualifying action was taken. The CCV analyzed on 8/29/02 at 16:41 displayed %Ds greater than the control limit on both columns for alpha-BHC at -16.8% and -25.0% and on the primary column for delta-BHC at -18.9%. Since these were non-target analytes, no data qualifying action was taken. The CCVs analyzed on 8/28/02 at 21:19 and on 8/30/02 at 00:20 displayed several compounds with %D anomalies on either column or both columns. Since there were no samples associated with these CCVs, no data qualifying action was taken. Surrogate tetrachloro-meta-xylene (TCMX) displayed %Rs less than the control limit (i.e. 30%) in the method blank on the primary column at 29% and in the LCS on both columns at 26% and 28%. Since these are QC samples and the other surrogate, decachlorobiphenyl (DCBP) met criteria, no data qualifying action was taken. Sample SOIL-Q-10-0.5 displayed a surrogate recovery less than the lower control limit for TCMX on the primary column at 26%. Since surrogate DCBP met criteria, no data qualifying action was taken. Sample SOIL-Q-1-0.5-DL displayed surrogate recoveries greater than the

upper control limit for DCBP on both columns at 184% and 226%. The only analyte of concern in this diluted sample, 4,4'-DDT, was flagged "J,s". Sample SOIL-Q-10-0.5-DUP displayed surrogate recoveries less than the lower control limit for TCMX on both columns at 19% and 22% and displayed %Rs greater than the control limit on both columns for surrogate DCBP at 440% and 340%. Associated sample results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s", unless previously flagged for dual column imprecision. Other samples displayed surrogate %Rs at 0%. Since these samples were analyzed at dilutions greater than 10x, no data qualifying action was taken. Several sample results displayed %RPDs between columns greater than the control limit (i.e. <40%) and were flagged "J,g". 4,4'-DDT displayed results greater than the calibration range in samples SOIL-Q-1-0.5 and SOIL-Q-9-0.5 and were flagged "J,q". These samples were re-analyzed at dilutions and the 4,4'-DDT results were within calibration range. It is recommended that the re-analyzed 4,4'-DDT results be used for data interpretation. Field duplicates SOIL-Q-10-0.5 and SOIL-Q-10-0.5-DUP displayed %RPDs or absolute differences greater than the control limit (i.e. <100% or <2x the RL) for heptachlor epoxide at 4.28 ug/kg, gamma-chlordane at 173.5%, for 4,4'-DDT at 174.5%, for dieldrin at 12.4 ug/kg, and for endrin aldehyde at 13.6 ug/kg. For associated sample results with %RPD anomalies, positive detections were flagged "J,f", unless previously flagged for other anomalies. Associated positive sample results associated with the absolute difference anomalies were flagged "J,f"; non-detects were flagged "UJ,f", unless previously flagged for other anomalies.

For the PCB analyses, several samples displayed surrogate %Rs at 0%. Since these samples were analyzed at dilutions greater than 10x, no data qualifying action was taken.

For the herbicides analyses, the method blank displayed a positive detection for pentachlorophenol at 14 ug/kg. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,z". The CCV analyzed on 8/6/02 at 20:25 displayed a %D greater than the control limit (i.e. <20%) for MCPA on the confirmation column at 15.5%. Since the analyte met criteria on the alternate column, no data qualifying action was taken. Sample SOIL-Q-1-0.5 displayed a surrogate recovery of 0%. Since this sample was analyzed at a dilution greater than 10x, no data qualifying action was taken. Several sample results displayed %RPDs between columns greater than the control limit (i.e. 40%) and were flagged "J,g".

For the metals analyses, the initial and final CRDLs displayed %Rs greater than the upper control limit (i.e. <120%) for aluminum at 124% and 136% and for lead at 136% and 124%. The CRDLs also displayed %Rs less than the lower control limit (i.e. 80%) for thallium at 73%, 78%, 67% and 73%; and for sodium at 69%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for aluminum at 2.3402 mg/kg, for calcium at 2.0763 mg/kg, for magnesium at 0.6902 mg/kg, and for sodium

at 41.274 mg/kg. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,p". The prep blank also displayed negative detections for arsenic at -0.6313 mg/kg and for cadmium at -0.0523 mg/kg. Associated sample results positive detections less than 5x the absolute amount found in the blank were flagged "J,p"; non-detects were flagged "UJ,p". The ICB, CCB4, CCB5, and CCB6 displayed positive detections for several analytes. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,o". CCB5 and CCB6 displayed negative detections for arsenic and potassium. Since the associated sample results were greater than 5x the absolute amount found in the blank, no data qualifying action was taken. Mercury displayed a negative detection in the ICB at -0.059 ug/L. Since the associated sample results were greater than 5x the absolute amount found in the blank, no data qualifying action was taken. The MS/MSD pair displayed %RPDs greater than the control limit (i.e. <35%) for copper at 130% and for mercury at 36.4%. Associated sample results with positive detections were flagged "J,d". The MS/MSD displayed %Rs either greater than the upper control limit (i.e. <125%) or less than the lower control limit (i.e. 75%) for antimony at 67% and 69% and for potassium in the MS at 126%. Associated antimony results with positive detections were flagged "J,m", unless previously flagged for blank contamination. Since the MSD and the post-digestion spike met criteria for potassium and the outlier was only slightly greater than the control limit, no data qualifying action was taken. The serial dilution displayed an absolute difference greater than the control limit (i.e. 10%) for zinc at 11.7%. Associated sample results with positive detections were flagged "J,s".

Correctable Anomalies: None.

Comments: For the SVOC, pesticides, PCBs, and herbicides analyses, the MS/MSDs were analyzed at high dilutions. Because of this, most of the analytes were not recovered. The LCS was used for data qualification.

For the SVOC analyses, field duplicates SOIL-Q-10-0.5 and SOIL-Q-10-0.5-DUP were analyzed at 1x and 10x dilutions, respectively. Due to the difference in dilution factors used in the field duplicate pair, it was not feasible to use this data to determine if the field duplicates were within control.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII40_____ **Fraction: _VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____JA_____ **Date: _____October 22, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the SVOC analyses, the MS and MSD samples were analyzed at a 10 times dilution due to matrix interference in the WASTE-Q-1-COMP MS/MSD pair. Most of the spiking compounds were diluted out. No data qualifying action was taken on this basis. Hexachlorocyclopentadiene (0% and 0%), 4,6-dinitro-2-methylphenol (0% and 0%), 2,4-dinitrophenol (0% and 0%) , and benzo(b)-fluoranthene (0% in MS) were not recovered in the WASTE-Q-9-COMP MS/MSD pair. This MS/MSD pair was re-analyzed by the laboratory. 2,4-Dinitrophenol (0% in MSD) and hexachlorocyclopentadiene (0% and 0%) were still not recovered. All 2,4-dinitrophenol and hexachlorocyclopentadiene results in the associated samples were flagged "R, m". Almost half of the MS/MSD recoveries were less than the lower control limit in the WASTE-Q-9-COMP MS/MSD pair. The surrogate recoveries for 2-fluorobiphenyl were less than the lower control limit (i.e., 30%) in samples WASTE-Q-9-COMPMS (21%), WASTE-Q-9-COMPMSD (24%), WASTE-Q-9-COMPMSRE (21%), and WASTE-Q-9-COMPMSDRE (22%). All other surrogate recoveries were in control but at low end. These MS and MSD samples displayed one or more internal standard peak area failures. The low MS/MSD recoveries may be attributed to the matrix interference and/or low extraction efficiency. The MS/MSD recoveries should not be used to assess the associated samples. Since LCS recoveries in the associated extraction batch were in control, no data qualifying action was taken. The data user is advised that the SVOC sample results may display more than usual bias or variability and should be used with caution.

Minor Anomalies: For the VOCs analyses, the Encore samplers for sample WASTE-Q-10-8 were received empty. This sample was analyzed from a bulk container and results may be biased low. All results in sample WASTE-Q-10-8 were flagged "J, Q" for positive detections and "UJ, Q" for non-detects. The continuing calibration

verification (CCV) analyzed on 7/31/02 at 08:08 displayed %Ds greater than the control limit (i.e., 20%) for bromomethane at 43.3%, acetone at 25.6%, and methylene chloride at -32.6%. Positive acetone and methylene chloride results were flagged "J, c" in the associated samples. Since bromomethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 7/31/02 at 20:23 displayed %Ds greater than the control limit for bromomethane at 35.5%, methylene chloride at -41.6%, and 2-butanone at -21.0%. Since associated samples were QC samples, no data qualifying action was taken. The MS/MSD recoveries for bromomethane (289% and 286%), acetone (173% and 177%), benzene (264% and 1292%), 1,2-dichloroethane (258% and 824%), trichloroethene (151%), 4-methyl-2-pentanone (168% and 322%), toluene (469% and 1621%), tetrachloroethene (258% and 659%), 2-hexanone (184% and 228%), chlorobenzene (415% and 969%), ethyl benzene (189% and 366%), total xylene (200% and 430%) were greater than the upper control limit due to matrix interference in the WASTE-Q-1-5' MS/MSD pair. The relative percent differences (RPDs) for benzene (124%), 1,2-dichloroethane (100%), 4-methyl-2-pentanone (58%), toluene (103%), tetrachloroethene (80%), chlorobenzene (74%), ethyl benzene (57%), and total xylene (64%) were greater than the acceptance limit. Positive detections for these compounds, except those flagged due to calibration failure, were flagged "J, m" in the parent sample. The MS/MSD recoveries for bromomethane (225% and 231%) and 1,1,1-trichloroethane (135% in MS) were greater than the upper control limit due to matrix interference in the WASTE-Q-9-8' MS/MSD pair. The RPDs for acetone (34%), methylene chloride (39%), chloroform (41%), 1,2-dichloroethane (37%), trichloroethene (41%), 1,2-dichloropropane (36%), bromodichloromethane (40%), cis-1,3-dichloropropene (40%), toluene (37%), 1,1,2-trichloroethane (41%), dibromochloromethane (35%), chlorobenzene (36%), bromoform (40%), and 1,1,2,2-tetrachloroethane (35%) were greater than the acceptance limit. Since these compounds were not detected in the parent sample, no data qualifying action was taken. Since LCS recoveries in the associated extraction batch were in control, no data qualifying action was taken to the associated samples. The data user is advised that the VOC sample results may display more than usual bias or variability and should be used with caution. The internal standard peak areas for chlorobenzene-d5 were less than the lower control limit (i.e., 50%) in samples WASTE-Q-1-5'MS (49.8%) and WASTE-Q-1-5'MSD (41.0%). Since these two samples are QC samples, no data qualifying action was taken. Field duplicates displayed absolute differences greater than the control limit (difference < 2X RL) for acetone and chlorobenzene. Acetone and chlorobenzene results, except those previously flagged due to calibration failure, were flagged "J, f" for positive detections or "UJ, f" for non-detects in the associated samples.

For the SVOCs analyses, the CCV analyzed on 8/16/02 at 00:55 displayed %Ds

greater than the control limit (i.e., 20%) for bis(2-chloroethyl)ether at 27.7%, hexachlorocyclopentadiene at -49.4%, 4,6-dinitro-2-methylphenol at 21.9%, and surrogate nitrobenzene-d5 at 21.2%. The CCV analyzed on 8/16/02 at 18:09 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether at 21.0%, hexachlorocyclopentadiene at -40.7%, 4,6-dinitro-2-methylphenol at 22.2%, and 2,4-dinitrophenol at 24.5%. The CCV analyzed on 8/30/02 at 09:50 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether at 22.3%, 4,6-dinitro-2-methylphenol at -29.4%, and dinoseb at -21.4%. Since all compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCVs analyzed on 8/16/02 at 01:47 and 8/16/02 at 18:42 displayed %Ds greater than the control limit for dinoseb at 44.0% and 51.1%, respectively. The dinoseb results in samples WASTE-Q-9-COMP and WASTE-Q-10-COMP-DUP were flagged "UJ, c". The surrogate recovery for 2-fluorobiphenyl was less than the lower control limit (i.e., 30%) in sample WASTE-Q-10-COMP (23%). Since all other surrogates in this sample were in control, no data qualifying action was taken. Surrogates were diluted out in samples WASTE-Q-1-COMP (DF =10), WASTE-Q-1-COMPDL (DF =50), WASTE-Q-1-COMPMS (DF =10), and WASTE-Q-1-COMPMSD (DF=10). Since the affected samples were analyzed at dilutions equal to or greater than 10, no data qualifying action was taken. Sample WASTE-Q-10-COMP-DUP displayed %Rs less than the lower control limit (i.e., 50%) for internal standards chrysene (44.9%) and perylene-d12 (31.3%). All results associated with those two surrogates were flagged "J, n" for positive detections or "UJ, n" for non-detects. This sample was re-analyzed on 8/16/02 by the laboratory and displayed three internal standard peak areas less than the lower control limits. The re-analyzed sample results should not be used for data interpretation. Sample WASTE-Q-1-COMP displayed 2,4-dichlorophenol and pentachlorophenol results that exceeded the calibration range. These results were flagged "J, q". This sample was re-analyzed at a greater dilution and these results were within the calibration range. It is recommended that results from the dilution analysis be used for data interpretation.

For the pesticides analyses, the CCV analyzed on 8/7/02 at 18:57 displayed a %D greater than the control limit on the confirmation column for endosulfan I (-15.7%). The positive endosulfan I result in sample WASTE-Q-10-COMP was flagged "J, c". The CCV analyzed on 8/8/02 at 05:33 displayed %Ds greater than the control limit on the confirmation column for endrin ketone (-20.9%), tetrachloro-m-xylene (TCMX, -16.7%), and decachlorobiphenyl (DCBP, -19.5%). Since all results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. Surrogates were diluted out in samples WASTE-Q-1-COMP (DF=50), WASTE-Q-9-COMP (DF=50), and their associated MS/MSD samples (DF=50). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the

abundance of target compounds in parent samples WASTE-Q-1-COMP (DF=50), WASTE-Q-9-COMP, the MS and MSD samples were analyzed at 50 times dilution. Therefore, the spiked pesticide compounds were not recovered and MS/MSD summary forms have not been provided in this SDG. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in all field samples and their associated MS/MSD samples (DF from 10 to 500). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent samples WASTE-Q-1-COMP (DF=500), WASTE-Q-9-COMP (DF=100), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked PCBs were not recovered in either MS/MSD pair (except the MSD recovery for octachlorobiphenyl in the WASTE-Q-9-COMP MS/MSD pair at 33%). The RPDs for dichlorobiphenyl (60%) and heptachlorobiphenyl (143%) were greater than the QC limit for WASTE-Q-1-COMP MS/MSD pair. The RPDs for trichlorobiphenyl (134%), tetrachlorobiphenyl (114%), pentachlorobiphenyl (112%), hexachlorobiphenyl (108%), heptachlorobiphenyl (163%), and octachlorobiphenyl (200%) were greater than the QC limit for WASTE-Q-9-COMP MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The data user is advised that the PCB sample results may display more than usual bias or variability and should be used with caution.

For the herbicides analyses, the method blank prepped on 8/6/02 displayed a positive detection for pentachlorophenol (PCP) at 4.4 µg/kg. Positive PCP results in samples WASTE-Q-9-COMP and WASTE-Q-10-COMP-DUP were flagged "U, z" at the reporting limit (RL). The CCV analyzed on 8/10/02 at 10:46 displayed a %D greater than the control limit (i.e., 15%) on the primary column for 2,4-DB at 20.6%. Since 2,4-DB was not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. Surrogates were diluted out in sample WASTE-Q-1-COMP (DF=5000) and its associated MS/MSD samples (DF=5000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample WASTE-Q-1-COMP (DF=5000), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked herbicide compounds were not recovered in this MS/MSD pair and MS/MSD summary forms have not been provided in this SDG. The RPDs for MCPP (74%), 2,4-D (62%), and pentachlorophenol (67%) were greater than the acceptance limit in the WASTE-

Q-9-COMP MS/MSD pair. Since all MS and MSD recoveries in this MS/MSD pair and the LCS in this analytical batch were in control, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., 40%) for several positive detections. These results were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low. Field duplicates displayed absolute differences greater than the control limit (difference < 2X RL) for 2,4-D and PCP. 2,4-D and PCP results, except those previously flagged due to other QC failures, were flagged "J, f" for positive detections or "UJ, f" for non-detects in the associated samples.

For the metal analyses, the initial CRDL percent recoveries for aluminum (124%), arsenic (127%), lead (136%), and thallium (73%, 76%, and 67%), and the final CRDL recoveries for aluminum (136%), lead (124%), sodium (69%), and thallium (78% and 79%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 2.3402 mg/kg, arsenic at -0.6313 mg/kg, cadmium at -0.0523 mg/kg, calcium at 2.0763 mg/kg, chromium at 0.1536 mg/kg, magnesium at 0.6902 mg/kg, and sodium at 41.274 mg/kg. Since all results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Selenium was detected in one continuing calibration blank at 0.00608 mg/L. The positive selenium result in sample WASTE-Q-9-COMP was flagged "U, o". Aluminum, arsenic, barium, chromium, cobalt, copper, manganese, mercury, potassium, thallium, and vanadium were detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Since all results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. All samples displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. The positive selenium results in samples WASTE-Q-10-COMP and WASTE-Q-10-COMP-DUP were flagged "J, n". The positive vanadium result in sample WASTE-Q-10-COMP-DUP was also flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (66% and 59%), cadmium (52% and 46%), and potassium (61% and 39%) were less than the lower control limit (i.e., 75%) in the WASTE-Q-1-COMP MS/MSD pair. All antimony, cadmium, and potassium results in sample WASTE-Q-1-COMP were flagged "J, m". The RPD for mercury (115.9%) was greater than the acceptance limit (i.e., 35%) in the WASTE-Q-1-COMP MS/MSD pair. The positive mercury result in sample WASTE-Q-1-COMP was flagged "J, d". Since the RPD result was in control in the WASTE-Q-9-COMP MS/MSD pair, no data qualifying action was taken for mercury results in other field samples. The MS/MSD recoveries for antimony

(43% and 44%), nickel (46% in MS), potassium (47% in MS), and silver (61% in MS) were less than the lower control limit (i.e., 75%) in the WASTE-Q-9-COMP MS/MSD pair. All antimony, nickel, potassium, and silver results in samples WASTE-Q-9-COMP, WASTE-Q-10-COMP, and WASTE-Q-10-COMP-DUP were flagged "J, m". The RPDs for copper (45.99%), iron (45.21%), and manganese (35.89%) were greater than the acceptance limit (i.e., 35%) in the WASTE-Q-9-COMP MS/MSD pair. Positive copper, iron, and manganese results in samples WASTE-Q-9-COMP, WASTE-Q-10-COMP, and WASTE-Q-10-COMP-DUP were flagged "J, d". The post-digestion spike analysis was performed and recoveries for these compounds were in control. Field duplicates displayed a RPD greater than the control limit (i.e., 100%) for nickel at 181.0%. The positive nickel result in sample WASTE-Q-1-COMP was flagged "J, f". Since all other nickel results were previously flagged due to MS/MSD recovery failure, no additional data flags were applied.

Correctable Anomalies: The SVOC case narrative was incorrect in this data package. The laboratory was contacted and revised case narrative was received.

Comments: Due to the abundance of target compounds, some samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII41_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____RA_____ **Date: _____October 21, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticide analyses, the recovery for surrogate decachlorobiphenyl (9%) was less than the QC limit (i.e., 30-150%) in sample GW-AA-Q-1-127 ½. Positive results were flagged "J,s" and non-detects were flagged "R",s".

Minor Anomalies: For the VOC analyses, the trip blank TB-0730-KC contained carbon disulfide at 0.31 ug/L and styrene at 2.4 ug/L. Positive carbon disulfide results less than five times the blank concentration were flagged "U,y" at the reporting limit. All associated sample results were non-detects for styrene and no data qualifying action was required. The initial calibration correlation coefficient for bromomethane (0.987) was less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/1/02. All associated sample results were non-detects and were flagged "UJ,r". The %Ds were greater than the QC limit (i.e., 20%) for chloromethane (-27.2%) and bromomethane (-26.3%) for the continuing calibration analyzed on 8/9/02. The %Ds were greater than the QC limit for chloromethane (-21.4%) for the continuing calibration analyzed on 8/11/02. Positive results were flagged "J,c" unless previously flagged due to initial calibration failure. The MS recovery was greater than the QC limit (i.e., 40-141%) for bromomethane at 150%. The MSD and LCS recoveries were acceptable and no data qualifying action was required. Chlorobenzene exceeded the calibration range in several samples and was flagged "E" by the laboratory. These results were flagged "J,q". These samples were re-analyzed at different dilution factors and the results from the dilution analyses should be used for data interpretation.

For the SVOC analyses, the %Ds were greater than the QC limit (i.e., 20%) for bis(2-chloroisopropyl)ether (22.3%), 4,6-dinitro-2-methylphenol (-29.4%), and dinoseb (-21.4%) for the continuing calibration analyzed on 8/30/02 at 0950. The %Ds were greater than the QC limit for 2,4-dinitrophenol (37%) and dinoseb (24.7%) for the continuing calibration analyzed on 9/4/02 at 0805. The %Ds were

greater than the QC limit for 2,4-dinitrophenol (45.2%), 4,6-dinitro-2-methylphenol (27.6%), 3,3-dichlorobenzidine (-22.5%) and dinoseb (27.2%) for the continuing calibration analyzed on 9/5/02 at 1137. Since these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogates were not recovered in samples GW-AA-Q-1-127 1/2 (DF = 10), GW-AA-Q-1-127 1/2 DL (DF = 20), GW-AA-Q-1-127 1/2 –DUP (DF = 10), GW-AA-Q-1-127 1/2 –DUP DL (DF = 20), GW-AA-Q-1-127 1/2 FILTERED DL (DF = 20), and GW-AA-Q-1-127 ½-DUP FILTERED DL (DF = 20). No data qualifying action was required since the dilution factors were greater than or equal to 10. Several compounds exceeded the calibration range in several samples and were flagged "E" by the laboratory. These results were flagged "J,q". These samples were re-analyzed at different dilution factors and the results from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for 4,4-DDT (16%) on the primary column and alpha-BHC (-32.8%), delta-BHC (-29.4%), and 4,4,-DDE (-29.6%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/10/02 at 0811. The %Ds for alpha-BHC (-33%), delta-BHC (-30.2%), and 4,4,-DDE (-28.9%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/9/02 at 2209. The %Ds for 4,4-DDT (-21.3%) and methoxychlor (-18.9%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/21/02 at 1314. The positive alpha-BHC result was flagged "J,c" in sample GW-AA-Q-1-127 1/2 –D. No positive results were reported for the other compounds and no data flags were applied since the recoveries were acceptable on the alternate column. The recoveries for surrogate dacachlorobiphenyl were less than the QC limit (i.e. 30-150%) on both columns in all samples. The recovery for surrogate tetrachloro-m-xylene was less than the QC limit (i.e. 30-150%) on one column in sample GW-AA-Q-1-127 1/2 (26%). All associated sample results were non-detects and were flagged "UJ,s". The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., < 40%) for several compounds in several samples. These results were previously flagged due to surrogate failure and no data qualifying action was taken. The recovery for internal standard bromonitrobenzene was greater than the QC limit (i.e. 50-150%) in samples GW-AA-Q-1-127 1/2 (158%)and GW-AA-Q-1-127 1/2 DUP (155%). All associated sample results were previously flagged and no data qualifying action was taken.

For the herbicide analyses, the method blank contained pentachlorophenol at 0.24 ug/L. All associated sample results were non-detects and no data qualifying action was required. The %Ds for pentachlorophenol (-18.5% and –20.2%), 2,4,5-TP (-22.1% and –23.3%), 2,4,5-T (-22.2% and –24.2%), and 2,4-DB (-

20.1% and –16.2%) on both columns were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 8/6/02 at 0931. The %D for MCPA (15.5%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 8/6/02 at 2025. Non-detects were flagged "UJ,c" for pentachlorophenol, 2,4,5-TP, 2,4,5-T, and 2,4-DB. All associated sample results were non-detects for MCPA and no data qualifying action was required since the %D was acceptable on the alternate column.

For the metal analyses, the initial and final CRDL percent recoveries for iron (79%, 126%, and 79%), selenium (123%, 132%, and 129%), and thallium (124% and 77%), and the final CRDL recoveries for lead (124% and 126%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, calcium, and magnesium. Positive aluminum results less than 5 times the blank concentration were flagged "U,p" at the reporting limit. The initial and continuing calibration blanks also contained aluminum, barium, magnesium, copper, vanadium and manganese at low levels. All associated sample results were greater than 5 times the blank concentration and no data qualifying action was taken. The MS and or MSD recoveries were greater than the QC limit (i.e., 75-125%) for aluminum (184% and 156%), potassium (127%) and sodium (129%). Positive results were flagged "J,m" unless previously flagged due to other failures.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 for instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. The continuing calibration %D was greater than the QC limit (i.e., 15%) for the FID detector (20.6%) for the continuing calibration analyzed on 8/7/02. This result was previously flagged and no further action was required. The continuing calibration %D was greater than the QC limit (i.e., 15%) for the TCD detector (19.9%) for the continuing calibration analyzed on 8/7/02. The positive methane result was flagged "J,c" in the associated samples. Methane exceeded the calibration range in several samples and was flagged "E" by the laboratory. These results were previously flagged due to calibration failure, and no data qualifying action was taken. The results from the TCD detector should be used. The MS/MSD recoveries were less than the QC limit (i.e., 75-125%) for methane (66% and 74%). These results were previously flagged due to calibration failure, and no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII42_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 29, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, acetone displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) in the initial calibration at 0.0487, the CCV analyzed on 8/6/02 at 15:03 at 0.04013, and in the CCV analyzed on 8/7/02 at 08:32 at 0.04357. Associated sample results were non-detect and were flagged "R,c".

For the pesticides analyses, the LCS/LCSD displayed %Rs less than the lower control limit (i.e. 46%) for alpha-BHC at 40% and 44%. Associated sample results were non-detect and flagged "R,l".

For the herbicides analyses, samples GW-AA-Q-2-120 and GW-AA-Q-8-64 were re-extracted outside the holding time (i.e. 14 days) by 28 days due to possible blank contamination from the original method blank. Associated sample results with positive detections were flagged "J,h"; non-detects were flagged "R,h". It is recommended that the original results be used for data interpretation.

Minor Anomalies: For the VOCs analyses, method blank 2O0806MB displayed positive detections for methylene chloride at 1.3 ug/L, for carbon tetrachloride at 0.11 ug/L, for ethylbenzene at 0.20 ug/L, for styrene at 0.18 ug/L, and for total xylenes at 0.64 ug/L. Method blank 1O0807MB displayed positive detections for methylene chloride at 1.4 ug/L, for ethylbenzene at 0.11 ug/L, and for total xylenes at 0.31 ug/L. Associated sample results with positive detections less than 5x or 10x (for common laboratory contaminations) the amount found in the blank were flagged "U,z" at the reporting limit. The CCV analyzed on 8/6/02 at 15:03 displayed %Ds greater than the control limit (i.e. <20%) for 1,1-dichloroethane at 38.4% and for tetrachloroethene (PCE) at 24.7%. The CCV analyzed on 8/7/02 at 08:32 displayed %Ds greater than the control limit for bromomethane at 26.5%, for chloroethane at 22.2%, for 1,1-dichloroethane at 48.5%, for PCE at 28.5%, and for 1,2-dichloroethene (total) at 34.7%. Positive 1,1-dichloroethane results in samples GW-AA-Q-8-44 and GW-AA-Q-8-54 were flagged "J,c". All other associated sample results were non-detect and no data qualifying action was taken due to the anomalies being only slightly greater than the control limit.

For the SVOCs analyses, the initial calibration analyzed on 8/23/02 displayed correlation coefficients less than the control limit (i.e. 0.990) for 4-nitrophenol at 0.9895, for pentachlorophenol (PCP) at 0.9878, for butylbenzylphthalate at 0.989, and for bis (2-ethylhexyl) phthalate at 0.9877. Associated sample results were non-detect and were

flagged "UJ,r". The CCV analyzed on 8/26/02 at 11:58 displayed a %D greater than the control limit (i.e. <20%) for butylbenzylphthalate at 29.2%. Since this analyte was previously flagged, no further data qualifying action was taken. The CCV analyzed on 8/30/02 at 08:17 displayed %Ds greater than the control limit for 2,6-dinitrotoluene at 33.5%, for 2,4-dinitrophenol at 24.0%, for 2,4-dinitrotoluene at 31.1%, for 4,6-dinitro-2-methylphenol at 29.5%, and for dinoseb at 26.2%. Since the associated sample results were non-detect and the anomalies were only slightly greater than the control limit, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 8/10/02 at 08:11 displayed %Ds greater than the control limit (i.e. <15%) for 4,4'-DDT at 16.0%, for surrogate 2,4-DCAA at -20.6%, and for surrogate tetrachloro-meta-xylene (TCMX) at -21.0% on the primary column; and for alpha-BHC at -32.8%, for delta-BHC at -29.4%, for 4,4'-DDE at -29.9%, for surrogate decachlorobiphenyl (DCBP) at -20.2%, for surrogate 2,4-DCAA at -17.3%, and for surrogate TCMX at -23.6% on the confirmation column. The CCV analyzed on 8/10/02 at 17:48 for surrogate 2,4-DCAA at -19.6% and for surrogate TCMX at -21.5% on the primary column; and for alpha-BHC at -30.4%, for delta-BHC at -26.1%, for 4,4'-DDE at -27.3%, for 4,4'-DDT at -16.4%, for surrogate DCBP at -17.2%, and for surrogate TCMX at -20.2% on the confirmation column. Since the anomalies either met criteria on the alternate column or were surrogates, no data qualifying action was taken. Surrogate DCBP displayed %Rs less than the lower control limit on both column in samples GW-AA-Q-8-24 at 14% and 15%, for sample GW-AA-Q-2-120 at 15% and 10%, and for GW-AA-Q-2-60 at 14% and 12%. Associated sample results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s", unless previously flagged for other anomalies. Sample GW-AA-Q-8-64 displayed a %R less than the lower control limit for surrogate DCBP on the confirmation column at 24%. Since the surrogate met criteria on the alternate column, no data qualifying action was taken. Sample GW-AA-Q-8-24 displayed a %RPD greater than the control limit (i.e. <40%) between columns for endosulfan I at 52.6% and was flagged "J,g".

For the herbicides analyses, method blank 0807N-SMB displayed positive detections for dicamba at 0.13 ug/L, for MCPP at 37 ug/L, for dichloroprop at 0.14 ug/L, for 2,4-D at 2.1 ug/L, for PCP at 1.6 ug/L, for 2,4,5-TP at 0.12 ug/L, and for 2,4,5-T at 0.21 ug/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,z". The CCV analyzed on 8/12/02 at 15:18 displayed %Ds greater than the control limit (i.e. <15%) for MCPP at 18.4%, for dichloroprop at 18.5%, and for PCP at 15.9% on the primary column; and for MCPA at 20.5%, for 2,4-D at 19.1%, and for 2,4-DB at 23.4% on the confirmation column. Since these compounds met criteria on the alternate column, no data qualifying action was taken. The LCS displayed a %R greater than the control limit for PCP at 290% and a %RPD greater than the control limit for the LCS/LCSD pair at 102%. Since associated PCP results were non-detect, no data qualifying action was taken. Sample GW-AA-Q-2-60 displayed a %RPD greater than the control limit (I.e. <40%) between columns for dichloroprop at 122.7%. Since this result was previously flagged due to method blank contamination, no further data qualifying action was taken.

For the metals analyses, the CRDL displayed %Rs less than the lower control limit (i.e. 80%) for iron at 79% and 79%. The CRDLs also displayed %Rs greater than the upper

control limit (i.e. <120%) for selenium at 123% and 129%, and for lead at 124%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for aluminum at 0.02256 mg/L, for calcium at 0.03087 ug/L, and for magnesium at 0.00934 mg/L. Associated sample results with positive detections less than 5x the amount found in the blank for aluminum, calcium, and magnesium were flagged "U,p" at the reporting limit. Aluminum displayed positive detections in the ICB and in CCB5 through CCB7 ranging from 0.01534 mg/L to 0.03292 mg/L, barium in CCB5 through CCB7 ranging from 0.0007 mg/L to 0.00115 mg/L, calcium in CCB5 through CCB7 ranging from 0.01314 mg/L to 0.01378 mg/L, copper in CCB6 and CCB7 at 0.00164 mg/L and 0.00156 mg/L, magnesium in the ICB and CCB6 at 0.00687 mg/L and 0.007 mg/L, manganese in CCB5 through CCB7 ranging from 0.00064 mg/L to 0.00123 mg/L, and for vanadium in CCB6 and CCB7 at 0.00148 mg/L and 0.00154 mg/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,o" at the reporting limit. The MSD displayed %Rs less than the lower control limit (i.e. 75%) for calcium at 49% and for iron at 73%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution used, no data qualifying action was taken.

For the dissolved gases analyses, the initial calibration displayed a correlation coefficient value less than the control limit (i.e. 0.990) for methane on the FID detector at 0.987. All associated sample results were flagged "J,r. The MS/MSD displayed %Rs less than the lower control limit for methane at 66% and 74%. Since associated sample results were previously flagged for initial calibration anomalies, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: For the VOCs analyses, the laboratory flagged all benzene results with a "B" qualifier. There is no evidence of blank contamination for benzene. The "B" qualifier was lined out by the data reviewer.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII43_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____November 4, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the herbicide analyses, the extraction holding times were grossly exceeded for samples GW-AA-Q-2-130BRE (20 days), GW-AA-Q-8-104BRE (35 days), and GW-AA-Q-3-50RE (19 days). These samples were re-extracted by the laboratory since several target compounds were present above the reporting limit. No positive results were reported and non-detects were flagged "R,h". The original sample results should be used for data interpretations.

Minor Anomalies: For the VOC analyses, the trip blank, TB080102-KH contained chloromethane at 0.63 ug/L and ethylbenzene at 0.88 ug/L. Positive results less than five times the blank concentration were flagged "U,y" at the reporting limit for results less than the RL. Trip blank, TB0802-KH contained methylene chloride at 0.77 ug/L and benzene at 0.15 ug/L. No positive results were reported and no data qualifying action was required. The initial calibration correlation coefficient for bromomethane (0.987) was less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/1/02. All associated sample results were non-detects and were flagged "UJ,r". The continuing calibration %Ds were greater than the QC limit (i.e., 20%) for chloromethane (-27%) and bromomethane (-26.3%) for the continuing calibration analyzed on 8/9/02 at 2103. The continuing calibration %D was greater than the QC limit for chloromethane (-21.4%) for the continuing calibration analyzed on 8/11/02 at 0918. Positive results were flagged "J,c" in the associated samples unless previously flagged due to other failures. The MS recovery for bromomethane (150%) was greater than the QC limit (i.e., 40-141%). No data qualifying action was required since the MSD and LCS recoveries were acceptable.

For the SVOC analyses, the initial calibration correlation coefficients for 2,6-dinitrotoluene (0.987), 3-nitroaniline (0.988), and 4-nitroaniline (0.986) were less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/10/02. All associated sample results were non-detects and were flagged "UJ,r". The %Ds were greater than the QC limit (i.e., 20%) for butylbenzylphthalate (29.2%) and

bis (2-ethylhexyl) phthalate (25.1%) for the continuing calibration analyzed on 8/26/02 at 1158. The %Ds were greater than the QC limit for 2,6-dinitrotoluene (33.5%), 2,4-dinitrophenol (24%), 2,4-dinitrotoluene (31.1%), 4,6-dinitro-2-methyl-phenol (29.5%), and dinoseb (26.2%) for the continuing calibration analyzed on 8/30/02 at 0817. The %Ds were greater than the QC limit for 2,6-dinitrotoluene (36.1%), 3-nitroaniline (20.4%), 2,4-dinitrophenol (30%), 2,4-dinitrotoluene (33.9%), 4,6-dinitro-2-methyl-phenol (38.8%), and dinoseb (36.9%) for the continuing calibration analyzed on 8/30/02 at 1926. The %Ds were greater than the QC limit for 2,6-dinitrotoluene (39.3%), 3-nitroaniline (25.8%), 2,4-dinitrotoluene (39.9%), 4-nitroaniline (30.9%), 4,6-dinitro-2-methyl-phenol (21%), and dinoseb (22.2%) for the continuing calibration analyzed on 9/1/02 at 1104. Since these compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticide analyses, the %Ds for endrin aldehyde (16%), 2,4-DCAA (-20.6%), and TCMX (-21%) on the primary column, and alpha-BHC (-32.8%), delta-BHC (-29.4%), 2,4-DCAA (-17.5%), TCMX (-23.6%), DCBP (-20.2%), and 4,4-DDE (-29.9%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/10/02 at 0811. The %Ds for 4,4-DDT (15.2%), 2,4-DCAA (-19.6%), and TCMX (-21.5%) on the primary column, and alpha-BHC (-30.4%), delta-BHC (-26.1%), 4,4-DDE (-27.3%), TCMX (-20.2%), DCBP (-17.2%) and 4,4-DDT (-16.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/10/02 at 1748. 4,4-DDT non-detects were flagged "UJ,c" in all samples. No data flags were applied to the non-detects for the other compounds since the recoveries were acceptable on the alternate column. The recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) on the confirmation column in samples GW-AA-Q-2-130B (26%) and GW-AA-Q-8-111 (26%). No data qualifying action is required based on one surrogate failure. The recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) for both columns in samples GW-AA-Q-8-104 (26% and 24%) and GW-AA-Q-3-50 (26% and 15%). Positive results were flagged "J,s" and non-detects were flagged "UJ,s" unless previously flagged due to other anomalies. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., < 40%) for several compounds in sample GW-AA-Q-3-50. These results were previously flagged due to surrogate recovery failures, and no data flags were applied.

For the herbicide analyses, the method blank extracted on 8/7/02 contained positive results for dicamba, MCPP, dichloroprop, 2,4-D, pentachlorophenol, 2,4,5-TP, and 2,4,5-T. Positive results less than 5 times the blank concentration were flagged "U,z" or "U,z" at the reporting level. The method blank extracted

on 9/13/02 contained a positive result for 2,4-D at 0.33 ug/L. No positive results were reported in the associated samples and no data qualifying action was required. The %Ds for MCPP (18.4%), dichloroprop (18.5%), and pentachlorophenol (15.9%) on the primary column, and MCPA (20.5%), 2,4-D (19.1%), and 2,4-DB (23.4%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/12/02 at 1518. The %Ds for MCPA (-24.3% and –42%) on both columns, and 2,4-DB (-16.3%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 9/18/02 at 1403. Positive results were previously flagged due to other anomalies and no further data qualifying action was required. Non-detects were previously flagged due to holding time failures, and no further data qualifying action was required. The LCS recovery and %RPD for pentachlorophenol (290% and 102%) were greater than the QC limit. Positive results were previously flagged due to method blank contamination and no further data qualifying action was required.

For the metal analyses, the initial and final CRDL percent recoveries for iron (79% and 79%) and selenium (123% and 129%), and the final CRDL percent recoveries for arsenic (78%) and thallium (73%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, calcium, and magnesium. Positive results less than 5 times the blank concentration were flagged "U,p" at the reporting limit for aluminum. Calcium and magnesium results were greater than 5 times the blank concentration and no data qualifying action was required. The initial and continuing calibration blanks also contained positive results for aluminum, barium, manganese, copper, calcium, vanadium, and magnesium at low levels. All associated sample results were either previously flagged due to method blank contamination or were greater than 5 times the blank concentration and no data qualifying action was required.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.986 for instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. The MS/MSD recoveries were less than the QC limit (i.e., 75-125%) at 66% and 74%, respectively. Associated sample results not previously flagged due to other failures were flagged "J,m". Methane exceeded the calibration range in sample GW-AA-Q-3-50 and was flagged "E" by the laboratory. This result was previously flagged due to calibration failure, and no further data qualifying action was taken. The results from the TCD detector should be used.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII44_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 23, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the initial calibration displayed a correlation coefficient less than the control limit (i.e. 0.990) for bromomethane at 0.987. Associated sample results were non-detect and were flagged "UJ,r". The initial calibration also displayed a %RSD greater than the control limit (i.e. 15%) for 2-hexanone at 15.26%. Associated sample results with positive detections were flagged "J,r". The CCV analyzed on 8/11/02 at 09:18 displayed a %D greater than the control limit (i.e. <20%) for chloromethane at -21.4%. Associated sample results with positive detections were flagged "J,c".

For the SVOCs analyses, the CCV analyzed on 9/1/02 at 11:04 displayed %Ds greater than the control limit (i.e. <20%) for 2,6-dinitrotoluene at 39.3%, for 3-nitroaniline at 25.8%, for 2,4-dinitrotoluene at 39.9%, 4-nitroaniline at 30.9%, for 4,6-dinitro-2-methylphenol at 21.0%, and for dinoseb at 22.2%. Since all associated sample results were non-detect and that the anomalies were only marginally outside the control limit, no data qualifying action was taken. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,4-dinitrotoluene at 130% and 130%. Since the associated sample results were non-detect, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 8/12/02 at 17:55 displayed %Ds greater than the control limit (i.e. <15%) for 4,4'-DDE at -21.1%, for dieldrin at 17.6%, for endrin at 16.9%, for methoxychlor at 21.9%, and for endrin ketone at 18.7% on the primary column; and for 4,4'-DDE at 15.4%, for dieldrin at 16.4%, for endrin at 18.7%, for alpha-BHC at -16.1%, for delta-BHC at -16.5%, and for endosulfan II at 18.5% on the confirmation column. The CCV analyzed on 8/13/02 at 03:47 displayed %Ds greater than the control limit for 4,4'-DDE at -25.2% and for methoxychlor at 27.2% on the primary column; and for alpha-BHC

at -18.1%, for delta-BHC at -18.1%, for endrin at 15.5%, and for endosulfan II on the confirmation column. For 4,4'-DDE, dieldrin, and endrin, associated sample results were non-detect and were flagged "UJ,c". For all other anomalies, since the analytes met criteria on the alternate column and that the results were non-detect, no data qualifying action was taken. Surrogate decachlorobiphenyl (DCBP) displayed %Rs less than the lower control limit in sample GW-AA-Q-4-50 at 20% and 22%. Associated sample results with positive detections were flagged previously flagged and no further data qualifying action was taken; non-detects were flagged "UJ,s", unless previously flagged for other anomalies. Beta-BHC displayed a %RPD between columns greater than the control limit (i.e. <40%) in sample GW-AA-Q-4-50 at 105.9% and was flagged "J,g".

For the herbicides analyses, the method blank displayed positive detections for dichloroprop at 0.11 ug/L, for 2,4,5-TP at 0.13 ug/L, and for 2,4,5-T at 0.18 ug/L. Since associated sample results were non-detect, no data qualifying action was taken.

For the metals analyses, the CRDL displayed %Rs less than the lower control limit (i.e. 80%) for sodium at 76% and 78% and for thallium at 67%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for aluminum at 0.01238 mg/L, for calcium at 0.01560 ug/L, and for magnesium at 0.00745 mg/L and a negative detection for thallium at -0.00547 mg/L. Associated sample results for Tl were non-detect and were flagged "UJ,p". Associated sample results with positive detections less than 5x the amount found in the blank for Aluminum, Calcium, and Mg were flagged "U,p" at the reporting limit. Aluminum displayed positive detections in the ICB and CCB3 at 0.02783 mg/L and 0.02098 mg/L, barium in CCB3 and CCB5 at 0.00078 mg/L and 0.00067 mg/L, calcium in the ICB, CCB3, and CCB5 ranging from 0.05322 mg/L to 0.00968 mg/L, copper in CCB3, CCB4, and CCB5 at 0.00101 mg/L, 0.00097 mg/L and 0.00123 mg/L, magnesium in CCB3 at 0.01302 mg/L, manganese in CCB3 and CCB5 at 0.00074 mg/L and 0.00068 ug/L, vanadium in CCB3 and CCB5 at 0.00126 mg/L and 0.00122 mg/L, and for zinc in the ICB at 0.00854 mg/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,o" at the reporting limit. The MSD displayed %Rs less than the lower control limit (i.e. 75%) for calcium at 58% and for iron at 71%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution used, no data qualifying action was taken.

For the dissolved gases analyses, the initial calibration displayed a correlation coefficient less than the control limit (i.e. 0.990) for methane on the FID detector at 0.987. All associated sample results were flagged "J,r"; except for sample GW-AA-Q-4-50, which was flagged "J,q" for exceeding the calibration range on the FID. The methane result was reported from the TCD detector and should be used

for data interpretation.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII45_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____October 16, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, trip blank TB-0806-KH contained styrene at 2.4 ug/L. The positive styrene result was flagged "U,y" in sample GW-AA-P-2-104. The initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the QC limit (i.e., 0.990) for bromomethane at 0.987. All associated sample results were non-detects and were flagged "UJ,r". The initial calibration analyzed on 8/1/02 displayed a %RSD greater than the QC limit (i.e., 15%) for 2-hexanone at 15.3%. All associated sample results were non-detects and the failure was not serious enough (i.e., > 50%) to affect the non-detects. No data qualifying action was required.

For the SVOC analyses, the continuing calibration analyzed on 9/4/02 at 0805 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol (37%) and dinoseb (24.7%). The continuing calibration analyzed on 9/4/02 at 2054 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether (20.8%), 2,4-dinitrophenol (31%) and dinoseb (29%). The continuing calibration analyzed on 9/5/02 at 1137 displayed %Ds greater than the control limit for n-nitroso-di-n-propylamine (21.9%), 3&4-methylphenol (23.7%), 2,4-dinitrophenol (45.2%), dinoseb (27.2%), 4,6-dinitro-2-methylphenol (27.6%), and 3,3-dichlorobenzidine (22.5%). Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Three base/neutral surrogates were diluted out in samples GW-AA-P-2-104 (DF = 5) and GW-AA-P-2-104 Filtered (DF = 5). Since only phenol results (acid fraction) in these two samples will be used for data interpretation, no data qualifying action was taken. Phenol exceeded the calibration range in several samples and was flagged "E" by the laboratory. These results were flagged "J,q". These samples were re-analyzed at a dilution factor of 5 and the results from dilution analyses should be used for phenol for data interpretation.

For the pesticide analyses, the %Ds for 4,4-DDE (21.1% and 15.4%), dieldrin (17.6% and 16.4%), and endrin (18.7% and 16.9%) on both columns, endrin ketone (18.7%) and methoxychlor (21.9%) on the primary column, and alpha-BHC (16.1%), delta-BHC (16.5%), and endosulfan II (18.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/12/02 at 1755. The %Ds for alpha-BHC (18.1%), delta-BHC (18.1%), endrin (15.5%), and 4,4-DDD (16%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/13/02 at 0347. Non-detects were flagged "UJ,c" for 4,4-DDE, dieldrin, and endrin in the associated samples. The positive alpha-BHC result was flagged "J,c" in sample GW-AA-P-2-104. The recoveries for surrogate dacachlorobiphenyl were less than the QC limit (i.e. 30-150%) in samples GW-AA-Q-4-110 (26% and 28%) and GW-AA-P-2-104 (28%). Positive results were flagged "J,s" and non-detects were flagged "UJ,s" in sample GW-AA-Q-4-110 unless previously flagged. No action is required based on one surrogate failure and no data flags were applied to sample GW-AA-P-2-104. The RPDs between primary and confirmatory columns for alpha-BHC in sample GW-AA-P-2-104 (81.7%) and heptachlor in sample GW-AA-P-1-104FT (118.2%) and GW-AA-P-1-120FT (125.4%) and for alpha-BHC in sample GW-AA-Q-4-110 (47.8%) were greater than the acceptance limit (i.e., < 40%). These results were previously flagged and no data qualifying action was taken.

For the herbicide analyses, the method blank contained dicamba at 0.13 µg/L, dichloroprop at 0.11 µg/L, 2,4,5-TP at 0.13 µg/L, and 2,4,5-T at 0.18 µg/L. No positive results were reported and no data qualifying action was taken. The %Ds for 2,4-DB (18.2% and 20.7%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/13/02 at 1601. Non-detects were flagged "UJ,c" in the associated samples. The RPD between primary and confirmation columns for MCPP in sample GW-AA-P-2-104 (154.6%) was greater than the acceptance limit (i.e., < 40%). This result was flagged "J,g".

For the metal analyses, the initial and final CRDL percent recoveries for sodium (76% and 78%) and the final CRDL recovery for thallium (67%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum, calcium, and magnesium and a negative result for thallium. The initial and continuing calibration blanks also contained aluminum, calcium, zinc, magnesium, copper, and manganese at low levels. Positive aluminum results less than 5 times the blank concentration were flagged "U,p" at the reporting limit. Thallium non-detects were flagged "UJ,p" in all

samples. Positive results for other analytes were greater than 5 times the blank concentration and no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. Sample GW-AA-Q-4-110 displayed iron and calcium concentrations greater than 50% of the iron and calcium concentrations in the ICSA solution. Positive antimony and cadmium results were flagged "J,n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The %D for the serial dilution analyses was greater than the QC limit (i.e., 10%) for zinc at 11%. Positive results were flagged "J,s".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 for instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. Methane exceeded the calibration range in sample GW-AA-P-2-104. This result was previously flagged due to calibration failure, and no data qualifying action was taken. The result from the thermoconductivity detector should be used.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII46_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____October 15, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, the initial calibration analyzed on 7/11/02 displayed a RRF less than the QC limit (i.e., 0.05) for acetone at 0.0428. Positive results were flagged "J,c" and non-detects and were flagged "R,c".

For the SVOC analyses, the MS/MSD recoveries were less than the QC limit (i.e., 10-144%) for 3,3-dichlorobenzidine (0% and 0%). This analysis was repeated with similar results. All associated sample results were non-detects and were flagged "R,m".

For the pesticide analyses, the recoveries for surrogate dacachlorobiphenyl were less than the QC limit (i.e. 30-150%) in sample GW-AA-Q-5-45 (4% and 5%). Positive results were flagged "J,s" and non-detects were flagged "R,s" in this sample. As a result, the percent completeness was less than the QC limit (i.e. 95%) at 71%.

Minor Anomalies: For the VOC analyses, the method blanks contained methylene chloride at 1.1 ug/L and 1.2 ug/L. Positive results in the associated samples were flagged "U,z" at the reporting limit. Trip blank TB-0807-KH contained styrene at 0.62 ug/L. All associated sample results were non-detects, and no data qualifying action was required. The %Ds were greater than the QC limit (i.e., 20%) for 1,1,-dichloroethane (20.3%), 1,1-dichloroethane (41%), 4-methyl-2-pentanone (27.2%), and tetrachloroethene (20.9%) for the continuing calibration analyzed on 8/11/02. The %Ds were greater than the QC limit for 1,1-dichloroethane (34.9%) and 1,2-dichloroethene (23.8%) for the continuing calibration analyzed on 8/12/02. All associated sample results were non-detects and the failures were not serious enough (i.e., > 50%) to affect the non-detects. No data qualifying action was required. The MS/MSD recoveries were greater than the QC limit (i.e., 51-140%) for 1,1,-dichloroethane (142% and 144%). The LCS recovery was greater than the QC limit (i.e., 51-140%) for 1,1-dichloroethane (146%). All associated sample results were non-detects, and no data qualifying action was required.

Chlorobenzene exceeded the calibration range in several samples and was flagged "E" by the laboratory. These results were flagged "J,q". These samples were re-analyzed at different dilution factors and the results from the dilution analyses should be used for data interpretation.

For the SVOC analyses, the %Ds were greater than the QC limit (i.e., 20%) for bis(2-chloroisopropyl)ether (-21.4%) and 2,4-dinitrophenol (25.1%) for the continuing calibration analyzed on 9/4/02 at 1433. The %D was greater than the QC limit for bis(2-chloroisopropyl)ether (-26%) for the continuing calibration analyzed on 9/5/02 at 0739. The %Ds were greater than the QC limit for bis(2-chloroisopropyl)ether (-22.5%), 4,6-dinitro-2-methylphenol (30.6%), dinoseb (24.2%) and 2,4-dinitrophenol (33.4%) for the continuing calibration analyzed on 9/5/02 at 2106. The %Ds were greater than the QC limit for 2,4-dinitrophenol (24%) and 4-nitrophenol (29%) for the continuing calibration analyzed on 9/9/02 at 1156. Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Three base/neutral surrogates were not recovered in sample GW-AA-Q-5-65DL (DF = 5). Positive associated results were flagged "J,s" and non-detects were flagged "UJ,s". The MS/MSD recoveries were less than the QC limit (i.e., 41-121%) for acenaphthylene (32%, 30%, 31% and 29%). The MS recovery was greater than the upper QC limit (i.e., 143%) for 4-nitrophenol (150%). The LCS recoveries were acceptable and no data qualifying action was taken. 4-Chloroaniline exceeded the calibration range in sample GW-AA-Q-5-65 and was flagged "E" by the laboratory. This result was flagged "J,q". These samples were re-analyzed at a dilution factor of 5 and the results from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for methoxychlor (-17.8%) and decachlorobiphenyl (-19.5%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/20/02 at 1050. No positive results were reported and no data flags were applied since the recovery was acceptable on the alternate column. The recoveries for surrogate dacachlorobiphenyl were less than the QC limit (i.e. 30-150%) in sample GW-AA-P-3-32 (21% and 23%). Positive results were flagged "J,s" and non-detects were flagged "UJ,s" in this sample. The RPDs between primary and confirmation columns for beta-BHC (95.1%) and aldrin (55.3%) in sample GW-AA-Q-5-45 were greater than the acceptance limit (i.e., < 40%). These results were previously flagged and no data qualifying action was taken.

For the herbicide analyses, the %Ds for 2,4-DB (-15.2%) on the primary column and dalapon (15.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/17/02 at 0039. The %Ds for 2,4-DB (-24%) and dalapon (-15.2%) on the primary column were

greater than the criterion for the continuing calibration analyzed on 8/17/02 at 1154. No positive results were reported and no data flags were applied since the recovery was acceptable on the alternate column. The RPD between primary and confirmation columns for MCPP in sample GW-AA-Q-5-45 (159.6%) was greater than the acceptance limit (i.e., < 40%). This result was flagged "J,g".

For the metal analyses, the initial and final CRDL percent recoveries for sodium (76% and 78%) and the final CRDL recovery for thallium (67%) were outside the control limit (i.e., 80-120%). Since the recoveries were only marginally outside the control limits, no data qualifying action was taken. The method blank contained positive results for aluminum and calcium, and a negative result for thallium. The initial and continuing calibration blanks also contained aluminum, barium, calcium, magnesium, copper, and manganese at low levels. Positive aluminum results less than 5 times the blank concentration were flagged "U,p" at the reporting limit. Thallium non-detects were flagged "UJ,p" in all samples. Positive results for other analytes were greater than 5 times the blank concentration and no data qualifying action was taken.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 for instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. The continuing calibration %D was greater than the QC limit (i.e., 15%) for the FID detector (23.9%) for the continuing calibration analyzed on 8/15/02 at 0945. This result was previously flagged and no further action was required. The continuing calibration %D was greater than the QC limit (i.e., 15%) for the TCD detector (16.9%) for the continuing calibration analyzed on 8/15/02 at 1135. The positive methane result was flagged "J,c" in the associated samples. Methane exceeded the calibration range in samples GW-AA-Q-5-45 and GW-AA-P-2-122. These results were previously flagged due to calibration failure, and no data qualifying action was taken. The results from the PCD detector should be used.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII47_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____October 9, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticide analyses, the DCBP surrogate recoveries on both columns in sample GW-AA-Q-5-85 (5% and 4%) were less than the lower control limit (i.e., 30%). All results in this sample were flagged "J, s" for positive detections or "R, s" for non-detects. As a result, the percent completeness for pesticides analysis was outside the control limit (i.e., 95%) at 81.9%.

Minor Anomalies: For the VOC analyses, the trip blank, TB-0808-KH, displayed a positive detection for chloromethane at 0.19 µg/L. Positive chloromethane results less than five times the blank concentration in the associated samples were flagged "U, y" at the reporting limit. The initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for bromomethane at 0.987. Bromomethane non-detect results in the associated samples were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/12/02 at 19:36 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at -26.1% and bromomethane at -33.2%. Since bromomethane results in the associated samples were previously flagged due to initial calibration failure, no additional data flags were applied. Positive chloromethane results in samples TB-0808-KH and SEEP-Q-1 were flagged "J, c". Since other positive chloromethane results were previously flagged due to trip blank contamination, no additional data flags were applied. The CCV analyzed on 8/13/02 at 10:18 displayed %Ds greater than the control limit (i.e. 20%) for bromomethane at -45.0%, chloroethane at -24.9%, trichloroethene at 23.6%, and 1,1,2,2-tetrachloroethane at -43.9%. Since these compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MSD recoveries for bromomethane (152% and 152%) were greater than the upper control limit (i.e., 141%) in two MS/MSD pairs. Since MS and LCS recoveries for this compound were in control, no data qualifying action was taken.

For the SVOC analyses, the method blank, 0815C-EMB, displayed a positive detection for bis(2-ethylhexyl)phthalate at 0.93 µg//L. Positive bis(2-ethylhexyl)-

phthalate results less than ten times the blank concentration in the associated samples were flagged "U, z" at the reporting limit. The initial calibration analyzed on 9/11/02 displayed two correlation coefficients less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9888 and 4,6-dinitro-2-methylphenol at 0.9882. These compounds were not detected in the associated samples and were flagged "UJ, r". The initial calibration analyzed on 9/15/02 displayed three correlation coefficients less than the control limit for hexachlorocyclopentadiene at 0.9882, 2,4-dinitrophenol at 0.9885, and dinoseb at 0.9885. Since these results in sample GW-AA-Q-5-85-FilteredRE were not used for data interpretation, no data qualifying action was taken. The continuing calibration analyzed on 9/5/02 at 11:37 displayed %Ds greater than the control limit (i.e., <20%) for n-nitroso-di-n-propylamine (21.9%), 3&4-methylphenol (23.7%), 2,4-dinitrophenol (45.2%), 4,6-dinitro-2-methylphenol (27.6%), dinoseb (27.2%), and 3,3'-dichlorobenzidine (-22.5%). The continuing calibrations analyzed on 9/6/02 at 09:20 displayed %Ds greater than the control limit for 4-nitrophenol (21.4%), 4-nitroaniline (26.4%), 2,4-dinitrophenol (52.9%), 4,6-dinitro-2-methylphenol (22.2%), dinoseb (29.2%), and benzo(g,h,i)perylene (-20.6%). Since all associated samples are QC samples, no data qualifying action was taken. The continuing calibration analyzed on 9/8/02 at 12:03 displayed %Ds greater than the control limit for 2,4-dinitrophenol (43.7%) and dinoseb (32.0%). The continuing calibration analyzed on 9/12/02 at 10:59 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-54.4%) and 2,4-dinitrophenol (-21.5%). The hexachlorocyclopentadiene results in the associated samples were flagged "UJ, c". Since all other compounds were either not detected in the associated samples or were surrogates, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The continuing calibration analyzed on 9/17/02 at 10:57 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-28.3%), 2,4-dinitrophenol (-35.9%), 4,6-dinitro-2-methylphenol (-27.4%), 4-bromophenyl-phenylether (-20.7%), benzo(k)fluoranthene (24.1%), and 2,4,6-tribromophenol (-22.9%). Since the associated sample GW-AA-Q-5-85-FilteredRE was not used for data interpretation, no data qualifying action was taken. Sample GW-AA-Q-5-95 displayed a base/neutral surrogate %R less than the lower control limit (i.e. 36%) for 2-fluorobiphenyl at 32%. Since the other two base/neutral surrogate recoveries were in control, no data qualifying action was taken. Sample GW-AA-Q-5-85-Filtered displayed two acid fraction surrogate %Rs less than the lower control limits for 2-fluorophenol (28%) and phenol-d5 (22%). All acid fraction results in this sample, except those previously flagged due to calibration failure, were flagged "J, s" for positive detections or "UJ, s" for non-detects. This sample was re-extracted (grossly exceeding the hold time by 29 days) and re-analyzed by the laboratory for confirmation propose, and displayed acceptable surrogate recoveries. All acid fraction results in the original analysis were confirmed by this re-analysis data. Since the holding time was grossly exceeded, this re-analysis data should not be used for data interpretation. These results were crossed-out by the reviewer. The original results in sample GW-AA-Q-5-85-Filtered should be used for data interpretation. Three surrogate

recoveries in sample GW-AA-Q-5-95MS and four surrogate recoveries in sample GW-AA-Q-5-95MSD were less than the lower control limits. Since these two samples are QC samples, no data qualifying action was taken. The RPD for 3,3-dichlorobenzidine (83%) was greater than the acceptance limit (i.e., 72%) in the GW-AA-P-3-52 MS/MSD pair. Regarding the MS/MSD recoveries, 71 of 128 recoveries and 33 of 64 RPDs were outside the control limit in the GW-AA-Q-5-95 MS/MSD pair. These recoveries and RPD failures may be attributed to low extraction efficiency by the laboratory (surrogate recoveries were also low in this MS/MSD pair) but the poor recoveries are limited to the MS and MSD samples. Since all recoveries and most of the RPD results in the GW-AA-P-3-52 MS/MSD pair were in control and associated LCS recoveries were also in control, no data qualifying action was taken. The 4-chloroaniline result in sample GW-AA-Q-5-85 exceeded the linear range of the calibration curve. This result was flagged "J, q". This sample was diluted by a factor of 2 and reanalyzed by the laboratory. The 4-chloroaniline result from the dilution analysis should be used for data interpretation.

For the pesticides analyses, the %Ds for methoxychlor (-17.8%), 2,4-DCAA (-21.1%), and decachlorobiphenyl (DCBP, -19.5%) on the primary column; and for DCBP (-16.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/20/02 at 10:50. The %Ds for 2,4-DCAA (-17.4%) and DCBP (-18.6%) on the primary column were greater than the criterion for the continuing calibration analyzed on 8/20/02 at 21:15. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The TCMX surrogate recoveries on both columns in sample SEEP-Q-2 (28% and 26%) were less than the lower control limit (i.e., 30%). The DCBP surrogate recoveries on both columns in samples GW-AA-P-3-72 (17% and 18%) and SEEP-Q-1 (22% and 22%) were less than the lower control limit (i.e., 30%). All results in these three samples were flagged "J, s" for positive detections or "UJ, s" for non-detects. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for beta-BHC (146.2%) and aldrin (50.0%) in sample GW-AA-Q-5-85. Since these two results were previously flagged due to surrogate recovery failure, no additional data flags were applied. It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %D for dalapon (-15.5%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/17/02 at 00:39. The %D for 2,4-DB (-24.0%) on the primary column was greater than the criterion for the continuing calibration analyzed on 8/17/02 at 11:54. Since dalapon and 2,4-DB were not detected in the associated samples and these results had an acceptable %D on the alternate column, no data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for

MCPP ((172.7%) in sample GW-AA-P-3-72 and MCPA (173.8%) in sample GW-AA-Q-5-85. These two results were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for arsenic (76%), selenium (121%), and thallium (125%) and the final CRDL recovery for selenium (121%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 0.0279 mg/L, calcium at 0.0149 mg/L, copper at 0.00111 mg/L, and thallium at 0.00402 mg/L. Positive aluminum and copper results in the associated samples less than five times the blank concentration were flagged "U, p" at the reporting limits. Since calcium and thallium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Selenium was detected in three continuing calibration blanks (CCB) at concentrations ranging form 4.90 µg/L to 7.14 µg/L. Silver was detected in CCB4 at 0.788 µg/L. Vanadium was detected in CCB4 at 1.01 µg//L. Positive selenium, silver, and vanadium results in the associated samples less than five times the blank concentration were flagged "U, o" at the reporting limits. Aluminum, barium, calcium, copper, manganese, and thallium were also detected in the initial calibration blank (ICB) and/or CCBs at low levels. Since these analyte results in the associated samples were either previously flagged due to preparation blank contamination or greater than five times the blank concentration, no data qualifying action was taken.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on the flame ionization detector (FID). Positive methane results reported from the FID were flagged "J, r" in the associated samples. The %D for methane (20.2%) on the thermo-conductivity detector (TCD) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/19/02 at 09:44. Positive methane results reported from the TCD were flagged "J, c". The methane results in samples GW-AA-Q-5-85 and GW-AA-Q-5-106 exceeded the linear range of the calibration curve. Since these methane results were previously flagged due to initial calibration failure, no additional data flags were applied. The methane results reported from the TCD detector should be used for data interpretation. The MS recovery for methane (61%) was less than the lower control limit (i.e., 75%) in the GW-AA-P-3-71 MS/MSD pair. Since all methane results were previously flagged due to other QC failure, no additional data flags were applied.

For the sulfate analyses, the %R for sulfate (88%) was less than the criterion (i.e., 90-110%) for the continuing calibration analyzed on 8/22/02 at 17:35. The positive sulfate result in sample GW-AA-P-3-72 was flagged "J, c".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAII48_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____October 17, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the method blank contained methylene chloride at 1.1 ug/L. Positive results less than 10 times the blank concentration were flagged "U,z" at the reporting limit. Trip blank TB-0809-KH contained chloromethane at 0.83 ug/L and methylene chloride at 1.2 ug/L which was previously flagged "U,z" due to method blank contamination. Positive chloromethane results less than 5 times the blank concentration were flagged "U,y" or "U,y" at the reporting limit in the associated samples. The initial calibration analyzed on 8/1/02 displayed a correlation coefficient less than the QC limit (i.e., 0.990) for bromomethane at 0.987. All associated sample results were non-detects and were flagged "UJ,r". The continuing calibration analyzed on 8/19/02 displayed a %D greater than the QC limit (i.e., 20%) for bromomethane at 34.3%. All associated sample results were previously flagged due to initial calibration failure and no further data qualifying action was required.

For the SVOC analyses, the method blank contained bis(2-ethylhexyl)phthalate at 0.93 ug/L. Positive results less than 10 times the blank concentration were flagged "U,z" at the reporting limit. The initial calibration %RSD was greater than the control limit (i.e., 15%) for 2-nitrophenol (15.06%) in the initial calibration analyzed on 8/27/02. Since this compound was not detected in the associated samples and the failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The continuing calibration analyzed on 9/5/02 at 1137 displayed %Ds greater than the QC limit (i.e., 20%) for n-nitroso-di-n-propylamine (21.9%), 3&4-methylphenol (23.7%), 2,4-dinitrophenol (45.2%), dinoseb (27.2%), 4,6-dinitro-2-methylphenol (27.6%), and 3,3-dichlorobenzidine (-22.5%). The continuing calibration analyzed on 9/6/02 at 0920 displayed %Ds greater than the QC limit for 3-nitroaniline (20.4%), 2,4-dinitrophenol (52.9%), 4-nitrophenol (21.4%), 4-nitroaniline (26.4%), 4,6-dinitro-2-methylphenol (22.2%), benzo(g,h,i)perylene (-20.6%), and

dinoseb (29.6%). The continuing calibration analyzed on 9/12/02 at 1059 displayed %Ds greater than the control limit for hexachlorocyclopentadiene (-54.5%) and 2,4-dinitrophenol (-21.6%). All associated sample results were non-detects and the only failures that were serious enough (i.e., > 50%) to affect the non-detects were 2,4-dinitrophenol and hexachlorocyclopentadiene. Non-detects for these two compounds were flagged "UJ,c" in the associated samples. Surrogates were not recovered in samples SEEP-R-1 (DF = 25) and SEEP-R-1DL (DF = 50). No data qualifying action was required since the dilution factors were greater than 10. The %RPD for the MS/MSD analyses was greater than the QC limit (i.e., 72%) for 3,3-dichlorobenzidine (83%). No data qualifying action was required since the MS/MSD and LCS recoveries were acceptable. 4-Chloroaniline exceeded the calibration range in sample SEEP-R-1 and was flagged "E" by the laboratory. This result was flagged "J,q". This sample was re-analyzed at a dilution factor of 50 and the result from the dilution analyses should be used for data interpretation.

For the pesticide analyses, the %Ds for methoxychlor (-17.8%) and decachlorobiphenyl (-19.5%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/20/02 at 1050. The positive methoxychlor results were flagged "J,c" in the associated samples. No data qualifying action was required for decachlorobiphenyl since it is a surrogate compound. The recoveries for surrogate decachlorobiphenyl (24% and 24%) were less than the QC limit (i.e., 30-150%) in sample GW-AA-P-3-112. All associated sample results were non-detects and were flagged "UJ,s". The RPDs between the two columns were greater than the acceptance limit (i.e., < 40%) for several compounds in sample SEEP-R-1. These results were flagged "J,g". The recovery for the internal standard bromonitrobenzene was greater than the QC limit (i.e., 50-150%) in sample SEEP-R-1 at 177%. The positive sample results not previously flagged in this sample, were flagged "J,n".

For the herbicide analyses, the %Ds for 2,4-DB (-15.2%) on the primary column and dalapon (-15.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/17/02 at 0039. The %Ds for 2,4-DB (-24%) on the primary column and dalapon (-15.2%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 8/17/02 at 1154. The %D for 2,4-D (17.8%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/5/02 at 0234. The positive 2,4-D result was flagged "J,c" in the diluted sample SEEP-R-1. No positive results were reported for 2,4-DB and dalapon and no data qualifying action was taken since the %Ds were acceptable on the alternate column. The recovery for surrogate 2,4-DCAA (155%) was greater than the QC limit (i.e., 27-133%) in sample SEEP-R-1. Positive results were flagged "J,s". Dichloroprop and 2,4-D exceeded the calibration range in sample SEEP-R-1 and

were flagged "E" by the laboratory. These results were previously flagged due to surrogate failure and no further data qualifying action was required. This sample was re-analyzed at a dilution factor of 25 and the results for these two compounds from the dilution analyses should be used for data interpretation. The RPDs between the two columns were greater than the acceptance limit (i.e., < 40%) for several compounds in sample SEEP-R-1. These results were previously flagged due to surrogate or calibration failure and no further data qualifying action was required.

For the metal analyses, the method blank contained positive results for aluminum, barium, copper and thallium. The initial and continuing calibration blanks also contained positive results at low levels for aluminum, copper and thallium, and negative results for calcium and magnesium. Positive aluminum, copper and thallium results less than 5 times the blank concentration were flagged "U,p" at the reporting limit. Positive results for other analytes were greater than 5 times the blank concentration and no data qualifying action was taken. The %D for the serial dilution analyses was greater than the QC limit (i.e., 10%) for sodium at 11.4%. Positive results were flagged "J,s".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on instrument VMTFID1. Positive methane results were flagged "J, r" in the associated samples. Methane exceeded the calibration range in sample GW-AA-P-3-112. This result was previously flagged due to calibration failure, and no data qualifying action was taken. The result from the TCD detector should be used. The MS recovery was less than the QC limit (i.e., 75-125%) at 71%. No data qualifying action was required since the MSD and LCS recoveries were acceptable.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAII49_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____October 9, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, the initial calibration analyzed on 7/11/02 (RRF=0.0487) displayed an average relative response factor (RRF) less than the control limit (i.e. 0.05) for acetone on instrument MSO5973. All acetone results were flagged "J, c" for positive detections and "R, c" for non-detects.

The LCS recoveries for 4-chloroaniline (5%), 3-nitroaniline (0%), 3,3'-dichlorobenzidine (0%), and carbazole (43%) were less than the lower control limit in one LCS/LCSD pair (0819C-EMB). These results in sample GW-AA-P-1-44 were flagged "R, l".

Minor Anomalies: For the VOC analyses, the method blank, 1O0821MB, displayed a positive detection for methylene chloride at 1.7 µg/L. Positive methylene chloride results in the associated samples were flagged "U, z" at the reporting limit. The trip blank, TB-0812-KH, displayed positive detections for methylene chloride at 1.2 µg/L, benzene at 0.14 µg/L, and styrene at 0.47 µg/L. Positive benzene and styrene results in sample GW-AA-P-3-122 were flagged "U, y" at the reporting limit. Since the methylene chloride result in this trip blank was previously flagged due to method blank contamination, therefore, this result was not used to assess the associated samples. The continuing calibration verification (CCV) analyzed on 8/21/02 at 10:16 displayed %Ds greater than the control limit (i.e. 20%) for acetone at 30.8%, methylene chloride at 33.3%, 1,1-dichloroethane at 32.3%, 4-methyl-2-pentanone at -20.8%, and tetrachloroethene at 21.7%. Since acetone and methylene chloride results in the associated samples were previously flagged due to other QC failures, no additional data flags were applied. Since 1,1-dichloroethane, 4-methyl-2-pentanone, and tetrachloroethene were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The LCS recoveries for 1,1-dichloroethane (154%), dibromochloromethane (130%), and total 1,2-dichloroethene (140%) were greater than the upper control limit. Since these three compounds were not detected in the associated samples, no data

qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 9/11/02 displayed two correlation coefficients less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9888 and 4,6-dinitro-2-methylphenol at 0.9882. The initial calibration analyzed on 9/15/02 displayed three correlation coefficients less than the control limit for hexachlorocyclopentadiene at 0.9882, 2,4-dinitrophenol at 0.9885, and dinoseb at 0.9885. These compounds were not detected in the associated samples and were flagged "UJ, r". The continuing calibration analyzed on 9/12/02 at 10:59 displayed %Ds greater than the control limit (i.e., <20%) for hexachlorocyclopentadiene (-54.4%) and 2,4-dinitrophenol (-21.5%). The continuing calibration analyzed on 9/16/02 at 08:20 displayed a %D greater than the control limit for 4-nitroaniline (25.2%). The hexachlorocyclopentadiene results in the associated samples were flagged "UJ, c". Since all other compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Sample GW-AA-P-1-44 displayed an acid surrogate %R less than the lower control limit (i.e. 25%) for phenol-d5 at 24%. Since the other two acid surrogate recoveries were in control, no data qualifying action was taken. All surrogate recoveries (270% to 360%) were greater than the upper control limits in one LCSD sample (0819C-EMBLCSD). Since this is an QC sample, no data qualifying action was taken. The LCS recoveries for benzo(b)fluoranthene (150%), benzo(a)pyrene (130%), and dibenzo(a,h)anthracene (160%) were greater than the upper control limit in one LCS/LCSD pair (0819C-EMB). Since these three compounds were not detected in the associated sample, no data qualifying action was taken. For the LCSD, 62 of 64 recoveries and all RPD values were greater than the control limits in one LCS/LCSD pair (0819C-EMB). This LCSD sample may have been double or triple spiked. All internal standard peak areas in this LCSD sample were less than the lower control limits. Thes results were not used for data interpretation.

For the pesticides analyses, the %Ds for methoxychlor (-17.8%), 2,4-DCAA (-21.1%), and decachlorobiphenyl (DCBP, -19.5%) on the primary column; and for DCBP (-16.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/20/02 at 10:50. The %Ds for 2,4-DCAA (-17.4%) and DCBP (-18.6%) on the primary column were greater than the criterion for the continuing calibration analyzed on 8/20/02 at 21:15. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken.

For the herbicide analyses, the %D for dalapon (-15.5%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 8/17/02 at 00:39. The %D for 2,4-DB (-24.0%) on the

primary column was greater than the criterion for the continuing calibration analyzed on 8/17/02 at 11:54. Since dalapon and 2,4-DB were not detected in the associated samples and these results had an acceptable %D on the alternate column, no data qualifying action was taken.

For the metal analyses, the preparation blank contained aluminum at 0.01144 mg/L, barium at 0.00043 mg/L, copper at 0.00080 mg/L, and thallium at 0.00439 mg/L. Positive aluminum, copper, and thallium results in the associated samples less than five times the blank concentration were flagged "U, p" at the reporting limits. Since barium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Arsenic was detected in two continuing calibration blanks (CCB) at -0.00347 mg/L (CCB3) and -0.00302 mg/L (CCB4). Positive arsenic results in associated samples were flagged "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Copper was detected in the initial calibration blank (ICB) at 0.00108 mg/L, CCB3 at 0.00194 mg/L, and CCB4 at 0.00164 mg/L. The positive copper result in sample GW-AA-P-3-126 was flagged "U, o". Barium, calcium, magnesium, and thallium were also detected in the initial calibration blank (ICB) and/or CCBs at low levels. Since these analyte results in the associated samples were either previously flagged due to preparation blank contamination or greater than five times the blank concentration, no data qualifying action was taken. The %D for potassium (11.1%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (GW-AA-P-3-126). Positive potassium results in the associated samples were flagged "J, s".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 6/12/02 was less than the QC limit (i.e., 0.990) for methane at 0.987 on the flame ionization detector (FID). The positive methane result in sample GW-AA-P-3-126 was flagged "J, r". The MS recovery for methane (71%) was less than the lower control limit (i.e., 75%) in one non-client MS/MSD pair. Since the parent sample is a non-client sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII50_____ **Fraction:** _VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____October 28, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the method blank analyzed on 8/23/02 displayed positive detections for benzene at 0.60 µg/kg, trichloroethene at 0.48 µg/kg, toluene at 0.95 µg/kg, and chlorobenzene at 0.90 µg/kg. Positive results less than five times the blank concentration in the associated samples were flagged "U, z" at the reporting limit. The method blank analyzed on 8/26/02 displayed positive detections for 2-butanone at 1.2 µg/kg, toluene at 1.6 µg/kg, and styrene at 0.21 µg/kg. Since the associated samples are MS/MSD samples (QC samples) and MS/MSD recoveries for these compounds were in control, no data qualifying action was taken. The trip blank, TB-0815-KH, displayed positive detections for benzene at 0.59 µg/kg, trichloroethene at 0.45 µg/kg, toluene at 0.96 µg/kg, and chlorobenzene at 0.88 µg/kg. Since these results were previously flagged due to method blank contamination, these data were not used to assess the associated samples. The initial calibration analyzed on 8/6/02 displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 52.4%. Bromomethane non-detect results in the associated samples were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 8/23/02 at 10:32 displayed %Ds greater than the control limit (i.e., 20%) for chloromethane at -51.2%, bromomethane at -63.1%, and methylene chloride at -20.5%. Chloromethane results in the associated samples were flagged "J, c" for positive detections and "UJ, c" for non-detects. Positive methylene chloride results were flagged "J, c" in the associated samples. Since bromomethane results were previously flagged due to initial calibration failure, no additional data flags were applied. The CCV analyzed on 8/26/02 at 11:07 displayed %Ds greater than the control limit for chloromethane at 22.8%, acetone at -21.9%, and 1,1,1-trichloroethane at -21.5%. Since associated samples were QC samples (MS/MSD samples), no data qualifying action was taken. The MSD recovery for carbon disulfide (138%) and

the RPD for acetone (32%) were greater the control limit in the SOIL-OS-3-0.5' MS/MSD pair. Since the MS recovery for carbon disulfide and both MS and MSD recoveries for acetone were in control, no data qualifying action was taken. The MS recovery for carbon disulfide (154%) and the RPDs for chloromethane (70%), acetone (51%), 1,2-dichloroethane (36%), 1,2-dichloropropane (34%), bromodichloromethane (35%), cis-1,3-dichloropropene (38%), 4-methyl-2-pentanone (44%), 1,1,2-trichloroethane (41%), 2-hexanone (43%), dibromochloromethane (35%), bromoform (36%), and 1,1,2,2-tetrachloroethane (40%) were greater the control limit in the SOIL-OS-3-6' MS/MSD pair. Since the MS recovery for carbon disulfide and both MS and MSD recoveries for those RPD outliers were in control, no data qualifying action was taken. The MS/MSD recoveries for chloromethane (171% and 152%), carbon disulfide (171% and 141%); the MS recoveries for vinyl chloride (146%), bromomethane (305%), chloroethane (146%), 1,1-dichloroethane (134); and the RPDs for acetone (37%), 1,2-dichloroethane (28%), 4-methyl-2-pentanone (56%), 1,1,2-trichloroethane (38%), 2-hexanone (55%), bromoform (32%), and 1,1,2,2-tetrachloroethane (41%) were greater the control limit in the SOIL-Q-13-0.5FT MS/MSD pair. Since these compounds were not detected in the associated samples (from Site Q), no data qualifying action was taken.

For the SVOCs analyses, the method blank prepared on 8/28/02 displayed positive detections for benzo(a)pyrene at 25 µg/kg, indeno(1,2,3-cd)pyrene at 29 µg/kg, and benzo(g,h,i)perylene at 31 µg/kg. Positive results less than five times the blank concentration in the associated samples were flagged "U, z" at the reporting limit. The initial calibration analyzed on 9/11/02 displayed correlation coefficients less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9888 and 4,6-dinitro-2-methylphenol at 0.9881. These two results in sample SOIL-OS-1-0.5' were flagged "UJ, r". The CCV analyzed on 9/12/02 at 10:59 displayed %Ds greater than the control limit (i.e., 20%) for hexachlorocyclopentadiene at -54.4% and 2,4-dinitrophenol at -21.5%. Since the associated samples were QC samples, no data qualifying action was taken. The CCV analyzed on 9/13/02 at 01:03 displayed a %D greater than the control limit for 4,6-dinitro-2-methylphenol at 30.5%. Since this result in the associated sample was previously flagged due to initial calibration failure, no additional data flags were applied. The CCV analyzed on 9/16/02 at 19:58 displayed a %D greater than the control limit for 2-nitroaniline at 25.3%. The CCV analyzed on 9/17/02 at 08:22 displayed %Ds greater than the control limit for 2,4-dinitrophenol at 25.9%, benzo(b)fluoranthene at 22.5%, and dinoseb at 22.5%. Since these compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The surrogate recoveries for 2,4,6-tribromophenol were less than the lower control limit (i.e., 30%) in samples SOIL-OS-3-6' (22%) and SOIL-OS-3-0.5' (22%). Since all other surrogates in these samples were in control, no data

qualifying action was taken. Surrogate recoveries for 2,4,6-tribromophenol (acid fraction) and terphenyl-d14 (base/neutral) were less than the lower control limit in samples SOIL-OS-2-0.5'-DUP (22% and 25%) and SOIL-OS-3-0.5'MS (17% and 19%). Since only one surrogate recovery from each fraction was out in sample SOIL-OS-2-0.5'-DUP and the sample SOIL-OS-3-0.5'MS was a QC sample, no data qualifying action was taken. Sample SOIL-OS-2-0.5'-DUP was re-analyzed by the laboratory and displayed acceptable surrogate recoveries. The original sample results in sample SOIL-OS-2-0.5'-DUP should be used for data interpretation. There are 26 of 64 MS recoveries, four MSD recoveries, and 17 of 64 RPDs outside the control limits in the SOIL-OS-3-0.5' MS/MSD pair. The low MS recoveries and high RPDs in this MS/MSD pair may be attributed to low extraction efficiency which indicated by low surrogate recoveries. Since the majority of the MS/MSD recoveries were in control and the LCS recoveries were in control, no data qualifying action was taken. The MS/MSD recoveries for dimethylphthalate (46%), n-nitrosodiphenylamine (46%), butylbenzylphthalate (40% and 48%), benzo(a)anthracene (48%), and chrysene (48% and 54%) were less than the lower control limits in the SOIL-OS-3-6' MS/MSD pair. The MS/MSD recoveries for dimethylphthalate (45%), n-nitrosodiphenylamine (50%), butylbenzylphthalate (43% and 45%), benzo(a)anthracene (52% and 50%), and chrysene (55% and 50%) were less than the lower control limits in the SOIL-Q-13-0.5FT MS/MSD pair. The RPD for 1,2,4-trichlorobenzene (27%) was greater than the acceptance limit (i.e., 22%) in this MS/MSD pair. Since these MS/MSD recoveries were slightly less than the lower control limit and the LCS recoveries for these compounds were in control, no data qualifying action was taken. The LCS recovery for 2,4-dimethylphenol (91%) was greater than the upper control limit (i.e., 84%). Since this compound was not detected in the associated samples, no data qualifying action was taken. Sample SOIL-OS-2-6' displayed a %R less than the lower control limit (i.e., 50%) for internal standard chrysene-d12 (47.6%). All results associated with this internal standard were non-detects and were flagged "UJ, n". This sample was re-analyzed and displayed a similar recovery (49.5%) and confirmed original sample results. The original sample results should be used for data interpretation. Samples SOIL-Q-13-6FT, SOIL-OS-4-0.5FT, and SOIL-OS-2-0.5-DUP displayed %Rs greater than the upper control limit (i.e., 200%) for internal standards 1,4-dichlorobenzene-d4 and naphthalene-d8. Since sample results associated with these two internal standards were non-detects and high internal standard recovery has no impact on non-detect results, no data qualifying action was taken. These samples were reanalyzed by the laboratory and displayed several internal standard %Rs less than the lower control limits. These re-analyzed sample data should not be used for data interpretation. Samples SOIL-OS-3-6', SOIL-OS-3-0.5MS, and SOIL-OS-3-0.5MSD displayed %Rs greater than the upper control limit (i.e., 200%) for internal standards 1,4-dichlorobenzene-d4 and naphthalene-d8. Sample SOIL-OS-3-0.5' displayed %Rs greater than the upper control limit (i.e., 200%) for

internal standards 1,4-dichlorobenzene-d4 (382.4%), naphthalene-d8 (334.7%), and acenaphthene-d10 (201.7%). Since results associated with these internal standards were non-detects in samples SOIL-OS-3-6' and SOIL-OS-3-0.5', and MS/MSD samples were QC samples, no data qualifying action was taken.

For the pesticides analyses, the method blank prepared on 8/28/02 displayed a positive detection for endrin ketone at 0.34 µg/kg. Positive endrin ketone results less than five times the blank concentration in the associated samples were flagged "U, z" at the reporting limit. The CCV analyzed on 8/31/02 at 14:38 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for alpha-BHC (-20.7%) and delta-BHC (-18.2%) and on both columns for 4,4'-DDD (16.9% and 18.8%), 4,4'-DDT (-33.3% and -29.4%), endrin aldehyde (-35.4% and -26.6%), and methoxychlor (-17.3% and -20.9%). Positive 4,4'-DDD, 4,4'-DDT, endrin aldehyde, and methoxychlor results were flagged "J, c" and non-detects were flagged "UJ, c" in the associated samples. Since alpha-BHC and delta-BHC were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The CCV analyzed on 9/11/02 at 16:09 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-22.6%), delta-BHC (-20.4%), endrin aldehyde (-24.9%), and endrin ketone (16.0%) and on the confirmation column for endrin aldehyde (-20.9%) and methoxychlor (-17.5%). The CCV analyzed on 9/12/02 at 10:34 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-23.9%), gamma-BHC (-17.1%), delta-BHC (-21.8%), 4,4'-DDT (-16.7%), and methoxychlor (-26.4%), and on the confirmation column for 4,4'-DDT (-16.6%), endrin aldehyde (-20.8%) and methoxychlor (-24.6%). The CCV analyzed on 9/12/02 at 20:52 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-23.0%), gamma-BHC (-16.0%), delta-BHC (-20.7%), endrin aldehyde (-20.2%), and on the confirmation column for endrin aldehyde (-19.4%) and methoxychlor (-17.1%). 4,4'-DDT, endrin aldehyde, and methoxychlor results were flagged "J, c" for positive detections and "UJ, c" for non-detects in the associated samples. Positive alpha-BHC and delta-BHC results in sample SOIL-OS-1-0.5 were flagged "J, c". Since other compounds were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The tetrachloro-m-xylene (TCMX) surrogate recoveries on both columns (21% and 24%) were less than the lower control limit (i.e., 30%) and the decachlorobiphenyl (358% and 374%) were greater than the upper control limit (i.e., 150%) in sample SOIL-OS-3-0.5'. All positive results were flagged "J, s" and non-detects were flagged "UJ, s" with the exception of those data previously flagged due to calibration failure. The DCBP recoveries were greater than the upper control limit (i.e., 150%) in samples SOIL-OS-2-0.5'-DUP and SOIL-OS-2-0.5'. Positive detections were flagged "J, s" in these two samples with the exception of those data previously flagged due to calibration failure. The DCBP recoveries were greater than the upper control

limit (i.e., 150%) in samples SOIL-OS-3-0.5'MS and SOIL-OS-3-0.5'MSD. Since these two samples were QC samples, no data qualifying action was taken. The TCMX recoveries on the primary column were less than the lower control limit in samples SOIL-Q-13-6FT (29%) and SOIL-OS-4-6FT (27%). No data qualifying action was taken since only one surrogate recovery was outside the control limit. The DCBP recovery was greater than the upper control limit on the confirmation column in sample SOIL-Q-13-0.5FtMS (167%). Since this sample was a QC sample and only one surrogate recovery was outside the control limit, no data qualifying action was taken. The MS/MSD recoveries for endosulfan I (214%), 4,4'-DDE (145%), 4,4'-DDD (147% and 147%), 4,4'-DDT (307% and 333%), endrin aldehyde (133%), and methoxychlor (187%) were greater than the upper control limits in the SOIL-OS-3-0.5' MS/MSD pair. The RPDs for aldrin (44%), endosulfan I (55%), endosulfan II (72%), methoxychlor (59%), and endrin ketone (62%) were greater than the acceptance limit. The high MS/MSD recoveries and high RPDs in this MS/MSD pair may be attributed to matrix interference which is indicated by high surrogate recoveries in both MS and MSD samples. Since all results in the parent sample were previously flagged due to surrogate recovery failure, no additional data flags were applied. The RPDs for 4,4'-DDE (40%), endrin (45%), 4,4'-DDT (46%), methoxychlor (55%), and endrin ketone (32%) were greater than the acceptance limit in the SOIL-OS-3-6' MS/MSD pair. The MSD recovery for endrin aldehyde (144%) and the RPDs for gamma-BHC (51%) and endrin ketone (32%) were greater than the control limit in the SOIL-Q-13-0.5FT MS/MSD pair. Since majority of the MS/MSD recoveries were in control, no data qualifying action was taken. The LCS recovery for endrin ketone was slightly greater than the upper control limit (i.e., 112%) at 113% due to method blank contamination. Since all positive endrin ketone results were previously flagged due to method blank contamination, no additional data flags were applied. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, the MS/MSD recoveries for hexachlorobiphenyl (31% and 39%) and octachlorobiphenyl (38% in MS) were less than the lower control limit (i.e., 40%) in the SOIL-OS-3-0.5' MS/MSD pair. The MS/MSD recoveries for hexachlorobiphenyl (36% and 39%) were less than the lower control limit in the SOIL-OS-3-6' MS/MSD pair. The MS recovery for hexachlorobiphenyl (35%) was less than the lower control limit in the SOIL-Q-13-0.5FT MS/MSD pair. Since these recoveries were only slightly less than the lower control limit and the LCS recoveries for these two compounds were in control, no data qualifying action was taken. The data user is advised that the hexachlorobiphenyl results may be biased low and should be used with caution.

For the herbicides analyses, the CCV analyzed on 9/17/02 at 09:57 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for dalapon at 16.2%, dicamba at 22.3%, MCPP at 18.3%, dichlorprop at 15.6%, pentachlorophenol at 19.2%, and 2,4,5-TP at 16.7%. Positive detections for these compounds were flagged "J, c" in the associated samples. The CCV analyzed on 9/19/02 at 21:19 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at -16.0%. Since 2,4-DB was not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The 2,4-DCAA recoveries were less than the lower control limit (i.e., 30%) on the primary column in samples SOIL-OS-2-6'-DUP (28%) and SOIL-Q-13-0.5FT (20%). All results, except those previously flagged due to calibration failure, were flagged "J, s" for positive detections and "UJ, s" for non-detects. The MS recovery (169%) and the RPD (64%) for MCPP were greater than the control limit in the SOIL-Q-13-0.5FT MS/MSD pair. Since MCPP was not detected in the associated samples, no data qualifying action was taken. The dichlorprop result in sample SOIL-OS-2-0.5'-DUP exceeded the linear range of the calibration curve. Since this result was previously flagged due to calibration failure, no additional data flags were applied. This sample was diluted by a factor of 2 and reanalyzed by the laboratory. The dichlorprop result from the dilution analysis should be used for data interpretation. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. Since these results were previously flagged due to other QC failure, no additional data flags were applied. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for selenium (148%) and vanadium (121%), and the final CRDL recovery for lead (74%) were outside the control limit (i.e., 80-120%). The positive selenium result in sample SOIL-OS-2-0.5' was flagged "J, w". Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 1.09873 mg/kg, arsenic at 0.44473 mg/kg, barium at 0.39174 mg/kg, beryllium at 0.01718 mg/kg, calcium at 2.21070 mg/kg, chromium at 0.19564 mg/kg, magnesium at 2.41547 mg/kg, potassium at 3.22578 mg/kg, sodium at 21.80473 mg/kg and vanadium at 0.28907 mg/kg. Positive sodium results less than five times the blank concentration were flagged "U, p". Since all other results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Aluminum, arsenic, barium, beryllium, calcium, chromium, magnesium, manganese, potassium, and vanadium were detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Since all results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Several analytes were detected in the ICSA initial and final

analyses at low levels. Several samples displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. Positive cadmium results in samples SOIL-OS-3-0.5', SOIL-OS-2-6', SOIL-Q-13-0.5FT, SOIL-OS-4-0.5FT, and SOIL-OS-4-6FT were flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (42% and 44%) and lead (51% and 40%) were less than the lower control limit (i.e., 75%) in the SOIL-OS-3-0.5' MS/MSD pair. The MS/MSD recoveries for antimony (62% and 63%) and potassium (64% and 68%) were less than the lower control limit (i.e., 75%) in the SOIL-OS-3-6' MS/MSD pair. Antimony, lead (except sample SOIL-OS-3-6'), and potassium (except SOIL-OS-3-0.5') results were flagged "J, m" for positive detections and "UJ, m" for non-detects in the associated off-site samples. The MS/MSD recoveries for antimony (37% and 43%) and mercury (135%) were outside the control limit in the SOIL-Q-13-0.5FT MS/MSD pair. Antimony and mercury results in all Site Q samples were flagged "J, m" for positive detections and "UJ, m" for non-detects. The post-digestion spike analysis was performed and recoveries for these compounds were in control. The %D for vanadium (11.4%) was greater than the acceptance limit (i.e., <10%) in one serial dilution analysis (SOIL-OS-3-6'). Positive vanadium results were flagged "J, s". Field duplicates displayed a RPD greater than the control limit (i.e., 100%) for copper at 110.9% in one SOIL-OS-2-0.5/SOIL-OS-2-0.5-DUP field duplicate pair. Positive copper results in samples SOIL-OS-2-0.5' and SOIL-OS-2-0.5'-DUP were flagged "J, f". Since the RPDs for copper in two other field duplicate pairs were in control, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII51_____ **Fraction:** _____Ferrous Iron (Fe^{+2})_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____October 31, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII52_____ **Fraction:** _Air PUFF - SVOCs, Pest., PCBs,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____November 7, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the SVOC analyses, surrogate recoveries for nitrobenzene-d5 and 2-fluoro-biphenyl were less than the lower control limit in samples SP3PA082402R035 (10% and 8%) and SO2PA082502R048 (8% and 11%). Positive detections in these two samples were flagged "J, s" and non-detects were flagged "R, s". These two samples were re-analyzed by the laboratory and displayed similar results. These two samples were not re-extracted due to limited sample provided. The original sample results should be used for data interpretation. The percent completeness for SVOC analysis was less than the control limit (i.e., 90%) at 84.7%.

For the pesticides analyses, the LCS recoveries for alpha-BHC (38%) and delta-BHC (30%) were less than the lower control limits. Positive detections for these two compounds, except those previously flagged due to calibration failure, were flagged "J, l" and non-detects were flagged "R, l".

Minor Anomalies: For the SVOC analyses, the continuing calibration verification (CCV) analyzed on 9/20/02 at 08:20 displayed %Ds greater than the control limit (i.e., 20%) for benzo(k)fluoranthene at 25.3% and indeno(1,2,3-cd)pyrene at -20.8%. Since the associated samples (re-analyzed samples) were not used for data interpretation, no data qualifying action was taken. The surrogate recoveries for nitrobenzene-d5 were less than the lower control limit (i.e., 40%) in the method blank (38%), and four associated samples: SP1PA082402R027 (32%), SP4PA082402R039 (36%), SPO3PA082502R053 (32%), and SO4PA-082502D063 (32%). Since all other surrogates in these samples were in control, no data qualifying action was taken. Surrogate recoveries for nitrobenzene-d5 and 2-fluoro-biphenyl were less than the lower control limit in sample SO4PA082502R058 (14% and 20%) and in the LCS/LCSD pair (24%/38% and 12%/20%). Positive detections in sample SO4PA082502R058 were flagged "J, s" and non-detects were flagged "UJ, s". Since LCS and LCSD are QC samples, no data qualifying action was taken. This

sample and the LCS/LCSD pair were re-analyzed by the laboratory and displayed similar results. These two samples were not re-extracted due to limited sample provided. The original sample results should be used for data interpretation. Excepting the LCS recovery for naphthalene, all LCS/LCSD recoveries were less than the lower control limit. This LCS/LCSD pair was re-analyzed by the laboratory and displayed similar recoveries. Since low LCS/LCSD recoveries may be attributed to low extraction efficiency (indicated by low surrogate recoveries), non-detects in the associated samples, except those previously flagged due to other QC failures, were flagged "UJ, l" instead of "R, l". Positive detections in the associated samples, except those previously flagged due to other QC failures, were flagged "J, l". Field duplicates displayed an absolute difference greater than the control limit (i.e., 2X the reporting limit-20 μg) for anthracene at 21 μg. Since all anthracene results were previously flagged due to other QC failures, no further data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 9/4/02 at 11:59 displayed a %D greater than the control limit (i.e., 15%) for alpha-BHC (-16.4%) on the primary column. The CCV analyzed on 9/4/02 at 22:16 displayed %Ds greater than the control limit on the primary column for endrin aldehyde (-19.4%), endosulfan sulfate (15.5%), and endrin ketone (18.5%), and on the confirmation column for endrin aldehyde (-22.6%). Positive alpha-BHC results in the associated samples were flagged "J, c". No data qualifying action was taken for non-detects since alpha-BHC had an acceptable %D on the alternate column. Endrin aldehyde was not detected in the associated samples and were flagged "UJ, c". Since endosulfan sulfate and endrin ketone were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The CCV analyzed on 9/19/02 at 10:07 displayed %Ds greater than the control limit on the primary column for heptachlor (16.0%), delta-BHC (-18.5%), heptachlor epoxide (16.4%), gamma-chlordane (15.8%), alpha-chlordane (16.3%), methoxychlor (-15.7%) and surrogate 2,4-DCAA (22.0%), and on the confirmation column for beta-BHC (16.5%), aldrin (19.5%), and gamma-chlordane (15.9%). The CCV analyzed on 9/19/02 at 15:37 displayed %Ds greater than the control limit on the primary column for 4,4'-DDT (17.7%) and endrin ketone (16.0%). The gamma-chlordane non-detect result in sample SO1PS082502R042 was flagged "UJ, c". Since other compounds were not detected in the associated samples and had acceptable %Ds on the alternate column, no data qualifying action was taken. The decachlorobiphenyl (DCBP) surrogate recoveries on both columns (25% and 29%) were less than the lower control limit (i.e., 30%) in sample SO2PS082502R047. The DCBP surrogate recoveries on the primary column were less than the lower control limit in samples SO4PS082502R057 (26%) and SO4PS082502D062 (26%). All positive results were flagged "J, s" and non-detect results, except those previously flagged due to LCS recovery failure, were flagged "UJ, s". Sample SO2PS082502R047

displayed a %R greater than the upper control limit (i.e., 150%) for internal standard bromonitrobenzene at 152.8%. Since sample results associated with this internal standard were non-detect and the high internal standard recovery had no impact on non-detect results, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results. These results, except those previously flagged due to other QC failure, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low. Reporting limits were raised due to dilution in sample SO1PS082502R042 (DF=2).

For the metal analyses, the initial CRDL percent recoveries for selenium (131%) and the final CRDL recovery for lead (79%) and sodium (74%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Thallium was detected in two continuing calibration blanks at 0.00554 mg/L (CCB3) and 0.00664 mg/L (CCB4). Since thallium was not detected in the associated samples, no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. Since aluminum, calcium, iron and magnesium concentrations in the associated samples were less than 50% of the concentrations in ICSA samples, no action was taken.

Correctable Anomalies: None.

Comments: No MS/MSD analyses were performed in the SDG due to insufficient sample volume provided.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII53_____ **Fraction:** _Air PUFF - SVOCs, Pest., PCBs,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____November 8, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the SVOC analyses, surrogate recoveries for nitrobenzene-d5 and 2-fluorobiphenyl were less than the lower control limit in samples SQ2PA082602R073 (2% and 4%), SQ3PA082602R078 (2% and 2%), SQ6PA082802D109 (6% and 5%), and SQ8PA082802R104 (8% and 10%). These four samples were re-analyzed by the laboratory and displayed similar results. Positive detections in these samples were flagged "J, s" and non-detects were flagged "R, s". These four samples were not re-extracted due to limited sample provided. The original sample results in samples SQ3PA082602R078 and SQ6PA082802D109 should be used for data interpretation. The re-analyzed sample results should be used for data interpretation in samples SQ2PA082602R073 and SQ8PA082802R104 due to the internal standard recovery issue (see discussion below). The percent completeness for SVOC analysis was less than the control limit (i.e., 90%) at 64.8%.

For the pesticides analyses, the LCS extracted on 9/2/02 displayed %Rs less than the lower control limits for alpha-BHC (30%), gamma-BHC (36%), and delta-BHC (47%). Positive detections for these compounds were flagged "J, l" and non-detects were flagged "R, l" in the associated samples. The LCS extracted on 9/3/02 displayed %Rs less than the lower control limits for alpha-BHC (31%), gamma-BHC (37%), beta-BHC (34%), delta-BHC (33%), alpha-chlordane (25%), and endosulfan sulfate (20%). Positive detections for alpha-BHC, gamma-BHC, and beta-BHC, except those previously flagged due to continuing calibration failure, were flagged "J, l" and non-detects were flagged "R, l" in the associated samples. Since the positive alpha-chlordane result in sample SQ6PS082802R093 was previously flagged due to method blank contamination, no further data qualifying action was taken. Since the LCS recovery calculations for alpha-chlordane and endosulfan sulfate were taking the method blank contamination into account by the laboratory and true recoveries for these two compounds may be in control, alpha-chlordane and endosulfan sulfate non-detect results were only flagged "UJ, l" instead of "R, l" (at normal condition) in the associated samples.

The percent completeness for pesticide analysis was less than the control limit at 84.4%.

Minor Anomalies: For the SVOC analyses, the surrogate recoveries for nitrobenzene-d5 were less than the lower control limit (i.e., 40%) in the method blank (0904D-MB, 26%), one LCS (0902A-MBLCS, 32%), and four samples SQ1PA082602R068 (20%), SQ5PA082802R089 (26%), SQ7PA082802B114 (30%), and SQ8PA082802B119 (28%). Since all other surrogates in these samples were in control, no data qualifying action was taken. Surrogate recoveries for nitrobenzene-d5 and 2-fluorobiphenyl were less than the lower control limit in the method blank (0902A-MB, 22% and 36%), one LCS (0904D-MBLCS, 22% and 34%), and three samples SQ4PA082602R083 (17% and 38%), SQ6PA082802R094 (12% and 22%), and SQ7PA082802R099 (14% and 26%). These samples and QC samples were re-analyzed by the laboratory and displayed similar results. These samples were not re-extracted due to limited sample provided. Since method blank and LCS are QC samples, no data qualifying action was taken. Positive detections in original samples SQ4PA082602R083 and SQ7PA082802R099 were flagged "J, s" and non-detects were flagged "UJ, s". Positive detections in the re-analyzed sample SQ6PA082802R094 were flagged "J, s" and non-detects were flagged "UJ, s". The original sample results in samples SQ4PA082602R083 and SQ7PA082802R099 and the re-analyzed sample results in sample SQ6PA082802-R094 (due to internal standard issue) should be used for data interpretation. Except for the LCS recovery for naphthalene, all LCS recoveries were less than the lower control limit in one LCS extracted on 09/04/02. This LCS was re-analyzed by the laboratory and displayed similar recoveries. Since low LCS recoveries may be attributed to low extraction efficiency (indicated by low surrogate recoveries) and these failures may have a little or no impact on data quality, non-detects in the associated samples, except those previously flagged due to other QC failures, were flagged "UJ, l" instead of "R, l". Positive detections in the associated samples, except those previously flagged due to other QC failures, were flagged "J, l". Sample SQ6PA082802R094 displayed %Rs greater than the upper control limit (i.e., 200%) for internal standards naphthalene-d8 (209.6%) and chrysene-d12 (200.7%). Sample SQ8PA082802R104 displayed %Rs greater than the upper control limit (i.e., 200%) for internal standards 1,4-dichloro-benzene-d4 (218.8%), naphthalene-d8 (225.3%), acenaphthene-d10 (221.0%), and phenanthrene-d10 (203.3%). Sample SQ2PA082602R073 displayed %Rs greater than the upper control limit (i.e., 200%) for all six internal standards (218.4%-264.4%). No data qualifying action was taken since all results were previously flagged due to other QC failures. These three samples were re-analyzed by the laboratory and displayed acceptable internal standard recovery. The re-analyzed results for these three samples should be used for data interpretation. The method blank extracted on 9/2/02 displayed a

%R less than the lower control limit (i.e., 50%) for internal standard perylene-d12 (43.3%). Since this is a QC sample, no data qualifying action was taken.

For the pesticides analyses, the method blank prepared on 9/3/02 displayed positive detections for alpha-chlordane at 0.043 µg and endosulfan sulfate at 0.051 µg. The positive alpha-chlordane result in sample SQ6PS082802R093 was flagged "U, z" at the reporting limit. The CCV analyzed on 9/5/02 at 11:50 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for alpha-BHC (-21.2%), delta-BHC (-20.4%), alpha-chlordane (25.5%), endrin aldehyde (-17.8%), and surrogate 2,4-DCAA (20.3%), and on the confirmation column for alpha-BHC (24.8%), endosulfan I (18.7%), endrin (17.1%), endodulfan sulfate (18.4%), and surrogate 2,4-DCAA (20.7%). The CCV analyzed on 9/5/02 at 19:43 displayed %Ds greater than the control limit on the primary column for alpha-BHC (-16.8%), heptachlor (16.8%), delta-BHC (-15.8%), alpha-chlordane (21.3%), endrin (16.1%), 4,4'-DDD (15.8%), 4,4'-DDT (-15.8%), and surrogate 2,4-DCAA (20.4%), and on the confirmation column for alpha-BHC (20.7%), beta-BHC (15.7%), endosulfan I (17.2%), dieldrin (15.8%), endrin (18.4%), 4,4'-DDD (18.6%), endosulfan II (15.9%), endosulfan sulfate (18.6%), methoxychlor (16.5%), and surrogate 2,4-DCAA (22.2%). Non-detect alpha-BHC, endrin, and 4,4'-DDD results, except those previously flagged due to LCS recovery failure, were flagged "UJ, c" in the associated samples. Positive beta-BHC, heptachlor, and endrin aldehyde results in the associated samples were flagged "J, c". Since other compounds were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The decachlorobiphenyl (DCBP) surrogate recovery on the confirmation column (26%) was less than the lower control limit (i.e., 30%) in sample SQ4PS082602R082. All results were flagged "UJ, s" with the exception of those previously flagged due to other QC failures. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results. Since these results were previously flagged due to other QC failure, no further data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for selenium (131%) and the final CRDL recovery for iron (79%) and sodium (74%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Sodium was detected in the field blank SQ7PM082802B115 at 27 µg. Positive sodium results were flagged "U, x" at the reporting limit in the associated samples. Several analytes were detected in the ICSA initial and final analyses at low levels. Since aluminum, calcium, iron and magnesium concentrations in the associated samples were less than 50% of the concentrations in ICSA samples, no action was taken.

Correctable Anomalies: None.

Comments: No MS/MSD analyses were performed in this SDG due to insufficient sample volume provided.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII54_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____November 4, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the initial calibration correlation coefficient for 2-butanone (0.987) was less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 9/3/02. The associated sample result was flagged "UJ,r". The continuing calibration %Ds were greater than the QC limit (i.e., 20%) for bromomethane (-20.3%) and acetone (33%) for the continuing calibration analyzed on 9/5/02 at 1014. The continuing calibration %Ds were greater than the QC limit for bromomethane (-38.4%) and 2-butanone (-25.9%) for the continuing calibration analyzed on 9/13/02 at 0922. All associated sample results were non-detects and no data qualifying action was required since the %D failures were not serious enough (i.e., > 50%) to affect the non-detects.

For the pesticide analyses, the %Ds for methoxychlor (-17.4%) on the primary column, and endosulfan sulfate (15.9%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/9/02 at 1005. The %Ds for endrin ketone (21% and 18.3%) on both columns and endosulfan sulfate (15.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 9/9/02 at 2022. Endrin ketone non-detect was flagged "UJ,c" in the associated sample. No data flags were applied to the non-detects for the other compounds since the recoveries were acceptable on the alternate column. The internal standard area was greater than the QC limit for bromonitrobenzene on the confirmation column. No positive results were reported and no data qualifying action was required.

For the herbicide analyses, the %Ds for dalapon (19.7%), dicamba (20.7%), pentachlorophenol (17.3%), 2,4,5-TP (16.2%), and 2,4,5-T (16.1%) on the primary column, and 2,4-D (21.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/6/02 at 1609. No positive results were reported and no data qualifying action was

required since the %D was acceptable on the alternate column. The recoveries for surrogate 2,4-DCAA (16% and 16%) were less than the QC limit (i.e., 27-133%) for the MSD sample. No action was required since this was a QC sample. The MSD recoveries for dicamba (20%), dichloroprop (14%), and 2,4,5-T (20%) were less than the QC limit. The %RPDs for all compounds were greater than the QC limit. The MS and LCS recoveries were acceptable and no data qualifying action was required. The MSD recovery for dalapon was 0%. The recoveries for surrogate 2,4-DCAA (16% and 16%) were less than the QC limit (i.e., 27-133%) for the MSD sample. The %RPDs for all compounds were greater than the QC limit. Since the MS and LCS recoveries are acceptable, this indicates that the low MSD recovery is due to laboratory error. Based on professional judgement, the dalapon non-detect was flagged "UJ,m" in sample BDRK-0-1.

For the metal analyses, the method blank contained positive results for aluminum, calcium, and copper. The positive copper result less than 5 times the blank concentration was flagged "U,p" at the reporting limit. Calcium and aluminum results were greater than 5 times the blank concentration and no data qualifying action was required. The initial and continuing calibration blanks also contained positive results for aluminum, barium, manganese, copper, calcium, thallium, and magnesium at low levels. All associated sample results were either previously flagged due to method blank contamination or were greater than 5 times the blank concentration and no data qualifying action was required. The serial dilution %D for sodium (10.8%) was greater than the QC limit (i.e., 10%). The positive sodium result was flagged "J,s".

For the wet chemistry analyses, the MSD recovery for sulfate (66%) was less than the QC limit (i.e., 75-125%). The positive sulfate result was flagged "J,m" in sample BDRK-0-1.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII55_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____RA_____ **Date:** _____November 4, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the method blank contained methylene chloride at 2.4 ug/l. Positive result less than 10 times the blank concentration was flagged "U,z" at the reporting limit in the trip blank sample. The initial calibration correlation coefficients for 2-hexanone (0.988), chloroethane (0.988), and 1,1,2,2-tetrachloroethane (0.989) were less than the QC limit (i.e., 0.990) for the initial calibration analyzed on 8/6/02. The associated sample results were non-detects and were flagged "UJ,r". The initial calibration %RSD for bromomethane (28%) was greater than the QC limit (i.e.,15%) for the initial calibration analyzed on 8/6/02. All associated sample results were non-detects and no data qualifying action was required since the %RSD failure was not serious enough (i.e., > 50%) to affect the non-detects. The continuing calibration %D was greater than the QC limit (i.e., 20%) for 1,1,2,2-tetrachloroethane (22.8%) for the continuing calibration analyzed on 9/11/02 at 0744. All associated sample results were non-detects and no data qualifying action was required since the %D failures were not serious enough (i.e., > 50%) to affect the non-detects.

For the SVOC analyses, the continuing calibration %Ds were greater than the QC limit (i.e., 20%) for 2,4-dinitrotoluene (23.1%), diethylphthalate (24.3%), 4-nitroaniline (23%), and di-n-octylphthalate (20.4%) for the continuing calibration analyzed on 9/20/02 at 1052. All associated sample results were non-detects and no data qualifying action was required since the %D failures were not serious enough (i.e., > 50%) to affect the non-detects.

For the pesticide analyses, the %Ds for endosulfan sulfate (15.3%), DBCP (19.6%), and methoxychlor (30.5%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/18/02 at 1033. The %Ds for dieldrin (16% and 15.8%), endrin (21.4% and 18.1%), endosulfan sulfate (18% and 18.6%), DBCP (21.8% and 22.3%), and

methoxychlor (25.5% and 40.2%) on both columns, 4,4-DDD (16.4%) and endrin ketone (22.9%) on the primary column, and heptachlor (16.1%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 918/02 at 1757. Dieldrin, endrin, endosulfan sulfate, and methoxychlor non-detects were flagged "UJ,c" in the associated samples. No data flags were applied to the non-detects for the other compounds since the recoveries were acceptable on the alternate column.

For the herbicide analyses, the %D for dalapon (17.1%) on the primary column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/12/02 at 1221. All associated sample results were non-detects and no data qualifying action was required since recoveries were acceptable on the alternate column.

For the metal analyses, the method blank contained positive results for aluminum, calcium, and magnesium. The initial and continuing calibration blanks also contained positive results for aluminum, barium, calcium, manganese, thallium, vanadium, and magnesium at low levels. All associated sample results were greater than 5 times the blank concentration and no data qualifying action was required. The serial dilution %D for sodium (20.7%) was greater than the QC limit (i.e., 10%). Positive sodium results were flagged "J,s". The MS/MSD recoveries for aluminum (506% and 531%) were greater than the QC limit (i.e., 75-125%). No action was required since the parent sample did not belong to this project.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, except for those flagged "R", are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII57_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____November 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The surrogate recovery for terphenyl-d14 (4%) was less than the lower control limit (i.e., 14%) in sample BDRK-P-1. All positive base/neutral results were flagged "J, s" and non-detects were flagged "R, s" in sample BDRK-P-1. This sample was re-extracted on 9/30/02 (holding time was grossly exceeded by 14 days) and re-analyzed by the laboratory and displayed acceptable surrogate recoveries. This re-extracted data set was crossed-out by the reviewer and should not be used for data interpretation. The original data should be used for data interpretation. The percent completeness for this analysis was less than the control limit (i.e., 95%) at 78.1%.

Minor Anomalies: For the VOC analyses, styrene was detected in two trip blanks at 0.28 µg/L (TB-090902) and 0.77 µg/L (D91002). Since styrene was not detected in the associated samples, no data qualifying action was taken. The MS/MSD recoveries for chloroethane (32% and 22%) were less than the lower control limit (i.e., 47%) in the LEACH-R-1 MS/MSD pair. The RPD for this compound (37%) was also greater than the acceptance limit (i.e., 34%). Since the LCS recovery for chloroethane in this analytical batch was in control, no data qualifying action was taken.

For the SVOC analyses, the method blank contained di-n-butylphthalate at 2.9 µg/L. Since this compound was not detected in the associated samples, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 9/24/02 at 11:01 displayed a %D greater than the control limit (i.e., <20%) for 4,6-dinitro-2-methylphenol (-21.9%). The CCV analyzed on 9/25/02 at 21:51 displayed a %D greater than the control limit for 3-nitroaniline (-21.5%). The CCV analyzed on 9/26/02 at 10:12 displayed %Ds greater than the control limit for 3-nitroaniline (-20.8%) and 4,6-dinitro-2-methylphenol (-21.2%). The CCV analyzed on 10/2/02 at 07:47 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether (-27.4%) and 4-nitrophenol (-22.0%). The CCV analyzed on 10/3/02 at 06:27 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether (-26.7%) and 3,3'dichlorobenzidine (-25.0%). Since

these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogates were diluted out in samples LEACH-R-1 and LEACH-R-1DL and their associated MS/MSD samples (DF from 200 to 1000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=200 and 1000), the MS and MSD samples were analyzed at the same dilution (DF=1000) as the parent sample. Therefore, the spiked SVOCs were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The phenol result in sample LEACH–R-1 exceeded the linear range of the calibration curve. The positive phenol result in this sample was flagged "J, q". This sample was diluted by a factor of 1000 and reanalyzed by the laboratory. The phenol result from the dilution analyses should be used for data interpretation.

For the pesticides analyses, the %Ds for alpha-BHC (-24.0%), gamma-BHC (-17.2%), delta-BHC (-22.5%), aldrin (-15.5%) on the primary column; and for 4,4'-DDD (16.4% and 16.0%), 4,4'-DDT (-17.3% and -22.2%), endrin aldehyde (-15.4% and -21.3%), and methoxychlor (-19.7% and -20.5%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/13/02 at 09:34. The %Ds for alpha-BHC (-24.6%), gamma-BHC (-17.4%), delta-BHC (-22.5%), 4,4'-DDD (16.6%), 4,4'-DDT (-19.1%), and endrin ketone (16.6%) on the primary column; and for 4,4'-DDD (16.0%), 4,4'-DDT (-20.5%), and methoxychlor (-17.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 9/13/02 at 16:39. Positive gamma-BHC and 4,4'-DDT results in sample LEACH-R-1 were flagged "J, c". All non-detect results for 4,4'-DDT, endrin aldehyde, methoxychlor, and 4,4'-DDD in the associated samples were flagged "UJ, c". The decachlorobiphenyl surrogate recoveries were less than the lower control limit (i.e., 30%) in samples BDRK-P-1 (13% and 11%) and BDRK-Q-1 (28% and 26%). All positive results were flagged "J, s" and non-detects were flagged "UJ, s" with the exception of those data previously flagged due to calibration failure. Surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 400). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=400), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked pesticides were not recovered in the MS/MSD pair and the MS/MSD summary form was not provided in the SDG. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be

noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 10). Since the affected samples were analyzed at dilutions equal to 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=10), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked PCBs were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken.

For the herbicide analyses, surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 1000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=1000), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked herbicides were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The LCS recovery for pentachlorophenol (120%) was greater than the upper control limit (i.e., 110%). Since this compound was not detected in the associated samples, no data qualifying action was taken. The RPD between primary and confirmation columns was greater than the acceptance limit (i.e., <40%) for MCPA in sample BDRK-P-1. The MCPA result was flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (64%) and sodium (70%), and the final CRDL recoveries for aluminum (124%), arsenic (121% and 66%), iron (129%), lead (148%) were outside the control limit (i.e., 80-120%). Positive lead results in the associated samples were flagged "J, w". Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 0.02099 mg/L, calcium at 0.01304 mg/L, and copper at 0.00153 mg/L. Since aluminum, calcium, and copper results in the associated samples were all greater than five times the blank concentration, no data qualifying action was taken. Arsenic was detected in the initial calibration blank (ICB) at 0.00348 mg/L. The positive arsenic result in sample BDRK-P-1 was flagged "U, o". Arsenic was also detected in the ICB at -0.00369 mg/L and one continuing calibration blank at -0.00465 mg/L (CCB4). The positive arsenic result in sample LEACH-R-1 was flagged "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum, barium, calcium, copper, manganese, thallium and vanadium were also detected in the ICB and/or

CCBs at low levels. Since these analyte results in the associated samples were either greater than five times the blank concentration or non-detects, no data qualifying action was taken. The MS recovery for aluminum (138%) was greater than the upper control limit in the LEACH-R-1 MS/MSD pair. The positive aluminum result in sample LEACH-R-1 was flagged "J, m". Since the associated samples are collected from difference site (may have different sample matrix), no data qualifying action was taken based on MS recovery failure. The RPD for mercury (53.16%) was greater than the acceptance limit in the LEACH-R-1 MS/MSD pair. All positive mercury results were flagged "J, d" in the associated samples.

For the methane analyses, the %D for methane (24.3%) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/12/02 at 08:52. Positive methane results were flagged "J, c" in the associated samples.

Correctable Anomalies: The nitrate result in sample BDRK-P-1 was incorrectly reported. The laboratory was contacted and revised Form I was received.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII57_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____November 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The surrogate recovery for terphenyl-d14 (4%) was less than the lower control limit (i.e., 14%) in sample BDRK-P-1. All positive base/neutral results were flagged "J, s" and non-detects were flagged "R, s" in sample BDRK-P-1. This sample was re-extracted on 9/30/02 (holding time was grossly exceeded by 14 days) and re-analyzed by the laboratory and displayed acceptable surrogate recoveries. This re-extracted data set was crossed-out by the reviewer and should not be used for data interpretation. The original data should be used for data interpretation. The percent completeness for this analysis was less than the control limit (i.e., 95%) at 78.1%.

Minor Anomalies: For the VOC analyses, styrene was detected in two trip blanks at 0.28 µg/L (TB-090902) and 0.77 µg/L (D91002). Since styrene was not detected in the associated samples, no data qualifying action was taken. The MS/MSD recoveries for chloroethane (32% and 22%) were less than the lower control limit (i.e., 47%) in the LEACH-R-1 MS/MSD pair. The RPD for this compound (37%) was also greater than the acceptance limit (i.e., 34%). Since the LCS recovery for chloroethane in this analytical batch was in control, no data qualifying action was taken.

For the SVOC analyses, the method blank contained di-n-butylphthalate at 2.9 µg/L. Since this compound was not detected in the associated samples, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 9/24/02 at 11:01 displayed a %D greater than the control limit (i.e., <20%) for 4,6-dinitro-2-methylphenol (-21.9%). The CCV analyzed on 9/25/02 at 21:51 displayed a %D greater than the control limit for 3-nitroaniline (-21.5%). The CCV analyzed on 9/26/02 at 10:12 displayed %Ds greater than the control limit for 3-nitroaniline (-20.8%) and 4,6-dinitro-2-methylphenol (-21.2%). The CCV analyzed on 10/2/02 at 07:47 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether (-27.4%) and 4-nitrophenol (-22.0%). The CCV analyzed on 10/3/02 at 06:27 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether (-26.7%) and 3,3'dichlorobenzidine (-25.0%). Since

these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogates were diluted out in samples LEACH-R-1 and LEACH-R-1DL and their associated MS/MSD samples (DF from 200 to 1000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=200 and 1000), the MS and MSD samples were analyzed at the same dilution (DF=1000) as the parent sample. Therefore, the spiked SVOCs were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The phenol result in sample LEACH–R-1 exceeded the linear range of the calibration curve. The positive phenol result in this sample was flagged "J, q". This sample was diluted by a factor of 1000 and reanalyzed by the laboratory. The phenol result from the dilution analyses should be used for data interpretation.

For the pesticides analyses, the %Ds for alpha-BHC (-24.0%), gamma-BHC (-17.2%), delta-BHC (-22.5%), aldrin (-15.5%) on the primary column; and for 4,4'-DDD (16.4% and 16.0%), 4,4'-DDT (-17.3% and -22.2%), endrin aldehyde (-15.4% and -21.3%), and methoxychlor (-19.7% and -20.5%) on both columns were greater than the criterion (i.e., %D ≤ 15%) for the continuing calibration analyzed on 9/13/02 at 09:34. The %Ds for alpha-BHC (-24.6%), gamma-BHC (-17.4%), delta-BHC (-22.5%), 4,4'-DDD (16.6%), 4,4'-DDT (-19.1%), and endrin ketone (16.6%) on the primary column; and for 4,4'-DDD (16.0%), 4,4'-DDT (-20.5%), and methoxychlor (-17.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 9/13/02 at 16:39. Positive gamma-BHC and 4,4'-DDT results in sample LEACH-R-1 were flagged "J, c". All non-detect results for 4,4'-DDT, endrin aldehyde, methoxychlor, and 4,4'-DDD in the associated samples were flagged "UJ, c". The decachlorobiphenyl surrogate recoveries were less than the lower control limit (i.e., 30%) in samples BDRK-P-1 (13% and 11%) and BDRK-Q-1 (28% and 26%). All positive results were flagged "J, s" and non-detects were flagged "UJ, s" with the exception of those data previously flagged due to calibration failure. Surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 400). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=400), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked pesticides were not recovered in the MS/MSD pair and the MS/MSD summary form was not provided in the SDG. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for all positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be

noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 10). Since the affected samples were analyzed at dilutions equal to 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=10), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked PCBs were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken.

For the herbicide analyses, surrogates were diluted out in sample LEACH-R-1 and their associated MS/MSD samples (DF = 1000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. Because of the abundance of target compounds in parent sample LEACH-R-1 (DF=1000), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked herbicides were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The LCS recovery for pentachlorophenol (120%) was greater than the upper control limit (i.e., 110%). Since this compound was not detected in the associated samples, no data qualifying action was taken. The RPD between primary and confirmation columns was greater than the acceptance limit (i.e., <40%) for MCPA in sample BDRK-P-1. The MCPA result was flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (64%) and sodium (70%), and the final CRDL recoveries for aluminum (124%), arsenic (121% and 66%), iron (129%), lead (148%) were outside the control limit (i.e., 80-120%). Positive lead results in the associated samples were flagged "J, w". Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 0.02099 mg/L, calcium at 0.01304 mg/L, and copper at 0.00153 mg/L. Since aluminum, calcium, and copper results in the associated samples were all greater than five times the blank concentration, no data qualifying action was taken. Arsenic was detected in the initial calibration blank (ICB) at 0.00348 mg/L. The positive arsenic result in sample BDRK-P-1 was flagged "U, o". Arsenic was also detected in the ICB at -0.00369 mg/L and one continuing calibration blank at -0.00465 mg/L (CCB4). The positive arsenic result in sample LEACH-R-1 was flagged "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum, barium, calcium, copper, manganese, thallium and vanadium were also detected in the ICB and/or

CCBs at low levels. Since these analyte results in the associated samples were either greater than five times the blank concentration or non-detects, no data qualifying action was taken. The MS recovery for aluminum (138%) was greater than the upper control limit in the LEACH-R-1 MS/MSD pair. The positive aluminum result in sample LEACH-R-1 was flagged "J, m". Since the associated samples are collected from difference site (may have different sample matrix), no data qualifying action was taken based on MS recovery failure. The RPD for mercury (53.16%) was greater than the acceptance limit in the LEACH-R-1 MS/MSD pair. All positive mercury results were flagged "J, d" in the associated samples.

For the methane analyses, the %D for methane (24.3%) was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/12/02 at 08:52. Positive methane results were flagged "J, c" in the associated samples.

Correctable Anomalies: The nitrate result in sample BDRK-P-1 was incorrectly reported. The laboratory was contacted and revised Form I was received.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII58_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____November 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the method blanks contained chloromethane at 0.46 µg/L (1P0919MB) and 0.70 µg/L (1P0922MB). Positive chloromethane results in the associated samples were flagged "U, z" at the reporting limit. The trip blank, TB-091102, contained chloromethane at 0.40 µg/L and styrene at 0.78 µg/L. No data qualifying action was taken since the chloromethane result was previously flagged due to method blank contamination and styrene was not detected in the associated samples. The initial calibration analyzed on 9/3/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2-butanone at 0.987. 2-Butanone results in the associated samples were flagged "J, r" for positive detections and flagged "UJ, r" for non-detects. The continuing calibration verification (CCV) analyzed on 9/19/02 at 07:30 displayed %Ds greater than the control limit (i.e. 20%) for bromomethane at –52.3%, 1,2-dichloroethane at 35.7%, and bromodichloromethane at 24.1%. The CCV analyzed on 9/20/02 at 09:17 displayed %Ds greater than the control limit for chloromethane at 48.9%, bromomethane at –54.2%, 1,1,1-trichloroethane at 31.8%, 1,2-dichloroethane at 42.0%, and bromodichloromethane at 34.4%. The CCV analyzed on 9/22/02 at 15:17 displayed a %D greater than the control limit for bromomethane at –61.6%. Bromomethane was not detected in the associated samples and non-detects were flagged "UJ, c". Positive 1,1,1-trichloroethane and 1,2-dichloroethane results were flagged "J, c' in the associated samples. Since all other compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS/MSD recoveries for benzene (52% and 52%), chlorobenzene (0% and 0%), ethylbenzene (68% and 72%), and xylenes (47% and 53%) were less than the lower control limits due to matrix interference in the Leach-O-1 MS/MSD pair. Chlorobenzene was detected in all associated samples and positive detections were flagged "J, m". Since other compounds displayed MS/MSD recoveries only slightly less than the lower control limits and LCS recoveries for these

compounds were in control, no data qualifying action was taken. The LCS recoveries for chloromethane (147%), 1,1,1-trichloroethane (136%), 1,2-dichloroethane (146%), and bromodichloromethane (134%) were greater than the upper control limit in one LCS sample (1P0919MB-LCS). The LCS recoveries for 1,1,1-trichloro-ethane (132%), 1,2-dichloroethane (142%), and bromodichloromethane (134%) were greater than the upper control limit in one LCS sample (1P0920MB-LCS). Since positive detections for these compounds were previously flagged due to other QC failures, no further data qualifying action was taken. The chlorobenzene result in sample LEACH-O-1 exceeded the linear range of the calibration curve. Since this chlorobenzene result was previously flagged due to MS/MSD recovery failure, no further data qualifying action was taken. This sample was diluted by a factor of 5 and reanalyzed by the laboratory. The chlorobenzene result from the dilution analysis should be used for data interpretation. Reporting limits were raised due to dilutions in samples LEACH-Q-1 (DF=20), LEACH-Q-1-DUP (DF=20), LEACH-O-1 (DF=5), and LEACH-O-1DL (DF=10).

For the SVOC analyses, the CCV analyzed on 9/24/02 at 11:01 displayed a %D greater than the control limit (i.e., <20%) for 4,6-dinitro-2-methylphenol (-21.92%). The CCV analyzed on 9/25/02 at 21:51 displayed a %D greater than the control limit for 3-nitroaniline (-21.5%). The CCV analyzed on 9/26/02 at 10:12 displayed %Ds greater than the control limit for 3-nitroaniline (-20.8%) and 4,6-dinitro-2-methylphenol (-21.2%). Since all compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogates were diluted out in all field samples and their associated dilution samples (DF from 25 to 1000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The pentachlorophenol result in sample LEACH–O-1 and 2,4-dichlorophenol results in samples LEACH-Q-1 and LEACH-Q-1-DUP exceeded the linear range of the calibration curve. Positive pentachlorophenol and 2,4-dichlorophenol results in these samples were flagged "J, q". These samples were diluted and reanalyzed by the laboratory. Pentachlorophenol and 2,4-dichlorophenol results from the dilution analyses should be used for data interpretation.

For the pesticides analyses, the %Ds for methoxychlor (28.0% and 36.3%), endrin ketone (19.6% and 17.5%), and surrogate decachlorobiphenyl (DCBP, 20.3% and 20.6%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/19/02 at 16:28. Positive methoxychlor and endrin ketone results were flagged "J, c" and non-detects were flagged "UJ, c". Since DCBP was a QC compound, no data qualifying action was taken. Surrogates were diluted out in all field samples (DF from 25 to 50). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying

action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, because of the abundance of target compounds in parent sample LEACH-R-1 (DF=100, in SDG: SAII57), the MS and MSD samples were analyzed at the same dilution as the parent sample. Therefore, the spiked PCBs were not recovered in the MS/MSD pair. Since all MS and MSD samples were analyzed at high dilution factors, no data qualifying action was taken. The data user is advised that the PCB sample results may display more than usual bias or variability and should be used with caution. Reporting limits were raised in sample LEACH-O-1 due to a five times dilution and a reduced extract volume of 750 mL (normal volume is 1000 mL).

For the herbicide analyses, the method blank, 0913N-SMB, contained 2,4-D at 0.33 μg/L. Since 2,4-D results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The %Ds for dicamba (18.0%) and 2,4-DB (-16.3%) on the confirmation column, and for MCPA (-24.3% and -42.0%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/18/02 at 14:03. Since associated samples are QC samples, no data qualifying action was taken. The %Ds for dalapon (20.5%), dicamba (16.3%), 2,4-D (17.4%), pentachlorophenol (PCP, 17.7%), 2,4,5-TP (16.0%) on the primary column, and for 2,4-DB (-16.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/24/02 at 15:05. Positive 2,4-D and PCP results in the associated samples were flagged "J, c". Since other outliers were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The %D for 2,4-DB (-23.0%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/25/02 at 10:56. The %D for 2,4-DB (-25.2%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/25/02 at 18:49. Since 2,4-DB was not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. Surrogates were diluted out in all field samples (DF from 100 to 20000). Since the affected samples were analyzed at dilutions greater than 10, no data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for PCP in sample LEACH-Q-1 and LEACH-Q-1-DUP. These two results were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for arsenic (136%), sodium (77%), and mercury (121%) and the final CRDL recoveries for arsenic (126%), selenium (126% and 75%), sodium (65%), and thallium (122%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Cobalt was detected in one continuing calibration blank (CCB5) at -0.00075 mg/L. Mercury was detected in the initial calibration blank (ICB) at –0.0760 µg/L and in CCB3 at –0.093 µg/L. The positive cobalt result in sample LEACH-O-1 and mercury non-detects in samples LEACH-Q-1 and LEACH-Q-1-DUP were less than five times the absolute blank concentration and were flagged "J, o" or "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum was detected in the preparation blank (PB) at 0.01098 mg/L, ICB at 0.02211 mg/L, CCB4 at 0.01482 mg/L, and CCB5 at 0.01443 mg/L. Arsenic was detected in the ICB at 0.00321 mg/L, CCB4 at 0.00541 mg/L, and CCB5 at 0.00471 mg/L. Copper was detected in CCB5 at 0.00082 mg/L. Selenium was detected in CCB4 at 0.00775 mg/L and CCB5 at 0.00667 mg/L. Vanadium was detected in CCB5 at 0.00122 mg/L. Aluminum, arsenic, copper, selenium and vanadium results less than five times the blank concentration were flagged "U, o" at the reporting limit. Barium, calcium, and manganese were also detected in the preparation blank and CCBs at low levels. Since these analyte results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MSD recovery for mercury (73%) was less than the lower control limit (i.e., 75%) in one non-client MS/MSD pair. Since the parent sample was not a client sample and the MS recovery for mercury was in control, no data qualifying action was taken. The post-digestion spike recovery for mercury was in control.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ____SAII59_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____November 18, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, acetone displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) in one CCV analyzed on 9/26/02 at 10:18 at 0.03484. Positive acetone results were flagged "J, c" and non-detects were flagged "R, c" in the associated samples.

For the pesticides analyses, the decachlorobiphenyl (DCBP) surrogate recoveries (9% and 9%) were less than the lower control limit in sample STORM-Q-1. All positive detections, except those previously flagged due to calibration failure, were flagged "J, s" and non-detects were flagged "R, s". The percent completeness for this analysis was less than the control limit (i.e., 95%) at 76.2%.

Minor Anomalies: For the VOC analyses, the continuing calibration verification (CCV) analyzed on 9/26/02 at 10:18 displayed %Ds greater than the control limit (i.e. 20%) for 1,1,1-trichloroethane at 20.9% and 1,2-dichloroethane at 23.8%. Since these two compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The LCS recovery for 1,1,1-trichloroethane (126%) was greater than the upper control limit (i.e., 120%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the CCV analyzed on 9/24/02 at 11:01 displayed a %D greater than the control limit (i.e., <20%) for 4,6-dinitro-2-methylphenol (-21.9%). The CCV analyzed on 9/25/02 at 21:51 displayed a %D greater than the control limit for 3-nitroaniline (-21.5%). Since these two compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the %Ds for methoxychlor (-42.1% and -30.7%) on both columns and for alpha-BHC (-23.6%), gamma-BHC (-17.8%), and aldrin (-23.7%) on the primary column were greater than the criterion (i.e., %D ≤ 15%)

for the continuing calibration analyzed on 9/23/02 at 09:48. The %Ds for alpha-BHC (-22.4%), delta-BHC (-19.8%), and endrin ketone (17.1%) on the primary column and for methoxychlor (-22.2% and -17.7%) and surrogate 2,4-DCAA (23.5% and 20.4%) on both columns were greater than the criterion for the continuing calibration analyzed on 9/23/02 at 20:16. Positive aldrin and gamma-BHC results were flagged "J, c" in the associated samples. Methoxychlor was not detected in the associated samples and non-detects were flagged "UJ, c" unless previously flagged due to surrogate recovery failure. Since all other compounds were not detected in the associated samples and either had an acceptable %D on the alternate column or was a surrogate, no data qualifying action was taken. The DCBP surrogate recoveries in sample STORM-Q-1 (28% and 22%) were less than the lower control limit. All positive detections, except those previously flagged due to calibration failure, were flagged "J, s" and non-detects were flagged "UJ, s". The LCS recovery for methoxychlor (48%) was less than the lower control limit (i.e., 60%). Since the LCSD recovery for methoxychlor was in control (but at the low end) and methoxychlor results were previously flagged due to calibration failure or surrogate recovery failure, no further data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failuress, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %D for 2,4-DB (-23.0%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 9/25/02 at 10:56. The %D for 2,4-DB (-25.2%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 9/25/02 at 18:49. Positive 2,4-DB results were flagged "J, c". The LCSD recoveries for 2,4-D (180%) and pentachlorophenol (125%) were greater than the upper control limit. Since these two compounds were not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recovery for lead (74%) and the final CRDL recoveries for aluminum (131%), arsenic (58%), and lead (64%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Arsenic was detected in the preparation blank (PB) at -0.00349 mg/L, initial calibration blank (ICB) at -0.00441 mg/L, and two continuing calibration blanks at -0.00438 mg/L (CCB5) and -0.00439 mg/L (CCB6). Mercury was detected in the ICB at -0.072 μg/L and CCB4 at -0.075 μg/L. All arsenic and mercury results were flagged "J, p" or "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Thallium was detected in the PB at 0.00458 mg/L, CCB5 at 0.00717 mg/L, and CCB7 at

0.00594 mg/L. Positive thallium results were flagged "U, p" at the reporting limit. Aluminum, barium, calcium, copper, manganese, and vanadium were also detected in the preparation blank and CCBs at low levels. Since these analyte results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points (i.e., those flagged "R"), all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII60_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____November 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, one trip blank contained 1,1-dichloroethene at 0.70 µg/L, benzene at 0.43 µg/L, trichloroethene at 0.44 µg/L, chlorobenzene at 0.34 µg/L, toluene at 0.54 µg/L, ethylbenzene at 0.11 µg/L and styrene at 0.73 µg/L. Positive 1,1-dichloroethene and benzene results were flagged "U, y" at the reporting limit and the positive toluene result was flagged "U, y" in sample STORM-Q-2. The initial calibration analyzed on 9/3/02 displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 32.646%. The continuing calibration verification (CCV) analyzed on 10/8/02 at 09:23 displayed %Ds greater than the control limit (i.e. 20%) for bromomethane at 29.4% and chloroethane at -21.0%. Since bromomethane and chloroethane were not detected in the associated samples, and %RSD and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The LCS recovery for bromomethane (160%) was greater than the upper control limit (i.e., 141%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 10/15/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for dinoseb at 0.989. Dinoseb was not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 10/18/02 at 10:29 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroisopropyl)ether (-23.0%), 2,6-dinitrotoluene (26.5%), n-nitroso-di-n-propylamine (-22.6%), 3-nitroaniline (31.9%), 2,4-dinitrophenol (24.1%), 4-nitrophenol (25.8%), 2,4-dinitrotoluene (77.3%), 4-nitroaniline (73.4%), 4,6-dinitro-2-methylphenol (39.0%), dinoseb (37.6%), 4-bromophenyl-phenylether (-21.2%), and surrogate 2,4,6-tribromophenol (29.4%). Positive 4-nitrophenol results in the associated samples were flagged "J, c". 2,4-Dinitrotoluene and 4-nitroaniline results were flagged "UJ, c" in the associated samples. Since all other compounds were not detected in the associated samples or were surrogates and %D failures were not serious enough (i.e., > 50%) to affect

the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the %D for methoxychlor (17.7%) on the primary column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 10/9/02 at 21:06. The positive methoxychlor result was flagged "J, c" in sample STORM-Q-1-10-3-02. No data qualifying action was taken for non-detects since this compound had an acceptable %D on the alternate column. The decachlorobiphenyl (DCBP) surrogate recoveries were less than the lower control limit (i.e., 30%) on both columns in samples STORM-R-1 (28% and 27%), STORM-Q-1 (18% and 16%), and STORM-Q-2 (12% and 12%). All positive results were flagged "J, s" and non-detects were flagged "UJ, s" with the exception of those data previously flagged due to calibration failure. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. Since all positive detections were previously flagged due to other QC failures, no further data qualifying action was taken. It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %Ds for MCPP (-15.6%) on the confirmation column; and for MCPA (-25.4% and -41.3%) and 2,4-DB (-17.5% and -24.0%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 10/8/02 at 12:10. The %Ds for MCPP (18.5%) and 2,4-DB (26.7%) on the primary column were greater than the criterion for the continuing calibration analyzed on 10/8/02 at 23:20. Positive MCPP results were flagged "J, c" in samples STORM-R-1 and STORM-Q-2. All MCPA and 2,4-DB results were flagged "J, c" for positive detections or "UJ, c" for non-detects. The MS/MSD recoveries for 2,4,5-TP (115% and 122%) and 2,4,5-T (132%) were greater than the upper control limits in one non-client MS/MSD pair. Since parent sample is not a client sample, no data qualifying action was taken. The LCS recoveries for dalapon (110%) and 2,4,5-TP (110%) were greater than the upper control limit. Since these two compounds were not detected in the associated samples, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for lead (64%), sodium (72%), and thallium (130%) and the final CRDL recoveries for lead (64%) and selenium (76% and 129%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. Copper was detected in three continuing calibration blanks at 0.899 μg/L (CCB4), 1.56 μg/L (CCB5), and 1.71 μg/L (CCB6). Thallium was

detected in the initial calibration blank (ICB) at 6.80 µg/L, CCB5 at 6.78 µg/L, and CCB6 at 7.17 µg/L. Vanadium was detected in CCB6 at 1.27 µg/L. Positive copper, thallium, and vanadium results in sample STORM-Q-2 were flagged "U, o" at the reporting limit. Lead was detected in CCB5 at -3.48 µg/L. The positive lead result in sample STORM-R-1 was flagged "J, o" and the non-detect result in sample STORM-Q-2 was flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum, magnesium, manganese, and potassium were also detected in the ICB and/or CCBs at low levels. Since these results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII61_____ **Fraction:** _VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals _____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____November 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the pesticide analyses, the CCV analyzed on 10/21/02 at 10:46 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for surrogate 2,4-DCAA (17.3%) and surrogate decachlorobiphenyl (DCBP, 23.0%). The CCV analyzed on 10/21/02 at 22:42 displayed %Ds greater than the control limit on both columns for 4,4'-DDD (26.8% and 33.5%), 4,4'-DDT (-48.6% and -62.7%), and methoxychlor (-53.9% and -52.9%); and on the primary column for surrogate 2,4-DCAA (17.0%). Positive 4,4'-DDD results were flagged "J, c" and non-detects were flagged "UJ, c". Positive 4,4'-DDT results were flagged "J, c" in the associated samples. All 4,4'-DDT and methoxychlor non-detect results were flagged "R, c". Since the 4,4'-DDT and methoxychlor %Ds were in control in the beginning of the analytical sequence (10/21/02 10:46), the laboratory suspects that the 4,4'-DDT and methoxychlor %D failures at the ending may be attributed to the sample matrix. All associated samples were diluted by a factor of 10 and re-analyzed by the laboratory. 4,4'-DDT and methoxychlor results from re-analyzed samples should be used for data interpretation.

Minor Anomalies: For the VOC analyses, one trip blank contained acetone at 6.0 µg/L and styrene at 0.82 µg/L. The positive acetone result in sample SOIL-Q-19-0.5 was flagged "U, y" at the reporting limit. Since styrene was not detected in the associated samples, no data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 10/11/02 at 11:09 displayed %Ds greater than the control limit (i.e., 20%) for acetone at –31.9% and 1,2-dichloroethane at –21.4%. Positive acetone results, except those previously flagged due to trip blank contamination, were flagged "J, c" in the associated samples. Since 1,2-dichloroethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 10/15/02 displayed a correlation coefficient less than the control limit (i.e., 0.990) for dinoseb at 0.989. Since the associated samples were QC samples, no data qualifying action was taken. The initial calibration analyzed on 10/23/02 displayed correlation coefficients less than the control limit for 2-nitroaniline at 0.9885, 2,4-dinitrophenol at 0.9863, 4-nitrophenol at 0.9867, 4,6-dinitro-2-methylphenol at 0.9897, 2,4-dinitrotoluene at 0.9891, and dinoseb at 0.9872. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 10/18/02 at 23:13 displayed %Ds greater than the control limit (i.e., 20%) for bis(2-chloroethyl)ether at –24.4%, bis(2-chloroisopropyl)ether at –23.4%, n-nitroso-di-n-propylamine at –21.0%, and 2,4-dinitrotoluene at 21.8%. Since the associated samples were QC samples, no data qualifying action was taken. The CCV analyzed on 10/24/02 at 08:16 displayed %Ds greater than the control limit for 2,4-dinitrophenol at 43.2%, 2,4-dinitrotoluene at 25.6%, 4-nitroaniline at 30.5%, 4,6-dinitro-2-methylphenol at 24.0%, and surrogate 2,4,6-tribromophenol at 22.8%. The CCV analyzed on 10/29/02 at 07:16 displayed a %D greater than the control limit for 4-nitrophenol at –23.3%. Since 2,4-dinitrophenol, 2,4-dinitrotoluene, and 4,6-dinitro-2-methyl-phenol results in the associated samples were previously flagged due to initial calibration failure, no further data qualifying action was taken. Since all other compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS recovery for butylbenzylphthalate (57%) was less than the lower control limit (i.e., 58%) in the SOIL-Q-16-0.5 MS/MSD pair. Since the MSD recovery and the LCS recovery were in control for this compound, no data qualifying action was taken.

For the pesticide analyses, the CCV analyzed on 10/24/02 at 17:40 displayed %Ds greater than the control limit (i.e., 15%) on both columns for 4,4'-DDT (-39.8% and –33.7%) and methoxychlor (-35.0% and –30.0%) and on the confirmation column for 4,4'DDD (27.9%). Positive 4,4'-DDT results were flagged "J, c" and non-detect methoxychlor results were flagged "UJ, c" in the associated samples. The CCV analyzed on 10/28/02 at 17:38 displayed %Ds greater than the control limit on the confirmation column for alpha-BHC (18.9%), gamma-BHC (16.3%), beta-BHC (15.9%), delta-BHC (19.8%), aldrin (20.6%), heptachlor epoxide (17.0%), gamma-chlordane (17.9%), alpha-chlordane (20.1%), endosulfan I (18.6%), 4,4'-DDE (17.9%), dieldrin (15.5%), 4,4'-DDD (16.8%), endosulfan II (21.2%), endosulfan sulfate (22.0%), and endrin ketone (16.8%). The CCV analyzed on 10/28/02 at 22:03 displayed %Ds greater than the control limit on the primary column for methoxychlor (-16.8%) and surrogate DCBP (-15.6%); and on the confirmation column for alpha-BHC (16.1%), delta-BHC (17.2%), aldrin (17.8%), alpha-chlordane (16.1%), endosulfan I (17.1%), 4,4'-DDE (15.8%), 4,4'-DDD (19.2%), endosulfan II (19.6%), endosulfan sulfate (19.4%), and endrin

ketone (17.9%). Positive detections for these compounds were flagged "J, c". No data qualifying action was taken for surrogates or non-detects since these compounds had an acceptable %D on the alternate column. The CCV analyzed on 10/29/02 at 02:28 displayed %Ds greater than the control limit on both columns for 4,4'-DDT (-36.4% and -29.8%) and methoxychlor (-32.0% and -27.6%); and on the confirmation column for alpha-BHC (16.4%), delta-BHC (17.9%), aldrin (17.7%), alpha-chlordane (16.3%), endosulfan I (15.9%), 4,4'-DDE (15.5%), 4,4'-DDD (29.0%), endosulfan II (20.5%), endosulfan sulfate (19.5%), and endrin ketone (17.2%). Positive detections for these target compounds were flagged "J, c" and non-detect methoxychlor results were flagged "UJ, c" in the associated samples. No data qualifying action was taken for other non-detects since these compounds had acceptable %Ds on the alternate column. The tetrachloro-m-xylene (TCMX) surrogate recoveries were less than the lower control limit (i.e., 30%) in sample SOIL-Q-18-0.5 (29% and 29%). All positive results were flagged "J, s" and non-detects were flagged "UJ, s" with the exception of those data previously flagged due to calibration failure. The TCMX surrogate recovery was less than the lower control limit on the primary column in sample SOIL-Q-16-0.5 (28%). No data qualifying action was taken due to only one surrogate recovery failure. The MS/MSD recoveries for 4,4'-DDE (31% and 32%), dieldrin (13% and 15%), and 4,4'-DDT (0% and 0%) were less than the lower control limit due to matrix interference in the SOIL-Q-16-0.5 MS/MSD pair. Positive 4,4'-DDT results were flagged "J, m" or "UJ, m" in the associated samples with the exception of those data previously flagged due to other QC failures. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results were flagged "J, g" with the exception of those data previously flagged due to other QC failures. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the PCB analyses, surrogates were diluted out in samples SOIL-Q-14-0.5 (DF=10) and SOIL-Q-15-0.5 (DF=10). Since the affected samples were analyzed at dilutions equal to 10, no data qualifying action was taken. The MS/MSD recoveries for hexachlorobiphenyl (39% and 27%), heptachlorobiphenyl (32% and 31%), octachlorobiphenyl (28% and 28%), and decachlorobiphenyl (16% and 15%) were less than the lower control limits in the SOIL-Q-16-0.5 MS/MSD pair. Since all LCS recoveries for these compounds were in control, no data qualifying action was taken. The data user is advised that the PCB sample results may display more than usual biases or variability and should be used with caution.

For the herbicides analyses, the CCV analyzed on 10/17/02 at 10:05 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for MCPA at 18.9% and 2,4-D at 25.4%. Positive MCPA and 2,4-D results were flagged "J, c" in the associated samples. The RPDs between primary and confirmation columns

were greater than the acceptance limit (i.e., 40%) for most of positive detections. These results were flagged "J, g" with the exception of those data previously flagged due to calibration failure. It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for lead (64%) and thallium (128%); and the final CRDL recoveries for lead (72%) and selenium (121%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 1.66 mg/kg, barium at 0.0402 mg/kg, cadmium at -0.048 mg/kg, chromium at 0.0815 mg/kg, potassium at 3.16 mg/kg, and sodium at 18.6 mg/kg. All positive sodium results were flagged "U, p" in the associated samples. Since all other results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Selenium was detected in one continuing calibration blank at 0.00608 mg/L. Aluminum and barium were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Since all results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Several analytes were detected in the ICSA initial and final analyses at low levels. Six soil samples displayed iron concentrations greater than 50% of the iron concentration in ICSA samples. The positive cadmium results in samples SOIL-Q-16-0.5, SOIL-Q-19-0.5, SOIL-Q-20-0.5, and SOIL-Q-15-0.5 were flagged "J, n". Since all other affected results were either greater than five times the ICSA concentration or non-detects, no data flags were applied. The MS/MSD recoveries for antimony (57% and 62%), magnesium (155% and 130%), manganese (164% and 167%), and potassium (132%) were outside the control limit (i.e., 75%-125%) in one non-client MS/MSD pair. The post-digestion spike analysis was performed on samples SOIL-Q-16-0.5 (for ICP) and SOIL-Q-13-0.5 (for Hg) and recoveries were in control. Since the parent sample is not a client sample and the post-digestion spike met criteria, no data qualifying action was taken. The serial dilution %D was greater than the QC limit (i.e., 10%) for cobalt at 10.8%. Positive cobalt results were flagged "J, s" in all samples.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exception of anomalies discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose,

based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII62_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____March 19, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, the LCS recoveries for chloromethane (22%) and vinyl chloride (32%) were less than the lower control limit in one laboratory control sample (1B0214MB). The positive chloromethane result in sample LEACH-Q-1 was flagged "J, l". All non-detected results for these two compounds in the associated samples were flagged "R, l".

For the SVOC analyses, the LCS recovery for indeno(1,2,3-cd)pyrene (36%) was less than the lower control limit (i.e., 37%) in one laboratory control sample (0212B-MB). This compound was not detected in sample LEACH-Q-1 and the non-detected result was flagged "R, l".

Minor Anomalies: For the VOC analyses, the continuing calibration verification (CCV) analyzed on 2/18/03 at 10:40 displayed a %D greater than the control limit (i.e., 20%) for bromomethane at -50.6%. This compound also displayed a relative response factor (RRF) less than the control limit (i.e. 0.05) at 0.03953. Since the associated samples are QC samples (MS and MSD) and MS/MSD percent recoveries for bromomethane were in control, no data qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 2/14/03 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9884. 2,4-Dinitrophenol was not detected in sample LEACH-Q-1 and the non-detect result was flagged "UJ, r". Due to the level of target compounds presented in sample LEACH-Q-1, this sample and the designated matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed at a 200X dilution and all surrogates and MS/MSD spiking compounds were not recovered (0%). No data qualifying action was taken since surrogates and spiking compounds are expected to be diluted out at a 200X dilution. The 2,4-dichlorophenol result in sample LEACH-Q-1 exceeded the linear range of the calibration curve. This sample was diluted by a factor of 2000 and reanalyzed by the laboratory. The 2,4-dichloro-phenol result from the dilution analysis should be used for data interpretation.

For the pesticides analyses, the %Ds for methoxychlor (-21.2% and -23.1%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 2/17/03 at 10:29. Methoxychlor was not detected in sample LEACH-Q-1 and the non-detect result was flagged "UJ, c". Due to the level of target compounds presented in sample LEACH-Q-1, this sample and the designated matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed at a 100X dilution and all surrogates and MS/MSD spiking compounds were not recovered (0%). No data qualifying action was taken since surrogates and spiking compounds are expected to be diluted out at a 100X dilution. Sample LEACH-Q-1 (245.8%) and their designated MS/MSD samples (224.1% and 236.2%) displayed internal standard %Rs for bromonitrobenzene greater than the upper control limit (i.e., 150%). Positive results in sample LEACH-Q-1 were flagged "J, n". Since MS/MSD samples are QC samples, no data qualifying action was taken.

For the PCB analyses, the MS/MSD recoveries for dichlorobiphenyl (1.4% and 0%) were less than the lower control limits in the LEACH-Q-1 MS/MSD pair. The positive dichlorobiphenyl result in sample LEACH-Q-1 was flagged "J, m'. Sample LEACH-Q-1MSD displayed internal standard %Rs for phenanthrene-d10 (48.1%) and chrysene-d12 (64.3%) less than the lower control limit (i.e., 70%). Since this sample is a QC sample, no data qualifying action was taken.

For the herbicide analyses, the %Ds for MCPA (-17.3% and -23.6%) on both columns were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 2/27/03 at 07:56. MCPA was not detected in sample LEACH-Q-1 and the non-detect result was flagged "UJ, c". Due to the level of target compounds presented in sample LEACH-Q-1, this sample and the designated matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed at a 50,000X dilution and all surrogates and MS/MSD spiking compounds were not recovered (0%). No data qualifying action was taken since surrogates and spiking compounds are expected to be diluted out at a 50,000X dilution.

For the metal analyses, the initial CRDL percent recovery for iron (76%), lead (76%), thallium (74%), and mercury (78%) and the final CRDL recoveries for iron (61%) and thallium (79%) were less than the lower control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken.

The preparation blank displayed a positive detection for calcium at 0.01284 mg/L and a negative detection for thallium at -0.0038 mg/L. Calcium was also detected in one continuing calibration blank (CCB5) at 0.01007 mg/L. Since calcium result in sample LEACH-Q-1 was greater than five times the blank concentration; no data qualifying action was taken. Thallium was not detected in sample

LEACH-Q-1 and the non-detect result was flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Antimony was detected in CCB5 at -0.00518 mg/L. Mercury was detected in the initial calibration blank at -0.000104 mg/L and CCB6 at -0.000081 mg/L. The positive antimony result was flagged "J, o" and the mercury non-detect result was flagged "UJ, o" in sample LEACH-Q-1 due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Arsenic was detected in CCB5 at 0.00309 mg/L. Copper was detected in CCB4 at 0.00095 mg/L. Positive arsenic and copper results in sample LEACH-Q-1 were flagged "U, o" at the reporting limit. Barium, manganese, and vanadium were also detected in CCBs at low levels. Since these results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, most of the samples were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SAII63_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____March 19, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the VOC analyses, the LCS recoveries for chloromethane (22%) and vinyl chloride (32%) were less than the lower control limit in one laboratory control sample (1B0214MB). Chloromethane and vinyl chloride were not detected in the associated samples and non-detected results were flagged "R, l".

For the SVOC analyses, the LCS recovery for indeno(1,2,3-cd)pyrene (36%) was less than the lower control limit (i.e., 37%) in one laboratory control sample (0212B-MB). This compound was not detected in samples BDRK-Q-1 and BDRK-R-1 and non-detected results were flagged "R, l".

Minor Anomalies: For the VOC analyses, the continuing calibration verification (CCV) analyzed on 2/17/03 at 1148 displayed a negative %D greater than the control limit (i.e., ±20%) for bromomethane at -25.4%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 2/14/03 displayed a correlation coefficient less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9884. 2,4-Dinitrophenol was not detected in the associated samples and non-detect results were flagged "UJ, r". Due to the level of target compounds presented in sample LEACH-Q-1 (in SDG: SAII62), this sample and the designated matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed at a 200X dilution. Since spiking compounds are expected to be diluted out at a 200X dilution and the matrix of parent sample (leachate) is different than the matrix of associated batch samples BDRK-Q-1 and BDRK-R-1, no data qualifying action was taken. All %Rs and RPDs were in control in the BDRK-Q-2 MS/MSD pair (in SDG: SAII64). Since the matrix of parent sample (BDRK-Q-2) has the same matrix as the samples in this SDG, all SVOC data should be acceptable for data interpretation.

For the pesticides analyses, the %Ds for methoxychlor (16.1%) on the primary column (RTX CLP) and for 4,4'-DDD (-21.6%), endosulfan II (-20.7%), 4,4'-

DDT (-17.1%), endrin aldehyde (-20.3), endosulfan sulfate (-18.0%), and endrin ketone (-18.6%) on the confirmation column (RTX CLP2) were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 2/14/03 at 0949. The %Ds for endosulfan I (16.3%), 4,4'-DDD (19.9%), and endrin ketone (23.0%) on the primary column and for 4,4'-DDT (-16.3%) and methoxychlor (-16.4%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 2/20/03 at 0918. The %Ds for endosulfan I (16.6%) and endrin ketone (22.5%) on the primary column were greater than the criterion for the continuing calibration analyzed on 2/20/03 at 1725. These compounds were not detected in the associated samples. Since these outliers had an acceptable %D on the alternate column, no data qualifying action was taken. The decachlorobiphenyl (DCBP) surrogate recoveries in sample BDRK-R-1 (13% and 11%) were less than the lower control limit (i.e., 30%). No target compounds were detected in this sample and non-detects were flagged "UJ, s". The DCBP surrogate recovery on the confirmation column in sample BDRK-S-1 (28%) was less than the lower control limit. Since all other surrogate recoveries in sample BDRK-S-1 were in control, no data qualifying action was taken.

For the PCB analyses, the MS/MSD recoveries for dichlorobiphenyl (1.4% and 0%) were less than the lower control limits in the LEACH-Q-1 MS/MSD pair. Since the matrix of parent sample (leachate) is different than the matrix of associated batch samples BDRK-Q-1 and BDRK-R-1, no data qualifying action was taken. All %Rs and RPDs were in control in the BDRK-Q-2 MS/MSD pair (in SDG: SAII64). Since the matrix of parent sample BDRK-Q-2 has the same matrix as the samples in this SDG, all PCB data should be acceptable for data interpretation.

For the herbicide analyses, the %D for 2,4-DB (-19.8%) on the confirmation column was greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 2/17/03 at 1159. The %D for 2,4,5-T (-16.0%) on the confirmation column was greater than the criterion for the continuing calibration analyzed on 2/17/03 at 2126. Positive 2,4,5-T results were flagged "J, c" in the associated samples. 2,4-DB was not detected in the associated samples. Since 2,4-DB had an acceptable %D on the alternate column, no data qualifying action was taken. The LCSD percent recovery for 2,4,5-TP was greater than the upper control limit (i.e., 100%) in the LCS/LCSD pair at 110%. The positive 2,4,5-TP result in sample BDRK-Q-1 was flagged "J, l".

For the metal analyses, the initial CRDL percent recovery for iron (76%), lead (76%), thallium (74%), and mercury (72%) and the final CRDL recoveries for iron (61%) and thallium (79%) were less than the lower control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank displayed a positive detection for calcium at 0.01284 mg/L and a negative detection for thallium at

-0.0038 mg/L. Calcium was also detected in four continuing calibration blanks at concentrations ranging from 0.00868 mg/L to 0.02587 mg/L. Since calcium results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Thallium was not detected in the associated samples and non-detect results were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Antimony was detected in CCB5 at -0.00518 mg/L. Mercury was detected in the initial calibration blank at -0.000116 mg/L, CCB2 at -0.00011 mg/L, and CCB5 at -0.000078 mg/L. Antimony and mercury were not detected in the associated samples and non-detect results were flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Arsenic was detected in CCB5 at 0.00309 mg/L. Vanadium was detected in CCB5 at 0.00108 mg/L. Positive arsenic and vanadium results in the associated samples were flagged "U, o" for results greater than the reporting limit or "U, o" at the reporting limit for results less than the reporting limit. Aluminum, barium, and manganese were also detected in CCBs at low levels. Since these results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. The field duplicates displayed a %RPD greater than the control limit (i.e., 50%) for iron at 53.6%. Affected iron results were flagged "J, f".

For the methane analyses, the correlation coefficient for the initial calibration analyzed 1/17/03 was less than the QC limit (i.e., 0.990) for methane at 0.9870 on the flame ionization detector (FID). Positive methane results reported from the FID were flagged "J, r" in the associated samples. The field duplicates displayed a RPD greater than the control limit (i.e., 50%) for methane at 112.7%. Since all methane results were previously flagged due to other QC failure, no additional data flags were applied.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SAII64_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Methane, Wet Chem._____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____March 28, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the SVOC analyses, the terphenyl-d14 surrogate recovery was less than the lower control limit (i.e., 14%) in sample BDRK-P-1 at 8%. All base/neutral results were flagged "R, s". This sample was not re-extracted and re-analyzed by the laboratory. This percent completeness was less than the control limit (i.e., 95%) at 80.4%.

Minor Anomalies: For the VOC analyses, the continuing calibration verification (CCV) analyzed on 2/25/03 at 1959 displayed negative %Ds greater than the control limit (i.e., ±20%) for bromomethane at -74.4%, chloroethane at -76.2%, acetone at -23.0%, 2-butanone at -20.6%, and bromoform at -25.2%. Bromomethane and chloroethane were not detected in the associated samples and non-detect results were flagged "UJ, c". Positive acetone and 2-butanone results were flagged "J, c" in the associated samples. Since %D failures for acetone, 2-butanone, and bromoform were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the SVOC analyses, the CCV analyzed on 3/3/03 at 0812 displayed %Ds greater than the control limit (i.e., 20%) for 4,6-dinitro-2-methylphenol at 26.6%, 4-bromophenyl-phenylether at 20.7%, and benzo(k)fluoranthene at -26.9%. Since these three compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Due to the level of target compounds presented in samples LEACH-R-1 and LEACH-R-1-DUP, these two samples were analyzed at 20X and 400X dilutions and all surrogates were not recovered (0%). Since surrogates are expected to be diluted out at 20X dilution or higher, no data qualifying action was taken. The phenol result in sample LEACH-R-1 and phenol and 4-chloroaniline results in sample LEACH-R-1-DUP exceeded the linear range of the calibration curve. These results were flagged "J, q". These samples were diluted and reanalyzed by the laboratory. The 4-chloroaniline and/or phenol results from the dilution analysis should be used for data interpretation. The field duplicates displayed %RPDs greater than the control limit (i.e., 50% or 2X the reporting limit) for 2-chlorophenol, 4-chloroaniline, dimethylphthalate, 4-nitro-

aniline, diethylphthalate, and butylbenzylphthalate. Affected results, except those previously flagged due to other QC failure, were flagged "J, f" or "UJ, f" in samples LEACH-R-1 and LEACH-R-1-DUP.

For the pesticides analyses, the %Ds for endosulfan I (16.3%), 4,4'-DDD (19.9%), and endrin ketone (23.0%) on the primary column and for 4,4'-DDT (-16.3%) and methoxychlor (-16.4%) on the confirmation column were greater than the criterion (i.e., 15%) for the continuing calibration analyzed on 2/20/03 at 0918. The %Ds for endosulfan I (16.6%) and endrin ketone (22.5%) on the primary column were greater than the criterion for the continuing calibration analyzed on 2/20/03 at 1725. The %Ds for endosulfan I (15.9%), 4,4'-DDD (26.1%), and endrin ketone (19.0%) on the primary column and for 4,4'-DDT (-20.9%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 2/21/03 at 1140. The %Ds for endosulfan I (15.9%), 4,4'-DDD (16.3%), and endrin ketone (22.3%) on the primary column and for 4,4'-DDT (-18.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 2/21/03 at 1656. The %Ds for 4,4'-DDE (17.4%) and 4,4'-DDD (16.8%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 2/26/03 at 2301. Since these compounds were not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The surrogate recoveries for decachlorobiphenyl in sample BDRK-P-1 (17% and 16%) were less than the lower control limit (i.e., 30%). Positive detections in sample BDRK-P-1 were flagged "J, s" and non-detects were flagged "UJ, s". The LCS recovery (44%) and RPD (69%) for gamma-chlordane were outside the acceptance limit in the LCS/LCSD pair. Since the LCSD recovery for this compound was in control, the gamma-chlordane result in sample BDRK-P-1 was not rejected based on reviewer's professional judgment. No further data qualifying action was taken since this result was previously flagged due to surrogate recovery failure. The RPD between primary and confirmation columns was greater than the acceptance limit (i.e., <40%) for endrin aldehyde in sample BDRK-P-1 at 186.4%. Since this result was previously flagged due to surrogate recovery failure, no further data qualifying action was taken. It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low. Due to matrix interference, sample LEACH-R-1 was analyzed at a 200X dilution and sample LEACH-R-1-DUP was analyzed at a 50,000X dilution. No target compounds were detected in these two samples. Field precision cannot be evaluated for pesticide analysis.

For the PCB analyses, the trichlorobiphenyl result in sample LEACH-R-1-DUP exceeded the linear range of the calibration curve. This result was flagged "J, q". This sample was diluted and reanalyzed by the laboratory. The trichlorobiphenyl result from the dilution analysis should be used for data interpretation. Sample LEACH-R-1 was analyzed at a 10X dilution and sample LEACH-R-1-DUP was

analyzed at 100X and 200X dilution. No target compounds were detected in sample LEACH-R-1. The field duplicates displayed absolute differences greater than the control limit (i.e., 2X the reporting limit) for all target compounds. Affected results, except those previously flagged due to other QC failure, were flagged "J, f" or "UJ, f" in samples LEACH-R-1 and LEACH-R-1-DUP.

For the herbicide analyses, the %Ds for dalapon (31.3%), dicamba (30.4%), dichlorprop (23.0%), 2,4-D (28.5%), pentachlorophenol (21.9%), 2,4,5-TP (27.3%), 2,4,5-T (28.0%), 2,4-DB (31.8%), dinoseb (18.3%), and surrogate 2,4-DCAA (29.0%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 2/25/03 at 1042. Since associated samples are QC samples, no data qualifying action was taken. The %Ds for MCPA (-17.3% and -23.6%) on both columns were greater than the criterion for the continuing calibration analyzed on 2/27/03 at 0756. MCPA was not detected in the associated samples and non-detect results were flagged "UJ, c". The MS/MSD percent recoveries for dalapon (110% and 115%) and 2,4,5-TP (110% and 120%) were greater than the upper control limit in the BDRK-Q-2 MS/MSD pair. Since these two compounds were not detected in the associated samples, no data qualifying action was taken. Sample LEACH-R-1 was analyzed at a 100X dilution and sample LEACH-R-1-DUP was analyzed at a 250X dilution. No target compounds were detected in these two samples.

For the metal analyses, the initial CRDL percent recovery for arsenic (122%), iron (78%), and lead (76%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank displayed positive detections for calcium at 0.02325 mg/L and copper at 0.0010 mg/L and negative detections for aluminum at -0.03872 mg/L and thallium at -0.00674 mg/L. Copper was also detected in four continuing calibration blanks at concentrations ranging from 0.00185 mg/L to 0.00249 mg/L. Positive copper results in the associated samples were flagged "U, p" at the reporting limit. Aluminum and thallium were also detected in the initial calibration blank (ICB) and continuing calibration blanks (CCBs) at low levels. The aluminum result was flagged "J, p" and the thallium result was flagged "UJ, p" in sample BDRK-Q-2 due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluminum results in other associated samples were greater than five times the absolute blank concentration, no data qualifying action was taken. Thallium was not detected in samples LEACH-R-1 and LEACH-R-1-DUP. Since the thallium reporting limits (0.10 mg/L) in these two samples were much higher than the action level (0.034 mg/L), no data qualifying action was taken. Manganese was detected in CCB4 at 0.00178 mg/L and CCB5 at 0.00323 mg/L. The positive manganese result in sample BDRK-Q-2 was flagged "U, o" at the reporting limit. Mercury was detected in CCB3 at 0.000084 mg/L and CCB5 at 0.000078 mg/L. Positive mercury results in samples LEACH-R-1 and LEACH-R-1-DUP were

flagged "U, o". Barium, chromium, nickel, selenium, and vanadium were also detected in CCBs at low levels. Since these results in the associated samples were either greater than five times the blank concentration or non-detect; no data qualifying action was taken.

For the methane analyses, the correlation coefficient for the initial calibration analyzed 1/17/03 was less than the QC limit (i.e., 0.990) for methane at 0.9870 on the flame ionization detector (FID). Positive methane results reported from the FID were flagged "J, r" in the associated samples.

For the wet chemistry analyses, the MS/MSD percent recoveries for sulfate (144% and 150%) were greater than the upper control limit in the BDRK-Q-2 MS/MSD pair. Since sulfate was not detected in the associated samples, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Due to the abundance of target compounds, samples LEACH-R-1 and LEACH-R-1-DUP were analyzed at dilutions for all organic analyses. Therefore, the reporting limits were raised.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: __SAII67_____ **Fraction: _VOCs,_Methane,_SVOCs,___ Pest,_PCBs,_Herb,_Metals,_Nitrate,_Sulfate,_CO_2,_Alk,____COD,_TDS,_TSS,_&_TOC___**

Lab: _STL Savannah_____ **Project Name: _____Sauget Area 2_____**

Reviewer: _____BL_____ **Date:_____September 26, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review and Inorganic Data Review, and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, the continuing calibration analyzed on 05/07/03 at 1613 displayed a relative response factor (RRF) less than the lower control limit for acetone at 0.0473. The positive associated field sample result was flagged "J,c" and associated non-detect result was flagged "R,c".

For the SVOC analyses, the continuing calibration analyzed on 05/14/03 at 1453 displayed an RRF less than the lower control limit for dinoseb at 0.047. The associated field samples were non-detect and were flagged "R,c".

Minor Anomalies: For the VOC analyses, the method blank analyzed on 05/07/03 displayed a positive detection for tetrachloroethene at 0.85 ug/L. The associated field sample results were non-detect; therefore, no data qualifying action was required. The method blank analyzed on 05/08/03 displayed a positive detection for methylene chloride at 3.5 ug/L. The positive associated field sample result was less than ten times the blank concentration for methylene chloride and was flagged "U,z". The trip blank, TB-0425-KH, displayed a positive detection for acetone at 4.4 ug/L. The associated field sample result was non-detect; therefore, no data qualifying action was required. The trip blank, TB-0424-KH, displayed positive detections for methylene chloride at 3.7 ug/L and 2-hexanone at 1.1 ug/L. The trip blank result for methylene chloride was previously qualified for method blank contamination, thus, no further data qualifying action was taken. The associated field sample result was non-detect for 2-hexanone; therefore, no data qualifying action was required. The qualified field sample result was

less than the reporting limit and was manually altered to reflect non-detect at the reporting limit.

The continuing calibration analyzed on 05/07/03 at 1613 displayed percent differences greater than the control limit (i.e., 20%) with a negative bias for chloromethane at -26.2%, acetone at -34.5%, 2-butanone at -31.0%, 1,1,1-trichloroethane at -20.3%, 1,2-dichloroethane at -23.3%, 4-methyl-2-pentanone at -31.2%, 1,1,2-trichloroethane at -22.2%, 2-hexanone at -29.0%, bromoform at -22.5%, and 1,1,2,2-tetrachloroethane at -22.8%. The continuing calibration analyzed on 05/08/03 at 1002 displayed percent differences greater than the control limit with a negative bias for acetone at -22.2%, 2-butanone at -22.9%, 1,2-dichloroethane at -20.7%, 4-methyl-2-pentanone at -29.7%, and 2-hexanone at -26.5%. The associated positive field sample results were flagged "J,c" and non-detect field sample results were flagged "UJ,c", unless previously qualified for a relative response factor anomaly.

For the dissolved gases analyses, the matrix spike duplicate for sample BDRK-Q-2 displayed a percent recovery less than the lower control limit (i.e., 75%) for methane at 72%. Since the recovery was only marginally low and the matrix spike displayed an acceptable recovery, no data qualifying action was necessary.

For the SVOC analyses, the continuing calibration analyzed on 05/14/03 at 1453 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for bis(2-chloroisopropyl)ether at 22.1%, 4-bromophenyl-phenylether at 21.1%, hexachlorobenzene at 22.2%, and benzo(k)fluoranthene at 32.0%. The associated field sample results were non-detect; therefore, no data qualifying action was required.

For the pesticides analyses, the continuing calibration analyzed on 04/30/03 at 1104 displayed percent differences greater than the control limit (i.e., 15%) with a positive bias on both columns for endrin (17.2/15.4%). The continuing calibration analyzed on 04/30/03 at 2117 displayed percent differences greater than the control limit with a positive bias on both columns for endrin (20.1%/17.7%). The continuing calibration analyzed on 05/01/03 at 0940 displayed percent differences greater than the control limit with a positive bias on both columns for endrin (18.8%/18.9%). The continuing calibration analyzed on 05/01/03 at 1202 displayed percent differences greater than the control limit with a positive bias on both columns for endrin (16.5%/15.7%). No data qualifying action was taken since the associated field sample results were non-detect.

Sample BDRK-R-1 displayed surrogate recoveries less than the lower control limit (i.e., 30%) on both columns for decachlorobiphenyl (27%/27%). All associated field sample results were non-detect and were flagged "UJ,s".
The matrix spike pair for sample BDRK-Q-2 displayed a relative percent difference (RPD) greater than the control limit (i.e., 43%) for methoxychlor at 46%. The associated field sample results were non-detect; therefore, no data qualifying action was required.

For the herbicides analyses, the method blank for batch 0501N displayed a positive detection for 2,4-D at 0.83 ug/L. The associated field sample results were non-detect; therefore, no data qualifying action was required.

The continuing calibration analyzed on 05/08/03 at 0632 displayed percent differences greater than the control limit (i.e., 15%) with a positive bias for 2,4-D at 20.6% and 2,4-DB at 16.2% on column one and 2,4-D at 16.6% on column two. No data qualifying action was taken since the associated field sample results were non-detect while the continuing calibration displayed positive biases.

The surrogate recovery was less than the lower control limit (i.e., 27%) in the BDRK-Q-2 matrix spike duplicate for 2,4-DCAA at 20%. Since this is a quality control sample, no data qualifying action was taken.

The matrix spike for sample for BDRK-Q-2 displayed percent recoveries greater than the upper control limits for dalapon at 126% and pentachlorophenol at 105%. The associated field sample results were non-detect; therefore no data qualifying action was required. The matrix spike duplicate displayed percent recoveries less than the lower control limits for dichloroprop at 16%, 2,4,5-T at 20%, and 2,4-DB at 34%. The associated field sample results were non-detect and were flagged "UJ,m". This matrix spike pair displayed relative percent differences for dichloroprop at 141%, 2,4,5-TP at 148%, 2,4,5-T at 135%, and 2,4-DB at 109%. The associated field sample results were non-detect; therefore no data qualifying action was required.

The laboratory control sample (LCS) displayed a percent recovery greater than the upper control limit (i.e., 97%) for dalapon at 115%. All associated field samples were non-detect while the laboratory control spike displayed a positive bias; therefore, no qualifying action was taken.

For the metals analyses, the continuing calibration blank analyzed on 05/06/03 at 2045 displayed a negative detection for aluminum at –0.02110 mg/L. The continuing calibration blank analyzed on 05/06/03 at 2139 displayed negative detections for aluminum at –0.02437 mg/L and antimony at –0.00412 mg/L. The continuing calibration blank analyzed

on 05/06/03 at 2248 displayed a negative detection for aluminum at –0.01851 mg/L. The associated positive field sample results less than five times the absolute value of the blank concentration were flagged "J,o" and non-detect field sample results were flagged "UJ,o". The continuing calibration blank analyzed 05/16/03 at 0012 displayed a negative detection for sodium at –0.3394 mg/L. The continuing calibration blank analyzed 05/16/03 at 0113 displayed a negative detection for sodium at –0.32074 mg/L. The continuing calibration blank analyzed on 05/16/03 at 0201 displayed a negative detection for sodium at –0.32688 mg/L. Since all associated field sample results were greater than five times the absolute value of the blank concentration, no data qualifying action was taken. The preparation blank for batch 0501H displayed a negative detection for aluminum at –0.02041 mg/L and a positive detection for vanadium at 0.00071 mg/L. The associated positive field sample result for vanadium less than five times the blank concentration was flagged "U,p". The associated field sample results for aluminum were previously flagged for continuing calibration blank anomalies, therefore, no further data qualifying action was taken.

The serial dilution for sample BDRK-R-1 displayed a percent difference than the control limit (i.e., 10%) for potassium at 14.3%. The associated field sample results were positive and were flagged "J,s".

For the general chemistry analyses, the laboratory duplicate performed on BDRK-R-1 displayed a relative percent deviation greater than the control limit for nitrate at 42.2%. The associated field sample result was positive and was flagged "J,k". The matrix spike pair for sample BDRK-Q-2 displayed percent recoveries greater than the upper control limit for sulfate at 170% and 167%. The associated field sample results were positive and were flagged "J,m".

Correctable Anomalies: None.

Comments: For the metals analyses, samples BDRK-R-1, BDRK-Q-2, and BDRK-Q-2S and BDRK-Q-2SD were analyzed and reported at a 1:5 dilution for sodium due to the abundance of this target analyte and display elevated reporting limits.

For the alkalinity analyses, sample BDRK-R-1 was analyzed and reported at a 1:5 dilution due to abundance of calcium and displays elevated reporting limits.

If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the

anomalies discussed above. All data, other than those flagged "R" are usable as qualified for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____Gen. Chem. Fraction__

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 13, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____Herbicides_____

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 19, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the herbicide analyses, the method blank analyzed on 05/08/03 displayed a positive detection for 2,4-D at 0.83 ug/L. All associated positive field sample results less than five times the blank concentration were flagged "U,z", unless previously flagged for other anomalies.

The continuing calibration analyzed on 05/08/03 at 0632 displayed percent differences greater than the control limit (i.e., 15%) for 2,4-D at 20.6% on column one and 16.6% on column two. The same continuing calibration analyzed on 05/08/03 displayed a percent difference greater than the control limit for 2,4-DB at 16.2% on column one. The continuing calibration analyzed on 05/09/03 at 0950 displayed a percent difference greater than the control limit for 2,4-DB at 19.7% on column two. All associated positive field sample results were flagged "J,c" and the associated non-detect field sample result for 2,4-D was flagged "UJ,c" in sample BDRK-P-1. Since all other associated non-detect field sample results were reported from columns displaying acceptable percent differences, no further data qualifying action was required.

Several compounds exceeded the calibration range in some samples and were flagged "E" by the laboratory. These results were flagged "J,q" by the data reviewer. These samples were re-analyzed at different dilution factors with acceptable results. It is the recommendation of the data reviewer that the re-analyzed sample results be used for data interpretation.

The relative percent differences were greater than 40% for MCPA, pentachlorophenol, and 2,4,5,-T in several samples. These results were flagged "J,g". The lower value between the two columns is reported and should be used for data interpretation.

The laboratory control sample (LCS) recovery was greater than the QC limit for dalapon at 115%. No positive results were reported and no data qualifying action was required.

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____Metals_____

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____July 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the metals analyses, the preparation blank analyzed displayed a negative detection for aluminum at 0.02041 mg/L and a positive detection for vanadium at 0.00071 mg/L. The associated field sample results were positive and were greater than five times the blank concentration; therefore, no flagging was required.

The continuing calibration blank (CCB 6) analyzed displayed negative detections for aluminum at -0.02437 mg/L and antimony at -0.00412 mg/L. The associated field sample results for aluminum were greater than five times the blank concentration; therefore, no further data qualifying action was taken. The associated field sample result less than five times the blank concentration for antimony was flagged "U,o". Several other continuing calibration blanks displayed positive or negative detections for various metals. Since the associated field sample results were greater than five times the blank concentrations, no data qualifying action was required.

The interference check sample analyzed displayed results for unspiked analytes greater than the method detection limit in sample S383960-5 for calcium at 1600 mg/L and iron at 200 mg/L and in sample S383060-4 for calcium at 1400 mg/L. All associated positive field sample results were flagged "J,n".

The matrix spike displayed percent recoveries outside of the control limits for barium at -22.0% and 25%, respectively, chromium at 63.0%, nickel at

69.0%, and mercury at -76.0% and 25.0%, respectively. All associated field sample results were positive and were flagged "J,m".

The serial dilution displayed a percent difference greater than the control limit (i.e., 10%) for potassium at 21.8%. All associated positive field sample results were flagged "J,s".

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____Methane_____

Lab: _____STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 23, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the methane analyses, the initial calibration analyzed on 04/08/03 at 1907 displayed a relative standard deviation greater than the control limit (i.e., 20%) for methane at 22.13%. The associated positive field sample result was flagged "J,r".

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____PCBs_____

Lab: _____STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 27, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: For the PCB analyses, the matrix spike/matrix spike duplicate (MS/MSD) displayed percent recoveries less than the lower control limits for trichlorobiphenyl at 0%, tetrachlorobiphenyl at 0%, and decachlorobiphenyl at 0% in both MS/MSD percent recoveries. All associated positive field sample results were flagged "J,m" and all associated non-detect field sample results were flagged "R,m".

The percent data completeness for this data validation report fell below the control limit (i.e., 95%) at 82.5% due to matrix spike/matrix spike duplicate anomalies.

Minor Anomalies: For the PCB analyses, the field sample Leach-R-1 and its duplicate Leach-R-1-DUP displayed relative percent differences greater than the control limit (i.e., 50%) for monochlorobiphenyl at 58%, dichlorobiphenyl at 149%, trichlorobiphenyl at 139%, tetrachlorobiphenyl at 149%, pentachlorobiphenyl at 148%, hexachlorobiphenyl at 154%, and heptachlorobiphenyl at 171%. All associated positive field sample results were flagged "J,f", unless previously flagged for MS/MSD anomalies.

The MS/MSD displayed percent recoveries greater than the control limit (i.e., 130%) for monochlorobiphenyl at 171% and 200% and dichlorobiphenyl at 143% and 175%, respectively. All associated positive field sample results were flagged "J,m". The MS/MSD displayed percent recoveries outside of the control limit for pentachlorobiphenyl at 0% and 145%, respectively. All associated positive field sample results were flagged "J,m" and all associated non-detect field sample results were flagged "UJ,m".

For several samples, surrogates were not recovered due to the dilution factor being greater than ten; therefore, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____SVOCs_____

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 12, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: For the SVOC analyses, the matrix spike/matrix spike duplicate displayed percent recoveries and relative percent differences at 0% for all compounds analyzed. In the parent sample, LEACH-Q-1, all associated positive field sample results were flagged "J,m" and all associated non-detect field sample results were flagged "R,m".

The percent completeness was less than the QC limit (i.e., 95%) at 92% due to these anomalies.

Minor Anomalies: Phenol, 4-chloraniline, and 2,4-dichlorophenol all displayed positive values which exceeded the linear range of the instrument. The results were flagged "E" by the laboratory and flagged "J,q" by the data reviewer. It is the recommendation of the data reviewer that the diluted sample results be used for data interpretation.

The field duplicate samples, LEACH-R-1/LEACH-R-1-DUP, displayed relative percent differences above the control limit (i.e., 50%) for phenol at 110%, 2-chlorophenol at 182%, 3 & 4 methylphenol at 164%, 2,4-dichlorophenol at 121%, 4-chloroaniline at 185%, 2-nitroaniline at 161%, dimethylphthalate at 188%, and diethylphthalate at 196%. All associated positive field sample results were flagged "J,f".

Correctable Anomalies: None.

Comments: Surrogates were diluted out in several samples.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____PEST_____

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 18, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the pesticide analyses, the continuing calibration analyzed on 05/05/03 at 1551 displayed a percent difference greater than the control limit (i.e., 15%) for endrin at 16.2% and 16.4%. The continuing calibration analyzed on 05/09/03 at 1056 displayed percent differences greater than the control limit for methyoxychlor at 16.1% and 16.3%, respectively. The continuing calibration analyzed on 05/09/03 at 2147 displayed percent differences greater than the control limit for endrin at 23.4% and 20.9% and methyoxchlor at 20.8% and 23.8%. All associated field sample results were non-detect and were flagged "UJ,c".

The recoveries for surrogate decachlorobiphenyl were less than the lower control limit (i.e., 30%) in sample BDRK-P-1 at 14% and 11%. All associated field sample results were non-detect and were flagged "UJ,s", unless previously flagged for a calibration anomaly.

Correctable Anomalies: None.

Comments: None.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII68_____ **Fraction:** _____VOCs_____

Lab: _STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____GF_____ **Date:** _____June 11, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the trip blank, TB-0428-MF analyzed on 05/05/03 displayed a positive detection for 2-butanone at 1.5 ug/L. All associated field sample results were non-detect therefore, no data qualifying action was required. The trip blank, TB-0428-KH analyzed on 05/05/03 displayed positive detections for acetone at 15 ug/L, 4-methylene-2-pentanone at 0.55 ug/L, toluene at 0.49 ug/L, and styrene at 0.26 ug/L. All associated positive field sample results were flagged "U,y". Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The continuing calibration analyzed on 05/05/03 at 1139 displayed percent difference values greater than the control limit (i.e., 20%) for bromomethane at -60.6% and chloroethane at -24.6%. All associated non-detect field sample results were flagged "UJ,c".

The matrix spike/matrix spike duplicate (MS/MSD) displayed a percent recovery less than the lower control limit (i.e., 40%) for chloromethane at 37%. The MS/MSD displayed a percent recovery less than the lower control limit (i.e., 22%) and a relative percent difference greater than the upper control limit (i.e., 50%) for bromomethane at 4% and 162%, respectively. The matrix spike duplicate displayed a relative percent difference greater than the control limit (i.e., 50%) for chloroethane at 67%. The MS/MSD displayed percent recoveries less than the lower control limits for toluene at 70% and chlorobenzene at 70%, respectively. No action is taken on MS/MSD data alone therefore, no flagging was necessary.

Trichloroethene and tetrachloroethene were shown to have positive results reported that exceeded the linear range of the instrument. The associated field sample results were flagged "J,q" and it is the recommendation of the data reviewer to use the diluted results.

Correctable Anomalies: None.

Comments: The trip blank, TB-0429-KH, listed on the chain of custody was inadvertently omitted from the sample delivery group by field personnel. This sample was not analyzed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SAII69_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Dissolved Gases, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____September 4, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the continuing calibration verification (CCV) analyzed on 5/8/03 at 10:02 displayed percent deviations (%Ds) greater than the control limit (i.e., 20%) for acetone at -22.2%, 2-butanone at -22.9%, 1,2-dichloroethane at -20.7%, 4-methyl-2-pentanone at -29.7%, and 2-hexanone at -26.5%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". The CCV analyzed on 5/9/03 at 11:01 displayed %Ds greater than the control limit for benzene at -29.0%, 1,2-dichloroethane at -26.7%, 4-methyl-2-pentanone at -33.2%, 2-hexanone at -34.0%, and 1,1,2,2-tetrachloroethane at -22.2%. Associated sample results were non-detect and were flagged "UJ,c". The CCV analyzed on 5/19/03 at 14:11 displayed %Ds greater than the control limit for bromomethane at -21.7%, chloroethane at -22.2%, methylene chloride at -21.8%, and 4-methyl-2-pentanone at -21.3%. Associated sample results were non-detect and were flagged "UJ,c". The method blank analyzed on 5/8/03 displayed a positive detection for methylene chloride at 3.5 µg/L. Since associated sample results were non-detect, no data qualifying action was taken. The method blank analyzed on 5/19/03 displayed positive detections for trichloroethene at 0.20 µg/L and total xylenes at 0.52 µg/L. Associated sample results with positive detections less than five times the blank concentration were flagged "U,z" at the reporting limit. Trip blank TB-0502-KH displayed a positive detection for styrene at 0.44 µg/L. Since the associated sample result was non-detect, no data qualifying action was taken. Trip blank TB-0505-KH displayed positive detections for acetone at 4.6 µg/L, toluene at 0.20 µg/L, ethylbenzene at 0.12 µg/L, styrene at 0.21 µg/L, and total xylenes at 1.2 µg/L. Since total xylenes were previously flagged as non-detect due to method blank contamination, no further data qualifying action was taken. Associated sample results with positive detections less than five times (or ten for common laboratory contaminants) the blank concentrations were flagged "U,y" at the reporting limit.

For the SVOCs analyses, the CCV analyzed on 5/8/03 at 07:04 displayed a %D greater than the control limit (i.e., 20%) with a positive bias for 3,3'-dichlorobenzidine at 20.8%. The CCV analyzed on 5/20/03 at 14:52 displayed a %D greater than the control limit with a positive bias for 4-nitroaniline at 23.7%. Since associated sample results were non-detect and the %Ds were marginally outside the control limit (i.e., <50%), no data qualifying action was taken. The matrix spike/matrix spike duplicate (MS/MSD) pair displayed relative percent deviations (RPDs) greater than the control limit (i.e., 20%) for anthracene at 22% and carbazole at 24%. Since the MS/MSD met criteria and associated sample results were non-detect, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 5/8/03 at 15:36 displayed %Ds greater than the control limit (i.e., 15%) with a positive bias on both columns for methoxychlor at 20.8% and 22.2%. Since associated sample results were non-detect and a positive %D indicates an increase in instrument sensitivity, no data qualifying action was taken. The CCV also displayed %Ds greater than the control limit on one column for beta-BHC at 20.3%, heptachlor at 16.3%, endrin at 16.6%, 4,4'-DDD at 15.5%, endosulfan sulfate at 29.7%, endrin ketone at 26.8%, and decachlorobiphenyl at 34.3%. The CCV analyzed on 5/9/03 at 03:47 displayed %Ds greater than the control limit on one column for endosulfan sulfate at 29.4%, methoxychlor at 19.3%, endrin ketone at 29.1%, and decachlorobiphenyl at 42.1%. For all anomalies, since the analytes met criteria on the alternate column and the results were non-detect, no data qualifying action was taken. Surrogate decachlorobiphenyl (DCBP) displayed %Rs less than the lower control limit in sample BDRK-Q-1 at 18% and 23%. Associated sample results were non-detect were flagged "UJ,s".

For the herbicides analyses, the method blank displayed a positive detection for 2,4-D at 1.6 µg/L. Since associated sample results were non-detect, no data qualifying action was taken. The laboratory control sample/laboratory control sample duplicate displayed percent recoveries greater than the upper control limit (i.e., 97%) for dalapon at 110% and 125%. Since associated sample results were non-detect, no data qualifying action was taken. Several sample results displayed RPDs between columns greater than the control limit (i.e., 40%). These results were flagged "J,g". It should be noted that the laboratory reported the smaller of the two values. These reported results may possibly be less than the actual concentration and may be biased low.

For the metals analyses, the CRDLs displayed %Rs less than the lower control limit (i.e., 80%) for lead at 62%, arsenic at 79%, and sodium at 59%. Since the lead and arsenic anomalies were only marginally outside the control limit, no data qualifying action was taken. Associated sample results for sodium were flagged

"J,w". The initial CRDL also displayed %Rs greater than the upper control limit (i.e., 120%) for selenium at 138%, sodium at 126%, and thallium at 134%. The final CRDL also displayed a %R greater than the upper control limit (i.e, 120%) for zinc at 122%. Since the anomalies were only marginally outside the control limit, no data qualifying action was taken. The prep blank displayed a negative detection for aluminum at -0.02640 mg/L. Since associated aluminum results were greater than five times the absolute blank value, no data qualifying action was taken. Aluminum displayed negative detections in continuing calibration blank (CCBs) CCB4 through CCB6 ranging from -0.02057 mg/L to -0.02547 mg/L. Lead also displayed a negative detection in CCB5 at -0.0255 mg/L. Since associated aluminum results were greater than five times the absolute blank value, no data qualifying action was taken. Associated sample results were non-detect and were flagged "UJ,o". Antimony displayed a positive detection in CCB4 at 0.00832 mg/L. Chromium displayed a positive detection in CCB4 at 0.00134 mg/L. Iron displayed a positive detection in CCB4 at 0.02997 mg/L. Sodium displayed positive detections in CCB4 and CCB11 at 0.37627 mg/L and 0.34069 mg/L, respectively. Thallium displayed a positive detection in the ICB at 0.00635 mg/L and in CCB5 at 0.00585 mg/L. Vanadium displayed positive detections in CCB4 and CCB6 at 0.00169 mg/L and 0.00072 mg/L, respectively. Associated sample results with positive detections less than five times the amount found in the blank were flagged "U,o" at the reporting limit. Iron displayed a RPD greater than the control limit (i.e., 50%) in field duplicate samples BDRK-Q-1/BDRK-Q-1-DUP at 63.2%. Associated sample results were flagged "J,f".

Correctable Anomalies: None.

Comments: For the wet chemistry analyses, the sulfate and nitrate samples were analyzed at a dilution of 1:2 due to high concentrations of target analyte. Reporting limits have been raised accordingly.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: __SAII70_____ **Fraction:** VOCs, SVOCs, Pesticides, PCBs, Herbicides, Metals, NO3, SO4, CO2, Alkalinity_____

Lab: _____STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____BL_____ **Date:**_____September 2, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies:

For the VOC analyses, the method blank analyzed on 06/24/03 displayed a positive detection for acetone at 3.1 ug/L. All associated positive sample results less than ten times the blank concentration were flagged "U,z". The trip blank, TB-0612-BH, analyzed on 06/24/03 displayed positive detections for acetone at 4.7 ug/L, benzene at 0.12 mg/L, and styrene at 0.20 mg/L. The trip blank detection for acetone was flagged as non-detect due to method blank contamination, thus, no further data qualifying action was taken. The associated field sample result for benzene was non-detect, therefore, no data qualifying action was required. Associated positive field sample results less than five times the blank concentration for chloromethane and styrene and were flagged "U,y". Qualified field sample results less than the reporting limit and were manually altered to reflect non-detects at the reporting limit.

The continuing calibration analyzed on 06/24/03 at 1007 displayed a percent difference greater than the control limit (i.e., 20%) with a negative bias for dibromochloromethane at –25.7%. The associated samples results were non-detect and were flagged "UJ,c".

For the SVOC analyses, the continuing calibration analyzed on 07/07/03 at 1009 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for 2-nitroaniline at 26.6% and with a negative bias for indeno (1,2,3-cd) pyrene at –22.5%. The positive field sample

result for indeno (1,2,3-cd) pyrene was flagged "J,c". Since 2-nitroaniline was non-detect while the continuing calibration displayed a positive bias, no data qualifying action was taken.

For the pesticides analyses, the opening continuing calibration analyzed on 06/18/03 at 1606 displayed percent differences greater than the control limit (i.e., 15%) with a negative bias for gamma-BHC at –17.2%, and with a positive bias for endosulfan I at 33.6% and endosulfan sulfate at 15.4% on column one. The closing continuing calibration displayed percent differences greater than the control limit with a negative bias for gamma-BHC at 18.0% and with a positive bias for endosulfan I at 34.7% and endosulfan sulfate at 15.7% on column one. Since only one passing column is required to report valid non-detects, no data qualifying action was taken.

For the herbicides analyses, the continuing calibration analyzed on 06/21/03 at 0726 displayed percent difference values greater than the control limit (i.e., 15%) with a negative bias for MCPP at –15.6%, MCPA at –16.1%, 2,4-D at 15.4%, and 2,4-DB at 21.3% on one of two columns. Since only one passing column is required to report valid non-detects, no data qualifying action was taken.

For the metals analyses, the preparation blank displayed a negative detection for aluminum at 0.03349 mg/L and a positive detection for sodium at 0.22779 mg/L. The associated field sample results for aluminum and sodium were greater than five times the blank concentration, thus, no qualifying action was taken. The continuing calibration blanks displayed detections for aluminum at -0.03630 and -0.02755 mg/L, vanadium at 0.00075 mg/L, and manganese at 0.00102 mg/L. The associated field sample result for vanadium was less than five times the blank concentration and was flagged "U,o". The qualified field sample result was less than the reporting limit and was manually altered to reflect a non-detect at the reporting limit. The associated field sample results for aluminum and manganese were greater than five times the blank concentration, thus, no data qualifying action was required.

The CRI was greater than the upper control limit (i.e., 120%) for sodium (127%) and less than the lower control limit (i.e., 80%) for arsenic at (78%/64%) and lead (58%). The associated field sample results for arsenic and lead were non-detect and were flagged "UJ,w". The associated field sample result for sodium was greater than two times the reporting limit and based on professional judgment, no data qualifying action was taken.

The interference check sample displayed results for unspiked analytes greater than the method detection limit for cobalt at –0.0017 and -0.0018

mg/L, manganese at 0.0066 and 0.0066 mg/L, lead at –0.0028 mg/L and at zinc 0.0155 and 0.0149 mg/L. However, no qualifying action was taken since the associated aluminum, calcium, iron, and manganese concentrations in the associated field sample were less than the level in the ICS.

The serial dilution displayed a percent difference greater than the control limit (i.e., 10%) for aluminum at 13.1% and potassium at 14.9%. All associated field sample results were positive and were flagged "J,s".

Correctable Anomalies: None.

Comments: The sample identification BDRK-P-1 on the chain of custody was incorrect. This sample was analyzed and reported as BDRK-S-1.

For the metals analyses, sodium was analyzed and reported from a 1:20 dilution and used in this data validation report due to elevated concentrations in the sample and displays elevated detection limits. Alkalinity was analyzed and reported from a 1:10 dilution and used in this data validation report due to elevated concentrations in the sample and displays elevated detection limits.

If a given fraction is not discussed, then no anomalies were encountered for that fraction. On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of anomalies discussed above. All data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII71_____ **Fraction:** VOCs, Methane, SVOCs, Pesticides, PCBs, Herbicides, Metals, NO3, SO4, CO2, & Alkalinity_____

Lab: _____STL Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____BL_____ **Date:**_____September 2, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review and Inorganic Data Review, and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the surrogate recoveries for decachlorobiphenyl were less than the lower control limit (i.e., 30%) in samples BDRK-P-1 (9%/10%) and BDRK-Q-1 (7%/11%). Sample BDRK-Q-1 also displayed a surrogate recovery less that the lower control limit for tetrachloro-m-xylene at 26%. All associated field sample results were non-detect and flagged "R,s". As a result, the pesticides analyses displayed a percent completeness less than the control limit (i.e., 95%) at 33%.

Minor Anomalies: For the VOC analyses, the method blank analyzed on 06/24/03 displayed a positive detection for acetone at 3.1 ug/L. The method blank analyzed on 06/26/03 displayed a positive detection for toluene at 0.072 ug/L. Associated positive sample results less than ten times the blank concentration for acetone or less than five times the blank concentration for toluene were flagged "U,z". The trip blank, TB-0616-BH, displayed a positive detection for toluene at 0.14 ug/L. The trip blank result was previously flagged for a method blank anomaly, thus, no further data qualifying action was required. The trip blank, TB-0617-BH, displayed a positive detection for styrene at 0.28 ug/L. Associated positive sample results less than five times the blank concentration were flagged "U,y". Qualified field sample results less than the reporting limit were manually altered to reflect non-detects at the reporting limit.

The initial calibration analyzed on 06/21/03 displayed a relative standard deviation (RSD) greater than the upper control limit (i.e., 15%) for total xylene at 24.8%. The associated field sample results were flagged "UJ,r".

The continuing calibration analyzed on 06/24/03 at 1007 displayed a percent difference greater than the control limit (i.e., 20%) with a negative bias for dibromochloromethane at –25.7%. The associated field sample results were non-detect for dibromochloromethane and were flagged "UJ,c". The continuing calibration analyzed on 06/26/03 at 0817 displayed percent differences greater than the control limit with a positive bias for chloromethane at 21.3% and with a negative bias for bromomethane at –47.8%. The associated field sample results for chloromethane were non-detect; therefore, no data qualifying action was taken. The associated field sample results were non-detect for bromomethane and were flagged "UJ,c".

The laboratory control sample (LCS) analyzed on 06/26/03 displayed a recovery greater than the upper control limit (i.e., 125%) for cis-1,3-dichloropropene at 126%. Since all associated field sample results were non-detect and the LCS displayed a positive bias, no data qualifying action was required.

For the SVOC analyses, the continuing calibration analyzed on 07/02/03 at 1832 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for carbazole at 21.4%. Since this continuing calibration was only associated with the method blank and LCS, no data qualifying action was required. The continuing calibration analyzed on 07/07/03 at 1009 displayed percent differences greater than the control limit with a positive bias for 2-nitroaniline at 26.6% and with a negative bias for indeno (1,2,3-cd) pyrene at –22.5%. The associated field sample result for 2-nitroaniline was non-detect; therefore, no data qualifying action was taken. The associated positive field sample result for indeno (1,2,3-cd) pyrene was flagged "J,c".

For the pesticides analyses, the opening calibration analyzed on 06/19/03 at 2255 displayed percent differences greater than the control limit (i.e., 20%) with a negative bias for delta-BHC at -17.1% and deildrin at -17.7% on column one. The continuing calibration analyzed on 06/20/03 at 0629 displayed percent differences greater than the control limit with a positive bias for 4,4-DDD at 16.0% and methoxychlor at 17.1% on column two. Since only one passing column is required to report valid non-detects, no data qualifying action was taken. The continuing calibration analyzed on 06/24/03 at 1055 displayed percent differences greater than the control limit with a negative bias for methoxychlor at –25.2% on column 1 at –36.2% on column 2. The continuing calibration analyzed on 06/24/03 at 2130 displayed percent differences greater than the control limit with a negative bias for methoxychlor at –16.0% on column 1 and at –17.5% on column 2. The associated non-detect field sample result for methoxychlor would have been flagged "UJ,c". However, it was previously flagged for a surrogate anomaly and no further data qualifying action was taken.

The internal standard area response was outside acceptance criteria on the first column for sample BDRK-Q-1 for bromonitrobenzene with a positive bias at 186%; therefore, data for this sample have been reported from column two. The associated sample results were previously flagged for surrogate recovery anomalies, thus, no further data qualifying action was required.

For the metals analyses, the continuing calibration blanks displayed positive detections for beryllium at 0.00059/0.00074/0.00111/0.00123 mg/L, antimony at 0.00375 mg/L, iron at 0.03284 mg/L, manganese at 0.00138/0.00167 mg/L, selenium at 0.00646 mg/L, and vanadium at 0.00099/0.00098/0.00076/0.00153 mg/L. The associated field sample results less than five times the blank concentration were flagged "U,o". The continuing calibration blanks displayed a negative detection for sodium at -0.199 mg/L. Since the sample concentration was greater than five times the blank concentration, no data qualifying action was required. The preparation blank displayed positive detections for beryllium at 0.00065 mg/L and vanadium at 0.00075 mg/L. Associated positive field sample results less than five times the blank concentration for beryllium and vanadium were previously flagged for continuing calibration anomalies, thus, no further data qualifying action was taken.

The interference check sample displayed results for unspiked analytes greater than the method detection limit for antimomy at 0.0039 mg/L, cadmium at 0.0069/0.0083 mg/L, copper at –0.0035/-0.0033 mg/L, selenium at -0.0057/-0.0105 mg/L, vanadium at -0.0048/-0.0048 mg/L, and zinc at 0.0225/0.225 mg/L. However, no qualifying action was taken since the associated aluminum, calcium, iron, and manganese concentrations in the associated field sample were less than the level in the ICS.

The serial dilution for sample BDRK-Q-1 displayed a percent difference greater than the control limit (i.e., 10%) for potassium at 10.8% and zinc at 13.1%. Associated positive field sample results were flagged "J,s".

The CRI was greater than the upper control limit (i.e., 120%) for beryllium at 130%. All associated positive field sample results were flagged "J,w", unless previously flagged for blank contamination.

Correctable Anomalies: Laboratory sample identification TRIP BLANK was manually corrected to TB-0616-BH by the data validator.

Comments: For the metals analyses, sodium was analyzed and reported from a 1:10 dilution for samples BDRK-Q-1 and BDRK-P-1 and from a 1:20 dilution

for sample BDRK-R-1 due to elevated concentrations in these samples. These samples display elevated detection limits.

For the alkalinity analyses, carbonate was analyzed and reported from a 1:4 dilution for samples BDRK-Q-1 and BDRK-R-1 and from a 1:10 dilution for BDRK-P-1 due to elevated concentrations in these samples. These samples display elevated detection limits.

If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data, other than those flagged "R", as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII72_____ **Fraction:** _VOCs,_Methane,_SVOCs,___ Pest,_PCBs,_Herb,_Metals,___ Nitrate,_Sulfate,_CO_2,_Alk,___ _COD,_TDS,_TSS,_&_TOC___

Lab: _STL Savannah_____ **Project Name:** _____Sauget Area 2_____

Reviewer: _____BL_____ **Date:**_____September 25, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic and Inorganic Data Review, and the specifics of the analytical method employed.

Major Anomalies: For the VOCs analyses, the continuing calibration analyzed on 06/25/03 at 1206 displayed a percent difference greater than the control limit (i.e., 20%) with a positive bias for chloroethane at 184.6%. The associated field sample results for chloroethane were non-detect and were flagged "R,c".

Minor Anomalies: For the VOC analyses, the method blank for batch 1B0625 displayed a positive detection for toluene at 0.14 ug/L. The positive associated field sample results less than five times the blank concentration were flagged "U,z". The trip blank, TRIP BLANK, analyzed on 06/25/03 displayed a positive detection for toluene at 0.18 ug/L and styrene at 0.52 ug/L. The trip blank toluene result was previously qualified as non-detect due to method blank contamination and no further data qualifying action was taken. The associated field sample results for styrene were non-detect; therefore, no data qualifying action was required.

The initial calibration analyzed on 06/21/03 displayed relative standard deviations greater than the control limit (i.e., 15%) for bromoform at 15.08%. The associated field samples were non-detect and were flagged "UJ,r".

The continuing calibration analyzed on 06/25/03 at 1206 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for 1,2-dichloroethane at 31.9%, bromodichloroethane at 28.9%, cis-1,3-dichloropropene at 22.2%, and trans-1,3-dichloropropene at 26.9%. The associated positive field sample results were flagged "J,c". This continuing calibration also displayed percent differences greater than the control limit with a negative bias for cis-1,2-dichloroethene at –31.5% and 2-butanone at –33.0%. The associated positive field sample results for cis-1,2-

dichloroethene and 2-butanone were flagged "J,c" and non-detects were flagged "UJ,c".

The laboratory control sample displayed a percent recovery greater than the control limit (i.e., 40%-158%) for chloroethane at 280%. The associated field sample results were non-detect and previously rejected due to a calibration anomaly; therefore, no further data qualifying action was required.

For the SVOC analyses, the initial calibration analyzed on 07/09/03 displayed a relative standard deviation greater than the control limit (i.e., 15%) for pentachlorophenol at 15.19%. The positive associated field sample results were flagged "J,r" and non-detects were flagged "UJ,r".

The continuing calibration analyzed on 07/16/03 at 0732 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for hexachloroethane at 25.6% and hexachlorocyclopentadiene at 32.0% and with a negative bias for carbazole at -20.1%. All associated field sample results were non-detect for hexachloroethane and hexachlorocyclopentadiene while the continuing calibration displayed a positive bias; therefore, no data qualifying action was taken. The associated field samples for carbazole were non-detect and were flagged "UJ,c".

The field duplicate displayed relative percent differences greater than the control limit (i.e., 50%) for 4-chloroaniline at 65.5%, 2-nitroaniline at 51.2%, and diethylphthalate at 71.4%. The associated positive field sample results for 4-chloroaniline and 2-nitroaniline were previously qualified for linear range exceedances. The positive associated field sample result for diethylphthalate was flagged "J,f".

The laboratory stated that the surrogates were diluted out in the dilutions of one to ten and higher. Surrogate recoveries were not provided and cannot be assessed. Both samples were analyzed initially at a dilution of ten due to the high concentration of target analytes. Several sample results exceeded the linear range of the instrument and were flagged "J,q". The samples were further diluted to bring concentrations of the target analytes within the instrument calibration range. These sample results displayed elevated reporting limits.

For the pesticides analyses, the continuing calibration analyzed on 07/02/03 at 0410 for column two displayed a negative bias for 4,4'-DDT at –16.1%. No qualifying action was taken since the associated field samples were non-detect and only one column is required to pass for non-detect results.

The laboratory control sample displayed relative percent differences greater than the control limit for 4,4'-DDE (i.e., 18%) at 21% and for endosulfan II (i.e., 22%) at 27%. The associated field sample results were non-detect; therefore, no data qualifying action was required.

For the PCBs analyses, the field duplicate displayed relative percent differences greater than the control limit (i.e., 50%) for tetrachlorobiphenyl at 98%, pentachlorobiphenyl at 90%, and hexachlorobiphenyl at 66%. All associated field sample results were positive and were flagged "J,f".

For the herbicides analyses, the continuing calibration analyzed on 06/27/03 at 1055 displayed percent differences greater than the control limit (i.e., 15%) on both columns with a positive bias for MCPP at (22.3%/15.7%) and with a negative and positive bias respectively for 2,4'-DB at (-23.1%/17.1%). The continuing calibration analyzed on 06/27/03 at 1505 displayed percent differences greater than the control limit on both columns with a negative and positive bias respectively for 2,4'-DB at (-18.3%/27.0%). No qualifying action was taken for MCPP since the associated field sample results were non-detect and the continuing calibration had a positive bias. The associated field sample results for 2,4'-DB were non-detect and were flagged "UJ,c".

The surrogate recoveries for samples Leach-Q-1 and Leach-Q-1-DUP were not provided due to a dilution of 1:20 and cannot be assessed. Samples were analyzed at dilutions due to elevated concentrations of target analytes in these samples and display elevated detection limits. Several sample results exceeded the linear range of the instrument and were flagged "J,q". The samples were further diluted to bring concentrations of the target analytes within the instrument calibration range. These sample results displayed elevated reporting limits.

For the metals analyses, the continuing calibration blanks displayed negative detection for arsenic at –0.00512 mg/L, and positive detections for barium at 0.00115 mg/L, manganese at 0.00109 mg/L, and vanadium at 0.00096 mg/L and 0.00169 mg/L. The associated field sample results for arsenic were less than five times the blank concentration were flagged "J,o". Barium, manganese, and vanadium field sample results were greater than five times the blank concentration; therefore, no data qualifying action was required.

The CRI displayed percent recoveries less than the lower control limit for arsenic at 76% and 67%. Since both arsenic field sample results were previously qualified due to a negative detection in the continuing calibration blank, no further data qualifying action was taken.

The field duplicate displayed relative percent differences greater than the control limit (i.e., 50%) for aluminum at 92%, arsenic at 83%, barium at 50%, beryllium at 77%, cadmium at 95%, calcium at 68%, chromium at 67%, copper at 67%, lead at 70%, magnesium at 57%, and vanadium at 57%. The associated field sample results for aluminum, arsenic, barium, calcium, chromium, copper, lead, magnesium, and vanadium were flagged "J,f". The associated field sample results for beryllium and cadmium displayed sample concentrations less than five times the reporting limit and displayed difference between the sample concentration and the duplicate concentration less than twice the reporting limit. Thus, no data qualifying action was taken.

The alkalinity field duplicate was greater than the control limit at 96%. The carbon dioxide field duplicate was greater than the control limit at 100%. The suspended solids field duplicate was greater than the control limit at 116%. The associated positive field sample results were flagged "J,f".

Correctable Anomalies: None.

Comments: Chemical oxygen demand, total dissolved solids, total suspended solids, and total organic carbon analyses were added by the client after laboratory receipt. The laboratory reported results for these analyses even though the analyses were not requested on the chain of custody.

For the VOCs analyses, the TRIP BLANK was inadvertently omitted from the chain of custody. The laboratory, however, performed the analysis of this sample.

For the pesticides and PCBs analyses, the surrogate recoveries for samples Leach-Q-1 and Leach-Q-1-DUP were not provided due to dilutions and cannot be assessed. Samples were analyzed at dilutions due to matrix interferences in these samples and display elevated detection limits.

For the metals analyses, field sample Leach-Q-1-DUP was analyzed and reported at a 1:2 dilution for calcium due to elevated concentrations in this sample and displays elevated detection limits.

The alkalinity and carbon dioxide fractions were analyzed at 1:5 dilutions for samples Leach-Q-1 and Leach-Q-1-DUP due to the abundance of calcium carbonate and displays elevated detection limits. The chemical oxygen demand (COD), sulfate, and total organic carbon (TOC) were analyzed at dilutions for samples Leach-Q-1 and Leach-Q-1-DUP due to the abundance of target analytes and display elevated detection limits.

On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data, other than those flagged "R" are usable as qualified for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII73_____ **Fraction:** _VOCs,_Methane,_SVOCs,___ Pest,_PCBs,_Herb,_Metals,___ Nitrate,_Sulfate,_CO_2,_Alk,___ _COD,_TDS,_TSS,_&_TOC___

Lab: _STL Savannah_____ **Project Name:** _____Sauget Area 2_____

Reviewer: _____BL_____ **Date:** _____September 26, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the laboratory control sample displayed a percent recovery less than the lower control limit (i.e., 53%) for delta-BHC at 52%. The associated filed sample results were non-detect and were flagged "R,l".

Minor Anomalies: For the VOC analyses, the method blank for batch 1A0626 displayed a positive detection for toluene at 0.072 ug/L. The associated positive field sample results less than five times the blank concentration were flagged "U,z". Trip blank TB-00619-BH displayed positive detections for acetone at 3.9 ug/L, 2-butanone at 0.50 ug/L, toluene at 0.079 ug/L, and styrene at 0.28 ug/L. The associated positive field sample results less than five times the blank concentration for acetone, 2-butanone, and styrene were flagged "U,y". Since toluene was previously flagged as non-detect due to blank contamination, no further data qualifying action was taken. Trip blank TB-0620-BH displayed positive detections for chloromethane at 0.64 ug/L, acetone at 6.2 ug/L, 2-butanone at 1.1 ug/L, and toluene at 0.189 ug/L. The associated positive field sample results were greater than five times the blank concentration; thus, no data qualifying action was required. Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The initial calibration analyzed on 06/21/03 displayed a percent recovery greater than the upper control limit (i.e., 15%) for total xylene at 24.8%. The associated positive field sample results were non-detect and were flagged "UJ,r".

The continuing calibration analyzed on 06/26/03 at 0817 displayed a percent difference (%D) greater than the control limit (i.e., 20%) with a positive bias

for chloromethane at 21.3% and a negative bias for bromomethane at –47.8%. The assiociated non-detect field sample results for bromomethane were flagged "UJ,c". The associated field sample results for chloromethane were non-detect; thus, no data qualifying action was required. The continuing calibration analyzed on 06/27/03 at 0857 displayed a %D greater than the control limit with a positive bias for carbon tetrachloride at 24.1%. Since associated sample results were either non-detect or not used for data interpretation, no data qualifying action was taken.

The matrix spike for sample Leach-R-1 displayed percent recoveries greater than the upper control limit for bromomethane at 152% and 1,2-dichloroethane at 140%. The matrix spike (MS) /matrix spike duplicate (MSD) pair for sample Leach-R-1 displayed a percent recovery greater than the upper control limit for trichloroethene at (400%/320%). Since the associated field sample results for trichloroethene was non-detect, no data qualifying action was taken. Since the MS and the associated LCS met criteria for 1,2-dichloroethane, no data qualifying action was taken. Since the associated field sample results for bromomethane were previously flagged for continuing calibration anomalies, no further data qualifying action was taken. The matrix spike duplicate (MSD) displayed percent recoveries less than the control limit for acetone at 16%. Since the MS and the associated LCS met criteria for acetone, no data qualifying action was taken. The MS/MSD pair displayed a relative percent difference greater than the control limit for chloroethane at 77%. The associated field sample results for chloroethane were non-detect; therefore, no data qualifying action was required.

The laboratory control sample displayed a percent recovery greater than the upper control limit (i.e., 125%) for cis-1,3-dichloropropene at 126%. The associated field sample results were non-detect; therefore, no data qualifying action was taken.

Several results in sample Leach-R-1 exceeded the linear range of the instrument and were flagged "J,q". This sample was re-analyzed at a further dilution to get all compounds within calibration range. It is recommended that the re-analyzed results be used for data interpretation.

For the SVOC analyses, the continuing calibration analyzed on 06/27/03 at 1409 displayed percent differences greater than the control limit (i.e., 20%) with a negative bias for bis(2-chloroisopropyl)ether at –22.0% and 4-nitrophenol at –22.9%, and with a positive bias for benzo(k)fluoranthene at 31.5%. Since only quality control data were associated with this calibration, no data qualifying action was taken. The continuing calibration analyzed on 07/16/03 at 0732 displayed percent differences greater than the control limit with positive biases for hexachloroethane at 25.6% and hexachlorocyclopentadiene at 32.0%. The associated field sample results for hexachloroethane and hexachlorocyclopentadiene were non-detect; therefore, no data qualifying action was taken. The continuing calibration analyzed on 07/15/03 at 1629 displayed percent differences greater than the control limit with a negative bias for carbazole at –20.5% and a positive bias for

hexachlorocyclopentadiene at 28.4%. Since only phenol and 4-chloroaniline were reported from the dilution sample, no data qualifying action was taken.

The internal standard area counts for perylene-d12 for sample Leach-R-1DL were less than the lower control limit (i.e. 50%) at 0.5%. Since analytes associated with the internal standard anomaly from the reanalyzed sample were not used for data interpretation, no data qualifying action was required.

Several sample results exceeded the linear range of the instrument and were flagged "J,q". This sample was re-analyzed at a further dilution to get all compounds within calibration range. It is recommended that the re-analyzed results be used for data interpretation.

For the pesticides analyses, the continuing calibration analyzed on 06/24/03 at 1055 displayed (%Ds) greater than the control limit (i.e., 15%) with a negative bias on both columns for methoxychlor at -25.2%/-36.2%. The continuing calibration analyzed on 06/24/03 at 2130 displayed %Ds greater than the control limit with a negative bias on both columns for methoxychlor at –16.0%/-17.5%. The associated non-detect field sample results were flagged "UJ,c". The continuing calibration analyzed on 07/03/03 at 2223 displayed a %D greater than the control limit with a positive bias on the primary column for 4,4-DDT at 19.7%. The continuing calibration analyzed on 07/04/03 at 1129 displayed a %D greater than the control limit with a negative bias on the primary column for methoxychlor at –19.3%. The continuing calibration analyzed on 07/04/03 at 1627 displayed %Ds greater than the control limit with a positive bias on the primary column for methoxychlor at 15.7% and with a negative bias on the confirmation column for 4,4-DDT at –16.5%. No qualifying action was taken if only one column was outside the limits, since only one column is required to pass for non-detect results.

The surrogate recoveries for sample LPond-1-W were less than the lower control limit (i.e., 30%) for decachlorobiphenyl at 14%/16% on both columns. The surrogate recoveries for sample LPond-3-W were less than the lower control limit for decachlorobiphenyl at 18%/19% on both columns. The associated field sample results were non-detect and were flagged "UJ,s", unless previously flagged for other anomalies. The surrogate recoveries for sample Leach-R-1 were not provided due to dilutions of 1:50. Leach-R-1 was analyzed at a dilution due to elevated concentrations in the sample and displayed elevated detection limits.

Sample Leach-R-1 displayed an RPD greater than the control limit (i.e., 40%) between the first and second columns for 4,4'-DDT. This result was flagged "J,g". The lower result between the columns was reported by the laboratory. This result may be biased low.

For the herbicides analyses, the continuing calibration analyzed on 06/27/03 at 1722 displayed percent differences greater than the control limit (i.e., 15%) with a negative bias on the primary column for 2,4,5-T at –36.3% and 2,4-DB

at –40.9%. The continuing calibration analyzed on 06/28/03 at 0034 displayed %Ds greater than the control limit with a negative bias on the primary column for 2,4,5-T at –26.0% and 2,4-DB at –29.2% and a positive bias on the confirmation column for 2,4-DB at 18.8%. The continuing calibration analyzed on 06/28/03 at 0809 displayed %Ds greater than the control limit with a negative bias on the primary column for 2,4-DB at –22.1% and a positive bias on the confirmation column at 26.9%; and a positive bias on primary column for MCPP at 19.6% and dicamba at 16.5%. The continuing calibration analyzed on 06/28/03 at 1157 displayed %Ds greater than the control limit with a negative bias on the primary column for 2,4-DB at –36.0% and dinoseb at –15.7% on the confirmation column, and a positive bias on the primary column for MCPP at 22.7% and MCPA at 25.4%. The positive associated sample results for 2,4,5-T and 2,4-DB were flagged "J,c" and non-detects were flagged "UJ,c". Since the only compound of interest was 2,4-D, no data qualifying action was taken. No data qualifying action was taken if only one column was outside the limits since only one passing column is required to report valid non-detects.

Several sample results exceeded the linear range of the instrument and were flagged "J,q". The samples were further diluted to the reported concentration of the target analytes within the instrument calibration range. These sample results displayed elevated reporting limits.

Several samples displayed RPDs greater than the control limit (i.e., 40%) between the first and second columns for MCPP, dochloroprop, 2,4,5-TP, and 2,4,5-T and were flagged "J,g". The lower result between the columns was reported by the laboratory. These results may be biased low.

For the metals analyses, the continuing calibration blanks displayed negative detections for aluminum ranging from –0.01942 to –0.03103 mg/L, and positive detections for vanadium ranging from 0.00073 to 0.00588 mg/L. The associated non-detect field sample results for aluminum with a negative bias were flagged "UJ,o, and positive field sample results less than five times the absolute value of the blank concentration for vanadium were flagged "J,o". The preparation blank analyzed displayed a negative detection for aluminum at –0.0217 mg/L. The associated non-detect field sample results for aluminum were previously flagged for continuing calibration blank contamination; therefore, no further data qualifying action was taken.

The MS/MSD pair for sample Leach-R-1 displayed percent recoveries outside the control limit (i.e., 75%-125%) for calcium at (-6095%/-5097%), cobalt at (179%/182%), iron at (1673%/2187%), magnesium at (–935%/-792%), manganese at (5936%/6816%), nickel at (22%/16%), potassium at (387%/966%), sodium at (6485%/12035%), vanadium at (67%/49%), and zinc at (1019%/1138%), and in the MS for aluminum at 135%, cadmium at 267%, copper at 254%, and lead at 142%. The positive associated field sample results for cobalt, nickle, and vanadium were flagged "J,m" and non-detects were flagged "UJ,m". The concentration for the parent sample for calcium, iron, magnesium, manganese, potassium, sodium, and zinc were

greater than four times the spike concentration; therefore, no data qualifying action was required. The MS/MSD pair displayed relative percent differences greater than the control limit for cadmium at 51.6%, copper at 48.1%, and lead at 27.3%. The positive associated field sample results for cadmium, copper, and lead were flagged "J,d". Since the MS for aluminum was within criteria, no data qualifying action was required.

The CRI displayed percent recoveries outside of the control limits (i.e., 80-120%) for arsenic at (76%/67%) and selenium at 67%. Since arsenic and selenium were slightly outside the control limit (i.e., >60%), no data qualifying action was required. The CRDL also displayed percent recoveries outside of the control limits (i.e., 80-120%) for iron at (71/66%), and thallium at 122%. Since iron and thallium were slightly outside the control limit, no data qualifying action was required.

Correctable Anomalies: None.

Comments: Sample Leach-R-1 was analyzed at dilutions in all analyses due to high concentrations of target analytes and displayed higher detection limits. For total organic carbon analyses, the initial calibration curve only contained four points. Sample Leach-R-1 was analyzed and reported at a 1:100 dilution due to the abundance of target compounds and displayed elevated detection limits.

If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data, other than those flagged "R" are usable as qualified for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAII74_____ **Fraction:** _VOCs,_Methane,_SVOCs,___ Pest,_PCBs,_Herb,_Metals,___ Nitrate,_Sulfate,_CO_2,_Alk,___ _COD,_TDS,_TSS,_&_TOC___

Lab: _STL Savannah_____ **Project Name:** _____Sauget Area 2_____

Reviewer: _____BL_____ **Date:**_____September 26, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic and Inorganic Data Review, and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the matrix spike/matrix spike duplicate pair for sample LPond-3-S displayed percent recoveries less than the lower control limit for 4,4'DDT at (0%/0%), and for gamma-chlordane at 0%, 4,4'-DDD at 0%. The associated non-detect sample results for gamma-chlordane and 4,4'-DDD were flagged "R,m". The associated positive sample result for 4,4'-DDT was previously flagged for a continuing calibration anomaly.

Minor Anomalies: For the VOC analyses, the method blank for batch 1M0626 displayed a positive detection for methylene chloride at 0.92 ug/L. The associated positive field sample results less than five times the blank concentration were flagged "U,z". Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The continuing calibration analyzed on 06/26/03 at 1225 displayed %Ds greater than the control limit (i.e., 20%) with a negative bias for chloroethane at -24.3% and positive biases for 4-methyl-2-pentanone at 25.6% and 2-hexanone at 23.7%. The positive associated field sample results for chloroethane were non-detect and flagged "UJ,c". The associated field sample results for 4-methyl-2-pentanone and 2-hexanone were non-detect; therefore, no data qualifying action was required.

For the SVOC analyses, the continuing calibration analyzed on 07/16/03 at 0732 displayed %Ds greater than the control limit (i.e., 20%) with a positive bias for hexachloroethane at 25.6% and hexachlorocyclopentadiene at 32.0%. The associated field sample results were non-detect for hexachloroethane, and hexachlorocyclo pentadiene; therefore, no data qualifying action was required.

The laboratory control sample (LCS) displayed a percent recovery greater than the upper control limit (i.e., 84%) for 2,4-dimethylphenol at 85%. The associated field sample results were non-detect; therefore, no data qualifying action was required.

For the pesticides analyses, the continuing calibration analyzed on 06/30/03 at 2058 displayed a %D greater than the control limit (i.e., 15%) with a negative bias on both columns for heptachlor at –17.2%/-16.0%, a positive bias for beta-BHC at 15.5% on the primary column, and a negative bias for 4,4'-DDT at –19.8% on the confirmation column. The continuing calibration analyzed on 07/01/03 at 0245 displayed %Ds greater than the control limit with a negative bias on both columns for methoxychlor at –29.4%/-29.2% and 4,4'-DDT at –40.0%/–44.9%, and a positive bias on both columns for 4,4'-DDD at 22.5%/24.3% and a negative bias for heptachlor at –19.9% on the primary column. The associated non-detect field sample results for heptachlor, methoxychlor, and 4,4'-DDT were flagged "UJ,c". The positive associated field sample results for 4,4'-DDD and 4,4'-DDT were flagged "J,c". Since only one passing column is required to report valid non-detects, no qualifying action was taken for beta-BHC.

The MS/MSD pair for sample LPond-3-S displayed percent recoveries greater than the upper control limit for beta-BHC at (178%/134%), heptachlor at 164%, heptachlor epoxide at (200%220%), endosulfan I at (192%200%), dieldrin at (350%/350%) and in the MS for endrin aldehyde at 160%. The MS for sample LPond-3-S displayed a percent recovery less than the lower control limit for 4,4'-DDE at 30% and methoxychlor at 19%. Since the associated MSD and LCS met the criteria for 4,4'-DDE and methoxychlor, no data qualifying action was required. The MSD for sample LPond-3-S displayed percent recoveries greater than the upper control limit for endrin aldehyde at 160%. The MS/MSD pair displayed RPDs greater than the control limit for gamma-chlordane at 200%, and 4,4'-DDD at 200%. Since the associated MS/MSD met the criteria for gamma-BHC and heptachlor, no data qualifying action was required. The concentration for the parent sample for 4,4'-DDT was greater than four times the spike concentration; therefore, no data qualifying action was required. The associated field sample results less than four times the spike concentration were flagged "UJ,m", unless previously flagged for other anomalies.

The surrogate recoveries for sample LPond-1-S and LPond-2-S were not recovered due to dilution factors. The positive associated field sample results were flagged "J,s" and non-detects were flagged "UJ,s" unless previously flagged for other anomalies.

The associated field sample results displayed an RPD greater than the control limit (i.e., 40%) between the first and second columns for gamma-BHC, 4,4'-DDT, 4,4'-DDD, and endrin ketone and were flagged "J,g", unless previously flagged for other anomalies. The lower result between the columns was reported by the laboratory. These results may be biased low.

For the herbicides analyses, the continuing calibration analyzed on 06/27/03 at 0428 displayed a percent difference greater than the control limit (i.e., 15%) with a positive bias on both columns for MCPP at 17.0%/20.2% and 2,4-DB at 44.9% on the conformation column. The continuing calibration analyzed on 06/27/03 at 1055 displayed a percent difference greater than the control limit with a positive bias on both columns for MCPP at 22.3%/15.7% and with a negative and a positive bias, respectively, for 2,4-DB at –23.1% on column one and 17.1% on the confirmation column. The associated positive field sample result in sample Lpond-2-S for MCPP was flagged "J,c" and the associated non-detect sample for 2,4-DB was flagged "UJ,c".

The MS/MSD pair displayed a relative percent difference greater than the upper control limit (i.e., 40%) for dalapon at 43%. The associated field sample results were non-detect; therefore, no data qualifying action was required.

The associated field sample results displayed an RPD greater than the control limit (i.e., 40%) between the first and second columns for MCPP. The associated field sample results were previously flagged for calibration anomalies. The lower result between the columns was reported by the laboratory. This result may be biased low.

For the PCBs analyses, the MS for sample SPond-1-S displayed percent recoveries less than the lower control limit for octachlorobiphenyl at 25% and for the MS/MSD pair for decachlrobiphenyl at (18%/15%). The matrix spike pair displayed relative percent differences (RPD) greater than the control limit for tetrachlorobiphenyl at 77% and octachlorobiphenyl at 54%. The positive associated field sample results for tetrachlorobiphenyl and octachlorobiphenyl were flagged "J,d". The associated field sample results for decachlorobiphenyl was non-detect and were flagged "UJ,m". The MS/MSD for sample SPond-1-S displayed percent recoveries less than the lower control limit for several analytes. Since the MS/MSD pair was analyzed at a dilution, several spiking analytes may have been diluted out, thus, no data qualifying action was taken.

For the metals analyses, the preparation blank displayed a negative detection for cadmium at –0.12928 mg/Kg and positive detections for barium at 0.17561, chromium at 0.16763 mg/Kg, lead at 0.46913 mg/Kg and zinc at 0.34856 mg/Kg. The associated field sample results were greater than five times the blank concentration, thus, no data qualifying action was required.

The MS/MSD pair displayed percent recoveries less than the control limit for antimony at (52%/54%). The associated field sample results for antimony were non-detect and were flagged "UJ,m". The MS/MSD pair displayed percent differences greater than the control limit for aluminum at (986%/856%), calcium at (130%), iron at (464%/498%), manganese at (61%/136%), and mercury at (-134%/-215%). Since the concentrations in the parent sample for aluminum, calcium, iron, manganese, and mercury were

greater than four times the spike concentration, no data qualifying action was required.

The CRI displayed percent recoveries outside of the control limits (i.e., 80-120%) for arsenic at 58% and lead at 72%. The positive associated field sample results for arsenic were flagged "J,w". The initial CRDL displayed percent recoveries greater than control limits for selenium at 135% and thallium at 131%. The final CRDL displayed percent recoveries greater than control limits for arsenic at 123% and iron at 121%. Since the CRDL recovery for lead was only marginally outside the control limits, no data qualifying action was taken.

The serial dilution displayed a percent difference greater than the control limit (i.e., 10%) for nickel at 11.4%, potassium at 10.6%, and zinc at 10.8%. All associated positive field sample results were flagged "J,s".

Correctable Anomalies: None.

Comments: For the SVOCs analyses, surrogate recoveries were not recovered due to high dilutions (>10x). Samples were analyzed at dilutions due to elevated concentrations and results displayed elevated detection limits.

For the pesticides analyses, the surrogate recoveries for samples LPond-1-S, LPond-3-S, and LPond-2-S were not recovered due to high dilutions of Samples were analyzed at dilutions due to elevated concentrations and results displayed elevated detection limits.

For the PCB analyses, surrogate recoveries for samples LPond-1-S and LPond-3-S were not recovered due to high dilutions due to the abundance of target compounds and results displayed elevated detection limits.

The results for grain size for sample LPond-2-S included in this SDG were reported form SDG# SAII77.

If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data, other than those flagged "R", are usable as qualified for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.:___SAII75_____ **Fraction:__VOCs, SVOCs, Pesticides, PCBs, Chlorinated Herbicides, Dissolved Gases, General Chemistry, & Metals**

Lab: _____STL Savannah_ **Project Name: __Sauget Area 2_____**

Reviewer: _____GF_____ **Date: _____September 23, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Inorganic or Organic Data Review and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the trip blank displayed positive detections for acetone at 2.8 ug/L, toluene at 0.14 ug/L, ethylbenzene at 0.13 ug/L, and styrene at 0.43 ug/L. All associated positive field sample results less than ten times the blank concentration for acetone and toluene and less than five times the blank concentration for ethylbenzene and styrene were flagged "U,y". Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The initial calibration analyzed on 06/21/03 displayed relative standard deviations greater than the control limit (i.e., 15%) for cis-1,2-dichloroethane at 15.2% and xylene (total) at 24.8%. All associated field sample results were non-detect and were flagged "UJ,r".

The continuing calibration analyzed on 06/28/03 at 1412 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for chloromethane at 22.2%, bromomethane at 36.1%, and 1,1,1-trichloroethane at 24.3%. All associated field sample results were non-detect; therefore, no data qualifying action was necessary.

The matrix spike/matrix spike duplicate displayed percent recoveries less than the lower control limits for chloromethane at 22% and 26% and vinyl chloride at 32% and 32%, respectively. The matrix spike duplicate also displayed relative percent differences greater than the upper control limits for acetone at 34% and 2-hexanone at 34%. All associated positive field

sample results were flagged "J,m" and all associated non-detect field sample results were flagged "UJ,m.

The laboratory control sample displayed a percent recovery greater than the upper control limit for bromomethane at 260%. All associated field sample results were non-detect; therefore, no data qualifying action was necessary.

For the SVOC analyses, the continuing calibration analyzed on 07/07/03 at 2145 displayed percent differences greater than the control limit with a positive bias for bis (2-chloroethyl) ether at 23.6%, bis (2-chloroisopropyl) ether at 30.6%, nitrobenzene at 22.3%, 2-nitroaniline at 36.3%, and 4-nitrophenol at 27.7%. Since all associated field sample results were non-detect, no data qualifying action was necessary.

The internal standard for sample BDRK-Q-2 displayed an area count less than the lower control limit (i.e., 50%) for perylene-d_{12}. All associated field sample results were non-detect and were flagged "UJ,n".

For the pesticide analyses, the continuing calibration analyzed on 06/19/03 at 2255 displayed percent differences greater than the control limit (i.e., 15%) with a positive bias for delta-BHC at 17.1% and with a negative bias for dieldrin at 17.7%. Since the associated sample results were non-detect and the percent differences were acceptable on the alternate column, no data qualifying action was required. The continuing calibration analyzed on 06/28/03 at 1944 displayed percent differences greater than the control limit on column one with a negative bias for 4,4-DDT at 23.1% and endrin aldehyde at 19.1%. The same continuing calibration also displayed a percent difference greater than the control limit on column two with a negative bias for 4,4-DDT at 23.9%. The associated field sample result for 4,4-DDT were flagged "UJ,c". Since endrin aldehyde passed on column 2, no data qualifying action was required.

The matrix spike duplicate displayed relative percent differences outside of the control limits for alpha-BHC at 31%, gamma-BHC at 28%, heptachlor at 28%, and alpha-chlordane at 22%. No action is taken on matrix spike duplicate data alone; therefore, no data qualifying action was required.

For the dissolved gas analyses, the initial calibration analyzed on 04/08/03 at 1907 displayed a relative standard deviation greater than the control limit (i.e., 15%) for methane at 22.1%. The associated field sample result was positive and was flagged "J,r". The continuing calibration analyzed on 07/07/03 at 1915 displayed a percent difference greater than the control limit (i.e., 20%) for methane at 25.0%. Since the associated field sample was previously flagged for the initial calibration anomaly, no further data

qualifying action was necessary. The matrix spike/matrix spike duplicate displayed percent recoveries less than the control limits for methane at 59% and 68%, respectively. No action is taken on matrix spike/matrix spike duplicate data alone; therefore; no further data qualifying action was necessary.

For the metals analyses, continuing calibration blanks displayed positive detections for barium at 0.00191 mg/L and 0.00179 mg/L, chromium at 0.00159 mg/L and 0.00110 mg/L, magnesium at 0.00211 mg/L and 0.00210 mg/L, selenium at 0.00979 mg/L and 0.00602 mg/L, and vanadium at 0.00245 mg/L and 0.00200 mg/L. All associated positive field sample results less than five times the blank concentration were flagged "U,o".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical methods with the exception of anomalies discussed above. If there is no mention of a given fraction, that means that there were no anomalies encountered for that fraction. All data are useable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.:___SAII76_____ **Fraction: VOCs, SVOCs, Pesticides, PCBs, Herbicides, Methane, Metals, Wet Chemistry___**

Lab: _STL Savannah_____ **Project Name: _____Sauget Area 2_____**

Reviewer: _____JFK_____ **Date: _____August 5, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: In the volatile organic compound (VOC) fraction, xylene displayed a percent relative standard deviation (%RSD) greater than the control limit (i.e., 15%) at 24.8% Associated non-detect sample results were flagged "UJ,r". No positive detections were reported. The initial calibration verification (ICV) displayed a percent drift (%D) greater than the control limit (i.e., 20%) with a positive bias for bromomethane at 28.0%. As all associated results were non-detect for this compound, no data qualification was required. The continuing calibration displayed percent differences or percent drifts (%Ds) greater than the control limit (i.e., 20%) with a positive bias for chloromethane, bromomethane, and carbon tetrachloride at 22.2%, 36.1%, and 24.3%, respectively. All associated results were non-detects, therefore, no data qualification was required. The matrix spikes (MSs) displayed recoveries for chloromethane (22%/26%) and vinyl chloride (32%/32%) versus lower control limits of 32% and 33% respectively. Associated results were flagged "UJ,m". The relative percent differences (RPDs) for the MS duplicates (MSDs) of 1,1-dichloroethane (34%) and 2-hexanone (34%) were greater than the control limits of 28% and 32%, respectively. As 1,1-dichloroethane results were all non-detects, no data flags were applied for this compound. Positive 2-hexanone results were flagged "J,m". The laboratory control sample displayed a percent recovery (%R) for bromomethane greater than the upper control limit (i.e., 173%) at 260%. No positive results were reported for this compound, therefore no data qualification was required. The trip blank displayed a number of compounds with positive detections greater than the method detection limit (MDL) but less than the reporting

limit (RL). Associated positive results in the field samples for acetone, toluene, styrene, and ethyl benzene were flagged "U,x", and the reported results were manually modified to reflect a non-detect at the reporting limit.

In the semivolatile organic compound (SVOC) fraction, 2-nitrophenol displayed a %D in the continuing calibration greater than the control limit (i.e., 20%) at 24%. Associated results, all non-detects, were flagged "UJ,c". The ICV displayed %Ds greater than the control limit (i.e., 20%) with a positive bias for n-nitrosodiphenylamine at 22.8% and benzo(b) flouranthene at 32.4%. As all reported results for these compounds were non-detects, no data qualification was required.

In the pesticide fraction, a small number of compounds displayed %Ds greater than the control limit (i.e., 15%) on one or the other chromatographic columns used for analysis. As all reported results were non-detects and the %D was acceptable for all compounds on at least one column, no data qualification was required.

In the herbicide faction, the compound 2,4,5-TP displayed a %R in the laboratory control sample (LCS) greater than the upper control limit (i.e., 100%) at 105%. As all associated results were non-detects, no data qualification was required. A small number of compounds displayed %Ds greater than the control limit (i.e., 15%) on one or the other chromatographic columns used for analysis. As all reported results were non-detects and the %D was acceptable for all compounds on at least one column, no data qualification was required.

The initial calibration for methane displayed a %RSD greater than the control limit (i.e., 20%) at 22.1%. All sample results were positive and were flagged "J,c". The matrix spikes displayed %Rs less than the lower control limit. However, as the results were all previously flagged for the calibration anomaly, no additional data qualification was required. The data user should be aware that a modest negative bias is indicated in the methane results.

In the metals fraction, iron, sodium, lead, selenium, and thallium displayed %Rs less than the lower control limit (i.e., 80%). Positive results less than two times the RL were flagged "J,c"; non-detects were flagged "UJ,c". Trace level positive and negative detections were observed for a variety of analytes in the preparation and calibration blanks. As a result, vanadium was flagged "U,o" in all samples. Chromium and iron were likewise flagged "U,o" in sample LPond-2-WF. Aluminum and potassium matrix spikes displayed %Rs greater than the upper control limit (i.e., 125%). Associated positive detections were flagged "J,m". Post digestion spike failures were observed for calcium, magnesium, and potassium.

Potassium was previously flagged for matrix spike failure and no additional flags were warranted. No matrix spike or serial dilution failures were reported for calcium or magnesium, thus no data qualification was required.

In the wet chemistry fraction, negative calibration blank results were reported for nitrate and/or nitrite. All sample result were non-detects and were flagged "UJ,o".

Correctable Anomalies: Sulfate results were incorrectly reported. The results were modified by the reviewer.

Comments: If a given fraction is not discussed above, it indicates that no quality control anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose, based on the data reviewed.

Signed: _____

John Kearns

DATA VALIDATION REPORT - Level III Review

SDG No.: SIIB02 **Fraction: SVOCs, Pest., PCBs, Herb., Metals**

Lab: Severn Trent-Savannah **Project Name: Sauget Area 2**

Reviewer: JA **Date: February 2, 2003**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, bis(2-ethylhexyl)phthalate was detected in the method blank at 71 µg/kg. Positive bis(2-ethylhexyl)phthalate results in the associated samples were flagged "U, z" at the reporting limit. The relative percent differences (RPDs) for 1,3-dichlorobenzene (32%), 1,4-dichlorobenzene (33%), 1,2-dichlorobenzene (34%), bis(2-chloroisopropyl)ether (33%), n-nitroso-di-n-propylamine (38%), nitrobenzene (34%), 1,2,4-trichlorobenzene (34%), 2,4,6-trichlorophenol (34%), 4-bromophenyl-phenylether (26%), bis(2-ethylhexyl)-phthalate (24%), and dibenzo(a,h)anthracene (29%) were greater than the acceptance limit in the LCS/LCSD pair. Since these compounds were not detected in the associated samples and LCS/LCSD recoveries for these compounds were in control, no data qualifying action was taken.

For the pesticide analyses, the extraction holding time was exceeded by one day for 10 samples. All positive results, except those flagged due to method blank contamination, were flagged "J, h" and non-detects were flagged "UJ, h". Methoxychlor was detected in the method blank (1022O-IMB) at 14 µg/kg. Heptachlor was detected in the method blank (1024Q-IMB) at 0.76 µg/kg. Positive methoxychlor and heptachlor results in the associated samples were flagged "U, z" at the reporting limit. The continuing calibration verification (CCV) analyzed on 11/8/02 at 05:27 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for 4,4'-DDT (-25.2%) and on the confirmation column for 4,4'-DDT (-31.9%), endrin aldehyde (-16.9%), methoxychlor (-20.1%), and surrogate 2,4-DCAA (25.3%). The positive 4,4'-DDT result in sample PL-Q-13 was flagged "J, c"; and the 4,4'-DDT results in samples PL-Q-12 and PL-Q-21 were flagged "UJ, c". Endrin aldehyde and methoxychlor were either non-detects or qualified as non-detects due to method blank contamination. Since these results either had an acceptable %D on the alternate column or were

surrogates, no data qualifying action was taken. The CCV analyzed on 11/8/02 at 12:29 displayed %Ds greater than the control limit on the primary column for emdrin aldehyde (-16.3%) and on the confirmation column for surrogate 2,4-DCAA (24.7%). The CCV analyzed on 11/8/02 at 20:43 displayed a %D greater than the control limit on the confirmation column for surrogate 2,4-DCAA (19.9%). Since these results in the associated samples were previously flagged due to holding time violation, no further data qualifying action was taken. The LCS/LCSD recoveries for methoxychlor (230% and 180%) were greater than the upper control limit in one LCS/LCSD pair. Since methoxychlor results in the associated samples were previously flagged due to method blank contamination, no further data qualifying action was taken. The LCS recovery (120%) and the RPD (50%) for alpha-BHC were greater than the control limit in another LCS/LCSD pair. Since alpha-BHC results in the associated samples were previously flagged due to holding time violation, no further data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to holding time violation, were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicides analyses, the extraction holding time was exceeded by five days in sample PL-Q-11. All positive results were flagged "J, h" and non-detects were flagged "UJ, h". The CCV analyzed on 10/25/02 at 11:30 displayed a %D greater than the control limit (i.e., 15%) on the primary column for MCPA (16.5%). The CCV analyzed on 10/25/02 at 18:03 displayed %Ds greater than the control limit on both columns for dalapon (-16.2% and -18.1%). The dalapon results in the associated samples PL-Q-10 and PL-Q-14 were flagged "UJ, c" and the positive MCPA result in sample PL-Q-14 was flagged "J, c". The CCV analyzed on 10/29/02 at 13:09 displayed a %D greater than the control limit on the primary column for 2,4-D (17.7%). The CCV analyzed on 10/29/02 at 18:02 displayed a %D greater than the control limit on the primary column for 2,4-D (16.1%). Since the positive 2,4-D result in sample PL-Q-11 was previously flagged due to holding time violation, no further data qualifying action was taken. 2,4-D was not detected in sample PL-Q-18. Since this result had an acceptable %D on the alternate column, no data qualifying action was taken. The surrogate DCAA recoveries on the confirmation column were greater than the upper control limit in samples PL-Q-10 (800%) and PL-Q-18 (1650%). Positive results in these two samples were flagged "J, s". The LCS/LCSD recoveries for MCPP (140%/140% and 135%/135%) were greater than the upper control limit in two LCS/LCSD pairs. Positive MCPP results, except those previously flagged due to surrogate recovery failure, were flagged "J, l". The RPD between primary and confirmation columns was greater than the acceptance limit (i.e., 40%) for most of positive detections. These results, except those previously flagged for other QC

failures, were flagged "J, g". It should be noted that the lower result was reported by the laboratory. These results in the associated samples may be biased low.

For the metal analyses, the initial CRDL percent recoveries for selenium (132%), sodium (77%), and mercury (70%); and the final CRDL recovery for selenium (136%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained sodium at 14.386 mg/kg. Sodium was also detected in the initial calibration blank (ICB) at 0.10363 mg/L and two continuing calibration blanks at –0.18785 mg/L (CCB5) and –0.15508 mg/L (CCB6). Positive sodium results in the associated samples were flagged "U, p" at the reporting limit. Copper was detected in CCB6 at 0.00234 mg/L. Mercury was detected in CCB5 at –0.056 μg/L and CCB6 at –0.053 μg/L. Since copper and mercury results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Arsenic was detected in the ICB at 0.00509 mg/L. Positive arsenic results in the associated samples were flagged "U, o" at the reporting limit. Selenium was detected in CCB6 at 0.00603 mg/L. Since selenium was not detected in the associated sample PL-Q-11, no data qualifying action was taken. The MS recoveries for calcium (144%) and mercury (23%) were outside the control limit (i.e., 75%-125%) in the PL-Q-12 and PL-Q-19 MS/MSD pairs. All calcium and mercury results in the associated samples were positive and were flagged "J, m".

Correctable Anomalies: None.

Comments: MS/MSD samples were not designated on the chain-of-custody (COC) for all organic analyses. Given that the majority of LCS/LCSD results associated with this SDG are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB03_____ **Fraction:** _SVOCs, Pest., PCBs, Herb., Metals_

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____JA_____ **Date:** _____February 2, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the SVOC analyses, the LCS/LCSD recoveries for 2,4-dimethylphenol (7% and 3%) were less than the lower control limit. The 2,4-dimethylphenol results in the associated samples were flagged "R, l". The LCSD recoveries for 1,3-dichlorobenzene (23%), 1,2-dichlorobenzene (24%), 2-methylphenol (21%), 3&4-methylphenol (22%) were less than the lower control limit. Results in the associated samples normally would be rejected based on National Functional Guidelines. However, since the LCS recoveries for these compounds were in control, based on professional judgement, these results were flagged "UJ, l" in the associated samples.

Minor Anomalies: For the SVOC analyses, the continuing calibration verification (CCV) analyzed on 11/5/02 at 06:22 displayed %Ds greater than the control limit (i.e., 20%) for 4-nitrophenol at –23.5% and 3,3-dichlorobenzidine at –21.7%. The CCV analyzed on 11/7/02 at 07:32 displayed %Ds greater than the control limit for 2,4-dinitrophenol at –35.1%, 4,6-dinitro-2-methylphenol at –35.1%, 3,3-dichloro-benzidine at –44.4%, and dinoseb at –38.6%. Since these compounds were not detected in the associated samples, and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The relative percent differences (RPDs) for phenol (46%), bis(2-chloroethyl)ether (53%), 2-chlorophenol (50%), 1,3-dichlorobenzene (52%), 1,4-dichlorobenzene (51%), 1,2-dichlorobenzene (50%), bis(2-chloroisopropyl)ether (48%), 2-methyl-phenol (58%), n-nitroso-di-n-propylamine (46%), 3&4-methyl-phenol (58%), hexachloroethane (55%), nitrobenzene (41%), 2,4-dimethylphenol (80%), 1,2,4-trichlorobenzene (44%), and naphthalene (42%) were greater than the acceptance limit in the LCS/LCSD pair. Since these results in the associated samples were previously flagged due to LCS/LCSD recovery failure, no further data qualifying action was taken. All other compounds were not detected in the associated samples and non-detect results were judged not affected by the reviewer. No data qualifying action was taken.

For the pesticide analyses, methoxychlor was detected in the method blank at 2.2 µg/kg. Since this compound was not detected in the associated samples, no data qualifying action was taken. The CCV analyzed on 10/30/02 at 09:49 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for alpha-BHC (–17.9%), methoxychlor (-23.3%), and surrogate decachlorobiphenyl (DCBP, -19.5%). The CCV analyzed on 10/30/02 at 19:20 displayed %Ds greater than the control limit on the primary column for alpha-BHC (–17.2%), endrin ketone (15.7%), and surrogate DCBP (-15.9%). The positive endrin ketone result in sample INQ2 was flagged "J, c". Since all other results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results were flagged "J, g". It should be noted that the lower results were reported by the laboratory. These results may be biased low.

For the herbicides analyses, the CCV analyzed on 10/22/02 at 15:53 displayed a %D greater than the control limit (i.e., 15%) on the primary column for 2,4-DB at –31.3%. The positive 2,4-DB result in sample IN Q1 was flagged "J, c". Since 2,4-DB was not detected in sample IN Q2 and had an acceptable %D on the alternate column, no data qualifying action was taken. The LCS recovery for MCPP (135%) was greater than the upper control limit (i.e., 130%) in the LCS/LCSD pair. Since MCPP was not detected in the associated samples, no

data qualifying action was taken. The RPD between the primary and confirmation columns was greater than the acceptance limit (i.e., 40%) for 2,4-DB in sample IN Q1 and 2,4-D in sample IN Q2. The 2,4-D result in sample IN Q2 was flagged "J, g". Since 2,4-DB result in sample IN Q1 was previously flagged due to calibration failure, no further data qualifying action was taken. It should be noted that the lower result was reported by the laboratory. The 2,4-DB result in sample IN Q1 and the 2,4-D result in sample IN Q2 may be biased low.

For the metal analyses, the initial CRDL percent recoveries for selenium (132%) and sodium (77%), and the final CRDL recovery for selenium (136%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained sodium at 14.386 mg/kg. Sodium was also detected in the initial calibration blank (ICB) at 0.10363 mg/L and two continuing calibration blanks at –0.18785 mg/L (CCB5) and –0.15508 mg/L (CCB6). Copper was detected in CCB6 at 0.00234 mg/L. Mercury was detected in CCB5 at –0.056 µg/L and CCB6 at –0.053 µg/L. Since sodium, copper, and mercury results in the associated samples were greater than five times the blank concentration; no data qualifying action was taken. Arsenic was detected in the ICB at 0.00509 mg/L. Since arsenic was not detected in the associated sample, no data qualifying action was taken. Selenium was detected in CCB6 at 0.00603 mg/L. Positive selenium results were flagged "U, o" or "U, o" at the reporting limit. The MS recoveries for calcium (144%) and mercury (22%) were outside the control limit (i.e., 75%-125%) in the PL-Q-12 and PL-Q-19 MS/MSD pairs (from SDG SIIB02). All calcium and mercury results in the associated samples were flagged "J, m". The %Ds for zinc (45.4%) and mercury (20.4%) were greater than the control limit (i.e., 10%) in the serial dilution sample. Positive zinc results in the associated samples were flagged "J, s". Since mercury results were previously flagged due to MS recovery failure, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: MS/MSD samples were not designated on the chain-of-custody (COC) for all organic analyses. Given that the majority of LCS/LCSD results associated with this SDG are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that

fraction. Excepting the rejected data points, all data are usable, as qualified, for their intended purpose, based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB04_____ **Fraction: __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, pH, TOC, and Grain Size__**

Lab: ___STL – Savannah_____ **Project Name: _____Sauget Area II_____**

Reviewer: _____JA_____ **Date: _____February 10, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the surrogate recoveries for tetrachloro-m-xylene (TCMX, 10% and 7%) and decachlorobiphenyl (DCBP, 21% and 25%) in sample R6AM1S were less than the lower control limit (i.e., 30-150%). This sample was re-extracted on 11/19/02 (within holding time), re-analyzed by the laboratory displaying similar recoveries. Only raw data were provided in the data package. The surrogate recoveries for TCMX (6% and 6%) in sample R6CM1S were less than the lower control limit. Positive detections in these two samples were flagged "J, s" and non-detects were flagged "R, s". The percent completeness for this analysis was less than the control limit (i.e., 95%) at 73.5%.

Minor Anomalies: For the VOC analyses, the trip blank shipped on 11/07/02 contained chloromethane at 0.51 µg/L (in SDG SIIB05). No data qualifying action was taken since this compound was previously flagged due to method blank contamination. The initial calibration, analyzed on 11/15/02, displayed a correlation coefficient less than the control limit (i.e., 0.990) for chloromethane at 0.9886. Chloromethane was not detected in the associated samples and non-detects were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 11/20/02 at 09:29 displayed %Ds greater than the control limit (i.e. 20%) for bromomethane at 30.9% and 2-butanone at –22.9%. Positive 2-butanone results were flagged "J, c". Since bromomethane was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The RPDs for acetone (54%) and 1,2-dichloroethane (26%) were greater than the acceptance limit in the LCS/LCSD pair (1L1120-MB). Positive acetone results were flagged "J, d" in the associated samples. Since 1,2-dichloroethane was not detected in the associated samples and LCS/LCSD %Rs were in control, no data qualifying action was taken. The field duplicates pair, R6AM1S and R6AM2S, displayed an absolute difference greater than the control limit (i.e., two times the reporting limit, 14.8 µg/kg) for styrene at 37 µg/kg. Affected styrene results were flagged "J, f" for positive detections or "UJ, f" for non-detects.

For the SVOC analyses, the method blank, 1114F-MB, contained benzo(a)pyrene at 22 µg/kg, bis(2-ethylhexyl)phthalate at 19 µg/kg, indeno(1,2,3-cd)pyrene at 23 µg/kg, and benzo(g,h,i)perylene at 28 µg/kg. Positive detections for these compounds were flagged "U, z" at the reporting limit in the associated samples. The CCV analyzed on 11/27/02 at 08:15 displayed %Ds greater than the control limit (i.e., <20%) for hexachlorocyclopentadiene at 32.2% and dinoseb at 26.3%. Since these two compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The base/neutral surrogate recoveries for 2-fluorobiphenyl (21%) and terphenyl-d14 (28%) in sample R6AU1S were less than the lower control limit. All base/neutral results were flagged "J, s" for positive detections or "UJ, s" for non-detects in sample R6AU1S. The base/neutral surrogate recoveries for 2-fluorobiphenyl were less than the lower control limit in samples R6AD1S (25%) and R6AM2S (25%). Since all other base/neutral surrogates displayed acceptable recoveries in these two samples, no data qualifying action was taken. These three samples were re-extracted outside the holding time by one to two days and re-analyzed by the laboratory. All surrogate recoveries were in control in these three re-analyzed samples and SVOC results confirmed the original analysis. However, due to the holding time violation, the original data should be used for data interpretation. All re-analyzed results were crossed-out by the reviewer and should not be used for data interpretation. There are 35 MS recoveries and 29 MSD recoveries less than the lower control limit in the R5AM3S MS/MSD pair (in SIIB07). The RPDs for hexachloroethane (35%) and hexachlorocyclopentadiene (88%) were greater than the acceptance limit. Surrogates 2-fluorobiphenyl and terphenyl-d14 recoveries for MS and MSD samples were less than the lower control limit (see detail discussion in SDG SIIB07). The combination of the two surrogates displaying low recoveries and many compounds in the MS/MSD displayed low recoveries may have resulted from a poor extraction. Therefore, the results of the MS/MSD recovery failures were not used to assess the associated data. Since LCS recoveries were in control, no data qualifying action was taken.

For the pesticides analyses, the %Ds for 4,4'-DDE (-16.3%), 4,4'-DDT (-20.7%), endrin aldehyde (-16.3%), methoxychlor (-28.0%), and surrogate 2,4-DCAA (-16.8%) on the primary column; and for 4,4'-DDD (-18.7%) and methoxychlor (-32.0%) on the confirmation column were greater than the criterion (i.e., %D < ±15%) for the continuing calibration analyzed on 11/17/02 at 16:43. The %Ds for 4,4'-DDE (-20.8%), 4,4'-DDD (16.1%), 4,4'-DDT (-41.2%), and surrogate 2,4-DCAA (16.4%) on the primary column; and for 4,4'-DDT (-32.4%) and endrin aldehyde (-15.5%) on the confirmation column were greater than the criterion for the continuing calibration analyzed on 11/18/02 at 01:34. Positive 4,4'-DDE results, except those previously flagged due to surrogate recovery failure, were flagged "J, c" in the associated samples. Methoxychlor and 4,4'-DDT results,

except those previously flagged due to surrogate recovery failure, were flagged "UJ, c" in the associated samples. All other target compounds were not detected in the associated samples. Since these other results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The TCMX surrogate recoveries in samples R6BM1W (26% and 23%) and R6AM2S (14% and 11%) were less than the lower control limit (i.e., 30-150%). All results, except those previously flagged due to calibration failure, were flagged "J, s" or "UJ, s" in these two sample. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. Since these results were previously flagged due to other QC failures, no further data qualifying action was taken. It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the CCV analyzed on 11/15/02 at 17:26 displayed a %D greater than the control limit (i.e., 15%) for 2,4-DB at –20.5% on the primary column. 2,4-DB was not detected in the associated samples. Since this compound had an acceptable %D on the alternate column, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for iron (78%) and thallium (78%); and the final CRDL recoveries for arsenic (75%), sodium (70%), and thallium (139% and 76%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained arsenic at -0.52809 mg/kg, cadmium at –0.04048 mg/kg, chromium at 0.18891 mg/kg, potassium at 3.27795 mg/kg, and sodium at 41.67883 mg/kg. Arsenic was also detected in two continuing calibration blanks at –0.00804 mg/L (CCB5) and –0.00368 mg/L (CCB9). Positive arsenic results less than five times the absolute blank concentration were flagged "J, p" or "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since positive cadmium results were greater than five times the absolute blank concentration, no data qualifying action was taken. The cadmium result was reported as a non-detect at the reporting limit (0.58 mg/kg) in sample R6CM1S. Since the action level (five times the absolute blank concentration) was much less than the reporting limit, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Positive sodium results were flagged "U, p" in the associated samples. Chromium and potassium results were greater than five times the blank concentration in the associated samples. Therefore, no data qualifying action was required. Copper was detected in four CCBs at concentrations ranging from 0.00201 mg/L to 0.00346 mg/L. The positive copper result in sample R6CM1S was flagged "U, o" at the reporting limit. All other copper results were greater than five times the blank concentration, therefore, no data qualifying action was taken. Thallium was detected in CCB6 at –0.00720

mg/L. Thallium was not detected in associated samples R6BM1S, R6AM2S, and R6CM1S and non-detects were flagged "UJ, o". Aluminum, barium, cadmium, chromium, cobalt, lead, manganese, potassium, sodium, thallium, and vanadium were also detected in ICB and CCBs at low levels. Since these results were either greater than five times the blank concentration or non-detects in the associated samples, no data qualifying action was taken. The MS recovery for magnesium (326%) was greater than the upper control limit (i.e., 125%) in a non-client MS/MSD pair. The RPDs for calcium (62.11%) and magnesium (72.82%) were greater than the acceptance limit. Since the parent sample is not a client sample, these recoveries and RPD failures were not used to assess the associated samples. The %D for cobalt (12.5%) was greater than the control limit (i.e., 10%) in the serial dilution sample (R6AU1S). Positive cobalt results in the associated samples were flagged "J, s".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: ____SIIB05_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Hardness_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 4, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the method blank, 1B1120MB, contained chloromethane at 0.64 µg/L. Positive chloromethane results in the associated samples were flagged "U, z" at the reporting limit. The trip blank shipped on 11/7/02 contained chloromethane at 0.51 µg/L. No data qualifying action was taken since this chloromethane result was previously flagged due to method blank contamination. The holding time was exceeded by one day in one re-analyzed sample R5AD1W-RE. All positive results were flagged "J, h" and non-detects were flagged "UJ, h". The initial calibration, analyzed on 11/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for chloromethane at 0.9887, carbon tetrachloride at 0.9866, 1,1,1-trichloroethane at 0.9854, and bromodichloromethane at 0.9871. This initial calibration also displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 22.0%. Since these results in the associated sample R5AD1W-RE were previously flagged due to holding time violation, no further data qualifying action was taken. The continuing calibration verification (CCV) analyzed on 11/20/02 at 13:23 displayed a %D greater than the control limit (i.e. 20%) for bromomethane at –47.6%. Since this compound was not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 11/22/02 at 10:38 displayed %Ds greater than the control limit for bromomethane at 117.1% (instrument sensitivity increased) and chloroethane at 27.1%. Since these two results in the associated sample R5AD1W-RE were previously flagged due to holding time violation, no further data qualifying action was taken. The LCS/LCSD recoveries for chloromethane (24% and 24%) and vinyl chloride (32% and 34%), and the LCS recovery for bromomethane (36%) were less than the lower control limit in one LCS/LCSD pair. Since the associated samples are MS and MSD samples (QC samples), no data qualifying action was taken. The LCS recovery for chloroethane (6%) and the LCSD recovery for bromomethane (200%) were outside the control limit in

another LCS/LCSD pair. The relative percent differences (RPDs) for bromomethane (45%), chloroethane (181%), 1,1,1-trichloroethane (28%), and 1,2-dichloroethane (31%) were greater than the acceptance limit. The chloroethane results in the associated samples would be rejected based on National Functional Guidelines. However, since the LCSD recovery for chloroethane was in control and all associated results were previously flagged due to holding time violation, no further data qualifying action was taken. Sample R5AD1W displayed internal standard percent recoveries less than the lower control limit (i.e. 50%) for 1,2-dichloroethane-d4 at 28.8%, 1,4-difluorobenzene (26.8%), and chlorobenzene-d5 (26.1%). All results in sample R5AD1W were flagged "J, n" for positive detections or "UJ, n" for non-detects. This sample was re-analyzed outside the holding time and displayed acceptable internal standard recoveries. The re-analyzed sample results should be used for data interpretation.

For the SVOC analyses, the CCV analyzed on 11/23/02 at 12:14 displayed a %D greater than the control limit (i.e., <20%) for 4-nitrophenol at -24.7%. The CCV analyzed on 11/24/02 at 12:33 displayed %Ds greater than the control limit for 1,2,4-trichlorobenzene at 20.5%, di-n-butylphthalate at -26.2%, 4-nitrophenol at -22.7%, and benzo(k)fluoranthene (-21.5%). Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the CCVs analyzed on 11/11/02 at 10:22 and 22:38 displayed %Ds greater than the control limit (i.e., 15%) on the confirmation column for surrogate 2,4-DCAA at 23.4% and 20.9%, respectively. The CCV analyzed on 11/12/02 at 09:54 displayed %Ds greater than the control limit on the primary column for methoxychlor at -25.4%; and on the confirmation column for endrin aldehyde at -18.0%. The CCV analyzed on 11/12/02 at 20:32 displayed a %D greater than the control limit on the primary column for surrogate 2,4-DCAA at 16.7%. Methoxychlor and endrin aldehyde were not detected in the associated samples. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken.

For the PCBs analyses, the MS/MSD displayed %Rs less than the lower control limit for hexachlorobiphenyl at 35% and 34% in the R5AM3W MS/MSD pair (in SDG: SIIB06). Since the LCS recovery met criteria for hexachlorobiphenyl, no data qualifying action was taken. Sample R6AM1W displayed a %R less than the lower control limit (i.e. 70%) for internal standard phenanthrene-d10 at 57.1%. Since this internal standard was not used for sample quantitation and internal standard chrysene-d12 recovery was in control (used for quantitation), no data qualifying action was taken.

For the herbicide analyses, the CCV analyzed on 11/13/02 at 19:09 displayed

%Ds greater than the control limit (i.e., 15%) on both columns for 2,4-DB at -16.0% and -15.8%. The CCV analyzed on 11/14/02 at 13:43 displayed %Ds greater than the control limit on both columns for 2,4-DB at -21.4% and -19.3%. The CCV analyzed on 11/15/02 at 02:28 displayed %Ds greater than the control limit on both columns for 2,4-DB at -22.4% and -16.5%. All 2,4-DB results in the associated samples were flagged "UJ, c". The MS recovery for 2,4,5-TP (105%) was greater than the upper control limit (i.e., 100%) in the R5AU1W MS/MSd pair (in SDG: SIIB06). Since this compound was not detected in the associated samples, no data qualifying action was taken. The RPD for 2,4-DB (44%) was greater than the acceptance limit (i.e., 43%) in one LCS/LCSD pair. The LCS recovery for 2,4,5-TP (108%) was greater than the upper control limit (i.e., 100%). Since these two compounds were not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for iron (138%), lead (64% and 74%), selenium (145%, 123%, and 69%), sodium (52%), thallium (77%), and mercury (75%); and the final CRDL recoveries for aluminum (122%), iron (125% and 121%), lead (60%), selenium (137% and 128%), sodium (75%), and thallium (129% and 148%) were outside the control limit (i.e., 80-120%). The positive dissolved sodium result in sample R6AD1WF was flagged "J, w". Since the dissolved thallium result in sample R6AD1WF was flagged due to calibration blank contamination, no further data qualifying action was taken. Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank for total metals analysis contained aluminum at 0.01642 mg/L and 0.01109 mg/L, calcium at 0.00901 mg/L, magnesium at 0.00953 mg/L, and thallium at –0.00537 mg/L (for S248089A). Thallium was not detected in the associated samples and non-detects were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since aluminum, calcium, and magnesium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The preparation blank for dissolved metals analysis contained aluminum at 0.01746 mg/L and 0.00872 mg/L, arsenic at 0.00437 mg/L (for S248089A), barium at 0.00035 mg/L, calcium at 0.04042 mg/L and 0.03186 mg/L, copper 0.00143 mg/L (for S248089A), magnesium at 0.01187 mg/L. Aluminum, arsenic, and copper results in the associated filtered samples were flagged "U, p" at the reporting limit. Since calcium and magnesium results in the associated filtered samples were greater than five times the blank concentration, no data qualifying action was taken. Aluminum was also detected in two initial calibration blanks (ICBs) and several continuing calibration blanks (CCBs) at concentrations ranging from 0.00999 mg/L to 0.0415 mg/L. The total aluminum result in sample R6BU1W was flagged "U, o". Antimony was detected in the ICB at –0.00473 mg/L. Total and dissolved antimony results in the associated samples (for S248089A) were

flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Cobalt was detected in CCB4 at 0.00146 mg/L. The dissolved cobalt result in sample R5AD1WF was flagged "U, o" at the reporting limit. Copper was also detected in several CCBs at concentrations ranging from 0.00106 mg/L to 0.00308 mg/L. Positive total and dissolved copper results, except those previously flagged due to preparation blank contamination, were flagged "U, o" at the reporting limit in the associated samples. Manganese was detected in several CCBs at concentrations ranging from 0.00076 mg/L to 0.00198 mg/L. Positive dissolved manganese results were flagged "U, o" at the reporting limit in the associated samples. Vanadium was detected in several CCBs at concentrations ranging from 0.00162 mg/L to 0.0219 mg/L. Positive total and dissolved vanadium results were flagged "U, o" at the reporting limit in the associated samples. Thallium was also detected in CCB4 at 0.00506 mg/L and CCB5 at –0.00494 mg/L. All dissolved thallium results in the associated samples (for S248089A) were flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Thallium was also detected in CCB3 at 0.00796 mg/L and CCB4 at 0.00652 mg/L. Positive dissolved thallium result in sample R6AD1WF was flagged "U, o" at the reporting limit. Antimony, arsenic, barium, beryllium, calcium, magnesium, silver, and selenium were also detected in the ICBs and CCBs at low levels. Since results for these analytes in the associated samples were either non-detects or greater than five times the blank concentration, no data qualifying action was taken. The MSD recovery for mercury (125%) was equal to the upper control limit (i.e., 125%) in the R6AD1W MS/MSD pair. The positive dissolved mercury result in sample R5AD1WF was flagged "J, m'. The post-digestion spike recovery for mercury was in control.

Correctable Anomalies: None.

Comments: MS/MSD analyses were not performed on SVOC and pesticides fractions. Given that the LCS/LCSD results for SVOC and pesticides analysis are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB06_____ **Fraction:**_VOCs, SVOCs, Pest., PCBs, Herb.,__ _Metals , Wet Chem_____

Lab: _Severn Trent-Savannah_____ **Project Name:** __Sauget Area 2_____

Reviewer: _____RA_____ **Date:** _____January 23, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical methods employed.

Major Anomalies: For the pesticides analyses, the recoveries for surrogate decachlorobiphenyl (8%, 8%) were less than the QC limit (i.e., 30-150%) in sample R5BU1W. All associated sample results were non-detects and were flagged "R,s". The percent completeness was less than the QC limit (i.e., 95%) at 88% due to this failure.

Minor Anomalies: For the VOC analyses, the initial calibration analyzed on 11/12/02 displayed correlation coefficients less than the control limit (i.e. 0.990) for chloromethane (0.989), 1,1,1-trichloroethane (0.985), carbon tetrachloride (0.987), and bromodichloromethane (0.987). Positive results were flagged "J,r" and non-detects were flagged "UJ,r" in the associated samples. This initial calibration also displayed a %RSD greater than the control limit (i.e. 15%) for bromomethane at 22%. All associated sample results were non-detects and no data qualifying action was required since the failure was not serious enough (i.e., > 50%) to affect the non-detect values. Rinse blank R5BU4W contained chloromethane at 0.22 ug/L, toluene at 0.7 ug/L, and 1,2-dichloroethene at 0.38 ug/L. Positive results were flagged "U,x" at the reporting level in the associated samples. The MS recovery (188%) and %RPD (85%) for bromomethane were greater than the QC limit. The %RPDs for 1,1,1-trichloroethane (28%), 1,2-dichloroethane (26%), bromodichloromethane (33%), and cis-1,3-dichloropropene (26%) were greater than the QC limit. No action is required based on MS/MSD failure and no data flags were applied. The LCS percent recovery for chloromethane (146%), the LCSD percent recovery and %RPD for bromomethane (194% and 108%), and the %RPD for 1,2-dichloroethane (24%) were greater than the QC limit. All associated sample results were non-detects and no data qualifying action was required.

For the SVOC analyses, the CCV analyzed on 11/21/02 displayed %Ds greater than the control limit (i.e. 20%) for indeno (1,2,3-cd) pyrene at –28%, dibenzo

(a,h) anthracene at –24.2%, and benzo (g,h,i) perylene at –21.8%. Since these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 11/14/02 at 0852 displayed %Ds greater than the control limit (i.e. 15%) for endrin aldehyde (-19.7%, -20.4%), and methoxychlor (-28.6%, -16%) on both columns, and 4,4-DDT (-20.1%) on the primary column. Non-detects were flagged "UJ,c" for endrin aldehyde and methoxychlor in all samples. No data flags were applied to 4,4-DDT results since the %D was acceptable on the alternate column. The recoveries for surrogate tetrachloro-m-xylene (24%, 26%) were less than the QC limit (i.e., 30-150%) in sample R5AMW3. The recoveries for surrogate decachlorobiphenyl were less than the QC limit (i.e., 30-150%) in samples R5AU1W (14%, 14%), R5CM1W (16%, 16%), R5BU4W (21%, 20%), R5BM1W (21%, 20%), and R5BU4S (13%, 12%). All associated sample results were non-detects and were flagged "UJ,s" unless previously flagged due to other failures.

For the PCB analyses, the MS/MSD recoveries for hexachlorobiphenyl (36%, 34%) were less than the QC limit (i.e., 40-140%). No action was required since the LCS recoveries were acceptable.

For the herbicides analyses, the CCV analyzed on 11/14/02 at 1343 displayed %Ds greater than the control limit (i.e. 15%) on both columns for 2,4-DB at –21.4% and –19.3%. The CCV analyzed on 11/15/02 at 0228 displayed %Ds greater than the control limit on both columns for 2,4-DB at –22.4% and –16.5%. All associated sample results were non-detects and were flagged "UJ,c". The MS recovery for 2,4,5-TP was greater than the control limit (i.e. 10-100%) at 105%. The LCS recovery for 2,4,5-TP was also greater than the control limit (i.e. 10-100%) at 108%. All associated sample results were non-detects and no data qualifying action was required. The RPDs between primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for dichloroprop in sample R5AM1W (121.4%) and MCPP in sample R5BM1W (47.5%). These results were flagged "J, g".

For the metal analyses, the initial CRDL percent recoveries for antimony (74%) and zinc (121%) and the final CRDL percent recoveries for iron (69%), sodium (52%), and thallium (72%) were outside the control limit (i.e., 80-120%). Positive sodium results were flagged "J,w" and non-detects were flagged "UJ,w" in all samples. Since the recoveries for antimony, zinc, iron, and thallium were only marginally outside the control limits, no data qualifying action was taken. The method blanks contained aluminum at 0.01035 mg/L and 0.01166 mg/L,

arsenic at – 0.00341 mg/L, barium at 0.00043 mg/L, calcium at 0.01472 mg/L and 0.03456 mg/L, copper at 0.00158 mg/L and 0.00187 mg/L, thallium at – 0.00445 mg/L, mercury at – 0.000078 mg/L, zinc at 0.00341 mg/L, and vanadium at 0.0011 mg/L. Positive results less than 5 times the blank concentration were flagged "U,p" at the reporting limit in the associated samples. Non-detects were flagged "UJ,p" for arsenic and thallium in the associated samples. Positive results were flagged "J,p" and non-detects were flagged "UJ,p" for mercury in the associated samples. The initial and continuing calibration blanks also contained positive results for aluminum, barium, calcium, copper, magnesium, manganese, and vanadium, and negative results for antimony, arsenic, and mercury. Positive results less than 5 times the blank concentration were flagged "U,o" at the reporting limit in the associated samples unless previously flagged due to other failures. Rinse blank R5BU4W contained calcium at 0.016 mg/L and magnesium at 0.0065 mg/L. Positive results in the associated samples were previously flagged due to method blank contamination and no further action was required. The %D for serial dilution analyses for total aluminum (10.9%) was greater than the acceptance limit (i.e., <10%). Positive results were flagged "J, s" in the associated samples.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. It should be noted that detection limits were raised in several samples due to dilutions. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. Except for rejected data points, all data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _SIIB07_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,_ Metals, TOC, pH, Particle Size_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____February 5, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the method blank analyzed on 11/21/02 displayed a positive detection for acetone at 3.7 ug/kg. Since only QC samples were associated with this method blank, no data qualifying action was taken. The equipment blank, R5BU4S, displayed a positive detection for toluene at 0.84 ug/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,x" at the reporting limit. The continuing calibration analyzed on 11/21/02 displayed a %D greater than the control limit (i.e. <20%) for bromomethane at -21.6%. Since associated sample results were non-detect and the %D was only slightly outside the control limit (i.e. <50%), no data qualifying action was taken. Acetone displayed relative response factors (RRFs) less than the control limit (i.e. <0.05) in the CCVs analyzed on 11/20/02 and 11/21/02 at 0.04418 and 0.04639, respectively. Since acetone was calibrated using peak area and linear regression, no data qualifying action was taken. The LCS analyzed on 11/21/02 displayed a %R greater than the upper control limit (i.e. 133%) for chloroform at 144%. Since associated sample results were non-detect, no data qualifying action was taken.

For the SVOCs analyses, the method blank analyzed on 11/18/02 displayed positive detections for bis (2-ethylhexyl) phthalate at 19 ug/kg, for benzo(a)pyrene at 22 ug/kg, for indeno(1,2,3-cd)pyrene at 23 ug/kg, and for benzo(g,h,i)perylene at 28 ug/kg. Since associated sample results were non-detect, no data qualifying action was taken. Surrogates 2-fluorobiphenyl and terphenyl-d14 displayed %Rs less than the lower control limit in the MS and the MSD at 23%, 26%, 25%, and 26%, respectively. Since these are QC samples, no data qualifying action was taken. A large number of MS and MSD results displayed %Rs less than the lower control limit. Since the LCS met criteria for these compounds, no data qualifying action was taken. The combination of the two

surrogates displaying low recoveries and many compounds in the MS/MSD displayed low recoveries may have resulted from a poor extraction. The MS/MSDs were not re-extracted or re-analyzed by the laboratory. The results of the MS/MSD recovery failures were not used to assess the associated data.

For the pesticides analyses, the CCV analyzed on 11/17/02 at 16:43 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for 4,4'-DDE at -16.3%, for 4,4'-DDD at -20.7%, for endrin aldehyde at -16.3%, methoxychlor at -28.0%, and for surrogate 2,4-DCAA at 16.8%; and on the confirmation column for 4,4'-DDD at -18.7% and for methoxychlor at -32.0%. The CCV analyzed on 11/18/02 at 01:34 displayed %Ds greater than the control limit on the primary column for 4,4'-DDE at -20.8%, for 4,4'-DDD at 16.1%, for 4,4'-DDT at -41.2%, and for surrogate 2,4-DCAA at 16.4%; and on the confirmation column for 4,4'-DDT at -32.4% and for endrin aldehyde at -15.5%. Associated sample results for 4,4'-DDD, 4,4'-DDT, and methoxychlor with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since other compounds displaying anomalies either met criteria on the alternate column or were surrogates, no data qualifying action was taken. Analyte 4,4'-DDT in sample R5AU1S displayed a %RPD greater than control limit (i.e. <40%) at 59.2%. Since this result was previously flagged for calibration anomalies, no further data qualifying action was taken.

For the herbicides analyses, the CCV analyzed on 11/15/02 at 17:26 displayed a %D greater than the control limit (i.e. <15%) for 2,4-DB at -20.5% on the primary column. The CCV analyzed on 11/25/02 at 19:45 displayed a %D greater than the control limit for 2,4-DB at 16.4% on the primary column. Since the analyte met criteria on the alternate column, no data qualifying action was taken. Analyte 2,4-D displayed a %RPD greater than the control limit (i.e. <40%) at 64.7% and was flagged "J,g".

For the metals analyses, the initial and final CRDL displayed %Rs less than the lower control limit (i.e. 80%) for thallium at 72% and 72%. The initial and final CRDL also displayed %Rs greater than the upper control limit (i.e. 120%) for iron at 135%, for lead at 132%, and for arsenic at 123%. Since these anomalies were only slightly outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for barium at 0.12884 mg/kg, for chromium at 0.15486 mg/kg, for copper at 0.16651 mg/kg, for iron at 2.59891 mg/kg, for lead at 0.2132 mg/kg, for magnesium at 0.6805 mg/kg, and for potassium at 4.12669 mg/kg and negative detections for aluminum at -1.37365 mg/kg and for thallium at -0.63588 mg/kg. Associated thallium results were non-detect and were flagged "UJ,p". All other associated sample results were either non-detect or greater than 5x the amount found in the blank and no data qualifying action was taken. CCB5 displayed a positive detection for cadmium at 0.00038 mg/L and for copper at 0.0039 mg/L. Associated sample results with positive

detections less than 5x the amount found in the blank for cadmium and copper were flagged "U,o" at the reporting limit. Several other metals displayed either positive or negative detections. Since associated sample results were either non-detect or greater than 5x the amount found in the blank and no data qualifying action was taken. The equipment blank, R5BU4S, displayed positive detections for calcium at 0.27 mg/L, for iron at 0.033 mg/L, for magnesium at 0.068 mg/L, for potassium at 0.07 mg/L, and for sodium at 0.45 mg/L. Since associated sample results were greater than 5x the amount found in the blank, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit (i.e. 125%) for several compounds and a %RPD greater than the control limit for iron at 58.96%. Since the MS/MSD was spiked on a non-client sample, no data qualifying action was taken.

Correctable Anomalies: During a Level IV review of the data, it was determined that the MSD result in the pesticides analysis was incorrectly calculated. The summary form for the MS/MSD was corrected by the data reviewer. No other QC data was incorrectly calculated.

Comments: During a Level IV review of the SVOCs data, the data reviewer noticed that the ICAL analyzed on 11/15/02 displayed results for a 100 ppb standard, even though there was no raw data to confirm the reported result. This was also confirmed as there was no 100ppb standard (lab file EQ556) listed on the tune summary for that date. The laboratory was contacted and submitted the missing raw data.

Two trip blanks and one equipment blank associated with sediment samples were analyzed by the laboratory and results were reported in SDG# SIIB06. Any validation anomalies found which affected the results of the trip blanks and equipment blank were addressed in SDG# SIIB06. Only positive detections which may impact sediment data quality were discussed in this data validation report.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB08_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Hardness_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the trip blank shipped on 11/10/02 contained benzene at 0.22 µg/L. Positive benzene results in the associated samples were flagged "U, y" at the reporting limit. The rinse blank for aqueous samples, R3BD4W, contained chloromethane at 0.82 µg/L and toluene at 0.64 µg/L. Positive toluene results in the associated samples were flagged "U, x" at the reporting limit. No data qualifying action was taken for chloromethane since this compound was not detected in the associated samples. The rinse blank for sediment samples, R3BD4S, contained toluene at 0.60 µg/L. Since sediment samples were reported in different data packages, no data qualifying action was taken. The initial calibration, analyzed on 11/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for chloromethane at 0.9887, carbon tetrachloride at 0.9866, 1,1,1-trichloroethane at 0.9854, and bromodichloromethane at 0.9871. Positive results were flagged "J, r" and non-detects were flagged "UJ,r" in the associated samples. This initial calibration also displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 22.0%. All associated sample results were non-detects and no data qualifying action was required since the failure was not serious enough (i.e., > 50%) to affect the non-detect values. The continuing calibration verification (CCV) analyzed on 11/21/02 at 08:55 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at 40.7%, bromomethane at –20.6%, chloroethane at 38.8%, dibromochloromethane at 31.6%, bromoform at 34.6%, and xylene at 24.5%. The CCV analyzed on 11/22/02 at 10:38 displayed %Ds greater than the control limit for bromomethane at 117.1% (instrument sensitivity increased) and chloroethane at 27.1%. The continuing calibration verification (CCV) analyzed on 11/23/02 at 09:42 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at 30.5%, chloroethane at 33.2%, 1,1,1-trichloroethane at 21.1%, 1,2-dichloroethane at 20.9%, dibromochloromethane at 32.5%, bromoform at 34.0%, carbon tetrachloride at 23.2%, 1,1,2,2-tetrachloroethane at 21.6%, and xylene at 24.5%. Bromomethane results were flagged "UJ, c" in the associated samples. Since

other compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MSD recovery (200%) and relative percent difference (RPD, 78%) for bromomethane were greater than the acceptance limit in the R3BM1W MS/MSD pair. Since bromomethane was not detected in the associated samples, no data qualifying action was taken. The MS/MSD RPD for 1,2-dichloroethane (24%) was greater than the acceptance limit (i.e., 23%). Positive 1,2-dichloroethane results in the associated samples were flagged "J, m". The LCS recoveries for bromomethane (176% and 200%) were greater than the upper control limit in two LCSs (1P1121MB and 1P1123MB). Since bromomethane was not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the method blank, 1113E-MB, contained chrysene at 0.78 µg/L. Since this compound was not detected in the associated samples, no data qualifying action was taken. The initial calibration, analyzed on 12/7/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2,4-dinitrophenol at 0.9871 and dinoseb at 0.9891. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 12/2/02 at 07:30 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroisopropyl)ether at 26.3%, hexachlorocyclopentadiene at –20.7%, and 4-nitrophenol at 22.0%. The CCV analyzed on 12/11/02 at 12:41 displayed %Ds greater than the control limit for bis(2-chloroisopropyl)ether at 30.3%, di-n-butyl-phthalate at 22.9%, and bis(2-ethylhexyl)phthalate at 21.8%. Since the associated samples are QC samples, no data qualifying action was taken. 29 out of 64 RPDs were greater than the acceptance limit in one LCS/LCSD pair (1113E-MB). The RPD for hexachlorocyclopentadiene (76%) was greater than the acceptance limit (i.e., 67%) in another LCS/LCSD pair (1114D-MB). These compounds were not detected in the associated samples. Since all LCS/LCSD recoveries were in control, non-detect results for these compounds were judged not affected and no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 11/14/02 at 21:59 displayed a %D greater than the control limit (i.e., 15%) on the confirmation column for surrogate 2,4-DCAA at 25.8%. The CCVs analyzed on 11/15/02 at 07:05 and 10:30 displayed %Ds (ranging from 16.9% to 29.0%) greater than the control limit for surrogate 2,4-DCAA on both columns. The CCV analyzed on 11/15/02 at 23:03 displayed %Ds greater than the control limit for endrin at 17.7% on the primary column; and for 4,4'-DDD at 23.6% and 25.5%, endrin aldehyde at –18.8% and –17.2%, and surrogate 2,4-DCAA at 16.8% and 27.6% on both columns. 4,4'-DDD and endrin aldehyde results were flagged "UJ, c" in the associated samples. Endrin was not detected in the associated samples. Since these results either had an acceptable %D on the alternate column or were surrogates, therefore, no data qualifying action was taken. The decachloro-

biphenyl (DCBP) surrogate recoveries on the confirmation column (28%) in samples R4BU1W (28%) and R3BD1W (28%) were less than the lower control limit (i.e., 30-150%). No data qualifying action was taken since all other surrogate recoveries were in control. The DCBP surrogate recoveries in samples R3BD4W (28% and 26%) and R3BD4S (15% and 12%) were less than the lower control limit on both columns. All results in these two sample, except those previously flagged due to calibration failure, were flagged "UJ, s". The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for two beta-BHC results. These two results were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the CCV analyzed on 11/18/02 at 17:07 displayed %Ds greater than the control limit (i.e., 15%) for 2,4-DB at 20.5% and 20.1% on both columns. The CCV analyzed on 11/19/02 at 04:29 displayed %Ds greater than the control limit for 2,4-DB (i.e., –25.7% and 15.6%) on both columns. All 2,4-DB results in the associated samples were flagged "UJ, c". The LCS/LCSD recoveries for 2,4,5-TP (108% and 110%) were greater than the upper control limit (i.e., 100%) in the LCS/LCSD pair. Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for antimony (74%), iron (135%), thallium (72%), and zinc (121%); and the final CRDL recoveries for arsenic (123%), iron (69%), lead (132%), sodium (52% and 68%), and thallium (72%) were outside the control limit (i.e., 80-120%). Positive dissolved sodium results were flagged "J, w" and non-detects were flagged "UJ, w" in the associated samples. Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank for total metals analysis contained aluminum at –0.03256 mg/L, beryllium at –0.00022 mg/L, calcium at 0.01505 mg/L, copper at 0.00220 mg/L, iron at 0.02927 mg/L, and nickel at 0.00485 mg/L. Aluminum was also detected in three continuing calibration blanks (CCBs) at concentrations ranging from -0.01457 mg/L to -0.02775 mg/L. Since all positive aluminum results were greater than five times the absolute blank concentration, no data qualifying action was taken. Total aluminum results in samples R3BD4W and R3BD4S were reported as non-detects at the reporting limit (0.20 mg/L). Since the action level (five times the absolute blank concentration) was much less than the reporting limit, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Beryllium was also detected in CCB5 at –0.00028 mg/L. Total beryllium results were reported as non-detects at the reporting limit (0.0040 mg/L). Since the action level (five times the absolute blank concentration) was much less than the reporting limit, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Calcium was also detected in the initial calibration blank (ICB) at 0.00985 mg/L, CCB4 at 0.02797 mg/L, and CCB5 at 0.01914

mg/L. The total calcium result in sample R3BD4W was flagged "U, p" at the reporting limit. Copper was also detected in CCB4 at 0.00381 mg/L, CCB5 at 0.00608 mg/L, and CCB6 at 0.00461 mg/L. All total copper results in the associated samples were flagged "U, p" at the reporting limit. Iron was also detected in CCB5 at 0.02373 mg/L. Positive total iron results in samples R3BD4W and R3BD4S were flagged "U, p" at the reporting limit. Nickel was not detected in the associated samples. Therefore, no data qualifying action was taken. Barium was detected in CCB4 at 0.00224 mg/L, CCB5 at 0.00482 mg/L, and CCB6 at 0.00318 mg/L. The positive total barium result in sample R3BD4S was flagged "U, o" at the reporting limit. Magnesium was detected in CCB5 at 0.00645 mg/L. The positive total magnesium result in sample R3BD4S was flagged "U, o" at the reporting limit. Selenium and thallium were detected in ICB at –0.00495 mg/L and –0.00734 mg/L, respectively. Total selenium and total thallium were not detected in the associated samples and non-detected were flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Vanadium was detected in CCB4 at 0.00153 mg/L, CCB5 at 0.00475 mg/L, and CCB6 at 0.00297 mg/L. Positive total vanadium results were flagged "U, o" at the reporting limit in the associated samples. Cadmium, chromium, and manganese were also detected in several CCBs at low levels. Since these analyte results in the associated samples were either non-detects or greater than five times the blank concentration, no data qualifying action was taken. The preparation blank for dissolved metals analysis contained antimony -0.00575 mg/L, arsenic at –0.00428 mg/L, barium at 0.00048 mg/L, calcium at 0.02588 mg/L, copper 0.00321 mg/L, potassium at 0.16839 mg/L, sodium at 0.46932 mg/L, and zinc at 0.00733 mg/L. Antimony was also detected in CCB4 at –0.00546 mg/L and CCB5 at –0.00471 mg/L. Arsenic was also detected in CCB6 at –0.00391 mg/L. All dissolved antimony and dissolved arsenic results were flagged "UJ, p" in the associated samples. Barium was also detected in the ICB at 0.00043 mg/L, CCB4 at 0.00212 mg/L, CCB5 at 0.00256 mg/L, and CCB6 at 0.00188 mg/L. The dissolved barium and dissolved calcium results in sample R3BD4WF were flagged "U, p" at the reporting limit. Cupper was also detected in CCB4 at 0.00272 mg/L, CCB5 at 0.00406 mg/L, and CCB6 at 0.00291 mg/L. All positive dissolved copper results were flagged "U, p" at the reporting limit. Since dissolved potassium and dissolved sodium results were greater than five times the blank concentration in the associated samples, no data qualifying action was taken. Positive dissolved zinc results in the associated samples were flagged "U, p" at the reporting limit. Aluminum was detected in the ICB at 0.01778 mg/L and CCB4 at –0.00784 mg/L. Positive dissolved aluminum results in samples R4BD1WF, R4CM1WF, and R4AM1WF were flagged "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Positive dissolved aluminum results in samples R3BD1WF and R3AD1WF were flagged "U, o" at the reporting limit. Manganese was detected in CCB4 at 0.00189 mg/L, CCB5 at 0.00250 mg/L, and CCB6 at 0.00185 mg/L. The positive dissolved manganese result in sample

R4BM1WF was flagged "U, o" at the reporting limit. Vanadium was detected in CCB4 at 0.00261 mg/L, CCB5 at 0.00319 mg/L, and CCB6 at 0.00262 mg/L. All positive dissolved vanadium results in the associated samples were flagged "U, o" at the reporting limit. Cadmium, lead, magnesium, and thallium were detected in the ICB and/or several CCBs at low levels. Since these analyte results in the associated samples were either non-detects or greater than five times the blank concentration, no data qualifying action was taken. The MS/MSD recoveries for total potassium (139% and 149%) were greater than the upper control limit (i.e., 125%) in one non-client MS/MSD pair. Since the parent sample is not a client sample, this failure was not used to assess the associated sample results. The serial dilution displayed a %D for total aluminum (14.1%) greater than the acceptance limit (i.e., 10%). All aluminum results, except those previously flagged due to blank contamination, were flagged "J, s". The rinse blank, R3BD4W, contained total calcium at 0.034 mg/L, total copper at 0.0012 mg/L, total iron at 0.029 mg/L, and total zinc at 0.0054 mg/L. Since total calcium, total copper, and total iron results were previously flagged as non-detects in this sample due to blank contamination, these three results were not used to assess the associated samples. Positive total zinc result less than five times the blank concentration were flagged "U, x" at the reporting limit in the associated samples. The rinse blank, R3BD4W, contained dissolved barium at 0.00036 mg/L, dissolved calcium at 0.059 mg/L, dissolved copper at 0.0020 mg/L, and dissolved zinc at 0.0037 mg/L. Since these results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Trace barium, calcium, copper, iron, magnesium, potassium, and zinc were detected in one rinse blank R3BD4S (for sediment samples). Since associated sediment samples were not provided in this data package, no data qualifying action was taken.

Correctable Anomalies: 2,6-Dinitrotoluene was incorrectly identified and reported in sample R4CM1W. The laboratory was contacted and a revised Form I and raw data were received.

Comments: MS/MSD analyses were not performed on SVOC, pesticides, PCBs and herbicides fractions. Given that most of the LCS/LCSD results are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _SIIB09_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, TOC, pH, Particle Size_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____February 5, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOCs analyses, the initial calibration analyzed on 11/12/02 on instrument MSP5973 displayed r^2 values less than the control limit (i.e. $r^2 > 0.990$) for chloromethane at 0.989, for 1,1,1-trichloroethane at 0.985, for carbon tetrachloride at 0.987, and for bromodichloromethane at 0.987 and a %RSD greater than the control limit (i.e. <15%) for bromomethane at 22.0%. The CCV analyzed on 11/26/02 at 12:50 displayed %Ds greater than the control limit (i.e. <20%) for bromomethane at 83.7%, for chloroethane at 36.9%, for dibromochloromethane at 25.2%, and for bromoform at 26.4%. Since the only compound reported from this run was chlorobenzene, no data qualifying action was taken. The initial calibration analyzed on 11/15/02 displayed a linear range less than the control limit for chloromethane at 0.9886. Associated sample results were non-detect and were flagged "UJ,r". The CCV analyzed on 11/21/02 displayed %Ds greater than the control limit for acetone at -22.9% and for 2-butanone at -21.2%. Positive acetone results were flagged "J,c". Since all other associated sample results were non-detect and the anomalies were only slightly outside the control limit (i.e. <50%), no data qualifying action was taken. Equipment blank, R3BD4S, displayed a positive detection for toluene at 0.6 ug/L. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,x" at the reporting limit. The trip blank analyzed on 11/23/02 displayed a positive detection for benzene at 0.22 ug/L. Since associated sample results were non-detect, no data qualifying action was taken. Chlorobenzene in sample R3AD1S exceeded the calibration range and was flagged "J,q". The sample was re-analyzed at a dilution and the diluted result should be used for data interpretation. Sample R3AD1S displayed surrogate %Rs less than the lower control limit for toluene-d8 at 61% and for 4-bromofluorobenzene at 57%. Since this sample was analyzed at a dilution greater than 10x, no data qualifying action was taken.

For the SVOCs analyses, the CCV analyzed on 12/11/02 at 12:41 displayed %Ds greater than the control limit (i.e. <20%) for bis (2-chloroisopropyl) ether at 30.3%, for di-n-butyl phthalate at 22.9%, and for bis (2-ethylhexyl) phthalate at 21.8%.

Associated sample results with positive detections for bis (2-ethylhexyl) phthalate were flagged "J,c". Since other associated sample results were non-detect and the anomalies were only slightly outside the control limit (i.e. <50%), no data qualifying action was taken. Several analytes in the MS/MSD displayed %Rs less than the lower control limit or %RPDs greater than the control limit. Since the LCS met criteria for these compounds and the anomalies were only slightly outside the control limit, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 11/23/02 at 15:51 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for delta-BHC at -15.8%, for 4,4'-DDD at -16.8%, for methoxychlor at -16.2%, and for surrogate 2,4-DCAA at 15.7%; and on the confirmation column for methoxychlor at -19.2%, for 4,4'-DDT at -16.6%, and for surrogate 2,4-DCAA at 17.3%. Associated sample results for methoxychlor with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since other analytes either met criteria on the alternate column or were surrogates, no further data qualifying action was taken. The CCV analyzed on 11/24/02 at 03:54 displayed %Ds greater than the control limit on the primary column for heptachlor at -16.7%, for 4,4'-DDT at -39.3%, and for methoxychlor at -29.3%; and on the confirmation column for heptachlor at -21.0%, for 4,4'-DDT at -42.3%, for methoxychlor at -23.0%, and for 4,4'-DDD at 31.0%. Associated sample results for heptachlor, 4,4'-DDT, and methoxychlor were non-detect and were flagged "UJ,c". Since 4,4'-DDD met criteria on the alternate column, no data qualifying action was taken. Sample R4BU1S displayed surrogate %Rs less than the control limit on the primary column for 2,4-DCAA at 28% and for tetrachloro-meta-xylene (TCMX) at 25%. Since DCAA is used as a monitoring surrogate only and TCMX met criteria on the alternate column, no data qualifying action was taken. Sample R4BM1S displayed surrogate %Rs less than the lower control limit on both columns for DCAA at 24% and 24% and for TCMX at 24% and 22%. Associated analytes with positive detections were flagged "J,s"; non-detects were flagged "UJ,s"; unless previously flagged for calibration anomaly. Sample R3AM1S displayed surrogate %Rs less than the lower control limit on the primary column for TCMX at 27% and for decachlorobiphenyl at 26%. Since the surrogates met criteria on the alternate column, no data qualifying action was taken. Several samples displayed %RPDs between columns greater than the control limit (i.e. <40%) and were flagged "J,g"; unless previously flagged for calibration anomalies. Sample R4BD1S displayed an internal standard %R greater than the control limit (i.e. 150%) for bromonitrobenzene at 179.8%. The positive endrin aldehyde result was flagged "J,n".

For the herbicides analyses, the CCV analyzed on 11/21/02 at 17:26 displayed %Ds greater than the control limit (i.e. <15%) on both columns for 2,4-D at -37.3% and -31.3%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". The CCV analyzed on 11/22/02 at 04:15 displayed %Ds greater than the control limit on the confirmation column for MCPP at 24.7% and for MCPA at 17.3%. Since the analytes met criteria on the alternate column, no

data qualifying action was taken. Several samples displayed %RPDs between column greater than the control limit (i.e. <40%) and were flagged "J,g".
For the metals analyses, the initial and final CRDLs displayed %Rs less than the lower control limit (i.e. 80%) for antimony at 74%, iron at 69%, for sodium at 52%, and for thallium at 72% and a %R greater than the upper control limit (i.e. 120%) for zinc at 121%. Associated sodium results with positive detections were flagged "J,w"; unless previously flagged for blank contamination. Since the other anomalies were only slightly outside the control limit, no data qualifying action was taken. The prep blank displayed positive detections for barium at 0.04801 mg/kg, for copper at 0.25416 mg/kg, for sodium at 45.13151 mg/kg, and for potassium at 2.9081 mg/kg and negative detections for aluminum at -1.16198 mg/kg, for antimony at -0.51577 mg/kg, for arsenic at -0.34228 mg/kg, and for thallium at -0.96812 mg/kg. Associated thallium, antimony, and arsenic results with positive detections less than 5x the absolute amount found in the blank were flagged "J,p"; non-detects were flagged "UJ,p". Positive sodium and copper results less than 5x the amount found in the blank were flagged "U,p". CCB4 displayed a positive detection for cadmium at 0.00056 mg/L. Associated sample results with positive detections less than 5x the amount found in the blank for cadmium were flagged "U,o" at the reporting limit. Several other metals displayed either positive or negative detections. Since associated sample results were either non-detect or greater than 5x the amount found in the blank and no data qualifying action was taken. Equipment blank, R3BD4S, displayed positive detections for calcium at 0.16 mg/L, for potassium at 0.033 mg/L, and for zinc at 0.02 mg/L. Since associated sample results were greater than 5x the amount found in the blank, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit (i.e. 125%) for aluminum at 331% and 435%, for mercury at 226% and 386%, and in the MS for magnesium at 165% and for iron at 620%; and in the MSD for calcium at 3130%. The MS/MSD also displayed %Rs less than the lower control limit (i.e. 75%) for lead at 69% and 72%; and in the MS for calcium at -124%; and in the MSD for iron at 25% and for zinc at 12%. The MS/MSD pair displayed %RPDs greater than the control limit for calcium at 129.1% and for zinc at 55.8%. Associated zinc and lead results with positive detections were flagged "J,m"; non-detects were flagged "UJ,m". Since the amount found in the parent sample for aluminum, iron, and mercury were greater than 4x the amount of spike used, no data qualifying action was taken. Since magnesium met criteria in the MSD and in the LCS, no data qualifying action was taken. Positive calcium results were flagged "J,d."

Correctable Anomalies: The Form I for sample R4AD1S reported analytes which are not part of the project list. These analytes were crossed out by the data reviewer.

Comments: Three trip blanks and one equipment blank were analyzed by the laboratory in SDG# SIIB08. These samples were used for validation purposes in this SDG and any anomalies were discussed above. Any validation anomalies found which affected the results of the trip blanks and equipment blank were addressed in SDG# SIIB08.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB10_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Hardness_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The relative response factor (RRF) was observed to be less than criteria (i.e., 0.05) in one continuing calibration (11/24/00 20:00) for bromomethane at 0.04566. The bromomethane result in sample R2AU1W was flagged "R, c".

Minor Anomalies: For the VOC analyses, the trip blank shipped on 11/13/02 contained styrene at 0.25 µg/L. No data qualifying action was taken since this compound was not detected in the associated samples. The initial calibration, analyzed on 11/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for chloromethane at 0.9887, carbon tetrachloride at 0.9866, 1,1,1-trichloroethane at 0.9854, and bromodichloromethane at 0.9871. Positive results were flagged "J, r" and non-detects were flagged "UJ, r" in the associated samples. This initial calibration also displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 22.0%. All associated sample results were non-detects and no data qualifying action was required since the failure was not serious enough (i.e., > 50%) to affect the non-detect values. The continuing calibration verification (CCV) analyzed on 11/23/02 at 09:42 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at 30.5%, chloroethane at 33.2%, 1,1,1-trichloroethane at 21.1%, carbon tetrachloride at 23.3%, 1,2-dichloroethane at 20.9%, dibromochloromethane at 32.5%, bromoform at 34.0%, 1,1,2,2-tetrachloroethane at 21.6%, and xylene at 24.5%. Positive 1,2-dichloroethane and xylene results were flagged "J, c". Since other compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 11/24/02 at 20:00 displayed %Ds greater than the control limit for bromomethane at -36.1%, acetone at -26.2%, 2-butanone at -27.1%, 4-methyl-2-pentanone at -26.2%, and 2-hexanone at -29.7%. Since these compounds were not detected in the associated samples and the %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MSD recovery (200%) and relative percent difference (RPD, 101%) for bromomethane were greater than the acceptance limit in the R3CM1W MS/MSD pair. Since bromomethane was not detected in the associated samples, no data qualifying

action was taken. The LCS recovery for bromomethane (200%) was greater than the upper control limit in one LCS/LCSD pair (1P1123MB). The RPDs for bromomethane (68%), 1,2-dichloroethane (25%), and 1,1,2,2-tetrachloroethane (24%) were greater than the acceptance limit. Positive 1,2-dichloroethane results were previously flagged due to calibration failure, therefore, further data qualifying action was not required. Since all other compounds were not detected in the associated samples, no data qualifying action was taken. The LCS/LCSD recoveries for bromomethane (480% and 240%) were greater than the upper control limit in another LCS/LCSD pair (1P1124MB). The RPDs for bromomethane (67%) and 1,1,2,2-tetrachloroethane (25%) were greater than the acceptance limit. Since these two compounds were not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the initial calibration, analyzed on 12/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2-nitroaniline at 0.9885, 3-nitroaniline at 0.9884, and 2,4-dinitrophenol at 0.9876. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 12/11/02 at 12:41 displayed %Ds greater than the control limit (i.e., <20%) for bis(2-chloroisopropyl)ether at 30.3%, di-n-butylphthalate at 22.9%, and bis(2-ethylhexyl)phthalate at 21.8%. Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS recoveries for nitrobenzene (41%), dibenzofuran (45%), hexachlorobenzene (41%), and benzo(a)pyrene (42%) were less than the lower control limit in the R3CM1W MS/MSD pair. 57 out of 64 RPDs were greater than the acceptance limit. Sample R3CM1WMS displayed all internal standard %Rs greater than the upper control limit (i.e. 200%) for 1,4-dichlorobenzene-d4 (206.0%), naphthalene-d8 (212.7), acenaphthene-d10 (220.8%), phenanthrene-d10 (224.2%), chrysene-d12 (286.4%), and perylene-d12 (314.0%). The internal standard may have been double spiked by the laboratory. This sample was not re-extracted and re-analyzed by the laboratory. Since this sample is a QC sample, no data qualifying action was taken. However, the low MS recoveries and high RPDs may be affected by high internal standard peak area count (used for quantitation). Therefore, MS recovery and RPD failures were not used to assess the associated samples. Since LCS and MSD recoveries were in control, SVOC data quality should not be adversely affected.

For the pesticides analyses, the decachlorobiphenyl (DCBP) surrogate recovery on the confirmation column (28%) in sample R3CM1W was less than the lower control limit (i.e., 30-150%). No data qualifying action was taken since all other surrogate recoveries were in control. The DCBP surrogate recoveries on both columns (25% and 23%) in sample R2AM1W were less than the lower control limit. All results in this sample were non-detects and were flagged "UJ, s".

For the PCBs analyses, the extraction holding time criteria was exceeded by 6 or 7 days for all samples due to laboratory error. PCBs were not detected in the associated samples and non-detects were flagged "UJ, h".

For the herbicide analyses, the CCV analyzed on 11/20/02 at 03:35 displayed %Ds greater than the control limit (i.e., 15%) for 2,4-DB at -27.6% and -20.0% on both columns. All 2,4-DB results in the associated samples were flagged "UJ, c". The CCV analyzed on 11/21/02 at 17:26 displayed %Ds greater than the control limit for 2,4-DB at -37.3% and -31.3% on both columns. The CCV analyzed on 11/22/02 at 04:15 displayed %Ds greater than the control limit for MCPP at 24.7% and MCPA at 17.3% on the confirmation column. Since these compounds in the associated sample R3AU1WDL (for 2,4-D only) were not used for data interpretation, no data qualifying action was taken. The DCAA surrogate recoveries in samples R3BU1W (150%), R3AU1W (1000%), and R3AU1WDL (1950%) were greater than the upper control limit (i.e., 133%) on the confirmation column. All positive results in these samples were flagged "J, s". The MS/MSD recoveries for 2,4,5-TP (102% and 110%) were greater than the upper control limit (i.e., 100%) in the R3CM1W MS/MSD pair. The LCS recovery for 2,4,5-TP (115%) was greater than the upper control limit (i.e., 100%). Since this compound was not detected in the associated samples, no data qualifying action was taken. The 2,4-D result in sample R3CM1W exceeded the linear range of the calibration curve. Since this result was previously flagged due to surrogate recovery failure, no additional data flags were applied. This sample was diluted by a factor of 4 and reanalyzed by the laboratory. The 2,4-D result from the dilution analysis should be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for three positive results. Since these results were either flagged due to surrogate recovery failure or not used for data interpretation, no further data qualifying action was taken. It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for antimony (68%) and sodium (62%); and the final CRDL recovery for sodium (59%) were less than the lower control limit (i.e., 80-120%). Positive sodium results were flagged "J, w". Since the antimony recovery was only marginally outside the control limits, no data qualifying action was taken. The preparation blank for total metals analysis contained antimony at -0.00649 mg/L, calcium at 0.01016 mg/L, cobalt at 0.00101 mg/L, copper at 0.00171 mg/L, and thallium at 0.00373 mg/L. The preparation blank for dissolved metals analysis contained aluminum at -0.01654 mg/L, antimony -0.00452 mg/L, barium at 0.00042 mg/L, calcium at 0.04848 mg/L, copper 0.00152 mg/L, and zinc at 0.00356 mg/L. Aluminum was also detected in the initial calibration blank (ICB) at 0.01977 mg/L and four continuing

calibration blanks (CCBs) at concentrations ranging from -0.01217 mg/L to -0.02172 mg/L. Since all positive aluminum results were greater than five times the absolute blank concentration, no data qualifying action was taken. Some aluminum results were reported as non-detects at the reporting limit (0.20 mg/L). Since the action level (five times the absolute blank concentration) was much less than the reporting limit, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Antimony was also detected in the ICB at -0.00478 mg/L, CCB6 at -0.00621 mg/L, and -0.00566 mg/L. Antimony was not detected in the associated samples and non-detects were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Cobalt was also detected in CCB7 at 0.00096 mg/L. Positive total cobalt results in the associated samples were flagged "U, p" at the reporting limit. Copper was also detected in five CCBs at concentrations ranging from 0.00151 mg/L to 0.00319 mg/L. All positive copper results were flagged "U, p" at the reporting limit. Thallium was also detected in the ICB at 0.00600 mg/L and five CCBs at concentrations ranging from 0.00415 mg/L to 0.00829 mg/L. Positive total thallium results were flagged "U, p" at the reporting limit and positive dissolved thallium results were flagged "U, o" at the reporting limit. Zinc was also detected in CCB5 at 0.00627 mg/L. Positive dissolved zinc results less than five times blank concentration were flagged "U, p" at the reporting limit and positive total zinc results in the associated samples were flagged "U, o" at the reporting limit. Arsenic was detected in CCB5 at 0.00315 mg/L and CCB7 at 0.00301 mg/L. Vanadium was detected in four CCBs at concentrations ranging from 0.00141 mg/L to 0.00244 mg/L. Positive arsenic and vanadium results less than five times the blank concentration were flagged "U, o" at the reporting limit in the associated samples. Manganese was detected in five CCBs at concentrations ranging from 0.00094 mg/L to 0.00256 mg/L. Positive dissolved manganese result in sample R3AU1WF and R2CM1WF were flagged "U, o" at the reporting limit. Barium, cadmium, calcium, and magnesium were also detected in several CCBs at low levels. Since these analyte results in the associated samples were either non-detects or greater than five times the blank concentration, no data qualifying action was taken. The MSD recovery for dissolved sodium (126%) was greater than the upper control limit (i.e., 125%) in the R3CM1WF MS/MSD pair. Since all sodium results were previously flagged due to CRDL recovery failure, no additional data flags were applied. The post-digestion spike recovery for mercury was in control.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _SIIB11_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, TOC, pH, Particle Size_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____February 12, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: For the SVOCs analyses, samples R2AD1S, R2BD1S, R2BM1S, and R2AM2S were re-extracted outside the recommended holding time (i.e. 14 days) by 19 days. The samples were re-extracted due to low surrogate recoveries in the original sample results. Re-extracted sample results with positive detections were flagged "J,h"; non-detects were flagged "R,h". It is recommended that the original results be used for data interpretation. Sample R2BM1S displayed internal standard recoveries less than the lower control limit (i.e. 50%) for 1,4-dichlorobenzene-d4 at 2.16%, for naphthalene-d8 at 1.64%, for acenaphthene-d10 at 0.65%, for phenanthrene-d10 at 0.4%, for chrysene-d12 at 1.67%, and for perylene-d12 at 2.67%. Associated sample results were non-detect and were flagged "R,n". The original sample R2BM1S displayed surrogate recoveries outside the control limit for 2-fluorophenol at 279%, for phenol-d5 at 907%, for 2-fluorobiphenol at 0%, for 2,4,6-tribromophenol at 0%, and for terphenyl-d14 at 0%. Since this sample was previously flagged for internal standard failures, no further data qualifying action was taken. The original sample R2AD1S displayed %Rs less than the lower control limit for surrogate nitrobenzene-d5 at 8%, for 2-fluorobiphenol at 10%, for 2,4,6-tribromophenol at 20%, and for terphenyl-d14 at 18%. Associated sample results for base/neutral fractions were non-detect and were flagged "R,s". Since only one acid surrogate was out, no data qualifying action was taken on the acid fraction.

For the pesticides analyses, the 4,4'-DDT/endrin breakdown analyzed on 11/27/02 at 11:47 displayed percentages greater than the control limit (i.e. <20%) on both columns for 4,4'-DDD breakdown at 20.5% and 27.6%, respectively and 4,4'-DDD and 4,4'-DDE combined breakdown at 20.5% and 27.6%, respectively. Associated sample result with a positive detection for 4,4'-DDT in sample R3AU1S was flagged "J,b". In sample R2AM2S, since the 4,4'-DDT result was non-detect and the 4,4'-DDE result was positive, the 4,4'-DDE result was flagged "R,b".

For the herbicides analyses, the LCS analyzed on 12/2/02 displayed a %R less than the lower control limit for dalapon at 7%. Since associated sample results were non-detect, associated sample results were flagged "R,l".

Minor Anomalies: For the VOCs analyses, the initial calibration analyzed on 11/15/02 on instrument MSL5972 displayed a linear range less than the control limit (i.e. $r^2 > 0.990$) for chloromethane at 0.9886. Associated sample results were non-detect and were flagged "UJ,r". The initial calibration analyzed on 11/12/02 on instrument MSP5973 displayed linear ranges less than the control limit for chloromethane at 0.989, for 1,1,1-trichloroethane at 0.985, for carbon tetrachloride at 0.987, and for bromodichloromethane at 0.987 and a %RSD greater than the control limit (i.e. <15%) for bromomethane at 22.0%. Since the only compound of interest was chlorobenzene, no data qualifying action was taken. The initial calibration analyzed on 12/3/02 on instrument MSL5972 displayed a linear range less than the control limit for bromomethane at 0.987. Since only QC samples were associated with this anomaly, no data qualifying action was taken. The CCV analyzed on 11/21/02 displayed %Ds greater than the control limit for acetone at -22.9% and for 2-butanone at -21.2%. Positive acetone results were flagged "J,c". The CCV analyzed on 11/26/02 at 12:50 displayed %Ds greater than the control limit (i.e. <20%) for bromomethane at 83.7%, for chloroethane at 36.9%, for dibromochloromethane at 25.2%, and for bromoform at 26.4%. Since the only compound reported was chlorobenzene, no data qualifying action was taken. The CCV analyzed on 12/6/02 at 15:07 displayed %Ds greater than the control limit for acetone at -67.0% and for methylene chloride at -29.2%. Since only QC samples were associated with these anomalies, no data qualifying action was taken. The MS/MSD pair displayed a %R less than the lower control limit for acetone in the MSD at 33% and displayed a %RPD greater than the control limit at 59%. Since associated samples were previously flagged for calibration anomalies and the LCS for acetone met criteria, no further data qualifying action was taken. The LCS analyzed on 12/6/02 displayed a %R less than the lower control limit for acetone in the LCSD at 23% and a %RPD greater than the control limit at 95%. Since only QC samples were associated with these anomalies, no data qualifying action was taken. Chlorobenzene in samples R3BU1S and R3AU1S exceeded the calibration range and were flagged "J,q". These samples were re-analyzed at dilutions and the chlorobenzene results were within calibration range. It is the recommendation of the data reviewer that the diluted chlorobenzene results be used for data interpretation.

For the SVOCs analyses, the initial calibration analyzed on 12/12/02 displayed linear range factor less than the control limit (i.e. 0.990) for 2-nitroaniline at 0.9885, for 3-nitroaniline at 0.9884, and for 2,4-dinitrophenol at 0.988. Since associated sample results were previously flagged for holding time violations, no further data qualifying action was taken. The initial calibration analyzed on

12/16/02 displayed a linear range factor less than the control limit for dinoseb at 0.986. Associated sample results were non-detect and were flagged "UJ,r", except for R2AD1S, which was flagged for low surrogate recovery. The CCV analyzed on 12/13/02 at 16:03 displayed a %D greater than the control limit (i.e. <20%) for dinoseb at 30.9%. Since associated results were previously flagged for linear range factor failures, no further data qualifying action was taken. The CCV analyzed on 12/14/02 at 07:18 displayed %Ds greater than the control limit for 2,4-dinitrophenol at 28.5%, for 4,6-dinitro-2-methylphenol at 24.9%, and for dinoseb at 35.8%. Since associated non-detect sample results were either only slightly greater than the control limit (i.e. <50%) or previously flagged for linear range factor anomalies, no further data qualifying action was taken. The CCV analyzed on 12/17/02 at 10:06 displayed %Ds greater than the control limit for indeno(1,2,3-cd)pyrene at 28.1% and for benzo(g,h,i)perylene at 20.8%. Associated positive results were flagged "J,c". Sample R2AM2S displayed surrogate recoveries less than the lower control limit for nitrobenzene-d5 at 17%, for 2-fluorobiphenyl at 27%, and for terphenyl-d14 at 25%. Sample R2BD1S displayed surrogate recoveries less than the lower control limit for 2-fluorobiphebnyl at 25% and for terphenyl-d14 at 27%. Associated base/neutral results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". The MS/MSD pair displayed a %Rs less than the lower control limit in the MS for butylbenzylphthalate at 54% and for chrysene at 54%. Since these compounds met criteria in the MS and the LCS, no data qualifying action was taken.

For the pesticides analyses, the confirmation column displayed a combined 4,4'-DDT/endrin breakdown percentage greater than the control limit (i.e. <30%) at 32.7%. Since the combined breakdown percentage on the primary column met criteria and endrin results were non-detect, no data qualifying action was taken. The CCV analyzed on 11/27/02 at 12:09 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for 4,4'-DDT at -49.8%, for methoxychlor at -35.8%, for endrin ketone at -16.7%, for 2,4-DCAA at 15.6%, and for DCBP at -19.4%; and on the confirmation column for 4,4'-DDT at -49.3%, for methoxychlor at -50.4%, for endrin aldehyde at -18.6%, for 2,4-DCAA at 17.7%, and for DCBP at -23.7%. Associated sample results for 4,4'-DDT and methoxychlor with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since endrin ketone and endrin aldehyde results were non-detect and had acceptable %Ds on the alternate column, no data qualifying action was taken. Since 2,4-DCAA and DCBP are surrogates, no data qualifying action was taken. The CCV analyzed on 11/27/02 at 05:14 displayed %Ds greater than the control limit on both columns for surrogates 2,4-DCAA at 18.6% and 16% and for decachlorobiphenyl (DCBP) at -17.0% and -22.1%. The CCV analyzed on 11/28/02 at 06:02 displayed a %D greater than the control limit on the confirmation column for 2,4-DCAA at 17.8%. The CCV analyzed on 11/28/02 at 13:43 displayed %Ds greater than the control limit on both columns for surrogate

2,4-DCAA at 17.5% and 17.6%, respectively. Since 2,4-DCAA and DCBP are surrogates (QC compounds), no data qualifying action was taken. Sample R2AU1S displayed surrogate %Rs less than the control limit on both columns for tetrachloro-meta-xylene (TCMX) at 23% and 26%, respectively. Associated sample results non-detect and were flagged "UJ,s". Sample R2BM1S displayed surrogate %Rs less than the lower control limit on both columns for for TCMX at 12% and 13%. Associated analytes with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Sample R2AM1S displayed surrogate %Rs less than the lower control limit on the primary column for TCMX at 27% and on both columns for decachlorobiphenyl at 26% and 25%, respectively. Associated sample results were non-detect and were flagged "UJ,c", unless previously flagged for calibration anomalies. Several samples displayed %RPDs between columns greater than the control limit (i.e. <40%) and were flagged "J,g", unless previously flagged for calibration anomalies. Samples R3BU1S, R3AU1S, R2AM1S, and R2AM2S were re-analyzed at 10x dilutions due to the possibility of matrix effect causing false positives. It is the recommendation that the original results be used for data interpretation.

For the PCBs analyses, internal standard (IS) phenanthrene-d10 displayed %Rs less than the lower control limit (i.e. 70%) in the MS and MSD at 61.9% and 63.6%, respectively. Since the MS/MSD are QC samples and phenanthrene-d10 was not used for quantitation (reference only), no data qualifying action was taken. IS chrysene-d12 displayed a %R greater than the upper control limit (i.e. 130%) for sample R2AU1S at 151.8%. Since associated sample results are non-detect, no data qualifying action is taken.

For the herbicides analyses, the CCV analyzed on 12/2/02 at 10:47 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for 2,4-D at 17.2% and on the confirmation column for 2,4-D at 15.9% and for 2,4-DB at 28.6%. The CCV analyzed on 12/2/02 at 19:49 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at 19.9%. Associated sample results for 2,4-D were non-detect and were flagged "UJ,c". Since associated sample results for 2,4-DB were non-detect and had acceptable %Ds on the alternate column, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit for MCPP at 139% and 133%. Since associated sample results were non-detect, no data qualifying action was taken. Several samples displayed %RPDs between column greater than the control limit (i.e. <40%) and were flagged "J,g".

For the metals analyses, the initial and final CRDLs displayed %Rs less than the lower control limit (i.e. 80%) for lead at 68% and 54% and for arsenic at 74%and %Rs greater than the upper control limit (i.e. 120%) for selenium at 121%. Associated lead results with positive detections were flagged "J,w". Since the other anomalies were only slightly outside the control limit, no data qualifying

action was taken. The prep blank displayed positive detections for antimony at 0.4808 mg/kg, barium at 0.09996 mg/kg, beryllium at 0.06023 mg/kg, chromium at 0.11534 mg/kg, lead at 0.37757 mg/kg, magnesium at 0.68826 mg/kg, for potassium at 2.2078 mg/kg and negative detections for cadmium at -0.11311 mg/kg and for silver at -0.10028 mg/kg. Associated antimony and beryllium results with positive detections less than 5x the amount found in the blank were flagged "U,p" at the detection limit. Associated non-detect cadmium and silver results were flagged "UJ,p". CCB3 and CCB4 displayed positive detections for beryllium at 0.470 mg/L and 0.765 mg/L. Associated sample results less than 5x the amount found in the blank were flagged "U,o" at the reporting limit; unless previously flagged for prep blank contamination. Several other metals displayed either positive or negative detections. Since associated sample results were either non-detect or greater than 5x the amount found in the blank and no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit (i.e. 125%) for aluminum at 158% and 283% and for calcium at 160% and 163%. The MS/MSD pair displayed a %RPD greater than the control limit for aluminum at 22.11%. Associated aluminum and calcium results with positive detections were flagged "J,m".

Correctable Anomalies: None.

Comments: Two trip blanks were analyzed by the laboratory for VOCs in SDG# SIIB10. Any validation anomalies found which affected the results of the trip blanks were addressed in SDG# SIIB10. Only positive detections that may impact data quality were discussed in this data validation report.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB12_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Hardness_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: The relative response factor (RRF) was observed to be less than criteria (i.e., 0.05) in one continuing calibration (11/24/00 20:00) for bromomethane at 0.04566. The bromomethane result in sample R1AD4W was flagged "R, c".

Minor Anomalies: For the VOC analyses, the first trip blank shipped on 11/16/02 contained toluene at 0.51 µg/L, ethylbenzene at 0.65 µg/L, and xylene at 0.80 µg/L. The second trip blank shipped on 11/16/02 contained toluene at 0.41 µg/L, ethylbenzene at 0.31 µg/L, and styrene at 0.30 µg/L. Positive toluene and xylene results in the associated samples were flagged "U, y" at the reporting limit. Since ethylbenzene and styrene were not detected in the associated blanks, no data qualifying action was taken. The rinse blank for aqueous samples, R1AD4W, contained acetone at 11 µg/L, toluene at 0.91 µg/L, and xylene at 0.22 µg/L. The rinse blank for aqueous samples, R1CM4W, contained toluene at 0.91 µg/L. No data qualifying action was taken for acetone since this compound was not detected in the associated samples. Since toluene and xylene results in these two rinse blanks were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. The rinse blank for sediment samples, R1AD4S, contained toluene at 0.62 µg/L. Since this toluene result was previously flagged as non-detects due to blank contamination, this result was not used to assess the associated samples. The initial calibration, analyzed on 11/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for chloromethane at 0.9887, carbon tetrachloride at 0.9866, 1,1,1-trichloroethane at 0.9854, and bromodichloromethane at 0.9871. Positive results were flagged "J, r" and non-detects were flagged "UJ, r" in the associated samples. This initial calibration also displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 22.0%. All associated sample results were non-detects and no data qualifying action was required since the failure was not serious enough (i.e., > 50%) to affect the non-detect values. The continuing calibration verification (CCV) analyzed on 11/23/02 at 09:42 displayed %Ds greater than the control limit (i.e. 20%) for chloromethane at 30.5%, chloroethane at 33.2%, 1,1,1-trichloroethane at 21.1%, carbon tetrachloride at 23.2%, 1,2-dichloroethane at

20.9%, dibromochloromethane at 32.5%, bromoform at 34.0%, 1,1,2,2-tetrachloroethane at 21.6%, and xylene at 24.5%. The CCV analyzed on 11/24/02 at 20:00 displayed %Ds greater than the control limit for bromomethane at -36.1%, acetone at -26.2%, 2-butanone at -27.1%, 4-methyl-2-pentanone at -26.2%, and 2-hexanone at -29.7%. Since positive chloromethane results were previously flagged due to initial calibration failure, no further data qualifying action was taken. Since other compounds were not detected in the associated samples and the %D failure was not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The CCV analyzed on 11/25/02 at 09:22 displayed a %D greater than the control limit for bromomethane at 128.1% (instrument sensitivity increased). Bromomethane results in two trip blanks were flagged "UJ, c". The MSD recovery (154%) and relative percent difference (RPD, 90%) for bromomethane were greater than the acceptance limit in the R1CM4S (a rinse blank) MS/MSD pair. The MS/MSD RPD for 1,2-dichloroethane (24%) was greater than the acceptance limit (i.e., 23%). Since bromomethane and 1,2-dichloroethane were not detected in the associated samples, no data qualifying action was taken. The LCS recoveries for bromomethane (200%, 240%, and 240%) were greater than the upper control limit in three LCS (1P1123MB, 1P1124MB, and 1P1125MB). Since bromomethane was not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the rinse blanks for sediment samples, R1AD4S and R1CM4S, contained bis(2-ethylhexyl)phthalate at 8.4 µg/L and 5.0 µg/L, respectively. Since associated sediment samples were not provided in this data package, no data qualifying action was taken. The initial calibration, analyzed on 12/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2-nitroaniline at 0.9885, 3-nitroaniline at 0.9884, and 2,4-dinitrophenol at 0.9876. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The RPDs for bis(2-ethylhexyl)phthalate (28%), benzo(b)fluoranthene (36%), and benzo(a)pyrene (27%) were greater than the acceptance limit in the LCS/LCSD pair (1121A-MB). Positive bis(2-ethylhexyl)-phthalate results in the associated samples were flagged "J, d". Since benzo(b)-fluoranthene and benzo(a)pyrene were not detected in the associated samples and LCS/LCSD recoveries were in control, no data qualifying action was taken.

For the pesticide analyses, the rinse blank for sediment samples, R1CM4S, contained gamma-chlordane at 80.0058 µg/L. Since associated sediment samples were not provided in this data package, no data qualifying action was taken. The decachlorobiphenyl (DCBP) surrogate recoveries in sample R1AD4S (21% and 18%) were less than the lower control limit (i.e., 30%) on both columns. All results in this sample were flagged "UJ, s". The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for endrin ketone in sample R1AU1W and gamma-chlordane in sample R1CM4S. These two results were flagged "J, g". It should be noted that the lower result

between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the CCV analyzed on 11/25/02 at 19:45 displayed a %D greater than the control limit (i.e., 15%) for 2,4-DB at 16.4% on the primary column. The CCV analyzed on 11/26/02 at 08:28 displayed %Ds greater than the control limit for 2,4-D at 21.0% and 2,4-DB at 24.8% on the primary column. 2,4-D and 2,4-DB were not detected in the associated samples. No data flags were applied to 2,4-D and 2,4-DB results since the %Ds were acceptable on the alternate column. The LCS recovery for 2,4,5-TP (118%) was greater than the upper control limit (i.e., 100%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for iron (78%) and thallium (76%); and the final CRDL recoveries for arsenic (134%), lead (122%), and sodium (134%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank for total metals analysis contained arsenic at 0.00303 mg/L, calcium at 0.0133 mg/L, copper at 0.00183 mg/L, sodium at 0.37139 mg/L, and thallium at -0.00660 mg/L. Calcium, copper, and sodium were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Positive total arsenic, calcium, copper, sodium results less than five times the blank concentration were flagged "U, p" at the reporting limit in the associated samples. Thallium was also detected in the ICB at -0.00493 mg/L. The positive total thallium result in sample R1CM1W was flagged "J, p" and all other non-detects were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Aluninum, barium, magnesium, manganese, selenium, and vanadium were detected in the ICB and/or CCBs at low levels. Positive total aluminum, barium, magnesium, manganese, selenium, and vanadium results less than five times the blank concentrations were flagged "U, o" at the reporting limit in the associated samples. The preparation blank for dissolved metals analysis contained aluminum -0.01907 mg/L, arsenic at 0.00392 mg/L, barium at -0.00034 mg/L, beryllium at -0.00020 mg/L, calcium at 0.01482 mg/L, magnesium -0.00643 mg/L, sodium at 0.31574 mg/L, and thallium at -0.00530 mg/L. Aluminum was also detected in ICB at 0.01903 mg/L and four CCBs at concentrations ranging from -0.01713 mg/L to -0.02872 mg/L. All dissolved aluminum and beryllium results were reported as non-detects at the reporting limits 0.20 mg/L and 0.0040 mg/L, respectively, in the associated samples. Since the action levels for aluminum and beryllium (five times the absolute blank concentration) were much less than the reporting limits, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Arsenic was also detected in the ICB at 0.00501 mg/L, CCB4 at 0.00324 mg/L, and CCB5 at 0.00427 mg/L. Positive dissolved arsenic results less than five times the blank

concentration were flagged "U, p" at the reporting limit in the associated samples. Barium was also detected in the ICB at -0.00046 mg/L, CCB3 at 0.00040 mg/L, CCB5 0.00064 mg/L, and CCB6 at 0.00040 mg/L. Magnesium was also detected in CCB3 at -0.00645 mg/L, CCB4 at -0.00644 mg/L, and CCB5 at -0.00958 mg/L. Barium and magnesium were reported as non-detects at the reporting limits, 0.010 mg/L and 0.50 mg/L, respectively, in samples R1AD4WF and R1CM4WF. Since the action levels for barium and magnesium (five times the absolute blank concentration) were much less than the reporting limits, non-detects were judged not affected by the reviewer and no data qualifying action was taken. All other positive dissolved barium and magnesium results were greater than five times the blank concentration, therefore, no data qualifying action was taken. Positive dissolved calcium results were flagged as "U, p" at the reporting limit in samples R1AD4WF and R1CM4WF. Since all positive dissolved sodium results were greater than five times the blank concentration, no data qualifying action was taken. All dissolved thallium results were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Antimony was detected in the ICB at -0.00553 mg/L. All dissolved antimony results were flagged "UJ, o". Copper was detected in the ICB at -0.00128 mg/L, and four CCBs at concentrations ranging from 0.00127 mg/L to 0.00184 mg/L. All positive dissolved copper results were flagged "U, o" at the reporting limit. Selenium was detected in CCB3 at 0.00575 mg/L. Since selenium was not detected in the associated samples, no data qualifying action was taken. The MS/MSD recoveries for total potassium (130% and 139%) were greater than the upper control limit (i.e., 125%) in one non-client MS/MSD pair. Since the parent sample is not a client sample, this failure was not used to assess the associated sample results. The rinse blank, R1AD4W, contained total barium at 0.00034 mg/L, total calcium at 0.031 mg/L, total copper at 0.0016 mg/L, total sodium at 0.36 mg/L, and total zinc at 0.0074 mg/L. Since total barium, total calcium, total copper, and total sodium results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Positive total zinc results less than five times the blank concentration in the associated samples were flagged "U, x" at the reporting limit. The rinse blank, R1AD4WF, contained dissolved calcium at 0.020 mg/L and dissolved copper at 0.00094 mg/L. Since these results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. The rinse blank, R1CM4W, contained total aluminum at 0.0091 mg/L, total calcium at 0.030 mg/L, total copper at 0.0016 mg/L, total iron at 0.022 mg/L, and total zinc at 0.0086 mg/L. Since total aluminum, total calcium, and total copper results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Positive total zinc results less than five times the blank concentration in the associated samples were flagged "U, x" at the reporting limit. Since positive total iron results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The rinse

blank, R1CM4WF, contained dissolved calcium at 0.028 mg/L, dissolved copper at 0.0012 mg/L, and dissolved zinc at 0.0058 mg/L. Since dissolved calcium and dissolved copper results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Since dissolved zinc was not detected in the associated samples, no data qualifying action was taken. Trace amounts of aluminum, arsenic, barium, calcium, copper, iron, magnesium, manganese, potassium, sodium, and zinc were detected in the rinse blank R1AD4S (for sediment samples). Since associated sediment samples were not provided in this data package, no data qualifying action was taken.

For the hardness analyses, the rinse blank, R1CM4W, contained hardness at 200 mg/L. Positive hardness results in the associated samples were flagged "U, x".

Correctable Anomalies: None.

Comments: MS/MSD analyses were not performed on SVOC and pesticides fractions. Given that most of the LCS/LCSD results are acceptable, and no major matrix interference was observed in the chromatograph associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. Excepting the rejected data points, all data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _SIIB13_____ **Fraction:_VOCs, SVOCs, Pest., PCBs, Herb.,__ Metals, Wet Chemistry_____**

Lab: _Severn Trent-Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____February 14, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP and the National Functional Guidelines for Organic and Inorganic Data Review (February 1994) and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the 4,4'-DDT breakdown analyzed on 11/28/02 at 18:29 displayed a percentage greater than the control limit (i.e. <20%) on both columns for 4,4'-DDD at 71.6% and 70.7% and for combined 4,4'-DDD/4,4'-DDE at 71.6% and 72.1%. The combined 4,4'-DDT/endrin breakdown displayed a percentage greater than the control limit (i.e. <30%) on both columns at 78.3% and 80.8%. The positive 4,4'-DDE result in sample R1AD1S and the positive endrin ketone results on samples R5AN1S and R5BN1S were flagged "R,b". The positive 4,4'-DDT result in sample P12S was flagged "J,b". The CCV analyzed on 11/28/02 displayed %Ds greater than the control limit (i.e. <15%) on both columns for 4,4'-DDT at -81.5% and -81.2%, respectively. Associated sample results were non-detect and were flagged "R,c"; unless previously flagged for breakdown anomalies.

For the herbicides analyses, the LCS analyzed displayed very low recoveries for all analytes due to the extraction vessel having a leak during the concentration part of the extraction. The laboratory did not attempt to re-extract an LCS. Associated sample results with positive detections were flagged "J,l"; non-detects were flagged "R,l". The data completeness failed the completeness criteria of 90% at 10% due to samples being flagged for LCS anomalies.

Minor Anomalies: For the VOCs analyses, the initial calibration analyzed on 11/15/02 on instrument MSL5972 displayed a linear range less than the control limit (i.e. $r^2 > 0.990$) for chloromethane at 0.9886. Associated sample results were non-detect and were flagged "UJ,r". The initial calibration analyzed on 11/12/02 on instrument MSP5973 displayed linear ranges less than the control limit for chloromethane at 0.989, for 1,1,1-trichloroethane at 0.985, for carbon tetrachloride at 0.987, and for bromodichloromethane at 0.987 and a %RSD greater than the control limit (i.e. <15%) for bromomethane at 22.0%. Since the only compound of interest was acetone, no data qualifying action was taken. The initial calibration analyzed on 12/3/02 on instrument MSL5972 displayed a linear range less than the control limit for bromomethane at 0.987. Since only QC samples were associated with

this anomaly, no data qualifying action was taken. The CCV analyzed on 11/25/02 at 09:51 displayed %Ds greater than the control limit for acetone at -39.1% and for bromomethane at 63.4%. Positive acetone results were flagged "J,c". Non-detect bromomethane results were flagged "UJ,c". The CCV analyzed on 11/26/02 at 12:50 displayed %Ds greater than the control limit (i.e. <20%) for bromomethane at 83.7%, for chloroethane at 36.9%, for dibromochloromethane at 25.2%, and for bromoform at 26.4%. Since the only compound reported was acetone, no data qualifying action was taken. The CCV analyzed on 12/6/02 at 15:07 displayed %Ds greater than the control limit for acetone at -67.0% and for methylene chloride at -29.2%. Since only QC samples were associated with these anomalies, no data qualifying action was taken. The trip blanks received on 11/18/02 displayed positive detections for toluene at 0.51 ug/L and 0.41 ug/L, for ethylbenzene at 0.65 ug/L and 0.31 ug/L, for styrene at 0.30 ug/L, and for total xylenes at 0.80 ug/L. Samples received on 11/18/02 with positive detections less than 5x the amount found in the blank were flagged "U,y" at either at the reporting limit or if the result was greater than the reporting limit, at the result. The equipment blank P14S displayed a positive detection for acetone at 15 ug/L. The positive acetone result in P12S was flagged "U,x" at the reporting limit. Trip blanks received on 11/19/02 displayed positive detections for chloromethane at 0.88 ug/L, for methylene chloride at 1.1 ug/L, for toluene at 0.3 ug/L and 0.36 ug/L, for benzene at 0.18 ug/L, and for styrene at 0.44 ug/L. Since associated samples received on the same day were non-detect, no data qualifying action was taken. The MS/MSD was analyzed on 12/7/02, which exceeded the holding time (i.e. 14 days) by 6 days. Since the LCS met criteria, no data qualifying action was taken. The MS/MSD pair displayed %Rs greater than the upper control limit for bromomethane and acetone in the MS at 238% and -3602%, respectively and a %R greater than the upper control limit for acetone in the MSD at 1111%. The MS/MSD pair displayed a %RPD greater than the control limit for acetone at 195%. Since the amount of acetone found in the parent sample was greater than 4x the amount of spiking solution used, no data qualifying action was taken. Since bromomethane met criteria in the MSD and in the LCS, no data qualifying action was taken. Non-detect acetone results were flagged "UJ,d". Since positive detections were previously flagged for calibration anomalies, no further data qualifying action was taken. Sample P11S displayed surrogate %Rs less than the lower control limit for dibromofluoromethane at 36%, for toluene-d8 at 28%, and for 4-bromofluorobenzene at 35%. Since this sample was analyzed at a dilution greater than 10x, no data qualifying action was taken. The LCS/LCSD pair analyzed on 11/25/02 displayed a %RPD for bromomethane at 145%. Since bromomethane was previously flagged for calibration anomalies, no data qualifying action was taken. The LCS analyzed on 12/6/02 displayed a %R less than the lower control limit for acetone in the LCSD at 23% and a %RPD greater than the control limit at 95%. Since only QC samples were associated with these anomalies, no data qualifying action was taken. Internal standard (IS) chlorobenzene-d5 displayed a %R less than the lower control limit (i.e. <50%) in

sample P11S at 46.1%. Analytes associated with the IS with positive detections were flagged "J,n"; non-detects were flagged "UJ,n". The MS/MSD pair displayed %Rs less than the lower control limit for all three ISs. Since the MS/MSD pair are QC samples, no data qualifying action was taken. Acetone in samples R5AN1S and P11S exceeded the calibration range and were flagged "J,q". Sample P11S was re-analyzed at a dilution and the acetone result was non-detect. Since acetone has poor solubility in methanol, it is the recommendation of the data reviewer that the original result for acetone be used for data interpretation. Sample R5AN1S was not re-analyzed at a dilution.

For the SVOCs analyses, the initial calibration analyzed on 12/12/02 displayed linear range factor less than the control limit (i.e. 0.990) for 2-nitroaniline at 0.9885, for 3-nitroaniline at 0.9884, and for 2,4-dinitrophenol at 0.988. Associated sample results were non-detect and were flagged "UJ,r". The initial calibration analyzed on 12/16/02 displayed a linear range factor less than the control limit for dinoseb at 0.986. Since only QC samples were associated with this CCV, no data qualifying action was taken. The CCV analyzed on 11/26/02 at 07:45 displayed %Ds greater than the control limit (i.e. <20%) for 4-nitrophenol at -29.2% and for di-n-butylphthalate at -27.6%. The CCV analyzed on 12/2/02 at 18:39 displayed a %D greater than the control limit for bis (2-chloroisopropyl) ether at 21.8%. Since only QC samples were associated with the CCVs, no data qualifying action was taken. The CCV analyzed on 12/15/02 at 11:04 displayed %Ds greater than the control limit for 2,4-dinitrophenol at 62.5%, for 4-nitrophenol at 22.3%, for 4,6-dinitro-2-methylphenol at 46.5%, and for dinoseb at 59.8%. Associated sample results for dinoseb were non-detect and were flagged "UJ,c". Since 2,4-dinitrophenol was previously flagged for linear range anomalies, no further data qualifying action was taken. Since 4-nitrophenol and 4,6-dinitro-2-methylphenol were non-detect and were only slightly greater outside the control limit (i.e. <50%), no data qualifying action was taken. Equipment blanks R1AD4S and R1CM4S displayed a positive detection for bis (2-ethylhexyl) phthalate at 8.4 ug/L and 5.0 ug/L, respectively. Since associated sample results were non-detect, no data qualifying action was taken. Sample R2BM1S displayed surrogate recoveries outside the control limit for 2-fluorophenol at 279%, for phenol-d5 at 907%, for 2-fluorobiphenol at 0%, for 2,4,6-tribromophenol at 0%, and for terphenyl-d14 at 0%. Since this sample was previously flagged for internal standard failures, no further data qualifying action was taken. Sample R2AD1S displayed %Rs less than the lower control limit for surrogate nitrobenzene-d5 at 8%, for 2-fluorobiphenol at 10%, for 2,4,6-tribromophenol at 20%, and for terphenyl-d14 at 18%. Associated sample results for both acid and base/neutral fractions with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Sample R2AM2S displayed surrogate recoveries less than the lower control limit for nitrobenzene-d5 at 17% and for 2-fluorobiphenyl at 27%. Associated base/neutral results with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Sample R2BD1S displayed surrogate recoveries less

than the lower control limit for 2-fluorobiphebnyl at 25% and for terphenyl-d14 at 27%. Since the other surrogates met criteria, no data qualifying action was taken. The MS/MSD pair displayed %Rs less than the lower control limit for dimethylphthalate at 42% and 45%, for n-nitrosodiphenylamine at 45% and 48%, for butylbenzylphthalate at 49% and 52%, for benzo(a)anthracene at 48% and 49%, and for chrysene at 48% and 49%. The MS/MSD pair also displayed a %RPD greater than the control limit for hexachlorocyclopentadiene at 117%. Associated sample results for hexachlorocyclopentadiene were non-detect and were flagged "UJ,d". Since these compounds met criteria in the LCS, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 11/28/02 at 18:51 displayed %Ds greater than the control limit (i.e. <15%) on the primary column for gamma-BHC at -16.0%, for heptachlor at -38.2%, for 4,4'-DDD at 38.2%, for methoxychlor at -75.5%, and for endrin ketone at -26.6%; and on the confirmation column for heptachlor at -42.3%, for 4,4'-DDD at 40.2%, for methoxychlor at -74.4%, for endrin ketone at -28.6%, for endosulfan II at 18.8%, and for surrogate 2,4-DCAA at 17.8%. Since 2,4-DCAA is a QC analyte, no data qualifying action was taken. Since gamma-BHC and endosulfan II were non-detect in associated samples, no data qualifying action was taken. For the other anomalies, associated sample results were non-detect and were flagged "UJ,c"; unless previously flagged for 4,4'-DDT/endrin breakdown anomalies. The CCV analyzed on 11/28/02 at 06:02 displayed a %D greater than the control limit on the confirmation column for 2,4-DCAA at 17.8%. The CCV analyzed on 11/28/02 at 13:43 displayed %Ds greater than the control limit on both columns for surrogate 2,4-DCAA at 17.5% and 17.6%, respectively. Since both surrogates are QC samples, no data qualifying action was taken. Sample R5BN1S and the MS/MSD displayed %Rs less than the lower control limit (i.e. 30%) for surrogate 2,4-DCAA on the primary column at 25%, 25%, and 28%, respectively. Since 2,4-DCAA is used only as a monitoring surrogate and the other surrogates met criteria, no data qualifying action was taken. Several diluted samples displayed all surrogate recoveries of 0%. Since these samples were analyzed at dilutions greater than 10x, no data qualifying action was taken. The MS/MSD analyzed on sample P11S displayed several analytes with recoveries greater than the upper control limit. Since the associated sample results were either non-detect or were previously flagged for other anomalies, no further data qualifying action was taken. Another MS/MSD was analyzed on sample P11S and displayed 0% recovery for all compounds except endrin, which displayed %Rs greater than the upper control limit. Since this MS/MS was analyzed at a 10x dilution, most of the recoveries were diluted out. No data qualifying action was taken. Samples P11S and the MS/MSD displayed %Rs greater than the upper control limit for internal standard (IS) bromonitrobenzene at 174.9%, for 185.9%, and for 169.3%. Since either the samples were QC samples or associated sample results were either non-detect or previously flagged, no data qualifying action was taken. Equipment

blank R1CM4S displayed a positive detection for gamma-chlordane at 0.0058 ug/L. Since associated sample results were non-detect, no data qualifying action was taken. Several samples displayed %RPDs between columns greater than the control limit (i.e. <40%) Since these analytes were previously flagged calibration anomalies, no further data qualifying action was taken.. Samples R1AM1S, R1AD1S, R5AN1S, P11S, P12S, and R5BN1S were re-analyzed at 10x dilutions. It is the recommendation that the original results be used for data interpretation.

For the PCBs analyses, the MS displayed a %R less than the lower control limit (i.e. 40%) for pentachlorobiphenyl at 36%. Since the MSD and the LCS met criteria, no data qualifying action was taken.

For the herbicides analyses, the CCV analyzed on 12/2/02 at 19:49 displayed a %D greater than the control limit on the confirmation column for 2,4-DB at 19.9%. The CCV analyzed on 12/3/02 at 05:42 displayed a %D greater than the control limit for 2,4-DB at 20.6%. Since associated sample results were non-detect, no data qualifying action was taken. The LCS displayed surrogate recoveries less than the lower control limit for surrogate 2,4-DCAA at 6% and 8%. Since the analytes associated with the LCS also displayed very low recoveries, associated sample results were flagged as described above. The MS/MSD pair displayed a %RPD greater than the control limit for dichloroprop at 59%. Since associated sample results were previously flagged for LCS anomalies, no further data qualifying action was taken. Several samples displayed %RPDs between columns greater than the control limit (i.e. <40%). Since these analytes were previously flagged for LCS anomalies, no further data qualifying action was taken.

For the metals analyses, the initial CRDL displayed a %R greater than the upper control limit (i.e. 120%) for selenium at 142%. The final CRDL displayed a %R greater than the upper control limit (i.e. 120%) for thallium at 135% and a %R less than the lower control limit for iron at 70%. Since associated sample results were either non-detect (selenium) or only slightly outside the control limit (iron and thallium), no data qualifying action was taken. The prep blank displayed positive detections for antimony 0.81737 mg/kg, for beryllium at 0.06077 mg/kg, and for lead at 0.25794 mg/kg and negative detections for arsenic at -0.38393 mg/kg, for cobalt at -0.1736 mg/kg, and for silver at -0.18682 mg/kg. Associated antimony and beryllium results with positive detections less than 5x the amount found in the blank were flagged "U,p" at the detection limit. Associated positive arsenic results less than 5x the absolute value found in the blank were flagged "J,p". The positive silver result in sample P12S was flagged "UJ,p" at the detection limit. Non-detect cadmium and silver results were flagged "UJ,p". Positive or negative blank detections were observed in CCB3, CCB4, CCB5, CCB7, and CCB8 Since associated sample results were either non-detect, previously flagged for prep blank contamination, or greater than 5x the amount found in the blank and no data qualifying action was taken. Rinsate blanks

R1CM4S, R1AD4S, and P14S displayed positive detections for calcium ranging from 0.12 mg/L to 0.24 mg/L, for potassium at 0.059 mg/L and 0.041 mg/L, for iron at 0.025 mg/L and 0.033 mg/L, and for zinc ranging from 0.0047 mg/L to 0.057 mg/L. The zinc results in samples R1BD1S and R2BU1S were flagged "U,x". Since other associated sample results were either non-detect or greater than 5x the amount found in the blank, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit (i.e. 125%) for aluminum at 855% and 1162%, for calcium at 270% and 231%, for iron at 1357% and 1603%, for magnesium at 164% and 169%, and for manganese at 155% and 152%. The MS/MSD also displayed %Rs less than the lower control limit (i.e. 75%) for antimony at 50% and 52%. Associated antimony results not flagged for prep blank contamination with positive detections were flagged "J,m". Since the amount found in the parent sample for aluminum, calcium, iron, magnesium, and manganese were greater than 4x the amount of spike used, no data qualifying action was taken. Zinc displayed a serial dilution %RPD greater than the control limit (i.e. 10%) at 11.0%. Associated zinc results were positive and were flagged "J,s".

Correctable Anomalies: None.

Comments: Three trip blanks and three rinse blanks were analyzed by the laboratory in SDG# SIIB12. Any validation anomalies found which affected the results of the trip blanks were addressed in SDG# SIIB12. Only positive detections which may impact sediment data quality were discussed in this data validation report.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method except for those mentioned above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that there were no anomalies observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB14_____ **Fraction:** __VOCs, SVOCs, Pest., PCBs, Herb.,_ __Metals, Hardness_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, one trip blank contained chloromethane at 0.88 µg/L, methylene chloride at 1.1 µg/L, and toluene at 0.30 µg/L. The second trip blank contained benzene at 0.18 µg/L, toluene at 0.36 µg/L, and styrene at 0.44 µg/L. Positive benzene and toluene results in the associated samples were flagged "U, y" for results equal to or greater than the reporting limit or "U, y" at the reporting limit for results less than the reporting limit. Since chloromethane, methylene chloride, and styrene were not detected in the associated samples, no data qualifying action was taken. The rinse blank for aqueous samples, P14W, contained toluene at 1.0 µg/L. Since this toluene result was previously flagged as a non-detect due to blank contamination, this result was not used to assess the associated aqueous samples. The rinse blank for sediment samples, P14S, contained acetone at 15 µg/L and toluene at 0.79 µg/L. Since the toluene result was previously flagged as a non-detect due to blank contamination, this result was not used to assess the associated sediment samples. Since all sediment samples were reported in different data packages, no data qualifying action was taken. The initial calibration, analyzed on 11/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for chloromethane at 0.9887, carbon tetrachloride at 0.9866, 1,1,1-tri-chloroethane at 0.9854, and bromodichloromethane at 0.9871. Positive results were flagged "J, r" and non-detects were flagged "UJ, r" in the associated samples. This initial calibration also displayed a %RSD greater than the control limit (i.e., 15%) for bromomethane at 22.0%. All associated sample results were non-detects and no data qualifying action was required since the failure was not serious enough (i.e., > 50%) to affect the non-detect values. The continuing calibration verification (CCV) analyzed on 11/27/02 at 03:03 displayed a %D greater than the control limit (i.e. 20%) for chloroethane at –52.7%. All chloroethane results were flagged "UJ, c" in the associated samples. The CCV analyzed on 11/27/02 at 14:12 displayed a %D greater than the control limit for bromomethane at 122.8% (instrument sensitivity increased). Since associated samples are QC samples, no data qualifying action

was taken. The MSD recovery (220%) and relative percent difference (RPD, 126%) for bromomethane were greater than the acceptance limit in the P11W MS/MSD pair. The LCS recoveries for bromomethane were greater than the upper control limit in two LCSs (1P1127MB and 2P1127MB). Since bromomethane was not detected in the associated samples, no data qualifying action was taken.

For the SVOC analyses, the initial calibration, analyzed on 12/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2-nitroaniline at 0.9885, 3-nitroaniline at 0.9884, and 2,4-dinitrophenol at 0.9876. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 12/13/02 at 16:03 displayed %Ds greater than the control limit (i.e., <20%) for 4-nitrophenol at –34.5% and di-n-butyl-phthalate at –28.3%. The CCV analyzed on 11/25/02 at 06:20 displayed %Ds greater than the control limit for 4,6-dinitro-2-methylphenol at 22.4% and dinoseb at 30.9%. Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The base/neutral surrogate recoveries for terphenyl-d14 in samples P11WMS (7%) and P11WMSD (10%) were less than the lower control limit (i.e., 14-148%). Since these two samples are QC samples, no data qualifying action was taken. There are 22 MS recoveries, 20 MSD recoveries, and four relative percent differences (RPDs) outside the control limits in the P11W MS/MSD pair. The low MS and MSD recoveries may be attributed to low surrogate recoveries (low extraction efficiency). Therefore, MS/MSD recovery and RPD failures were not used to assess the associated samples. Since LCS recoveries were in control and no major matrix interference was observed in the associated samples, SVOC data quality should not be affected.

For the pesticide analyses, the CCV analyzed on 11/25/02 at 08:37 displayed %Ds greater than the control limit (i.e., 15%) on both columns for methoxychlor at –29.9% and –16.1%. Methoxychlor was not detected in the associated samples and non-detects were flagged "UJ, c". The decachlorobiphenyl (DCBP) surrogate recovery on the confirmation column (26%) in sample R1BU1W was less than the lower control limit (i.e., 30-150%). No data qualifying action was taken since all other surrogate recoveries were in control. The DCBP surrogate recoveries on both columns in samples R5BN1W (28% and 26%), P14W (22% and 20%), P12W (22% and 22%), and P14S (10% and 11%) were less than the lower control limit. All results, except those previously flagged due to calibration failure, were flagged "J, s" or "UJ, s" in these four samples. The tetrachloro-m-xylene (TCMX) and DCBP surrogate recoveries on both columns in samples P11W (19%/23% and 12%/11%), P11WMS (24%/28% and 13%/13%), and P11WMSD (20%/24% and 9%/8%) were less than the lower control limit. All positive results in sample P11W were flagged "J, s" and non-detects were flagged "UJ, s". Since P11WMS and P11WMSD are QC samples, no data qualifying action was

taken. The MS/MSD recoveries for alpha-chlordane (54% and 47%) and the MSD recoveries for heptachlor epoxide (42%), gamma-chlordane (48%), and 4,4'-DDT (36%) were less than the lower control limit in the P11W MS/MSD pair. The RPDs for gamma-chlordane (26%) and endrin aldehyde (46%) were also greater than the acceptance limits. The low MS and MSD recoveries may be attributed to low surrogate recoveries (low extraction efficiency). Since LCS recoveries were in control and these MS/MSD recoveries were only marginally outside the control limits, no data qualifying action was taken. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for beta-BHC and aldrin in sample P12W. Since these two results were previously flagged due to surrogate recovery failure, no further data qualifying action was taken. It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the CCV analyzed on 11/25/02 at 19:45 displayed a %D greater than the control limit (i.e., 15%) for 2,4-DB at 16.4% on the primary column. The CCV analyzed on 11/26/02 at 08:28 displayed %Ds greater than the control limit for 2,4-D at 21.0% and 2,4-DB at 24.8% on the primary column. Positive 2,4-D results were flagged "J, c" in the associated samples. 2,4-DB was not detected in the associated samples. No data qualifying action was taken since this compound had an acceptable %D on the alternate column. The LCS recovery for 2,4,5-TP (118%) was greater than the upper control limit (i.e., 100%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the metal analyses, the initial CRDL percent recoveries for iron (71%), thallium (78%), and mercury (142%), and the final CRDL recoveries for antimony (71%), iron (132%), lead (122%), and sodium (79%) were outside the control limit (i.e., 80-120%). Since mercury was not detected in the associated samples, no data qualifying action was taken. Since all other recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank for total metals analysis contained aluminum at –0.04736 mg/L, beryllium at –0.00021 mg/L, copper at 0.00159 mg/L, and thallium at 0.00371 mg/L. The preparation blank for dissolved metals analysis contained aluminum at -0.04562 mg/L, beryllium at -0.00023 mg/L, calcium at 0.01981 mg/L, copper at 0.00219 mg/L, thallium at 0.00492 mg/L, and zinc at 0.00421 mg/L. Aluminum was also detected in the initial calibration blank (ICB) at 0.05130 mg/L and four continuing calibration blanks (CCBs) at concentrations ranging from -0.04210 mg/L to -0.07625 mg/L. All non-detected aluminum results were flagged "UJ, p". Since all positive aluminum results were greater than five times the blank concentration, no data qualifying action was taken. Beryllium was also detected in CCB4 at –0.00021 mg/L, CCB5 at –0.00023 mg/L, and CCB6 at –0.00027 mg/L. All beryllium results were reported as non-detects at the reporting limit (0.0040 mg/L). Since the action level (five times the absolute blank

concentration) was much less than the reporting limit, non-detects were judged not affected by the reviewer and no data qualifying action was taken. Calcium was detected in the ICB at 0.03360 mg/L, and CCB3 at 0.01047 mg/L. Copper was also detected in four CCBs at concentrations ranging from 0.00187 mg/L to 0.00258 mg/L. Positive calcium, copper, thallium, and zinc results less than five times the blank concentration were flagged "U, p" or "U, o" at the reporting limit. Antimony was detected in CCB4 at -0.00460 mg/L. Antimony was not detected in the associated samples and non-detects were flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Barium was detected in four CCBs at concentrations ranging from 0.00035 mg/L to 0.00082 mg/L. Magnesium was detected in the ICB at 0.03134 mg/L and CCB3 at 0.01322 mg/L. Positive barium and magnesium results in samples P14WF and P14S were flagged "U, o" at the reporting limit. Manganese was detected in CCB3 at 0.00090 mg/L, CCB4 at 0.00066 mg/L, and CCB5 at 0.00069 mg/L. The positive manganese result in sample P14S was flagged "U, o" at the reporting limit. Potassium was detected in CCB3 at –0.02839 mg/L. Since positive potassium results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Thallium was also detected in CCB6 at –0.00382 mg/L. Thallium results in sample P14W and P14S were flagged "UJ, o". The MS/MSD recoveries for total aluminum (142% and 138%) were greater than the upper control limit (i.e., 125%) in the P11W MS/MSD pair. Positive total aluminum results in the associated samples were flagged "J, m". The post-digestion spike recovery for aluminum was in control. The percent difference (%D) for total aluminum was greater than the acceptance limit (i.e., 10%) at 26.2% in the serial dilution sample (R5AN1W). Since all total aluminum results were previously flagged due to matrix spike recovery failure, no further data qualifying action was taken. The rinse blank, P14WF, contained total calcium at 0.013 mg/L and total copper at 0.0028 mg/L. Since total calcium and total copper results were previously flagged as non-detects due to blank contamination, these two results were not used to assess the associated samples. The rinse blank, P14W, contained dissolved barium at 0.00041 mg/L, dissolved calcium at 0.042 mg/L, dissolved copper at 0.0029 mg/L, dissolved magnesium at 0.0067 mg/L, and dissolved zinc at 0.0083 mg/L. Since these results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Trace amounts of barium, calcium, copper, iron, magnesium, manganese, and zinc were detected in one rinse blank P14S (for sediment samples). Since barium, copper, magnesium, and manganese results were previously flagged as non-detects due to blank contamination, these results were not used to assess the associated samples. Since the associated sediment samples were not provided in this data package, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB15_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_ __Percent Lipid_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, the initial calibration, analyzed on 12/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2-nitroaniline at 0.9885, 3-nitroaniline at 0.9884, and 2,4-dinitrophenol at 0.9876. The initial calibration, analyzed on 12/16/02, displayed a correlation coefficient less than the control limit (i.e., 0.990) for dinoseb at 0.9861. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The CCV analyzed on 12/15/02 at 11:04 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol at 62.5%, 4-nitrophenol at 22.3%, 4,6-dinitro-2-methylphenol at 46.5%, and dinoseb at 59.8%. Dinoseb results in the associated samples were flagged "UJ, c". Since 2,4-dinitrophenol results in the associated samples were previously flagged due to initial calibration failure, no further data qualifying action was taken. Since the other two compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 12/14/02 at 05:51 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for alpha-BHC at –15.5% and on the confirmation column for surrogate 2,4-DCAA at 17.3%. Alpha-BHC was not detected in the associated samples. Since these results either had an acceptable %D on the alternate column or were surrogates, no data qualifying action was taken. The CCV analyzed on 12/18/02 at 08:58 displayed a %D greater than the control limit on the confirmation column for surrogate 2,4-DCAA at 18.6%. The CCV analyzed on 12/18/02 at 20:20 displayed %Ds greater than the control limit (i.e., 15%) on the primary column for 4,4'-DDT at –22.4% and on the confirmation column for 4,4'-DDT at –16.8%, 4,4'-DDD at 18.6%, and surrogate 2,4-DCAA at 19.4%. The 4,4'-DDT result in sample Blue Gill-whole fish-DL was flagged "UJ, c". Since other compounds in the associated sample, Blue Gill-whole fish-DL (for 4,4'-DDT only), were either not used for data interpretation or were surrogates, no data qualifying action was

taken. The 4,4'-DDT result in sample Blue Gill-whole fish exceeded the linear range of the calibration curve. The 4,4'-DDT result was flagged "J, q". This sample was diluted by a factor of 4 and reanalyzed by the laboratory. Upon dilution, it was noted that there was co-eluting interference with a non-target peak in the original analysis. The interference was no longer present in the diluted analysis and 4,4'-DDT was undetected. The 4,4'-DDT result from the dilution analysis should be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for 4,4'-DDT and endrin ketone results in sample Blue Gill-whole fish and alpha-chlordane in sample Carp Fillets. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, sample Carp Fillets displayed a %R greater than the upper control limit (i.e. 130%) for internal standard phenanthrene-d10 at 154.04%. Since this internal standard was used for reference only (chrysene-d12 was used for quantitation), no data qualifying action was taken. The LCS/LCSD recoveries for decachlorobiphenyl (140% and 140%) were greater than the upper control limit (i.e., 30-130%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the herbicide analyses, the RPD between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for the 2,4-DB result in sample Carp Fillets. This result was flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. This result may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (78%), selenium (77%), and thallium (139%), and the final CRDL recoveries for beryllium (130%), iron (77%), and selenium (60%) were outside the control limit (i.e., 80-120%). Since all recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained antimony at 0.60856 mg/kg, cadmium at –0.13933 mg/kg, lead at 0.38924 mg/kg, selenium at –0.60818 mg/kg, thallium at –0.78281 mg/kg, and zinc at 1.56430 mg/kg. Cadmium, selenium, and thallium results were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Positive antimony and lead results were flagged "U, p" at the reporting limit in the associated samples. Zinc results in samples Black Bullhead-fillets and Carp-fillets were flagged "U, p". Mercury was detected in the initial calibration blank at –0.000084 mg/L and four continuing calibration blanks at concentrations ranging from –0.000044 mg/L to –0.000085 mg/L. Since mercury results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MSD recovery for

calcium (139%) was greater than the upper control limit (i.e., 125%) in the Carp-fillets pair. The RPD for calcium (39.40%) was greater than the acceptance limit. Positive calcium results in the associated samples were flagged "J, m". The post-digestion spike recoveries for mercury were less than the lower control limit (i.e., 85%) in samples Blue Gill-whole fish (73%), Black Bullhead-fillets (75%) and Carp-fillets (81%). Since these three samples were re-analyzed by single-point method of standard addition (MSA), no data qualifying action was taken.

For the percent lipid analyses, the method blank contained % lipid at 0.03%. Since all % lipid results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

Correctable Anomalies: Percent lipid result was incorrectly reported in sample Carp-fillets. The laboratory was contacted and revised Form I was received.

Comments: MS/MSD analyses were not performed on SVOC, pesticides, PCBs and herbicides fractions due to insufficient sample volume provided. Given that most of the LCS/LCSD results are acceptable, and no major matrix interference was observed in the chromatographs associated with these samples, no significant impact on data quality is expected.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB16_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_ __Percent Lipid_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the herbicides analyses, the surrogate for 2,4-DCAA in sample #13 was not recovered (0%) on the confirmation column. This sample was not re-extracted and not re-analyzed by the laboratory. Positive detections in this sample were flagged "J, s" and non-detects were flagged "R, s".

Minor Anomalies: For the SVOC analyses, the method blank contained benzo(a)anthracene at 93 µg/kg. Positive benzo(a)anthracene results in the associated samples were flagged "U, z" at the reporting limit. The initial calibration, analyzed on 12/16/02, displayed a correlation coefficient less than the control limit (i.e., 0.990) for dinoseb at 0.9861. The initial calibration, analyzed on 12/17/02, displayed a correlation coefficient less than the control limit for pentachlorophenol at 0.9869. These compounds were not detected in the associated samples and non-detects were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 12/17/02 at 10:06 displayed %Ds greater than the control limit (i.e., <20%) for indeno(1,2,3-cd)pyrene at 28.1% and benzo(g,h,i)perylene at 20.8%. The CCV analyzed on 12/18/02 at 11:51 displayed a %D greater than the control limit for 3,3'-dichlorobenzidine at –26.8%. The CCV analyzed on 12/19/02 at 09:53 displayed a %D greater than the control limit for 3,3'-dichlorobenzidine at –32.1%. Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The RPDs for phenol (35%), 2-chlorophenol (36%), 2,4-dimethylphenol (36%), 1,2,4-trichlorobenzene (35%), naphthalene (36%), 4-chloro-3-methylphenol (30%), acenaphthylene (28%), and acenaphthene (29%) were greater than the acceptance limit in the LCS/LCSD pair. Since these compounds were not detected in the associated samples and LCS/LCSD %Rs were in control, no data qualifying action was taken.

For the pesticides analyses, the method blank contained heptachlor at 1.2 µg/kg, gamma-chlordane at 0.61 µg/kg, and endrin ketone at 5.7 µg/kg. Positive results less than five times blank concentration in the associated samples were flagged "U, z" at the reporting limit. The CCV analyzed on 12/19/02 at 11:20 displayed

%Ds greater than the control limit (i.e., 15%) on the primary column for alpha-BHC at –19.6%, beta-BHC at 17.9%, delta-BHC at –16.9%, aldrin at –17.6%, heptachlor epoxide at –17.0%, and gamma-chlordane at –16.9%; and on the confirmation column for surrogate 2,4-DCAA at 25.1% and tetrachloro-m-xylene (TCMX) at 22.8%. The CCV analyzed on 12/19/02 at 22:17 displayed %Ds greater than the control limit on the primary column for alpha-BHC at –16.6%, aldrin at –16.2%, heptachlor epoxide at –15.6%, gamma-chlordane at –19.6%, alpha-chlordane at –16.3%, endrin aldehyde at –19.6%, and methoxychlor at 16.0%; and on the confirmation column for surrogate 2,4-DCAA at 23.0% and TCMX at 16.5%. Positive detections for these compounds were flagged "J, c". The CCV analyzed on 1/10/03 at 09:43 displayed %Ds greater than the control limit on the primary column for heptachlor epoxide at 17.2%, endosulfan I at 15.6%, 4,4'-DDE at –17.4%, endosulfan II at 17.4%, endosulfan sulfate at 17.2%, and methoxychlor at –22.4%; and on the confirmation column for aldrin at 16.6%, heptachlor epoxide at 17.8%, endosulfan sulfate at 16.6%, endrin ketone at 16.8%, and surrogate TCMX at 17.2%. The CCV analyzed on 1/10/03 at 12:03 displayed %Ds greater than the control limit on the primary column for heptachlor epoxide at 16.6%, 4,4'-DDE at –16.9%, and methoxychlor at –19.6%; and on the confirmation column for aldrin at 15.9%, endosulfan sulfate at 16.2%, endrin ketone at 15.5%, and surrogate 2,4-DCAA at 15.7%. Since these compounds in the associated sample #8DL (for 4,4'-DDT only) were either not used for data interpretation or were surrogates, no data qualifying action was taken. The surrogate recoveries on the primary column for decachlorobiphenyl (DCBP) in method blank (160%) and samples #3 (160%), #7 (172%), #10 (180%), #14 (170%), and #15 (160%) were greater than the upper control limit (i.e., 30-150%). The surrogate recoveries on the primary column for tetrachloro-m-xylene (TCMX) in samples #5 (198%) and #16 (160%) were greater than the upper control limit (i.e., 30-150%). Since all other surrogate recoveries for each sample were in control, no data qualifying action was taken. The LCS recoveries for 4,4'-DDT (140%), endosulfan sulfate (150%), and methoxychlor (220%); and the LCSD recoveries for gamma-BHC (154%), beta-BHC (134%), 4,4'-DDE (140%), 4,4'-DDD (140%), methoxychlor (250%), and endrin ketone (133%) were greater than the upper control limit in the LCS/LCSD pair. Positive detections were flagged "J, l" in the associated samples. Sample #8 displayed a 4,4'-DDT result that exceeded the calibration range. Since this result was previously flagged due to LCS recovery failure, no further data qualifying action was taken. This sample was re-analyzed at a greater dilution and these results were within the calibration range. It is recommended that the diluted 4,4'-DDT result in sample #8DL be used for data interpretation. The RPDs for gamma-BHC (66%) and heptachlor epoxide (49%) were greater than the acceptance limit. Positive results, except those previously flagged due to calibration failures, were flagged "J, l" in the associated samples. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were

flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, the surrogate recovery for $^{13}C_{12}$-decachlorobiphenyl in sample #7 (150%) was greater than the upper control limit (i.e., 30-130%). The positive tetrachlorobiphenyl result in sample #7 was flagged "J, s". Sample #1 displayed pentachlorobiphenyl and hexachlorobiphenyl results that exceeded the calibration range. Sample #8 displayed trichlorobiphenyl and tetrachlorobiphenyl results that exceeded the calibration range. Sample #18 displayed trichlorobiphenyl, tetrachlorobiphenyl, and pentachlorobiphenyl results that exceeded the calibration range. These results were flagged "J, q". These three samples were re-analyzed at a greater dilution and these results were within the calibration range. It is recommended that the diluted results for these compounds in these three samples be used for data interpretation.

For the herbicide analyses, the CCV analyzed on 12/14/02 at 01:38 displayed a %D greater than the control limit (i.e., 15%) on the primary column for 2,4,5-T at –17.3%. The positive 2,4,5-T result in sample #18 was flagged "J, c". The CCV analyzed on 12/14/02 at 14:00 displayed %Ds greater than the control limit on the primary column for 2,4-DB at 22.4% and on the confirmation column for dalapon at –16.5%. The CCVs analyzed on 1/7/03 at 15:01 (22.7%), 1/7/03 at 21:25 (30.1%), and 1/8/03 08:34 (21.0%) displayed %Ds greater than the control limit on the confirmation column for 2,4-DB. The CCV analyzed on 1/8/03 at 17:34 displayed a %D greater than the control limit on the primary column for 2,4-DB at 20.4%. Since 2,4-DB and dalapon were not detected in the associated samples and these non-detect results had acceptable %Ds on the alternate column, no data qualifying action was taken. The CCV analyzed on 1/9/03 at 17:44 displayed a %D greater than the control limit on the confirmation column for MCPA at 16.8%. The positive MCPA result in sample #6DL was flagged "J, c". The surrogate recoveries for 2,4-DCAA on the confirmation column were greater than the upper control limit (i.e., 189%) in samples #1 (490%), #2 (600%), #8 (550%), #12 (310%), #18 (430%), #19 (195%), and #6DL (190%). Positive detections, except those previously flagged due to calibration failure, were flagged "J, s" in the associated samples. Sample #6 displayed the MCPA result that exceeded the calibration range. This result was flagged "J, q". This sample was re-analyzed at a greater dilution (4X) and the MCPA result was within the calibration range. It is recommended that the diluted MCPA result in this sample be used for data interpretation. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive detections. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for arsenic (67%) and

the final CRDL recovery for selenium (53%) were less than the lower control limit (i.e., 80-120%). Positive selenium results were flagged "J, w" and non-detects were flagged "UJ, w" in the associated samples. Since the arsenic recovery was only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at 4.70528 mg/kg, cadmium at –0.1013 mg/kg, mercury at –0.0027 mg/kg, sodium at 38.92280 mg/kg, and zinc at 1.18331 mg/kg. Since aluminum, cadmium, sodium, and zinc results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. Mercury was also detected in two initial calibration blanks (ICB) and three continuing calibration blanks (CCB) at concentrations ranging from –0.000041 mg/L to –0.000084 mg/L. Positive mercury results less than five times the absolute blank concentration were flagged "J, p" or "J, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Chromium was detected in CCB5 at 0.00216 mg/L. Positive chromium results less than five times the blank concentration were flagged "U, o" or "U, o" at the reporting limit. Aluminum and manganese were also detected in several CCBs at low levels. Since aluminum and manganese results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MS/MSD recoveries for aluminum (139% and 186%) were greater than the upper control limit (i.e., 125%) in the #3 MS/MSD pair. The MS recovery for mercury (72%) was less than the lower control limit (i.e., 75%). Positive aluminum and mercury results, except those previously flagged due to negative baseline drift, were flagged "J, m" in the associated samples. The %D for zinc (11.1%) was greater than the control limit (i.e., 10%) in the serial dilution sample (#3). Positive zinc results in the associated samples were flagged "J, s".

For the percent lipid analyses, the method blank contained % lipid at 0.02%. Since all % lipid results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

Correctable Anomalies: The tetrachlorobiphenyl result in sample #3 was incorrectly reported as 2800 μg/kg (should be 3600 μg/kg). The laboratory was contacted and revised Form I was received.

Comments: MS/MSD analyses were not performed on SVOC, pesticides, PCBs and herbicides fractions due to insufficient sample volume provided. Given that most of the LCS/LCSD results are acceptable, and no major matrix interference was observed in the chromatographs associated with these samples, no significant impact on data quality is expected.

Reduced sample size (one half of normal size) was used for all organic analyses in 15 samples due to insufficient sample volume provided. The reporting limits

were raised by a factor of 2.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB17_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_ __Percent Lipid_____

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____February 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, the initial calibration, analyzed on 12/12/02, displayed correlation coefficients less than the control limit (i.e., 0.990) for 2-nitroaniline at 0.9885, 3-nitroaniline at 0.9884, and 2,4-dinitrophenol at 0.9876. Since associated samples are QC samples, no data qualifying action was taken. The initial calibration, analyzed on 12/17/02, displayed a correlation coefficient less than the control limit for pentachlorophenol at 0.9869. Pentachlorophenol was not detected in the associated samples and non-detects were flagged "UJ, r". The continuing calibration verification (CCV) analyzed on 12/15/02 at 11:04 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol at 62.5%, 4,-nitrophenol at 22.3%, 4,6-dinitro-2-methylphenol at 46.5%, and dinoseb at 59.8%. Since associated samples are QC samples, no data qualifying action was taken. The CCV analyzed on 12/16/02 at 09:18 displayed %Ds greater than the control limit for bis(2-chloroethyl)ether at 21.6%, n-nitroso-di-n-propylamine at 20.9%, isophorone at 21.9%, hexachlorocyclopentadiene at 21.0%, 2-nitroaniline at 29.1%, and 4-nitrophenol at 37.5%. The CCV analyzed on 12/18/02 at 11:51 displayed a %D greater than the control limit for 3,3'-dichlorobenzidine at –26.8%. Since these compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken.

For the pesticides analyses, the CCV analyzed on 12/14/02 at 05:51 displayed a %D greater than the control limit (i.e., 15%) on the primary column for alpha-BHC at –15.5%. The positive alpha-BHC result in sample #23 was flagged "J, c". The surrogate recoveries on the primary column for decachlorobiphenyl (DCBP) in samples #22 (185%), #25 (155%), and #23 (160%) were greater than the upper control limit (i.e., 30-150%). The surrogate recovery on the confirmation column for tetrachloro-m-xylene (TCMX) in samples #26 (12%) was less than the lower control limit (i.e., 30-150%). Since all other surrogate recoveries for each sample were in control, no data qualifying action was taken. The RPDs between primary

and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive results. These results, except those previously flagged due to other QC failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the PCB analyses, the LCS/LCSD recoveries for decachlorobiphenyl (140% and 140%) were greater than the upper control limit (i.e., 30-130%). Since this compound was not detected in the associated samples, no data qualifying action was taken.

For the herbicide analyses, the surrogate recoveries for 2,4-DCAA on the confirmation column were greater than the upper control limit (i.e., 189%) in samples #23 (275%) and #29 (1375%). Positive detections were flagged "J, s" in samples #23 and #29. The RPDs between primary and confirmatory columns were greater than the acceptance limit (i.e., <40%) for most of the positive detections. These results, except those previously flagged due to surrogate recovery failures, were flagged "J, g". It should be noted that the lower result between two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recoveries for arsenic (79%) and thallium (78%); and the final CRDL recovery for arsenic (129%) were outside the control limit (i.e., 80-120%). Since arsenic and thallium recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained cadmium at –0.1567 mg/kg, lead at 0.33893 mg/kg, and selenium at –0.62056 mg/kg. The positive lead result in sample #30 was flagged "U, p". Positive cadmium and selenium results less than five times the absolute blank concentration were flagged "J, p" and non-detect results for selenium were flagged "UJ, p" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Mercury was detected in the initial calibration blank (ICB) at –0.000084 mg/L and five continuing calibration blanks (CCB) at concentrations ranging from –0.000044 mg/L to –0.000089 mg/L. Positive mercury results less than five times the absolute blank concentration were flagged "J, o" and the non-detect result in sample #21 was flagged "UJ, o" due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. The post-digestion spike recoveries for mercury were less than the lower control limit (i.e., 85%) in samples #22 (60%), #24 (73%), and #29 (73%). Since these three samples were re-analyzed by single-point method of standard addition (MSA), no data qualifying action was taken. The %D for zinc (13.9%) was greater than the control limit (i.e., 10%) in the serial dilution sample (#21). Positive zinct results in the associated samples were flagged "J, s".

For the percent lipid analyses, the method blank contained % lipid at 0.03%. Since all % lipid results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: MS/MSD analyses were not performed on SVOC, pesticides, PCBs, herbicides, and ICP metals fractions due to insufficient sample volume provided. Given that most of the LCS/LCSD results are acceptable, and no major matrix interference was observed in the chromatographs or ICP serial dilution results associated with these samples, no significant impact on data quality is expected.

Reduced sample size (one half of normal size) was used for all organic analyses in 8 samples due to insufficient sample volume provided. The reporting limits were raised by a factor of 2.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level IV Review

SDG No.: _____SIIB18_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____April 14, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, the continuing calibration verification (CCV) analyzed on 3/15/03 at 1540 displayed %Ds greater than the control limit (i.e., <20%) for 2,4-dinitrophenol at -23.7%, 4,6-dinitro-2-methylphenol at -20.7%, and indeno(1,2,3-cd)pyrene at -21.5%. The CCV analyzed on 3/17/03 at 0736 displayed a %D greater than the control limit for 4-nitrophenol at 27.7%. The positive indeno-(1,2,3-cd)pyrene result in sample R5CM1S was flagged "J, c". Since all other compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. Surrogate recoveries were less than the lower control limit (i.e., 31%) for 2-fluorophenol in samples P11S (30%), R1AU1S (28%), R4AM1S (29%), R4AD1S (29%), and CONT#2 (28%). Since all other surrogates in these samples were in control, no data qualifying action was taken. Surrogate recoveries for 2-fluorophenol, phenol-d5, nitrobenzene-d5, and 2-fluorobiphenyl were less than the lower control limit in samples R5BN1S, R5AN1S, R1BU1S, R2AU1S, and R4CM2S. All SVOC results in these samples were flagged "UJ, s". Surrogate recoveries for 2-fluorophenol (24%), nitrobenzene-d5 (28%), and 2-fluorobiphenyl (34%) were less than the lower control limit in sample R5BM1S. All base/neutral results in sample R5BM1S were flagged "UJ, s". Since all other acid fraction surrogates in sample R5BM1S were in control, no data qualifying action was taken. The MS recoveries for 2,4-dimethylphenol (44%), 2,4-dinitro-phenol (18%), and di-n-butylphthalate (37%) and the MSD recoveries for 1,3-dichlorobenzene (30%), hexachloroethane (27%), 2,4-dimethylphenol (44%), and 2,4-dinitrophenol (14%) were less than the lower control limit in the R5BN1S MS/MSD pair. No data qualifying action was required since the LCS recoveries were in control.

For the pesticides analyses, the CCV analyzed on 3/11/03 at 0926 displayed a %D greater than the control limit (i.e., 15%) for methoxychlor at –16.8% on the confirmation column. Methoxychlor was not detected in the associated samples. Since methoxychlor had an acceptable %D on the alternate column, no data

qualifying action was taken. The surrogate recovery on the confirmation column for tetrachloro-m-xylene (TCMX) in sample R6AD1S (28%) was less than the lower control limit (i.e., 30-150%). Since all other surrogate recoveries in sample R6AD1S were in control, no data qualifying action was taken. The MS recoveries for alpha-BHC (130%), heptachlor epoxide (19%), 4,4'-DDE (30%), endrin (160%), endrin aldehyde (36%) and the MSD recoveries for aldrin (33%), heptachlor epoxide (28%), alpha-chlordane (35%), 4,4'-DDE (15%), and endrin aldehyde (30%) were outside the control limit in the P11S MS/MSD pair. The MS/MSD RPDs for alpha-BHC (68%), beta-BHC (58%), and endosulfan sulfate (85%) were greater than the acceptance limit (i.e., 50%). No data qualifying action was required since the LCS recoveries were in control. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for four positive 4,4'-DDE results. These results were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the %Ds for 2,4-D (16.1%), 2,4,5-T (18.6%), 2,4-DB (19.7%), and surrogate 2,4-DCAA (16.9%) on the primary column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 3/7/03 at 2239. The %Ds for 2,4-D (16.4%), 2,4,5-T (18.5%), 2,4-DB (21.6%), and surrogate 2,4-DCAA (16.3%) on the primary column were greater than the criterion for the continuing calibration analyzed on 3/8/03 at 0443. Positive 2,4-D, 2,4,5-T and 2,4-DB results were flagged "J, c". The MS recovery for 2,4-D (210%) was greater than the upper control limit in the CONT#2 MS/MSD pair. The MS/MSD RPD for 2,4-D (90%) was greater than the acceptance limit (i.e., 50%). Since all positive 2,4-D results in the associated samples were previously flagged due to calibration failure, no further data qualifying action was taken. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for most of positive results. These results, except those previously flagged due to calibration failure, were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for mercury (126%); and the final CRDL recoveries for iron (74%), selenium (74%), and sodium (127%) were outside the control limit (i.e., 80-120%). Since mercury, iron, selenium, and sodium recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained barium at 0.19 mg/kg, cadmium at -0.06371 mg/kg, chromium at 0.24670 mg/kg, sodium at 54.5243 mg/kg, and zinc at 0.22741 mg/kg. Barium, chromium, sodium, and zinc were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Positive cadmium result was flagged "J, p" in sample R4AD1S due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Positive chromium results

in samples R5BN1S and R1BU1S were flagged "U, p" at the reporting limit. Since barium, sodium, and zinc results in the associated samples were greater than five times the blank concentration in the associated samples, no data qualifying action was taken. Vanadium was detected in five CCBs at concentrations ranging from 0.00125 mg/L to 0.0020 mg/L. Positive vanadium results less than five times the blank concentration were flagged "U, o" at the reporting limit.

Correctable Anomalies: None.

Comments: The clam sample volume provided to the laboratory cannot cover all analyses listed on the chain-of-custody. The whole clam (meat and shell) was ground prior to extraction as directed by AMEC project manager (Charles Harman).

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB19_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____April 14, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, the continuing calibration verification (CCV) analyzed on 3/17/03 at 0736 displayed a %D greater than the control limit (i.e., <20%) for 4-nitrophenol at 27.7%. The CCV analyzed on 3/18/03 at 0928 displayed a %D greater than the control limit for 2,4-dinitrophenol at 20.8%. Since these two compounds were not detected in the associated samples and %D failures were not serious enough (i.e., > 50%) to affect the non-detect values, no data qualifying action was taken. The MS/MSD recoveries for di-n-butylphthalate (33% and 33%) were greater than the upper control limit in the R2CM1S MS/MSD pair. The RPD for 2,4-dinitrophenol (61%) was greater than the acceptance limit (i.e., 50%). No data qualifying action was required since the LCS recoveries were in control. The LCS recovery for 3,3'-dichlorobenzidine (100%) was greater than the upper control limit (i.e., 98%). Since this compound was not detected in the associated samples, no data qualifying action was taken. The method blank displayed an internal standard %R greater than the upper control limit (i.e., 200%) for chrysene-d12 at 241.2%. Since method blank is a QC sample and no target compounds were detected in the method blank, no data qualifying action was taken.

For the pesticides analyses, the %Ds for alpha-BHC (15.6%), endrin (16.3%), 4,4'-DDD (19.1%), methoxychlor (50.1%) on the primary column; and for 4,4'-DDD (18.0%), methoxychlor (58.1%), and surrogate DCBP (-19.1%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 3/13/03 at 0828. 4,4'-DDD and methoxychlor were not detected in the associated samples and non-detects were flagged "UJ, c". Since all other compounds were either not detected in the associated samples or a surrogate and had an acceptable %D on the alternate column, no data qualifying action was taken. The CCV analyzed on 3/19/03 at 1551 displayed a %D greater than the control limit for 4,4'-DDD at 18.3% on the primary column. Since 4,4'-DDD was not detected in the associated samples and had an acceptable %D on the alternate column, no data qualifying action was taken. The MS/MSD recoveries

for heptachlor epoxide (340% and 290%) and endrin (200% and 195%) were greater than the acceptance limit in the R2CM1S MS/MSD pair. No data qualifying action was required since these two compounds were not detected in the associated samples and the LCS recoveries were in control. Four samples R6AU1S (163.1%), R1BD1S (153.8%), R2AD1S (158.9%), and R2BU1S (163.3%) and the LCS (156.1%) displayed internal standard %Rs slightly greater than the upper control limit (i.e., 150%) for bromonitrobenzene. Positive results in these four samples were flagged "J, n". The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for several positive detections. These results, except those previously flagged due to internal standard failure, were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the MS/MSD RPDs for dalapon (75%), MCPA (53%), and pentachlorophenol (123%) were greater than the acceptance limit (i.e., 50%) in the R2AM1S MS/MSD pair. No data qualifying action was required since the MS/MSD and LCS recoveries were in control. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for several positive detections. These results were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the initial CRDL percent recovery for lead (72%); and the final CRDL recoveries for arsenic (131%) and lead (78%) were outside the control limit (i.e., 80-120%). Since arsenic and lead recoveries were only marginally outside the control limits, no data qualifying action was taken. The preparation blank contained aluminum at -4.72536 mg/kg, barium at 0.22434 mg/kg, cadmium at -0.07297 mg/kg, chromium at 0.20822 mg/kg, sodium at 35.71292 mg/kg, and zinc at 0.14362 mg/kg. Aluminum, barium, sodium, and zinc were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Positive aluminum results less than five times the absolute blank concentration were flagged "J, p" in the associated samples due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Positive chromium results in samples R4BM1S, R1BM1S, and R1AM1S were flagged "U, p" at the reporting limit. Since barium, cadmium, sodium, and zinc results in the associated samples were either greater than five times the blank concentration or non-detect in the associated samples, no data qualifying action was taken. Vanadium was detected in CCB2 at 0.00192 mg/L, CCB5 at 0.00212 mg/L, and CCB6 at 0.00216 mg/L. Vanadium results less than five times the blank concentration were flagged "U, o" for results greater than the reporting limit or "U, o" at the reporting limit for results less than the reporting limit. Copper, iron, and manganese were also detected in several CCBs at low levels. Since these analyte results in the

associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MS/MSD recoveries for potassium (133% and 136%) and the MS recovery for iron (294%) were greater than the upper control limit (i.e., 125%) in the R6AU1S MS/MSD pair. The MS/MSD RPD for iron (48.3%) was greater than the acceptance limit (i.e., 35%). All iron and potassium results were flagged "J, m". The post-digestion spike recovery for potassium was greater than the upper control limit at 136%. Since potassium results were previously flagged due to matrix spike recovery, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: The clam sample volume provided to the laboratory cannot cover all analyses listed on the chain-of-custody. The whole clam (meat and shell) was ground prior to extraction as directed by AMEC project manager (Charles Harman).

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____
Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: _____SIIB20_____ **Fraction:** __SVOCs, Pest., PCBs, Herb., Metals_

Lab: ___STL – Savannah_____ **Project Name:** _____Sauget Area II_____

Reviewer: _____JA_____ **Date:** _____April 14, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (as required), the data review checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II Project QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the SVOC analyses, the MS recoveries for 3-nitroaniline (100%) and di-n-octylphthalate (130%) and the MSD recovery for 3-nitroaniline (100%) were greater than the upper control limit in the R3BD1S MS/MSD pair. No data qualifying action was required since these two compounds were not detected in the associated samples.

For the pesticides analyses, the CCV analyzed on 3/18/03 at 2251 displayed a %D greater than the control limit (i.e., 15%) for methoxychlor at 20.9% on the primary column. Methoxychlor was not detected in the associated samples. Since methoxychlor had an acceptable %D on the alternate column, no data qualifying action was taken. The MS/MSD RPDs for alpha-BHC (56%) and endosulfan sulfate (59%) were greater than the acceptance limit (i.e., 50%). No data qualifying action was required since the LCS recoveries were in control. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for 4,4'-DDE results in samples R3CM1S and R4BU1S. These two results were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the herbicide analyses, the method blank prepped on 3/19/03 displayed a positive detection for 2,4-DB at 5.1 µg/kg. Since this compound was not detected in the associated samples, no data qualifying action was taken. The %Ds for dinoseb (16.9%) on the primary column; and for 2,4-DB (-16.7%) on the confirmation column were greater than the criterion (i.e., %D $\leq$ 15%) for the continuing calibration analyzed on 3/21/03 at 2031. Dinoseb and 2,4-DB were not detected in the associated samples. Since these two compounds had acceptable %Ds on the alternate column, no data qualifying action was taken. The MS/MSD recoveries for 2,4,5-TP (35% and 34%) and 2,4-DB (9% and 19%) were less than the lower control limit in the CONT#1 MS/MSD pair. The MS/MSD RPD for 2,4-DB (71%) was greater than the acceptance limit (i.e.,

50%). No data qualifying action was required since the LCS recoveries were in control. The RPDs between the primary and confirmation columns were greater than the acceptance limit (i.e., <40%) for dichloroprop results in samples R3CM1S and R3AU1S. These two results were flagged "J, g". It should be noted that the lower result between the two columns was reported by the laboratory. These results may be biased low.

For the metal analyses, the final CRDL recovery for arsenic (131%) was greater than the upper control limit (i.e., 80-120%). Since the arsenic recovery was only marginally outside the control limit, no data qualifying action was taken. The preparation blank contained aluminum at -4.80397 mg/kg, barium at 0.34829 mg/kg, cadmium at -0.06361 mg/kg, chromium at 0.14103 mg/kg, iron at 5.70138 mg/kg, sodium at 41.23826 mg/kg, and zinc at 0.23661 mg/kg. Aluminum, barium, iron, sodium, and zinc were also detected in the initial calibration blank (ICB) and/or continuing calibration blanks (CCBs) at low levels. Positive aluminum results less than five times the absolute blank concentration were flagged "J, p" in the associated samples due to the possibility of a negative drift in the instrument that may give rise to a detection limit with a low bias. Since barium, cadmium, chromium, iron, sodium, and zinc results in the associated samples were either greater than five times the blank concentration or non-detect in the associated samples, no data qualifying action was taken. Vanadium was detected in CCB2 at 0.00212 mg/L, CCB3 at 0.00216 mg/L, and CCB4 at 0.00134 mg/L. Vanadium results less than five times the blank concentration were flagged "U, o" for results greater than the reporting limit or "U, o" at the reporting limit for results less than the reporting limit. Copper and manganese were also detected in several CCBs at low levels. Since these analyte results in the associated samples were greater than five times the blank concentration, no data qualifying action was taken. The MS/MSD recoveries for iron (178% and 21%), sodium (188% and 161%), and mercury (74% and 71%) and the MS recovery for aluminum (135%) were outside the control limit in the CONT#3 MS/MSD pair. The MS/MSD RPD for iron (40.3%) was greater than the acceptance limit (i.e., 35%). All aluminum, iron, sodium, and mercury results, except those previously flagged due to blank contamination, were flagged "J, m" or "UJ, m". The post-digestion spike recoveries for aluminum, iron, and sodium were in control. The post-digestion spike recovery for mercury was less than the lower control limit at 70%. Since mercury results were previously flagged due to matrix spike recovery, no further data qualifying action was taken. The %D for zinc (46.7%) was greater than the acceptance limit (i.e., <10%) in the serial dilution analysis (CONT#3). Positive zinc results were flagged "J, s" in the associated samples.

Correctable Anomalies: None.

Comments: The clam sample volume provided to the laboratory cannot cover all analyses listed on the chain-of-custody. The whole clam (meat and shell) was ground prior to extraction as directed by AMEC project manager (Charles Harman).

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception of errors discussed above. It should be noted that if a given fraction (analysis) is not discussed in this report, it indicates that no anomalies were observed for that fraction. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

Jason Ai

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SAIIB21_____ **Fraction: VOCs, SVOCs, Pesticides,____ PCBs, Herbicides, Metals, &__ Hardness_____**

Lab: _STL Savannah_____ **Project Name: __Sauget Area 2_____**

Reviewer: _____BL_____ **Date:_____August 18, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic and Inorganic Data Review (October 1999), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the VOC analyses, the trip blank TB-0613-BH displayed a positive detection for acetone at 5.3 ug/L, toluene at 0.11 mg/L, and styrene at 0.22 mg/L. All positive associated sample results less than ten times the trip blank concentration for acetone or less than five times the trip blank concentration for toluene and styrene were flagged "U,y". Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The initial calibration analyzed on 06/21/03 displayed a relative standard deviation greater than the control limit (i.e., 15%) for cis-1,2-dichloroethene at 15.16%. All associated non-detect field samples were flagged "UJ,r".

The continuing calibration analyzed on 06/27/03 at 0857 displayed a percent difference greater than the control limit (i.e., 20%) carbon tetrachloride at 24.1%. All associated field sample results were non-detect and were flagged "UJ,c".

The matrix spike/matrix spike duplicate (MS/MSD) displayed a relative percent difference (RPD) greater than the control limit (i.e., 50%) for bromomethane at 58%. Since the matrix spikes display acceptable recoveries and the associated field sample results were non-detect, no data qualifying action was taken.

For the SVOC analyses, the initial calibration analyzed on 07/09/03 displayed a standard deviation greater than the control limit (i.e., 15%) for pentachlorophenol at 15.20%. All associated field sample results were non-detect and were flagged "UJ,r".

The continuing calibration analyzed on 07/15/03 at 1629 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for hexachlorocyclopentadiene at 28.4% and with a negative bias for carbazole at -20.5%. The continuing calibration analyzed on 07/16/03 at 0732 displayed percent differences greater than the control limit (i.e., 20%) with a positive bias for hexachloroethane at 25.6% and hexachlorocyclopentadiene at 32.0% and with a negative bias for carbazole at -20.1%. All associated field sample results were non-detect for hexachloroethane and hexachlorocyclopentadiene while the continuing calibration displayed a positive bias; therefore, no data qualifying action was taken. All associated field samples for carbazole were non-detect and were flagged "UJ,c".

The internal standard area counts for phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} for sample SPond-3-W and its reanalysis were less than the lower control limit. All associated non-detect analytes were flagged "UJ,n" and positive results were flagged "J,n", unless previously qualified for calibration anomalies. The data user should use the re-analysis results because the internal standard area counts displayed better responses.

For the pesticides analyses, the continuing calibration analyzed on 06/19/03 at 2255 displayed percent differences greater than the control limit (i.e., 15%) with a negative bias for delta-BHC at -17.1% and dieldren at -17.7% on column SGRECD1. The continuing calibration analyzed on 06/20/03 at 0629 displayed percent differences greater than the control limit with a positive bias for 4,4'-DDD at 16.0% and methoxychlor at 17.1% on column SGRECD2. No qualifying action was taken since the associated field samples were non-detect and only one column is required to pass to report non-detect results.

The surrogate recoveries for decachlorobiphenyl were less than the lower control limit (i.e., 30%) in samples SPond-1-W at (16%/19%), SPond-3-W at (27%/27%), and SPond-2-W-Dup at (28%/28%). All associated field sample results were non-detect and were flagged "UJ,s".

For the herbicides analyses, the continuing calibration analyzed on 06/21/03 at 0726 on column two displayed percent differences greater than the control limit (i.e., 15%) with a negative bias for MCPP at -15.6%, MCPA at -16.1%, 2,4-D at -15.4, and 2,4-DB at -21.3%. No qualifying action was taken since the associated field samples were non-detect and only one column is required to pass to report non-detect results.

For the metals analyses, the preparation blank displayed a negative detection for aluminum at 0.03649 mg/L and a positive detection for zinc at 0.00192 mg/L. The associated positive field sample results were greater than five times the blank concentration for zinc and no data qualifying action was required. All associated field sample results for aluminum were non-detect and were previously flagged for instrument calibration blank contamination; thus, no further data qualifying action was required.

The continuing calibration blanks displayed negative detections for aluminum at -0.04188, -0.03313, -0.03463, and -0.04043 mg/L and positive detections for antimony at 0.00407 mg/L and 0.00471 mg/L, chromium at 0.00115 mg/L, and vanadium at 0.00084 mg/L and 0.00101 mg/L. The associated field sample results less than five times the blank concentration for antimony, chromium, and vanadium were flagged "U,o". All associated field sample results for aluminum were non-detect and were flagged "UJ,o".

The interference check A (ICSA) sample displayed results for unspiked analytes greater than the method detection limit for lead at -0.0028 mg/L and manganese at 0.0066/0.0066 mg/L. Since the associated field sample concentrations for aluminum, calcium, iron, and manganese were less than the level in the ICSAB, no further qualifying action was required.

The CRI displayed percent recoveries outside of the control limits (i.e., 80-120%) for arsenic at 78% and 64% and lead at 72% and 58%. Since arsenic was above 60%, no data qualifying action was required. All associated field sample results for lead were non-detect and were flagged "UJ,w".

Correctable Anomalies: None.

Comments: Grainsize, TOC, and pH are reported in sample delivery group SAIIB22. If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: ___SIIB22_____

Fraction: _VOCs,_Methane,_SVOCs,___ PEST,_PCBs,_HERB,_Metals,_ Nitrate,_Sulfate,_CO_2,_Alk,___ _COD,_TDS,_TSS,_&_TOC___

Lab: _STL Savannah_____

Project Name: _____Sauget Area 2_____

Reviewer: _____BL_____

Date:_____September 26, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic and Inorganic Data Review, and the specifics of the analytical method employed.

Major Anomalies: For the pesticides analyses, the performance evaluation mixture analyzed on 06/21/03 at 2133 displayed a 4,4'-DDT breakdown greater than the upper control limit (i.e., 15%) on both columns for 4,4'-DDD at (52.7%/58.1%) and 4,4'-DDD+4,4'-DDE at (53.9%/58.1%). The performance evaluation mixture analyzed on 06/21/03 at 2133 displayed an endrin breakdown for endrin ketone at (18.8%/18.6%). The associated field sample results were non-detect; therefore, no data qualifying action was taken. The performance evaluation mixture analyzed on 06/23/03 at 2135 displayed a 4,4'-DDT breakdown of 4,4'-DDD at (19.8%/20.3%). The performance evaluation mixture analyzed on 06/21/03 at 2133 displayed an endrin breakdown greater than the upper control limit for ketone+aldehyde at 20.5% on the primary column and for ketone+aldehyde at 20.2% on the confirmation column. The performance evaluation mixture analyzed on 06/23/03 at 2135 displayed a 4,4'-DDT breakdown greater than the upper control limit for 4,4'-DDD+4,4'-DDE at 20.6%/20.3% on both columns. The total breakdown for 4,4'DDT and endrin percent breakdowns were greater than the control limit (i.e. 30%) at (74.4%/78.3%). The positive associated field sample results for 4,4'-DDD for SPond-3-S and SPond-3-SDup were flagged "R,b".

Minor Anomalies: For the VOC analyses, the method blank for batch 1M0624 displayed a positive detection for methylene chloride at 0.56 ug/L. The associated positive field sample results were less than ten times the blank concentration and were flagged "U,z" at the reporting limit. Qualified field sample results less than the reporting limits were manually altered to reflect non-detects at the reporting limit.

The continuing calibration analyzed on 06/24/03 at 0920 displayed percent differences (%Ds) greater than the control limit (i.e., 20%) with a negative bias for chloroethane at -27.3%, and a positive bias for 2-butanone at 23.3%, 4-methyl-2-pentanone at 37.3%, 2-hexanone at 29.0%, and 1,1,2,2-tetrachloroehtane at 26.9%. The associated field sample results for chloroethane were non-detect and were flagged "UJ,c" and the positive associated samples results for 2-butanone were flagged "J,c".

The continuing calibration analyzed on 06/25/03 at 1045 displayed %Ds greater than the control limit (i.e., 20%) with a negative bias for chloroethane at -34.0%, and positive biases for acetone at 23.0%, 2-butanone at 39.0%, 4-methyl-2-pentanone at 42.2%, 2-hexanone at 38.1%, and 1,1,2,2-tetrachloroehtane at 23.4%. The associated field sample results in SPond-2-S for acetone and 2-butanone were positive and were flagged "J,c". The non-detect field sample result for chloroethane was flagged "UJ,c".

The matrix spike duplicate (MSD) displayed a percent recovery greater than the upper control limit for 1,1-dichloroethane at 183%. The MSD also displayed relative percent differences greater than the control limit for trans-1,2-dichloroethene at 53% and 1,1-dichloroethane at 53%. Since the associated sample results were non-detect; no data qualifying action was required.

For the SVOC analyses, the continuing calibration analyzed on 07/15/03 at 1629 displayed %Ds greater than the control limit (i.e., 20%) with a positive bias for hexachlorocyclopentadiene at 28.4% and with a negative bias for carbazole at -20.5%. The associated field samples for carbazole were non-detect and were flagged "UJ,c". The associated field sample results were non-detect for hexachlorocyclopentadiene; therefore, no data qualifying action was required.

The internal standard (IS) area counts were greater than the control limit (i.e., 200%) for 1,4-dichlorobenzene-d4 at 266.0%, naphthalene-d8 at 246.2%, and acenaphthene-d10 at 220.2% in sample SPond-1-S. The IS area counts were greater than the control limit for 1,4-dichlorobenzene-d4 at 331.8%, naphthalene-d8 at 314.2%, and acenaphthene-d10 at 282.3% in sample SPond-2-S. The IS area counts were greater than the control limit for 1,4-dichlorobenzene-d4 at 249.1%, naphthalene-d8 at 239.1%, and acenaphthene-d10 at 228.8% in sample SPond-3-S. The IS area count was greater than the control limit for phenanthrene-d10 at 227.7% for sample SPond-2-S. The associated field sample results were non-detect; therefore, no data qualifying action was required. The IS area counts were less than the control limit (i.e., 50%) for phenanthrene-d10 at 48.9%, chrysene-d12 at 54.5%, and perylene-d12 at 43.6% in sample SPond-1-

SRE. The IS area counts were less than the control limit for phenanthrene-d10 at 40.1%, chrysene-d12 at 30.4%, and perylene-d12 at 28.4% in sample SPond-2-SRE. The IS area counts were less than the control limit for chrysene-d12 at 27.6% and perylene-d12 at 26.5% in sample SPond-3-SRE. All associated non-detect sample results were flagged "UJ,n" unless previously qualified for calibration anomalies. The samples were re-analyzed and displayed similar anomalies. It is the professional judgment of the data validator that the original results be used for data making decisions.

For the pesticides analyses, the continuing calibration analyzed on 06/21/03 at 1525 displayed %Ds greater than the control limit (i.e., 15%) with a negative bias on both columns for methoxychlor at -25.7%/-27.4%. The continuing calibration analyzed on 06/21/03 at 2155 displayed %Ds greater than the control limit with negative biases on both columns for heptachlor at -26.5%/-17.9%, for 4,4'-DDT at -79.9%/-79.9%, for mehtoxychlor at -69.2%/ -69.6%, and a positive bias on both columns for 4,4'-DDD at 25.9%/38.4%. All associated non-detect field sample results for heptachlor, methoxychlor, and 4,4'-DDT were flagged "UJ,c". Since 4,4-DDD %Ds displayed a positive bias and since the sample results were non-detect, no data qualifying action was taken.

The continuing calibration analyzed on 06/23/03 at 1020 displayed %Ds greater than the control limit with a positive bias on both columns for methoxychlor at 31.5%/88.7%. The continuing calibration analyzed on 06/023/03 at 1020 also displayed %Ds greater than the control limit with a positive bias on the primary column for heptachlor at 16.9% and on the confirmation column for dieldrin at 30.2%, 4,4'-DDD at 28.0%, and endrin ketone at 21.7%. The continuing calibration analyzed on 06/23/03 at 2154 displayed %Ds greater than the control limit with a positive bias on both columns for 4,4'-DDD at 27.9%/45.3% and on the confirmation column for dieldrin at 36.0% and endrin ketone at 23.1%. The continuing calibration analyzed on 06/23/03 at 2154 also displayed %Ds greater than the control limit with a negative bias on both columns for 4,4'-DDT at -44.9%/-45.0% and on the primary column for methoxychlor at -20.6%. All associated non-detect field sample results for heptachlor, methoxychlor, and 4,4'-DDD, were flagged "UJ,c". Since 4,4-DDD %Ds displayed positive bias and since the sample results were non-detect, no data qualifying action was taken. No data qualifying action was taken if only one column was outside the limits, since only one passing column is required to report valid non-detects.

Several samples displayed RPDs greater than the control limit (i.e., 40%) between the first and second columns for gamma-BHC and dieldrin and were flagged "J,g". The lower result between the columns was reported by the laboratory. These results may be biased low.

The samples originally analyzed at 1:10 dilutions were re-analyzed at 1:25 dilutions due to possible matrix interferences. It is the professional judgment of the data validator that the original results with lower dilutions should be used for data interpretations.

For the PCBs analyses, several analytes displayed percent recoveries less than the lower control limit. The MS/MSD pair was analyzed at a ten times dilution and several spiked analytes may have been diluted out; thus, no data qualifying action was taken.

For the herbicides anlyses, several samples displayed RPDs greater than the control limit (i.e., 40%) between the first and second columns for 2,4-D and were flagged "J,g". The lower result between the columns was reported by the laboratory. These results may be biased low.

For the metals analyses, the continuing calibration blanks analyzed displayed negative detections for aluminum ranging from –0.0416 to -0.0469 mg/L, iron at –0.0194 mg/L, and sodium at –0.179 mg/L; and positive detections for aluminum at 0.0175 mg/L, barium ranging from 0.00122 to 0.00131 mg/L, chromium ranging from 0.00144 to 0.00163 mg/L, copper ranging from 0.00334 to 0.00351 mg/L, and manganese ranging from 0.00127 to 0.00137 mg/L. Since the associated field sample results were greater than five times the blank concentration; no data qualifying action was required. The preparation blank analyzed displayed a negative detection for aluminum at –4.41 mg/L and positive detections for barium at 0.267 mg/L, chromium at 0.221 mg/L, copper at 0.206 mg/L, sodium at 39.9 mg/L, and zinc at 0.187 mg/L. The associated positive field sample results for sodium were less than five times the blank concentration and were flagged "U,p".

The serial dilution displayed a percent difference greater than the control limit (i.e., 10%) for potassium at 10.8%. All associated positive field sample results were flagged "J,s".

The CRI displayed percent recoveries outside of the control limits (i.e., 80-120%) for arsenic at 72%, iron at 73%, and sodium at 71%. Since arsenic, iron, and sodium were marginally outside the control limit (i.e., >60%), no data qualifying action was required.

Correctable Anomalies: None.

Comments: For the pesticides analyses, the surrogate recoveries for samples SPond-1-S, SPond-2-S, SPond-3-S, and SPond-3-SDup were not provided due to dilutions of (1:10, 1:25), (1:10, 1:25), (1:10), and (1:2, 1:10), respectively.

Due to the dilution level, surrogates were not recovered for samples diluted at 1:10 or greater. Samples were analyzed at dilutions due to elevated concentrations in these samples and displayed elevated detection limits. Due to matrix interferences, the matrix spike and matrix spike duplicate were analyzed at a primary dilution of 1:10 and a secondary dilution of 1:25. Due to the dilution level, surrogates for spiking compounds were not recovered.

For the pesticides analyses, the lower sample dilutions were used for validation interpretation.

If a given fraction is not discussed within this report, no anomalies were found. On the basis of this evaluation, the laboratory appears to have followed the specific analytical method, with the exception of the anomalies discussed above. All data, other than those flagged "R" are usable as qualified for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: SAIIB23 **Fraction:** Metals, SVOC, Pest, Herb, PCBs, Dioxin

Lab: STL **Project Name:** Sauget

Reviewer: JFK **Date:** November 12, 2003

This report presents the findings of a review of the referenced data. The report consists of this summary, a listing of the samples included in the review, copies of data reports with data qualifying flags applied (if any), supporting documentation (as needed), and an explanation of the data qualifying flags employed. The review performed is based on the Region III Modifications to the USEPA National Functional Guidelines for Data Review, modified to reflect the specifics of the analytical method employed, and provisions of the approved project-specific QAPP. Please note that the dioxin/furan data was contained in a separate report labeled as SDG G3H190290.

Major Anomalies: None.

Minor Anomalies: Selenium displayed a CRDL standard recovery greater than the upper QC limit. No positive detections were reported and no data qualification was required. Positive detections greater than the method detection limit were observed in the preparation and/or associated calibration blanks for barium, chromium, iron, lead, manganese, vanadium, and zinc. Beryllium and cadmium displayed negative detections with absolute values greater than the method detection limit. All barium, iron, manganese, and zinc results were greater than 5X the value in the blank and no data qualification was required. Chromium, lead, and vanadium results less than 5X the concentration in the blank were flagged "U,p" for preparation blank contamination or "U,o" for calibration blank contamination. All beryllium and cadmium results were non-detect and were flagged "UJ,p". Matrix spike recoveries for iron and potassium were outside validation protocol limits. All associated results were positive and were flagged "J,m". Iron displayed a negative bias; potassium displayed a positive bias. The serial dilution for zinc displayed a percent difference greater than the QC limit. All results for zinc were positive and were flagged "J,s".

For the SVOC samples, continuing calibrations displayed percent differences greater than the QC limit. For target analytes, all biases were positive and sample results were non-detect. Therefore, no data qualification was required.

For the pesticide analyses, various matrix spike recoveries were greater than the upper QC limit. As the associated field sample results were non-detects, no data qualification was required. Most positive detections reported displayed percent differences greater than 40% between the two analytical columns. Associated sample results were flagged

"J,Q". Methoxychlor and 4,4-DDD displayed continuing calibration %Ds greater than the QC limit on both columns. Associated field sample results were non-detect and were flagged "UJ,c".

For the herbicide analyses, the continuing calibrations displayed percent differences greater than the QC limit on both columns for MCPP and 2,4-D. MCPP displayed a positive bias while 2,4-D displayed a negative bias. As all field sample results were non-detect, 2,4-D results were flagged "UJ,c".

Correctable Anomalies: None.

Comments: These results are for tissue samples and were reported on an "as received" basis.

Dilutions were performed for calcium in various samples due to the abundance of this element in the samples.

The samples were frozen initially and were thawed just prior to analysis. Thus, although technically, solid sample holding times were exceeded, based on professional judgment, no data qualification was performed.

SVOC internal standards were double spiked into some SVOC field and QC samples. The laboratory accounted for the double spikes during analysis and there does not appear to be any discernable negative impact on data usability.

If a given fraction is not specifically mentioned above it indicates that no anomalies were observed in that fraction. Based on the data reviewed, the laboratory appears to have followed the specified methods of analysis. All data are usable, as qualified, for their intended purpose.

Signed: _____
John Kearns

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F130162_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F130365_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F140368_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F190283_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F200329_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F210326_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: The sample received by the laboratory had a sample ID of GW-UAA-2-60FT sampled at 09:50 written on the chain of custody and GW-UAA-2-70FT sampled at 12:25 on the bottle label. The project manager was contacted and stated that the sample ID on the bottle was correct and was to be used.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F260243_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2F270270_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 7/3/02 at 06:44 displayed %Ds greater than the control limit (i.e. 15%) for labeled internal standard ^{13}C-1,2,3,6,7,8-HpCDF at -19.9% and for target compound OCDF at -15.5%. The CCV analyzed on 7/3/02 at 16:39 displayed %Ds greater than the control limit for target compounds 1,2,3,7,8,9-HxCDD at -17.3% and for OCDF at -28.3%. Since ^{13}C-1,2,3,6,7,8-HpCDF is a QC analyte and given that the exceedance was marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analytes 1,2,3,7,8,9-HxCDD and OCDF were marginally outside the control limit (i.e. 15%), no data qualifying action was taken regarding those analytes in the associated sample. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 138% and 138%, and for 1,2,3,7,8,9-HxCDF at 153% and 143%. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 137%. Since the associated sample was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2F290184, G2G030282,_ G2G100238, G2G110175, G2G110183, G2G160231_____

Fraction:____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento_____

Project Name: __Sauget Area 2_____

Reviewer: _____MRS_____

Date: _____July 19, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/1/02 at 08:02 displayed %Ds greater than the control limit (i.e. 15%) for 1,2,3,4,7,8-HxCDD at -17.9% and for ^{13}C-OCDD at -15.3%. The CCV analyzed on 8/2/01 at 18:51 displayed %Ds greater than the control limit for ^{13}C-1,2,3,4,7,8-HxCDF at -16.8%, for 1,2,3,4,7,8-HxCDD at -20.1%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at -15.9%, ^{13}C-1,2,3,4,7,8-HxCDF and for ^{13}C-OCDD at -18.8%. Since ^{13}C-1,2,3,6,7,8-HpCDF, ^{13}C–OCDD, ^{13}C-1,2,3,4,7,8-HxCDF are QC analytes and given that the exceedances were marginal, no data qualifying action was taken due to the calibration %D anomalies. Since analyte 1,2,3,4,7,8-HxCDD was marginally outside the control limit (i.e. <15%) and all associated sample results were non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Sample GW-UAA-P-1-74 displayed a result for 2,3,7,8-TCDF at 5.6 pg/L which was reported from the confirmation analysis. This was noted by the laboratory with a "CON".

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G020272_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**October 3, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the samples were extracted one day outside the recommended holding time (i.e. 30 days). Associated sample results with positive detections were flagged "J,h"; non-detects were flagged "UJ,h". Sample WASTE-O-2-7FT and SOIL-S-1-6FT displayed peaks which interfered with the recoveries of internal standards ^{13}C-1,2,3,4,6,7,8-HpCDF and ^{13}C-OCDD and sample WASTE-O-3-9FT displayed peaks which interfered with the recovery of ^{13}C-OCDD. The laboratory used the internal standard ^{13}C-1,2,3,6,7,8-HxCDD to determine the concentrations of analytes associated with ^{13}C-1,2,3,4,6,7,8-HpCDF and ^{13}C-OCDD. The data reviewer checked the retention times to verify that the peaks were correctly identified. Since different internal standards were used to quantitate these analytes, it should be noted that these results should be considered as estimated. Since the results were previously flagged for holding time anomalies, no additional data qualifying action was taken. However, the data user should be aware that these results may display a more than usual bias and results should be used with caution. Labeled analytes displayed %Ds greater than the control limit (i.e. <15%) for the CCVs analyzed on 8/7/02 at 11:04 at -16.9%, on 8/12/02 at 10:51 at -22.3%, on 8/15/02 at 10:36 at -16.0%, on 8/16/02 at 10:35 at -20.3%, on 8/23/02 at 06:43 at -18.3%, and on 8/25/02 at 16:27 at -23.9%. The CCV analyzed on 8/15/02 at 10:36 also displayed %Ds greater than the control limit for analytes 1,2,3,6,7,8-HxCDD at 16.8% and for Total HxCDD at 16.8%. Since all analytes were either labeled compounds, which are QC analytes, or were previously flagged for other anomalies, no further data qualifying action was taken. Samples WASTE-O-2-7FT, WASTE-O-3-9FT, WASTE-S-1-6FT, SOIL-S-1-6FT displayed compounds that exceeded the calibration range. Since these analytes still exceeded the calibration range at a 10x dilution, which is the maximum dilution allowed before jeopardizing the internal standard recoveries, and these analytes were previously flagged for holding time anomalies, no further data qualifying action was taken. Sample duplicates SOIL-O-3-6FT and SOIL-O-

3-6FTDUP displayed %RPDs greater than the control limit (i.e. 100%) for several analytes. Since these analytes were previously flagged for holding time anomalies, no further data qualifying action was taken.

For the TCLP dioxin/furans analyses, the samples were extracted outside the recommended holding time (i.e. 30 days) by two days. Associated sample results with positive detections were flagged "J,h"; non-detects were flagged "UJ,h". The CCV analyzed on 8/15/02 at 08:05 displayed %Ds greater than the control limit for labeled analyte ^{13}C-OCDD at -24.6% and for analyte 1,2,3,6,7,8-HxCDF at 16.5%. The CCV analyzed on 8/16/02 at 21:19 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.6%. The CCV analyzed on 8/23/02 at 06:43 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -18.3%. Since all analytes were either labeled analytes, which are QC analytes, or associated sample results were non-detect, no data qualifying action was taken. The MS displayed %Rs greater than the upper control limit for 1,2,3,7,8-PeCDD at 156%, for 1,2,3,6,7,8-HxCDD at 157%, for 2,3,4,6,7,8-HxCDF at 169%, and for 1,2,3,4,7,8,9-HpCDF at 168%. The MS/MSD pair displayed a %RPD greater than the control limit for 1,2,3,4,7,8,9-HpCDF at 53%. Since the MSD and the LCS met criteria and associated sample results for these analytes were non-detect, no data qualifying action was taken. The MSD displayed a %R less than the lower control limit for 1,2,3,4,6,7,8-HpCDD at 30%. Since the MS and LCS met criteria, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution added, no data qualifying action was taken. All samples displayed internal standard recoveries greater than the upper control limit (i.e. 120%). Since these samples were previously flagged for holding time anomalies, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2G030314_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____November 4, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: For the dioxin/furans analyses, samples WASTE-O-1-4FT and SOIL-O-1-6FT were originally extracted on August 1st using 10 grams of sample. The laboratory analyzed the extracts at dilutions of 4x and 10x and was unable to achieve any usable results. URS asked the laboratory to re-extract the samples using 1 gram of sample. These samples were extracted 40 days past the recommended holding time (i.e. 30 days). Positive detections were flagged "J,h" and non-detects were flagged "R,h". Since dioxins and furans are generally stable for long periods of time and do not volatilize easily, it is the opinion of the reviewer that, even though the results had to be flagged "R" to be compliant with USEPA NFGs, the results are usable for data interpretation.

The dioxin/furan analyses failed the percent completeness criteria (i.e. 95%) at 85.3% due to the non-detect results being flagged "R" because of holding time violations.

Minor Anomalies: For the TCLP dioxin/furans analyses, the CCV analyzed on 8/15/02 at 08:05 displayed %Ds greater than the control limit (i.e. <15%) for target analyte 1,2,3,6,7,8-HxCDF at 16.5% and for labeled analyte 13C-OCDD at -24.6%. The associated sample result for 1,2,3,6,7,8-HxCDF was non-detect and was flagged "UJ,c". The MS displayed %Rs greater than the upper control limit for 1,2,3,7,8-PeCDD at 156%, for 1,2,3,7,8,9-HxCDD at 157%, for 2,3,4,6,7,8-HxCDF at 169%, and for 1,2,3,4,7,8,9-HpCDF at 168%. The MSD displayed a %R greater than the upper control limit for OCDF at 151%. The MSD displayed a %R less than the lower control limit for 1,2,3,4,6,7,8-HpCDD at 30%. Since either the MS or MSD and the LCS met criteria, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the spiking amount, no data qualifying action was taken. The MS/MSD pair displayed a %RPD greater than the control limit for 1,2,3,4,7,8,9-HpCDF at 53%. Since the

associated sample result was non-detect, no data qualifying action was taken.

For the dioxin/furans analyses, the MS/MSD pair displayed several outliers which were either biased high or biased low. Since the associated sample results were previously flagged for holding time violations, no further data qualifying action was taken. The LCS displayed a %R greater than the upper control limit for OCDD at 146%. Since the associated sample results were previously flagged for holding time violations, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: Several samples and QC samples displayed surrogate recoveries either greater than or less than the control limit. Since either the samples were QC samples, were non-detect, or were previously flagged for holding time anomalies, no additional data qualifying action was taken.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, except those anomalies mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G110177_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**October 3, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/7/02 at 11:04 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -16.9%. The CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.2%. The CCV analyzed on 8/16/02 at 10:35 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -20.3%. Since all affected analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. Samples SOIL-O-3-0.5FT and SOIL-O-1-0.5FT displayed several analytes which exceeded the linear range. Since these analytes still exceeded the calibration range at a 10x dilution, which is the maximum dilution allowed before jeopardizing the internal standard recoveries, these analytes were flagged "J,q".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G120301_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____September 30, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.2%. The CCV analyzed on 8/16/02 at 10:35 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -20.3%. The CCV analyzed on 8/16/02 at 22:28 displayed a %D greater than the control limit for ^{13}C-OCDD at -23.0%. The CCV analyzed on 8/26/02 at 16:15 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -20.8%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 13 ng/g. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,z". The LCS displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 257%, for OCDD at 5850%, and for OCDF at 191%. Associated sample results with positive detections were flagged "J,l"; unless previously flagged for method blank contamination.

For the TCLP dioxin/furans analyses, the CCV analyzed on 8/15/02 at 08:05 displayed %Ds greater than the control limit for labeled analyte ^{13}C-OCDD at -24.6% and for analyte 1,2,3,6,7,8-HxCDF at 16.5%. The CCV analyzed on 8/16/02 at 09:19 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.6%. The CCV analyzed on 8/23/02 at 06:43 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -18.3%. Since all analytes were either labeled analytes, which are QC analytes, or associated sample results were non-detect no data qualifying action was taken. The MS displayed %Rs greater than the upper control limit for 1,2,3,7,8-PeCDD at 156%, for 1,2,3,6,7,8-HxCDD at 157%, for 2,3,4,6,7,8-HxCDF at 169%, and for 1,2,3,4,7,8,9-HpCDF at 168%. The MS/MSD pair displayed a %RPD greater than

the control limit for 1,2,3,4,7,8,9-HpCDF at 53%. Since the MSD and the LCS met criteria and associated sample results for these analytes were non-detect, no data qualifying action was taken. The MSD displayed a %R less than the lower control limit for 1,2,3,4,6,7,8-HpCDD at 30%. Since the MS and LCS met criteria, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution added, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2G130163_____ **Fraction:___Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____September 30, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.2%. The CCV analyzed on 8/16/02 at 22:28 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.0%. The CCV analyzed on 8/25/02 at 16:27 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.9%. The CCV analyzed on 8/26/02 at 16:15 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -20.8%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 13 ng/g. Associated OCDD results with positive detections less than 5x the amount found in the blank were flagged "U,z". The LCS displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 257%, for OCDD at 5850%, and for OCDF at 191%. Associated sample results with positive detections were flagged "J,l", unless previously flagged for method blank contamination. Internal standard ^{13}C-OCDD displayed a %R less than the lower control limit (i.e. 25%) for sample SOIL-R-3-0.5FT. Associated analytes OCDD and OCDF were flagged "UJ,s".

For the TCLP dioxin/furans analyses, samples WASTE-R-3-22FT and WASTE-R-4-24FT were extracted past the recommended holding time (i.e. 30 days) by three days and were flagged "UJ,h". The CCV analyzed on 8/19/02 at 22:31 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -19.4%. The CCV analyzed on 8/22/02 at 18:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -17.6%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken.

Correctable Anomalies: The chain of custody was not relinquished by a representative of URS. The field copy of the COC was subsequently signed by the URS field team and faxed to the appropriate laboratories.

The laboratory received a bottle labeled of "WASTE-R-3-22FT", while the COC displayed "WASTE-R-3-20FT". The field tem was asked which label was correct. The field team indicated that 'WASTE-R-3-22FT" was correct. The COC was corrected to reflect the change.

The laboratory received a bottle labeled with a time of 15:59 and a time of 16:50 on the COC for sample "SOIL-R-4-6FT". The field team was asked which time was correct. The field team indicated that the correct time was 16:50. The label was corrected to reflect the change.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2G130163_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**September 30, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.2%. The CCV analyzed on 8/16/02 at 22:28 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.0%. The CCV analyzed on 8/25/02 at 16:27 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.9%. The CCV analyzed on 8/26/02 at 16:15 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -20.8%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 13 ng/g. Associated OCDD results with positive detections less than 5x the amount found in the blank were flagged "U,z". The LCS displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 257%, for OCDD at 5850%, and for OCDF at 191%. Associated sample results with positive detections were flagged "J,l", unless previously flagged for method blank contamination. Internal standard ^{13}C-OCDD displayed a %R less than the lower control limit (i.e. 25%) for sample SOIL-R-3-0.5FT. Associated analytes OCDD and OCDF were flagged "UJ,s".

For the TCLP dioxin/furans analyses, samples WASTE-R-3-22FT and WASTE-R-4-24FT were extracted past the recommended holding time (i.e. 30 days) by three days and were flagged "UJ,h". The CCV analyzed on 8/19/02 at 22:31 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -19.4%. The CCV analyzed on 8/22/02 at 18:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -17.6%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken.

Correctable Anomalies: The chain of custody was not relinquished by a representative of URS. The field copy of the COC was subsequently signed by the URS field team and faxed to the appropriate laboratories.

The laboratory received a bottle labeled of "WASTE-R-3-22FT", while the COC displayed "WASTE-R-3-20FT". The field tem was asked which label was correct. The field team indicated that 'WASTE-R-3-22FT" was correct. The COC was corrected to reflect the change.

The laboratory received a bottle labeled with a time of 15:59 and a time of 16:50 on the COC for sample "SOIL-R-4-6FT". The field team was asked which time was correct. The field team indicated that the correct time was 16:50. The label was corrected to reflect the change.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G170286_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**September 30, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the TCLP dioxin/furans analyses, the CCV analyzed on 8/19/02 at 10:31 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -19.4%. The CCV analyzed on 8/20/02 at 11:11 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -21.2%. The CCV analyzed on 8/22/02 at 18:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -17.6%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken.

For the dioxin/furans analyses, the CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for ^{13}C-OCDD at -23.2%. The CCV analyzed on 8/26/02 at 03:34 displayed %Ds greater than the control limit for ^{13}C-OCDD at -21.0%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The CCV analyzed on 8/26/02 at 03:34 displayed %Ds greater than the control limit for 1,2,3,4,6,7,8-HpCDD at -16.0%, for HpCDD Total at -16.0%, and for 1,2,3,4,7,8-HxCDF at -15.5%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". The method blank displayed a positive detection for OCDD at 13 ng/g. Sample WASTE-P-4-17FT was flagged "U,z" at the sample result. The LCS displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 257%, for OCDD at 5850%, and for OCDF at 191%. Associated sample results with positive detections not previously flagged for other anomalies were flagged "J,l".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2G180210_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____October 3, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/12/02 at 10:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -22.3%. The CCV analyzed on 8/14/02 at 10:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -23.2%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The CCV analyzed on 8/26/02 at 0334 displayed %Ds greater than the control limit for labeled analyte ^{13}C-OCDD at -21.0%, for analyte 1,2,3,4,7,8,9-HpCDD at -16.0%, for Total HpCDD at -16.0%, and for 1,2,3,4,7,8-HxCDF at 15.5%. Since there were no samples associated with the CCV, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 13 ng/g. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,z". The LCS displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 257%, for OCDD at 5850%, and for OCDF at 191%. The OCDD LCS recovery is extremely high due to laboratory contamination. Associated sample results with positive detections were flagged "J,l"; unless previously flagged for method blank contamination.

For the TCLP dioxin/furans analyses, the CCV analyzed on 8/19/02 at 22:31 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -19.4%. The CCV analyzed on 8/20/02 at 11:11 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -21.2%. The CCV analyzed on 8/22/02 at 18:51 displayed a %D greater than the control limit for labeled analyte ^{13}C-OCDD at -17.6%. Since all analytes were labeled analytes, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2G190209_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 15, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/26/02 at 03:34 displayed %Ds greater than the control limit (i.e. <15%) for 1,2,3,4,6,7,8-HpCDD at -16.0%, for Total HpCDD at -16.0%, and for 1,2,3,4,7,8-HxCDF at 15.5%. The CCV analyzed on 9/10/02 displayed %Ds greater than the control limit for 1,2,3,4,7,8-HxCDF at 15.7%. The CCV analyzed on 9/5/02 displayed %Ds greater than the control limit for 1,2,3,7,8-PeCDF at -16.9%, for Total PeCDF at -16.9%, for 1,2,3,7,8-PeCDD at -17.5%, and for Total PeCDD at -17.5%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Internal standard ^{13}C-OCDD displayed %Ds greater than the control limit in the CCVs analyzed on 8/26/02 at 03:34 at -21.0%, on 8/26/02 at 16:15 at -20.8%, and 9/10/02 at 16:23 at -19.6%. Since ^{13}C-OCDD is a QC analyte, no data qualifying action was taken. The method blank analyzed on 8/26/02 displayed positive detections for OCDD at 5.6 ng/g and for Total HxCDF at 0.71 ng/g. Associated sample results with positive detections less than 5x the amount found in the blank were flagged "U,z", unless previously flagged for other anomalies. The LCS displayed a %R greater than the upper control limit for OCDD at 288%. Associated sample results with positive detections were flagged "J,l", unless previously flagged for other anomalies. Samples WASTE-Q-4-9FT and WASTE-Q-2-8FT displayed internal standard ^{13}C-OCDD %Rs greater than the upper control limit at 216% and 394%, respectively. Affected positive OCDD and OCDF results were flagged "J,n"; unless previously flagged for other anomalies. WASTE-Q-2-8FT-MS displayed internal standards greater than the upper control limit. Since this was a QC sample, no data qualifying action was taken. Samples WASTE-Q-4-9FT, SOIL-Q-4-0.5FT, and WASTE-Q-2-8FT displayed several analytes which exceeded the linear range. Since these analytes still exceeded the calibration range at a 10x dilution, which is the maximum dilution allowed before jeopardizing the internal standard recoveries, these analytes were flagged "J,q".

For the TCLP dioxin/furans analyses, the CCV analyzed on 8/16/02 at 21:19 displayed a %D greater than the control limit (i.e. <15%) for internal standard ^{13}C-OCDD at -23.6%. Since ^{13}C-OCDD is a QC analyte, no data qualifying action was taken. The MS displayed %Rs greater than the upper control limit for 1,2,3,7,8-PeCDD at 156%, for 1,2,3,6,7,8-HxCDD at 157%, for 2,3,4,6,7,8-HxCDF at 169%, and for 1,2,3,4,6,7,8-HpCDF at 168%. Since the MSD and the LCS met criteria, no data qualifying action was taken. The MSD displayed a %R greater than the upper control limit for OCDF at 151%. Since the MS and the LCS met criteria, no data qualifying action was taken. The MS displayed a %R less than the lower control limit for 1,2,3,4,6,7,8-HpCDD at 30%. Since the MSD and the LCS met criteria, no data qualifying action was taken. The MS/MSD pair displayed a %RPD greater than the control limit for 1,2,3,4,6,7,8-HpCDF at 53%. Since the MSD and the LCS met criteria, no data qualifying action was taken. The MS/MSD displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution, no data qualifying action was taken. Samples WASTE-Q-2-8FT, WASTE-Q-4-7FT, the TCLP method blank, and the and WASTE-Q-4-7FT DUP displayed internal standard %RS greater than the upper control limit. Since all sample results were either non-detect or was a QC sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Due to a laboratory calculation error, the MS\MSD analyzed for waste was analyzed at a low concentration. Because several of the analytes contained positive detections in the parent sample, this low concentration caused a majority of the analytes to either have greatly exaggerated recoveries or to not have recovered at all. The data reviewer used the LCS as the sole QC sample as the basis for quality assessment.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exceptions mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G200165_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____October 14, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furan analyses, the CCV analyzed on 9/5/02 at 15:20 displayed a %D greater than the control limit (i.e. <15%) for 1,2,3,6,7,8-HxCDF at 16.6%. The associated sample result was non-detect and was flagged "UJ,c". The CCVs analyzed on 8/24/02 at 20:56, 9/5/02 at 15:20, and 9/17/02 at 11:47 displayed %Ds greater than the control limit for internal standard ^{13}C-OCDD at -16.6%, at -20.4%, and at -20.3%, respectively. Since ^{13}C-OCDD is a QC analyte, no data qualifying action was taken. The MS/MSD displayed %Rs greater than the upper control limit for 1,2,3,4,6,7,8-HpCDD at 280% and 277% and for OCDF at 175% and 188%. Since the LCS met criteria, no data qualifying action was taken. The MS/MSD also displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution, no data qualifying action was taken. Field duplicates WASTE-Q-6-15 displayed an absolute difference greater than the control limit (i.e. <2x the RL) for analyte 1,2,3,7,8-PeCDF. Associated sample results with positive detections were flagged "J,f"; non-detects were flagged "UJ,f", unless previously flagged for other anomalies. Sample WASTE-Q-6-15 displayed a %R greater than the upper control limit for internal standard ^{13}C-OCDD at 151%. The OCDF result was flagged "J,n". Since OCDD was flagged for linear range exceedance, no further data qualifying action was taken. Samples SOIL-Q-7-0.5, SOIL-Q-7-0.5DUP, WASTE-Q-6-15, and WASTE-Q-6-15DUP displayed several analytes which exceeded the linear range. Since these analytes still exceeded the calibration range at a 10x dilution, which is the maximum dilution allowed before jeopardizing the internal standard recoveries, these analytes were flagged "J,q".

For the TCLP dioxin/furan analyses, the CCVs analyzed on 8/19/02 at 22:31, 8/20/02 at 11:11, and 8/22/02 at 18:51 displayed %Ds greater than the control limit (i.e. <15%) for internal standard ^{13}C-OCDD at -19.4%, at -21.2%, and at -17.6%, respectively. Since ^{13}C-OCDD is a QC analyte, no data qualifying action

was taken.

For the water dioxin/furan analyses, the CCV analyzed on 8/6/02 at 09:47 displayed a %D greater than the control limit (i.e. <15%) for ^{13}C-1,2,3,7,8-PeCDD at -16.0%. The CCV analyzed on 8/6/02 at 19:31 displayed %Ds greater than the control limit for ^{13}C-2,3,7,8-TCDF at 16.3%, for ^{13}C-1,2,3,7,8-PeCDF at 21.2%, for ^{13}C-1,2,3,7,8-PeCDD at 17.9%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 25.3%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 28.2%, and for ^{13}C-OCDD at 46.7%. Since these analytes are QC analytes, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Sample SOIL-Q-8-6 was not received by the laboratory for analysis as listed on the chain of custody.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2G230250_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 16, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the waste/soil dioxin/furans analyses, field duplicates SOIL-Q-11-0.5 displayed %RPDs greater than the control limit (i.e. either <100% or <2x the RL) for 1,2,3,6,7,8-HxCDD at 126.5%, for Total HxCDD at 102.2%, for 1,2,3,4,6,7,8-HpCDD at 107.7%, for Total HpCDD at 111.1%, for Total PeCDF at 113.3%, for 1,2,3,6,7,8-HxCDF at 101.9%, for 1,2,3,7,8,9-HxCDF at 1.19, for Total HpCDF at 106.4%, and for OCDF at 111.1%. Associated sample results with positive detections for all anomalies were flagged "J,f". 1,2,3,7,8,9-HxCDF non-detect results were flagged "UJ,f". Samples SOIL-Q-11-0.5, SOIL-Q-11-0.5-DUP, SOIL-Q-11-6, and WASTE-Q-12-4-DUP displayed several analytes that exceeded the linear range. Since these analytes still exceeded the calibration range at a 10x dilution, which is the maximum dilution allowed before jeopardizing the internal standard recoveries, these analytes were flagged "J,q".

For the TCLP dioxin/furans analyses, internal standard ^{13}C-OCDD displayed %Ds greater than the control limit (i.e. <15%) on 8/19/02 at 22:31 at -19.4%, on 8/20/02 at 11:11 at -21.2%, and on 8/22/02 at 18:51 at -17.6%. Since ^{13}C-OCDD is a QC analyte, no data qualifying action was taken. Field duplicates WASTE-Q-12-4 displayed %RPDs greater than the control limit (i.e. <100%) for Total TCDF at 127% and for Total PeCDF at 114.3%. Associated sample results with positive detections were flagged "J,f".

For the aqueous dioxin/furans analyses, the CCV analyzed on 8/6/02 at 09:47 displayed a %D greater than the control limit for internal standard 13C-1,2,3,7,8-PeCDD at -16.0%. The CCV analyzed on 8/6/02 at 19:31 displayed %Ds greater than the control limit for internal standards ^{13}C-2,3,7,8-TCDF at 16.3%, for ^{13}C-1,2,3,7,8-PeCDF at 21.2%, for ^{13}C-1,2,3,7,8-PeCDD at 17.9%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 25.3%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 28.2%, and for ^{13}C-OCDD at 46.7%. Since these are QC analytes, no data qualifying action was

taken. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 132%. Since the associated sample was non-detect for this analyte, no data qualifying action was taken. The LCS displayed a %R less than the lower control limit for 2,3,4,7,8-PeCDF at 67%. The associated sample was flagged "UJ,l" for this analyte. The LCS displayed low recoveries for most of the internal standards and for surrogate $^{37}C_{14}$-2,3,7,8-TCDD. Since this is a QC sample and seems to be an isolated incident of low surrogate and internal standard recoveries, no data qualifying action was taken based on the internal standard and surrogate anomalies.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G240261_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**August 20, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/6/02 at 09:47 displayed a %D greater than the control limit for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at -16.0%. The CCV analyzed on 8/6/02 at 19:31 displayed %Ds greater than the control limit for labeled analytes ^{13}C -TCDF at 16.3%, ^{13}C -1,2,3,7,8-PeCDF at 21.2%, for ^{13}C -1,2,3,7,8-PeCDD at 17.9%, for ^{13}C -1,2,3,4,6,7,8-HpCDF at 25.3%, for ^{13}C -1,2,3,4,6,7,8-HpCDD at 28.2%, and for ^{13}C -OCDD at 46.7%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The LCS displayed a %R greater than the control limit for 1,2,3,7,8,9-HxCDD at 132%. Since associated sample results were non-detect, no data qualifying action was taken. The LCS displayed a %R less than the lower control limit for analyte 2,3,4,7,8-PeCDF at 67%. The associated sample was flagged "UJ,l" for analyte 2,3,4,7,8-PeCDF. The LCS also displayed %Rs less than the lower control limit for labeled standards ^{13}C -2,3,7,8-TCDD at 34%, for ^{13}C -2,3,7,8-TCDF at 33%, for ^{37}C14-TCDD at 34%, for ^{13}C -1,2,3,7,8-PeCDD at 33%, for ^{13}C -1,2,3,7,8-PeCDF at 37%, for ^{13}C -1,2,3,6,7,8-HxCDD at 29%, for ^{13}C -1,2,3,6,7,8-HxCDF at 35%, for ^{13}C -1,2,3,4,6,7,8-HpCDD at 36%, and for ^{13}C -1,2,3,4,6,7,8-HpCDF at 38%. Since this was a QC sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G250332_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____August 28, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 8/6/02 at 09:47 displayed a %D greater than the control limit for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at -16.0%. The CCV analyzed on 8/6/02 at 19:31 displayed %Ds greater than the control limit for labeled analytes ^{13}C-TCDF at 16.3%, ^{13}C-1,2,3,7,8-PeCDF at 21.2%, for ^{13}C-1,2,3,7,8-PeCDD at 17.9%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 25.3%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 28.2%, and for ^{13}C-OCDD at 46.7%. Since all analytes were labeled compounds, which are QC analytes, no data qualifying action was taken. The LCSD displayed a %R greater than the upper control limit (i.e. 130%) for 1,2,3,7,8,9-HxCDF at 135%. The LCS/LCSD displayed %RPDs greater than the control limit (i.e. 20%) for 1,2,3,7,8,9-HxCDF at 28% and for 1,2,3,4,7,8,9-HpCDF at 26%. Since associated sample results were non-detect, no data qualifying action was taken. The LCS displayed a labeled analyte greater than the upper control limit (i.e. 130%) for ^{13}C-1,2,3,4,7,8,9-HpCDF at 142%. Since this labeled analyte was associated with a QC sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G240266_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____September 30, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the LCS displayed a %R greater than the upper control limit for OCDD at 160%. The associated sample result was flagged "J,l".

Correctable Anomalies: None.

Comments: The soil sample was received by the laboratory at a temperature of 0°C, which is lower than the preservation requirements (2°C-6°C). Since the sample was a soil, the low temperature should not have any impact on data quality.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2G270187_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____November 7, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the samples were originally extracted on 8/20/02; however there was no LCS extracted with the batch. The samples were re-extracted on 9/10/02 with an LCS. The re-extracted samples were outside the recommended holding time (i.e. <30 days) by 16 days. Sample results with positive detections were flagged "J,h", unless previously flagged for calibration range exceedance, and non-detects were flagged "UJ,h", unless previously flagged for calibration range exceedance. Since dioxin/furans are very stable compounds and LCS recoveries associated with the re-extracted samples were in control, it is recommended that the re-extracted sample results be used for data interpretation. The MS/MSD was analyzed three separate times on three different samples from the batch extracted on 9/10/02. Several analytes displayed anomalies either in one, two, or all three MS /MSD pairs. Since these analytes were previously flagged for holding time violations, no further data qualifying action was taken. Several samples displayed analytes which exceeded the calibration range at a 10x dilution. Those analytes were flagged "J,q".

For the TCLP dioxin/furans analyses, the CCVs analyzed on 8/19/02, 8/20/02, and 8/22/02 at 22:31, 11:11, and 18:51, respectively, displayed %Ds greater than the control limit for labeled analyte ^{13}C-OCDD at -19.4%, -21.2%, and -17.6%, respectively. Since ^{13}C-OCDD is a QC analyte, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: It should be noted that the original results were compared to the re-analyzed results and the results did agree with each other.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2G310240, G2H010333, _G2H020286_____ **Fraction:**___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____October 3, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: Sample GW-AA-Q-2-60 was received by the laboratory at a temperature of 11°C. Sample GW-AA-Q-2-130B was received by the laboratory at a temperature of 8°C. Since these temperatures only slightly exceed the required preservation temperature and dioxins/furans are known to be very stable under ambient environmental conditions, there should be no affect on the integrity of the data.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2H090277, G2H100167 **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 16, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, surrogate 37C14-2,3,7,8-TCDD displayed %Rs greater than the copper control limit (i.e. <150%) for samples SEEP-Q-1, SEEP-R-1, the LCS and the LCSD at 152%, 180%, 155%, and 152%, respectively. The positive detections in sample SEEP-Q-1 were flagged "J,s". Since the LCS and LCSD are QC samples, no data qualifying action was taken. The LCS/LCSD displayed %Rs greater than the upper control limit for 1,2,3,7,8-PeCDD at 180% and 182%, for 1,2,3,4,7,8-HxCDD at 167% and 168%, and for 2,3,7,8-TCDF at 148% and 137%. Since the associated sample results were non-detect for these analytes, no data qualifying action was taken. The LCS displayed a %R greater than the upper control limit for OCDD at 130% and for 1,2,3,6,7,8-HxCDD at 134%. The LCS/LCSD pair displayed a %RPD greater than the control limit for 1,2,3,6,7,8-HxCDD at 27%. Since the LCSD met criteria and the associated sample results were non-detect for these analytes, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2H130327_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____November 4, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the MS/MSD extracted on 8/23/02 displayed several analytes with %Rs greater than the upper control limit. Since the LCS met criteria and associated sample results were non-detect, no data qualifying action was taken. OCDD and 1,2,3,4,6,7,8-HpCDD displayed MS/MSD recoveries of 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount in the spiking solution, no data qualifying action was taken. The MS/MSD extracted on 9/10/02 displayed %Rs greater than the upper control limit for several analytes. Since the LCS met criteria and the recovery amounts were only slightly greater than the control limit, no data qualifying action was taken. Associated samples for 1,2,3,4,6,7,8-HpCDF with positive detections were flagged "J,m" due to the abnormally high spike recoveries (i.e. >200%) in respect to the parent sample having either no positive detections or very small concentrations compared to the recovery amount. The data user is advised that the sample results may display more than usual bias or variability and should be used with caution.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2H150312_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**November 7, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the field duplicates SOIL-OS-2-0.5 and SOIL-OS-2-0.5-DUP displayed %RPDs greater than the control limit (i.e. <2x the RL) for 1,2,34,6,7,8-HpCDD, for total HpCDD, for OCDD, for total HpCDF, and OCDF. Associated sample results with positive detections were flagged "J,f"; non-detects were flagged "UJ,f", except for field duplicates SOIL-OS-2-6FT and SOIL-OS-2-6FT-DUP. This duplicate pair displayed an acceptable %RPD at 0%.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2H160315_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**October 17, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, sample duplicates SOIL-OS-4-6 and SOIL-OS-4-6-DUP displayed a %RPD greater than the control limit (i.e. 100%) for OCDD at 144%. Associated sample results with positive detections were flagged "J,f"; non-detects were flagged "UJ,f". The CCV analyzed on 10/2/02 at 09:50 displayed %Ds greater than the control limit (i.e. <15%) for 1,2,3,7,8-HxCDD at 18.5%, for Total HxCDD at 18.5%, and for surrogate 37C14-2,3,7,8-TcDD at -19.7%. Since this CCV was not associated with any samples, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG Nos.: _G2H280230, G2H300216 **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____October 17, 2002_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the air dioxin/furan analyses, the CCV analyzed on 9/25/02 at 15:01 displayed %Ds greater than the control limit (i.e. <15%) for 1,2,3,4,7,8-HxCDD at 15.5% and for internal standard (IS) ^{13}C-1,2,3,4,7,8-HxCDF at 16.8%. The CCV analyzed on 9/26/02 at 00:21 displayed %Ds greater than the control limit for 2,3,7,8-TCDD at -17.4%, for Total TCDD at -17.4%, for IS ^{13}C-1,2,3,7,8-PeCDF at -17.1%, and for IS ^{13}C-1,2,3,7,8-PeCDD at -19.7%. The CCV analyzed on 9/26/02 at 11:19 displayed %Ds greater than the control limit for 2,3,7,8-TCDD at -18.0%, for Total TCDD at -18.0%, for IS ^{13}C-1,2,3,7,8-PeCDF at -18.9%, and for IS ^{13}C-1,2,3,7,8-PeCDD at -26.4%. The CCV analyzed on 9/26/02 at 21:00 displayed %Ds greater than the control limit for 2,3,7,8-TCDD at -17.0%, for Total TCDD at -17.0%, for 1,2,3,7,8,9-HxCDF at -16.4%, for IS ^{13}C-1,2,3,7,8-PeCDF at -16.4%, and for IS ^{13}C-1,2,3,7,8-PeCDD at -18.5%. IS ^{13}C-2,3,7,8-TCDF displayed %Ds greater than the control limit for the CCV analyzed on 10/2/02 at 10:28 at 25.5% and for the CCV analyzed on 10/2/02 at 18:38 at 26.3%. For all non-IS analytes, associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since the IS's are QC analytes, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: Samples SP1DI082202R001, SP2DI082202R006, SP2DI082202R011, and SP2DI082202R016 were cancelled per instructions on the chain of custody.

The chain of custody was not properly relinquished to the laboratory. Samples were logged in and analyzed as described in the chain of custody.

The laboratory received the cooler for samples in SDG# G2H300216 at a temperature of 19°C. Since dioxin/furans are relatively stable at moderate temperatures, there should be no impact on the usability.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions described above, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _G2J100348_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____January 17, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/27/02 at 12:02 displayed a %D greater than the control limit (i.e. <15%) for ^{13}C-1,2,3,7,8-PeCDD at -16.0%. The CCV analyzed on 10/28/02 at 01:15 displayed %Ds greater than the control limit for target compounds 2,3,7,8-TCDD at -15.9%, for total TCDD at -15.9%, and for 1,2,3,4,7,8-HxCDD at -17.9%; and for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at -17.6%. Samples associated with the anomalies were non-detect and were flagged "UJ,c". Since labeled analytes are QC compounds, no data qualifying action was taken. Samples PL-Q-19, PL-Q-21, PL-Q-13, PL-Q-18, PL-Q-10, and PL-Q-17 displayed internal standard (IS) recoveries less than the lower control limit (i.e. 40%) primarily for ^{13}C-2,3,7,8-TCDD (in three samples), ^{13}C-2,3,7,8-TCDF (in all samples), and for ^{13}C-1,2,3,7,8-PeCDF (in one sample). Sample results associated with the IS anomalies were non-detect and were flagged "UJ,s".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2J090270_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____January 17, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/28/02 at 01:15 displayed %Ds greater than the control limit (i.e. <15%) for target compounds 2,3,7,8-TCDD at -15.9%, for total TCDD at -15.9%, and for 1,2,3,4,7,8-HxCDD at -17.9%; and for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at -17.6%. Samples associated with the anomalies with positive detections were flagged "J,c"; non-detects were flagged "UJ,c".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2J080173_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____November 25, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 11/12/02 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 1,2,3,6,7,8-HxCDD at 16.6% and for total HxCDD at 16.6%. The CCV analyzed on 11/15/02 displayed %Ds greater than the control limit for 1,2,3,6,7,8-HxCDD at 17.6%, for total HxCDD at 17.6%, and for OCDF at 20.4%. Associated sample results were non-detect and were flagged "UJ,c". The MS displayed %Rs greater than the upper control limit for several analytes. OCDD also displayed a %R greater than the upper control limit in the MSD and a %RPD greater than the control limit. Since the MSD and the LCS met criteria, no data qualifying action was taken. The MS displayed internal standard recoveries less than the lower control limit for all ISs. It should be noted that the IS low recoveries observed in the MS are probably directly related to the high MS recoveries. It is recommended that the MS not be used for QC determinations. Since the MS is a QC sample, no data qualifying action was taken on the associated samples.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2J040216_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**November 18, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/25/02 at 11:55 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 1,2,3,6,7,8-HxCDF at 19.7%, for 1,2,3,7,8,9-HxCDF at 17.3%, and for 1,2,3,4,7,8-HxCDD at -17.3%; and for labeled compounds 13C-TCDF at 18.2%, for 13C-1,2,3,7,8-PeCDD at -21.7%, and for 13C-1,2,3,4,7,8-HxCDF at -18.1%. The CCV analyzed on 10/25/02 at 23:22 displayed %Ds greater than the control limit for target analytes 1,2,3,7,8,9-HxCDF at 16.4%, for 1,2,3,4,7,8-HxCDD at -17.2%, for 1,2,3,7,8,9-HxCDD at -16.7%, and for total HxCDD at -16.5%; and for labeled compound 13C-TCDF at 25.8%. Associated sample results were non-detect and flagged "UJ,c". Since the labeled compounds are QC analytes, no data qualifying action was taken. The LCS/LCSD displayed %Rs greater than the upper control limit for 2,3,4,6,7,8-HxCDF at 131% and 151% and for 1,2,3,4,7,8,9-HpCDF at 132% and 143%. The LCSD displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDF at 150%. Since associated sample results were either non-detect or were previously flagged for other anomalies, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2I190197, G2I210165__ **Fraction:**___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____November 18, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed datavalidation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/25/02 at 11:55 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 1,2,3,6,7,8-HxCDF at 19.7%, for 1,2,3,7,8,9-HxCDF at 17.3%, and for 1,2,3,4,7,8-HxCDD at -17.3%; and for labeled compounds 13C-TCDF at 18.2%, for 13C-1,2,3,7,8-PeCDD at -21.7%, and for 13C-1,2,3,4,7,8-HxCDF at -18.1%. The CCV analyzed on 10/25/02 at 23:22 displayed %Ds greater than the control limit for target analytes 1,2,3,7,8,9-HxCDF at 16.4%, for 1,2,3,4,7,8-HxCDD at -17.2%, for 1,2,3,7,8,9-HxCDD at -16.7%, and for total HxCDD at -16.5%; and for labeled compound 13C-TCDF at 25.8%. The CCV analyzed on 10/31/02 at 00:08 displayed %Ds greater than the control limit for target analytes 2,3,7,8-TCDD at 19.2%, for total TCDD at 19.2%, and for OCDF at 16.3%; and for labeled compound ^{13}C-TCDF at 30.0%. The CCV analyzed on 10/31/02 at 06:26 displayed %Ds greater than the control limit for target analytes 2,3,7,8-TCDD at 20.1%, for total TCDD at 20.1% and for OCDF at 20.8%; and for labeled compounds ^{13}C-TCDF at 33.3% and for ^{13}C-1,2,3,4,7,8-HxCDF at 21.6%, and for ^{13}C-1,2,3,4,6,7,8-HpCDF at 20.2%. Associated sample results with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since the labeled compounds are QC analytes, no data qualifying action was taken. The CCVs analyzed on 10/30/02 at 09:42 and 15:59, respectively, for TCDF confirmation displayed %Ds greater than the control limit for labeled standard ^{13}C-2,3,7,8-TCDF at 32.5% and 22.7%, respectively and for labeled standard ^{37}C-2,3,7,8-TCDD at 24.8%. Since the labeled compounds are QC analytes, no data qualifying action was taken. Internal standards 13C-1,2,3,4,6,7,8-HpCDD and 13C-OCDD displayed %Rs greater than the upper control limit (i.e. 135%) in sample LEACH-O-1 at 138% and 148%, respectively. Target analytes associated with the internal standards with positive detections were flagged "J,s".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2I110209_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**November 7, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/15/02 at 09:53 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 2,3,7,8-TCDF at-19.2%, for total TCDF at -19.2%, for 1,2,3,6,7,8-HxCDD at -16.9% for 1,2,3,7,8,9-HxCDD at -16.3%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -24.6%, for ^{13}C-1,2,3,7,8-PeCDD at -25.3%, for ^{13}C-1,2,3,4,7,8-HxCDF at -21.4%, and for ^{13}C-OCDD at 17.1%. The CCV analyzed on 10/15/02 at 17:50 displayed %Ds greater than the control limit for target analytes 1,2,3,7,8-PeCDD at -17.2%, for total PeCDD at -17.2%, for 1,2,3,4,7,8-HxCDD at -16.2%, for 1,2,3,6,7,8-HxCDD at -17.9%, and for total HxCDD at -16.0%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -21.5% and for ^{13}C-1,2,3,4,7,8-HxCDF at -22.1%. The CCVs analyzed on 10/30/02 at 09:42 and 15:59, respectively, for TCDF confirmation displayed %Ds greater than the control limit for labeled standard ^{13}C-2,3,7,8-TCDF at 32.5% and 22.7%, respectively and for labeled standard ^{37}C-2,3,7,8-TCDD at 24.8%. Sample results with positive detections associated with target analyte anomalies were flagged "J,c". Since the labeled standards are QC analytes, no data qualifying action was taken. The MS/MSD displayed a majority of analytes with recoveries greater than the upper control limit. Since most of the sample amounts in the parent sample were greater than 4x the spiking amount and the LCS met criteria, no further data qualifying action was taken. However, it is the professional judgment that the associated sample results may display a high bias.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2I070159, G2I100264__ _G2I120203_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____October 31, 2002_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/15/02 at 09:53 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 2,3,7,8-TCDF at -19.2%, for total TCDF at -19.2%, for 1,2,3,6,7,8-HxCDD at -16.9% for 1,2,3,7,8,9-HxCDD at -16.3%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -24.6%, for ^{13}C-1,2,3,7,8-PeCDD at -25.3%, for ^{13}C-1,2,3,4,7,8-HxCDF at -21.4%, and for ^{13}C-OCDD at 17.1%. The CCV analyzed on 10/15/02 at 17:50 displayed %Ds greater than the control limit for target analytes 1,2,3,7,8-PeCDD at -17.2%, for total PeCDD at -17.2%, for 1,2,3,4,7,8-HxCDD at -16.2%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -21.5% and for ^{13}C-1,2,3,4,7,8-HxCDF at -22.1%. The CCVs analyzed on 10/21/02 at 16:38 and 19:54, respectively, for TCDF confirmation displayed %Ds greater than the control limit for labeled standard ^{13}C-2,3,7,8-TCDF at 17.0% and 21.4%, respectively. Sample results with positive detections associated with target analyte anomalies were flagged "J,c"; non-detects were flagged "UJ,c". Since the labeled standards are QC analytes, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2H310168_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**November 4, 2002**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 9/26/02 at 11:19 displayed %Ds greater than the control limit (i.e. <15%) for target analytes 2,3,7,8-TCDD at -18.0% and total TCDD at -18.0%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -18.9% and ^{13}C-1,2,3,7,8-PeCDD at -26.4%. The CCV analyzed on 9/26/02 at 21:00 displayed %Ds greater than the control limit for target analytes 2,3,7,8-TCDD at -17.0%, total TCDD at -17.0%, and 1,2,3,7,8,9-HxCDF at -16.4%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -16.4% and ^{13}C-1,2,3,7,8-PeCDD at -18.5%. The CCV analyzed on 10/5/02 at 16:20 displayed a %D greater than the control limit for labeled analyte ^{13}C-1,2,3,4,6,7,8-HpCDD at 16.1%. The CCV analyzed on 10/5/02 at 23:01 displayed %Ds greater than the control limit for target analyte 1,2,3,4,7,8-HxCDD at -17.6%; and for labeled standards ^{13}C-1,2,3,7,8-PeCDD at -18.4% and for ^{13}C-OCDD at -16.3%. Sample results associated with the target analyte anomalies were non-detect and were flagged "UJ,c". Since the labeled compounds are QC analytes, no further data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _G2J110344_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____January 6, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 10/26/02 at 23:33 displayed %Ds greater than the control limit (i.e. <15%) for target compounds 1,2,3,4,7,8-HxCDD at -15.9% and for 1,2,3,7,8,9-HxCDD at -15.7% and for labeled standards ^{13}C-1,2,3,7,8-PeCDF at -16.1% and for ^{13}C-OCDD at 28.2%. The CCV analyzed on 10/27/02 at 12:52 displayed %Ds greater than the control limit for target compound 2,3,7,8-TCDD at -16.1%, and for total 2,3,7,8-TCDD at -16.1% and for labeled standard ^{13}C-OCDD at 25.9%. Associated samples INROS1 and INP1 with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since labeled compounds are QC analytes, no data qualifying action was taken on those standards. Samples INQ1 and INOS1 displayed %Rs less than the lower control limit (i.e. 40%) for internal standards (ISs) ^{13}C-2,3,7,8-TCDD (38% and 39%) and ^{13}C-2,3,7,8-TCDF (32% and 33%). Analytes associated with those internal standards were non-detect and were flagged "UJ,s". Sample INQ2 displayed a %R greater than the upper control limit for IS ^{13}C-OCDD at 183%. Sample INROS1 displayed %Rs greater than the upper control limit for ISs ^{13}C-OCDD at 168% and for ^{13}C-1,2,3,4,6,7,8-HpCDF at 140%. These internal standards were analyzed at a 10x dilution. The data reviewer examined the raw data from the original data (1x) and the diluted data (10x) and noticed matrix interference in both cases. Since the matrix interference caused the apparent elevated IS recoveries, no data qualifying action was taken. Sample INP1 displayed a %R less than the lower control limit for IS ^{13}C-2,3,7,8-TCDF at 36%. Analytes associated with those internal standards were non-detect and were flagged "UJ,n".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2K080306_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____January 8, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furans analyses, the CCV analyzed on 12/3/02 at 22:50 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at 27.7%. The CCV analyzed on 12/4/02 at 10:46 displayed a %D greater than the control limit for OCDD at 19.8%. The associated sample result for OCDD was flagged "J,c". The MS/MSD analyzed displayed several %Rs greater than the upper control limit in the MSD and a few %RPDs greater than the control limit. Since the MS and LCS met criteria and all associated results were non-detect, no data qualifying action was taken. The MS/MSD displayed zero recovery for OCDD. Since the amount found in the parent sample was greater than 4x the spiking amount and the associated sample result was previously flagged due to continuing calibration failure, no further data qualifying action was taken.

For the aqueous dioxin/furan analyses, the CCV analyzed on 11/17/02 at 17:41 displayed a %D greater than the control limit for ^{13}C-1,2,3,4,6,7,8-HpCDD at 15.6%. The CCV analyzed on 11/18/02 at 04:07 displayed %Ds greater than the control limit for 2,3,7,8-TCDD at -15.7%, for total TCDD at -15.7%, and for ^{13}C-OCDD at 15.8%. The sample results for 2,3,7,8-TCDD and for total TCDD were flagged "UJ,c". Since 13C-OCDD is a QC sample, no data qualifying action was taken. The LCSD displayed a %R greater than the upper control limit for 1,2,3,7,8-PeCDD at 127%. Since associated sample results were non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2K110165_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**January 17, 2003**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furans analyses, the CCV analyzed on 11/20/02 at 03:17 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-OCDD at -18.5%. Since the labeled analyte is a QC compound, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 9.3 pg/g. Since the amount found in the sample was greater than 5x the blank contamination, no data qualifying action was taken. The MS/MSD pair displayed %Rs less than the lower control limit (i.e. 64%) for OCDD at 0% and 0%. There was evidence of matrix effect, but the amount found in the parent sample was not greater than 4x the amount of spiking solution used. Therefore, the associated positive sample result for OCDD was flagged "J,m".

For the aqueous dioxin/furan analyses, the CCV analyzed on 11/17/02 at 17:41 displayed a %D greater than the control limit for labeled analyte ^{13}C-1,2,3,4,6,7,8-HpCDD at 15.6%. The CCV analyzed on 11/18/02 at 04:07 displayed %Ds greater than the control limit for target compounds 2,3,7,8-TCDD at -15.7% and for total 2,3,7,8-TCDD at -15.7% and for labeled analyte ^{13}C-OCDD at 15.8%. Associated sample results for 2,3,7,8-TCDD and total TCDD were non-detect and were flagged "UJ,c". Since the labeled analytes are QC analytes, no data qualifying action was taken. The LCSD displayed a %R greater than the upper control limit (i.e. 124%) for 1,2,3,7,8-PeCDD at 127%. Since the associated sample result was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2K120279_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____January 17, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furans analyses, the CCV analyzed on 11/20/02 at 03:17 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-OCDD at -18.5%. Since the labeled analyte is a QC compound, no data qualifying action was taken. The method blank displayed a positive detection for OCDD at 9.3 pg/g. Since the amount found in the sample was greater than 5x the blank contamination, no data qualifying action was taken. The MS/MSD pair displayed %Rs less than the lower control limit (i.e. 64%) for OCDD at 0% and 0%. There was evidence of matrix effect, but the amount found in the parent sample was not greater than 4x the amount of spiking solution used. Therefore, the associated positive sample result for OCDD was flagged "J,m".

For the aqueous dioxin/furan analyses, the CCVs analyzed on 11/20/02 at 03:17 and 16:43, respectively, displayed %Ds greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-OCDD at -18.5% and -26.2%, respectively. Since the labeled analyte is a QC compound, no data qualifying action was taken. The LCSD displayed a %R greater than the upper control limit (i.e. 124%) for 1,2,3,7,8-PeCDD at 127%. Since the associated sample result was non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG Nos.: _G2K130217_____ **Fraction:**___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____January 17, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the aqueous dioxin/furans analyses, the CCV analyzed on 11/27/02 at 01:46 displayed %Ds greater than the control limit (i.e. <15%) for labeled compounds ^{13}C-1,2,3,7,8-PeCDD at -19.4%, for ^{13}C-1,2,3,4,7,8-HxCDF at 15.5%, and for ^{13}C-1,2,3,4,6,7,8-HpCDF at 17.1%. The CCV analyzed on 11/27/02 at 11:31 displayed %Ds greater than the control limit for target analyte 1,2,3,4,7,8-HxCDD at 22.0% and for labeled compounds ^{13}C-1,2,3,7,8-PeCDD at -27.3% and for ^{13}C-1,2,3,4,7,8-HxCDF at 18.1%. Associated sample results for 1,2,3,4,7,8-HxCDD were non-detect and were flagged "UJ,c". The MSD in the MS/MSD pair displayed %Rs greater than the upper control limit for 1,2,3,6,7,8-HxCDD at 129%, for 1,2,3,7,8,9-HxCDD at 151%, for 2,3,4,6,7,8-HxCDF at 155%, or 1,2,3,7,8,9-HxCDF at 148%, and for 1,2,3,4,7,8,9-HpCDF at 136%. The MS/MSD pair also displayed %RPDs greater than the control limit for 1,2,3,7,8,9-HxCDD at 21%, for 2,3,4,7,8,9-HxCDF at 27%, for 1,2,3,7,8,9-HxCDF at 28%, and for 1,2,3,4,7,8,9-HpCDF at 21%. Since the associated sample results were non-detect and the MS met criteria, no data qualifying action was taken. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 144%. Since associated sample results were non-detect, no data qualifying action was taken.

For the soil dioxin/furans analyses, the CCV analyzed on 12/3/02 at 18:01 displayed %Ds greater than the control limit for target analytes 1,2,3,7,8-PeCDD at -16.2%, for total 1,2,3,7,8-PeCDD at -16.2%, and for 1,2,3,6,7,8-HxCDF at -18.9%; and for labeled analytes ^{13}C-1,2,3,4,6,7,8-HpCDF at 17.1%, ^{13}C-OCDD at 19.9%, and for ^{13}C-1,2,3,4,6,7,8-HpCDD at 24.4%. Associated sample results for target analytes were non-detect and were flagged "UJ,c". The MSD in the MS/MSD pair displayed %Rs greater than the upper control limit for 1,2,3,6,7,8-HxCDD at 139%, for 1,2,3,4,6,7,8-HpCDD at 201%, for OCDF at 212%, for 2,3,4,6,7,8-HxCDF at 164%, and for 1,2,3,4,6,7,8-HpCDF at 164%. The

MS/MSD pair also displayed %Rs greater than the upper control limit for 2,3,7,8-TCDF at 140% and 149%. The MS/MSD pair displayed %RPDs greater than the control limit for 1,2,3,4,6,7,8-HpCDD at 42%, for OCDF at 49%, for 2,3,4,6,7,8-HxCDF at 22%, and for 1,2,3,4,6,7,8-HpCDF at 25%. Since associated sample results were either non-detect or previously flagged for internal standard anomalies, no further data qualifying action was taken. The MS/MSD pair displayed %Rs less than the lower control limit for OCDD at 0% and 0%. Since the amount found in the parent sample was greater than 4x the amount of spiking solution used, no data qualifying action was taken. For sample R3BM1S, internal standards (ISs) ^{13}C-2,3,7,8-TCDF and ^{13}C-1,2,3,7,8-PeCDF displayed %Rs less than the lower control limit at 39% and 37%, respectively. Associated sample results associated with the ISs with positive detections were flagged "J,s"; non-detects were flagged "UJ,s".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method, with the exception mentioned above. All data, as qualified, are usable for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level IV Review

SDG No.: _G2K180141_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**January 6, 2003**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furans analyses, the CCV analyzed on 12/3/02 at 22:50 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at 27.7%. The CCV analyzed on 12/4/02 at 10:46 displayed a %D greater than the control limit for OCDD at 19.8%. Associated sample results were flagged "J,c". The MS/MSD displayed several %Rs greater than the upper control limit in the MSD and %RPDs greater than the control limit. Since the MS and LCS met criteria and all associated results were non-detect, no data qualifying action was taken. The MS/MSD displayed zero recovery for OCDD. Since the amount found in the parent sample was greater than 4x the spiking amount and associated results were previously flagged due to continuing calibration anomalies, no data qualifying action was taken. The field duplicate pair, R1BM1S and R1BM2S, displayed a %RPD greater than the control limit for OCDD at 98.8%. Since OCDD was previously flagged for calibration anomalies, no further data qualifying action was taken.

For the aqueous dioxin/furan analyses, the CCV analyzed on 11/26/02 at 12:33 displayed a %D greater than the control limit for ^{13}C-1,2,3,4,7,8-HxCDF at 22.5%. The CCV analyzed on 11/27/02 at 01:46 displayed %Rs greater than the control limit for labeled standards ^{13}C-1,2,3,7,8-PeCDD at -19.4%, for ^{13}C-1,2,3,4,7,8-HxCDF at 15.5%, and for ^{13}C-1,2,3,4,6,7,8-HpCDD at 17.1%. Since these anomalies are QC analytes, no data qualifying action was taken on associated samples. The MS/MSD displayed several %Rs greater than the upper control limit in the MSD and %RPDs greater than the control limit. Since the MS and LCS met criteria and associated sample results were non-detect, no data qualifying action was taken. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 144%. Since associated sample results were non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: The CCV analyzed on 11/27/02 at 01:46 was analyzed 1 hour and 13 minutes past the 12 hour window. The previous CCV was analyzed on 11/26/02 at 12:33. Since associated sample results were analyzed within the 12 hour window, no data qualifying action was taken.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2K190199_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____January 8, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the soil dioxin/furans analyses, the CCV analyzed on 12/7/02 at 1909 displayed %Ds greater than the control limit (i.e. <15%) for labeled analytes ^{13}C-1,2,3,7,8-PeCDF at 21.9%, for ^{13}C-1,2,3,7,8-PeCDD at 22.6%, for ^{13}C-1,2,3,4,7,8-HxCDF at -23.7%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 16.6%, and for ^{13}C-OCDD at 17.1% and for target compounds 1,2,3,7,8,9-HxCDF at 20.4%, 1,2,3,4,7,8,9-HpCDF at -15.8% and for OCDF at -15.9%. The CCV analyzed on 12/8/02 at 08:26 displayed %Ds greater than the control limit for target compound 1,2,3,4,7,8,9-HpCDF at -15.8% and for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at 16.3%. Since analyte 1,2,3,4,7,8,9-HpCDF displayed anomalies in both CCVs, this result in the associated sample, PIIS, was flagged "J,c". Since all other results in associated sample PIIS was flagged for internal standard anomalies, no further data qualifying action was taken. The MS/MSD analyzed displayed several %RPDs greater than the control limit. Since the MS/MSD and LCS met criteria and all associated results were non-detect, no data qualifying action was taken. The MS/MSD displayed zero recovery for 1,2,3,4,7,8,9-HpCDD and for OCDD. Since the amount found in the parent sample was greater than 4x the spiking amount, no data qualifying action was taken. Sample P11S displayed %Rs less than the lower control limit for all internal standards (ISs). Associated sample results, with the exception of 1,2,3,4,7,8,9-HpCDF, with positive detections were flagged "J,s"; non-detects were flagged "UJ,s". The method blank, LCS, and the MS/MSD displayed several ISs less than the lower control limit. Since these were QC samples, no further data qualifying action was taken.

For the aqueous dioxin/furan analyses, the CCV analyzed on 11/27/02 at 01:46 displayed %Ds greater than the control limit for labeled analytes ^{13}C-1,2,3,7,8-PeCDD at -19.4%, for ^{13}C-1,2,3,4,7,8-HxCDF at 15.5%, and for ^{13}C-1,2,3,4,6,7,8-HpCDD at 17.1%. The CCV analyzed on 11/27/02 at 11:31 displayed %Ds

greater than the control limit for labeled analytes ^{13}C-1,2,3,7,8-PeCDD at -27.3% and for ^{13}C-1,2,3,4,7,8-HxCDF at 18.1% and for target analyte 1,2,3,4,7,8-HxCDD at 22%. The sample result for 1,2,3,4,7,8-HxCDD was non-detect and was flagged "UJ,c". Since labeled analytes are QC compounds, no data qualifying action was taken. The MS/MSD analyzed displayed several %Rs greater than the upper control limit in the MSD and a few %RPDs greater than the control limit. Since the MS and LCS met criteria and all associated results were non-detect, no data qualifying action was taken. The LCS displayed a %R greater than the upper control limit for 1,2,3,7,8,9-HxCDD at 144%. Since associated sample results were non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2L070182_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____January 27, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 12/19/02 at 15:07 displayed %Ds greater than the control limit (i.e. <15%) for target compounds 2,3,7,8-TCDD at -15.9% and for total TCDD at -15.9%; and for labeled analytes ^{13}C-1,2,3,4,6,7,8-HpCDF at 22.3% and for ^{13}C-1,2,3,4,6,7,8-HpCDD at 21.3%. The CCV analyzed on 12/20/02 at 07:26 displayed %Ds greater than the control limit for labeled analytes ^{13}C-1,2,3,4,6,7,8-HpCDF at 21.0%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 29.1%, and for ^{13}C-OCDD at 31.3%. The TCDF confirmation CCV analyzed on 12/21/02 at 22:11 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-2,3,7,8-TCDF at 25.4%. The TCDF confirmation CCV analyzed on 12/22/02 at 11:24 displayed a %D greater than the control limit for labeled analyte ^{13}C-2,3,7,8-TCDF at 28.7%. Associated sample results for 2,3,7,8-TcDD at total TCDD with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Since labeled analytes are QC analytes, no data qualifying action was taken on the labeled analytes.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

A fish tissue SRM (standard reference material) sample (Lot #R543) was submitted to the laboratory for analysis along with the other fish samples. The results from the laboratory were within the certified ranges specified from the reference sheet with the following exceptions:

- 2,3,7,8-TCDD displayed a laboratory value of 15 pg/g, while the certified value was 17 pg/g (± 1.4). Associated sample results may display values which may be biased low.

- 2,3,7,8-TCDF displayed a laboratory value of 26 pg/g, while the certified value was 22 pg/g (± 1.6). Associated sample results with positive detections may display values which may be biased high.

- 1,2,3,7,8-PeCDF displayed a laboratory value of 5.6 pg/g, while the certified value was 4.9 pg/g (± 0.56). Associated sample results with positive detections may display values which may be biased high.

- 2,3,4,6,7,8-HxCDF displayed a laboratory value of ND at a reporting limit of 0.87 pg/g, while the certified value was 2.3 pg/g (± 1.9). Associated sample results may display values which may be biased low.

- 1,2,3,4,6,7,8-HpCDF displayed a laboratory value of ND at a reporting limit of 1.6, while the certified value was 4.4 pg/g (± 6.0). Associated sample results may display values which may be biased low.

Laboratory results for 1,2,3,4,7,8-HxCDD (ND @ 1.6 pg/g), 1,2,3,7,8,9-HxCDD (ND @ 1.4 pg/g), and 1,2,3,4,7,8,9-HpCDF (ND @ 2.1 pg/g) were non-detect at reporting limits which were greater than the certified values listed. Associated data should be acceptable for use. Laboratory results for 1,2,3,4,6,7,8-HpCDD (ND @ 1.4 pg/g) and OCDF (ND @ 2.2 pg/g) displayed values of non-detect while the certified values were equal to or slightly greater than the reporting limit (1,2,3,4,6,7,8-HpCDD – 1.4 pg/g and OCDF – 2.6 pg/g). When the confidence limit is factored into the certified value (1,2,3,4,6,7,8-HpCDD ± 0.53 pg/g and OCDF ± 1.3 pg/g), there is a chance that the certified value may be less than the reporting limit. Results for these compounds near the reporting limit may be estimated and may give rise to low biases. The dioxin/furan results were not qualified based on SRM results. However, some dioxin/furan results may display modest to moderate biases as described above.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G2L070183_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____January 16, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the CCV analyzed on 12/15/02 at 11:51 displayed %Ds greater than the control limit (i.e. <15%)for target compound 1,2,3,6,7,8-HxCDF at -16.6% and for labeled compounds ^{13}C-1,2,3,7,8-PeCDF at 16.9% and for ^{13}C-1,2,3,7,8-PeCDD at 27.3%. The CCV analyzed on 12/16/02 at 12:20 displayed %Ds greater than the control limit for labeled analytes ^{13}C-2,3,7,8-TCDF at 15.8%, for ^{13}C-1,2,3,7,8-PeCDD at 20.1%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 29.3%, and for ^{13}C-OCDD at 22.1%. The CCV analyzed on 12/17/02 at 01:33 displayed %Ds greater than the control limit for labeled analytes ^{13}C-1,2,3,7,8-PeCDD at 16.8%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 23.7%, and for ^{13}C-OCDD at 18.1%. The CCV analyzed on 12/17/02 at 14:04 for target analyte 1,2,3,6,7,8-HxCDF at -20.3% and for labeled compound ^{13}C-1,2,3,7,8-PeCDD at 21.4%. The CCV analyzed on 12/18/02 at 12:32 displayed %Ds greater than the control limit for target compound 1,2,3,6,7,8-HxCDD at -18.7% and for labeled analyte ^{13}C-1,2,3,7,8-PeCDD at 23.3%. The CCV analyzed on 12/19/02 at 01:44 displayed %Ds greater than the control limit for target compounds 2,3,7,8-TCDF at -16.9%, for total TCDF at -16.9%, for 1,2,3,4,7,8-HxCDD at 18.9%, and for 1,2,3,7,8,9-HxCDD at 16.9%; and for labeled analytes ^{13}C-1,2,3,7,8-PeCDF at 26.8%, for ^{13}C-1,2,3,7,8-PeCDD at 18.0%, and for ^{13}C-1,2,3,4,6,7,8-HpCDD at 16.5%. The CCV analyzed on 12/19/02 at 10:46 displayed %Ds greater than the control limit for target compound 1,2,3,6,7,8-HxCDF at -17.7% and for labeled analytes ^{13}C-1,2,3,7,8-PeCDF at 20.5%, for ^{13}C-1,2,3,7,8-PeCDD at 24.4%, and for ^{13}C-OCDD at -19.9%. Samples associated with CCV target analyte anomaly and positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Sample #15 displayed an internal standard recovery less than the lower control limit (i.e. 40%) for ^{13}C-1,2,3,4,7,8-HxCDF at 38%. Analytes associated with that IS and positive detections were flagged "J,s"; non-detects were flagged "UJ,s". Sample #20 was flagged "JA" by the laboratory for analyte 2,3,7,8-TCDD due to matrix

interference which caused the ion abundance ratio to be outside the QC limits. This result was flagged "J,w" by the data reviewer. Samples #8 and #18 displayed OCDD exceeding the calibration range at a 10x dilution. The laboratory does not dilute samples beyond 10x due to loss of internal standard recovery. Those analytes were flagged "J,q".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3B140267_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____March 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the continuing calibration verification (CCV) analyzed on 2/24/03 at 11:31 displayed a %D greater than the control limit (i.e., <15%) for 1,2,3,4,7,8-HxCDD at -15.7%. The associated sample result in sample BDRK-Q-2 for 1,2,3,4,7,8-HxCDD was non-detect and was flagged "UJ,c".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3B140265_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**April 1, 2003**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, target compounds 1,2,3,4,6,7,8-HpCDD, OCDD, and 1,2,3,4,6,7,8-HpCDF in sample LEACH-R-1-DUP exceeded the calibration range and were flagged "J,q". The laboratory did not attempt to re-analyze the sample at a further dilution due to the unusual consistency of the sample. It was observed that the nature of the sample matrix would cause potential serious matrix interference if the sample was analyzed at further dilutions and that analytes detected in the original sample would not be detected at further dilutions. The %RPD between field duplicate samples exceeded the control limit (i.e., <50%) for a majority of the analytes. Associated positive sample results were flagged "J,f"; unless previously flagged for calibration range exceedances.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level IV Review

SDG No.: G3B060193, G3B060194, G3B060196 **Fraction:** ___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____March 10, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the continuing calibration verification (CCV) analyzed on 2/20/03 at 13:11 displayed %Ds greater than the control limit (i.e., <15%) for 1,2,3,4,7,8-HxCDD at -18.8% and for OCDF at -16.0%. The CCV analyzed on 2/20/03 at 22:54 displayed %Ds greater than the control limit for 2,3,4,6,7,8-HxCDF at -17.6% and for 1,2,3,4,6,7,8-HpCDF at -16.0%. Associated sample results were non-detect and were flagged "UJ,c". The CCV analyzed on 2/24/03 at 11:31 displayed a %D greater than the control limit for 1,2,3,4,7,8-HxCDD at -15.7%. The CCV analyzed on 2/24/03 at 17:47 displayed a %D greater than the control limit for 1,2,3,6,7,8-HxCDF at 17.5%. Since only QC samples were associated with these CCVs, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level IV Review

SDG No.: _G2L070184_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____January 8, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the TCDF confirmation CCV analyzed on 12/17/02 at 00:06 displayed a %D greater than the control limit (i.e. <15%) for labeled analyte ^{13}C-2,3,7,8-TCDF at 17.2%. The CCV analyzed on 12/17/02 at 05:08 displayed a %D greater than the control limit for labeled analyte ^{13}C-2,3,7,8-TCDF at 18.2%. Since labeled analytes are QC analytes, no data qualifying action was taken on the labeled analytes. Sample #27 displayed internal standard (IS) %Rs less than the lower control limit (i.e. 40%) for ^{13}C-2,3,7,8-TCDD at 30%, for ^{13}C-2,3,7,8-TCDF at 26%, and for ^{13}C-1,2,3,7,8-PeCDF at 38%. Sample #28 displayed IS %Rs less than the lower control limit for ^{13}C-2,3,7,8-TCDD at 25% and for ^{13}C-2,3,7,8-TCDF at 23%. Analytes associated with those ISs with positive detections were flagged "J,s"; non-detects were flagged "UJ,s".

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3C110310_____ **Fraction:**___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____April 22, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, several CCVs analyzed between 3/25/03 and 3/27/03 displayed labeled analytes with %Ds greater than the control limit (i.e., <15%). Since the labeled compounds are QC analytes, no data qualifying action was taken. Sample R4AD1S displayed an internal standard %R less than the lower control limit (i.e., 40%) for 13C-1,2,3,7,8-PeCDD at 38%. Associated analytes were non-detect and were flagged "UJ,n". Sample CONT #2 displayed internal standard %Rs less than the lower control limit in all ISs except for 13C-1,2,3,4,7,8-HxCDF. Analytes associated with the IS anomalies were non-detect and were flagged "UJ,n". The method blank analyzed on 3/26/03 displayed all internal standard recoveries less than the control limit. Since the method blank is a QC sample and the low recoveries seem to be an isolated incident, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Two fish tissue SRM (standard reference material) samples (Lot #R544) for two different batch numbers (3077258 and 3077263) were submitted to the laboratory for analysis along with the other fish samples. The results from the laboratory were within the certified ranges specified from the reference sheet with the following exceptions:

For the results associated with sample batch 3077258:

- 2,3,7,8-TCDF displayed a laboratory value of 19 pg/g, while the certified value was 17 pg/g (± 1.5).
- 1,2,3,7,8-PeCDF displayed a laboratory value of 45 pg/g, while the certified value was 40 pg/g (± 3.7).

For the results associated with sample batch 3077263:

- 1,2,3,6,7,8-HxCDD displayed a laboratory value of 63 pg/g, while the certified value was 56 pg/g (± 4.8).
- 1,2,3,4,6,7,8-HpCDF displayed a laboratory value of 84, while the certified value was 76 pg/g (± 5.9).
- 2,3,7,8-TCDF displayed a laboratory value of 21 pg/g, while the certified value was 17 pg/g (± 1.5).
- 1,2,3,7,8-PeCDF displayed a laboratory value of 46 pg/g, while the certified value was 40 pg/g (± 3.7).

Since all sample results associated with the anomalies listed above were non-detect, there should be no impact on data quality.

Signed: _____
Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3C110311_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____April 29, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, several CCVs analyzed between 3/28/03 and 4/11/03 displayed both labeled analytes and target compounds with %Ds greater than the control limit (i.e., <15%). Since the labeled compounds are QC analytes, no data qualifying action was taken. Target compounds associated with CCV anomalies with positive detections were flagged "J,c"; non-detects were flagged "UJ,c". Samples R2BD1S, R1BD1S, and P12S displayed internal standard %Rs less than the lower control limit (i.e., 40%). Associated analytes not previously flagged due to calibration anomalies were non-detect and were flagged "UJ,n".

Correctable Anomalies: None.

Comments: The samples were collected on 2/6/03 and frozen for later analysis. The samples were then thawed and extracted on 3/18/03 and analyzed per SW8290. Because of the nature of the matrix, freezing of the samples is permitted without any consequence of possible contaminant degradation or loss.

On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

One fish tissue SRM (standard reference material) sample (Lot #R544) for batch number (3077312) was submitted to the laboratory for analysis along with the other fish samples. The results from the laboratory were within the certified ranges specified from the reference sheet with the following exceptions:

For the results associated with sample batch 3077312:

- 2,3,7,8-TCDF displayed a laboratory value of 19 pg/g, while the certified value was 17 pg/g (± 1.5).
- 1,2,3,7,8-PeCDF displayed a laboratory value of 45 pg/g, while the certified value was 40 pg/g (± 3.7).
- 2,3,4,6,7,8-HxCDF displayed a laboratory result of 66 pg/g while the certified value was 60 pg/g (± 5.5).
- 1,2,3,4,7,8,9-HpCDF displayed a laboratory result of 89 pg/g while the certified value was 73 pg/g (± 7.7).

Sample results associated with the anomalies listed above with positive detections may display results which are biased high.

Signed: _____
Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3C130291_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____April 21, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the aqueous dioxin/furans analyses, the continuing calibration verification (CCV) analyzed on 3/28/03 at 10:22 displayed a %D greater than the control limit (i.e., <15%) for labeled analyte ^{13}C-OCDD at 19.6%. The CCV analyzed on 3/28/03 at 19:27 displayed %Ds greater than the control limit for labeled analytes ^{13}C-2,3,7,8-TCDF at 21.7%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 23.9%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 17.9%, and for ^{13}C-OCDD at 28.4%; and for standard ^{37}Cl-2,3,7,8-TCDD at 15.7%. Since the above mentioned analytes are QC analytes, no data qualifying action was taken on associated samples.

For the soil dioxin/furans analyses, the continuing calibration verification (CCV) analyzed on 3/28/03 at 10:22 displayed a %D greater than the control limit (i.e., <15%) for labeled analyte ^{13}C-OCDD at 19.6%. The CCV analyzed on 3/28/03 at 19:27 displayed %Ds greater than the control limit for labeled analytes ^{13}C-2,3,7,8-TCDF at 21.7%, for ^{13}C-1,2,3,4,6,7,8-HpCDF at 23.9%, for ^{13}C-1,2,3,4,6,7,8-HpCDD at 17.9%, and for ^{13}C-OCDD at 28.4%; and for standard 37Cl-2,3,7,8-TCDD at 15.7%. Since the above mentioned analytes are QC analytes, no data qualifying action was taken on associated samples. QC samples method blank and LCSD and sample SOIL-Q-51 displayed internal standard %Rs less than the lower control limit (i.e., 40%) for internal standard 13C-2,3,7,8-TCDD at 36%, 28%, and 30%, respectively; and for internal standard 13C-2,3,7,8-TCDF at 35%, 28%, and 30%, respectively. Affected analytes were flagged "J,n" in sample SOIL-Q-51. Since the LCSD and method blank are QC samples, no data qualifying action was taken. Surrogate ^{37}Cl$_{14}$-2,3,7,8-TCDD displayed a %R less than the lower control limit (i.e., 40%) in SOIL-Q-51 at 33% and in the LCSD at 30%. Analytes in SOIL-Q-51 were flagged "J,s", unless previously flagged for internal standard anomalies. Since the LCSD is a QC sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____
Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3D260174_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 1, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3D300180_____ **Fraction:**____Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____August 1, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the confirmation CCV analyzed on 5/7/03 at 18:27 displayed a percent difference greater than the control limit for labeled standard ^{13}C-2,3,7,8-TCDF at -30.9%. 2,3,7,8-TCDF in the affected sample, LEACH-Q-1, was flagged "J,c". The matrix spike/matrix spike duplicate (MS/MSD) displayed percent recoveries (%Rs) outside the control limits (i.e., 70%-130%) and relative percent differences (RPDs) outside the control limit (i.e., 20%) (anomalies will be displayed in parentheses) for 2,3,7,8-TCDD at 1.3% and 175% (84%), 1,2,3,6,7,8-HxCDD at 0% and 226%, 1,2,3,7,8,9-HxCDD at 20% and 187% (75%), 2,3,4,7,8-PeCDF at 45% and 168% (71%), and 1,2,3,4,7,8-HxCDF at 26% and 208% (78%). Associated sample results were positive and were flagged "J,m" in the parent sample, unless previously flagged for calibration anomalies. The MS and the RPDs (RPDs anomalies will be displayed in parentheses) also displayed %Rs outside the control limits for 1,2,3,7,8-PeCDD at 49% (52%), 2,3,7,8-TCDF at 54% (35%), 1,2,3,6,7,8-HxCDF at 67% (35%), 1,2,3,7,8,9-HxCDF at 135% (25%), and 1,2,3,4,7,8,9-HpCDF at 36% (51%). Associated sample results were positive and were flagged "J,m" in the parent sample. The non-detect 1,2,3,7,8,9-HxCDF result in the parent sample was flagged "UJ,d". The MS/MSD pairs also displayed relative percent differences greater than the control limit (i.e., 20%) for 1,2,3,4,7,8-HxCDD at 35% and 1,2,3,7,8-PeCDF at 21%. Since the MS and MSD met criteria, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3E030177_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 21, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the laboratory control sample/laboratory control sample duplicate (LCS/LCSD) (batch # 3133293) displayed percent recoveries (%Rs) greater than the upper control limit (i.e., 122%) for 1,2,3,4,7,8-HxCDD at 127%/124%. Since associated sample results were non-detect, no data qualifying action was taken. The LCS/LCSD (batch # 3126516) displayed a %R less than the lower control limit (i.e., 70%) in the LCS for 2,3,4,7,8-PeCDF at 69%. Since the LCSD met criteria, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3E030187_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 1, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the laboratory control sample displayed a percent recovery less than the lower control limit (i.e., 70%) for 2,3,4,7,8-PeCDF at 69%. Since the laboratory control sample duplicate met criteria, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3E060299_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 5, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exception mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3F130171_____ **Fraction:**____**Dioxin/Furans**_____

Lab: _**Severn Trent-Sacramento**____ **Project Name:** __**Sauget Area 2**_____

Reviewer: _____**MRS**_____ **Date:** _____**August 1, 2003**_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: The laboratory control sample/laboratory control sample duplicate pair displayed percent recoveries (%Rs) greater than the upper control limit (i.e., 130%) for 2,3,4,6,7,8-HxCDF (133%/138%). Since the associated sample result was non-detect, no data qualifying action was taken. The LCSD displayed internal standard recoveries less than the lower control limit (i.e., 40%) for ^{13}C-2,3,7,8-TCDD at 38% and ^{13}C-2,3,7,8-TCDF at 37% and a surrogate recovery less than the lower control limit (i.e., 40%) for $^{37}C_{14}$-2,3,7,8-TCDD at 37%. Since the affected sample is a QC sample, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3F140170_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 1, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP, the National Functional Guidelines for Organic Data Review (February 1994), and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, 1,2,3,4,6,7,8-HpCDD, OCDD, 1,2,3,4,6,7,8-HpCDF, and OCDF displayed matrix spike/matrix spike duplicate recoveries outside the control limits (i.e., 70%-130%). Since the amount found in the parent sample was greater than four times the amount of spiking solution, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3F230144_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 5, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: A few analytes displayed matrix spike/matrix spike duplicate percent recoveries outside the control limits (i.e., 70%-130%). Since the amount found in the parent sample was greater than four times the spike amount, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _G3F260324_____ **Fraction:**___Dioxin/Furans_____

Lab: _Severn Trent-Sacramento____ **Project Name:** __Sauget Area 2_____

Reviewer: _____MRS_____ **Date:** _____August 1, 2003_____

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: For the dioxin/furans analyses, the matrix spike/matrix spike duplicate (MS/MSD) displayed percent recoveries less than the lower control limit (i.e., 70%) in the MSD for 1,2,3,7,8-PeCDD at 69% and OCDF at 65%. The MS/MSD also displayed a relative percent difference greater than the control limit (i.e., 20%) for 1,2,3,7,8-PeCDD at 23%. The associated non-detect 1,2,3,7,8-PeCDD result was flagged "UJ,m". Since the MS and the associated laboratory control sample met criteria for OCDF, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _SA2DNX10_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 1, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: The laboratory control sample duplicate displayed a percent recovery greater than the upper control limit (i.e., 130%) for 2,3,4,6,7,8-HxCDF at 133%. Since the LCS met criteria and the associated sample results were non-detect, no data qualifying action was taken.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

DATA VALIDATION REPORT - Level III Review

SDG No.: _SA2DNX11_____ **Fraction:____Dioxin/Furans_____**

Lab: _Severn Trent-Sacramento____ **Project Name: __Sauget Area 2_____**

Reviewer: _____MRS_____ **Date: _____August 1, 2003_____**

This report presents the findings of a review of the referenced data. The report consists of this summary, copies of data reports with data qualifying flags applied (as required), the completed data validation checklist, supporting documentation, and an explanation of the data qualifying flags employed. The review performed is based on the Sauget Area II QAPP and the specifics of the analytical method employed.

Major Anomalies: None.

Minor Anomalies: None.

Correctable Anomalies: None.

Comments: On the basis of this evaluation, the laboratory appears to have followed the specified analytical method with the exceptions mentioned above. All data are usable, as qualified, for their intended purpose based on the data reviewed.

Signed: _____

Michael Shadle

APPENDIX I

Final Report - Thin-Section Analysis

-FINAL REPORT-
POROSITY TYPES STUDY
INVOLVING THIN SECTION MODAL ANALYSIS
OF CONVENTIONAL CORE SAMPLES
FOR
URS CORPORATION
SAUGET AREA-2

OMNI
Laboratories, Inc.

OMNI Laboratories, Inc.

(832) 237-4000
8845 Fallbrook • Houston, Texas 77064

4 December, 2003

Ms. Brandy Higgins
URS Corporation
1001 Highlands Plaza Drive W.
Ste. 300
St. Louis, MO 63110

SUBJECT: *Final Report – Thin Section Modal Analysis*
Sauget Area-2
OMNI File No. G-20068

Dear Ms. Higgins:

Fifty-four (54) conventional core samples from the above referenced area were submitted for thin section preparation and modal analysis. This final report provides thin section modal analysis (point count) results for porosity distribution, and thin section photomicrograph descriptions. Thin section photomicrographs were sent earlier under separate cover (report dated March, 2003). One (1) copy of this report has been provided, additional copies can be provided upon request. This report acts to replace the March, 2003 report text, although photomicrographs from the earlier report should be inserted under this cover.

It has been a pleasure to provide this study for URS Corporation. Please feel free to contact us if you have any questions concerning this report or if we can be of further service.

Sincerely,
OMNI LABORATORIES, INC.

Michael Dixon
Manager, Geologic Services

M. Charles Manske
Sedimentologist

The interpretations or opinions expressed represent the best judgement of OMNI Laboratories, Inc. and it assumes no responsibility and makes no warranty or representations, as to the productivity, proper operation, or profitableness of any oil, gas or any other mineral well. These analyses, opinions or interpretations are based on observations and materials supplied by the client for whom this report is made.

INTRODUCTION

Fifty-four (54) conventional core samples were selected for thin section preparation, photomicrography with descriptions, and quantitative porosity types determination. These samples were taken from Sauget Area-2.

Sample identifications are given in Table 1 (below).

TABLE 1

SAMPLE IDENTIFICATONS AND ANALYSES PERFORMED

Sample Identification	Detailed T.S. Porosity Determination	T.S. Photo./ Description
O-1-132	X	X
O-1-134	X	X
O-1-136	X	X
O-1-139	X	X
O-1-142	X	X
O-1-145	X	X
O-1-147	X	X
O-1-151	X	X
O-1-153	X	X
P-1-137	X	X
P-1-139	X	X
P-1-141	X	X
P-1-143	X	X
P-1-145	X	X
P-1-148	X	X
P-1-151	X	X
P-1-153	X	X
P-1-155	X	X
P-1-158	X	X
Q-1-142	X	X
Q-I-145.5	X	X
Q-1-149.5	X	X
Q-1-151.5	X	X
Q-1-153.5	X	X
Q-1-155.5	X	X
Q-1-157	X	X
Q-1-159	X	X
Q-1-161	X	X
Q-1-163	X	X
Q-2-126	X	X
Q-2-129	X	X
Q-2-131	X	X
Q-2-133	X	X

TABLE 1 (cont.)

SAMPLE IDENTIFICATIONS AND ANALYSES PERFORMED

Sample Identification	Detailed T.S. Porosity Determination	T.S. Photo./ Description
Q-2-135	X	X
Q-2-137	X	X
Q-2-141	X	X
Q-2-143	X	X
R-1-142	X	X
R-1-144	X	X
R-1-146	X	X
R-1-149	X	X
R-1-151	X	X
R-1-153	X	X
R-1-155	X	X
R-1-157	X	X
R-1-159	X	X
R-1-161	X	X
R-1-163	X	X
S-1-147	X	X
S-1-155	X	X
S-1-157	X	X
S-1-159	X	X
S-1-161	X	X
S-1-163	X	X
S-1-165	X	X

These analyses were performed in order to address two main objectives: 1) to assess general rock type and depositional fabric; and 2) to assess general reservoir quality and porosity distribution.

SUMMARY OF PETROGRAPHIC RESULTS

These fifty-four (54) samples are all described as carbonate rocks. Fifty (50) of these samples are identified as limestones, with only three (3) categorized as dolostones (Q-2-141, Q-2-143, S-1-147), and one (1) as a chert (P-1-139).

The limestones are mainly packstones and grainstones, with lime wackestones and mudstones occasionally detected as well. These rock types reflect typically moderate to high energy during sediment deposition. Micritic matrix has commonly been replaced by microspar. Laminations observed in many samples are defined by a change in rock type, or by concentrations of organics, and even siliciclastic clay material. The dolostones appear to represent dolomitized lime wackestones, whereas the chert represents a silicified spiculitic packstone. Stylolitic seams, evidencing intense chemical compactional effects, are rare.

Quartz silt and sand are rarely encountered, as are muscovite mica particles. Plant remains (carbonaceous material, organics) are frequently noted. Glauconite pellets, which are indicative of marine deposition, are rare as well. A wide variety of allochems are present in these limestones and dolostones, including common echinoids/crinoids and pellets. Other allochems include undifferentiated micritic grains, various mollusks, brachipods, algal-coated grains, ooids, algal material, bryozoans, and chambered foraminifera (forams). Sponge spicules are locally abundant in the chert sample (P-1-139).

The original micritic groundmass in these samples (with the exception of the dolomitized samples) has typically been partially to entirely replaced by microspar (fine crystalline calcite). Similarly, fine-crystalline dolomite has entirely replaced depositional micrite in the dolostones (Q-2-141, Q-2-143, S-1-147). The chert sample (P-1-139) represents a silicified spiculitic packstone. Besides the extensive dolomite in restricted intervals, other common secondary (authigenic) components include blocky to coarse calcite spar, the most common cement within the limestones. Pyrite is found in a trace amount in many limestones as well. Anhydrite and bitumen are rare. Relatively coarse calcite spar fills moldic pores and is also found in interparticle areas.

Reservoir quality is related to the degree of effective pore space present in these rocks, and is typically very poor. Many samples; however, have moderate or better reservoir quality, including the dolostones (Q-2-141, Q-2-143, S-1-147) and chert (P-1-139), as well as limestone samples Q-2-129 and S-1-157. Overall, porosity averages 3% (by volume) in the sample suite as a whole (Appendix B). By rock type, this corresponds to 24% (by volume) in the chert, 20% (by volume) in the dolostones, and <2% (by volume) in the limestones. Porosity is somewhat better in the dolostones, due to volume changes related to recrystallization, and to allochem leaching in both the dolostones and the cherts. Overall for the sample suite, in order of decreasing abundance, pore types include moldic, intercrystalline, microscopic, interparticle, intraparticle, vuggy, fracture, and solution seam varieties.

APPENDIX A

PETROGRAPHIC ANALYTICAL PROCEDURES

Thin Section Petrographic Analysis

Samples for thin section analysis were submitted by the client. Preparation procedures involved using a vacuum impregnation method with blue-dyed epoxy. These thin sections were later stained for the carbonate minerals calcite and ankerite. Thin sections were covered with index oil and temporary cover slips, and analyzed using standard petrographic techniques. These techniques included point-count modal analysis of 200 counts per slide to determine porosity types and volumes.

Photomicrography, two (2) photos per sample, and descriptions of each were also performed.

APPENDIX B

THIN SECTION MODAL ANALYSIS DATA
POROSITY TYPES AND VOLUMES

Quantitative Porosity Determination
Thin Section Point Count Modal Analysis
URS Corporation

Sample ID.	Intercryst.	Moldic	Vuggy	Micro.*	Intraparticle	Interparticle	Fracture	Solution Seam	Total
O-1-132	0	0	0	0	0	0	0	0	0
O-1-134	0	0	0	0	0	0	0	0	0
O-1-136	0	0	0	0	0	0	0	0	0
O-1-139	0	0	0	0	0	0	0	0	0
O-1-142	0	0	0	0	0	0	0	0	0
O-1-145	0	0	0	0	0	0	0	0	0
O-1-147	0	0	0	tr	tr	0	0	0	tr
O-1-151	2	2	0	1	0	0	0	0	5
O-1-153	1	2	0	tr	0	0	tr	0	3
P-1-137	0	0	0	0	0	0	0	0	0
P-1-139	3	7	tr	4	tr	10	0	0	24
P-1-141	0	0	0	0	0	0	0	0	0
P-1-143	0	0	0	0	0	0	0	0	0
P-1-145	tr	0	0	0	0	0	0	0	tr
P-1-148	tr	0	0	0	0	tr	0	0	tr
P-1-151	tr	tr	0	3	tr	0	0	0	3
P-1-153	tr	0	1	tr	0	0	tr	0	1
P-1-155	0	0	0	0	0	0	0	0	0
P-1-158	0	0	0	0	0	0	0	0	0
Q-1-142	0	0	0	0	0	0	0	0	0
Q-I-145.5	0	0	0	0	0	0	0	0	0
Q-1-149.5	0	0	0	0	0	0	0	0	0
Q-1-151.5	0	0	0	0	0	0	0	0	0
Q-1-153.5	0	0	0	tr	0	0	0	0	tr
Q-1-155.5	0	0	0	tr	tr	tr	0	0	tr
Q-1-157	0	0	0	tr	tr	0	0	0	tr
Q-1-159	tr	0	0	0	0	0	0	0	tr
Q-1-161	tr	tr	0	3	0	0	0	0	3
Q-1-163	0	0	0	0	0	0	0	0	0

* Includes only those detectable in thin section, as indicated by bluish haze. Does not__ include very small micropores certain to be present within micrite and very fine microspar/dolomite. A66.

Quantitative Porosity Determination
Thin Section Point Count Modal Analysis
URS Corporation

Sample ID	Intercryst.	Moldic	Vuggy	Micro.*	Intraparticle	Interparticle	Fracture	Solution Seam	Total
Q-2-126	4	tr	0	6	tr	2	0	0	12
Q-2-129	7	1	0	2	tr	5	0	0	15
Q-2-131	1	tr	0	3	2	1	0	0	7
Q-2-133	tr	tr	0	tr	tr	0	0	0	tr
Q-2-135	0	0	0	0	0	0	0	0	0
Q-2-137	0	0	0	tr	tr	0	0	0	tr
Q-2-141	8	14	tr	2	0	tr	0	0	24
Q-2-143	6	13	tr	2	0	tr	0	0	21
R-1-142	0	tr	1	3	tr	0	0	0	4
R-1-144	2	4	tr	2	0	0	tr	0	8
R-1-146	tr	0	0	tr	0	0	0	0	tr
R-1-149	4	2	0	3	0	tr	0	tr	9
R-1-151	0	0	0	tr	tr	0	tr	0	tr
R-1-153	0	0	0	0	0	0	0	0	0
R-1-155	0	0	0	0	0	0	0	0	0
R-1-157	0	tr	0	tr	0	0	0	0	tr
R-1-159	1	tr	0	1	0	0	0	0	2
R-1-161	0	0	0	tr	tr	0	0	0	tr
R-1-163	0	0	0	0	0	0	0	0	0
S-1-147	5	6	1	2	tr	0	0	0	14
S-1-155	tr	tr	0	tr	0	0	tr	0	tr
S-1-157	5	4	0	3	0	0	0	0	12
S-1-159	0	tr	0	0	0	0	0	0	0
S-1-161	0	0	0	0	0	0	0	0	0
S-1-163	0	0	0	0	0	0	0	0	0
S-1-165	0	0	0	0	0	0	0	0	0

* Includes only those detectable in thin section, as indicated by bluish haze. Does not__ include very small micropores certain to be present within micrite and very fine microspar/dolomite. tr = trace (<0.5%).

APPENDIX C

THIN SECTION PHOTOMICROGRAPHS WITH DESCRIPTIVE CAPTIONS

URS Corporation
Sauget Area-2

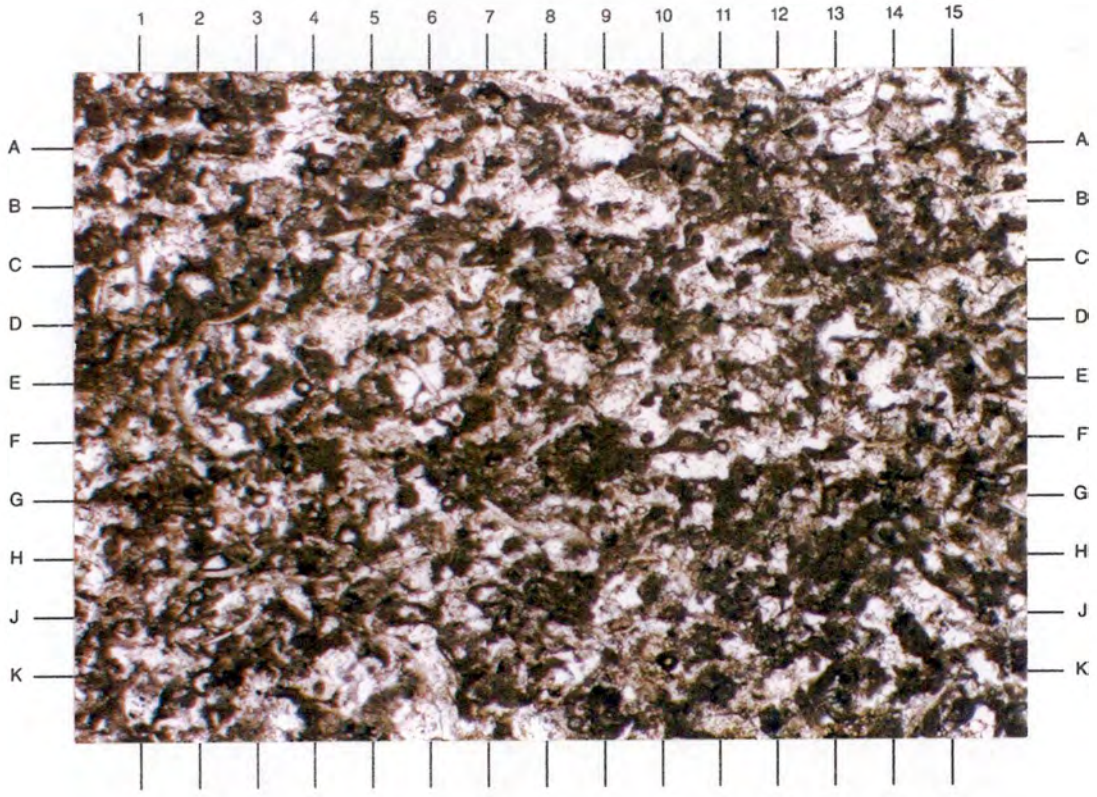
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-132

PLATE 1

Dunham Rock Type:	Pelletal Lime Packstone to Grainstone
Fabric & Matrix:	Micrite and microspar matrix in lower energy zones; higher energy grainstone areas are spar calcite-cemented
Cements/Replacement:	Spar calcite cement in cleaner zones; minor micrite matrix recrystallization to microspar
Allochems/Grains:	Abundant pellets (Plate 1B; B8); common undiff. micritized grains; rare miliolid and other chambered forams; minor pelecypod mollusks; minor crinoid debris; minor algal-coated grains; minor ostracod fragments (Plate 1B; F8) ; trace quartz silt
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X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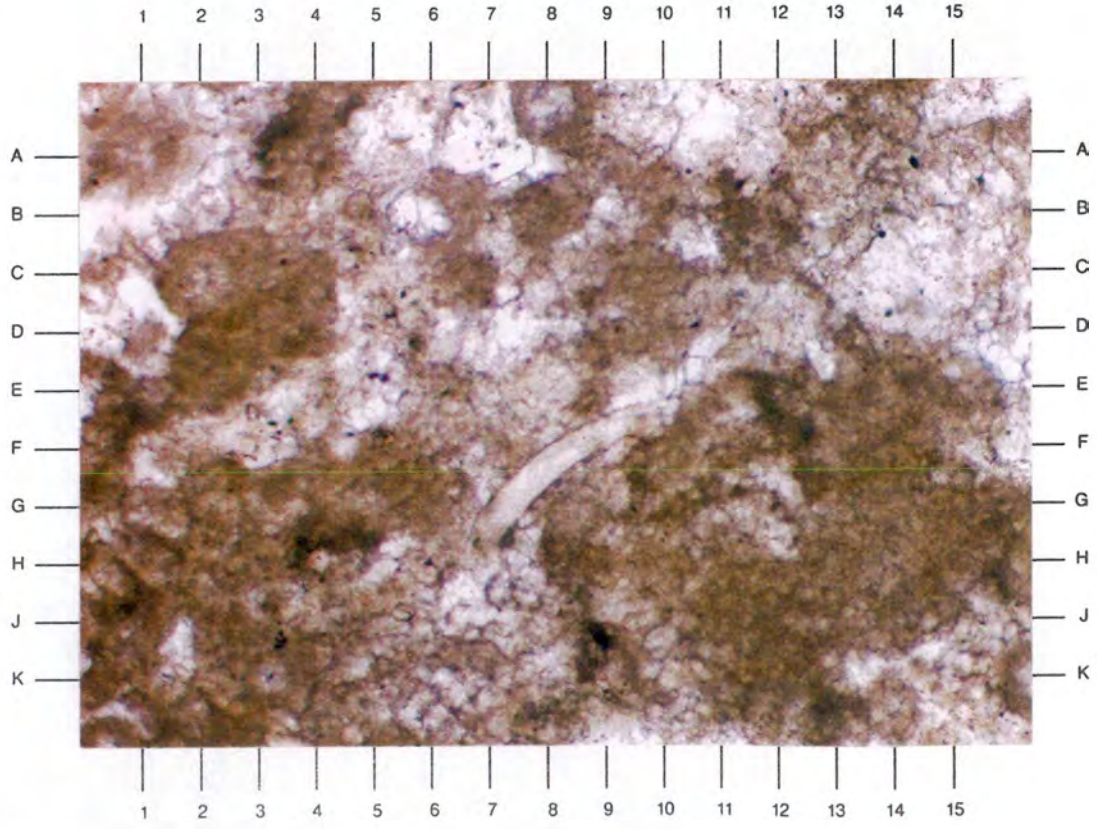
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B

URS Corporation
Sauget Area-2

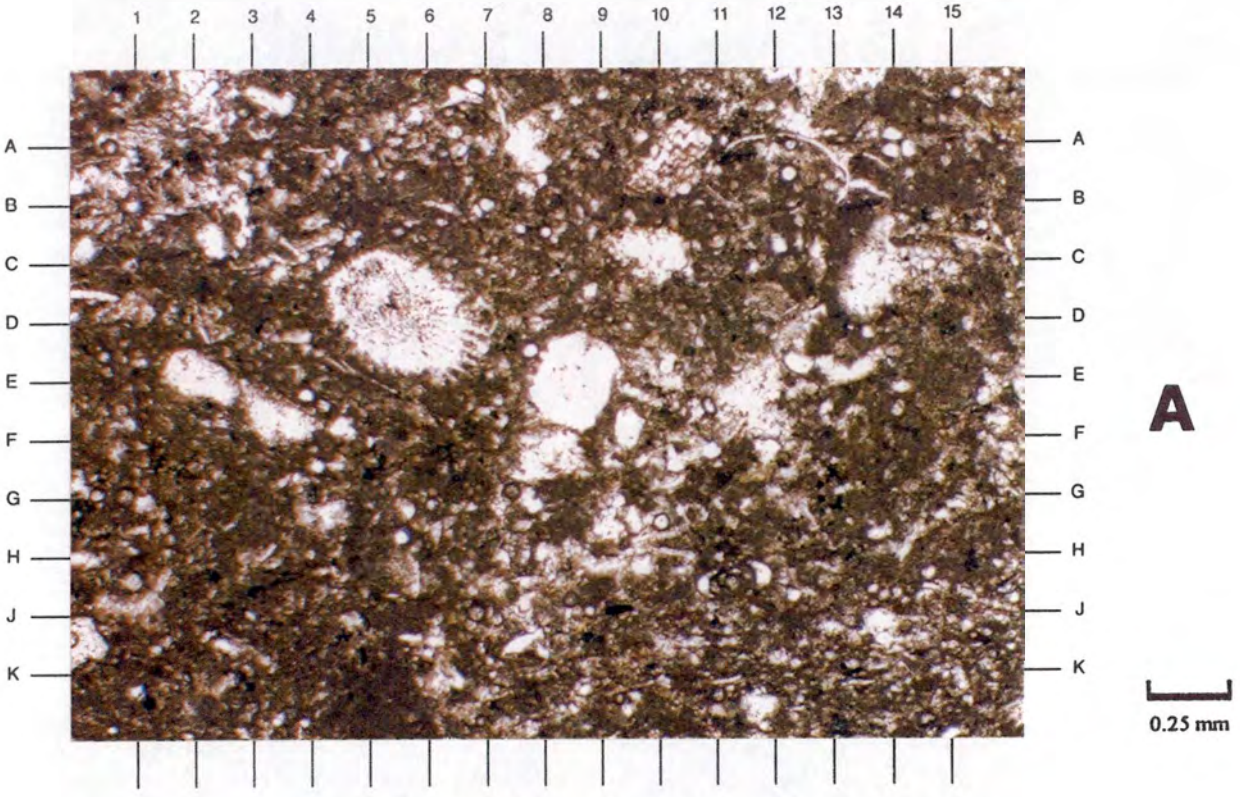
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-134

PLATE 2

Dunham Rock Type:	Lime packstone
Fabric & Matrix:	Abundant micritic matrix; much "psuedomatrix" resulting from compaction of micritic grains (pellets and others) giving rock a wackestone appearance in some areas
Cements/Replacement:	Minor spar calcite pore fill; rare isopachous calcite grain rims; trace megaquartz void fill
Allochems/Grains:	Abundant crinoids/echinoids (Plate 2A; D-E8); abundant pellets (Plate 2B; A12.5); common undiff. micritized grains; common algal-coated grains; minor mollusks; rare ostracods; rare quartz silt
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X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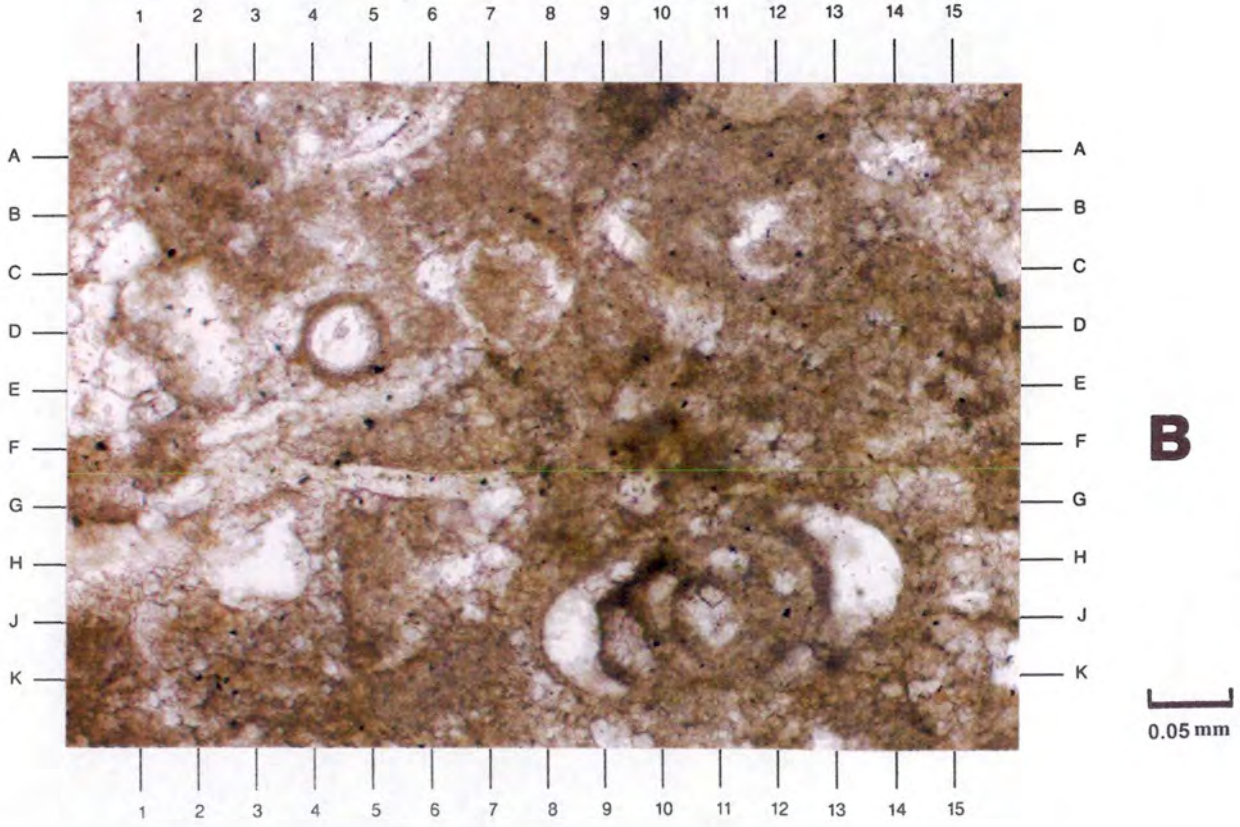
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0.05 mm

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-136

PLATE 3

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**Rare micritic matrix in sparse lower energy portions; moderately compacted prior to cementation**
Cements/Replacement:	**Early "dogtooth" spar (Plate 3B; H-J14.5) coats many grains; later blocky to coarse spar (Plate 3B; E-F10.5) completely fills intergranular pore space**
Allochems/Grains:	**Mainly micritic types; including common intraclasts (Plate 3A; K8); common undiff. micritic grains (Plate 3A; A2); minor pellets; minor ooids, minor mollusks; rare chambered forams (D8.5); common crinoid plates/stems**
Porosity & Reservoir Quality:	**0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains; reservoir quality is considered very poor, due to a lack of effective pore space**
Porosity Types:	**Micropores likely associated with micrite and microspar**
Magnification:	**A: 40X B: 200X**

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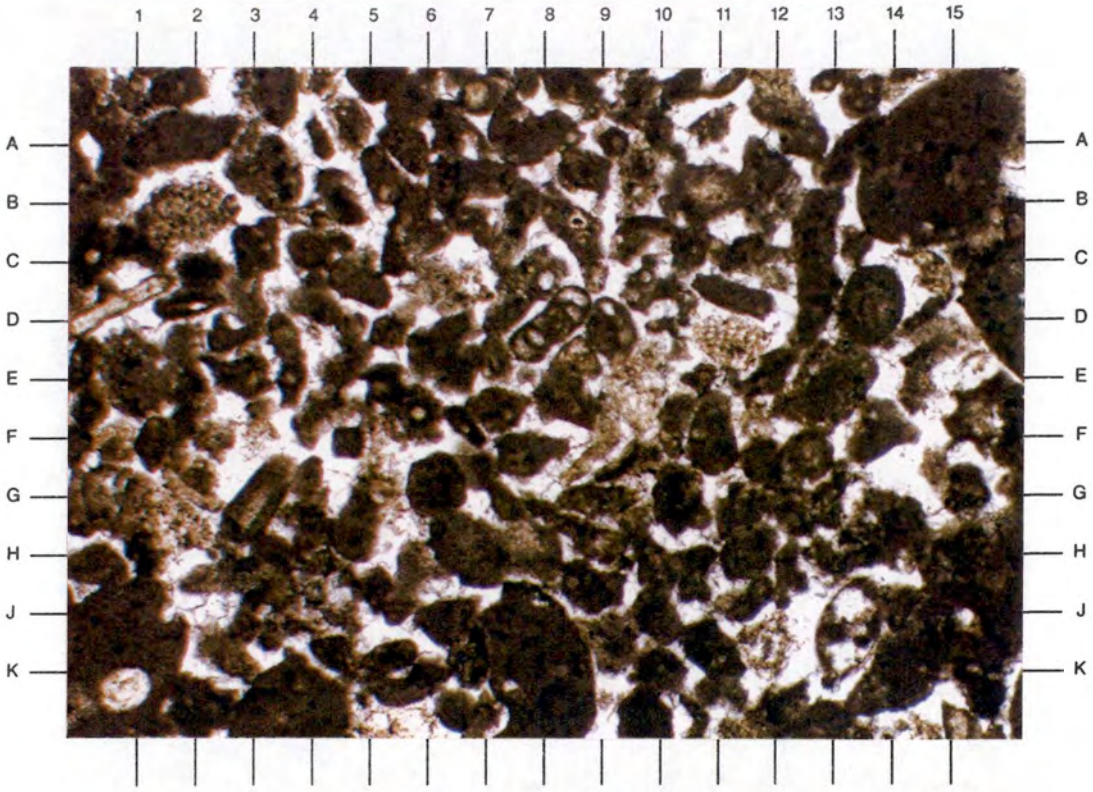

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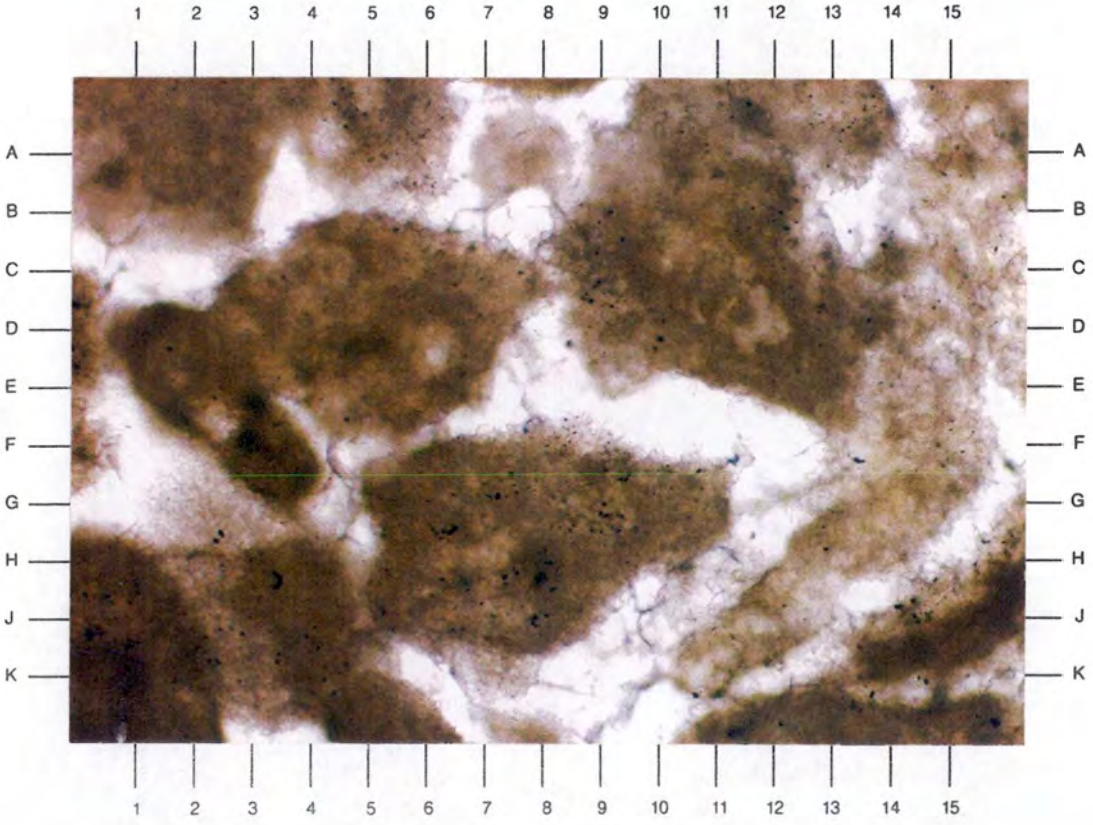

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-139

PLATE 4

Dunham Rock Type:	Lime Packstone to Grainstone
Fabric & Matrix:	Packstone areas contain micritic matrix
Cements/Replacement:	Common blocky calcite cement (Plate 4B; A-B10.5) in grainstone areas
Allochems/Grains:	Common crinoids (Plate 4A; H-J14.5); common, undifferentiated micritic grains (Plate 4A; A9); minor mollusks (Plate 4A; A-B11.5)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X

OMNI Laboratories, Inc.

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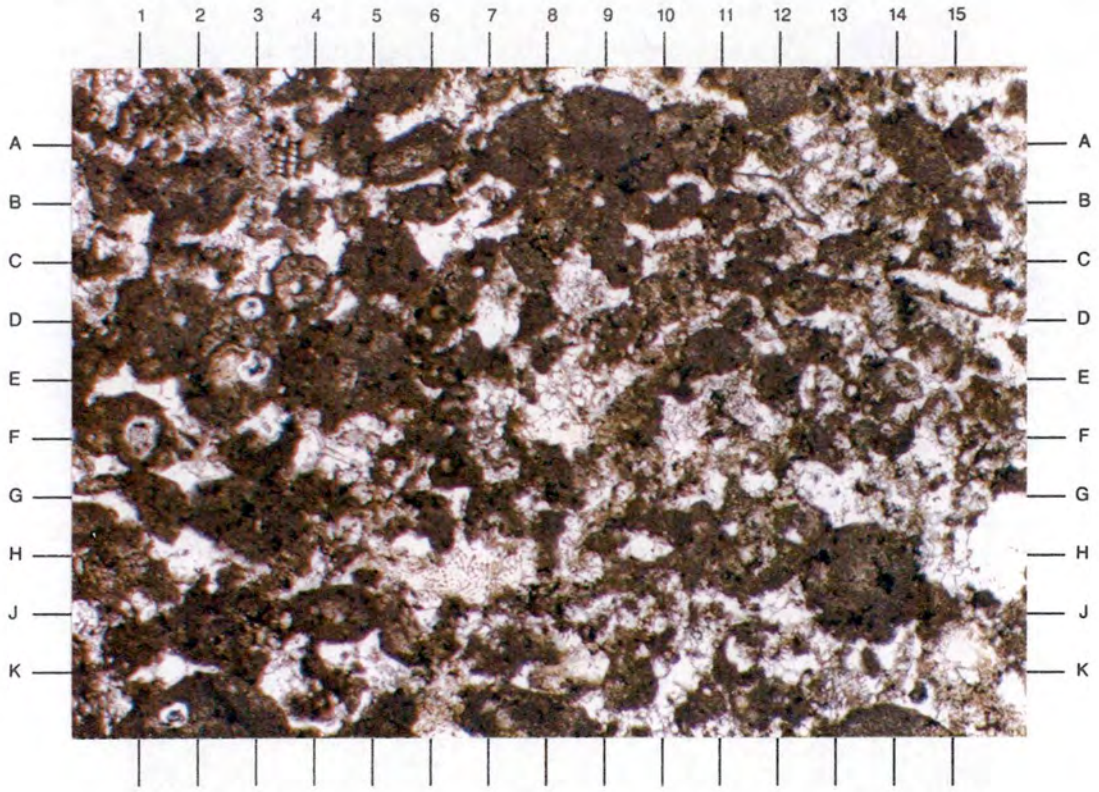

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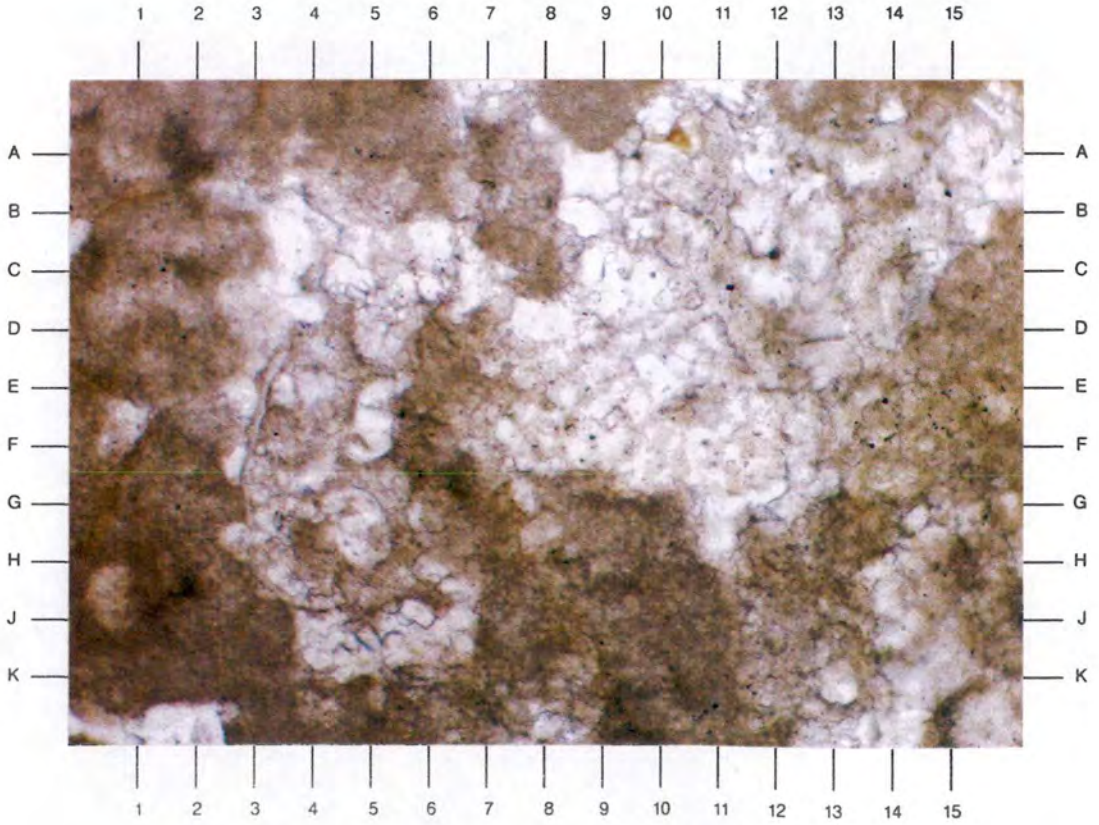

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-142

PLATE 5

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Micritic matrix has mainly been replaced by microspar (Plate 5B; K5)
Cements/Replacement:	Common blocky calcite spar (Plate 5B; D-E7.5); rare pyrite (Plate 5B; K13)
Allochems/Grains:	Common crinoids (Plate 5A; J2); common pellets (Plate 5A; D-E15.5); minor mollusks (Plate 5A; B6,D-E1)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X

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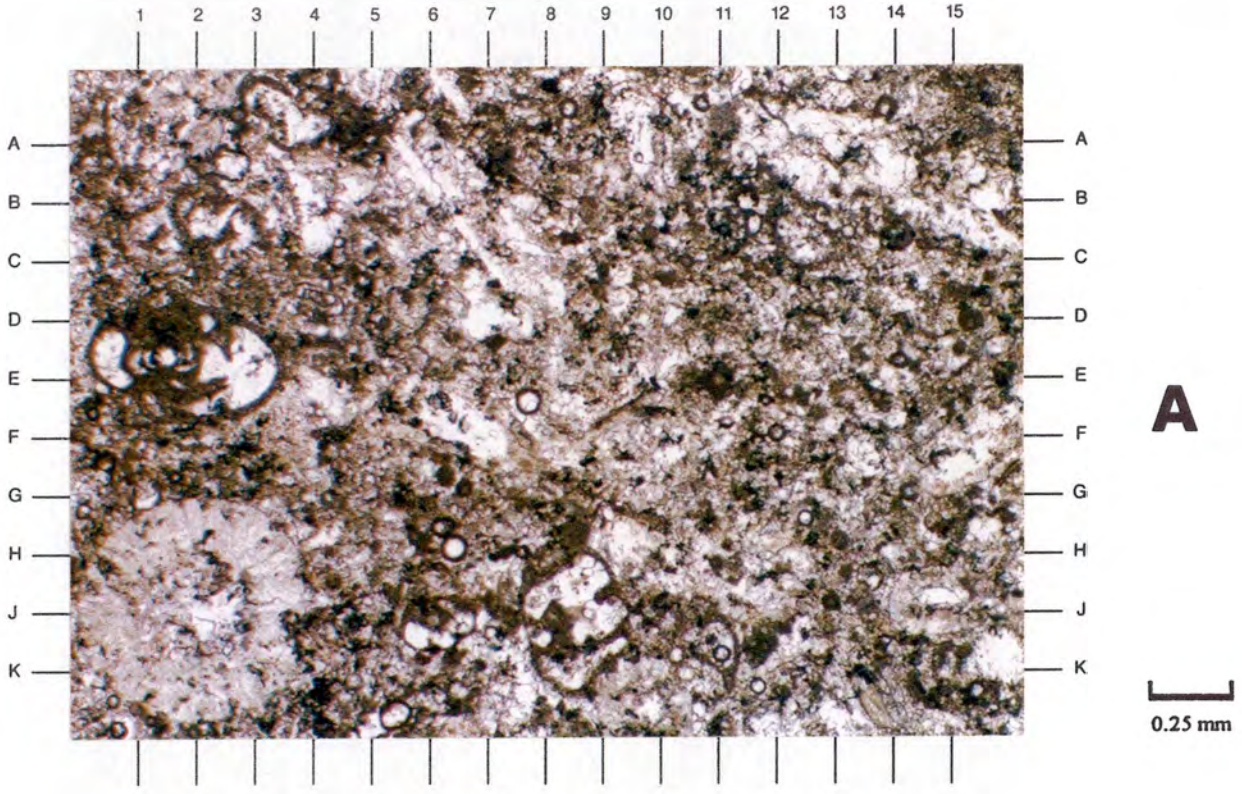

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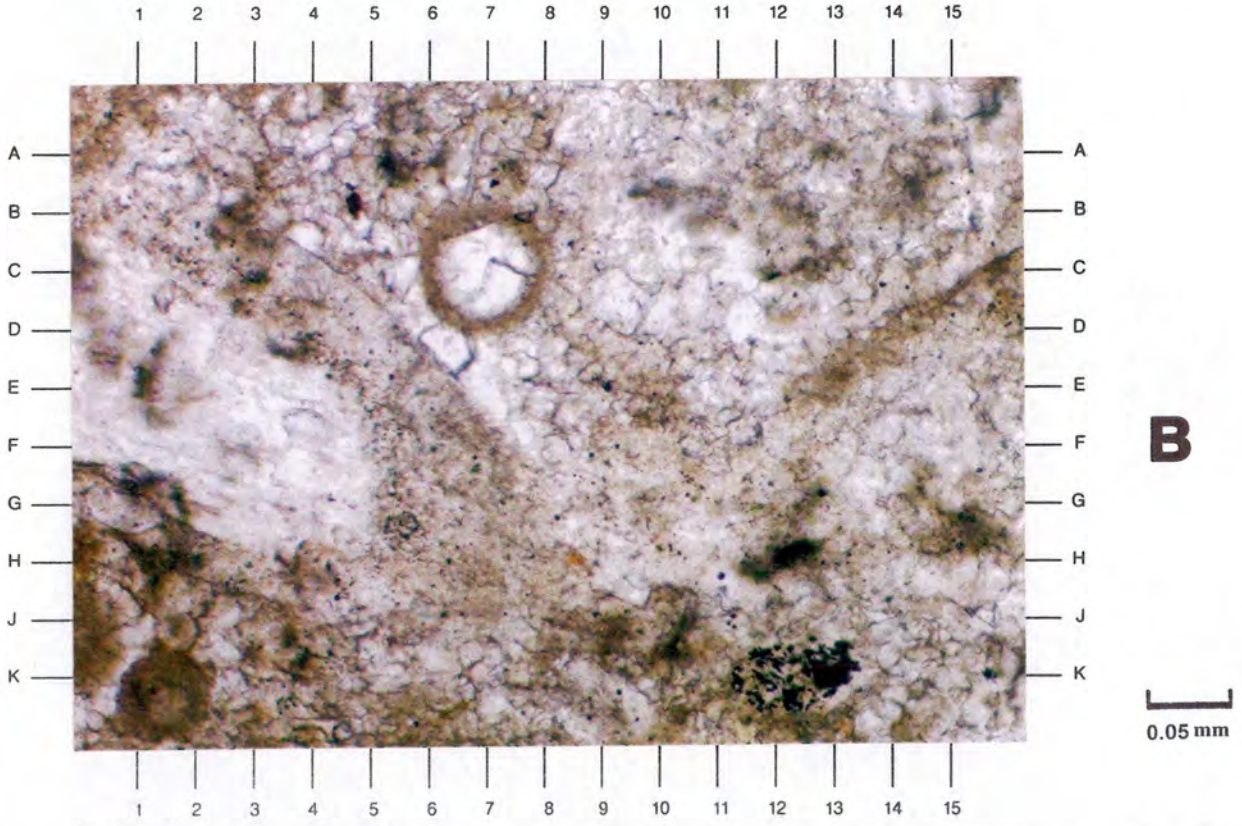


B

URS Corporation
Sauget Area-2

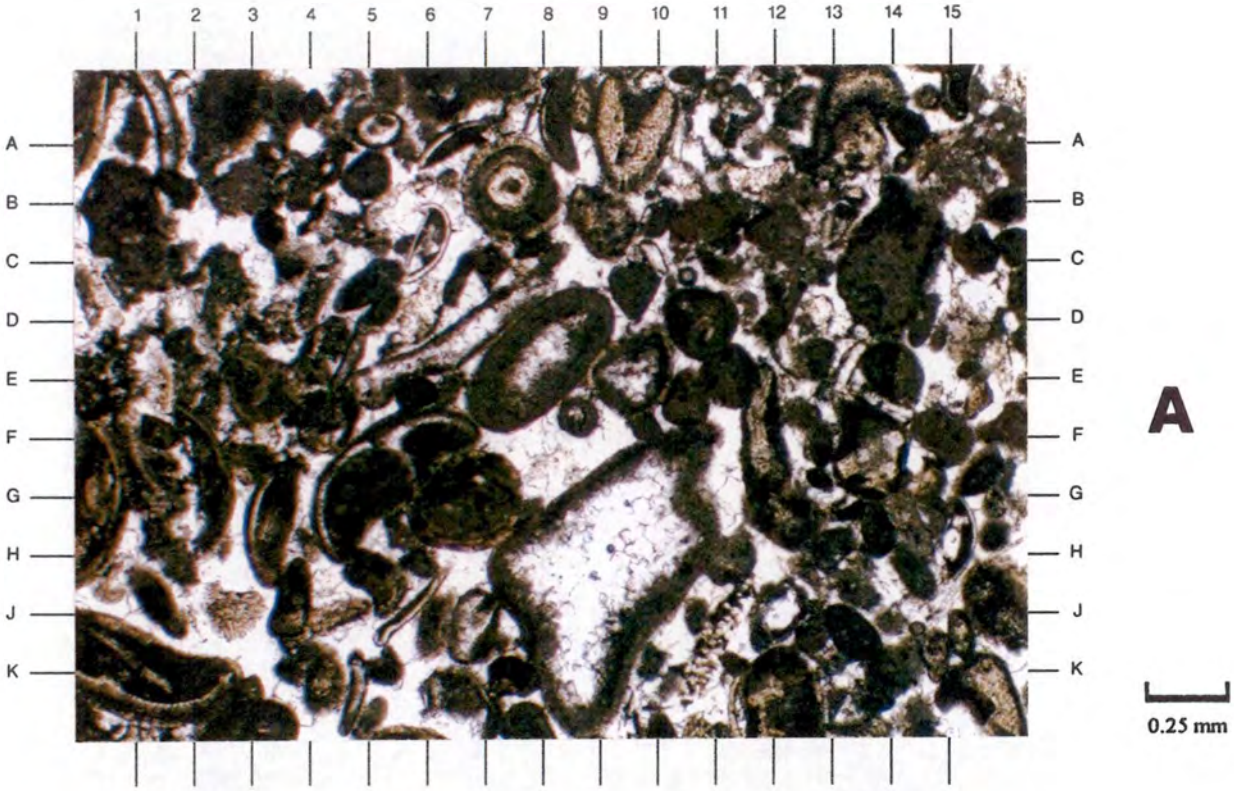
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-145

PLATE 6

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**This clean rock contains little or no matrix, and represents a high energy environment of deposition**
Cements/Replacement:	**Abundant blocky to coarse calcite spar (Plate 6B; F-G5)**
Allochems/Grains:	**Common echinoderm spines (Plate 6A; B7.5), crinoid plates (Plate 6A; H9), and echinoids (Plate 6A; A9.5); minor ooids (Plate 6A; G7), mollusks (Plate 6A; D-E6.5), and undifferentiated micritic clasts (Plate 6A; C14)**
Porosity & Reservoir Quality:	**0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space**
Porosity Types:	**Micropores likely associated with micrite and microspar**
Magnification:	**A: 40X B: 200X**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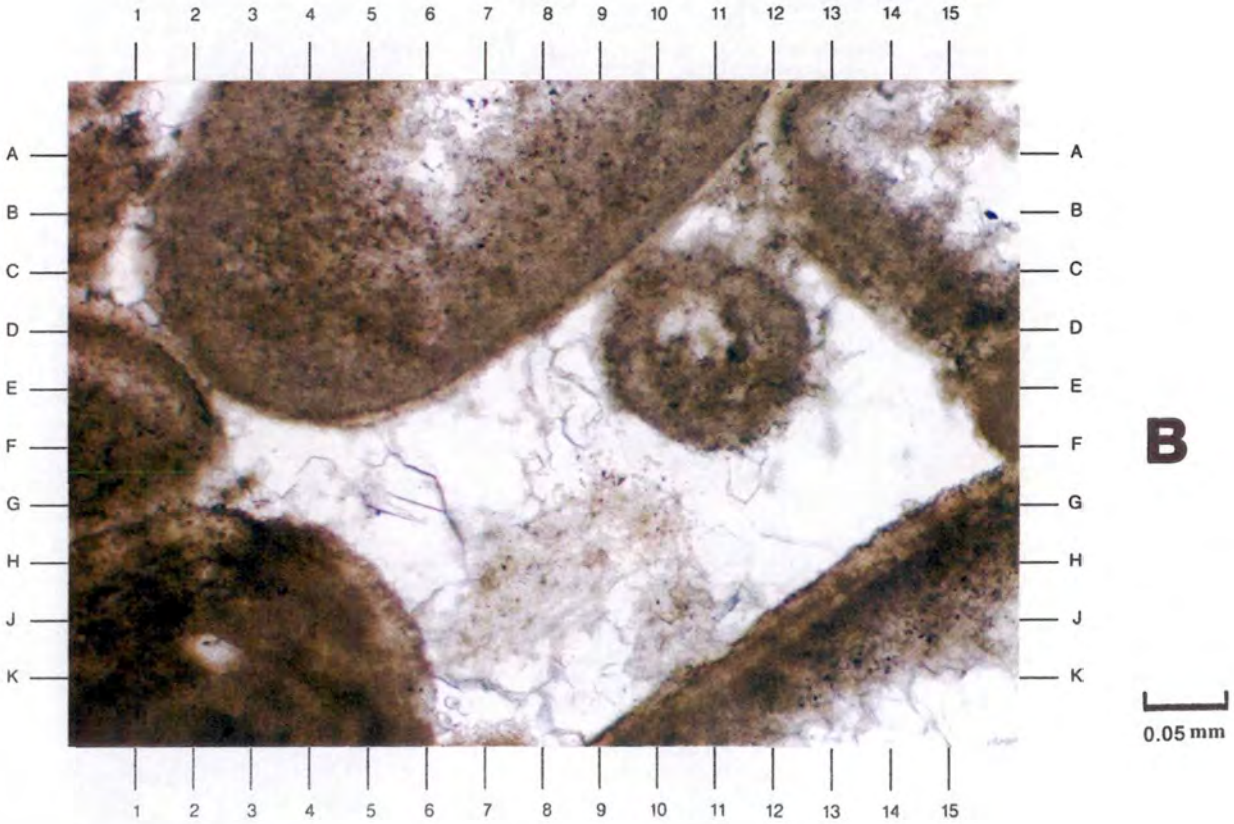
A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A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-147

PLATE 7

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	Minor micrite (Plate 7A; G-H14) is noted in limited regions
Cements/Replacement:	Moderate amounts of calcite spar cement (Plate 7B; C7)
Allochems/Grains:	Echinoderm spines (Plate 7A; C-D5), crinoid plates (Plate 7A; G-H12.5), and other allochems act as nuclei of ooids (Plate 7A; C-D8); minor echinoid plates (Plate 7A; K1)
Porosity & Reservoir Quality:	A trace amount of intraparticle pore space is noted; microporosity (trace) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Intraparticle pores not observed in this view; micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X

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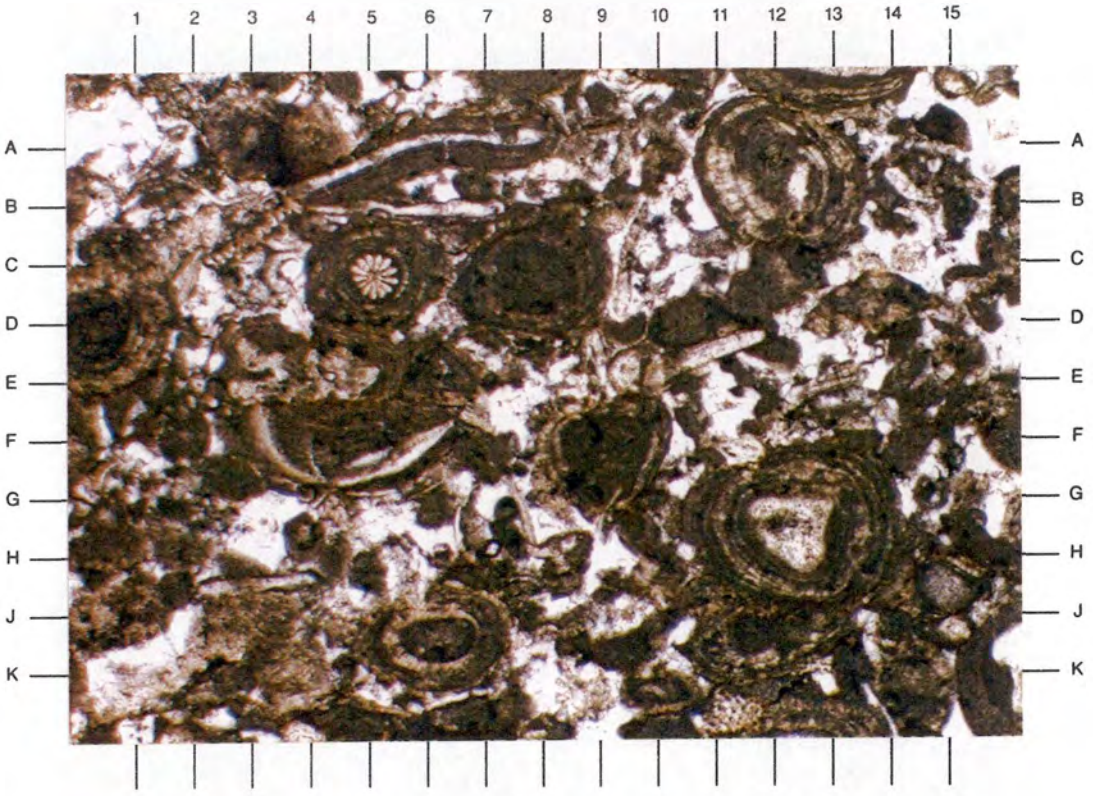

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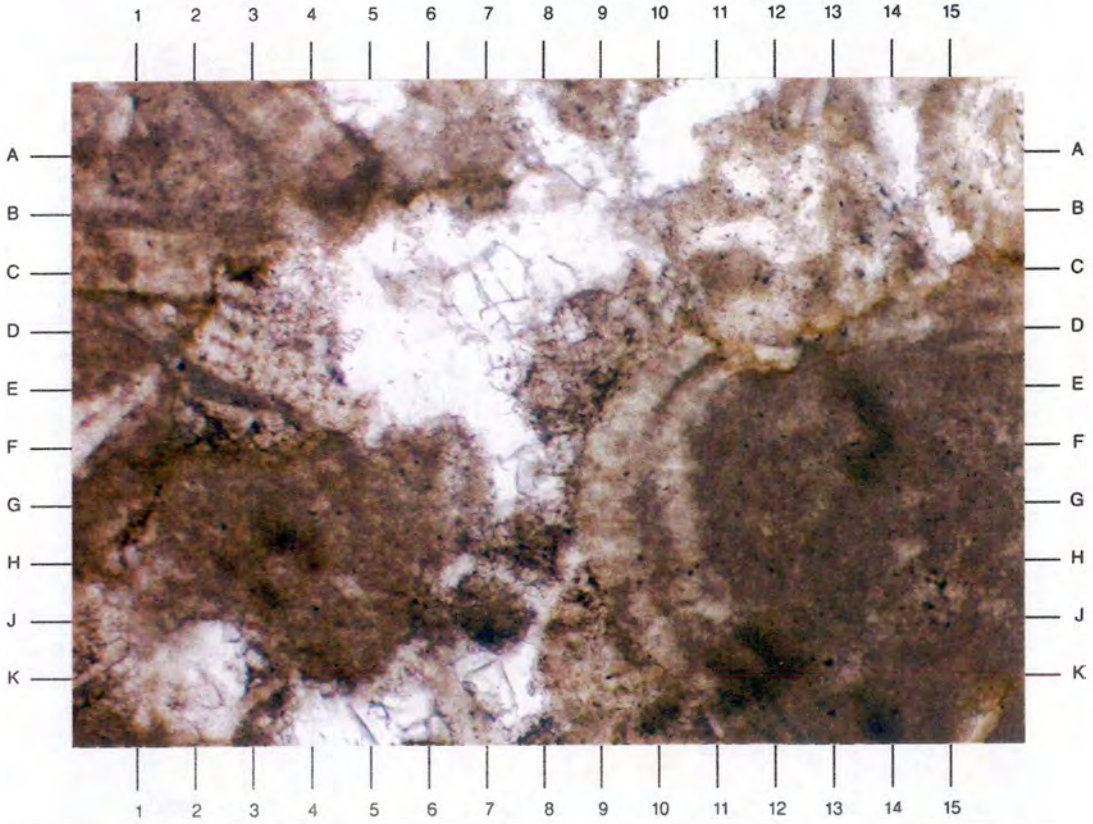

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URS Corporation
Sauget Area-2

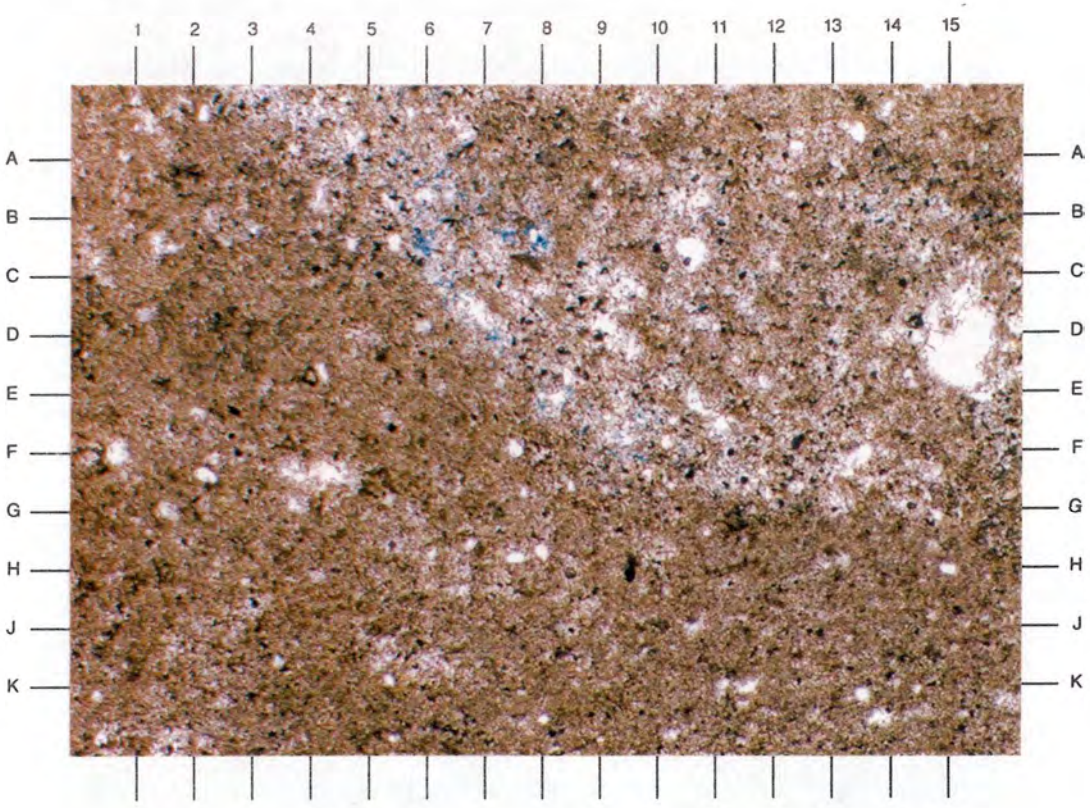
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-151

PLATE 8

Dunham Rock Type:	Lime Wackestone
Fabric & Matrix:	Abundant depositional micritic matrix has mainly been replaced by microspar (Plate 8B; G2.5); some "zoning" of porosity and filled moldic pores (upper right)
Cements/Replacement:	Calcite microspar replacement (Plate 8B; D-E15) is prevalent; minor anhydrite (Plate 8B; D9); minor calcite blocky spar (Plate 8B; B9.5)
Allochems/Grains:	Mostly obscured by microspar calcite replacement; minor "ghost" pellets (Plate 8B; D-E2.5) detected
Porosity & Reservoir Quality:	Minor visible porosity includes moldic, intercrystalline, and intraparticle types; microporosity (approx. 3% by volume) is associated with micritic grains and matrix; reservoir quality is considered very poor to poor due to only very minor effective pore space
Porosity Types:	4% (by volume) total porosity; intercrystalline pores (Plate 8B; D-E15) area have a moldic origin; micropores are associated with microspar
Magnification:	A: 40X B: 200X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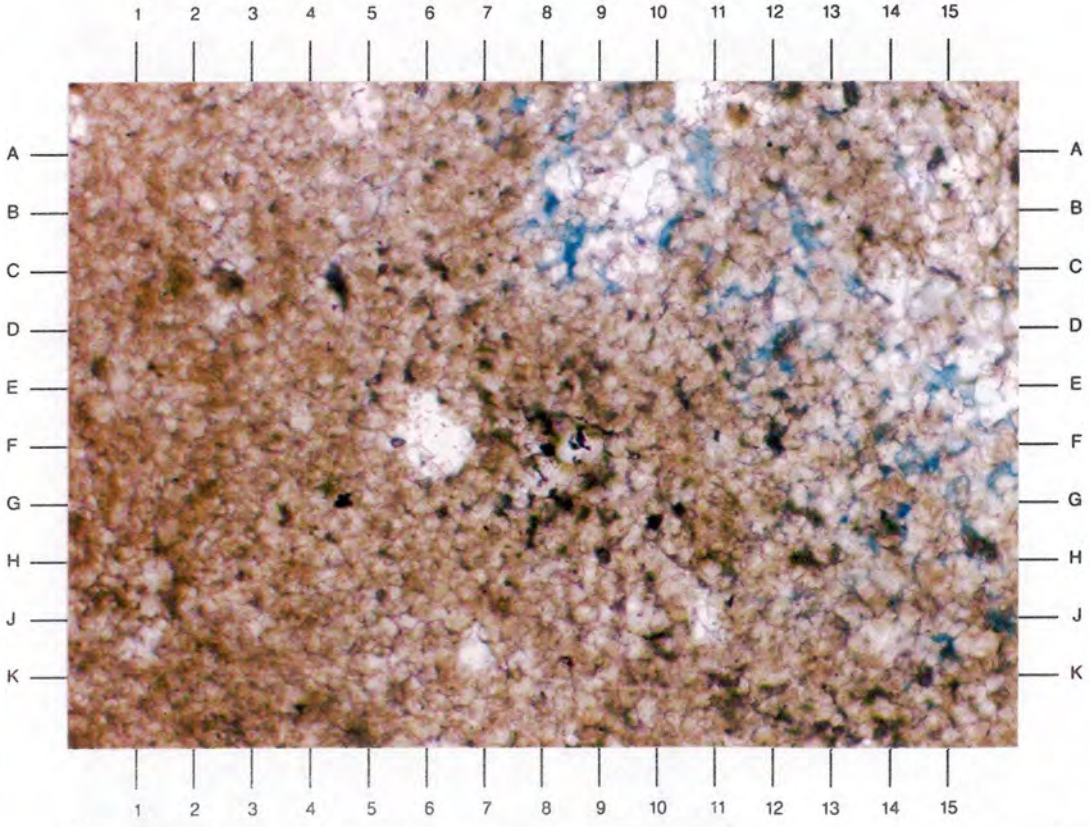
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B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: O-1-153

PLATE 9

Dunham Rock Type:	**Lime Wackestone**
Fabric & Matrix:	**Abundant micrite has been replaced by microspar (Plate 9B; D10)**
Cements/Replacement:	**Abundant microspar (Plate 9B; pink material); rare replacement pyrite (Plate 9B; H7.5)**
Allochems/Grains:	**Pellets (Plate 9B; B-C10.5); most allochems "hidden" by replacement**
Porosity & Reservoir Quality:	**3% (by volume) visible porosity includes moldic and intercrystalline types; microporosity (approx. a trace amount) is associated with micritic grains and matrix; a trace amount of fracture porosity; reservoir quality is considered very poor to poor, due to a scarcity of effective pore space**
Porosity Types:	**3% (by volume) total porosity; elongate moldic pores (Plate 9B; C2); small moldic pores (Plate 9B; G13); intercrystalline pores; fracture porosity; micropores**
Magnification:	**A: 40X B: 200X**

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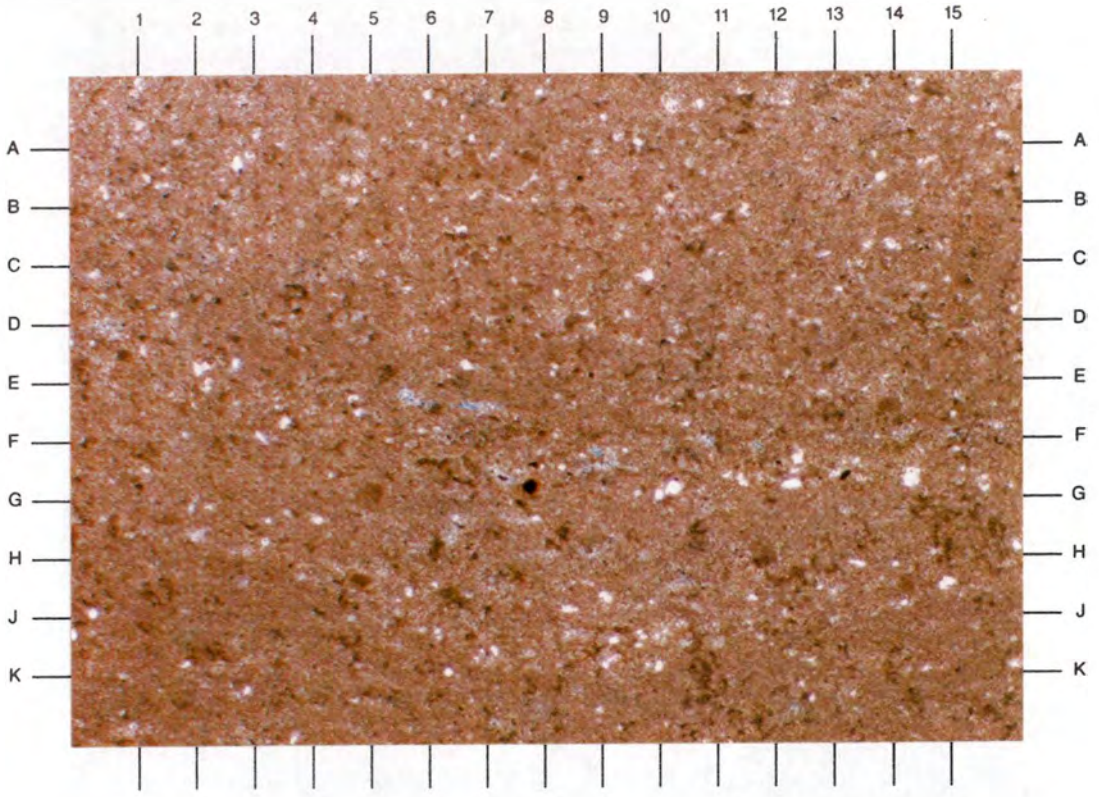

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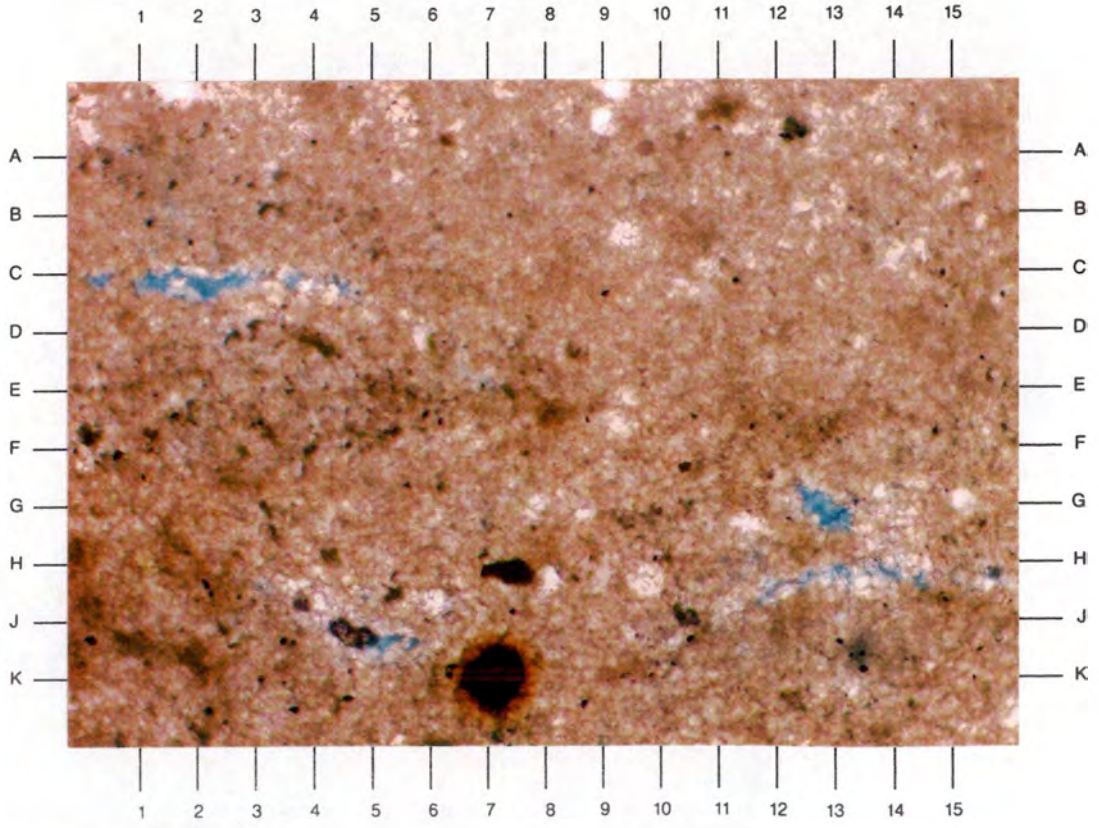

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URS Corporation
Sauget Area-2

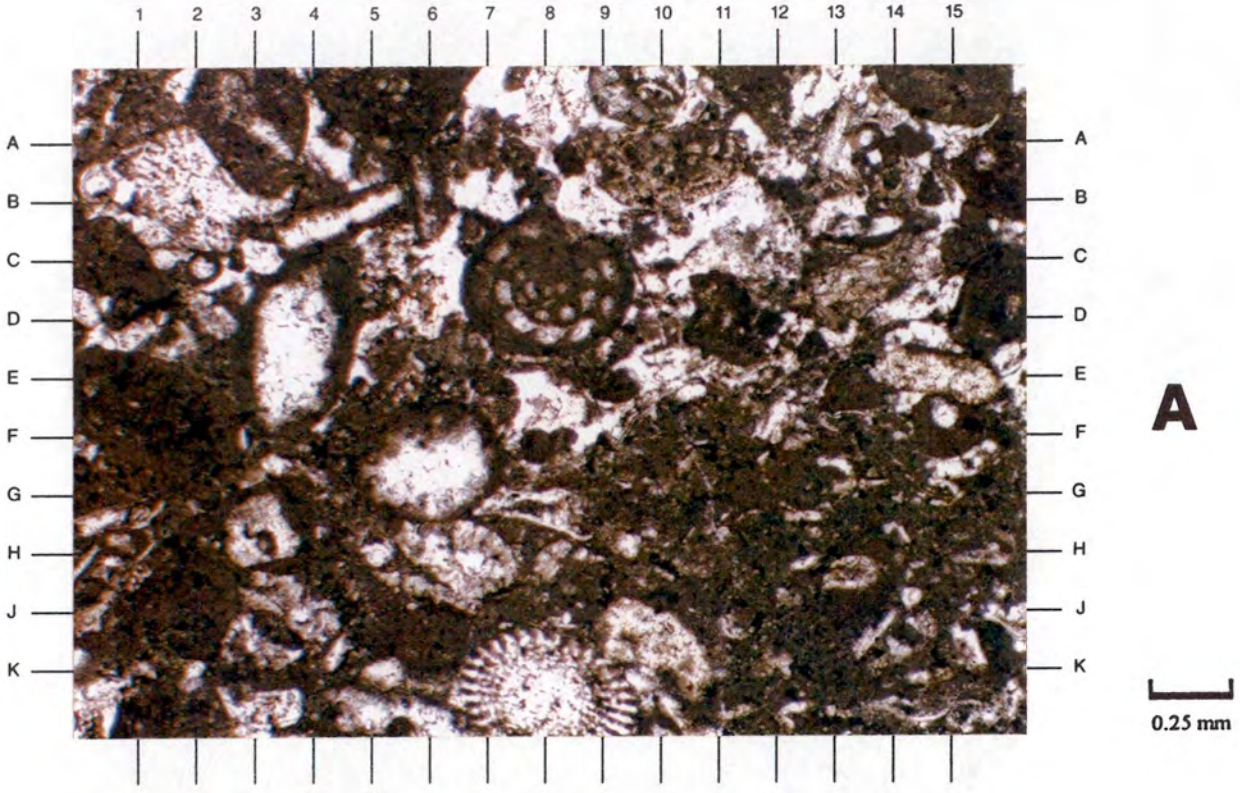
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-137

PLATE 10

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Micrite (Plate 10 A; G-H11.5) surrounds allochems in the majority of this sample
Cements/Replacement:	Calcite spar (Plate 10B; B-C9); rare pyrite (Plate 10B; H-J12)
Allochems/Grains:	A variety of allochems includes chambered forams (Plate 10A; C8), echinoderm spines (Plate 10B; K8), crinoid plates (Plate 10A; D-E3.5), undifferentiated micritic grains (Plate 10A; F1), and pellets (Plate 10B; G8)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores are likely associated with micritic matrix and grains
Magnification:	A: 40X B: 200X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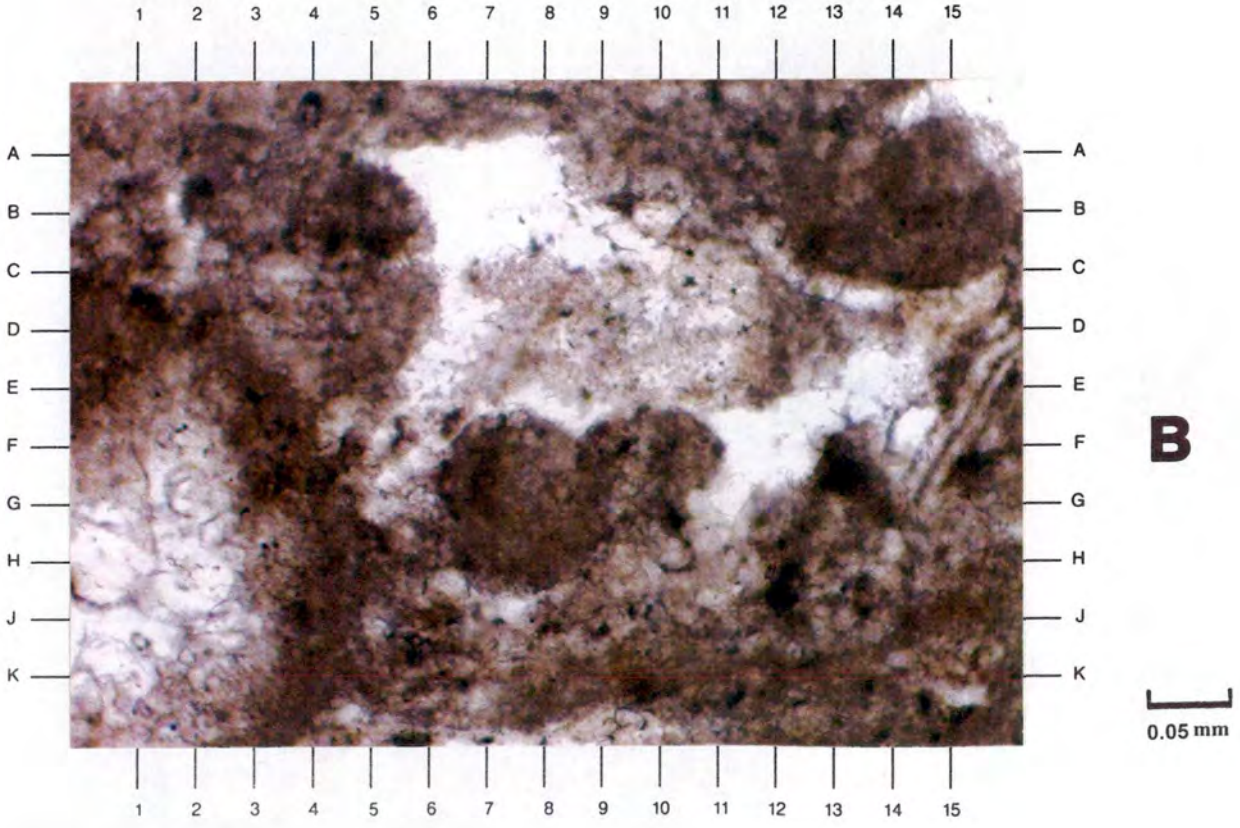
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URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-139

PLATE 11

Rock Type:	Chert
Fabric & Matrix:	Minor micrite/microsparite remain in portions of the sample (Plate 11A; lower right); groundmass composed mainly of chert
Cements/Replacement:	Extensive silica replacement of what was originally a spiculitic lime packstone
Allochems/Grains:	Sponge spicules (Plate 11B; H9) entirely silica-replaced; other silica-replaced fossils of unknown origin (Plate 11A; E-F10.5; D13)
Porosity & Reservoir Quality:	Reservoir quality moderate to high; porosity development related to silicification of rock groundmass and common dissolution; visible pores and micropores both common
Porosity Types:	24% (by volume) total porosity; interparticle pore space (Plate 11B; D-E9.5); moldic pores (Plate 11B; A-B14.5); intercrystalline pores (Plate 11B; J4.5); intraparticle pores (Plate 11B; H-J15.5); a trace of vuggy pore space observed elsewhere; common microporosity (Plate 11B; J-K14)
Magnification:	A: 40X B: 200X

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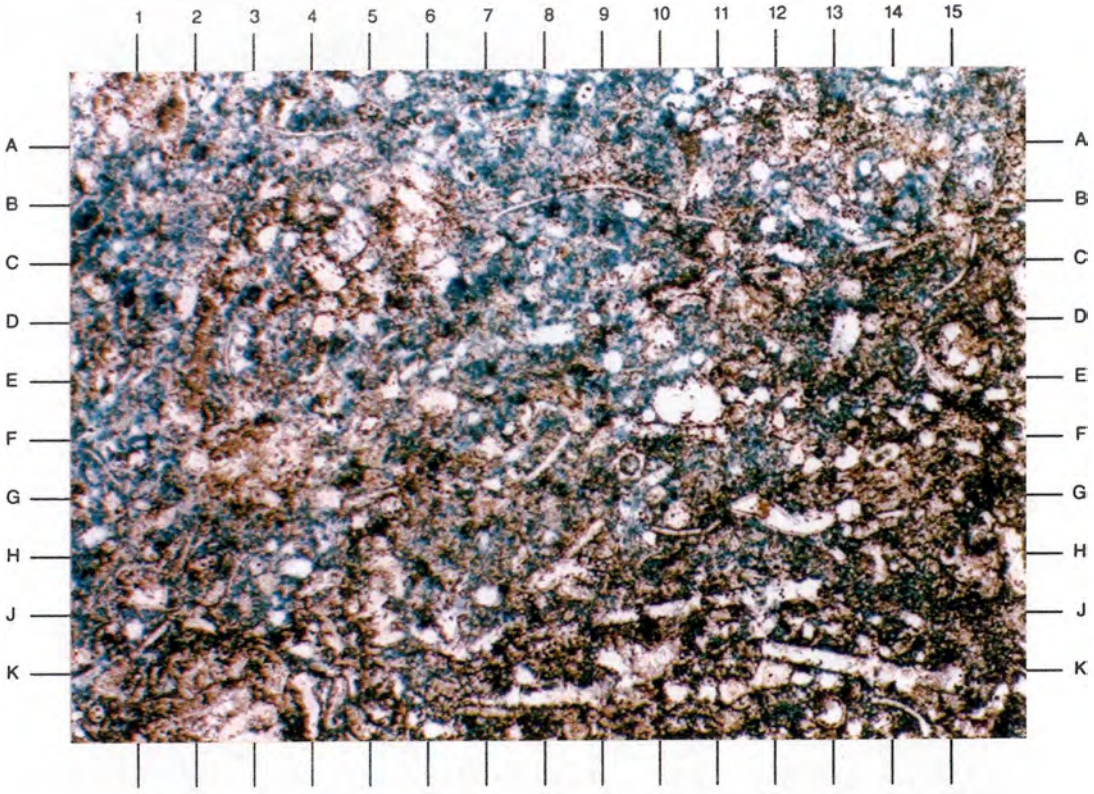

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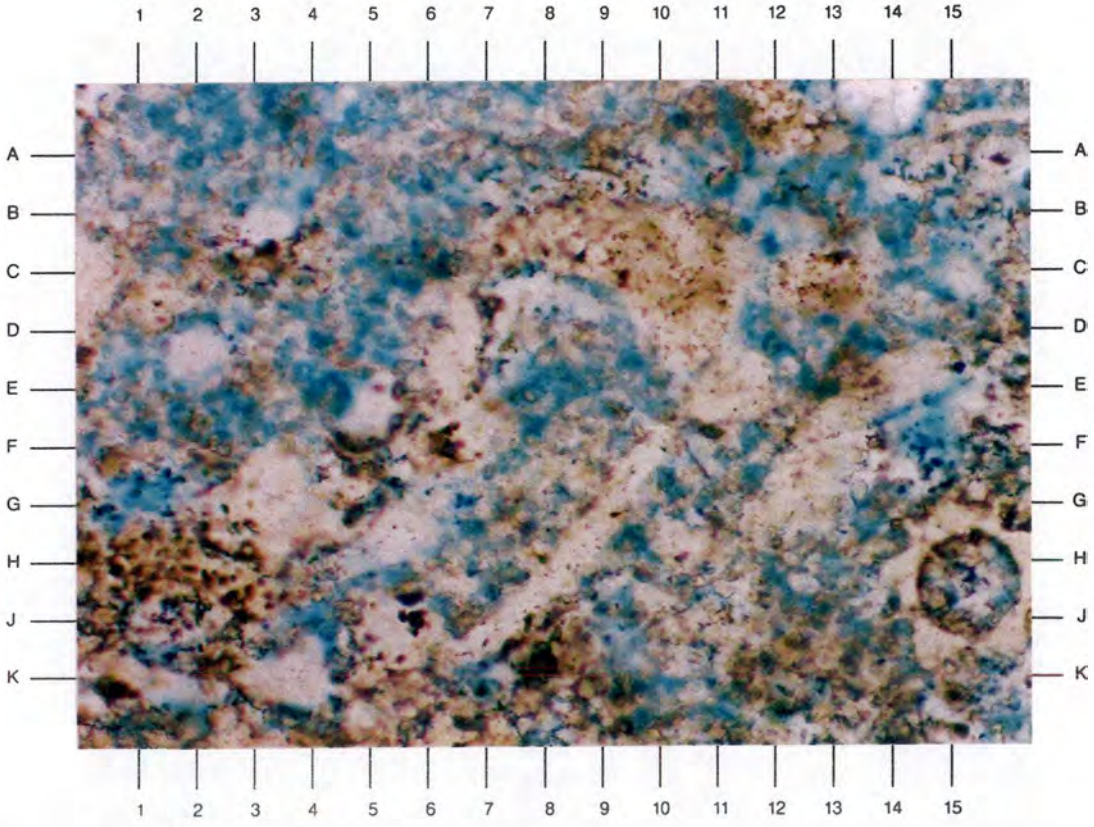

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URS Corporation
Sauget Area-2

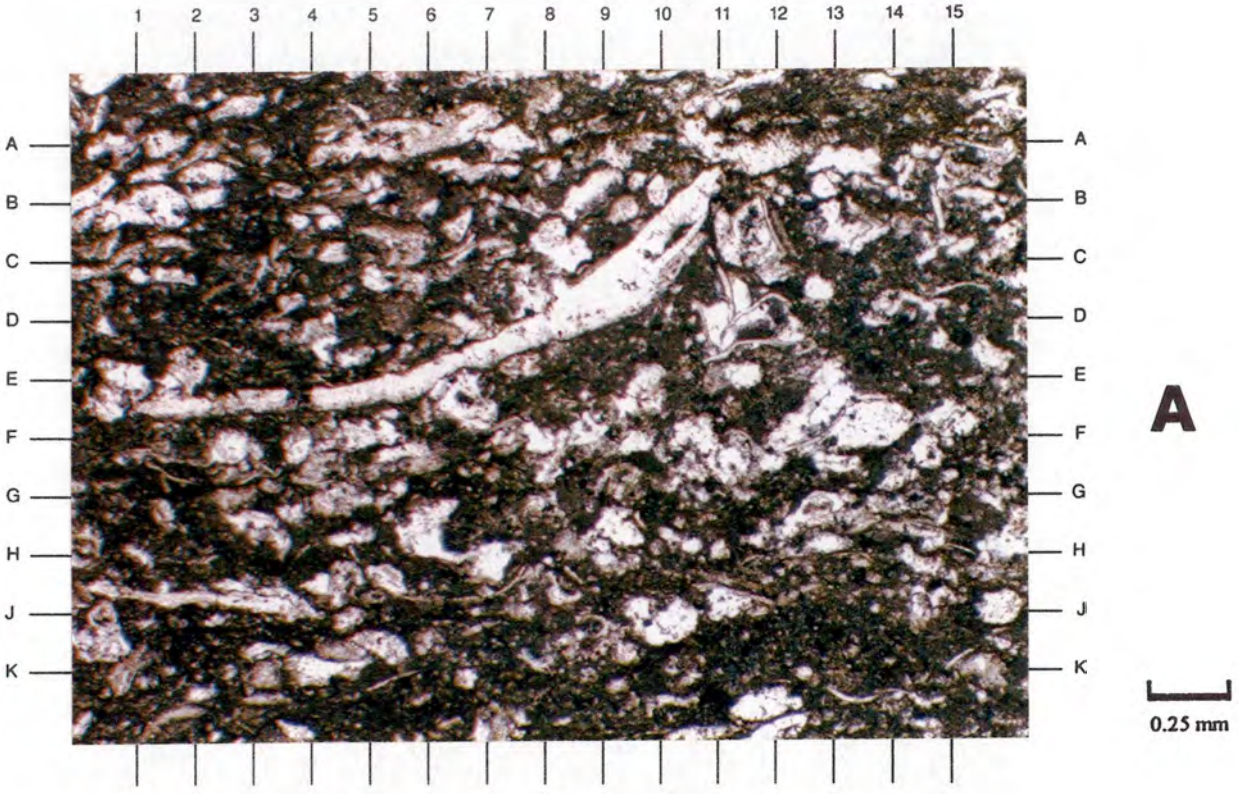
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-141

PLATE 12

Dunham Rock Type:	Lime Packstone (minor Wackestone)
Fabric & Matrix:	Micrite (Plate 12A; brownish groundmass) is pervasive
Cements/Replacement:	Isolated areas of microspar-replaced micrite; minor pyrite replacement (Plate 12B; H11)
Allochems/Grains:	Large, elongate brachipod fragment (trending E-F1 to B11 of Plate 12A); common crinoid fragments (Plate 12A; E-F14), mollusks (Plate 12A; A6) and pellets (Plate 12A; B-C9)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores are likely associated with micritic matrix and grains
Magnification:	A: 40X B: 200X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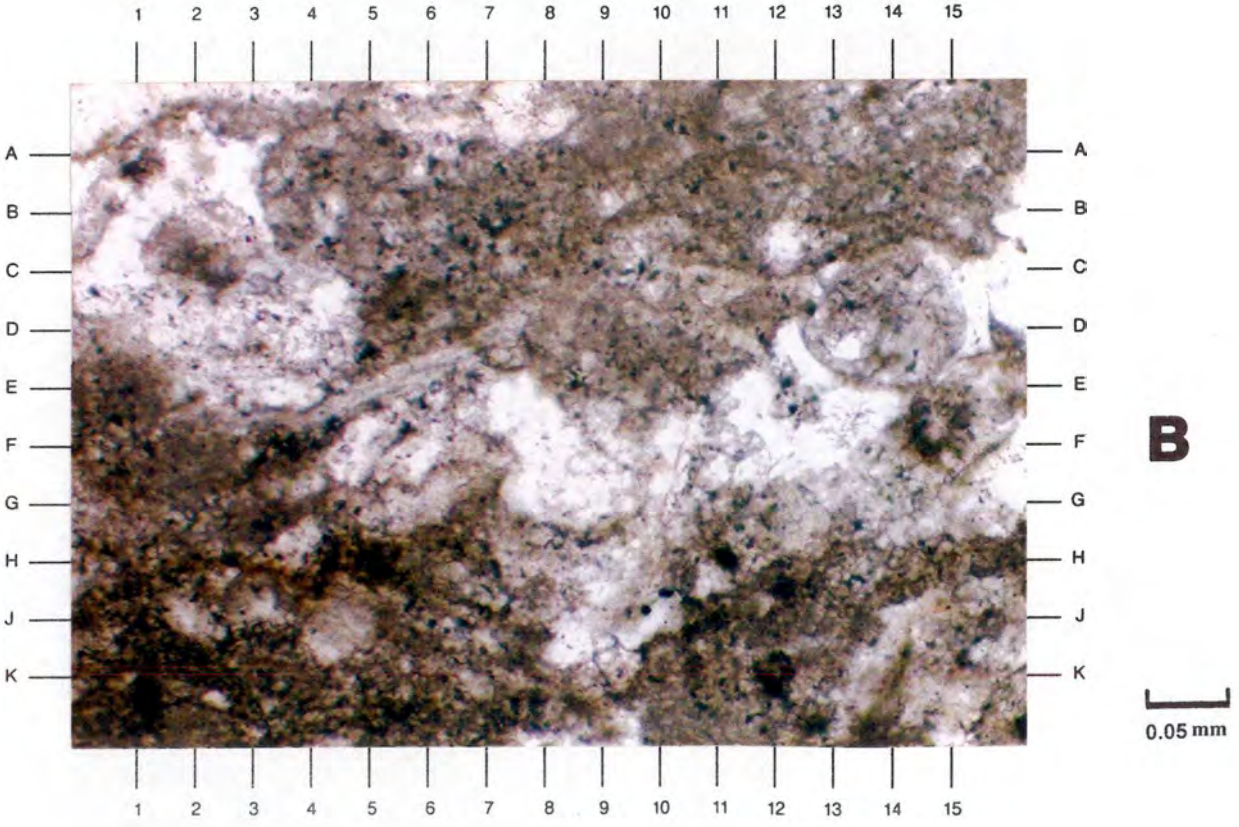
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URS Corporation
Sauget Area-2

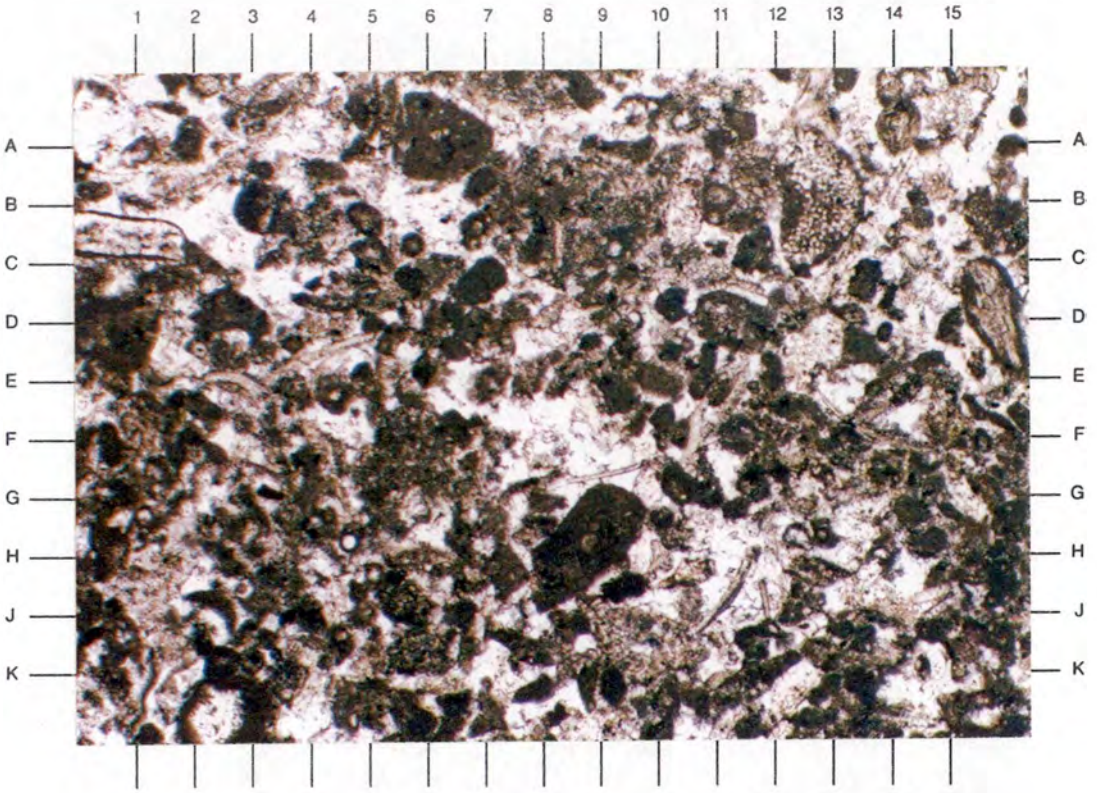
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-143

PLATE 13

Dunham Rock Type:	Lime Packstone/Grainstone
Fabric & Matrix:	Micrite common in packstone fabric areas (such as around B8 in Plate 13A)
Cements/Replacement:	Common blocky to coarse calcite spar (Plate 13B; D12)
Allochems/Grains:	Note the micritic intraclast (Plate 13A; A6); other allochems include mollusks (Plate 13A; D15.5), pellets (Plate 13A; A-B7), and ooids (Plate 13A; A14)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Micropores are likely associated with micritic matrix and grains
Magnification:	A: 40X B: 200X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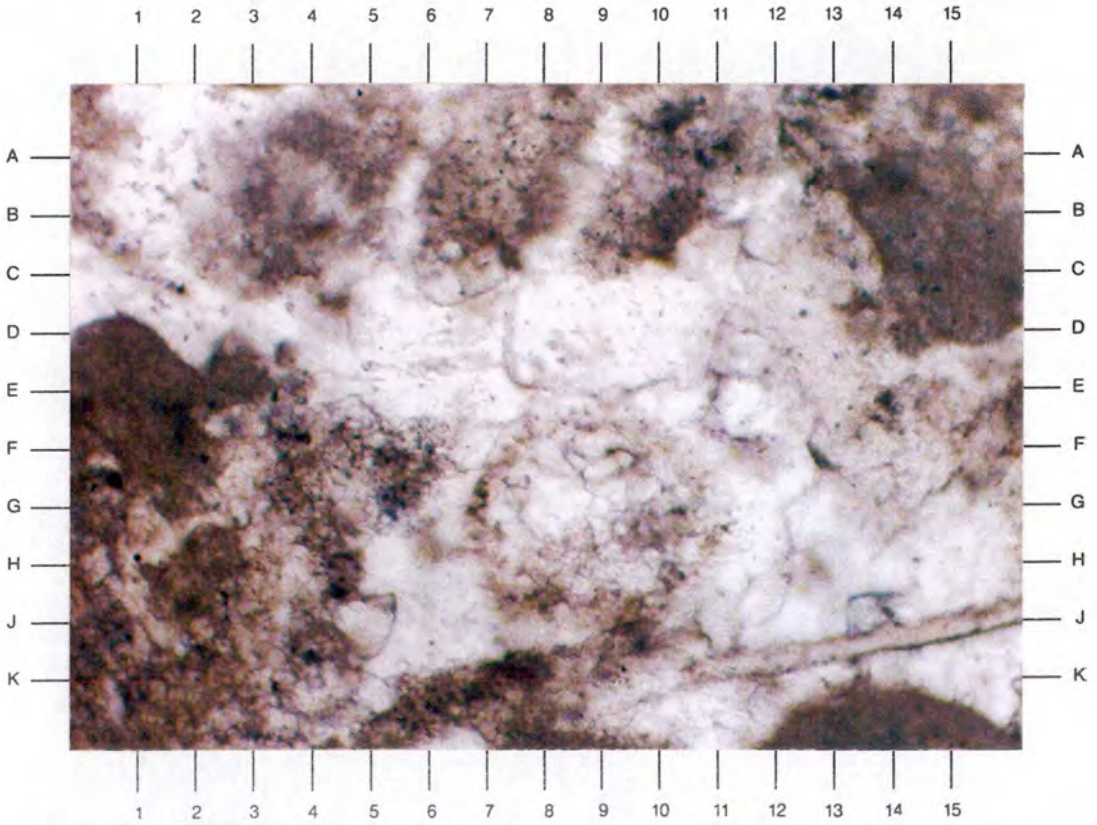
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0.05 mm

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URS Corporation
Sauget Area-2

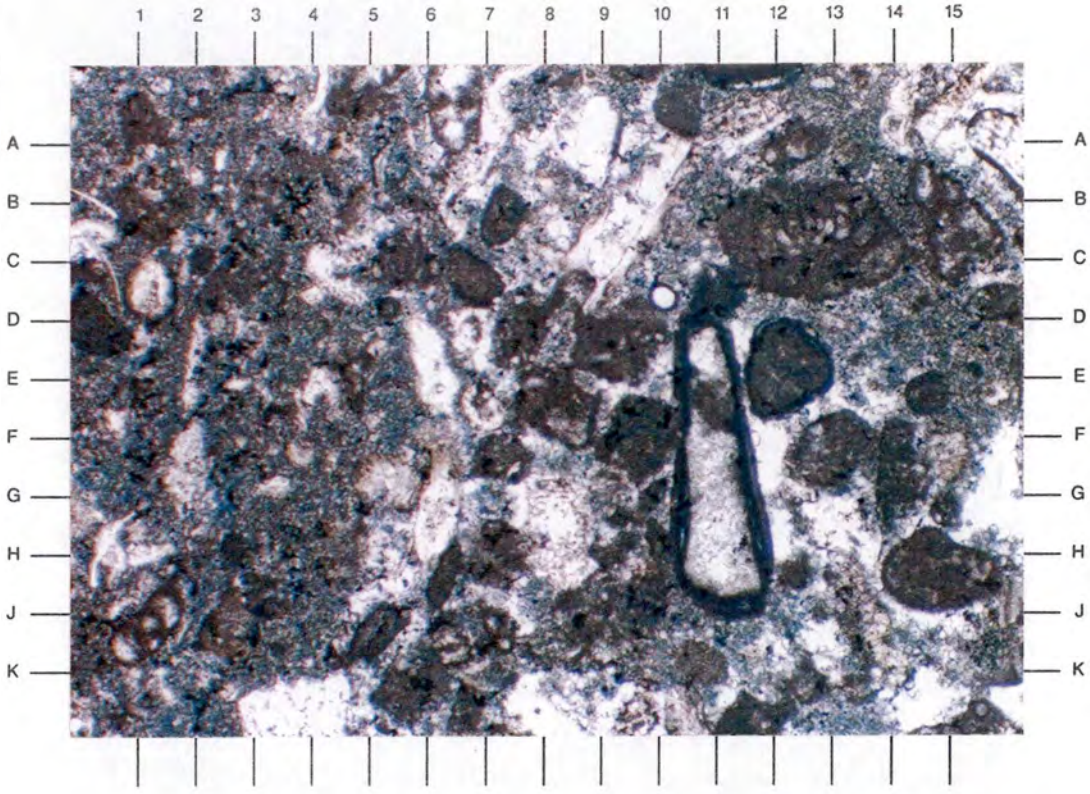
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-145

PLATE 14

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Micrite is unaltered (Plate 14B; C-D11.5) to microspar-replaced (Plate 14B; A9)
Cements/Replacement:	Fine, blocky calcite spar (Plate 14B; H-J3.5), replacive pyrite (Plate 14B; A3.5)
Allochems/Grains:	Micritic pellets (Plate 14B; G-H5.5); algal-coated grains (Plate 14A; D-E12.5); chambered forams (Plate 14A; J1.5); undifferentiated micritic grains (Plate 14A; D-E12.5); crinoid plates (Plate 14A; G-H8)
Porosity & Reservoir Quality:	A trace amount of visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Visible pores are strictly intercrystalline (Plate 14B; H13,H-J9); this view shows much more porosity than the sample as a whole; micropores are likely associated with micritic matrix and grains
Magnification:	A: 40X B: 200X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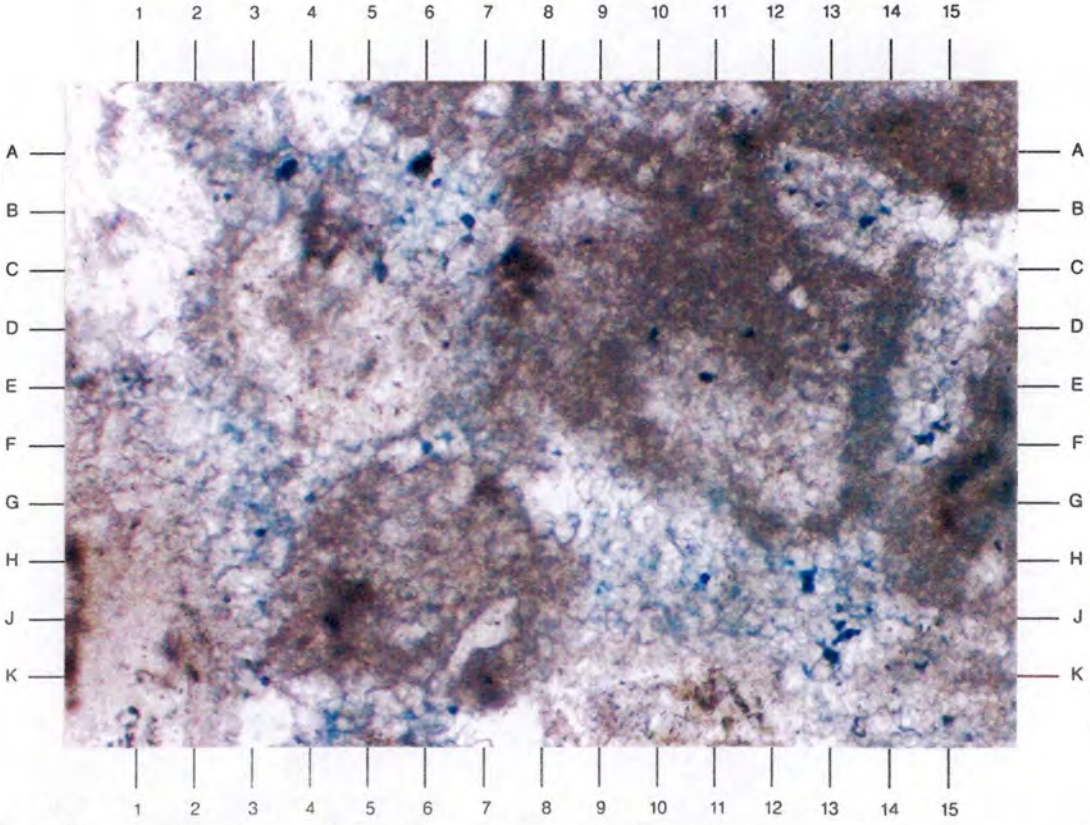
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Sauget Area-2

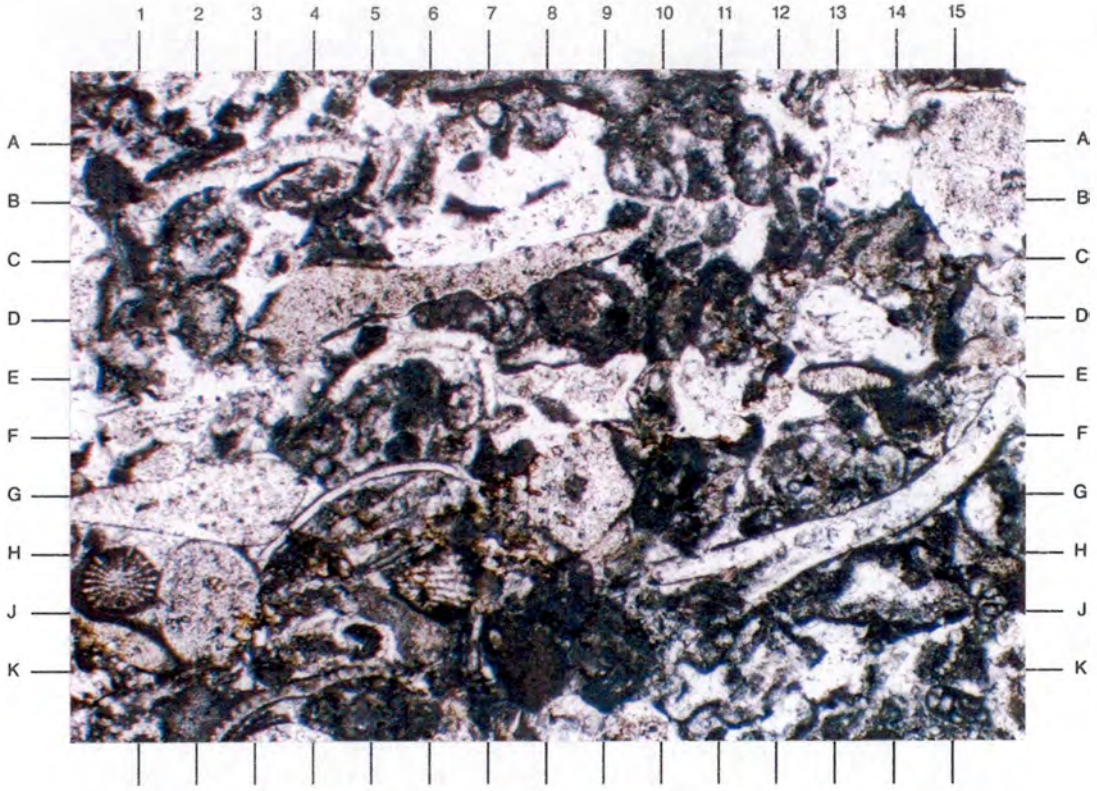
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-148

PLATE 15

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**Only minor micrite in limited regions (not present in this view); a stylolitic seam (Plate 15B; G10) is evidence of strong chemical compaction**
Cements/Replacement:	**Common calcite spar (Plate 15B; C5.5)**
Allochems/Grains:	**Common crinoid debris such as plates (Plate 15B; K12 area); echinoderm spines (Plate 15A; H-J0.5); undifferentiated micritic grains (Plate 15A; J-K8); pelecypod mollusks (Plate 15A; C-D4.5)**
Porosity & Reservoir Quality:	**Only a trace amount of visible porosity (intercrystalline, interparticle); microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space**
Porosity Types:	**Micropores are likely associated with micritic matrix and grains**
Magnification:	**A: 40X B: 200X**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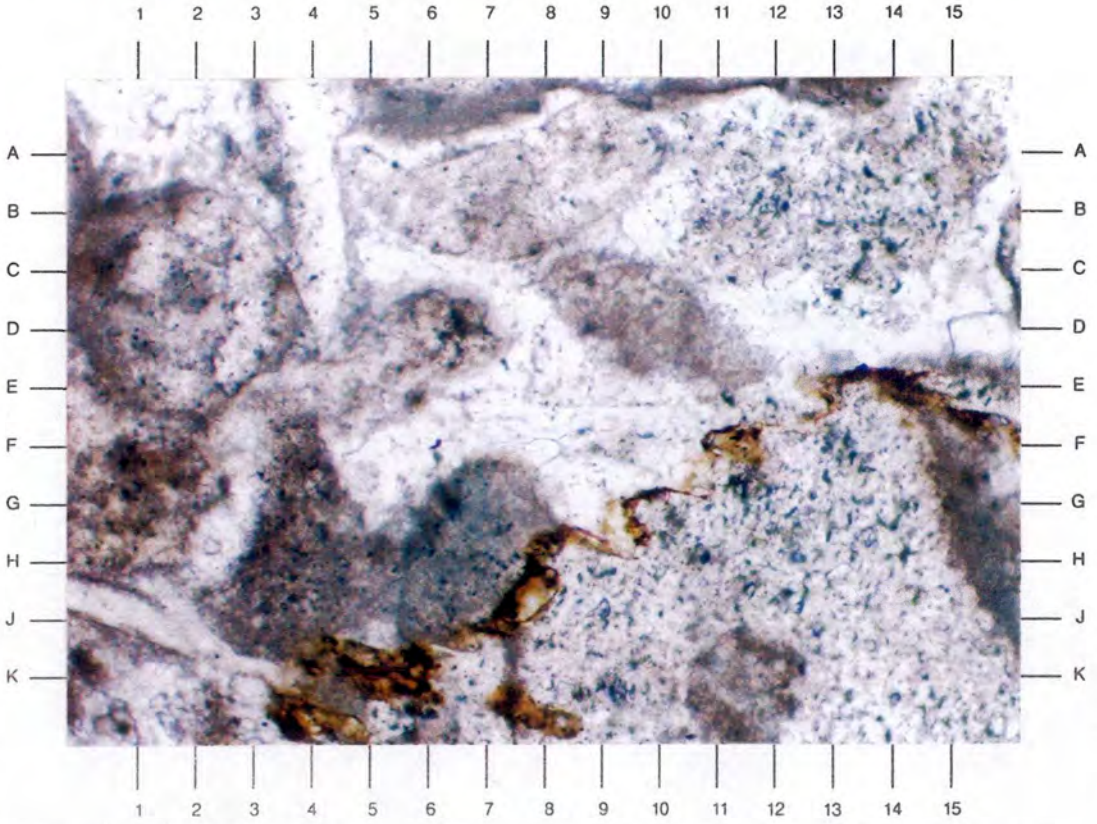
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0.05 mm

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URS Corporation
Sauget Area-2

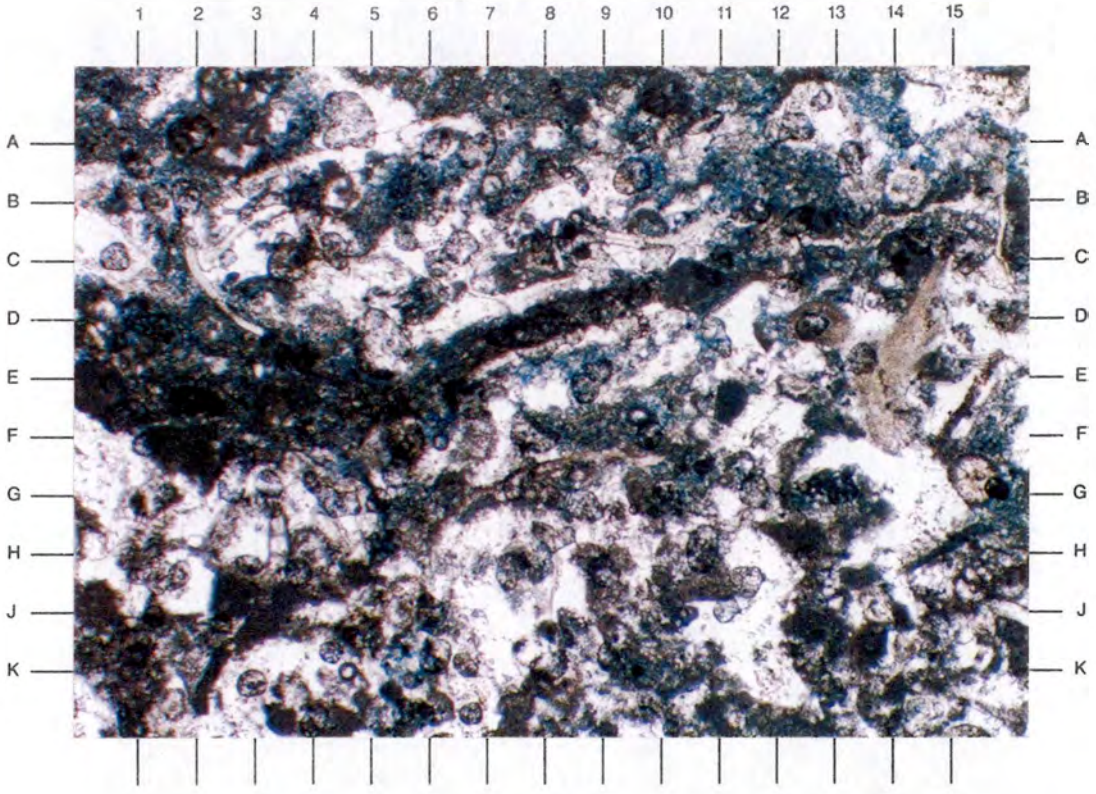
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-151

PLATE 16

Dunham Rock Type:	Lime Packstone (minor Grainstone)
Fabric & Matrix:	Micrite (Plate 16A; area of E2.5) present in packstone regions
Cements/Replacement:	Calcite spar (Plate 16B; B5.5)
Allochems/Grains:	Pelecypod mollusks (Plate 16A; D-E14); undifferentiated (Plate 16A; A-B12.5); crinoid plates (Plate 16A; above A4.5)
Porosity & Reservoir Quality:	A trace amount of visible porosity includes interparticle, intercrystalline, and moldic varieties; microporosity (approx. 3% by volume) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Intercrystalline pores (Plate 16B; A-B6); intraparticle pores (Plate 16B; F-G14), some microscopic in size
Magnification:	A: 40X B: 200X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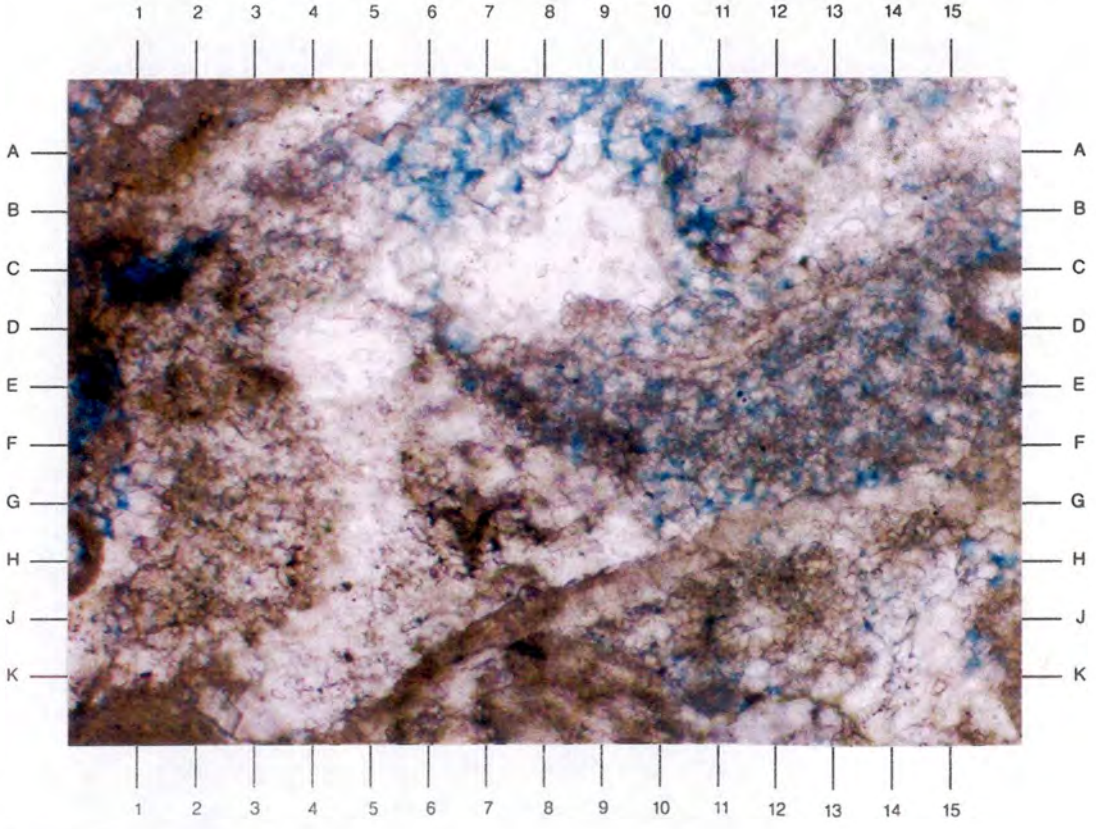
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URS Corporation
Sauget Area-2

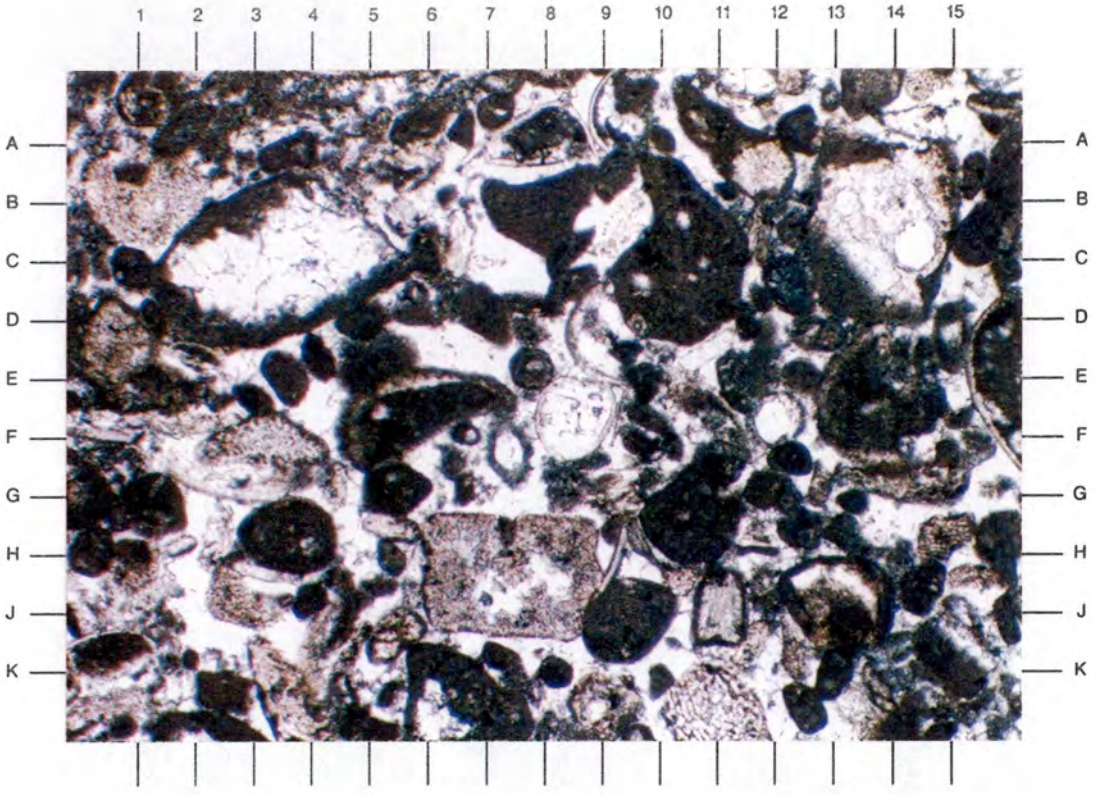
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-153

PLATE 17

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	Little or no micritic matrix in this high energy grainstone
Cements/Replacement:	Blocky to coarse calcite spar (Plate 17B; D7.5)
Allochems/Grains:	Echinoid fragments (Plate 17A; H7); algal-coated grains (Plate 17A; H-J13); pellets (Plate 17A; E3.5); micritic intraclasts (Plate 17A; C10.5); undifferentiated micritic grains (Plate 17A; G-H11)
Porosity & Reservoir Quality:	1% (by volume) visible porosity (vuggy); microporosity (approx. a trace amount) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	Vuggy pore space present, but not observed in this view; micropores approximate a trace amount
Magnification:	A: 40X B: 200X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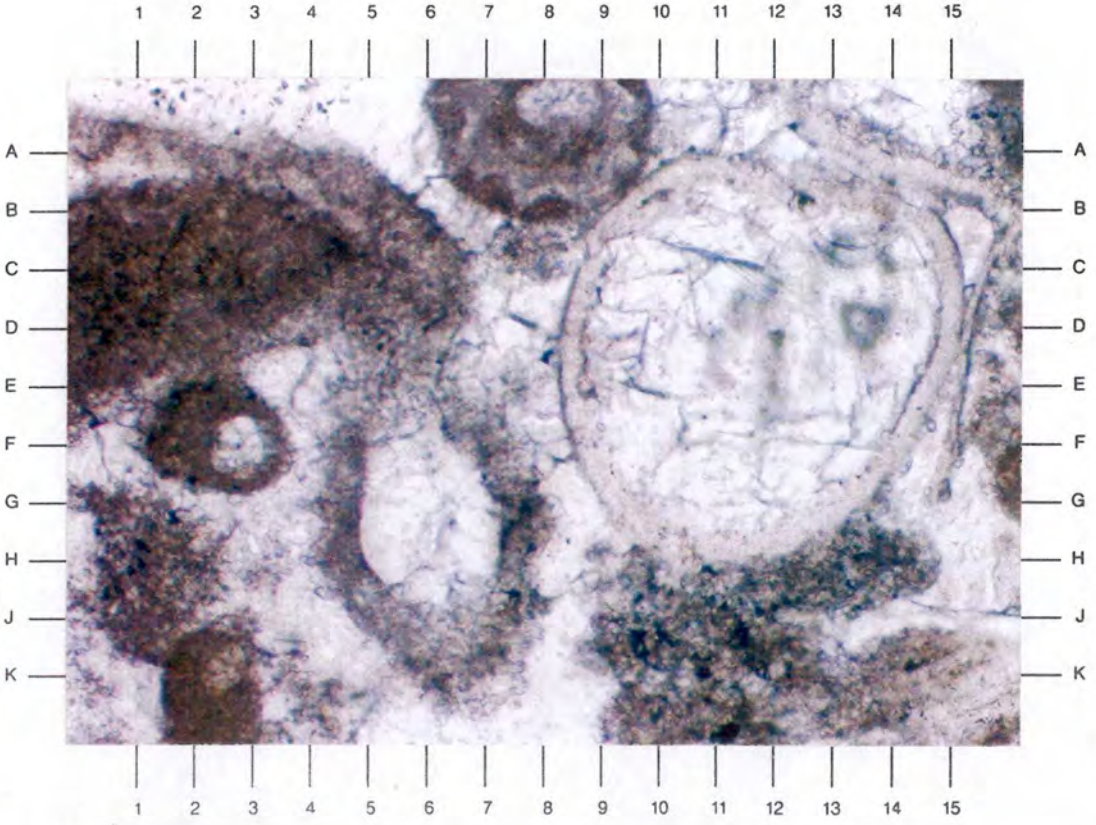
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0.05 mm

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URS Corporation
Sauget Area-2

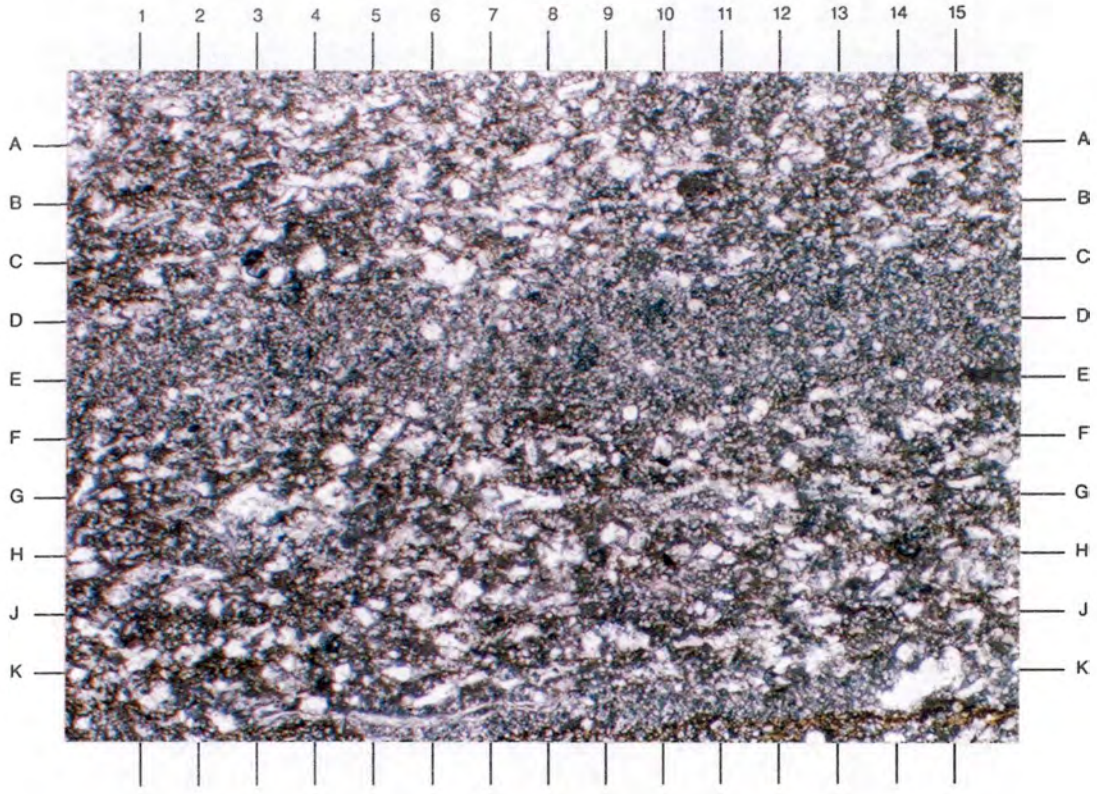
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-155

PLATE 18

Dunham Rock Type:	Lime Wackestone/Packstone
Fabric & Matrix:	Strong laminar tendency (note zoning in Plate 18A); original micrite matrix has largely been replaced with microspar (Plate 18B; F-G12)
Cements/Replacement:	Minor dolomite (Plate 18B; E10.5)
Allochems/Grains:	Common, altered mollusk and crinoid fragments (Plate 18A; white structures)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	No visible porosity; micropore space likely associated with micrite and microspar
Magnification:	A: 40X B: 200X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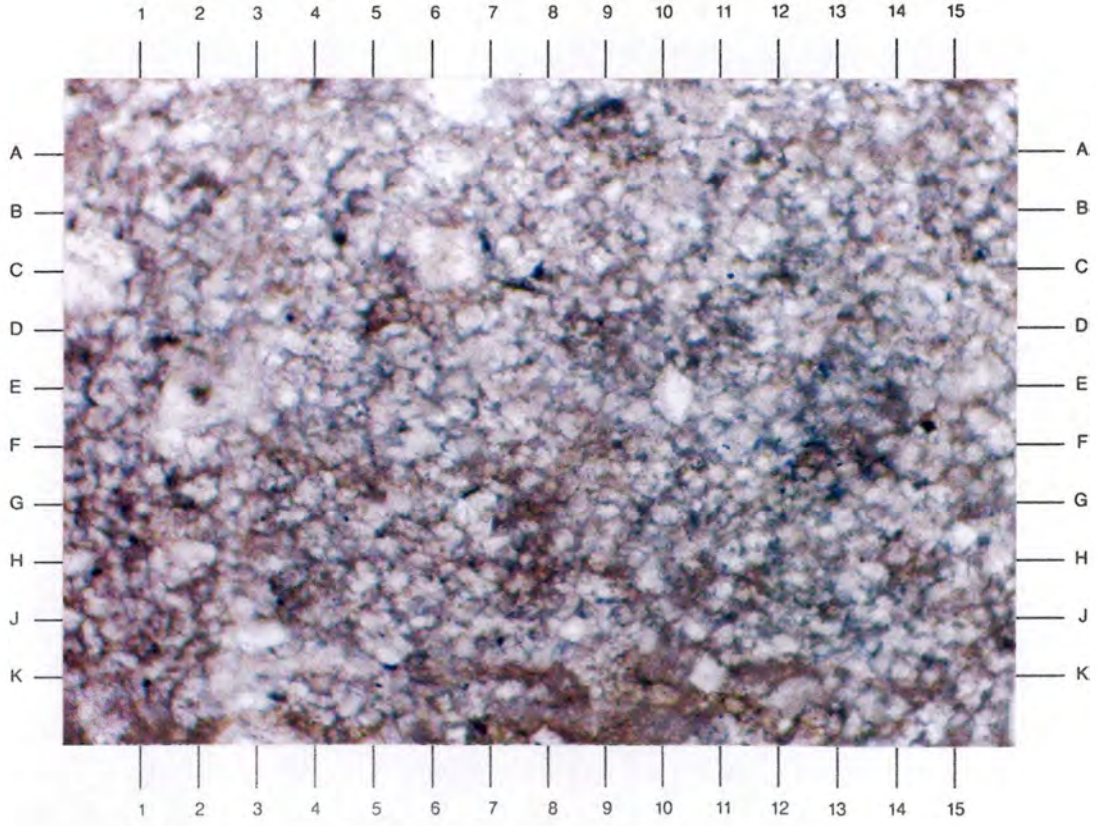
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URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: P-1-158

PLATE 19

Dunham Rock Type:	Lime Wackestone (minor Packstone, Mudstone)
Fabric & Matrix:	Laminated; abundant micrite and microspar matrix; note packstone fabric toward top of photo and mudstone/wackestone to base
Cements/Replacement:	Microspar (Plate 19B; F12) replacement of micrite is abundant; rare pyrite (Plate 19B; D9)
Allochems/Grains:	Mollusks (Plate 19A; G13.5); micritic intraclasts (Plate 19A; D3.5); undifferentiated micritic grains (Plate 19A; A-B12.5)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	No visible pore space; micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X

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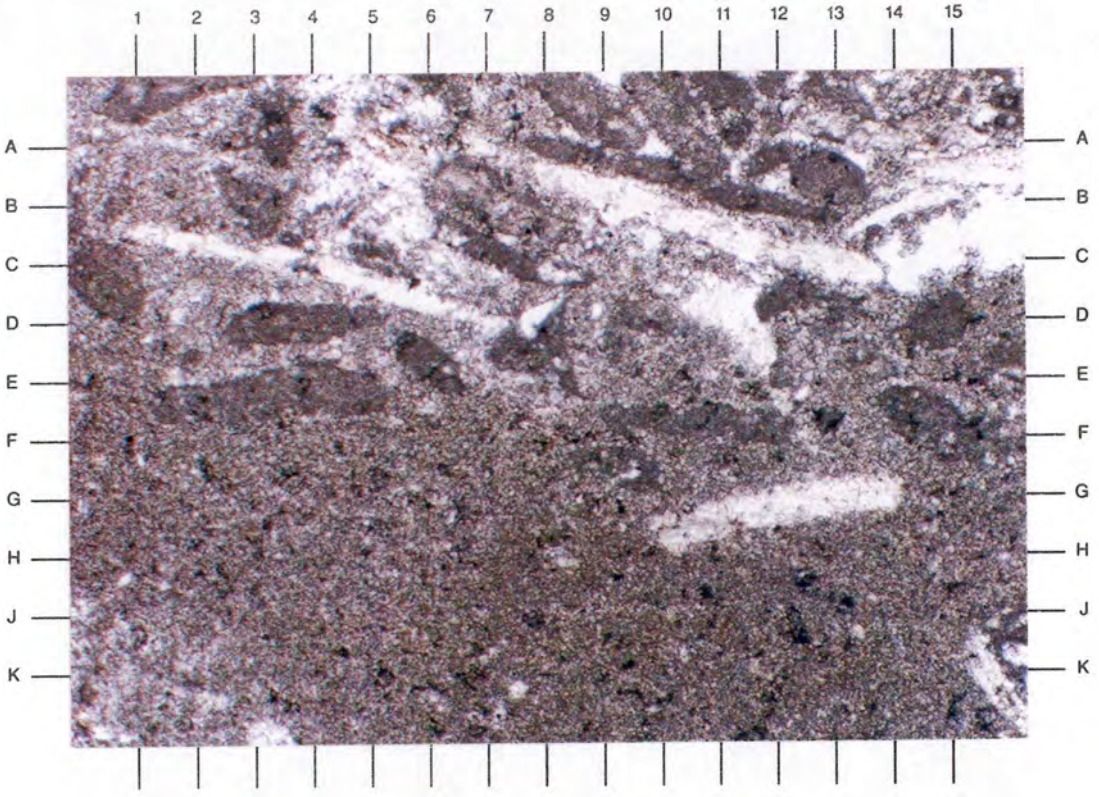

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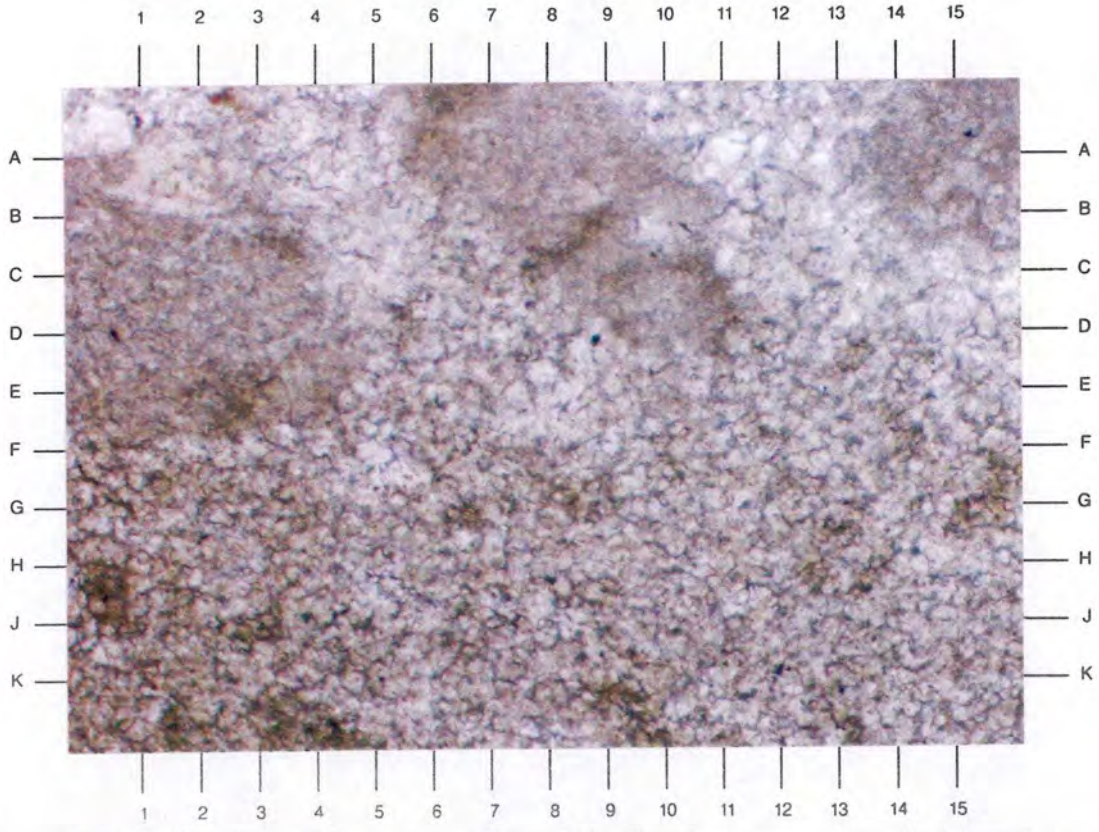

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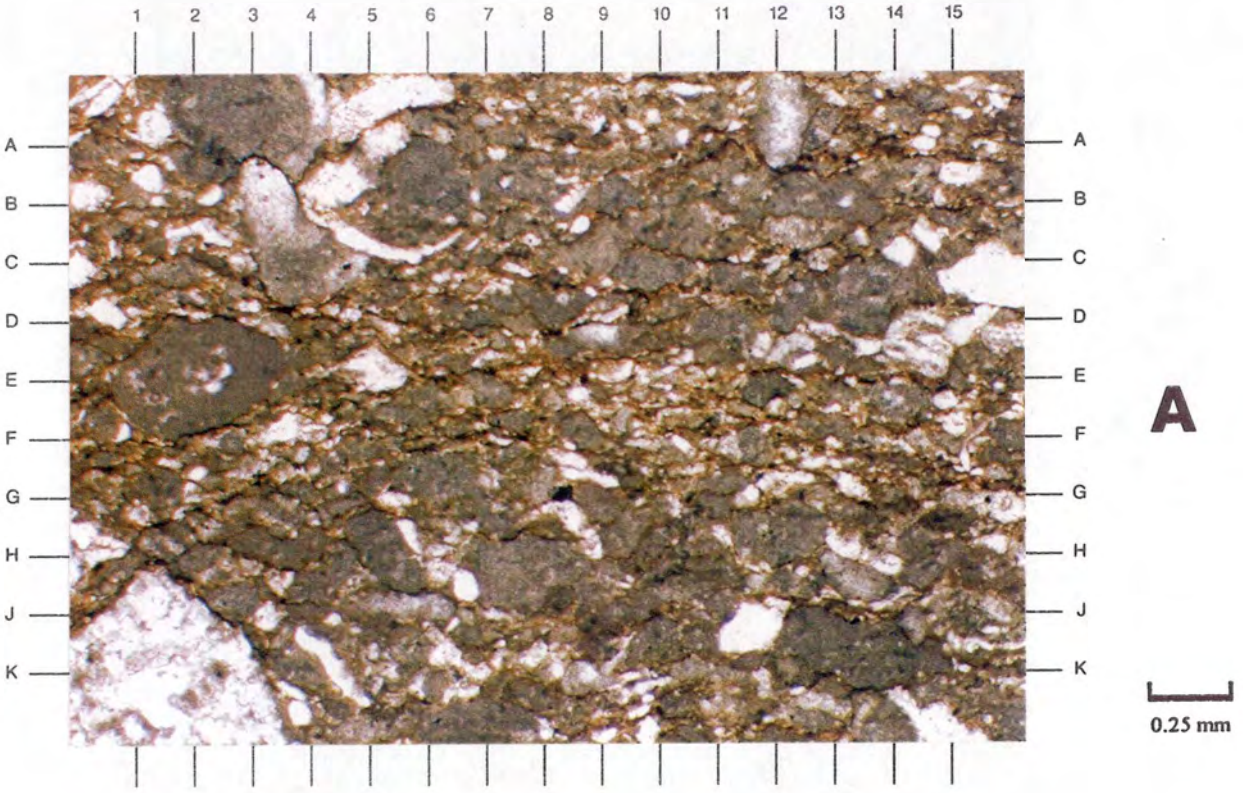
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

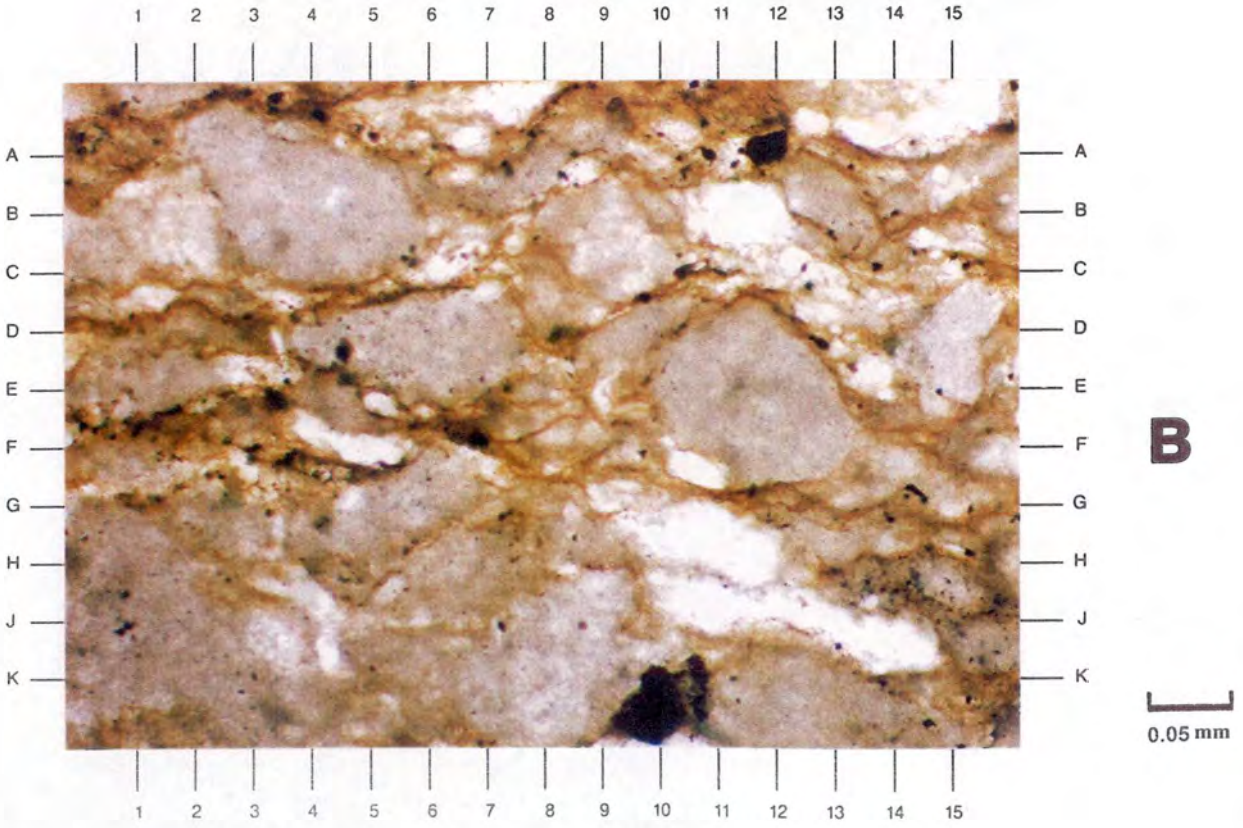
SAMPLE NUMBER: Q-1-142

PLATE 20

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Siliciclastic clay matrix (Plate 20B; above A11.5) associated with organics (Plate 20B; C-D12); micrite is not true matrix but "pseudomatrix" created by compaction of micritic grains (Plate 20A; E1)
Cements/Replacement:	Minor pyrite replacement (Plate 20B; K10,A12)
Allochems/Grains:	Micritic grains (Plate 20A; E1,A3,J-K13.5) are both intraclasts and undifferentiated forms; large crinoid plates (Plate 20A; K1.5); scattered quartz sand grains (Plate 20A; C-D15.5)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	No visible pore space; micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

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Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-145.5

PLATE 21

Dunham Rock Type:	**Lime Packstone**
Fabric & Matrix:	**Micritic pellets (Plate 21B; B-C12.5) are often compacted, effectively acting as "pseudomatrix"**
Cements/Replacement:	**Fine, blocky calcite spar (Plate 21B; E14) and rare dolomite (Plate 21A; C11) cements**
Allochems/Grains:	**Abundant pelllets; rare, fragmented skeletal grains (Plate 21A; B5.5)**
Porosity & Reservoir Quality:	**0% (by volume) visible porosity; microporosity (none detected) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space**
Porosity Types:	**No visible pore space; micropores likely associated with micrite and microspar**
Magnification:	**A: 40X B: 200X**

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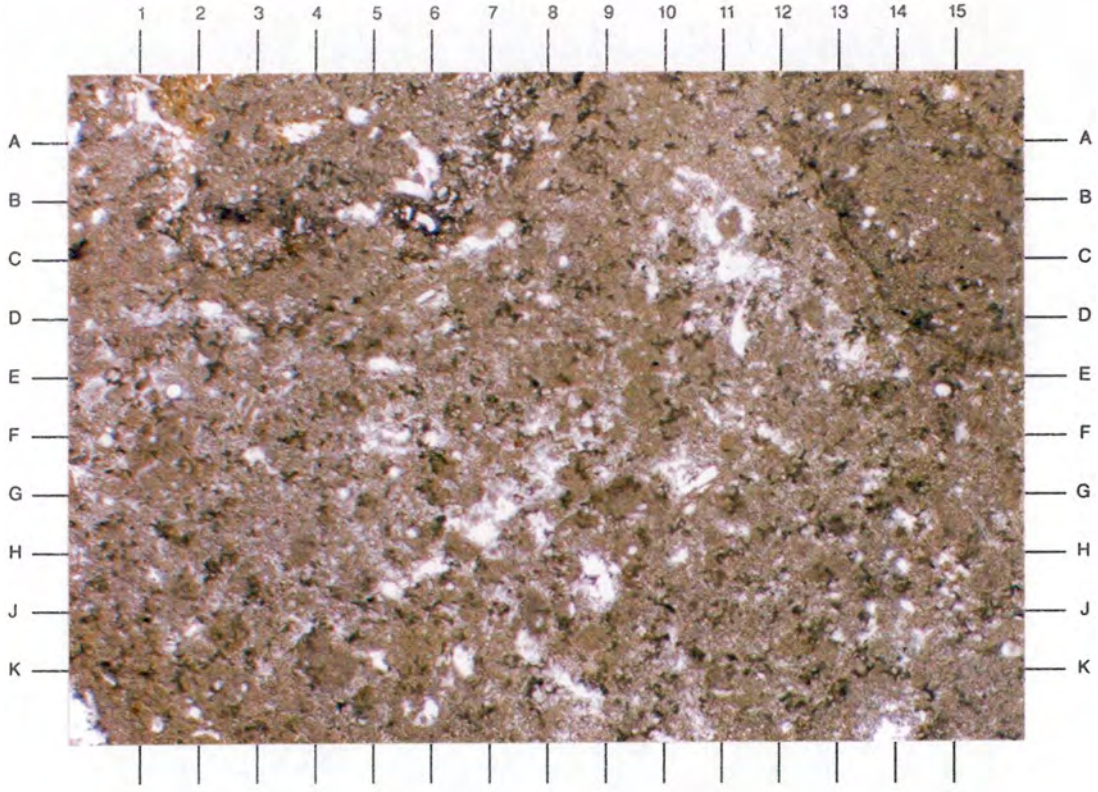
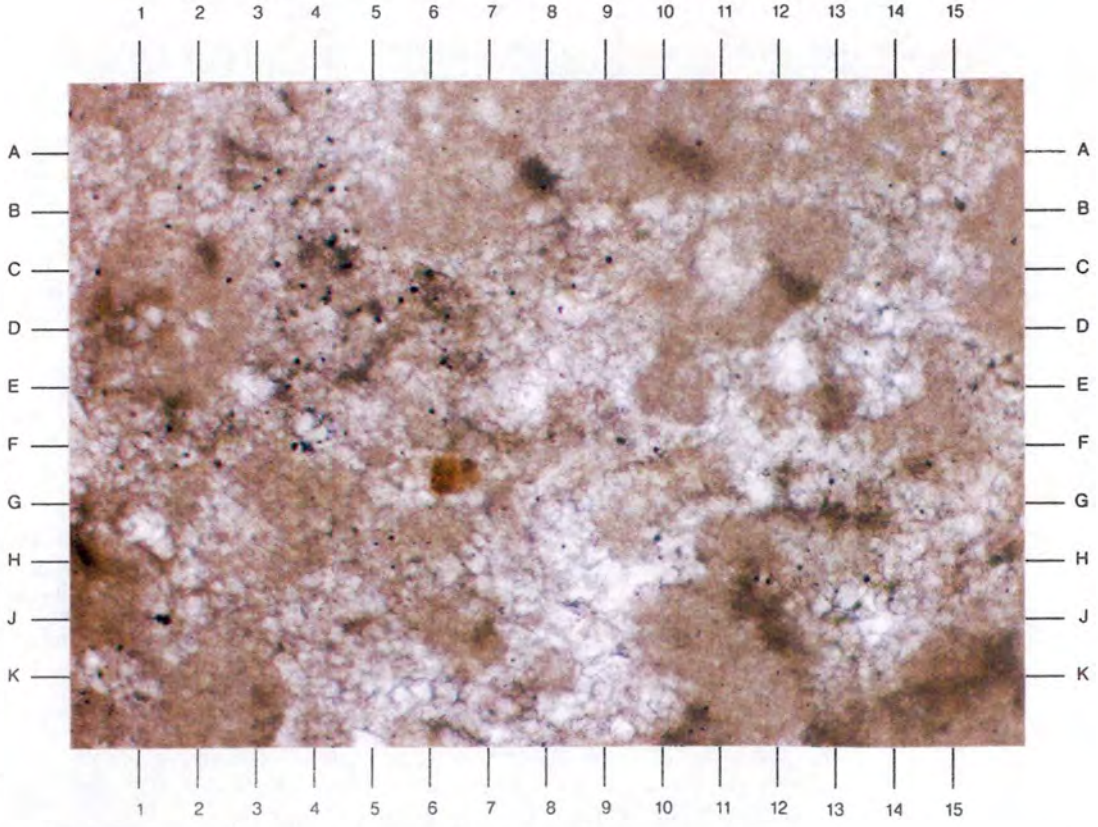


A

0.25 mm



B

0.05 mm

URS Corporation
Sauget Area-2

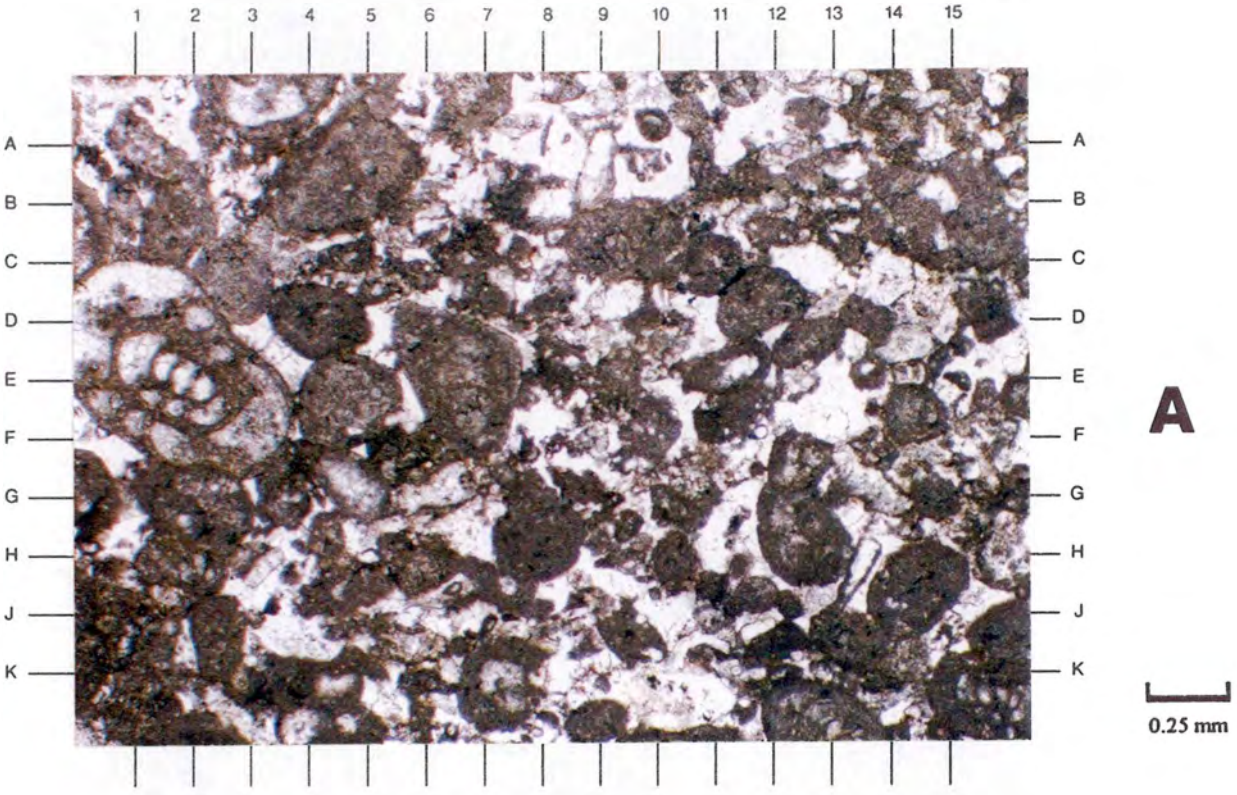
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-149.5

PLATE 22

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	Micrite matrix is rare in this high energy grainstone
Cements/Replacement:	Abundant calcite spar (Plate 22B; D-E8) in interparticle regions
Allochems/Grains:	Chambered PETEPURRAZELLAS (Plate 22A; E1.5); abundant undifferentiated micritic grains (Plate 22A; G-H8); minor pellets (Plate 22A; above A12.5); rare echinoid fragments (Plate 22A; H13.5)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	No visible pore space; micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X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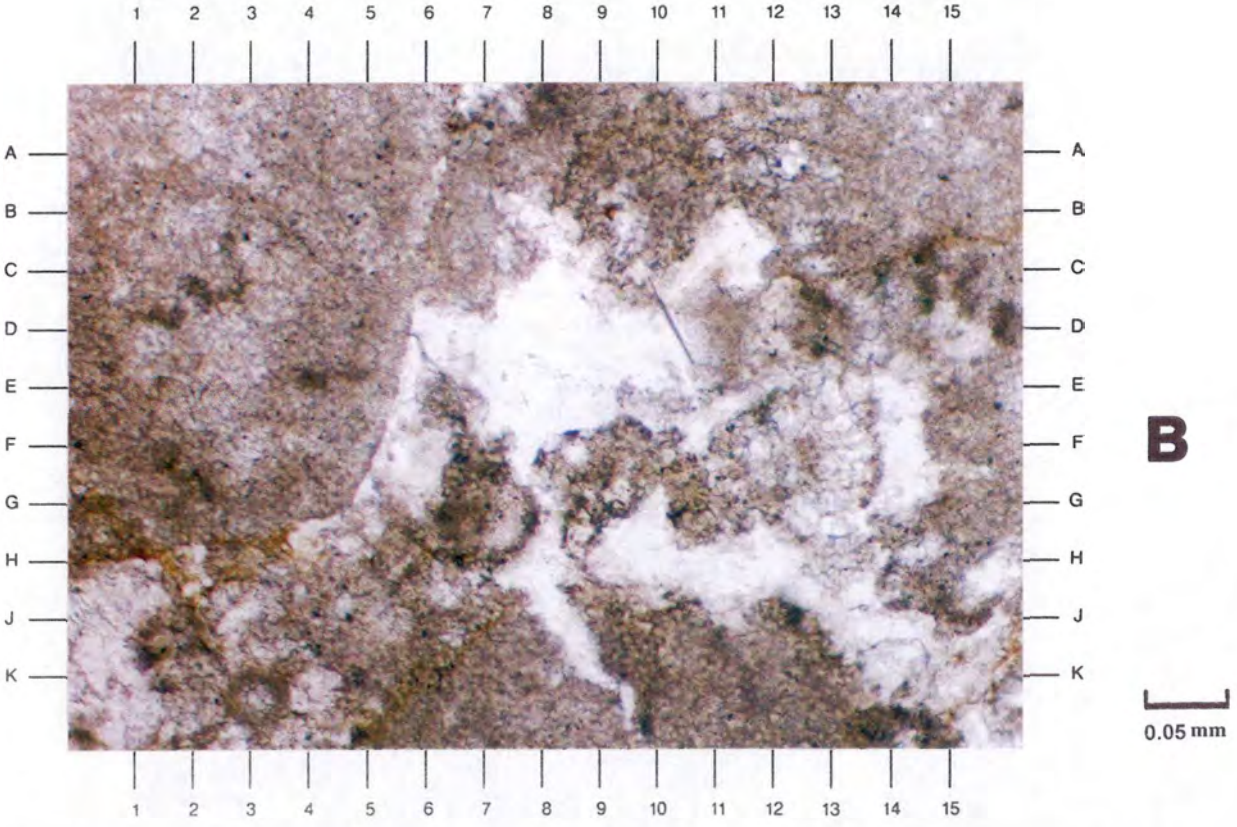
A B C D E F G H J K
0.25 mm

A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A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

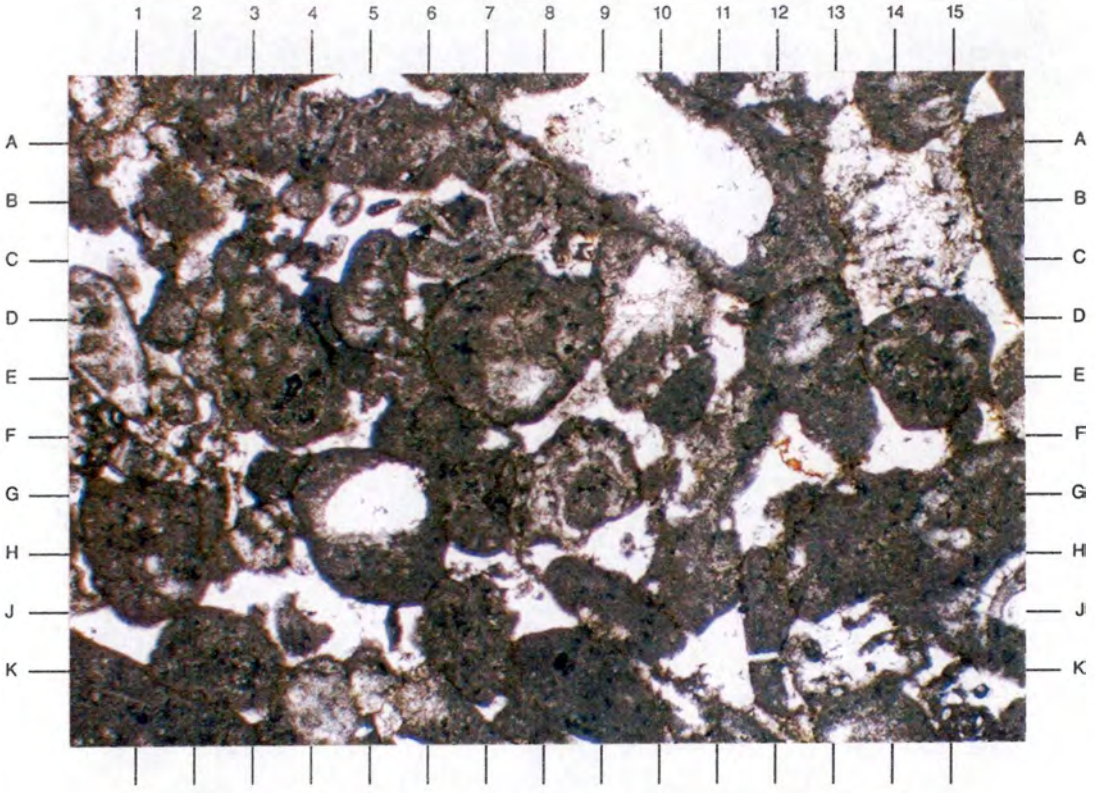
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-151.5

PLATE 23

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	Micrite is rare due to the high energy deposition of this sediment
Cements/Replacement:	Abundant calcite spar cement (Plate 23B; E8)
Allochems/Grains:	Common intraclasts (Plate 23B; D-E7.5); abundant, undifferentiated micritic grains (Plate 23B; D-E15); minor chambered grains (Plate 23B; D-E3) and crinoid debris (Plate 23B; A9) including within intraclasts (Plate 23B; G5)
Porosity & Reservoir Quality:	0% (by volume) visible porosity; microporosity (none detected) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space
Porosity Types:	No visible pore space; micropores likely associated with micrite and microspar
Magnification:	A: 40X B: 200X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0.25 mm

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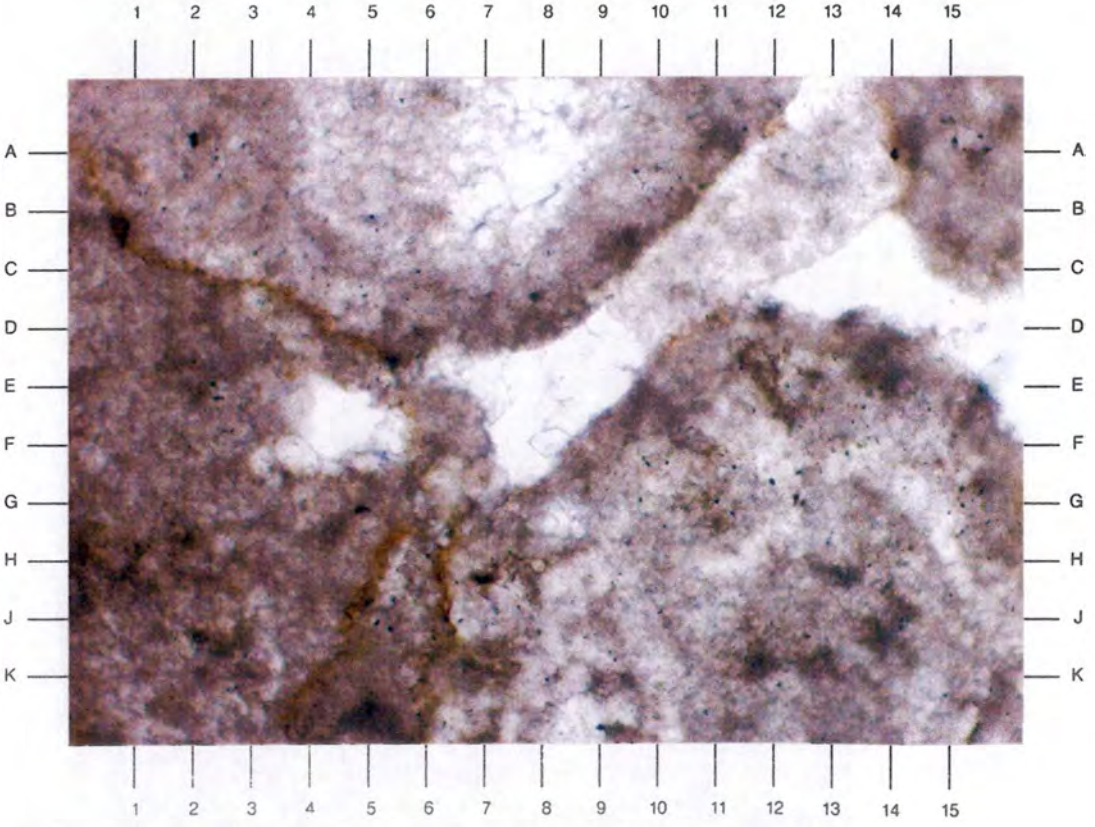

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

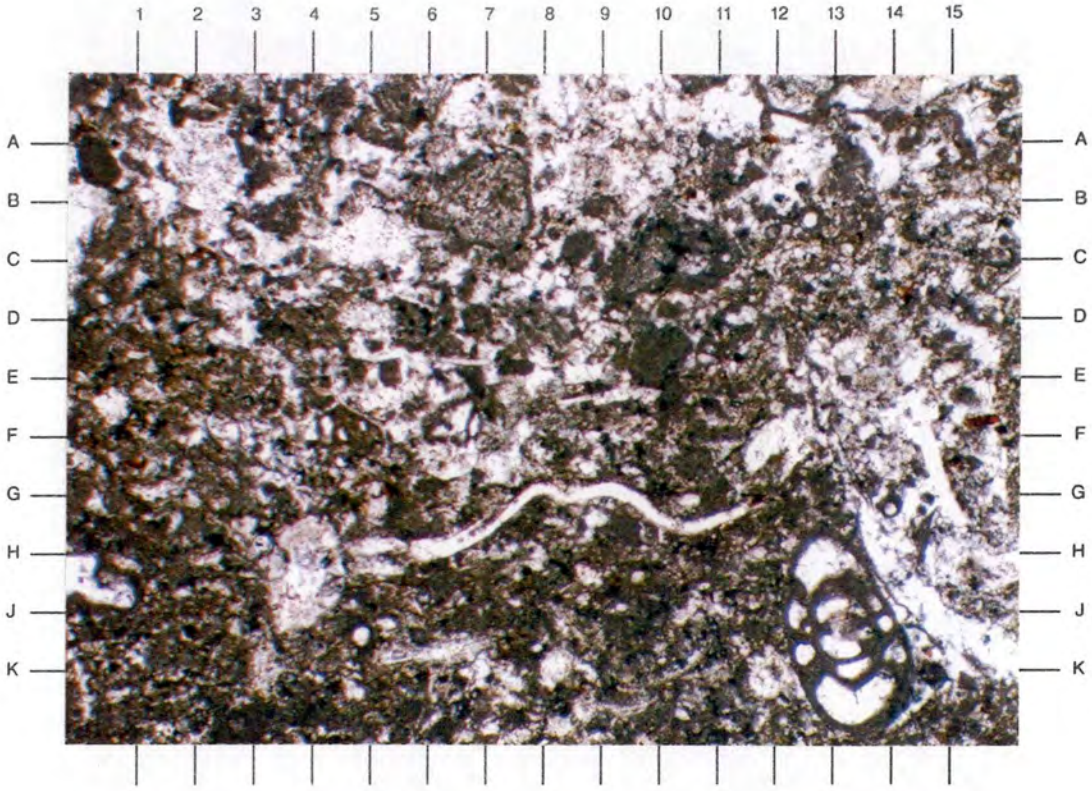
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-153.5

PLATE 24

Dunham Rock Type:	**Lime Packstone**
Fabric & Matrix:	**Common micrite (brownish interparticle material)**
Cements/Replacement:	**Common, blocky spar calcite (Plate 24B; A13.5)**
Allochems/Grains:	**Chambered PETEPURRAZELLA (Plate 23A; J-K13); elongate brachiopod fragment (Plate 23A; G-H9.5); crinoid fragments (Plate 23A; A-B2); micritic pellets (Plate 23A; E-F1.5)**
Porosity & Reservoir Quality:	**0% (by volume) visible porosity; microporosity (approx. a trace amount) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a lack of effective pore space**
Porosity Types:	**None visible; although only a trace micropore space noted, but may be higher (associated with micrite)**
Magnification:	**A: 40X B: 200X**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A B C D E F G H J K
0.25 mm

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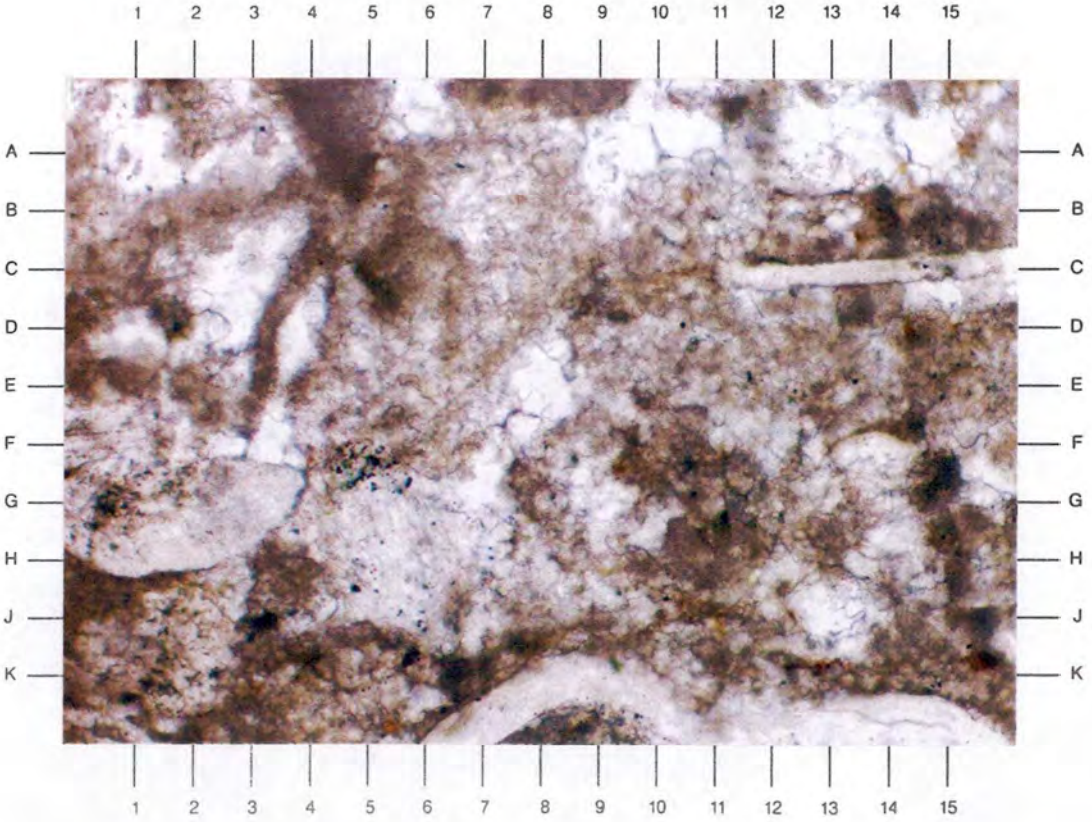

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

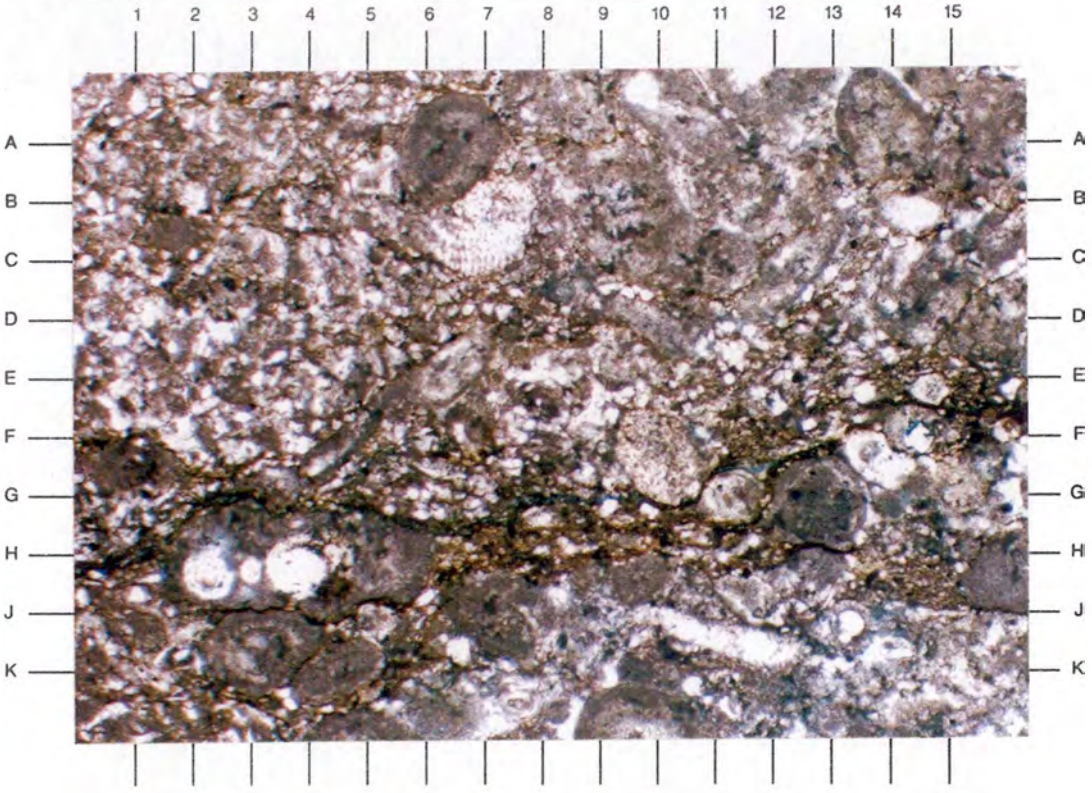
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

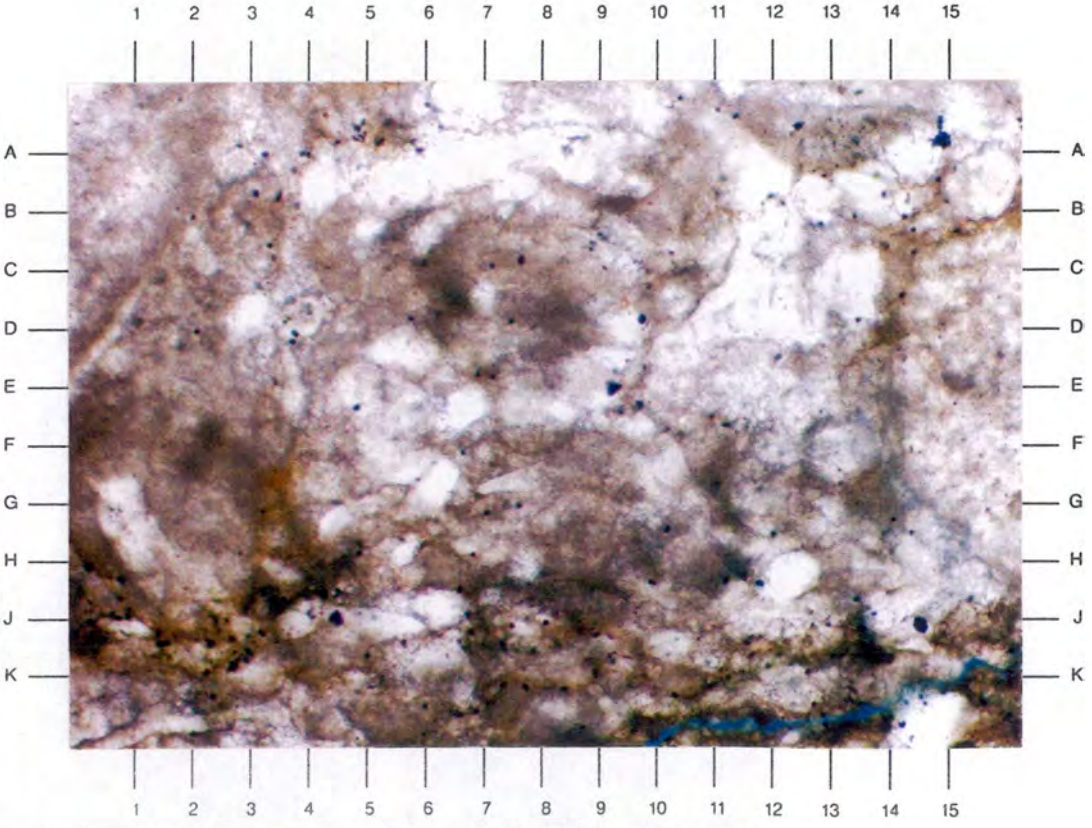
SAMPLE NUMBER: Q-1-155.5

PLATE 25

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Laminated; organic-rich material (Plate 25A; H1-F15); common micrite (Plate 25B; B2.5); minor siliciclastic clay (Plate 25A; G-H9)
Cements/Replacement:	Minor, blocky calcite spar (Plate 25B; C11.5) in interparticle regions
Allochems/Grains:	Crinoid fragments (Plate 25A; F10); intraclasts undifferentiated micritized grains (Plate 25A; J-K11)
Porosity & Reservoir Quality:	A trace amount of visible porosity (interparticle and intraparticle); microporosity (approx. a trace amount) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a near-lack of effective pore space
Porosity Types:	Trace interparticle pore space; trace intragranular porosity; microscopic pores may be higher than observed (associated with micrite); apparent fracture at K15 is artificial.
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

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Sauget Area-2

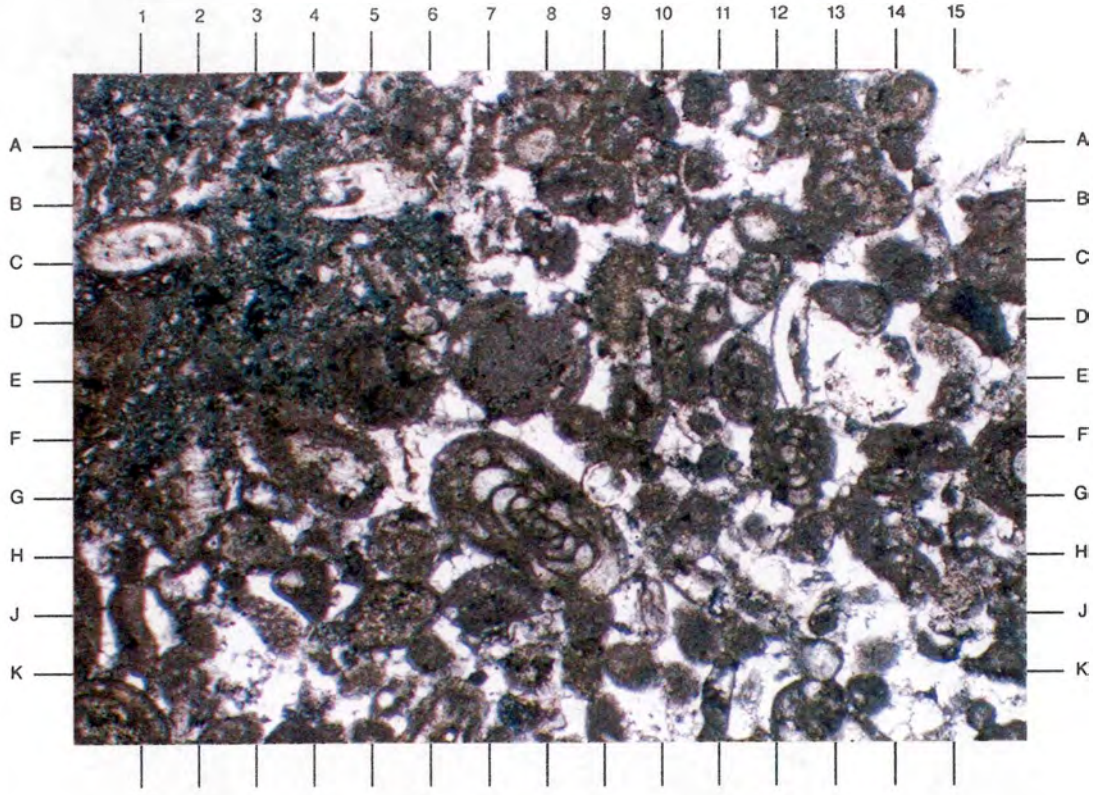
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

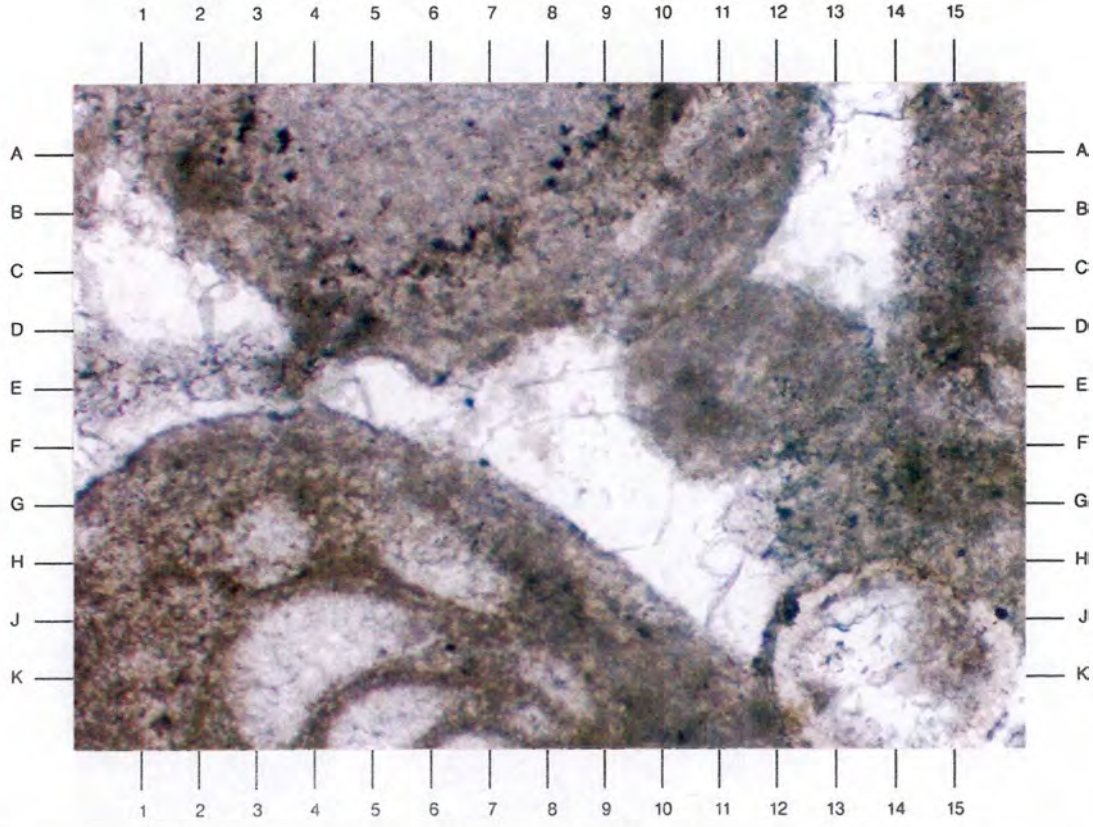
SAMPLE NUMBER: Q-1-157

PLATE 26

Dunham Rock Type:	Lime Grainstone (rare Packstone)
Fabric & Matrix:	Common micrite (Plate 26A; C-D1.5) in rare packstone regions (such as upper left)
Cements/Replacement:	Blocky calcite spar
Allochems/Grains:	Chambered forams (Plate 26A; G7.5); undifferentiated micritic grains (Plate 26A; D-E7.5); mollusks (D-E12)
Porosity & Reservoir Quality:	A trace amount of visible porosity (intraparticle); microporosity (approx. a trace amount; note faint bluish haze to upper left) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a near-lack of effective pore space
Porosity Types:	A trace amount of intragranular porosity; microscopic pore content may be higher than observed
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

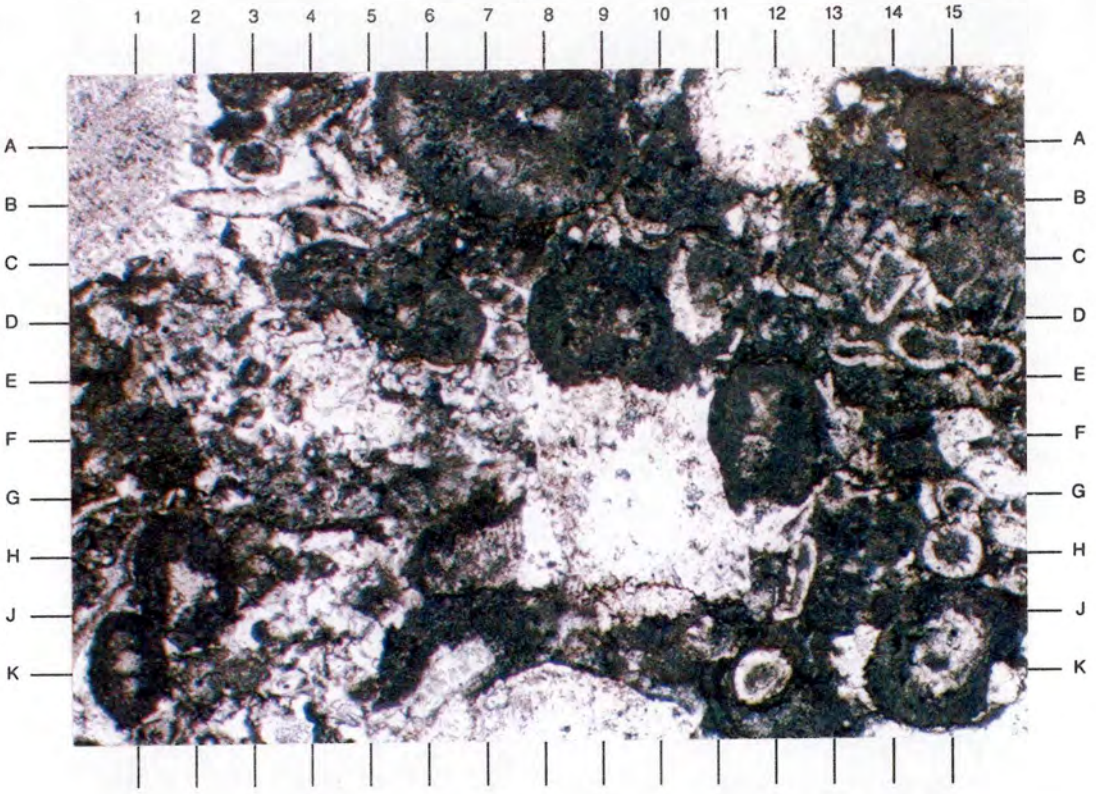
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

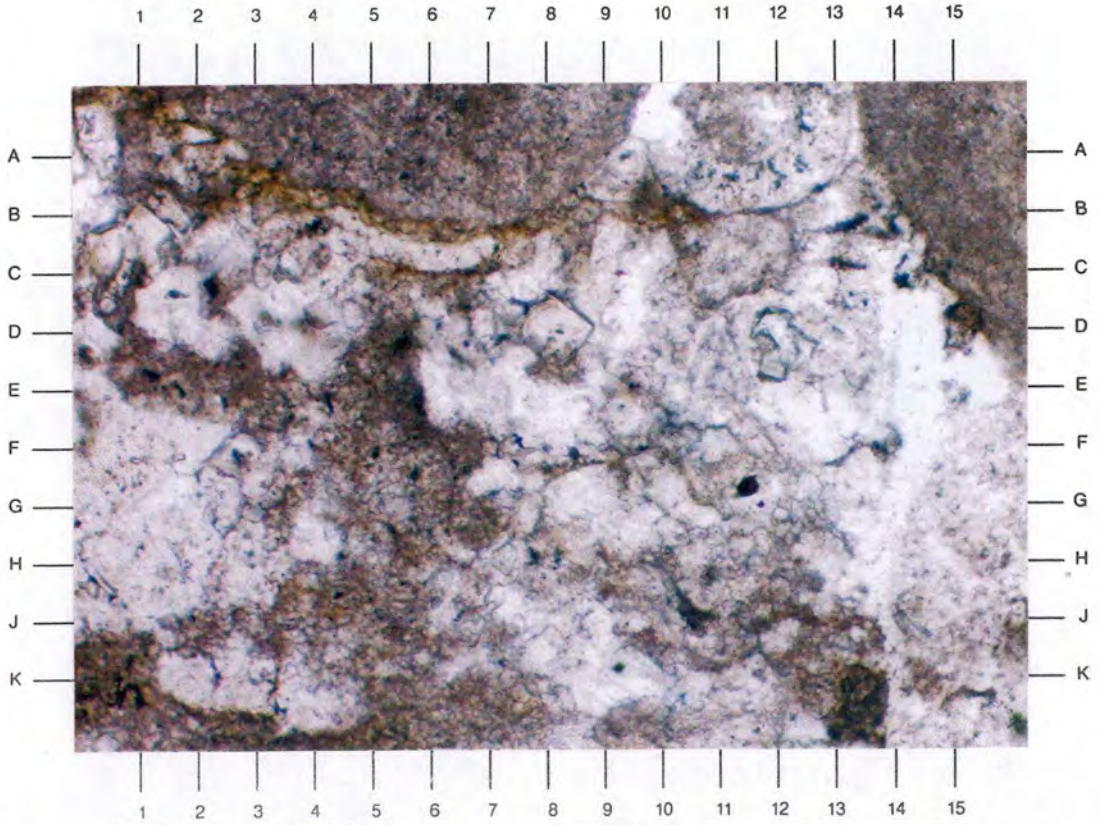
SAMPLE NUMBER: Q-1-159

PLATE 27

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Micrite present in lower energy areas (such as upper right plate) within this packstone
Cements/Replacement:	Calcite spar (Plate 27B; D-E14) is abundant; rare dolomite (Plate 27B; D8)
Allochems/Grains:	Echinoderm spines (Plate 27A; H15); crinoid plates (Plate 27A; G9,A1); undifferentiated micritic grains (Plate 27A; D9); mollusks (Plate 27A; B2.5)
Porosity & Reservoir Quality:	A trace amount of visible porosity (intercrystalline); microporosity (none observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a near-lack of effective pore space
Porosity Types:	A trace amount of intercrystalline porosity; microporosity is likely associated with micrite and micritic grains
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

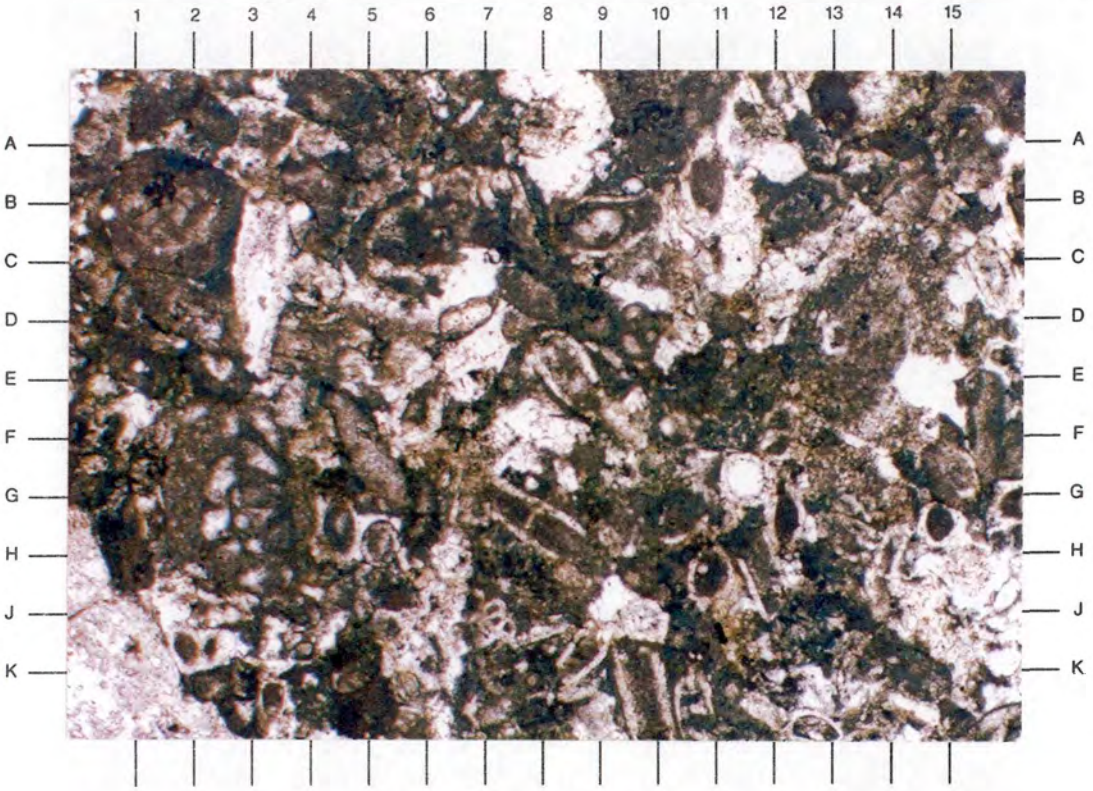
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-161

PLATE 28

Dunham Rock Type:	Lime Packstone
Fabric & Matrix:	Common micritic groundmass (Plate 28A; G-H9.5)
Cements/Replacement:	Mainly calcite spar (Plate 28B; A-B12)
Allochems/Grains:	Chambered forams (Plate 28A; G2.5); micritic intraclasts (Plate 28A; B-C1.5); echinoid debris (Plate 28A; K10,B-C3); echinoderm spines (Plate 28A; F-G11.5)
Porosity & Reservoir Quality:	A trace amount of visible porosity (intercrystalline and moldic); microporosity (3% observed) is associated with micritic grains and matrix; reservoir quality is considered very poor, due to a near-lack of effective pore space
Porosity Types:	Microscopic (B-C10) and intercrystalline (A8) pores are shown in Plate 28B; microporosity may be higher than indicated; rare (trace) moldic pores are observed elsewhere in the sample
Magnification:	A: 40X B: 200X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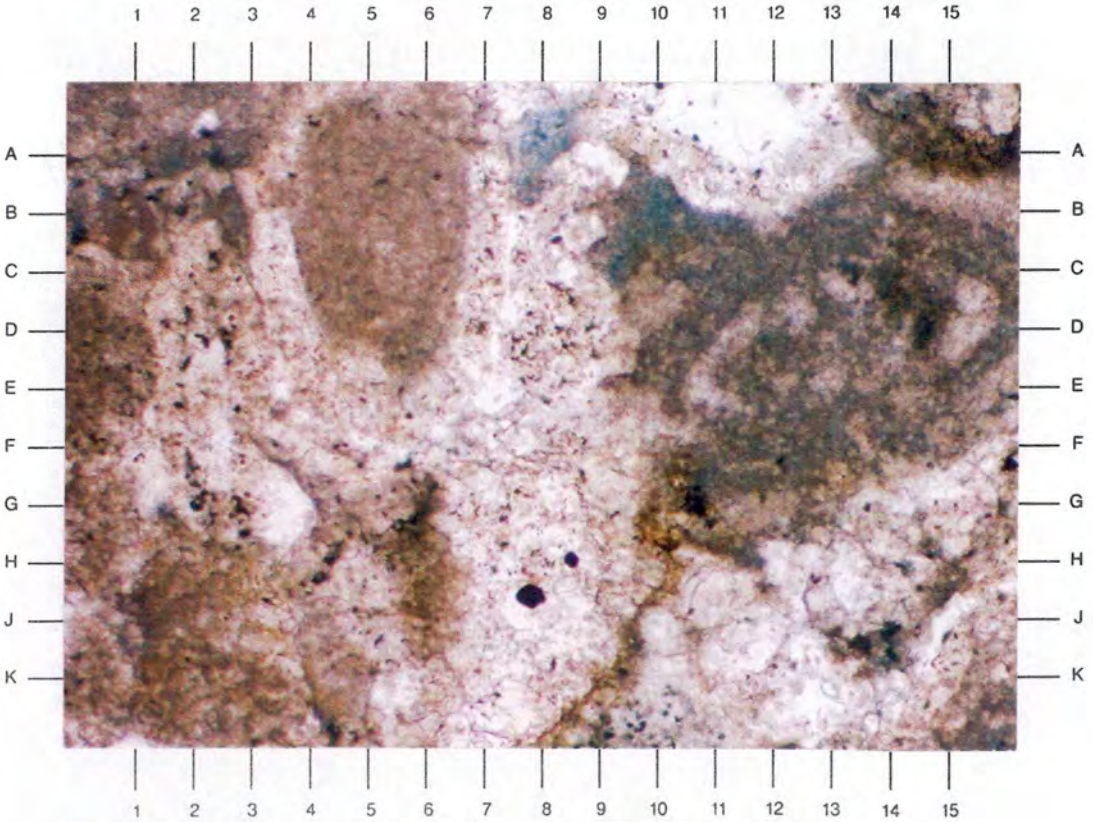
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

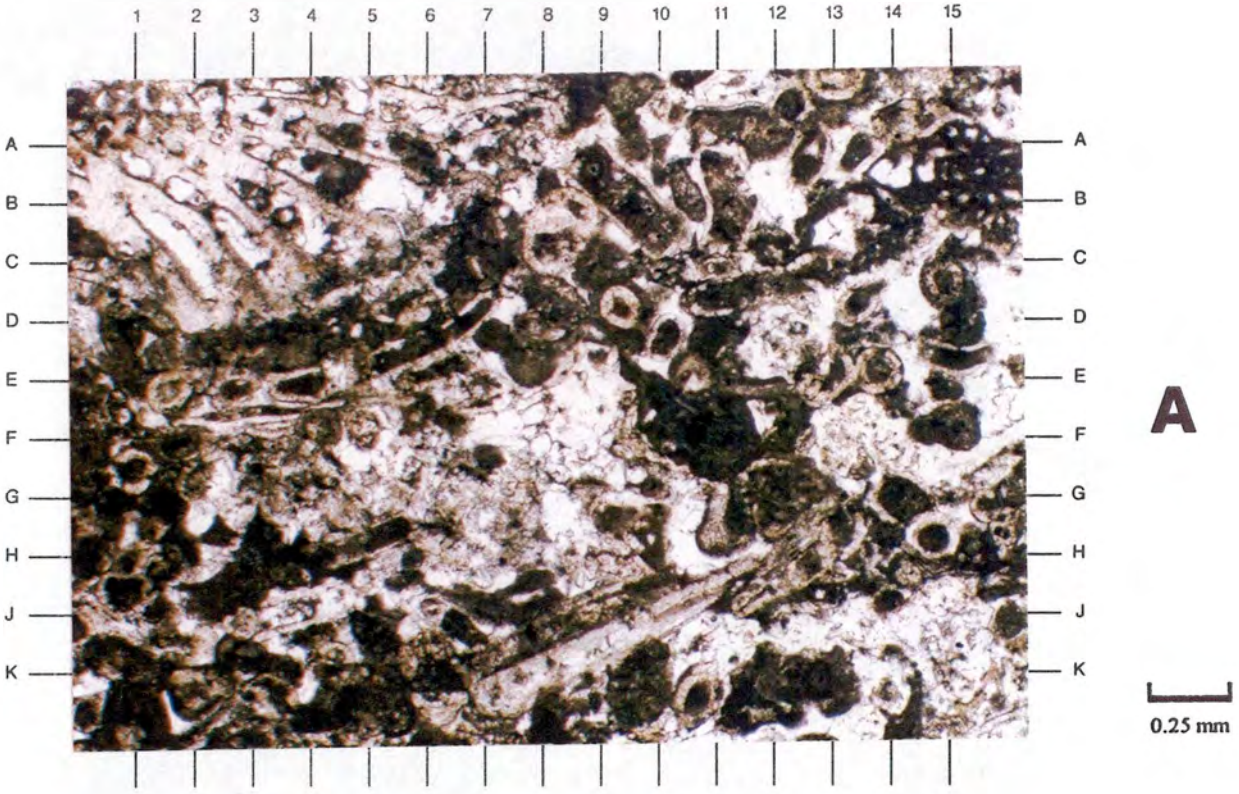
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-1-163

PLATE 29

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	A trace micritic matrix; dominantly high energy deposition and clean interparticle system
Cements/Replacement:	Dominantly blocky spar calcite (Plate 29B; G11.5)
Allochems/Grains:	Large bryozoans (Plate 29A; B2); echinoderm spines (Plate 29A; E7.5,K145); pellets (Plate 29A; Plate 29B; G3.5); undifferentiated micritic grains (Plate 29A; F11); chambered forams (Plate 29A; A-B15.5)
Porosity & Reservoir Quality:	No visible pore space, nor micropore space observed, reservoir quality very poor, due to a lack of porosity development
Porosity Types:	No visible porosity; micropore space not observed, but likely associated with micritic matrix and grains
Magnification:	A: 40X B: 200X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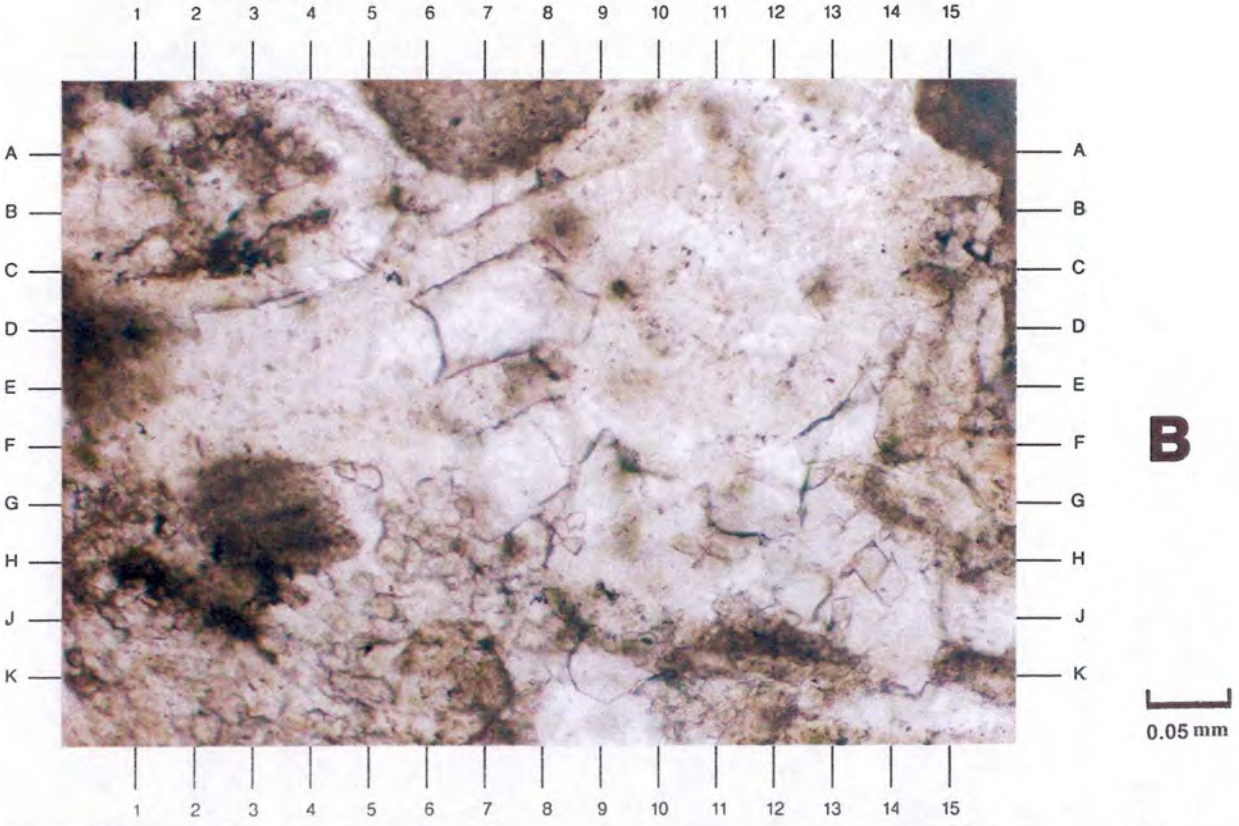
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

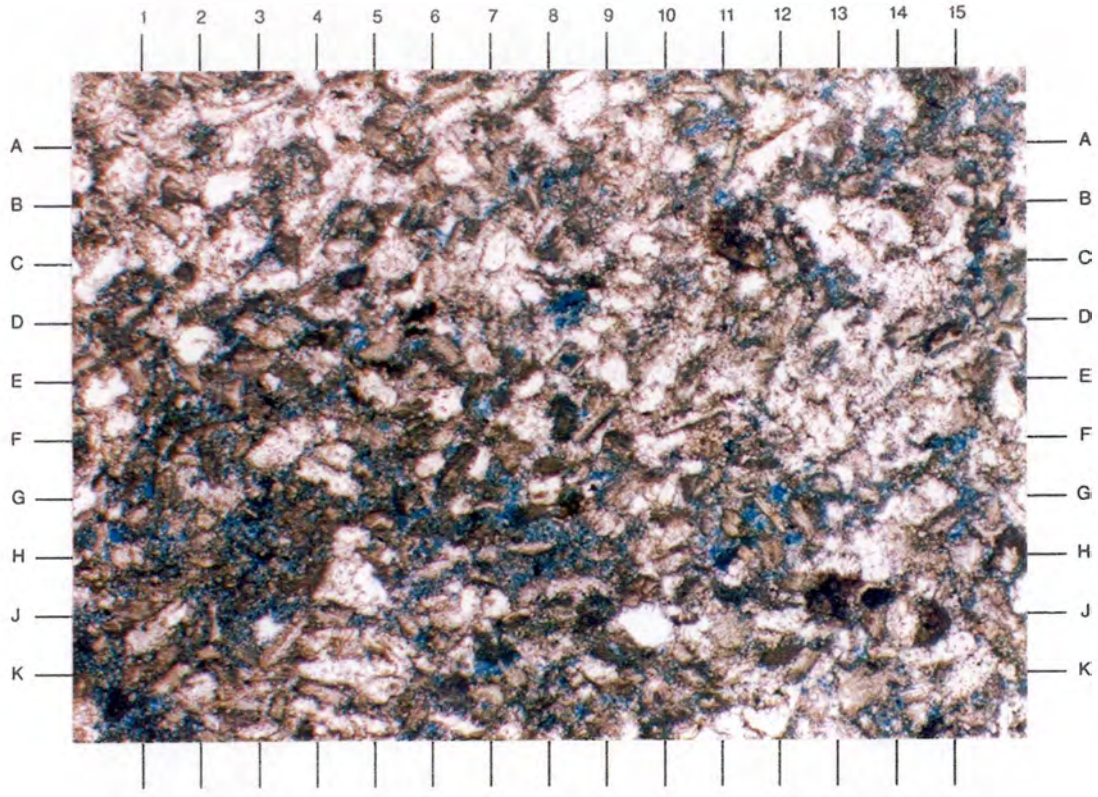
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-126

PLATE 30

Dunham Rock Type:	Lime Packstone/Grainstone
Fabric & Matrix:	Micritic groundmass, partially microspar-replaced; grainstone areas fine spar calcite-cemented
Cements/Replacement:	Microspar replacement of orginal micritic matrix in wackestone and packstone portion; fine spar calcite cement in grainstone portions, minor secondary pyrite
Allochems/Grains:	Dominantly crinoids and echinoids (Plate 30B; G5), common mollusks (Plate 30B; E12), pellets (Plate 30B; H8), rare quartz sand (Plate 30A; J3)
Porosity & Reservoir Quality:	12% (by volume) porosity total; reservoir quality considered poor to moderate overall, due to poor pore interconnectivity
Porosity Types:	Micropore content approx. 6% (Plate 30B; H-J3), intercrystalline pores (4% by volume, Plate 30B; D-E11.5), interparticle pores (2% by volume; Plate 30B; C-D3), trace intraparticle and moldic pores
Magnification:	A: 40X B: 200X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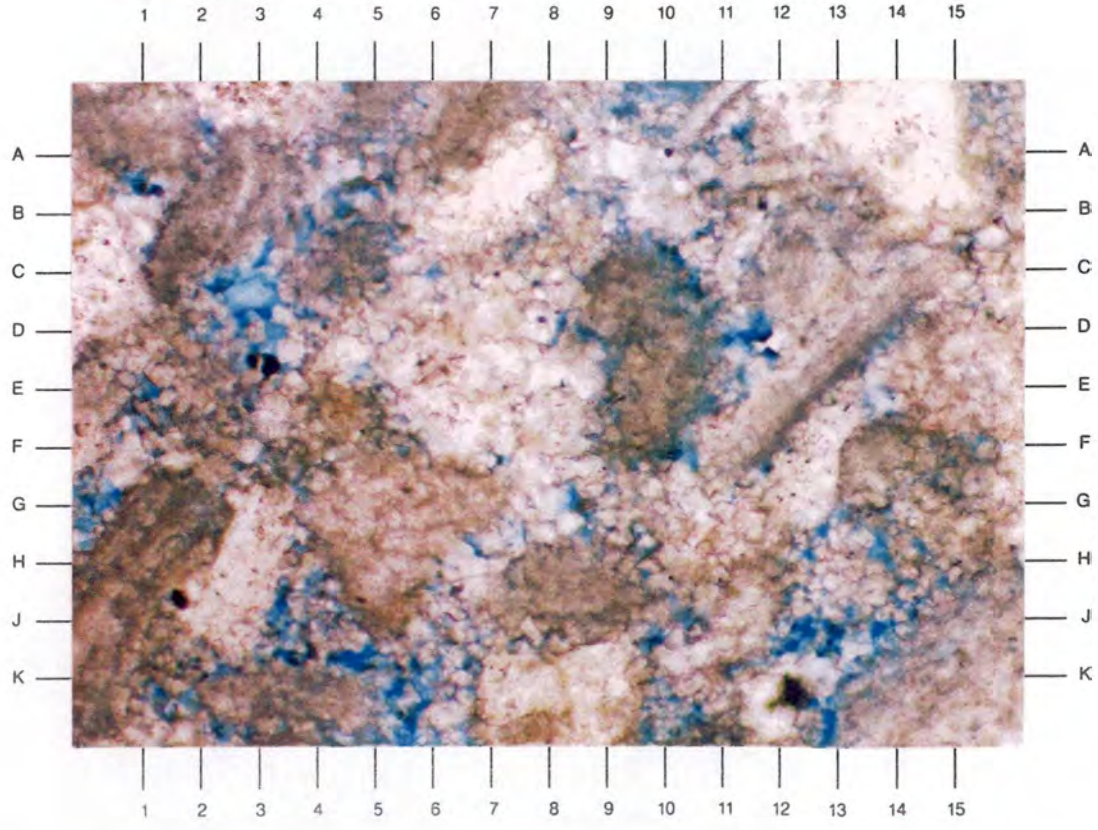
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

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Sauget Area-2

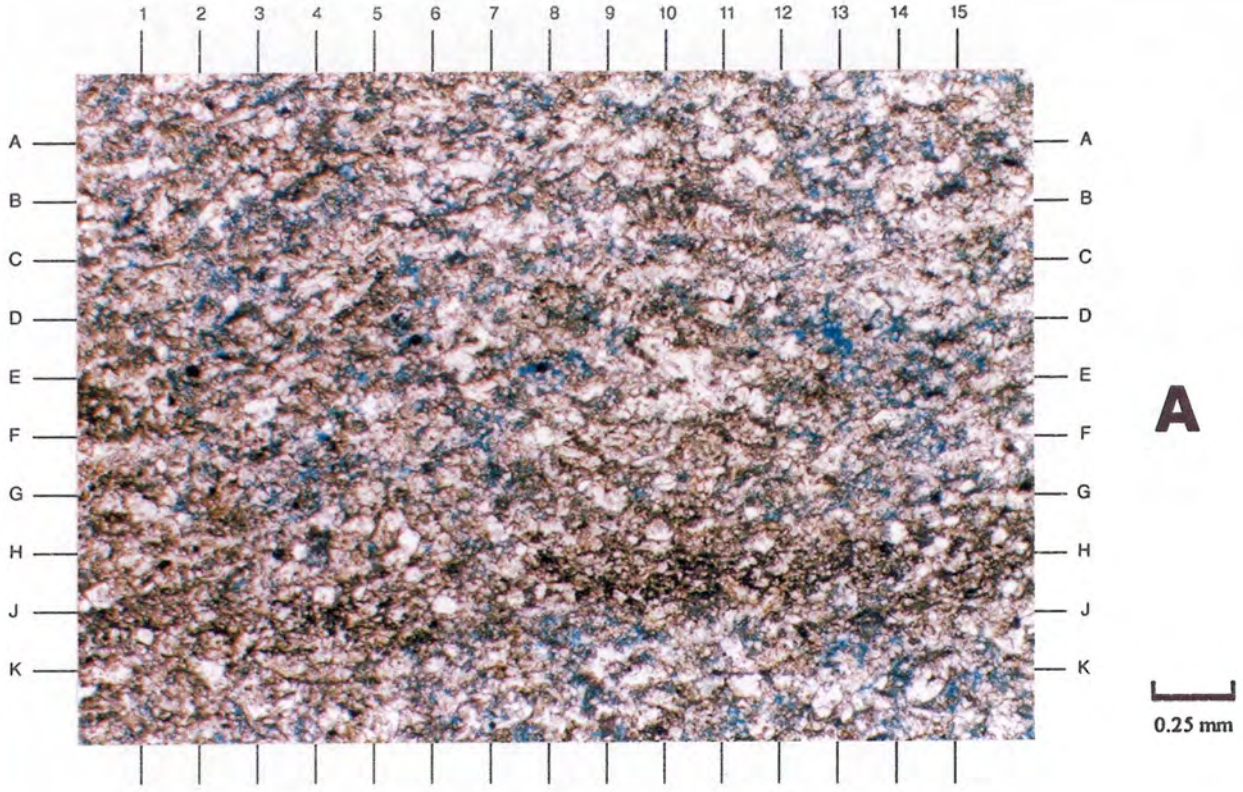
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-129

PLATE 31

Dunham Rock Type:	**Lime Packstone**
Fabric & Matrix:	**Depositional micritic groundmass has been mainly replaced by microspar (Plate 31B; B7.5); some laminar tendency as indicated by concentrated organics (Plate 31A; across photo from H to J)**
Cements/Replacement:	**Blocky calcite spar (Plate 31B; C15.5); minor late pyrite (Plate 31B; above A7.5)**
Allochems/Grains:	**Rare quartz silt (Plate 31B; K11); altered allochems (Plate 31B; G10,B2) are difficult to identify as to origin, but many are echinoids/crinoids**
Porosity & Reservoir Quality:	**Total porosity 15% (by volume); microporosity (2% by volume) is associated with micritic grains and residual matrix; reservoir quality is considered moderate**
Porosity Types:	**Visible pore types include intercrystalline (7% by volume; Plate 31B; A8.5), interparticle (5%; not observed in this view) moldic (2% by volume; Plate 31A; D13), and intraparticle (trace; Plate 31B; J3.5);**
Magnification:	**A: 40X B: 200X**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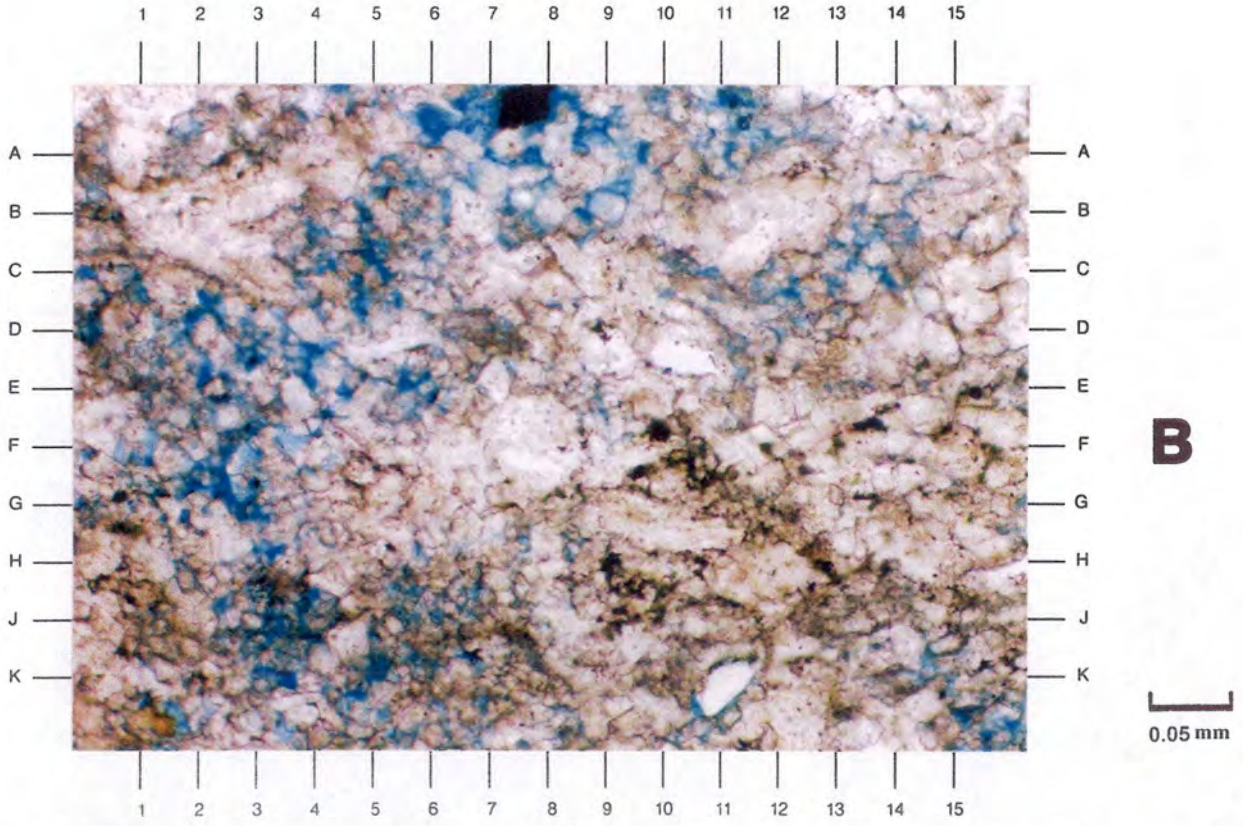
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

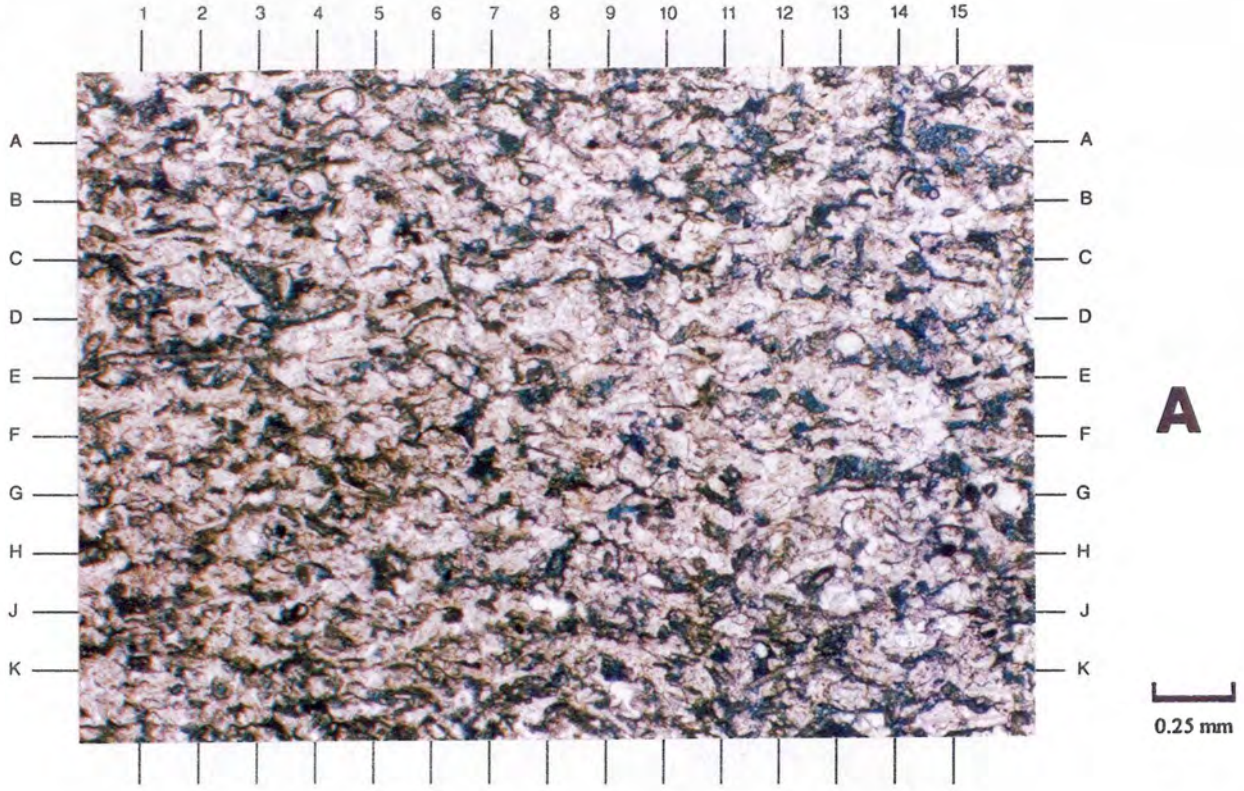
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-131

PLATE 32

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**Very minor micrite (Plate 32A; general area of H2) in this high energy sediment; some alignment of allochems**
Cements/Replacement:	**Dominant calcite spar (Plate 32B; C14); rare pyrite (Plate 32B; K12) and bitumen (Plate 32B; E-F1)**
Allochems/Grains:	**Common echinoids (Plate 32A; D-E4.5) and crinoids (Plate 32B; G0.5); rare micritic pellets (Plate 32A; C-D14)**
Porosity & Reservoir Quality:	**Several percent visible pore space (blue epoxy); micropores approximate 3% (by volume), and are associated mainly with micrite**
Porosity Types:	**Minor intragranular pore space (Plate 32B; G-H3.5); interparticle pores (Plate 32B; B-C6.5); intercrystalline pores (Plate 32B; B13); a trace amount of moldic porosity (not observed in these views)**
Magnification:	**A: 40X B: 200X**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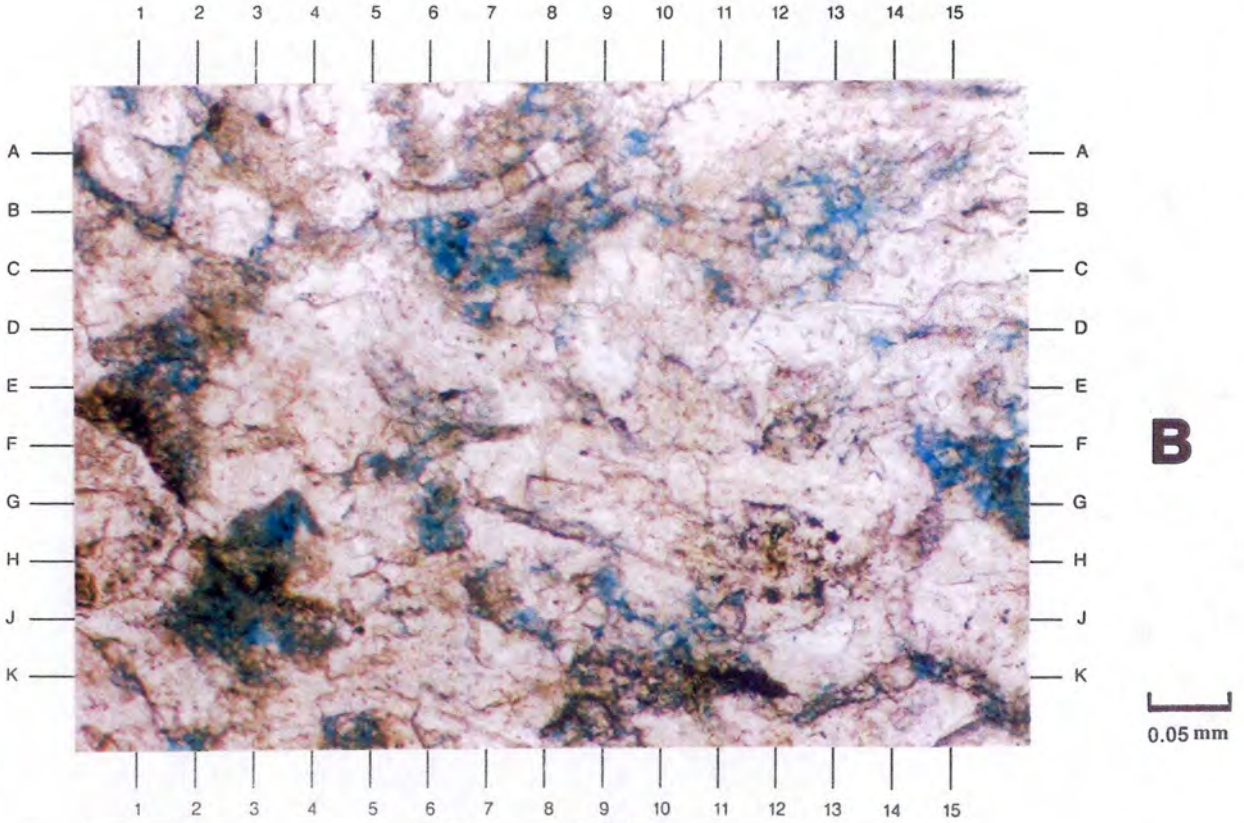
A B C D E F G H J K
0.25 mm

A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A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

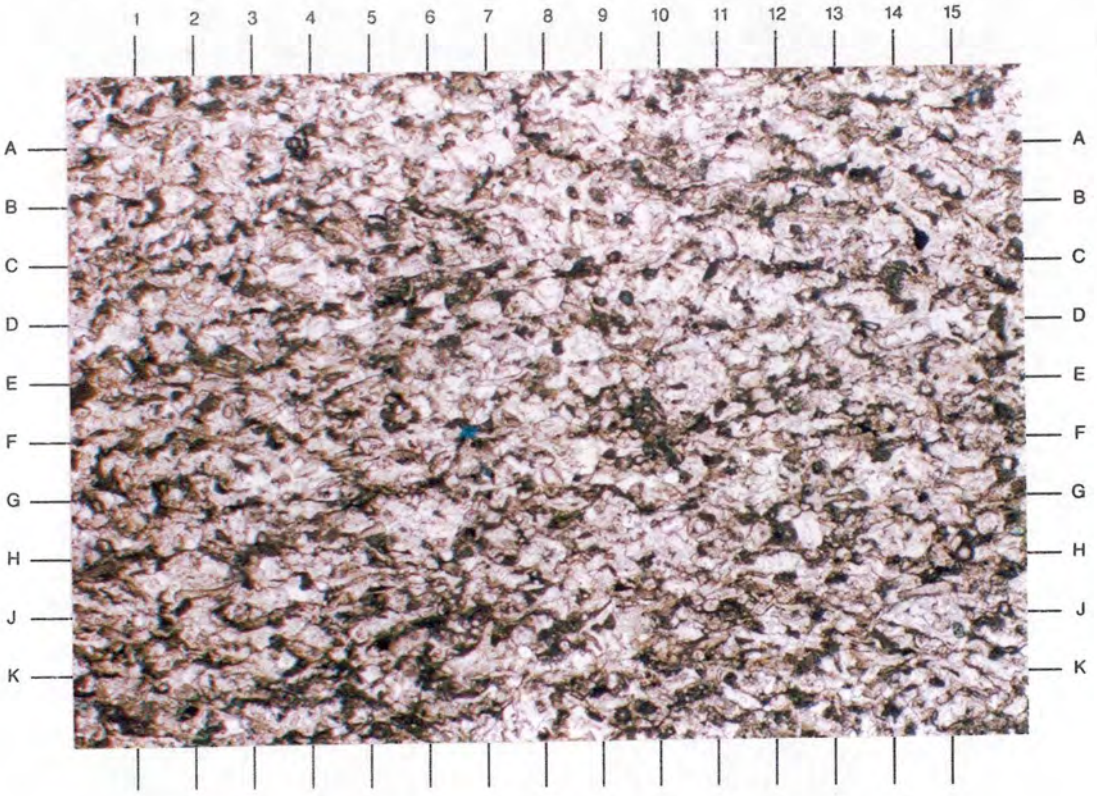
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

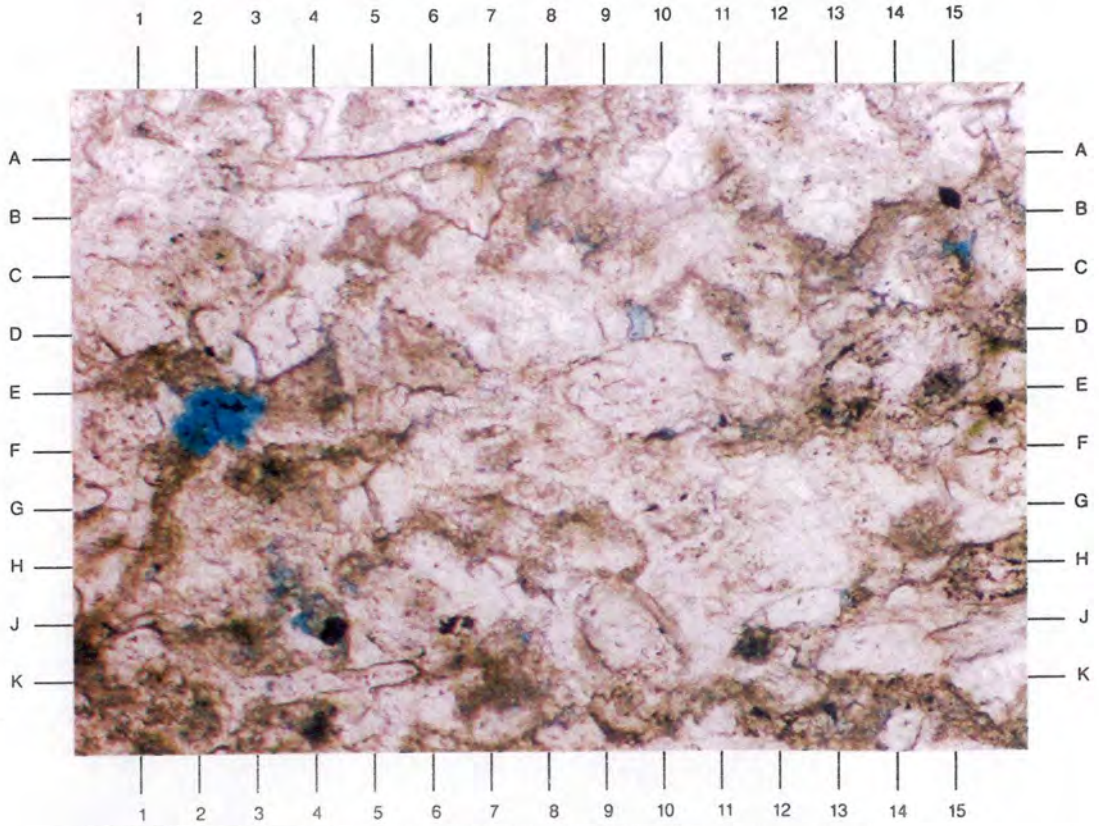
SAMPLE NUMBER: Q-2-133

PLATE 33

Dunham Rock Type:	**Lime Packstone/Grainstone**
Fabric & Matrix:	**Microspar has dominantly replaced micrite in lower energy Packstone portions**
Cements/Replacement:	**Common calcite spar (Plate 33B; B3.5); rare pyrite (Plate 33B; B15)**
Allochems/Grains:	**Altered calcareous fossils include crinoids (Plate 33A; B8.5), chambered forams (Plate 33A; A3.5), and mollusks (Plate 33A; K11.5)**
Porosity & Reservoir Quality:	**Only a trace amount of visible pore space (intercrystalline, moldic, intraparticle); reservoir quality very poor; trace observed micropore space associated with micrite**
Porosity Types:	**Moldic (Plate 33B; E-F2.5); intercrystalline (Plate 33B; C-D9.5); intraparticle (Plate 33B; J4.5)**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A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A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

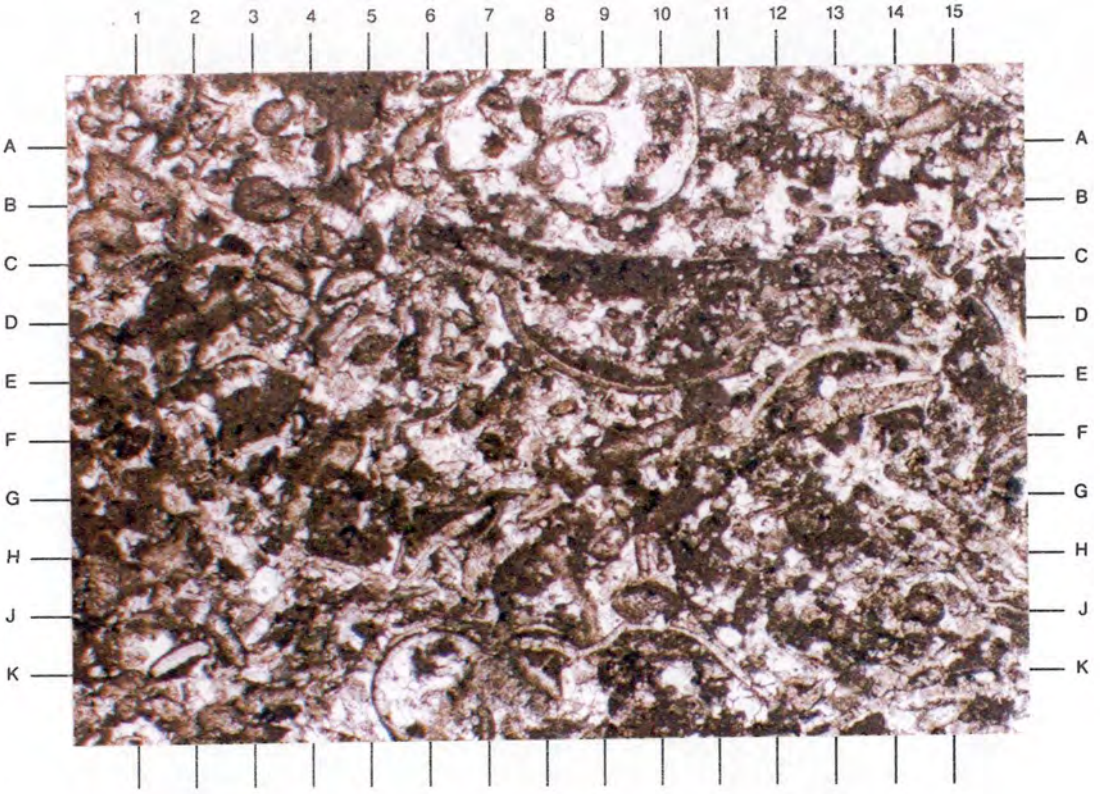
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-135

PLATE 34

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**Micrite (Plate 34A; lower left) is rare due to the high energy deposition of this sediment**
Cements/Replacement:	**Dominantly blocky calcite spar cement (Plate 34B; E7.5)**
Allochems/Grains:	**Brachiopods (Plate 34A; D7.5); thin-shelled pelecypods (Plate 34A; J-K11); crinoids (Plate 34A; above A9); echinoids (Plate 34A; E14); pellets (Plate 34B; C-D2.5); undifferentiated micritic grains (Plate 34A; E-F3); rare, chambered forams (Plate 34A; A-B12)**
Porosity & Reservoir Quality:	**No visible porosity; microporosity (none observed) is likely associated with micritic grains**
Porosity Types:	**0% (by volume) total porosity; reservoir quality is very poor, due to a lack of effective pore space; some micropore space likely associated with micritized grains**
Magnification:	**A: 40X B: 200X**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0.25 mm

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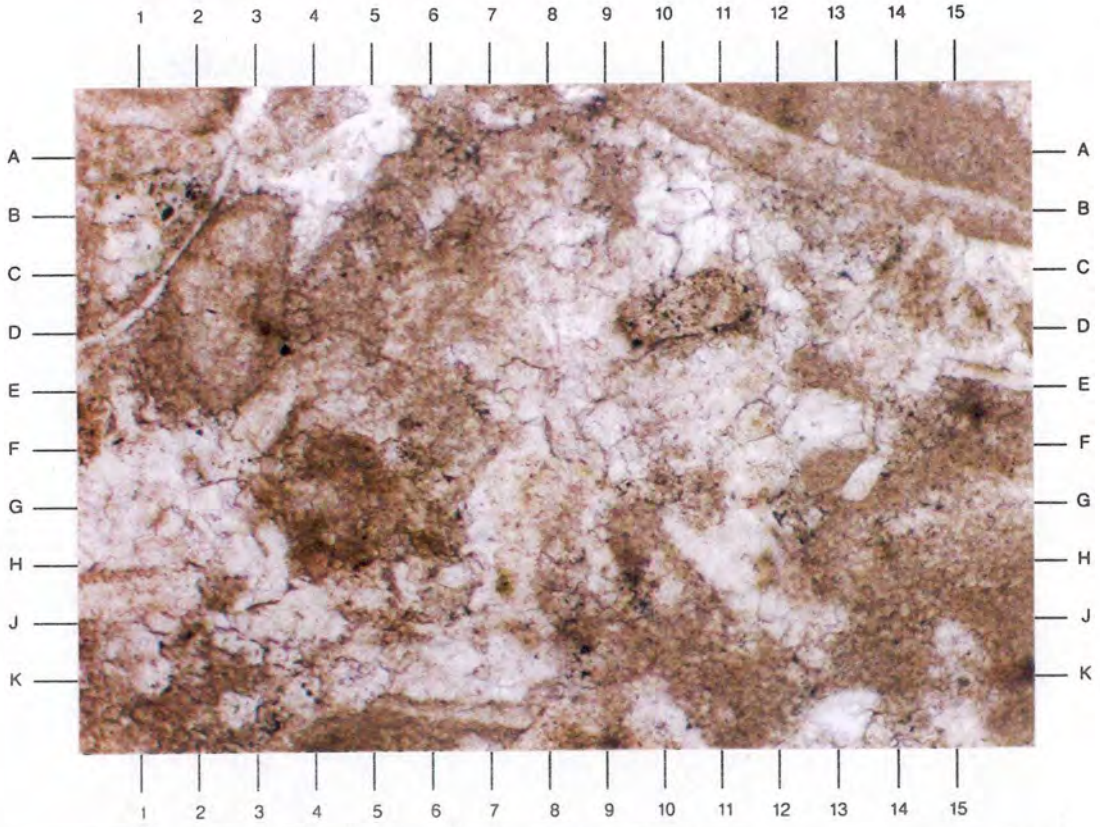

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

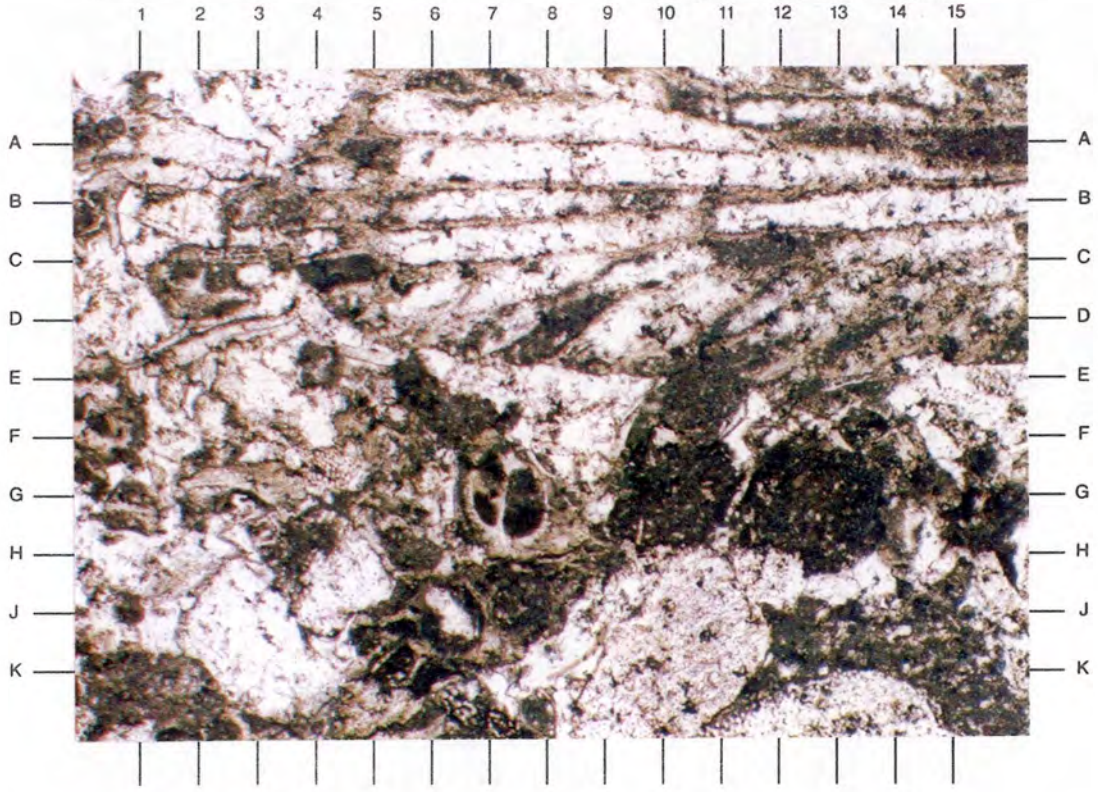
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-137

PLATE 35

Dunham Rock Type:	Lime Grainstone
Fabric & Matrix:	Minor micrite (Plate 35A; G-H3.5); fairly high compactional levels
Cements/Replacement:	Moderate calcite spar (Plate 35B; C5); minor replacement pyrite (Plate 35B; H-J4.5)
Allochems/Grains:	Large bryozoan fragment (upper right); crinoid debris (Plate 35A; below K13,J3,K10); undifferentiated micritic clasts (Plate 35A; E12.5)
Porosity & Reservoir Quality:	A trace of intraparticle pore space observed; trace microporosity associated with micritic grains
Porosity Types:	Reservoir quality is very poor; trace total porosity; note intraparticle pore space (Plate 35B; K15.5)
Magnification:	A: 40X B: 200X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0.25 mm

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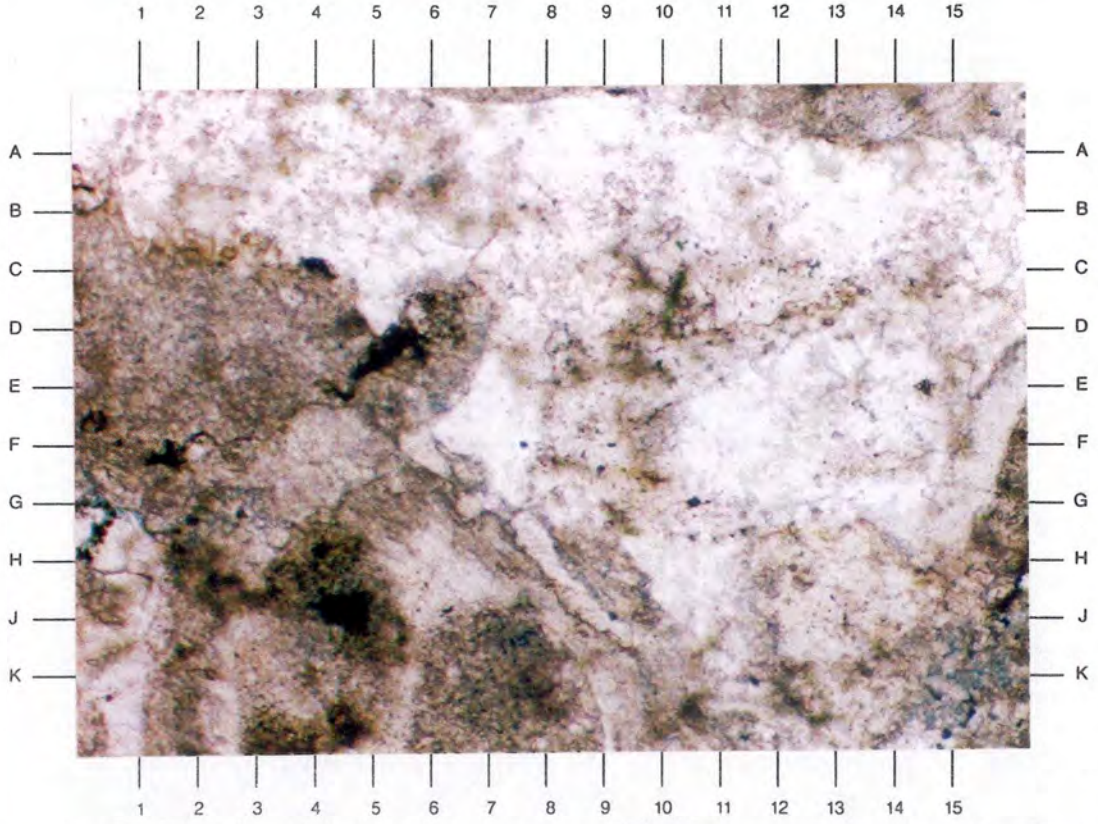
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A B C D E F G H J K
0.05 mm

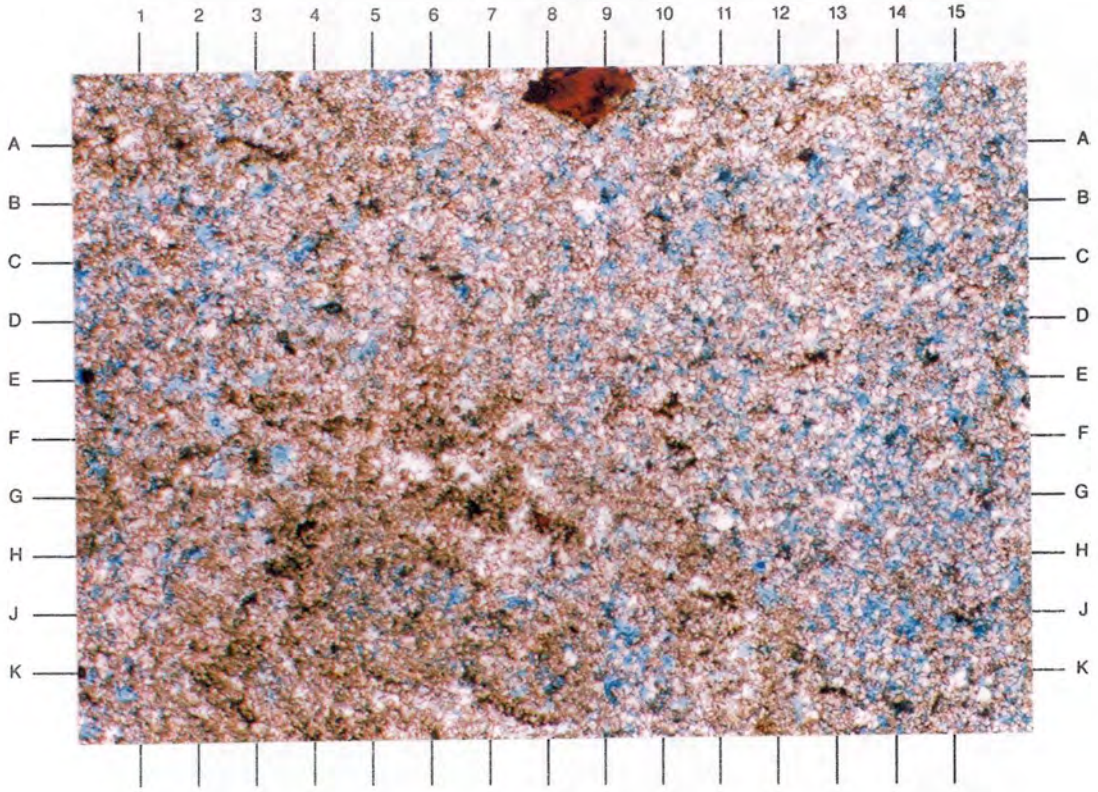
B

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-141

PLATE 36

Dunham Rock Type:	Finely-crystalline dolostone
Fabric & Matrix:	Original groundmass has been entirely dolomitized
Cements/Replacement:	Dominantly dolomite (Plate 36B; F-G14); minor late pyrite (Plate 36B; H-J14)
Allochems/Grains:	Obscured by dolomitization; pellets (Plate 36A; E-F9); rare phosphatic fragments (Plate 36A; above A8.5)
Porosity & Reservoir Quality:	Reservoir quality moderate to good; major pore types include moldic (14% by volume) and intercrystalline (8% by volume); a trace each vuggy and interparticle pore space; microporosity (2% by volume) associated with small intercrystalline pores within dolomite groundmass
Porosity Types:	24% (by volume) total porosity; moldic pores (Plate 36B; B12) and intercrystalline pores (Plate 36B; F-G15) are most common
Magnification:	A: 40X B: 200X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0.25 mm

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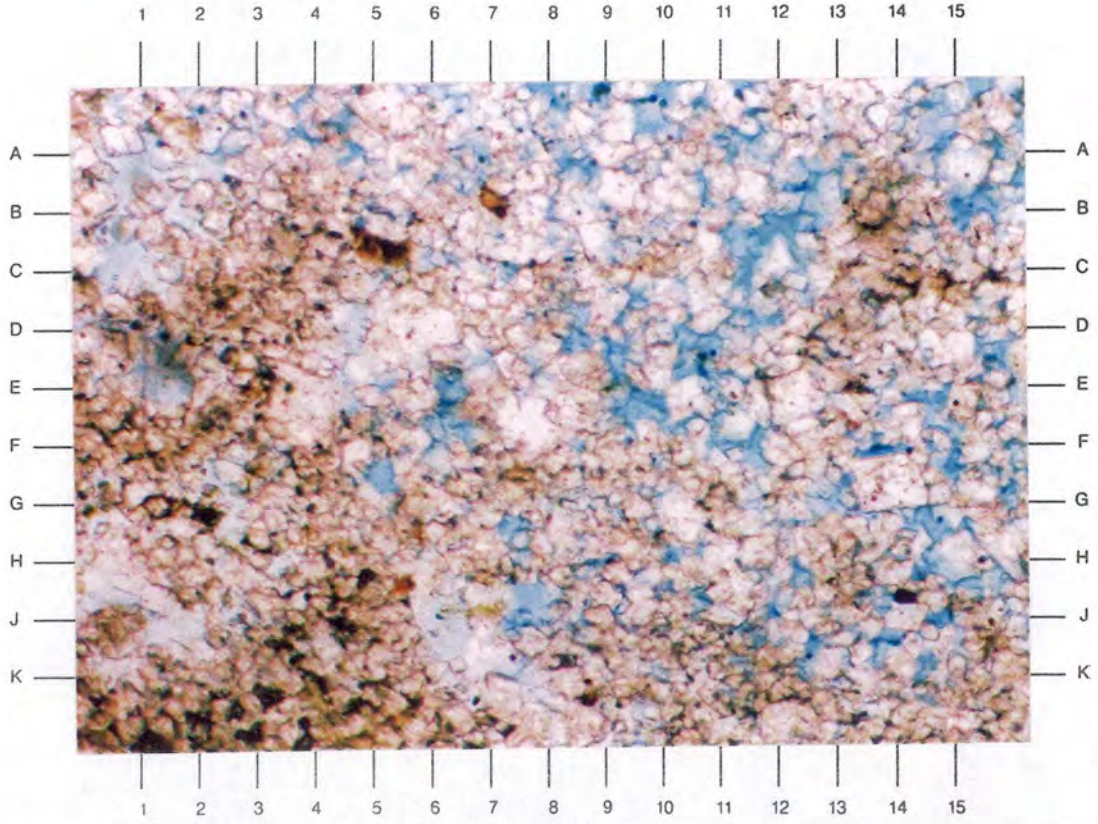
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

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Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: Q-2-143

PLATE 37

Dunham Rock Type:	Finely-crystalline dolostone
Fabric & Matrix:	Dominantly dolomite
Cements/Replacement:	Dolomite; minor pyrite (black) and Fe-oxides (red brown)
Allochems/Grains:	Obscured by dolomitization
Porosity & Reservoir Quality:	Reservoir quality moderate to good; major pore types include moldic and intercrystalline; a trace each vuggy and interparticle pore space; microporosity (2% by volume) associated with small intercrystalline pores within dolomite groundmass
Porosity Types:	21% (by volume) total porosity; 13% (by volume) moldic pores (Plate 36B; B12) and 6% (by volume) intercrystalline pores (Plate 36B; F-G15) are most common
Magnification:	A: 40X B: 200X

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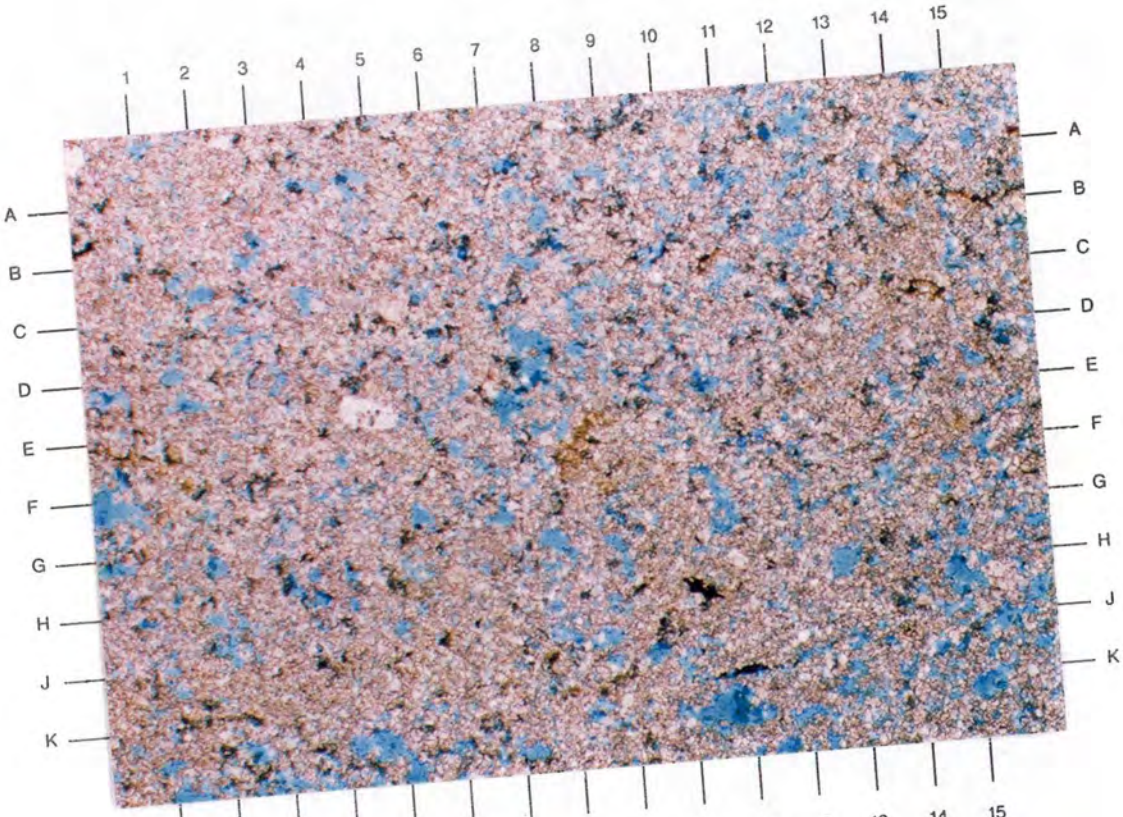

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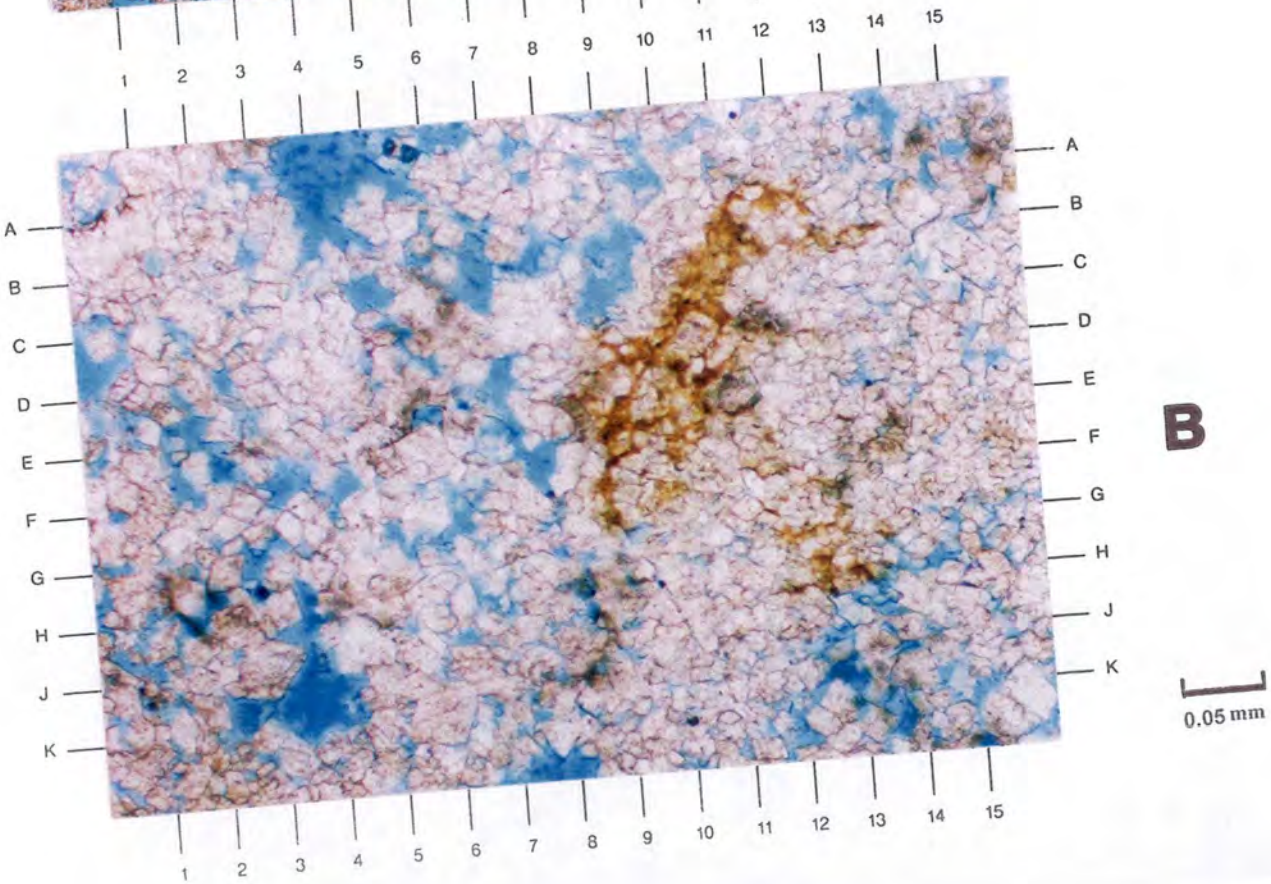


B

URS Corporation
Sauget Area-2

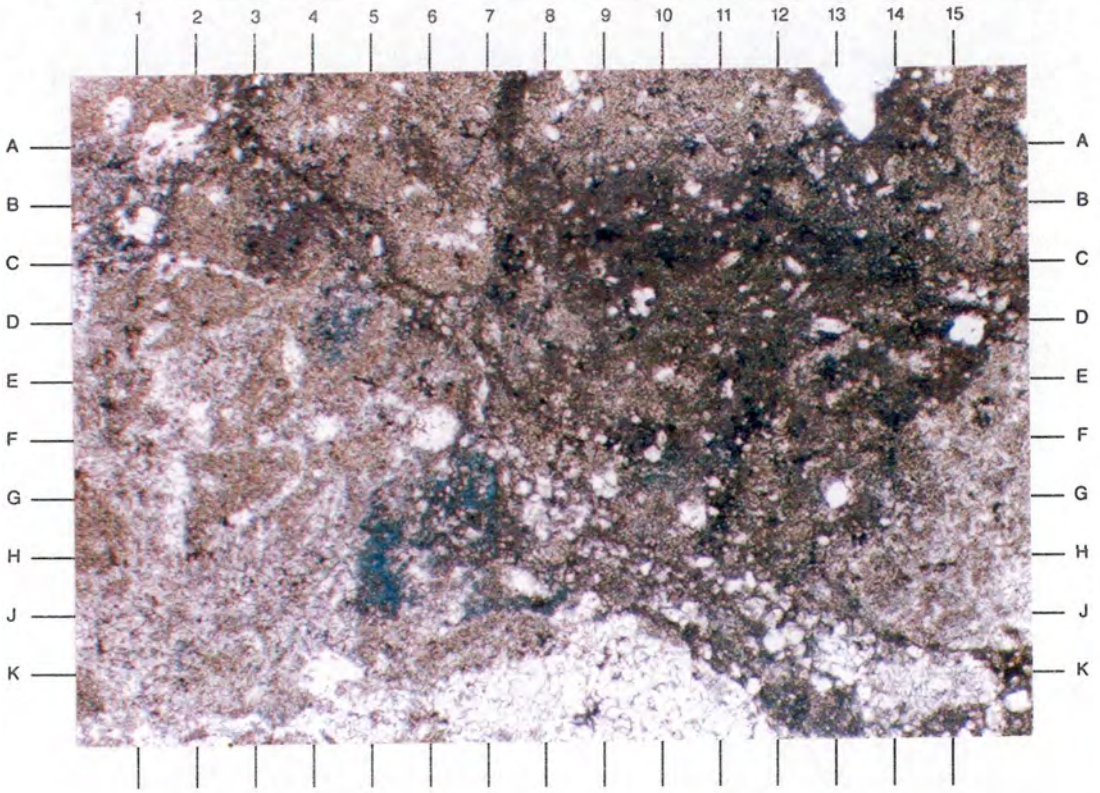
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-142

PLATE 38

Dunham Rock Type:	**Lime Wackestone**
Fabric & Matrix:	**Dominant micrite; some dolomitization (such as Plate 38A; area of K14)**
Cements/Replacement:	**Mainly dolomite replacement (Plate 38B; B4.5)**
Allochems/Grains:	**Rare quartz silt (Plate 38A; G13); scattered allochems including crinoids (Plate 38A; K9)**
Porosity & Reservoir Quality:	**Very poor or better reservoir quality; 4% (by volume) total porosity**
Porosity Types:	**Minor vuggy (Plate 38B; C6.5); in this case reduced by dolomite); micropores (Plate 38B; J12); associated both with micrite and with dolomitized areas**
Magnification:	**A: 40X B: 200X**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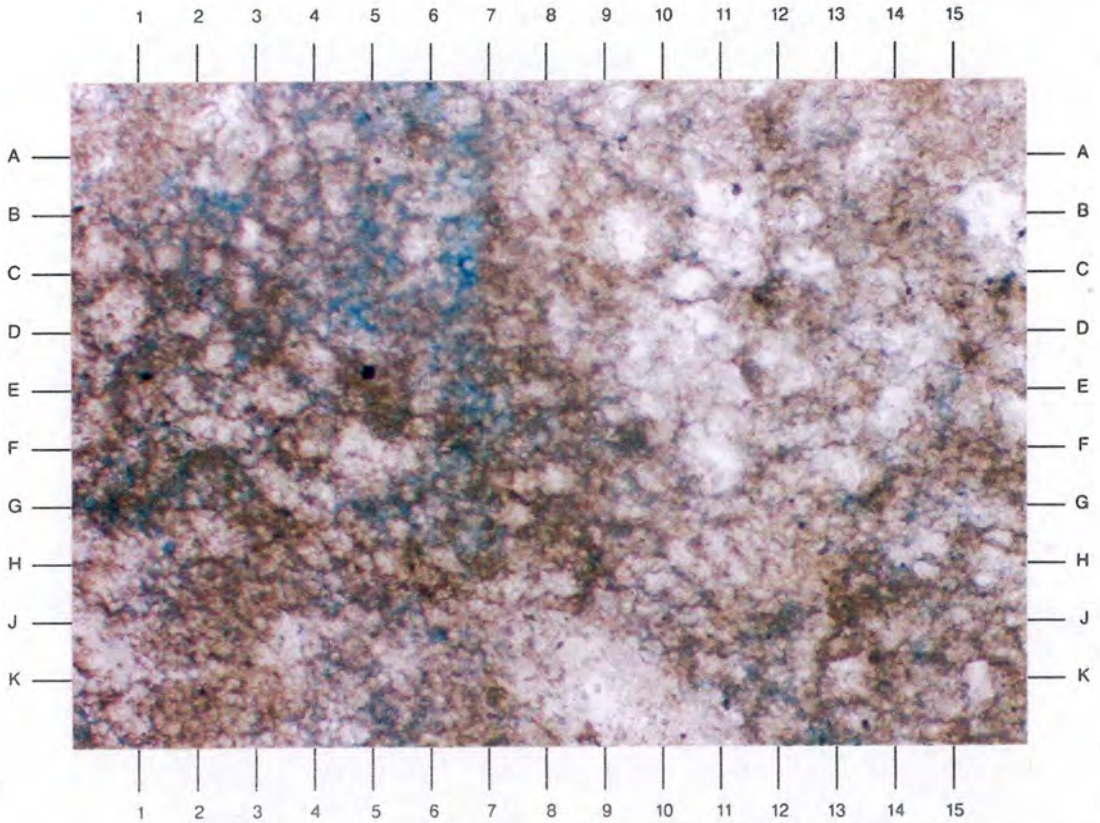
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

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Sauget Area-2

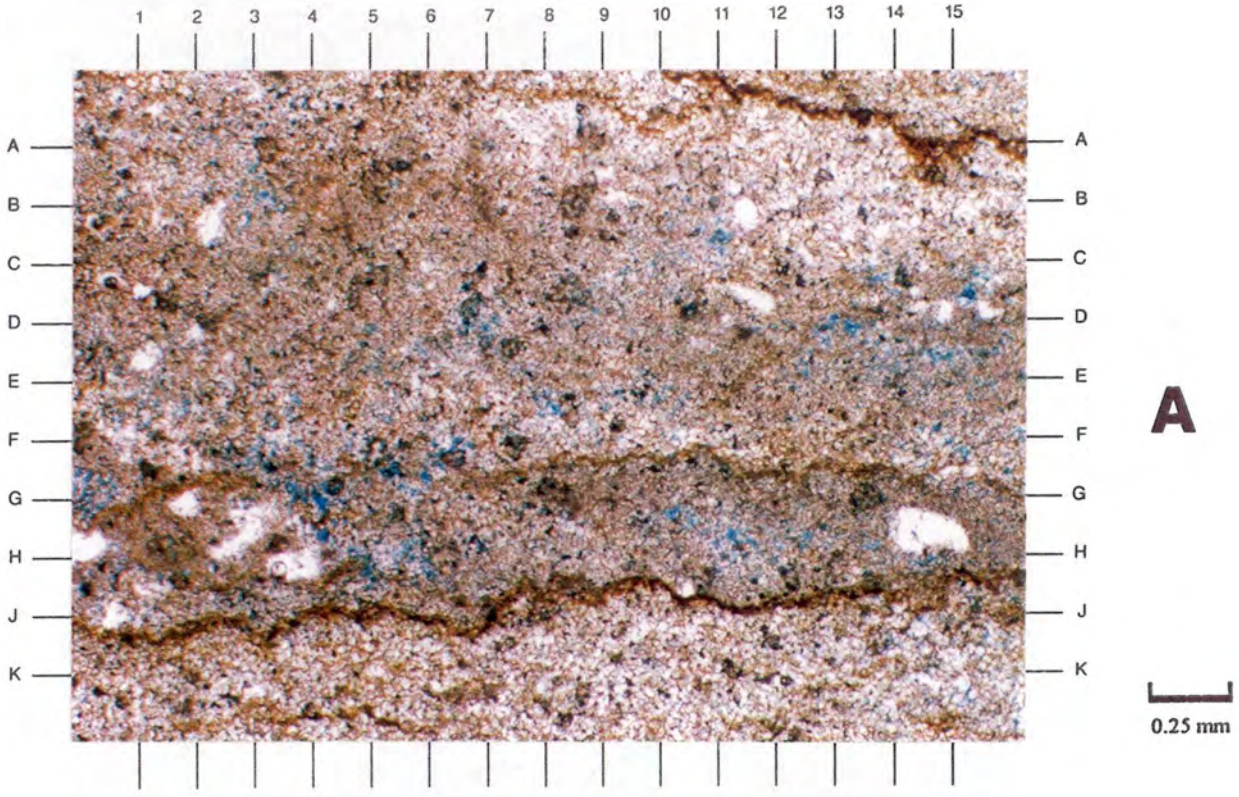
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

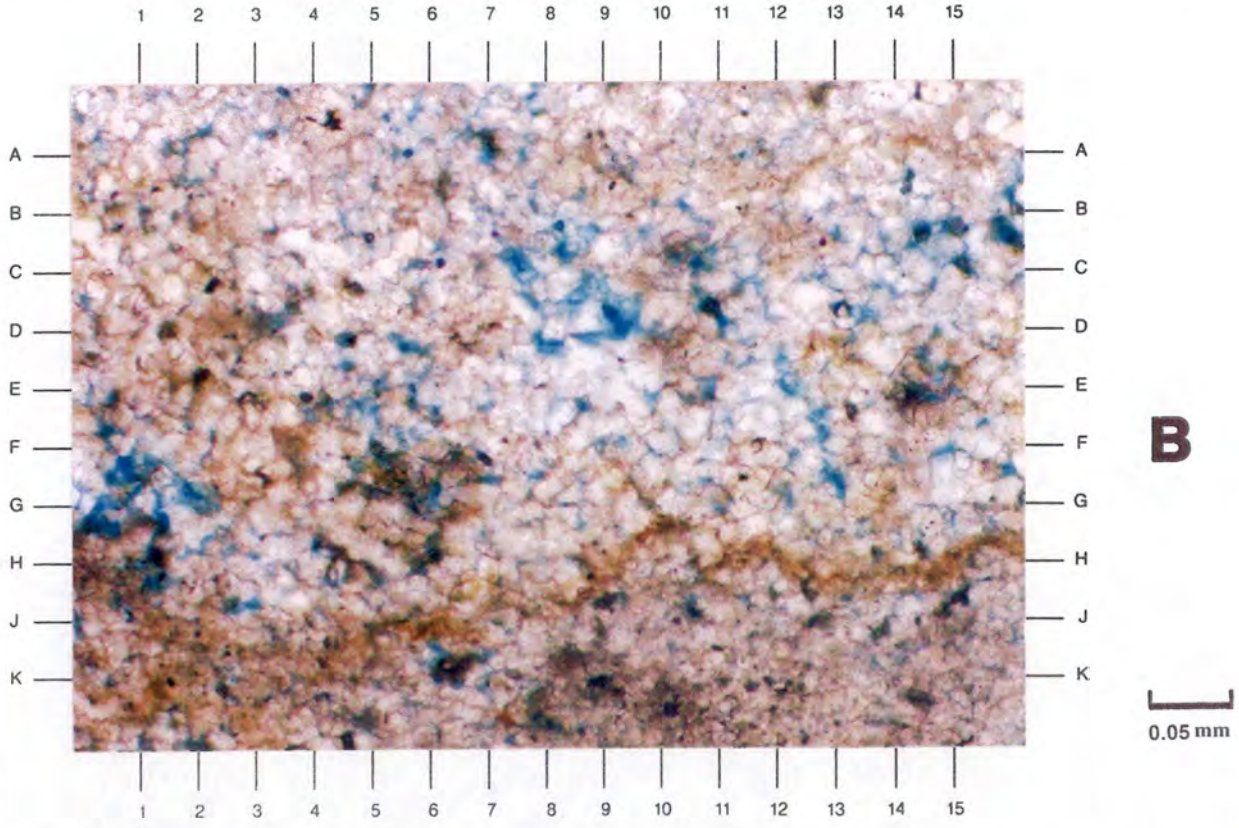
SAMPLE NUMBER: R-1-144

PLATE 39

Dunham Rock Type:	Lime Wackestone, variably dolomitized
Fabric & Matrix:	Laminated; pre-stylolitic seams (across Plate 39A from H-J) forming in response to chemical compaction, with resulting concentration of organics (dark)
Cements/Replacement:	Microspar replacement of micrite (Plate 39A; D-E15); dolomitization (area of Plate 39B)
Allochems/Grains:	"Ghost" pellets (Plate 39A; B-C7); filled moldic voids (Plate 39A; G-H15)
Porosity & Reservoir Quality:	Zoned porosity (blue epoxy); poor to moderate reservoir quality
Porosity Types:	Moldic (4% by volume; C-D9 of Plate 39B); intercrystalline (2% by volume; E-F12.5 of Plate 39B); microscopic (2% by volume observed), trace vuggy, trace fracture
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

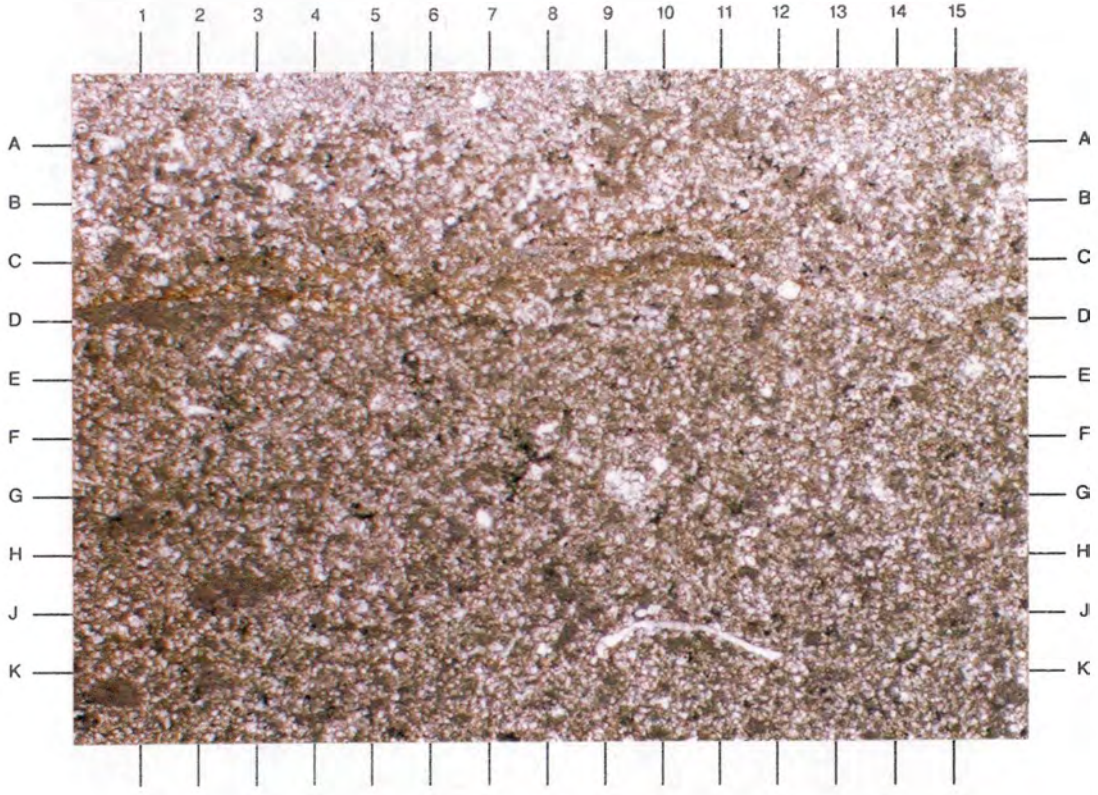
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-146

PLATE 40

Dunham Rock Type:	**Lime Packstone, variably dolomitized**
Fabric & Matrix:	**Common micrite (brownish) as both "true" matrix and compacted pellets ("pseudomatrix")**
Cements/Replacement:	**Common, scattered dolomite rhombs (Plate 40B; G-H11); late replacive pyrite (Plate 40B; E-F7)**
Allochems/Grains:	**Abundant pellets (Plate 40B; J2); minor thin-shelled pelecypods (Plate 40A; J-K10); minor undifferentiated micritic grains (Plate 40A; H-J2.5)**
Porosity & Reservoir Quality:	**A trace amount of intercrystalline pore space (not observed in this view) in addition to trace microporosity**
Porosity Types:	**Micropore space may be higher than the "trace" indicated due to nature of the sediment**
Magnification:	**A: 40X B: 200X**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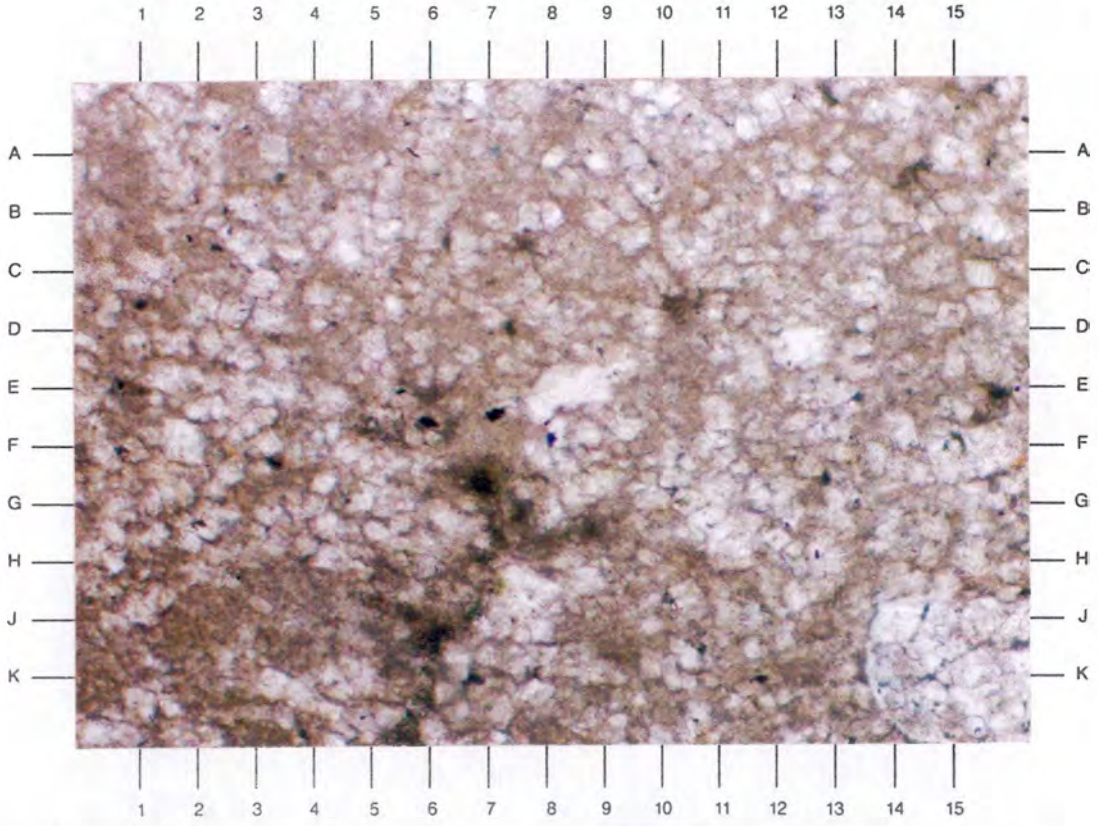
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

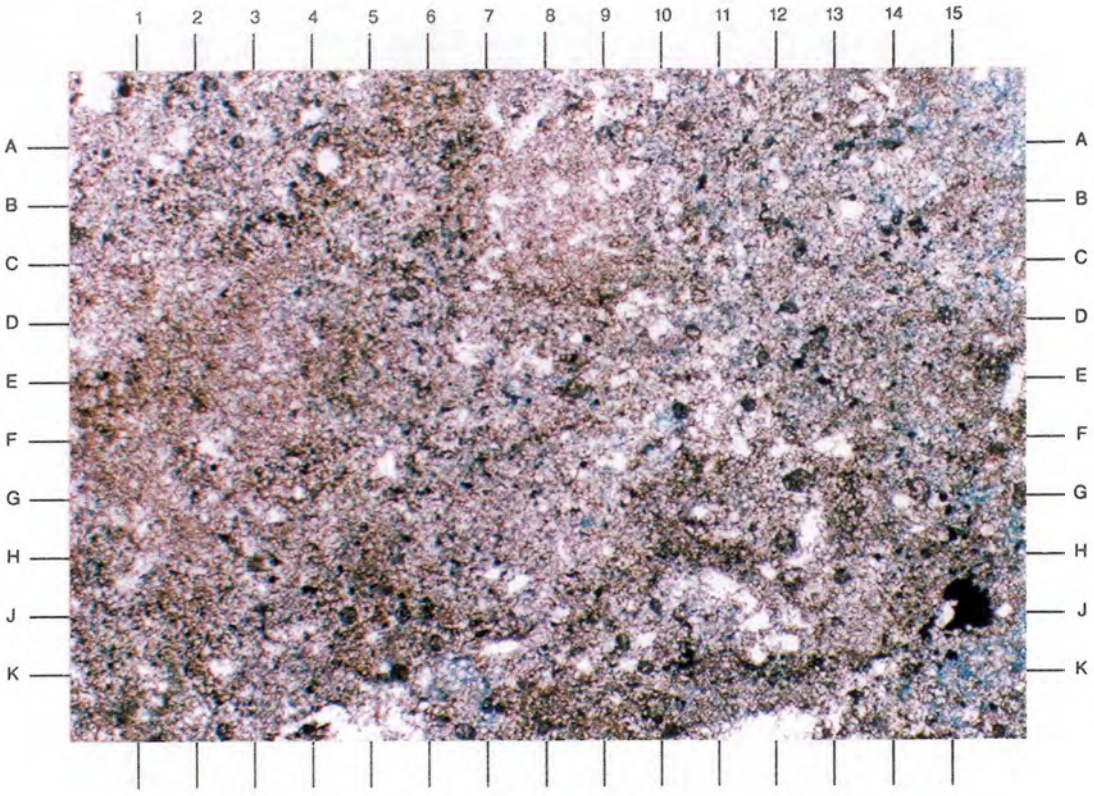
B

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-149

PLATE 41

Dunham Rock Type:	Lime Wackestone, variably dolomitized
Fabric & Matrix:	Some patchy, burrowed fabric is noted in Plate 41A; micritic matrix (Plate 41A; H14.5) in this view is mainly dolomite-replaced
Cements/Replacement:	Common dolomite replacement (Plate 41B; D8) shown in this view; late pyrite (Plate 41B; C12) is commonly noted
Allochems/Grains:	Minor crinoid/echinoid debris (Plate 41A; below K12,E15.5); "ghost" pellets (Plate 41B; A-B10.5)
Porosity & Reservoir Quality:	Overall poor or better reservoir quality; 9% (by volume) total porosity by point count methods
Porosity Types:	Intercrystalline pores (Plate 41B; F-G14) and moldic pores (Plate 41B; A-B4.5) are common effective types; ineffective micropores also commonly-observed
Magnification:	A: 40X B: 200X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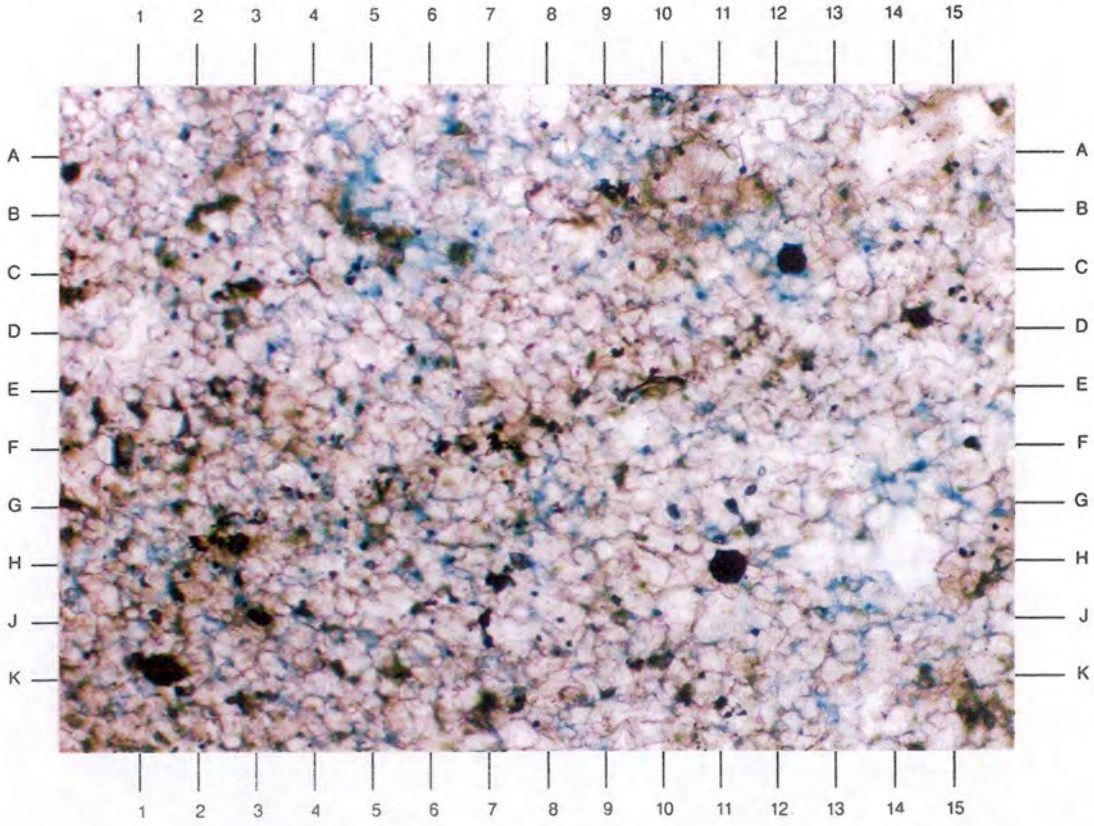
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

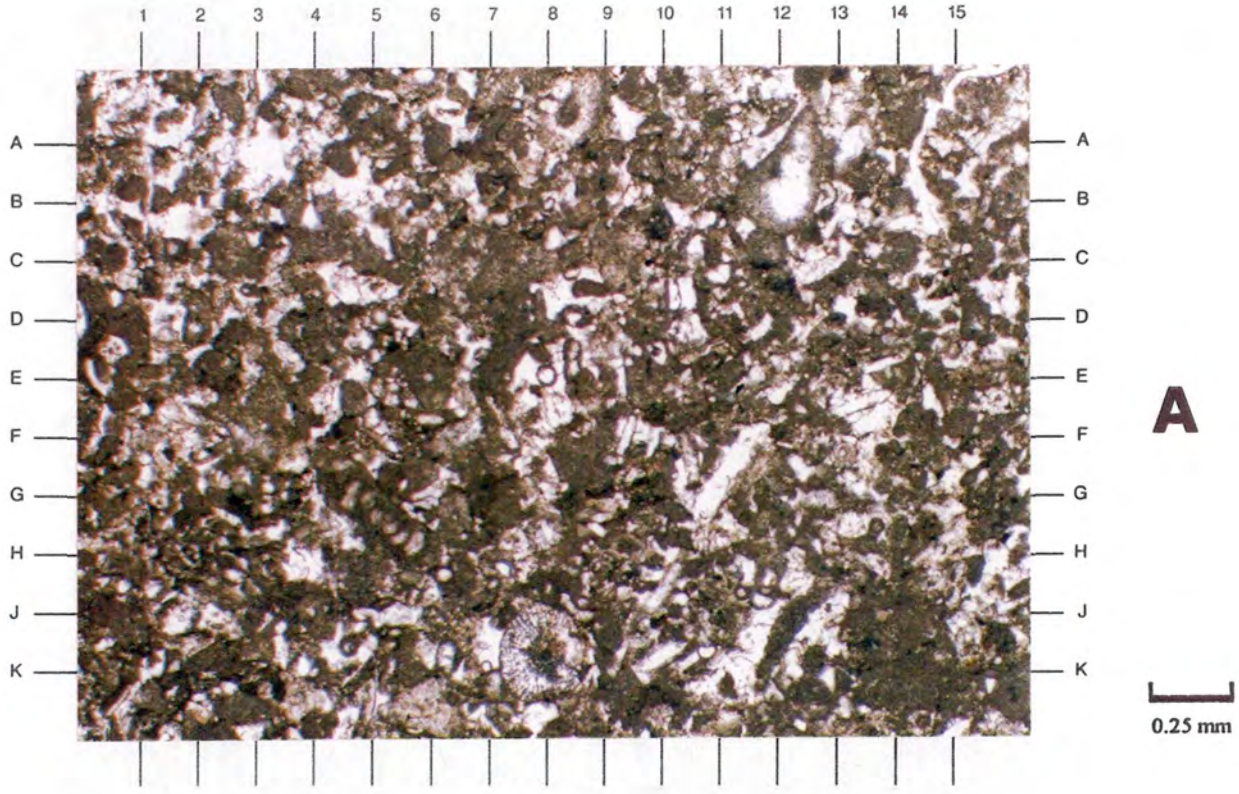
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-151

PLATE 42

Dunham Rock Type:	Lime Grainstone (minor Packstone)
Fabric & Matrix:	Micrite matrix rare, only in packstone regions
Cements/Replacement:	Coarse calcite spar cement (Plate 42B; A6.5) dominant
Allochems/Grains:	Chambered forams (Plate 42B; G-H5.5); crinoid plates (Plate 42B; A-B12); echinoderm spines (Plate 42B; J-K8); pellets (Plate 42B; A-B4.5); undifferentiated micritic types (K14 of Plate 42B)
Porosity & Reservoir Quality:	Reservoir quality is considered very poor; pores limited to micropores (trace observed) and intraparticle pores (trace observed) within micritic grains
Porosity Types:	No porosity is observed in this view; overall micropore content may be greater than the "trace" observed, due to high micrite content (within allochems)
Magnification:	A: 40X B: 200X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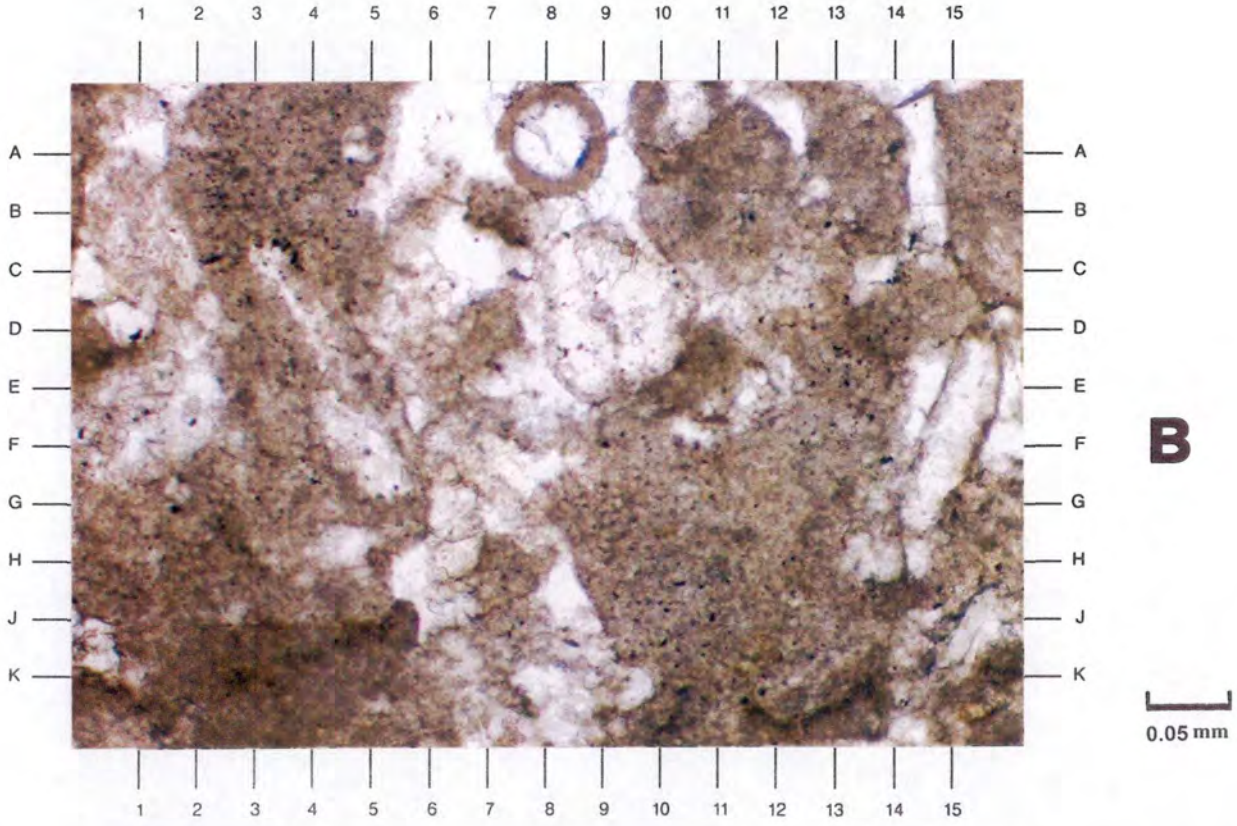
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

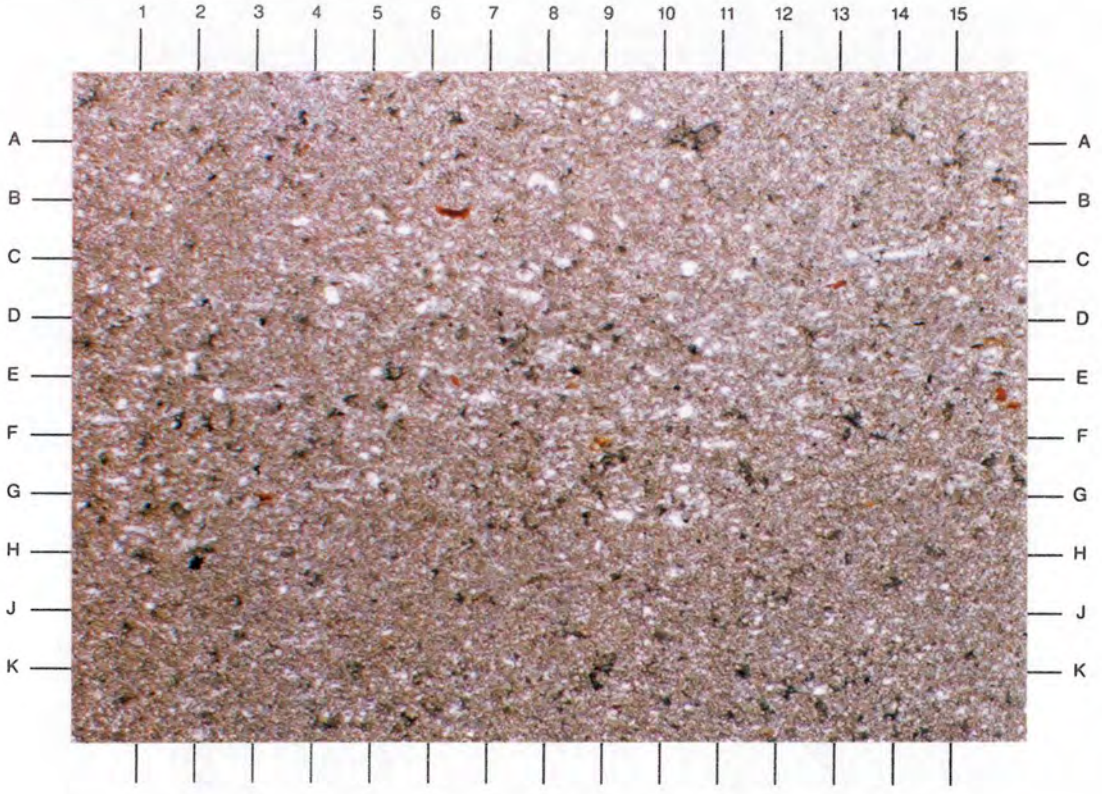
B

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-153

PLATE 43

Dunham Rock Type:	**Lime Wackestone, slightly dolomitized**
Fabric & Matrix:	**Massive fabric; common micrite (brownish; H-J2 of Plate 43B); sporadic dolomite replacement (Plate 43B; K8.5) with very fine crystals**
Cements/Replacement:	**Aforementioned dolomite; minor late pyrite (Plate 43B; A5.5)**
Allochems/Grains:	**"Ghost" pellets (Plate 43B; A7.5); calcitic fossil fragments (Plate 43A; C14,B8)**
Porosity & Reservoir Quality:	**No porosity observed; reservoir quality is very poor**
Porosity Types:	**Micropores should be present in this rock, but were not observed**
Magnification:	**A: 40X B: 200X**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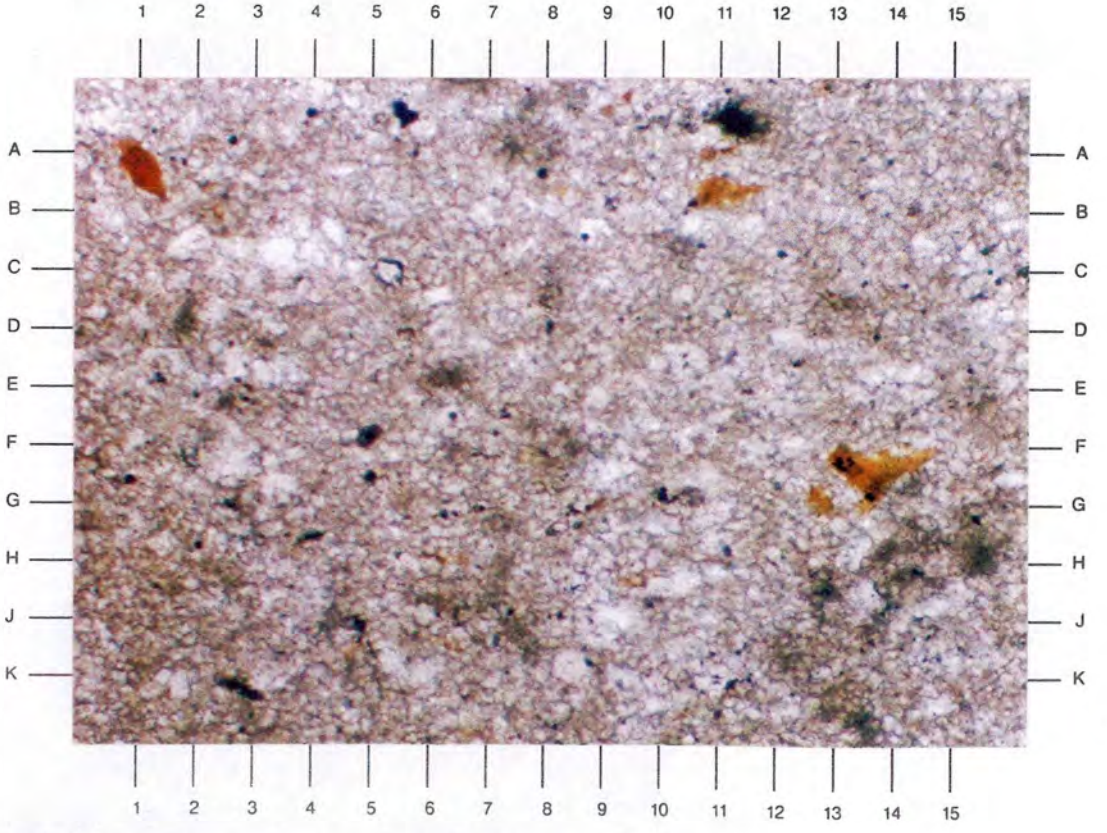
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: R-1-155

PLATE 44

Dunham Rock Type:	Lime Wackestone, variably dolomitized
Fabric & Matrix:	Appears massive, micrite (brownish) is replaced in areas by dolomite
Cements/Replacement:	Common very fine dolomite (Plate 44B; B4.5); minor pyrite (Plate 44B; E13)
Allochems/Grains:	Echinoid plates (Plate 44A; K13.5); compressed pellets (Plate 44B; K5)
Porosity & Reservoir Quality:	No pore space observed; reservoir quality is very poor
Porosity Types:	Microporosity may be present within micrite and between very fine dolomite crystals
Magnification:	A: 40X B: 200X

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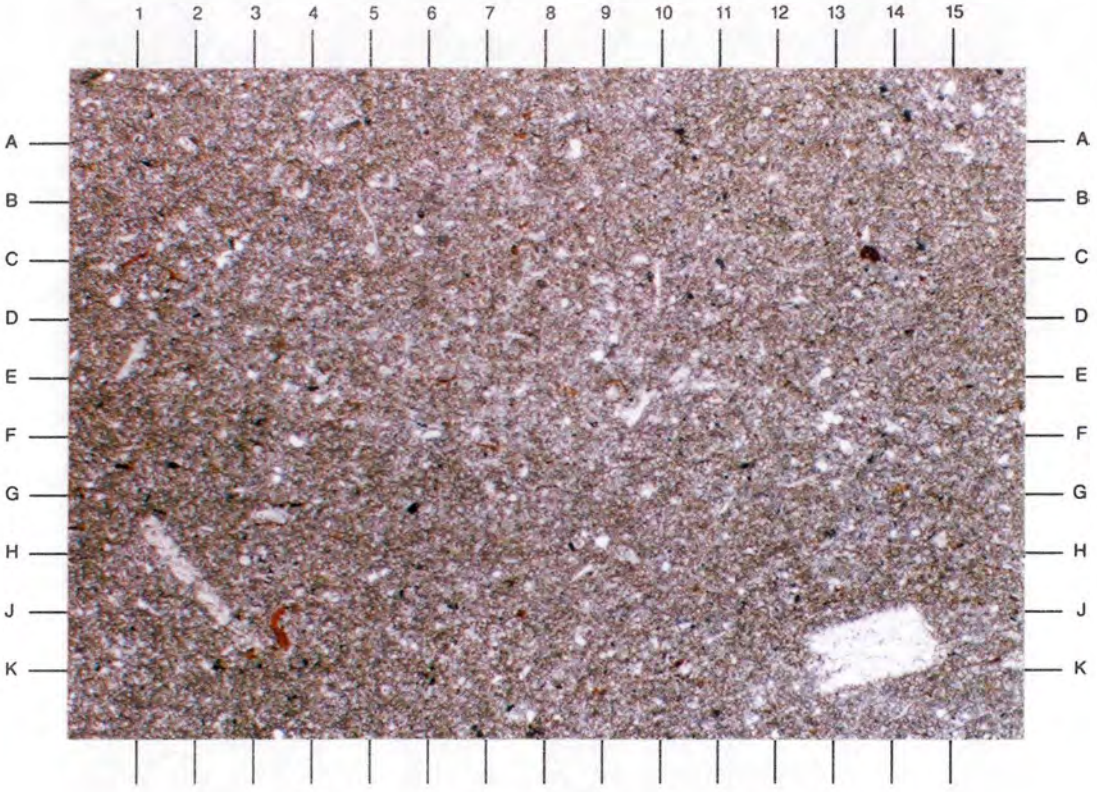

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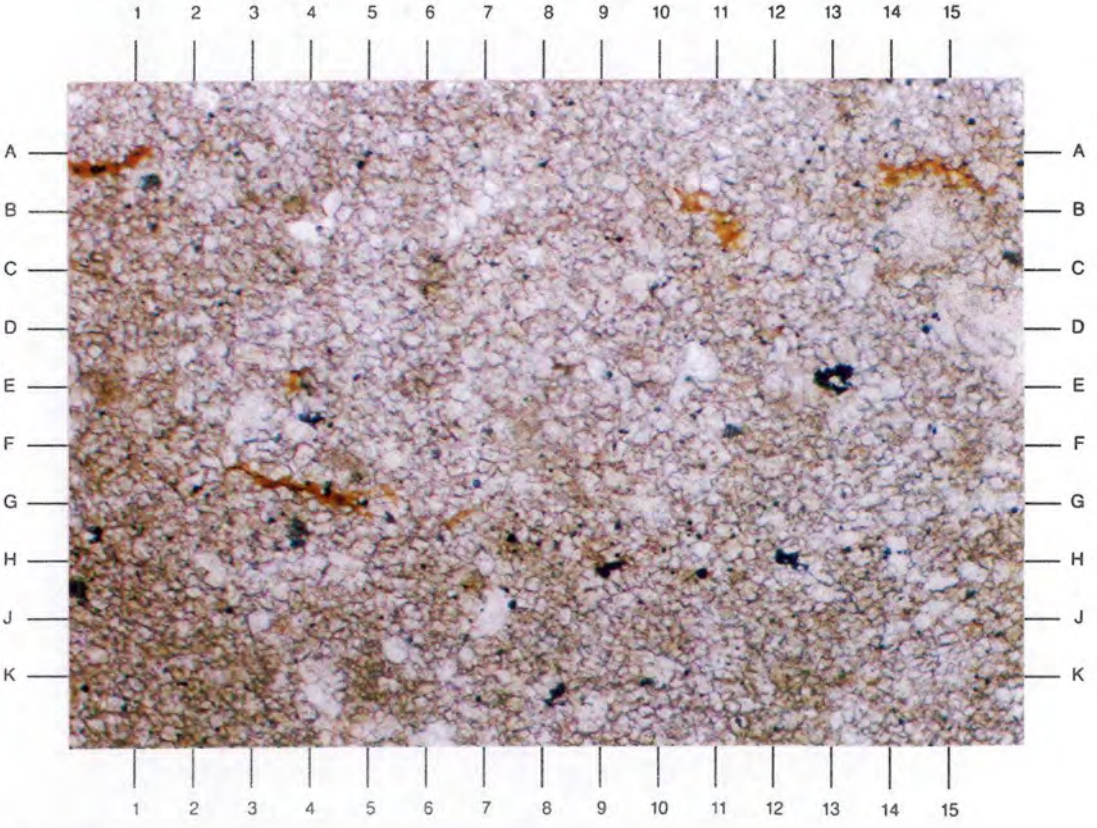

B

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Sauget Area-2

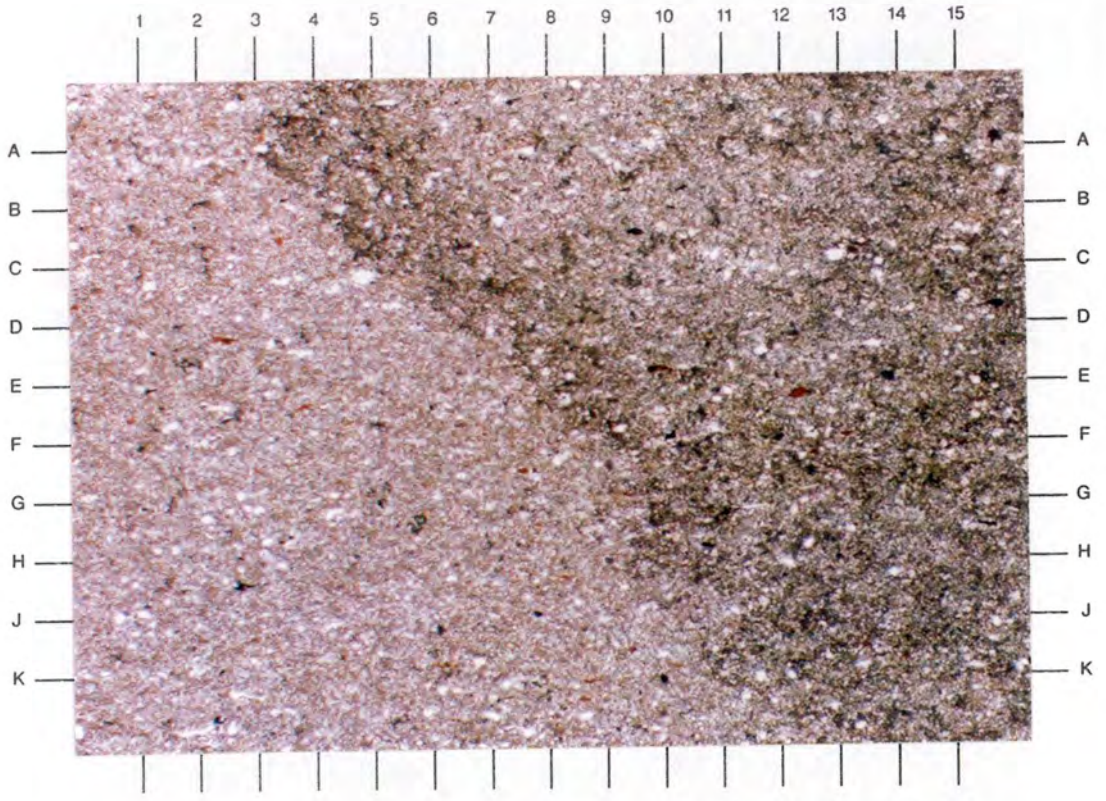
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

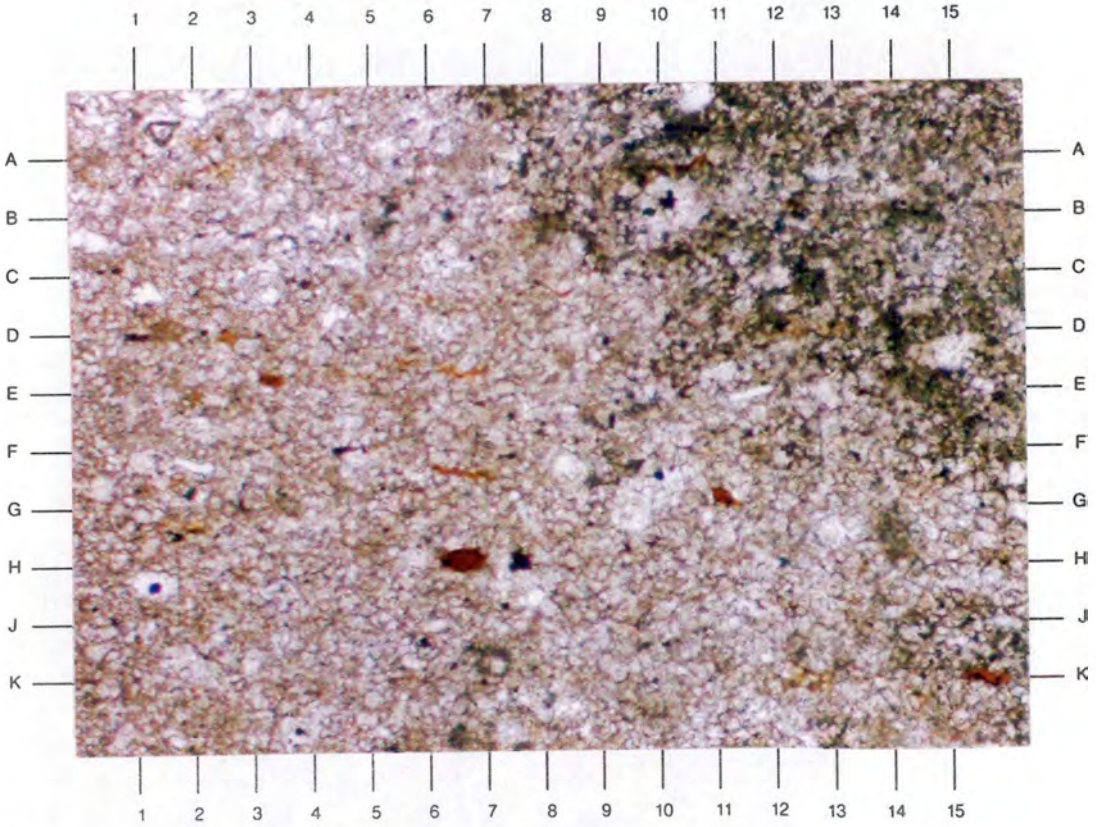
SAMPLE NUMBER: R-1-157

PLATE 45

Dunham Rock Type:	Lime Wackestone, variably dolomitized
Fabric & Matrix:	Note the variable appearance of the sample, with tighter material to lower left and a burrowed area to the upper right (of Plate 45A); micrite and very fine dolomite replacement
Cements/Replacement:	Very fine dolomite replacement (A4.5 of Plate 45B) is common
Allochems/Grains:	Obscured by dolomitization; minor skeletal allochems (Plate 45A; E-F2.5) observed
Porosity & Reservoir Quality:	Only a trace of porosity observed; reservoir quality is very poor
Porosity Types:	Moldic (not observed in this view, a trace amount); microporosity (a trace amount observed) could potentially be significantly higher
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A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A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

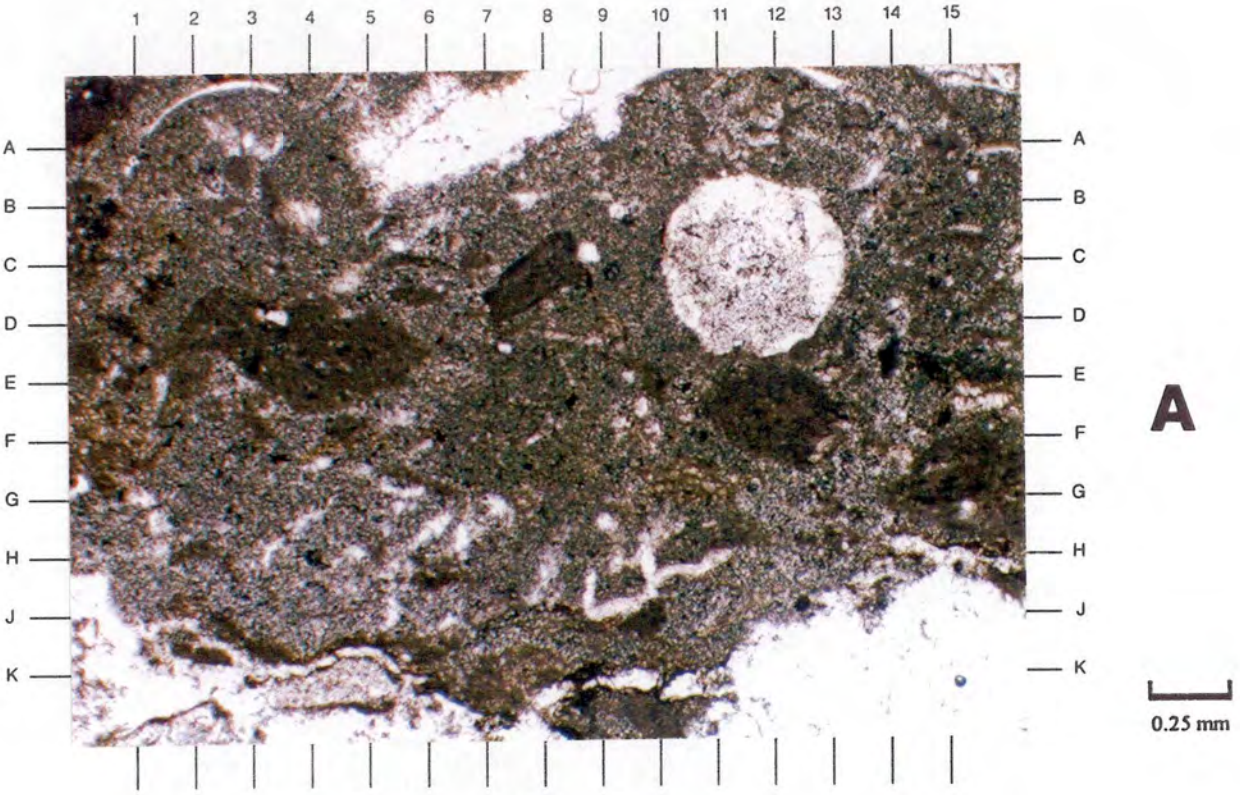
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

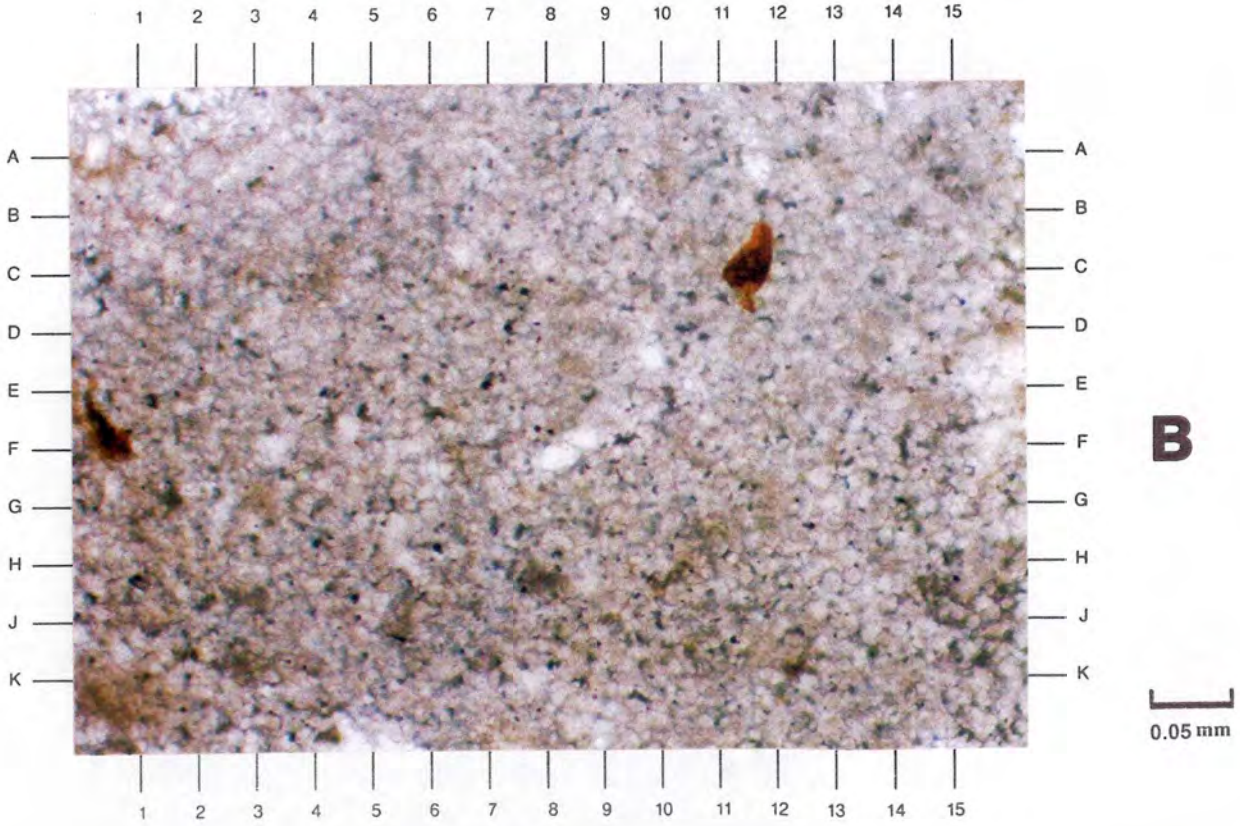
SAMPLE NUMBER: R-1-159

PLATE 46

Dunham Rock Type:	Lime Wackestone/Packstone, variably dolomitized
Fabric & Matrix:	Majority of micrite has been replaced by very fine dolomite (Plate 45B; C15)
Cements/Replacement:	Dolomite replacement is common
Allochems/Grains:	Micritic intraclasts (Plate 46A; D-E4.5); crinoid fragments (Plate 46A; C12); thin-shelled pelecypods (Plate 46A; above A2)
Porosity & Reservoir Quality:	Intercrystalline pores (Plate 46A; A-B6); micropores related to micrite as well as dolomitization; reservoir quality is very poor to poor
Porosity Types:	Micropore content may be higher than indicated; minor intercrystalline pore space in dolomitized areas
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

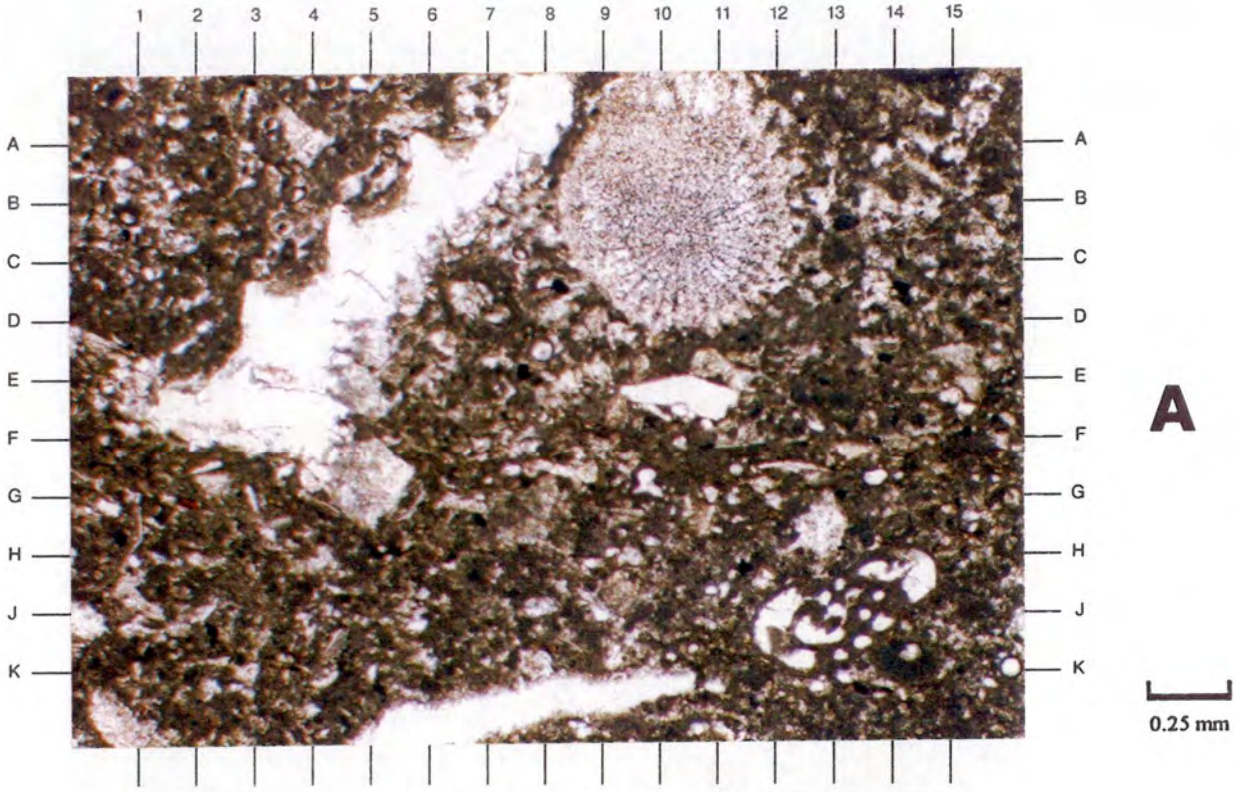
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

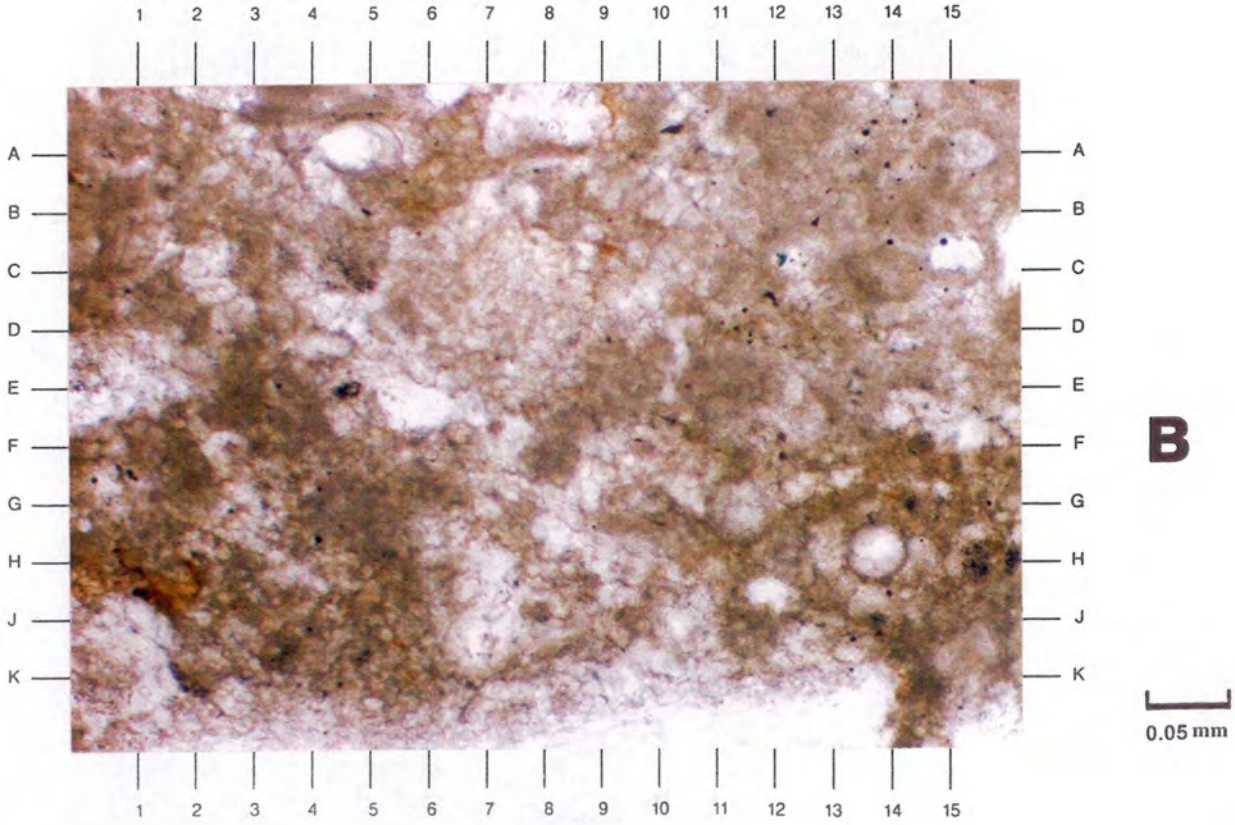
SAMPLE NUMBER: R-1-161

PLATE 47

Dunham Rock Type:	Pelletal Lime Packstone
Fabric & Matrix:	Abundant micrite (brownish interparticle material)
Cements/Replacement:	Minor replacement pyrite (Plate 47A; A-B14); some microspar replacement of micrite
Allochems/Grains:	Echinoderm fragments (Plate 47A; B10,D4.5); minor chambered forams (Plate 47A; J13); abundant micritic pellets (Plate 47B; C13.5)
Porosity & Reservoir Quality:	Minor intraparticle pores and micropores are noted; reservoir quality is considered very poor
Porosity Types:	No pore space shown in these views; micropore space may be higher than indicated
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

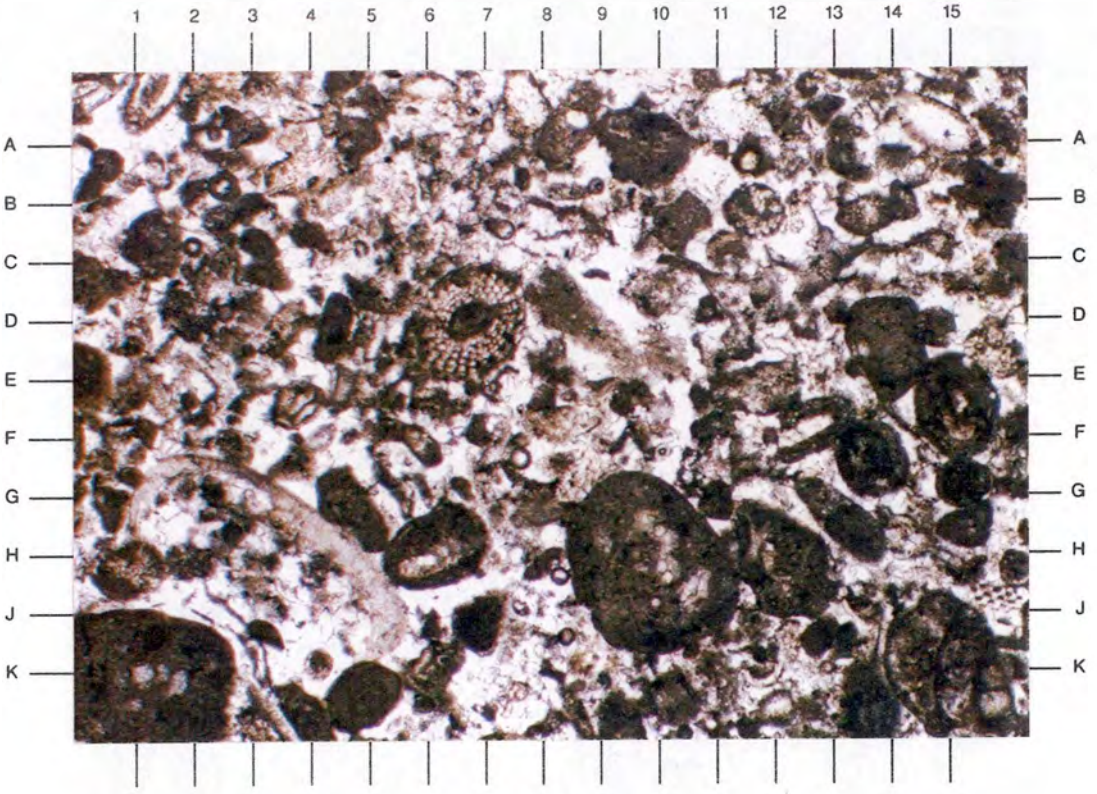
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

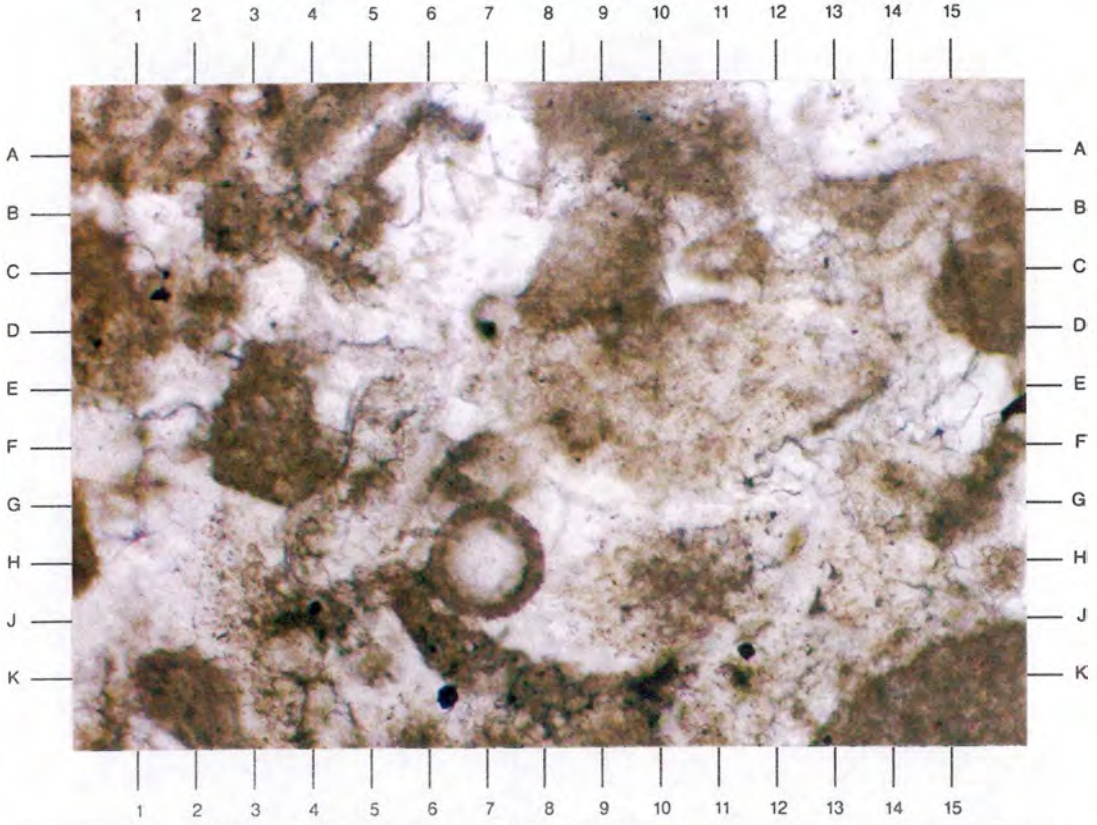
SAMPLE NUMBER: R-1-163

PLATE 48

Dunham Rock Type:	**Lime Grainstone**
Fabric & Matrix:	**No micritic matrix in this high depositional energy sediment**
Cements/Replacement:	**Dominant blocky to coarse calcite spar (Plate 48B; B-C7)**
Allochems/Grains:	**Micritic intraclasts (Plate 48A; H10.5); echinoderm spines (Plate 48A; D7); undifferentiated micritic grains (Plate 48A; D-E14); pellets (Plate 48A; C3); echinoid fragments (Plate 48A; B10.5)**
Porosity & Reservoir Quality:	**No porosity observed; reservoir quality is considered very poor**
Porosity Types:	**None observed; microporosity is likely associated with the common micritic grains**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

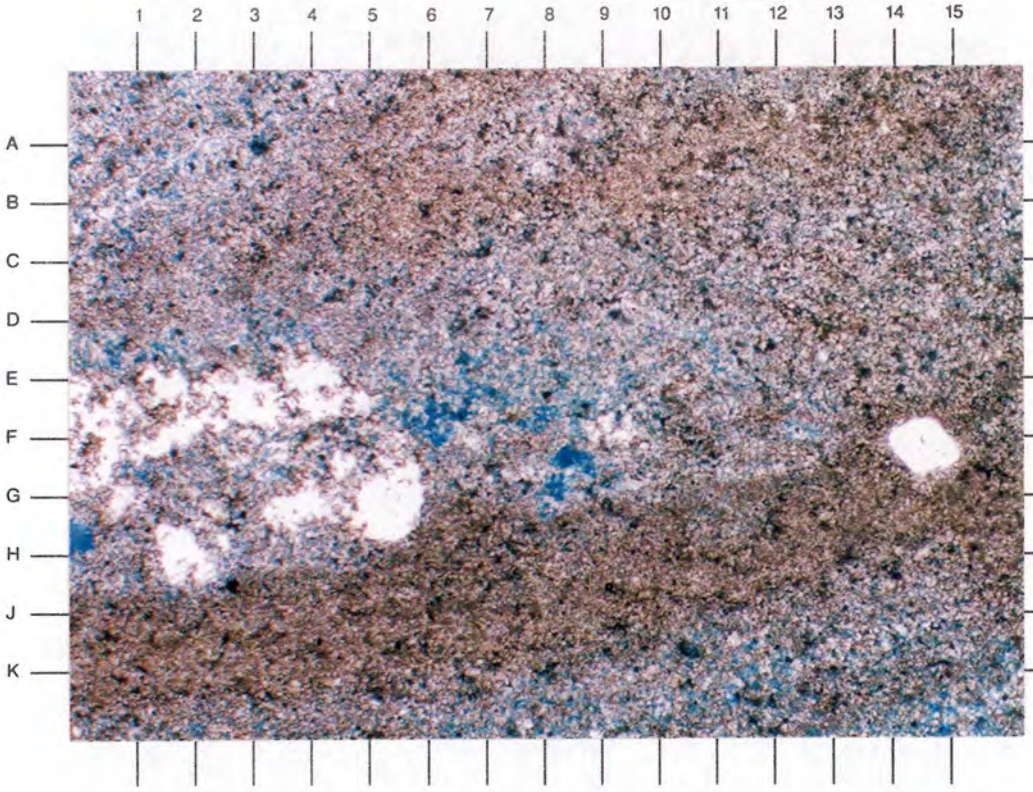
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

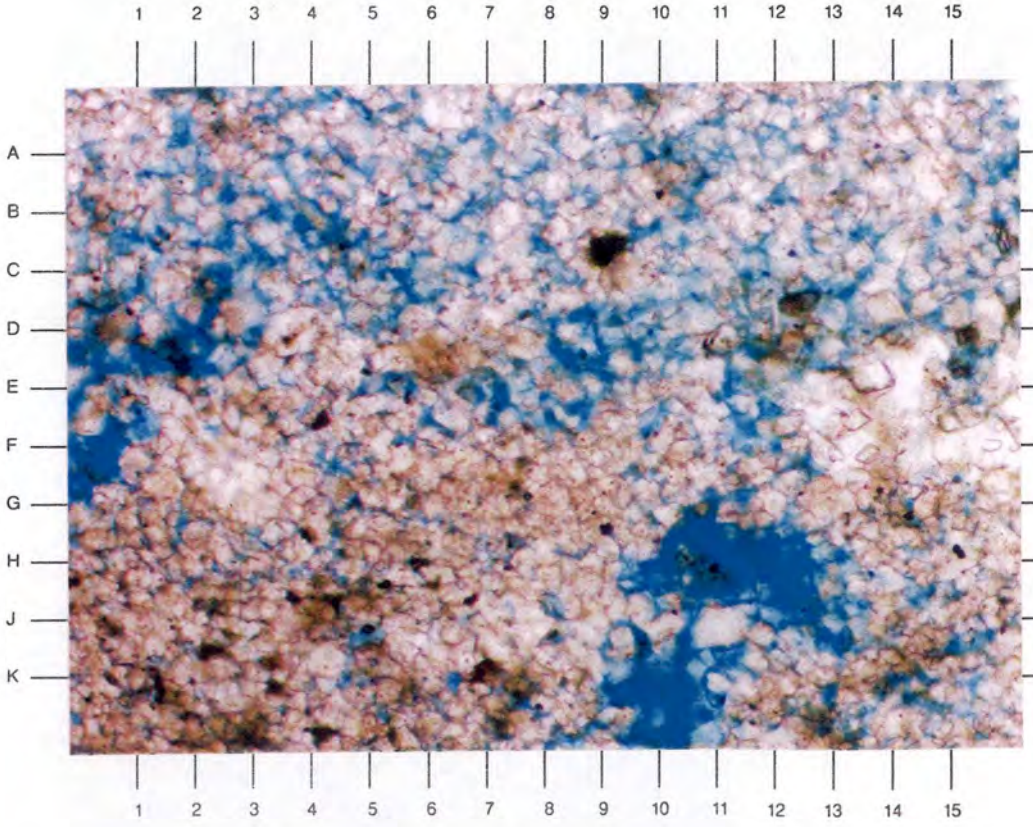
SAMPLE NUMBER: S-1-147

PLATE 49

Dunham Rock Type:	Fine-crystalline Dolostone
Fabric & Matrix:	Laminated; more finely-crystalline darker material (Plate 49A; near photo base) is observed in contrast to more porous, coarser dolostone (center of Plate 49A photo)
Cements/Replacement:	Extensive dolomitization (dolomite crystal at C-D14 of Plate 49B); anhydrite (white; E-F3 of Plate 49A); pyrite (Plate 49B; B-C9)
Allochems/Grains:	None observed except for "ghost" pellets (Plate 49A; A-B11)
Porosity & Reservoir Quality:	Reservoir quality is considered moderate; porosity is patchy but fairly developed; 12% (by volume) total porosity
Porosity Types:	Common pore types include intercrystalline (Plate 49B; B2.5), moldic (Plate 49B; H11.5), and microscopic (area of G-H12 in Plate 49A) varieties
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

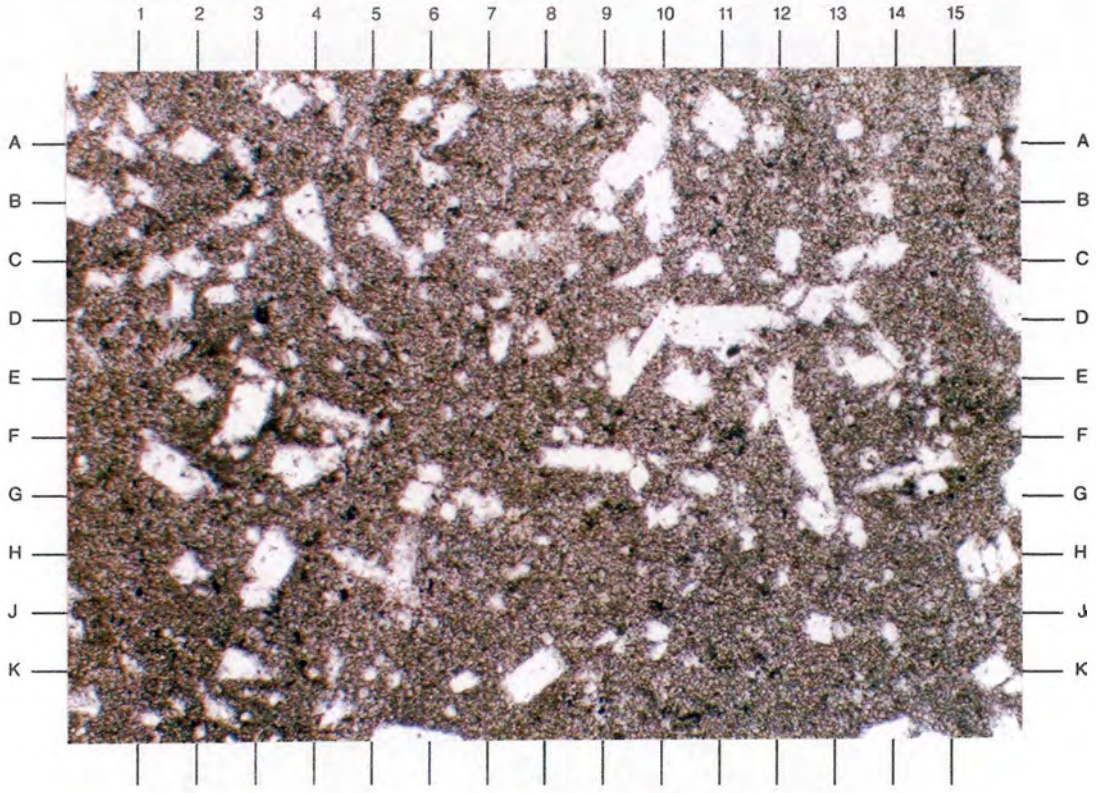
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

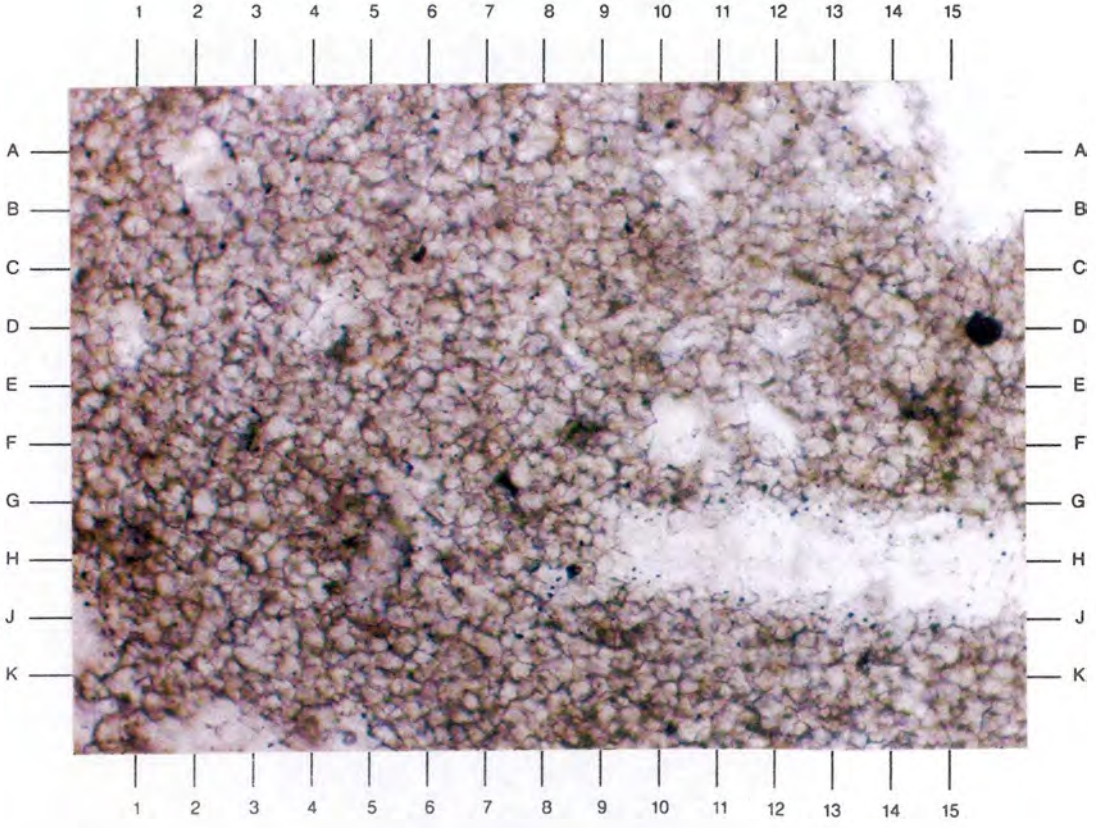
SAMPLE NUMBER: S-1-155

PLATE 50

Dunham Rock Type:	Lime Wackestone (dolomitized)
Fabric & Matrix:	Extensive dolomitization
Cements/Replacement:	Dolomite replacement (Plate 50B; area of C7); rare pyrite (Plate 50B; D15.5)
Allochems/Grains:	Mainly echinoid (Plate 50A; F12.5) and mollusk (Plate 50A; H5) fragments
Porosity & Reservoir Quality:	Reservoir quality is very poor, due to a lack of effective pore space
Porosity Types:	A trace amount each of intercrystalline, moldic, fracture, and microscopic types was detected
Magnification:	A: 40X B: 200X


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

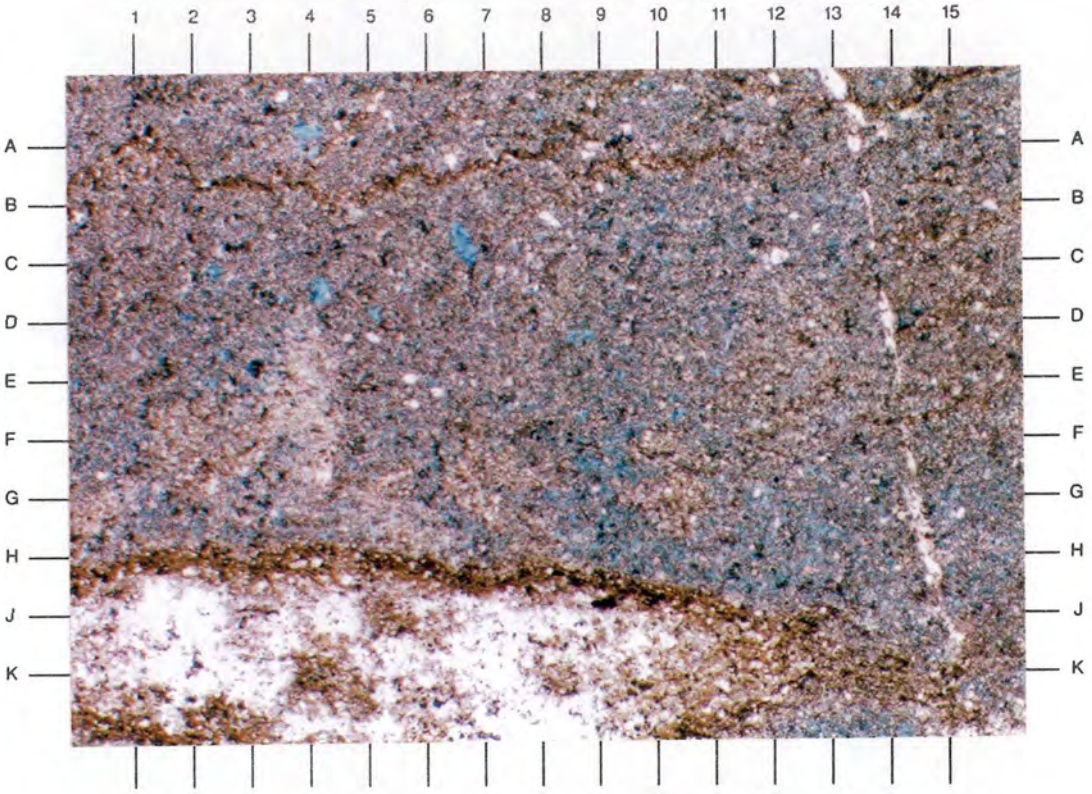
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

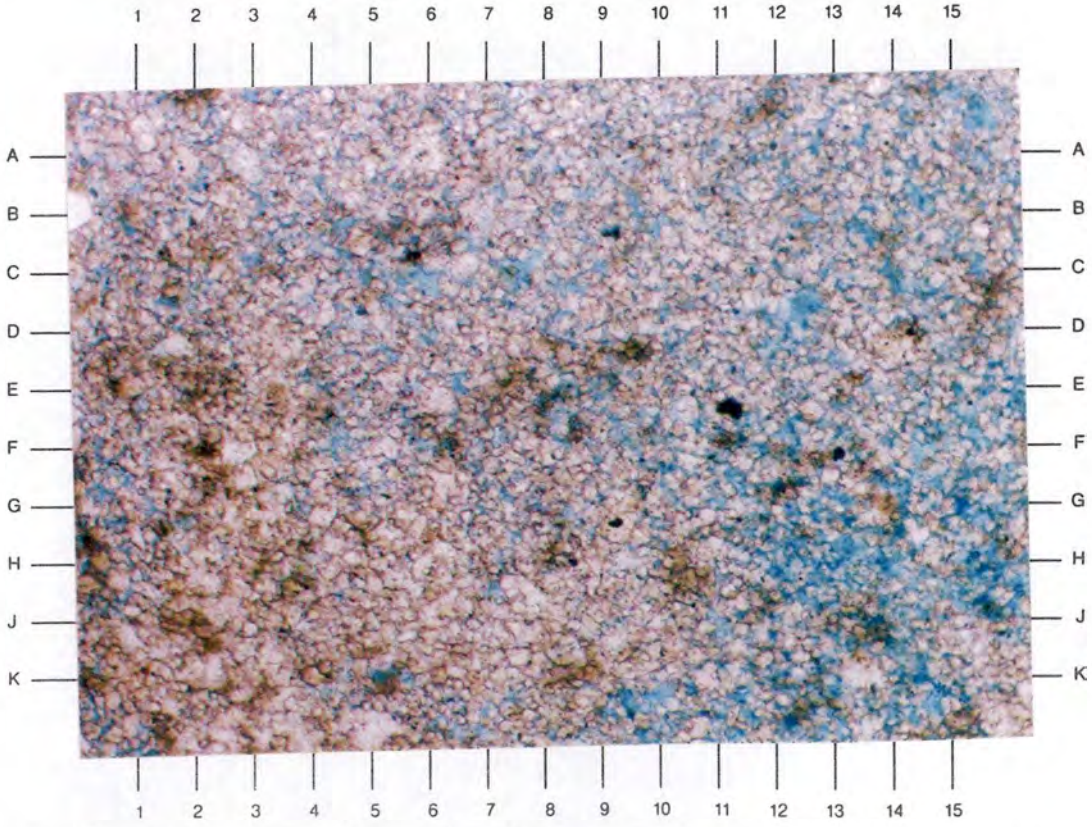
SAMPLE NUMBER: S-1-157

PLATE 51

Dunham Rock Type:	**Lime Wackestone, dolomitized**
Fabric & Matrix:	**Laminated; note the vshaly, lensoidal lamination to the lower left of Plate 51A; fractured (fracture trends form A13-K15 of Plate 51A)**
Cements/Replacement:	**Common dolomite replacement (Plate 51B; B10 area)**
Allochems/Grains:	**Only "ghost" pellets (Plate 51B; H11) observed**
Porosity & Reservoir Quality:	**Reservoir quality is considered moderate; porosity (blue epoxy) is fairly developed**
Porosity Types:	**12% (by volume) total porosity; intercrystalline (Plate 51B; B14.5), moldic (Plate 51A; C6.5), and microscopic (Plate 51B; area of A5) pores observed**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

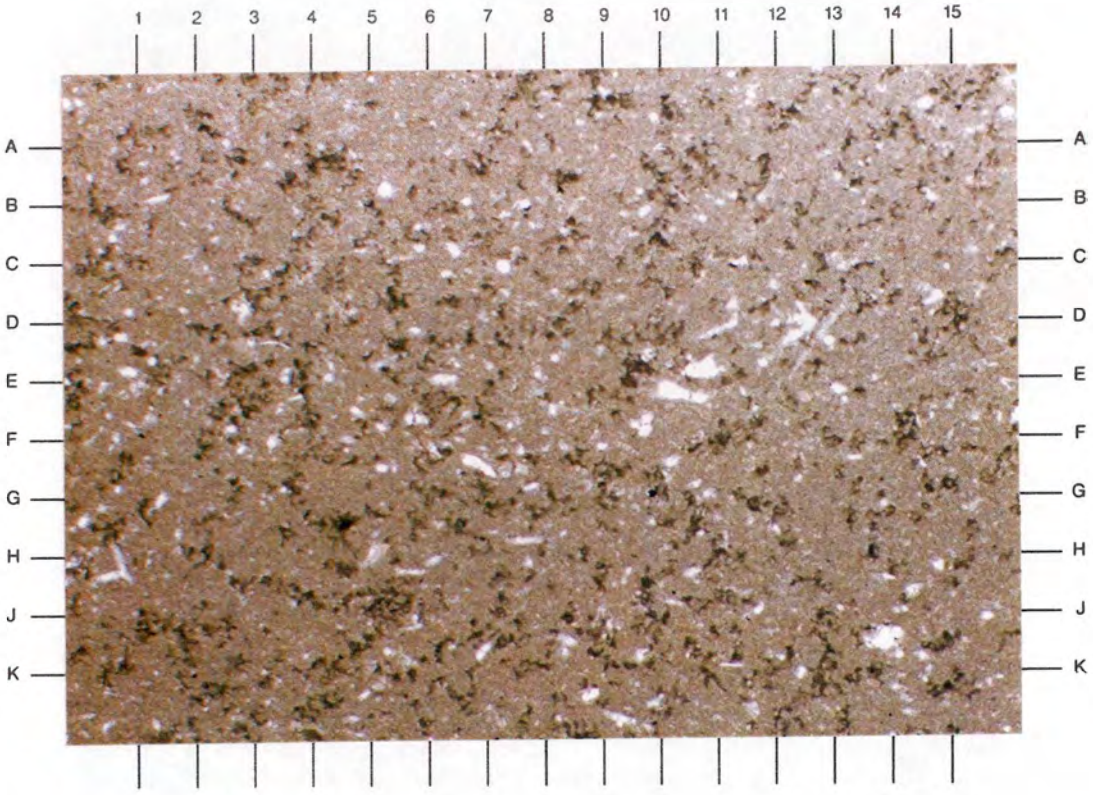
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

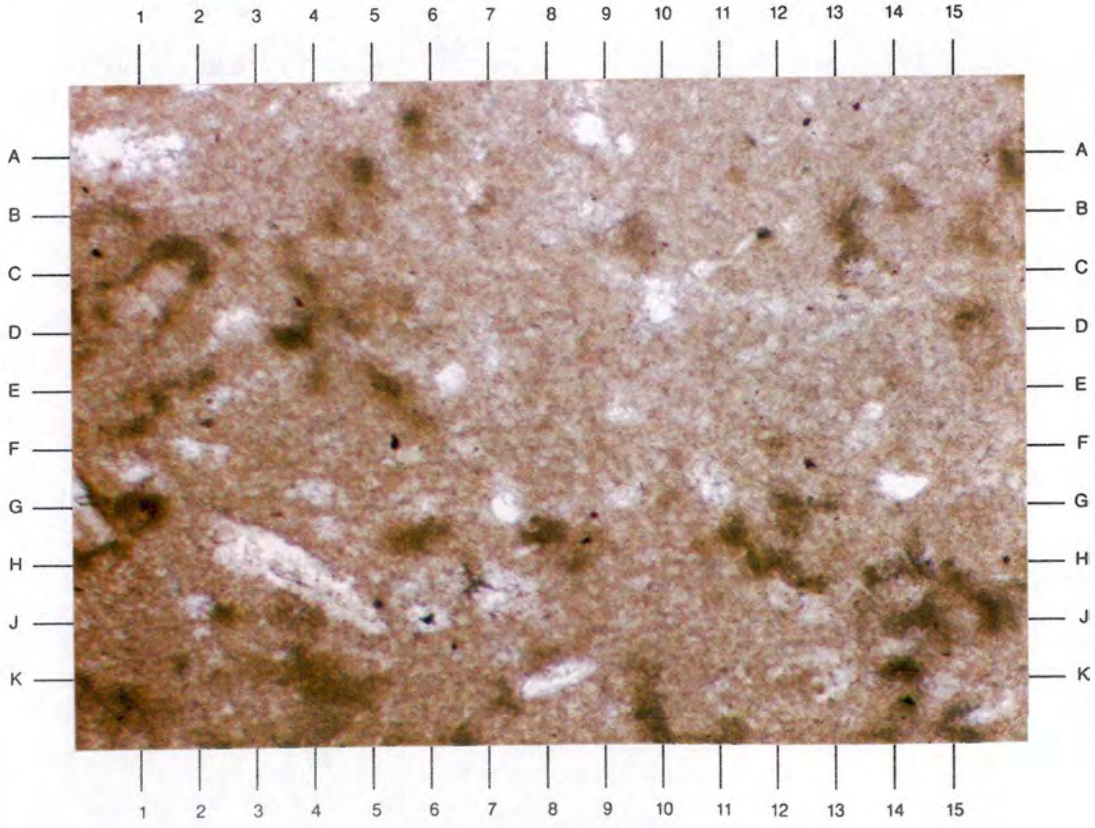
SAMPLE NUMBER: S-1-159

PLATE 52

Dunham Rock Type:	**Lime Wackestone**
Fabric & Matrix:	**Massive, abundant micrite/microspar matrix**
Cements/Replacement:	**Microspar has replaced much of the original micritic groundmass**
Allochems/Grains:	**Mollusks (Plate 52B; H3); organic material (dark structures)**
Porosity & Reservoir Quality:	**Only visible porosity observed (not in this view) is a trace of moldic pore space; reservoir quality is very poor**
Porosity Types:	**Some microporosity is likely associated with the micritic and microspar-replaced matrix**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

SAMPLE NUMBER: S-1-161

PLATE 53

Dunham Rock Type:	**Lime Wackestone/Pelletal Packstone**
Fabric & Matrix:	**Micritic matrix (brownish) which has been variably replaced by microspar**
Cements/Replacement:	**Minor dolomite replacement (Plate 53B; D10)**
Allochems/Grains:	**Mollusks (Plate 53A; J-K14); echinoids (Plate 53A; C-D6)**
Porosity & Reservoir Quality:	**No porosity observed; reservoir quality is considered very poor**
Porosity Types:	**Microporosity is likely associated with the recrystallized micritic matrix**
Magnification:	**A: 40X B: 200X**

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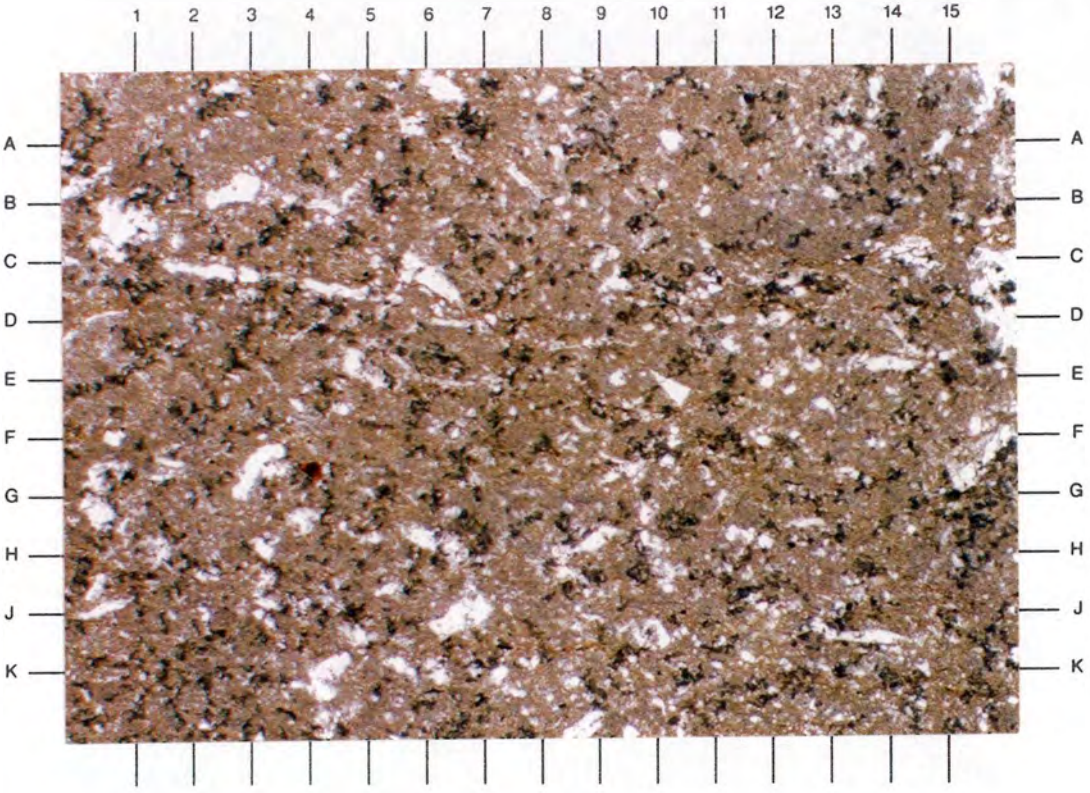
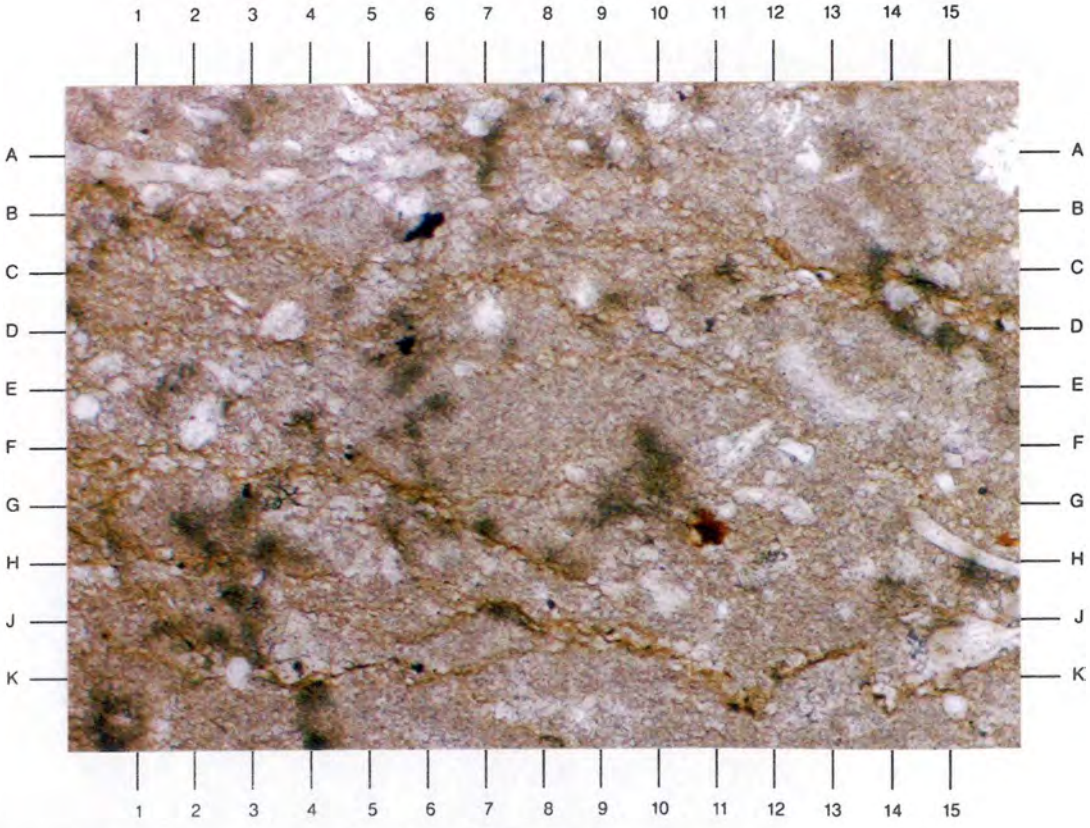


A



B

URS Corporation
Sauget Area-2

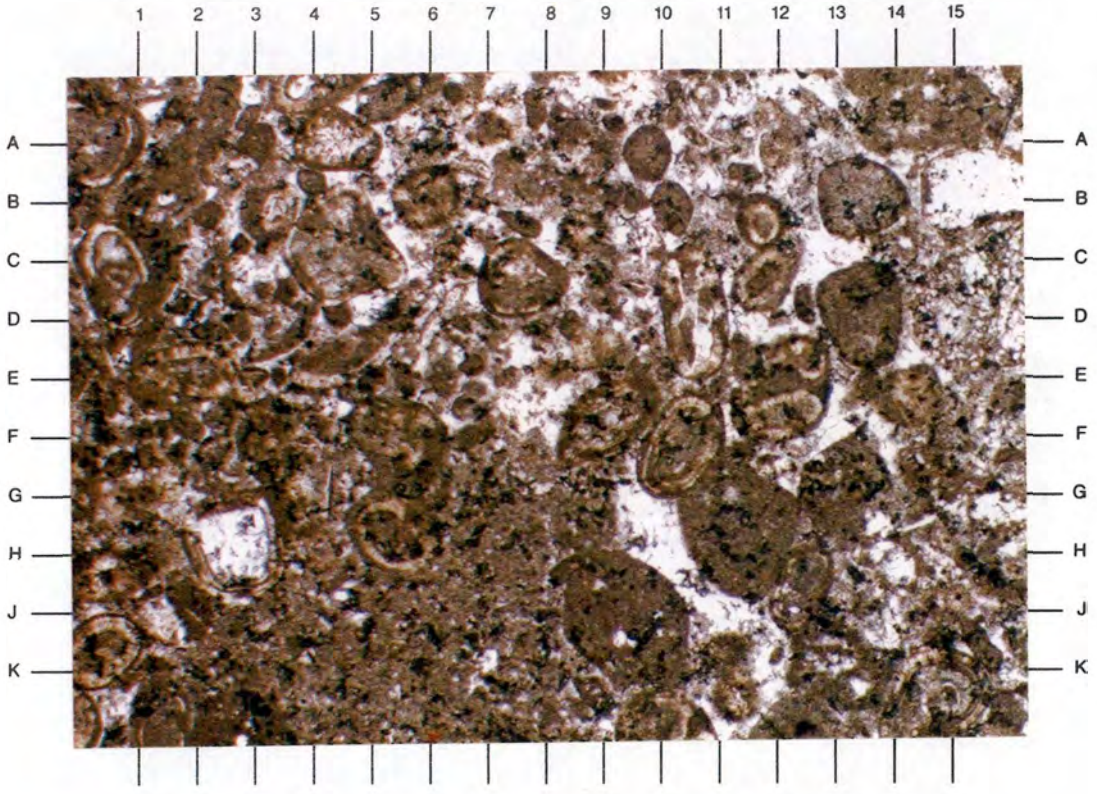
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

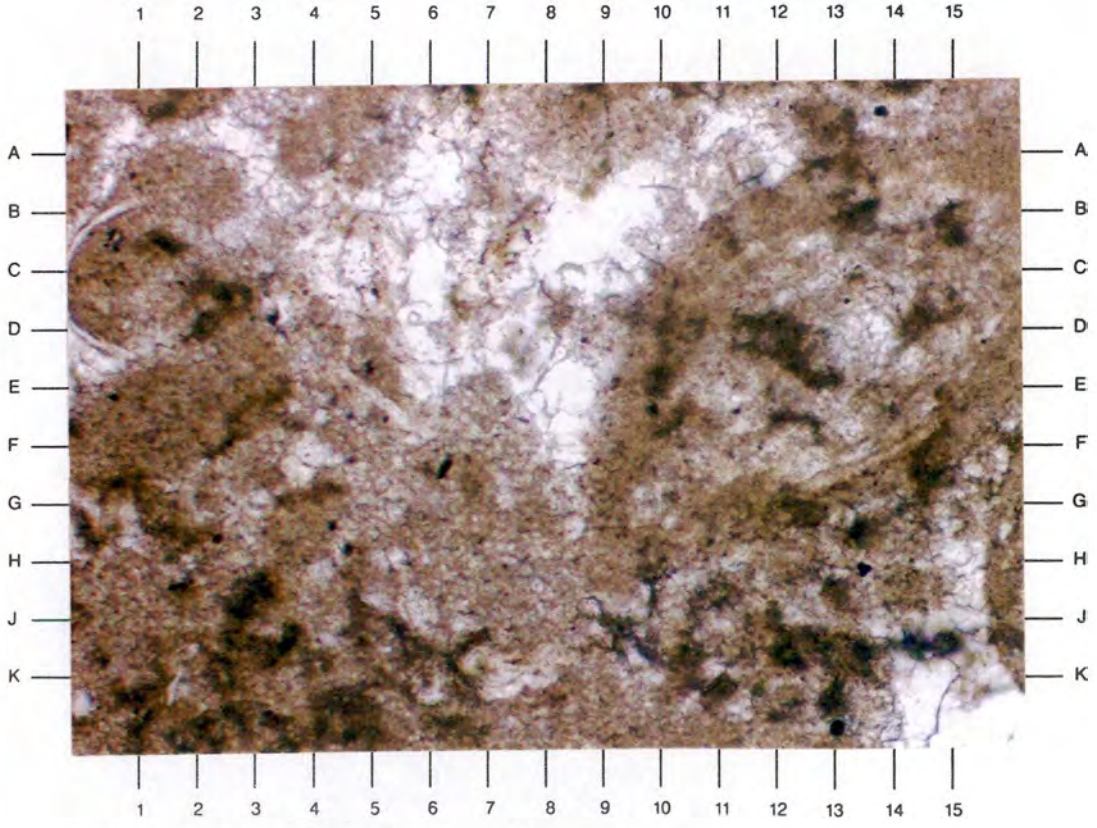
SAMPLE NUMBER: S-1-163

PLATE 54

Dunham Rock Type:	**Lime Packstone/Grainstone**
Fabric & Matrix:	**Abundant micrite in packstone regions (such as to lower left)**
Cements/Replacement:	**Common calcite spar (Plate 54B; B-C9)**
Allochems/Grains:	**Ooids (Plate 54A; F10.5); algal-coated grains (Plate 54A; A0.5); undifferentiated micritic grains (Plate 54A; G-H11.5); pellets (Plate 54A; A10); crinoid plates (Plate 54A; A-B15.5)**
Porosity & Reservoir Quality:	**Reservoir quality is very poor; no porosity observed**
Porosity Types:	**None observed; microporosity is likely associated with common micritic grains and matrix**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

URS Corporation
Sauget Area-2

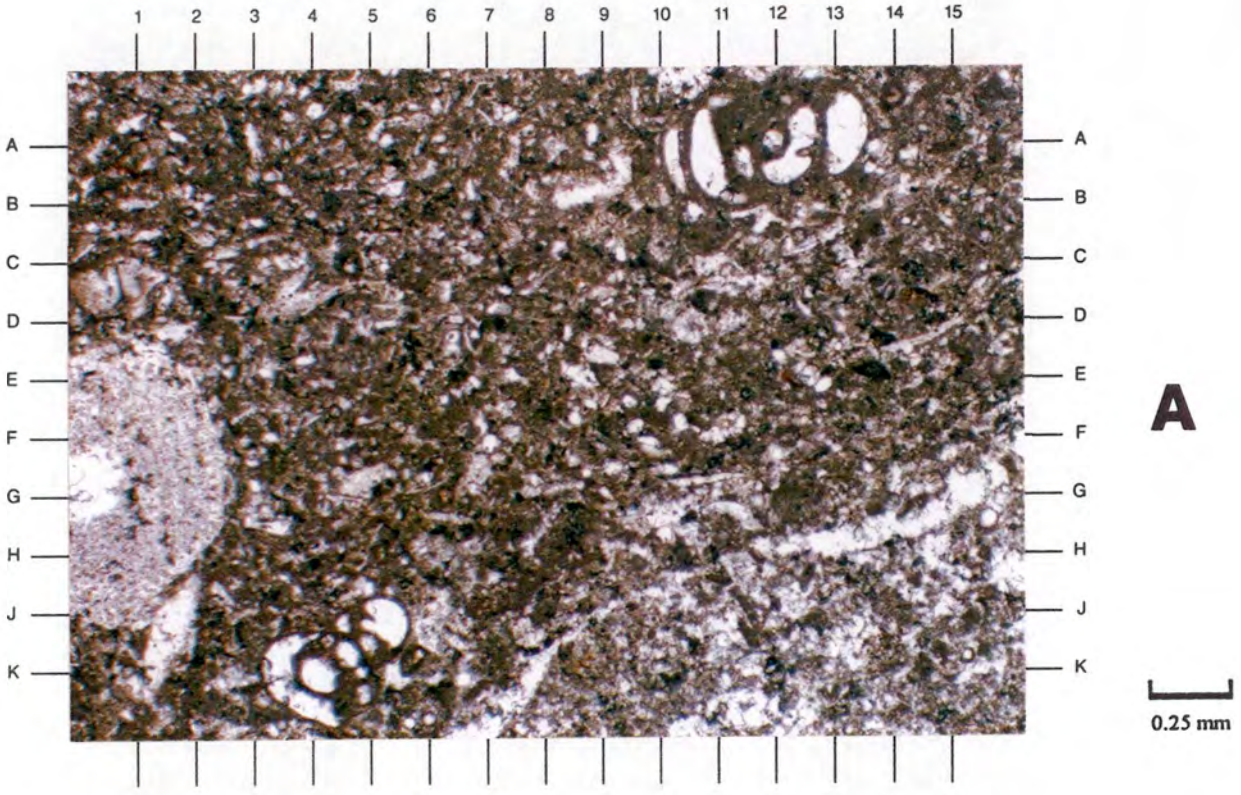
File No.: G-20068

THIN SECTION DESCRIPTION - DETAILED

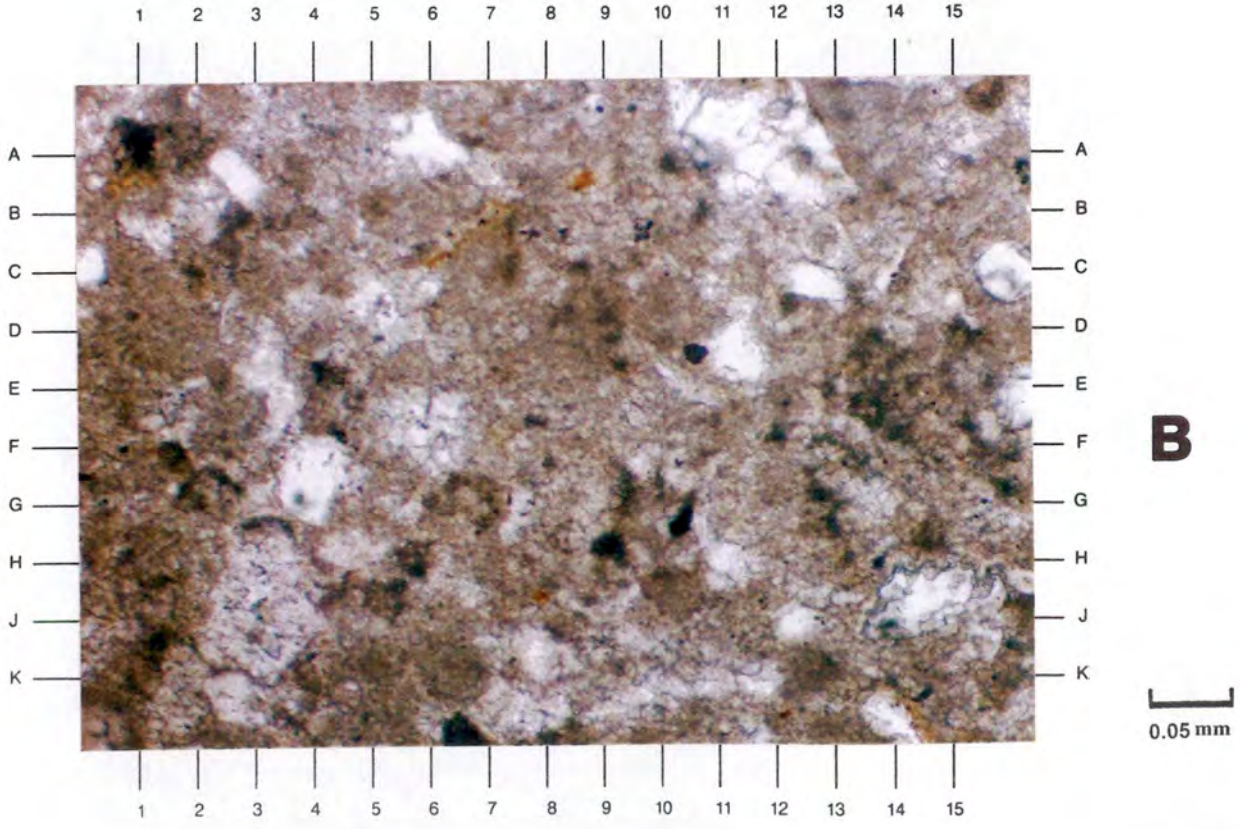
SAMPLE NUMBER: S-1-165

PLATE 55

Dunham Rock Type:	**Lime Packstone (minor Grainstone)**
Fabric & Matrix:	**Abundant micrite matrix (brownish interparticle material), which has been locally recrystallized to microspar**
Cements/Replacement:	**Calcite spar only in "cleaner" regions; rare replacment pyrite (Plate 55B; G10.5)**
Allochems/Grains:	**Abundant pellets (Plate 55B; K5); scattered crinoid fragments (Plate 55A; F-G1); minor chambered forams (Plate 55A; A12,K4.5)**
Porosity & Reservoir Quality:	**Reservoir quality is very poor; there is no visible pore space nor micropores noted**
Porosity Types:	**Micropore space is likely associated with the micritic groundmass and common micritized grains**
Magnification:	**A: 40X B: 200X**


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.25 mm

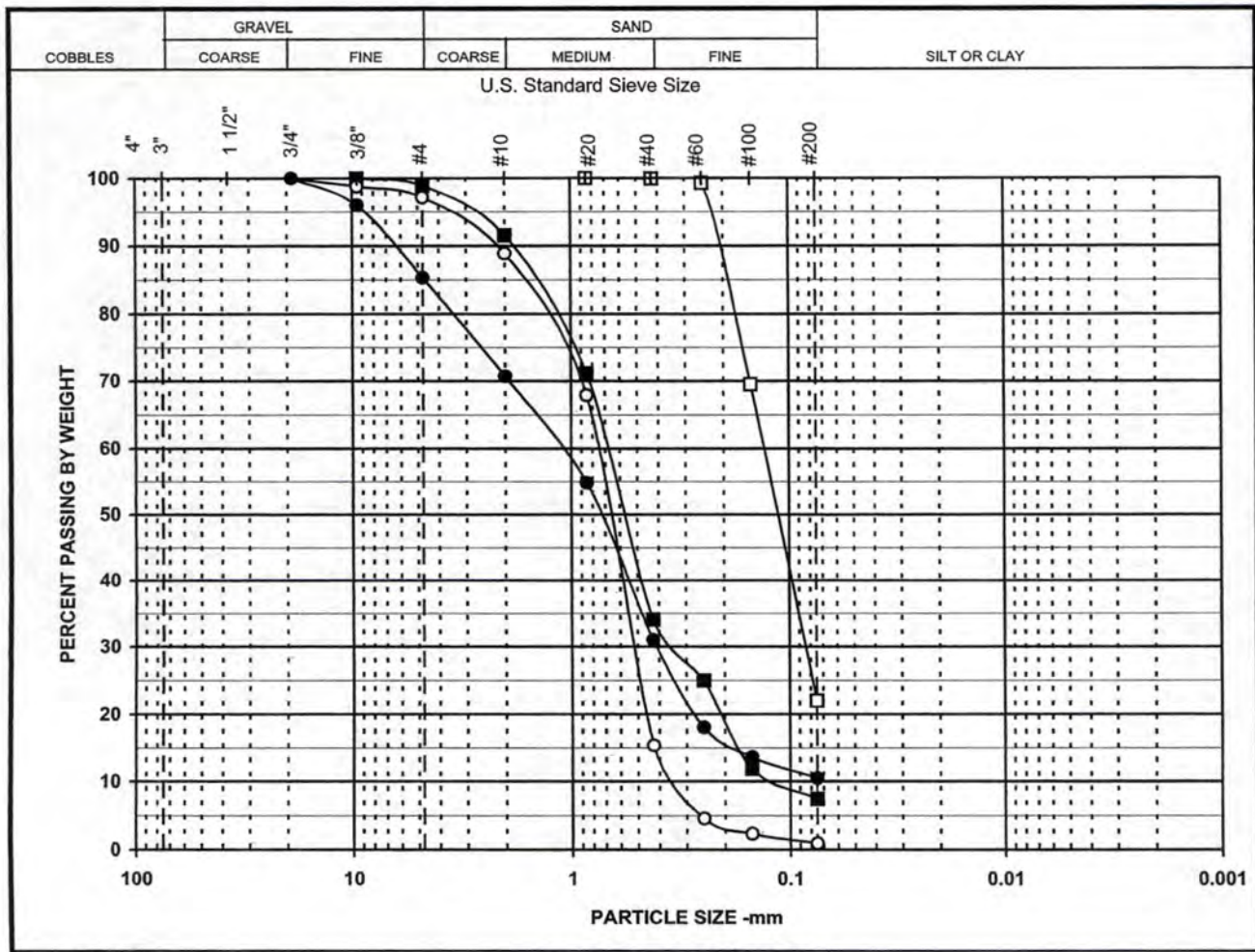
A


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
A B C D E F G H J K
0.05 mm

B

APPENDIX J

Geotechnical Laboratory Results



SYMBOL	DESCRIPTION AND REMARKS
□	light brown f. SAND, some silt.
■	light gray c-f SAND, trace f. gravel, silt.
○	light gray c-f SAND, trace f. gravel.
●	dark brown c-f SAND, some f. gravel, trace silt.

Symbol	□	■	○	●
Boring	PZ-1	PZ-1	PZ-1	PZ-1
Sample	C	C	C	C
Spec				
Depth	23.75	78.85	118.8	123.85
% +3"				
% Gravel		1.1	2.9	14.7
% SAND	78.0	91.4	96.2	74.8
% FINES	22.0	7.5	0.9	10.5
% -2μ				
Cc		1.4	1.1	2.2
Cu		6.1	2.3	19.7
LL				
PL				
PI				
USCS	SM	SW-SM	SP	SW-SM
w (%)	21.2	8.4	9.3	7.3

Particle Size	PERCENT FINER			
(Sieve #)	□	■	○	●
4"				
3"				
1 1/2"				
3/4"			100.0	100.0
3/8"		100.0	98.7	96.0
4		98.9	97.1	85.3
10		91.5	88.8	70.7
20	100.0	71.1	67.9	54.8
40	99.9	34.1	15.4	31.0
60	99.3	25.0	4.6	18.1
100	69.5	11.9	2.3	13.6
200	22.0	7.5	0.9	10.5

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

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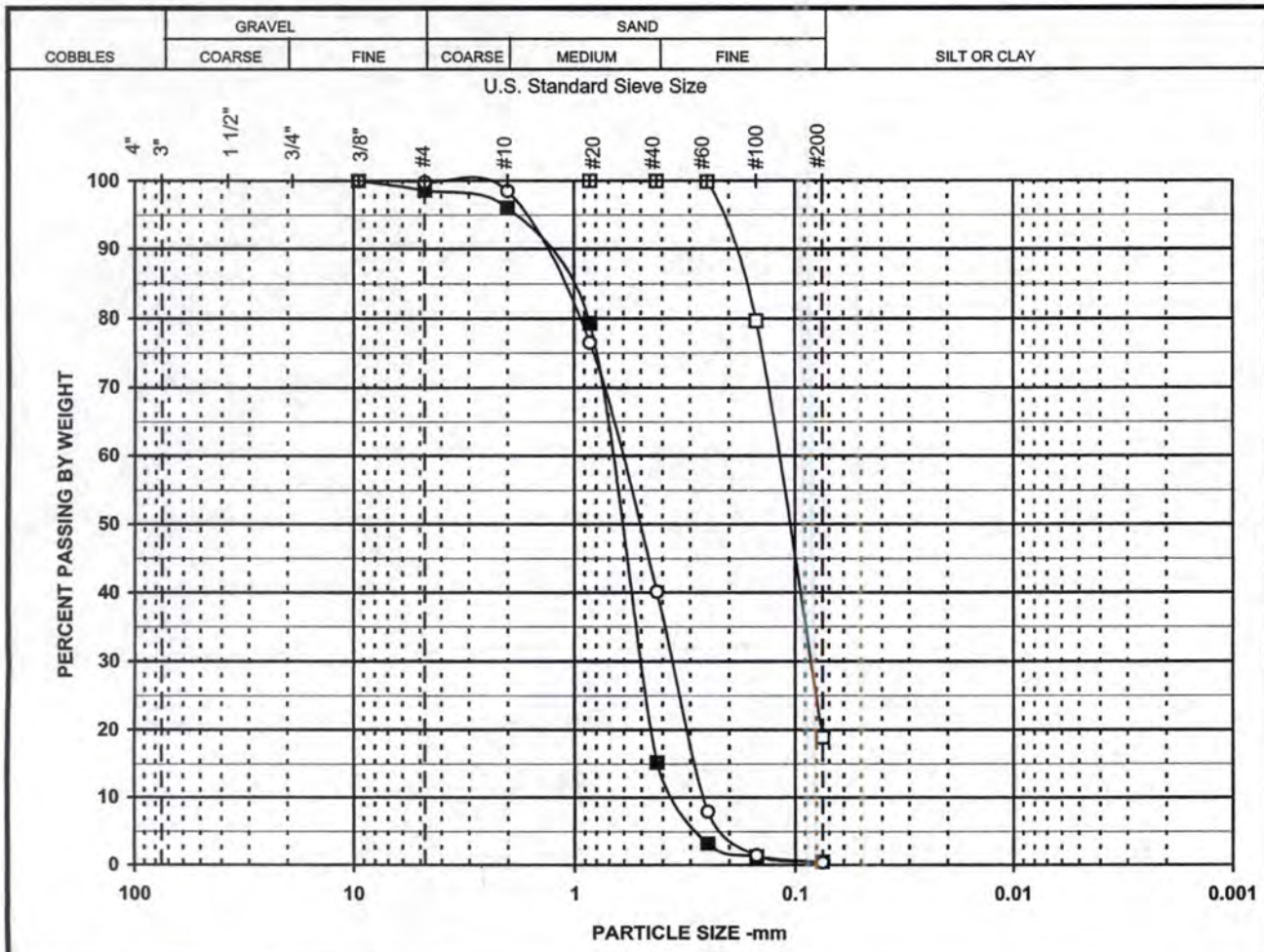

Symbol	□	■	○
Boring	PZ-2	PZ-2	PZ-2
Sample	C	C	C
Spec			
Depth	20.8	83.25	119.5
% +3"			
% Gravel		1.4	0.2
% SAND	81.1	98.1	99.4
% FINES	18.9	0.5	0.4
% -2μ			
Cc		1.1	0.8
Cu		2.1	2.5
LL			
PL			
PI			
USCS	SM	SP	SP
w (%)	8.9	6.5	14.5

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	100.0
4		98.6	99.8
10		96.0	98.5
20	100.0	79.3	76.5
40	99.9	15.2	40.1
60	99.9	3.2	7.9
100	79.7	1.3	1.4
200	18.9	0.5	0.4

SYMBOL	DESCRIPTION AND REMARKS
□	light brown f. SAND, some silt.
■	light gray m-f SAND, trace f. gravel, c. sand.
○	light gray m-f SAND, trace c. sand.

PARTICLE SIZE DISTRIBUTION
Sauget Area 2

Project No.		
21560888	October 2003	Figure

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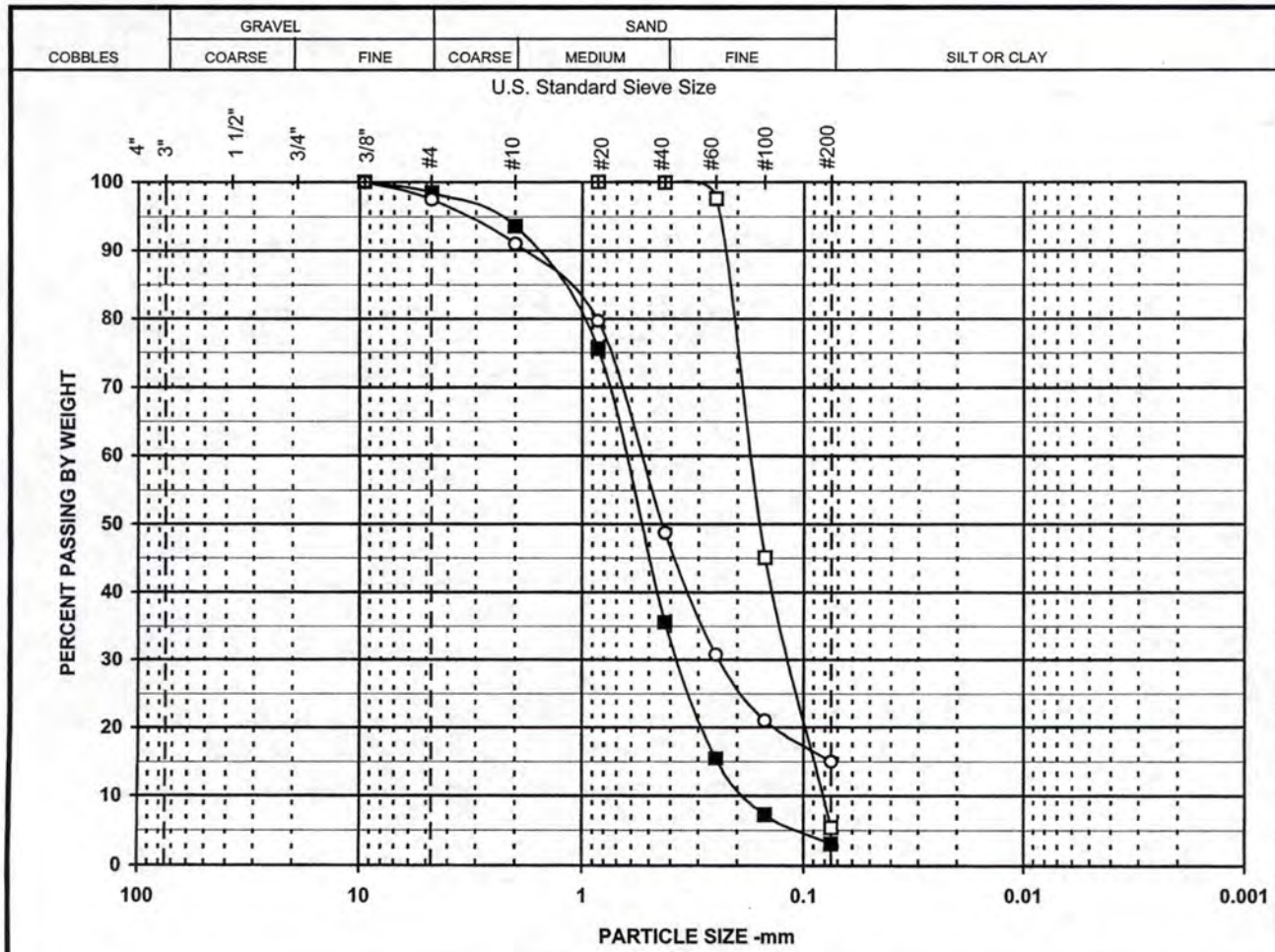
.xls 10/29/2003



Symbol	□	■	○
Boring	PZ-3	PZ-3	PZ-3
Sample	C	C	C
Spec			
Depth	33.7	68.75	113.75
% +3"			
% Gravel		1.6	2.5
% SAND	94.6	95.3	82.5
% FINES	5.4	3.1	15.0
% -2μ			
Cc	1.0	1.1	
Cu	2.1	3.7	
LL			
PL			
PI			
USCS	SP-SM	SP	SM
w (%)	21.8	11.0	9.5

Particle Size (Sieve #)	PERCENT FINER □	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	100.0
4		98.4	97.5
10		93.6	91.0
20	100.0	75.6	79.7
40	99.9	35.6	48.7
60	97.6	15.4	30.8
100	45.1	7.3	21.0
200	5.4	3.1	15.0

SYMBOL	DESCRIPTION AND REMARKS
□	light brown f. SAND, trace silt.
■	light gray m-f SAND, trace f. gravel, c. sand, silt.
○	light gray c-f SAND, some silty, trace f. gravel.

PARTICLE SIZE DISTRIBUTION
Sauget Area 2

Project No.		Figure
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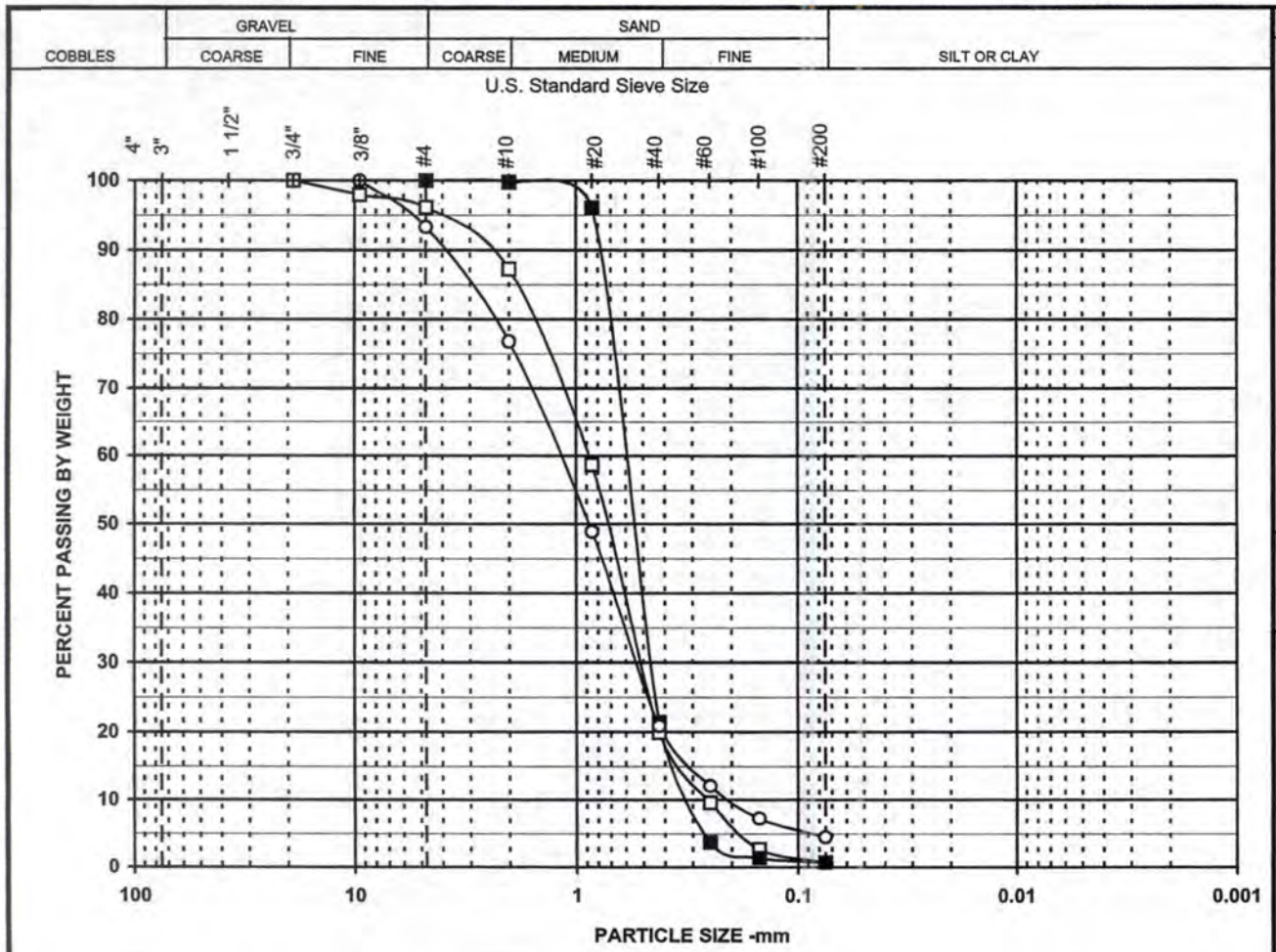
siev1c.xls 10/29/2003



SYMBOL	DESCRIPTION AND REMARKS
□	gray c-f SAND, trace f. gravel.
■	light gray m-f SAND.
○	light gray c-f SAND, trace f. gravel, silt.

Symbol	□	■	○
Boring	PZ-4	PZ-4	PZ-4
Sample	C	C	C
Spec			
Depth	48.31	85.75	127.2
% +3"			
% Gravel	3.9		6.7
% SAND	95.3	99.3	88.8
% FINES	0.8	0.7	4.5
% -2μ			
Cc	1.2	1.1	1.2
Cu	3.5	2.1	6.3
LL			
PL			
PI			
USCS	SP	SP	SW
w (%)	8.0	11.5	7.6

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"	100.0		
3/8"	98.0		100.0
4	96.1	100.0	93.3
10	87.3	99.8	76.8
20	58.7	96.1	48.9
40	19.9	21.4	20.9
60	9.6	3.7	12.1
100	2.7	1.4	7.3
200	0.8	0.7	4.5

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

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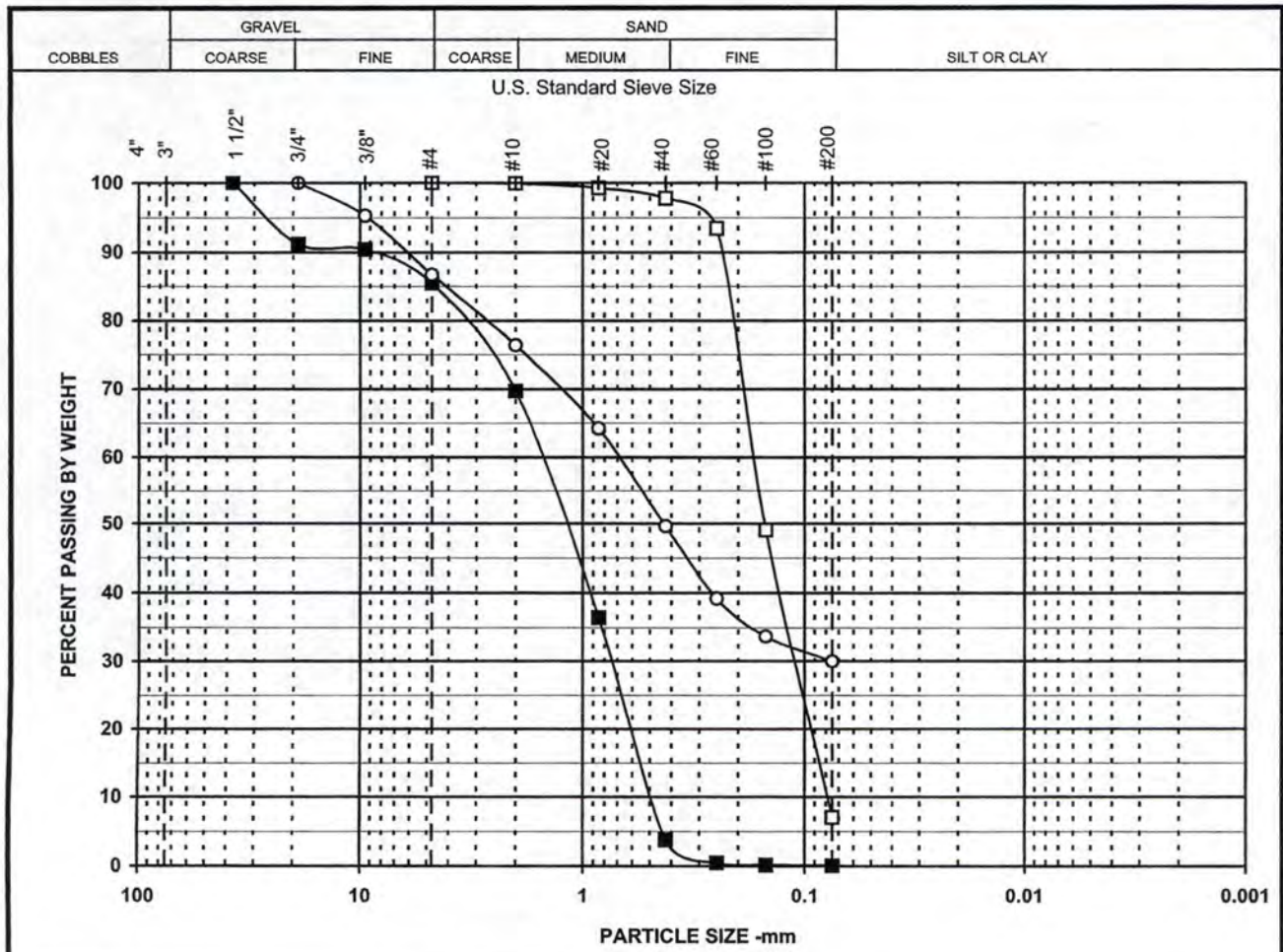

SYMBOL	DESCRIPTION AND REMARKS
□	brown f. SAND, trace m. sand, silt.
■	light gray c-m SAND, some gravel, trace f. sand.
○	light gray silty clayey c-f SAND, some f. gravel.

Symbol	□	■	○
Boring	PIEZ-5	PIEZ-5	PIEZ-5
Sample	C	C	C
Spec			
Depth	27.5	78.8	116.8
% +3"			
% Gravel		14.6	13.3
% SAND	92.9	85.3	56.7
% FINES	7.1	0.1	30.0
% -2μ			
Cc	1.0	0.7	
Cu	2.2	3.3	
LL			
PL			
PI			
USCS	SP-SM	SP	SC
w (%)	23.1	4.7	9.3

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"		100.0	
3/4"		91.2	100.0
3/8"		90.4	95.3
4	100.0	85.4	86.7
10	99.9	69.7	76.4
20	99.3	36.4	64.3
40	97.8	3.8	49.6
60	93.5	0.5	39.2
100	49.1	0.2	33.7
200	7.1	0.1	30.0

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

URS Corporation

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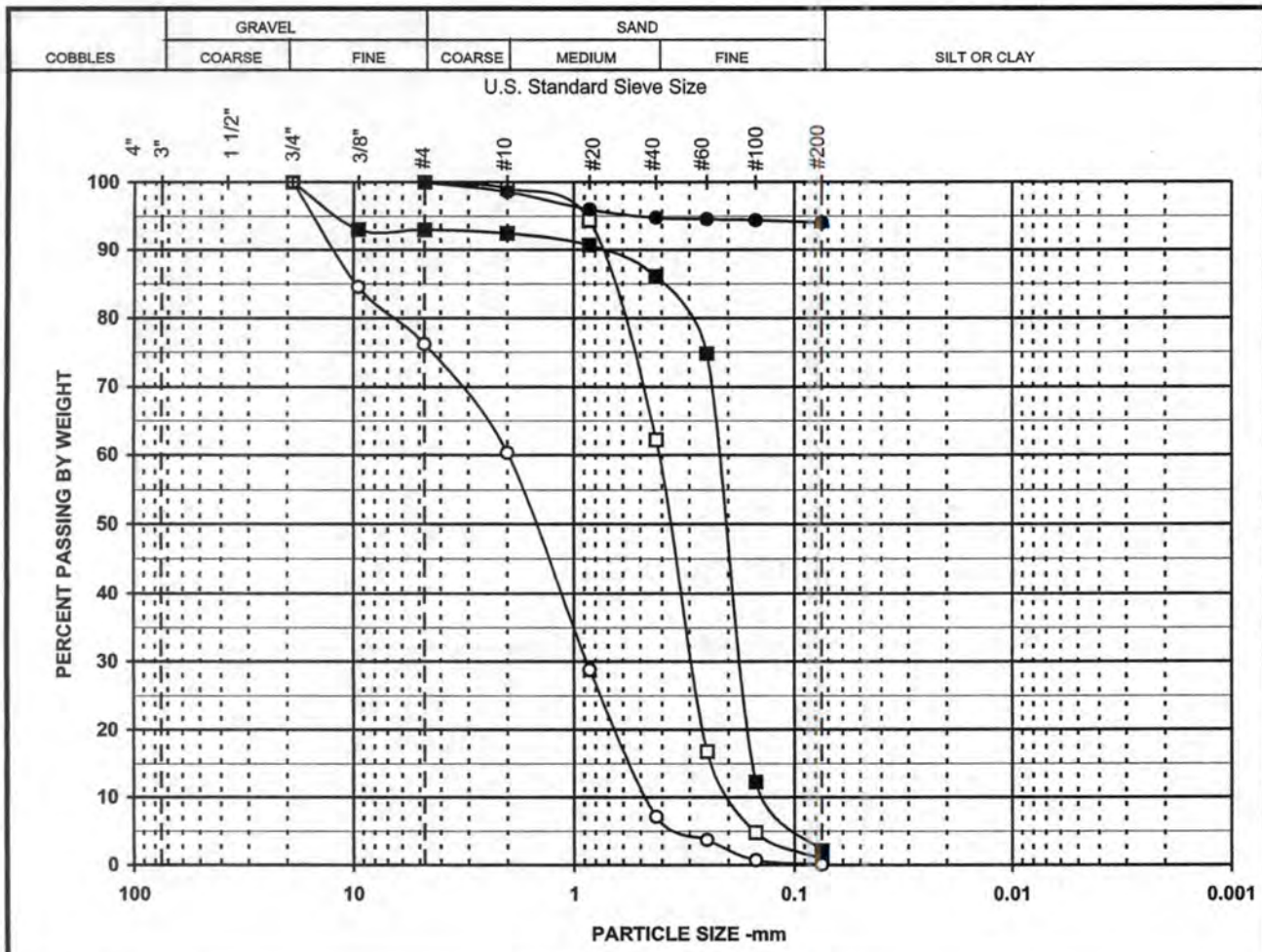

Symbol	□	■	○	●
Boring	PIEZ-6	PIEZ-6	PIEZ-6	PIEZ-6
Sample	C	C	C	B
Spec Depth	29.8	69.75	89.8	104.8
% +3"				
% Gravel		7.0	23.8	
% SAND	99.1	90.9	76.1	6.0
% FINES	0.9	2.1	0.1	94.0
% -2μ				
Cc	1.1	1.1	0.8	
Cu	2.2	1.7	4.1	
LL				
PL				
PI				
USCS	SP	SP	SP	CL
w (%)	15.8	21.2	4.2	37.7

Particle Size	PERCENT FINER			
(Sieve #)	□	■	○	●
4"				
3"				
1 1/2"				
3/4"		100.0	100.0	
3/8"		93.0	84.5	
4	100.0	93.0	76.2	100.0
10	99.1	92.4	60.3	98.6
20	94.3	90.7	28.8	95.9
40	62.2	86.1	7.2	94.7
60	16.7	74.8	3.7	94.5
100	4.8	12.3	0.7	94.4
200	0.9	2.1	0.1	94.0

SYMBOL	DESCRIPTION AND REMARKS
□	brown m-f SAND.
■	gray f. SAND, trace f. gravel, c-m sand, silt.
○	light gray c-f SAND, some f. gravel.
●	light gray CLAY, trace c-f sand.

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

URS Corporation

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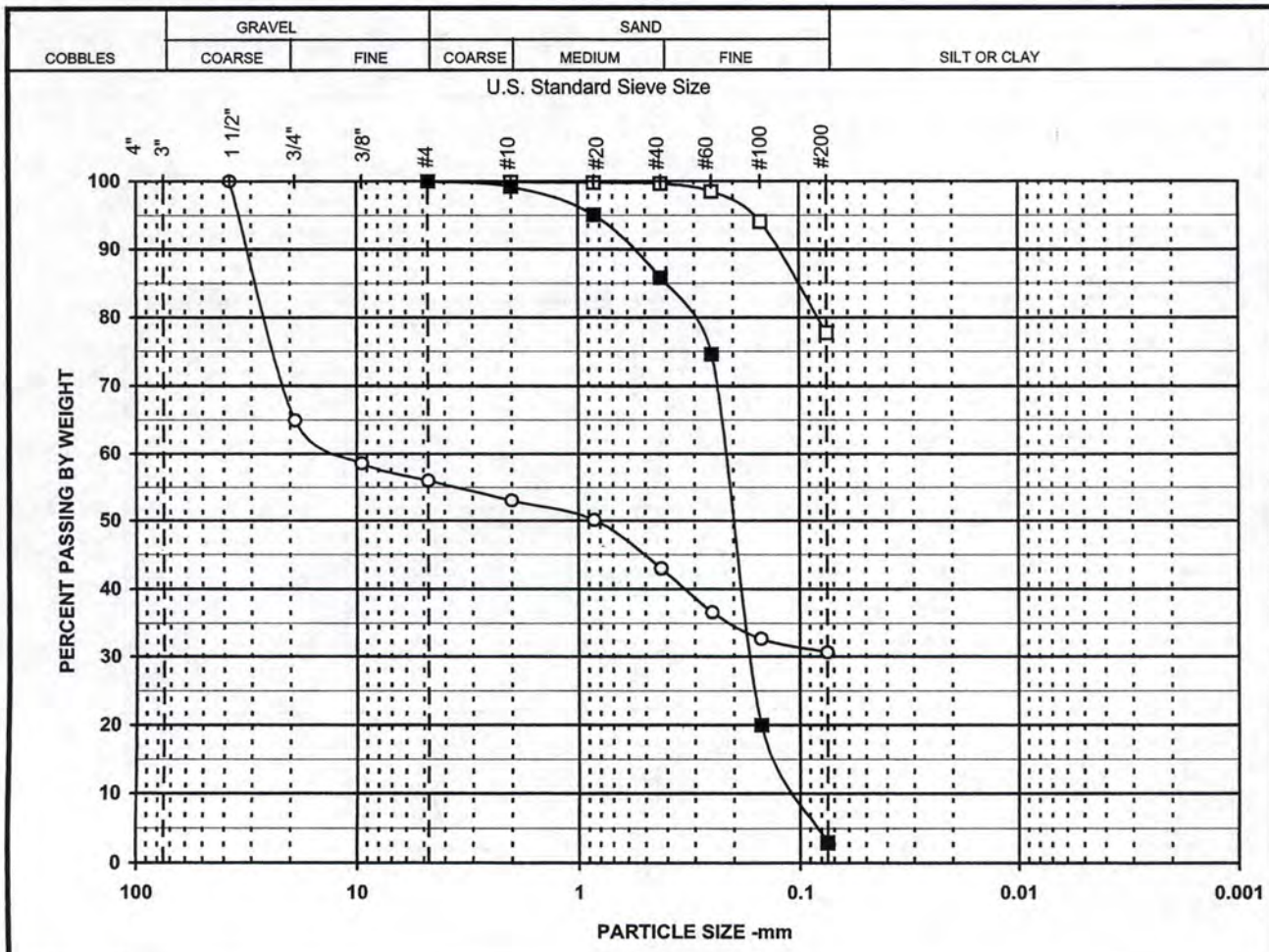

SYMBOL	DESCRIPTION AND REMARKS
□	black SILT, some f. sand.
■	gray m-f SAND, trace silt.
○	gray silty clayey GRAVEL, some c-f sand.

Symbol	□	■	○
Boring	PZ-7	PZ-7	PZ-7
Sample	C	C	C
Spec			
Depth	23.45	68.8	108.65
% +3"			
% Gravel			44.0
% SAND	22.3	97.1	25.4
% FINES	77.7	2.9	30.6
% -2μ			
Cc		1.2	
Cu		2.1	
LL			
PL			
PI			
USCS	ML	SP	GC
w (%)	30.7	18.0	10.4

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			100.0
3/4"			65.0
3/8"			58.6
4	100.0	100.0	56.0
10	99.9	99.2	53.0
20	99.8	95.1	50.1
40	99.7	85.8	43.0
60	98.5	74.6	36.6
100	94.1	19.9	32.7
200	77.7	2.9	30.6

PARTICLE SIZE DISTRIBUTION
Sauget Area 2

Project No.		
21560888	October 2003	Figure

URS Corporation

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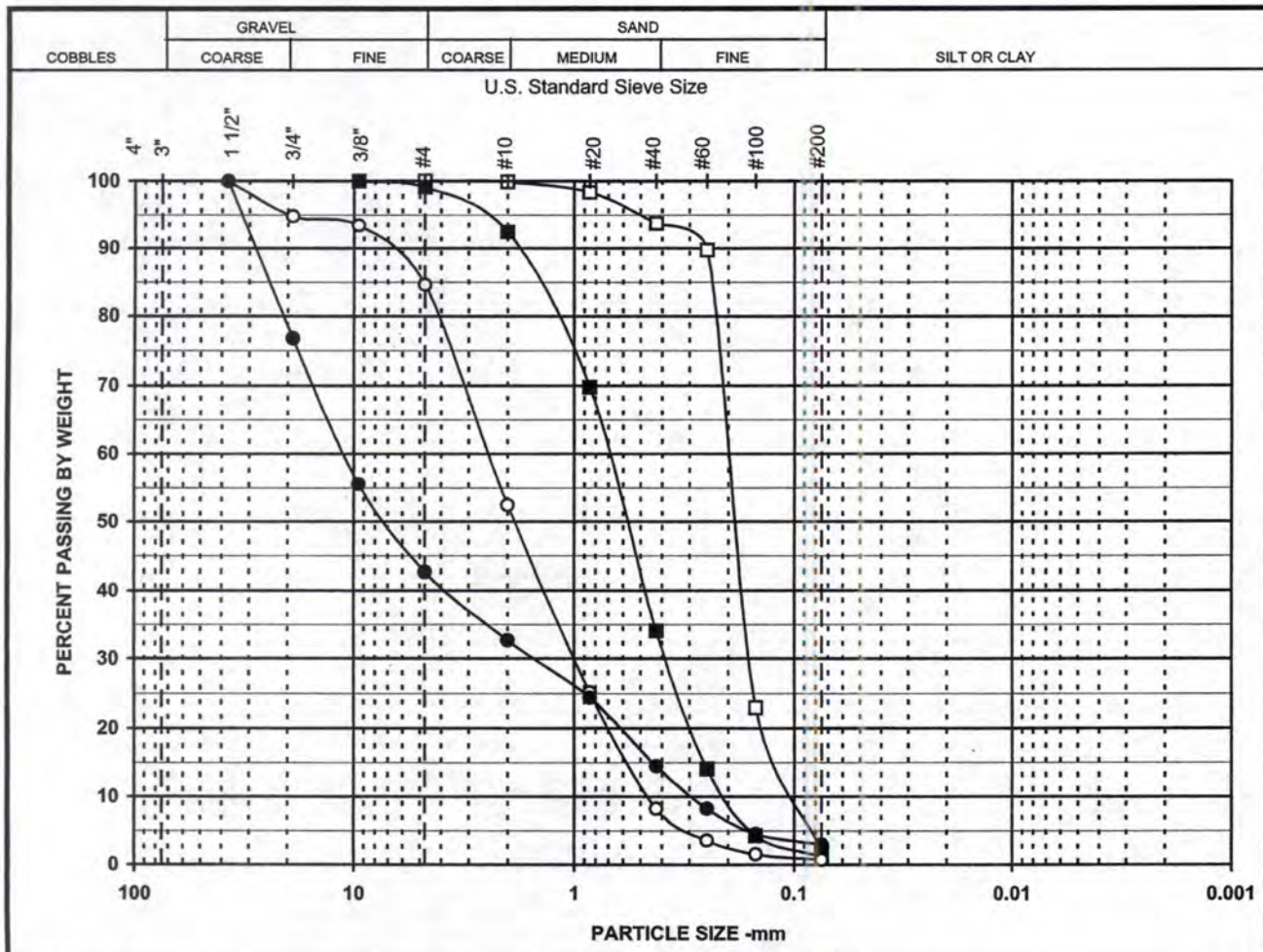

Symbol	□	■	○	●
Boring	PZ-8	PZ-8	PZ-8	PZ-8
Sample	B	C	C	C
Spec Depth	25.8	66.25	73.9	103.8
% +3"				
% Gravel		0.9	15.4	57.3
% SAND	97.8	97.9	83.9	39.7
% FINES	2.2	1.2	0.7	3.0
% -2μ				
Cc	1.2	1.0	0.9	0.8
Cu	2.0	3.5	5.6	38.4
LL				
PL				
PI				
USCS	SP	SP	SP	GP
w (%)	20.3	10.2	5.2	6.5

Particle Size (Sieve #)	PERCENT FINER □	■	○	●
4"				
3"				
1 1/2"			100.0	100.0
3/4"			94.8	76.8
3/8"		100.0	93.4	55.5
4	100.0	99.1	84.6	42.7
10	99.9	92.4	52.5	32.7
20	98.3	69.8	25.2	24.4
40	93.7	34.0	8.2	14.5
60	89.7	14.1	3.6	8.2
100	23.0	4.3	1.5	4.6
200	2.2	1.2	0.7	3.0

SYMBOL	DESCRIPTION AND REMARKS
□	gray f. SAND, trace m. sand, silt.
■	gray m-f SAND, trace c. sand, silt.
○	light gray c-f SAND, some gravel.
●	light gray c-f sandy GRAVEL, trace silt.

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

URS Corporation

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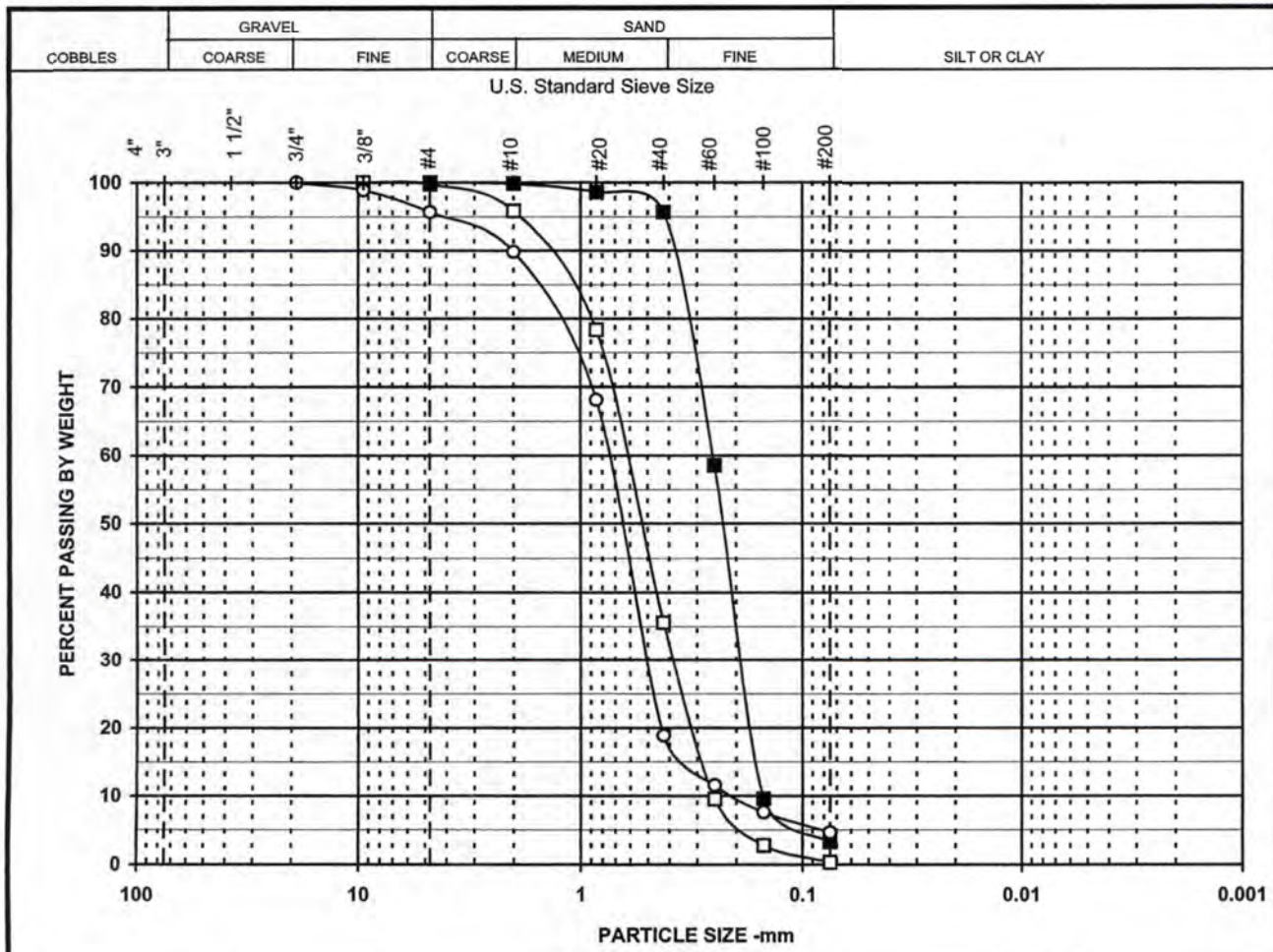

SYMBOL	DESCRIPTION AND REMARKS
□	light gray m-f SAND, trace c. sand.
■	light gray f. SAND, trace m. sand, silt.
○	light brown c-f SAND, trace f. gravel, silt.

Symbol	□	■	○
Boring	PZ-9	PZ-9	PZ-9
Sample	C	C	C
Spec			
Depth	23.85	73.8	103.8
% +3"			
% Gravel	0.2		4.3
% SAND	99.5	96.7	91.1
% FINES	0.3	3.3	4.6
% -2μ			
Cc	0.9	0.9	1.7
Cu	2.6	1.7	3.7
LL			
PL			
PI			
USCS	SP	SP	SP
w (%)	10.6	15.7	10.1

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			100.0
3/8"	100.0		98.9
4	99.8	100.0	95.7
10	95.8	99.8	89.8
20	78.4	98.6	68.1
40	35.6	95.7	18.8
60	9.6	58.6	11.6
100	2.8	9.6	7.6
200	0.3	3.3	4.6

PARTICLE SIZE DISTRIBUTION

Sauget Area 2

Project No.		Figure
21560888	October 2003	

URS Corporation

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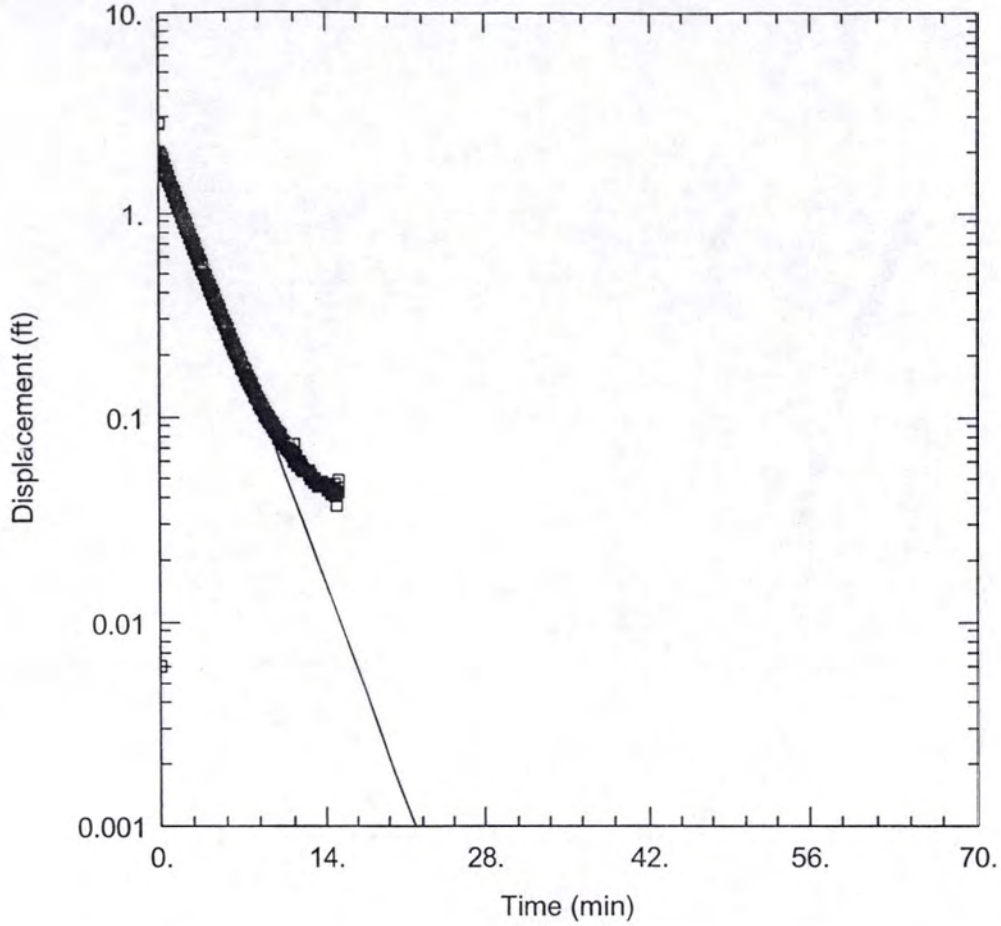
APPENDIX K

Slug Test Reduction Forms



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-O-1(IN).aqt
Date: 11/07/03 Time: 07:58:28

PROJECT INFORMATION

Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/9/02

AQUIFER DATA

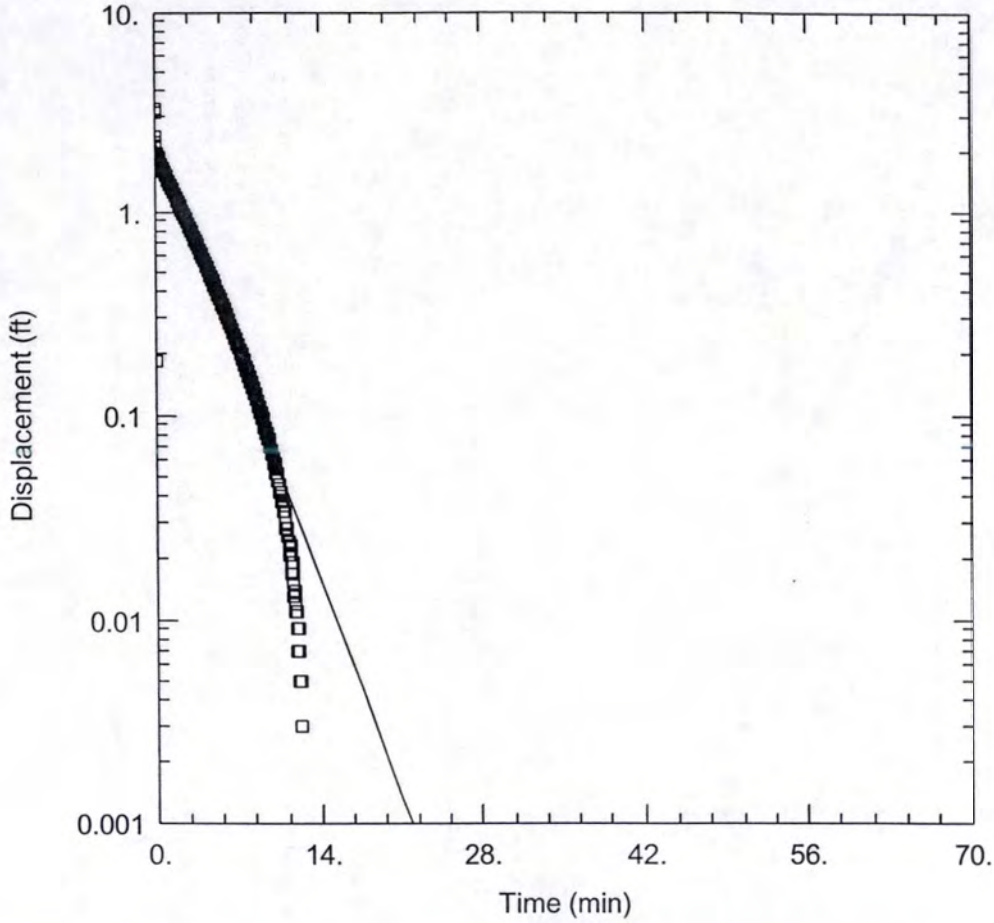
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-O-1)

Initial Displacement: 2.799 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 133.6 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003156 ft/min
y0 = 2.214 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-O-1(OUT).aqt
Date: 11/07/03 Time: 07:58:23

PROJECT INFORMATION

Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/9/02

AQUIFER DATA

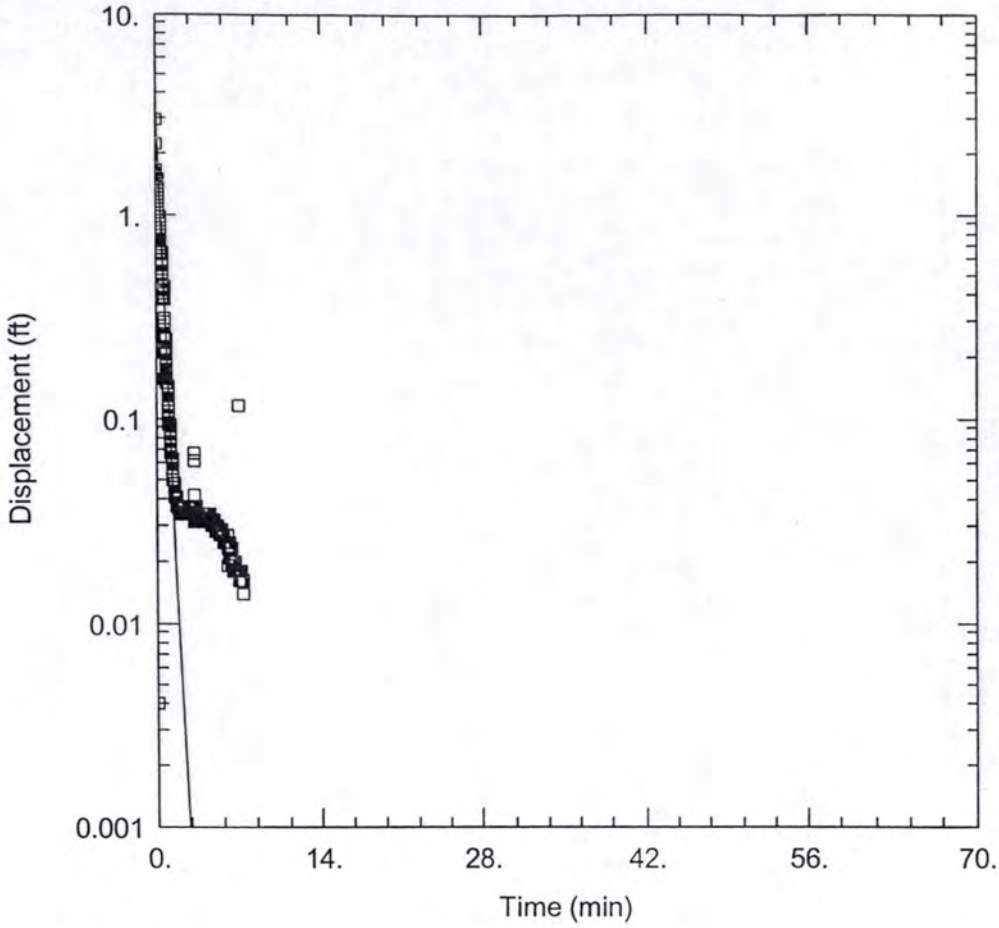
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-O-1)

Initial Displacement: 2.356 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 133.6 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003156 ft/min
y0 = 2.214 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-Q-2(IN).aqt
Date: 11/07/03 Time: 07:57:59

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/9/02

AQUIFER DATA

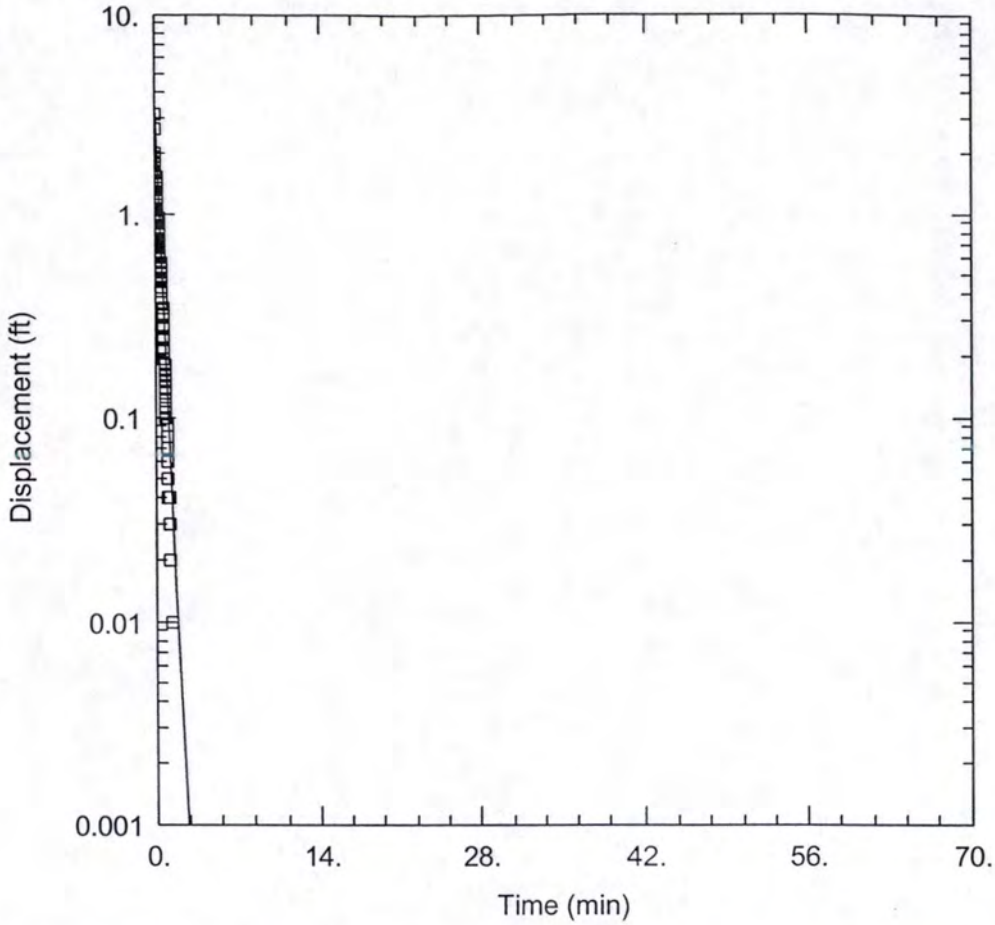
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-Q-2)

Initial Displacement: 2.916 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 123.4 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0274 ft/min
y0 = 3.502 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-Q-2(OUT).aqt
Date: 11/07/03 Time: 07:57:38

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/9/02

AQUIFER DATA

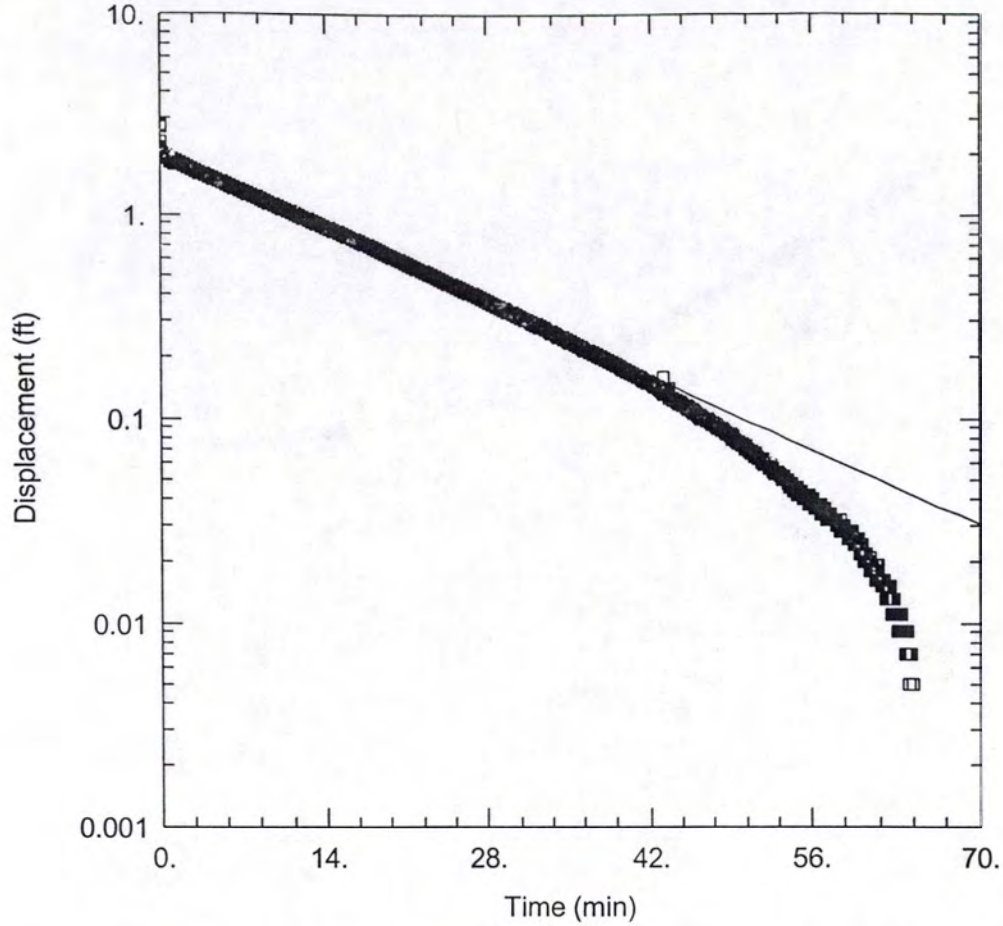
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-Q-2)

Initial Displacement: 3.15 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 123.4 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0274 ft/min
y0 = 3.502 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-Q-1(IN).aqt
Date: 11/07/03 Time: 07:58:17

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/10/02

AQUIFER DATA

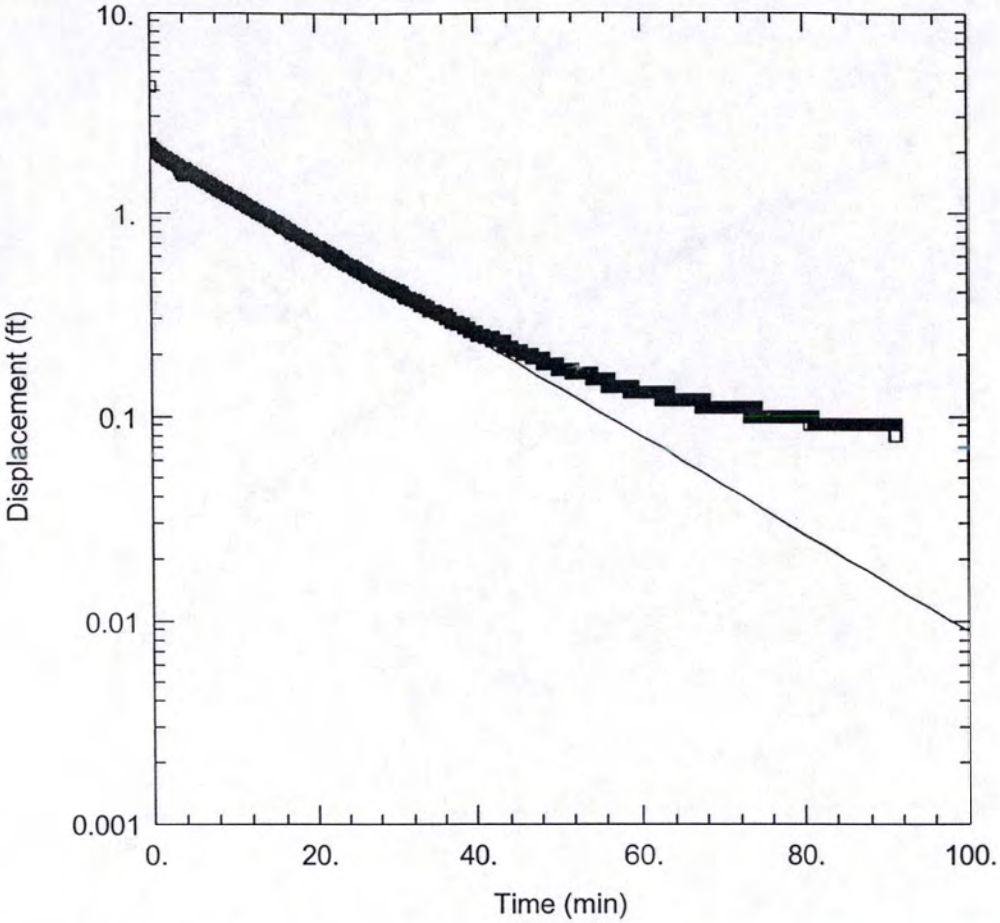
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-Q-1)

Initial Displacement: 2.776 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 126.3 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0005269 ft/min
y0 = 1.968 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-Q-1(OUT).aqt
Date: 11/07/03 Time: 07:58:08

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/10/02

AQUIFER DATA

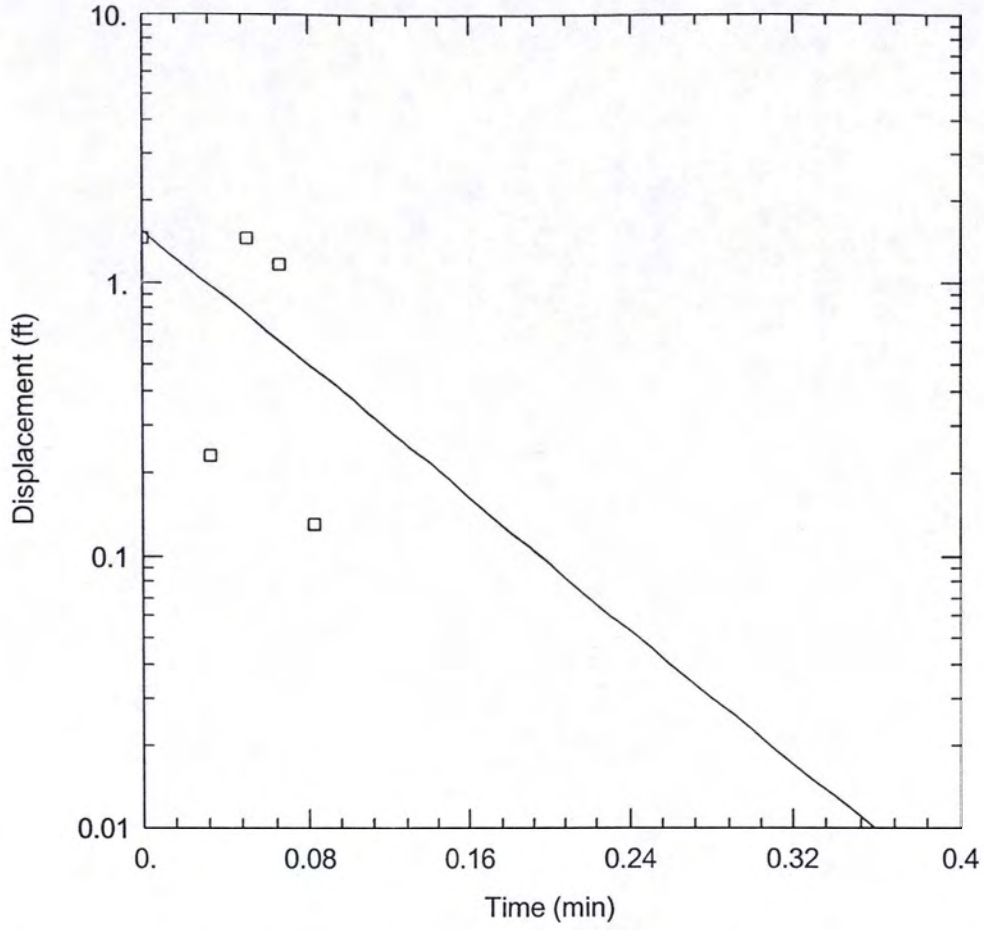
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-Q-1)

Initial Displacement: 4.21 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 126.3 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0004877 ft/min
y0 = 2.192 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-R-1(IN).aqt
Date: 11/07/03 Time: 08:01:37

PROJECT INFORMATION

Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

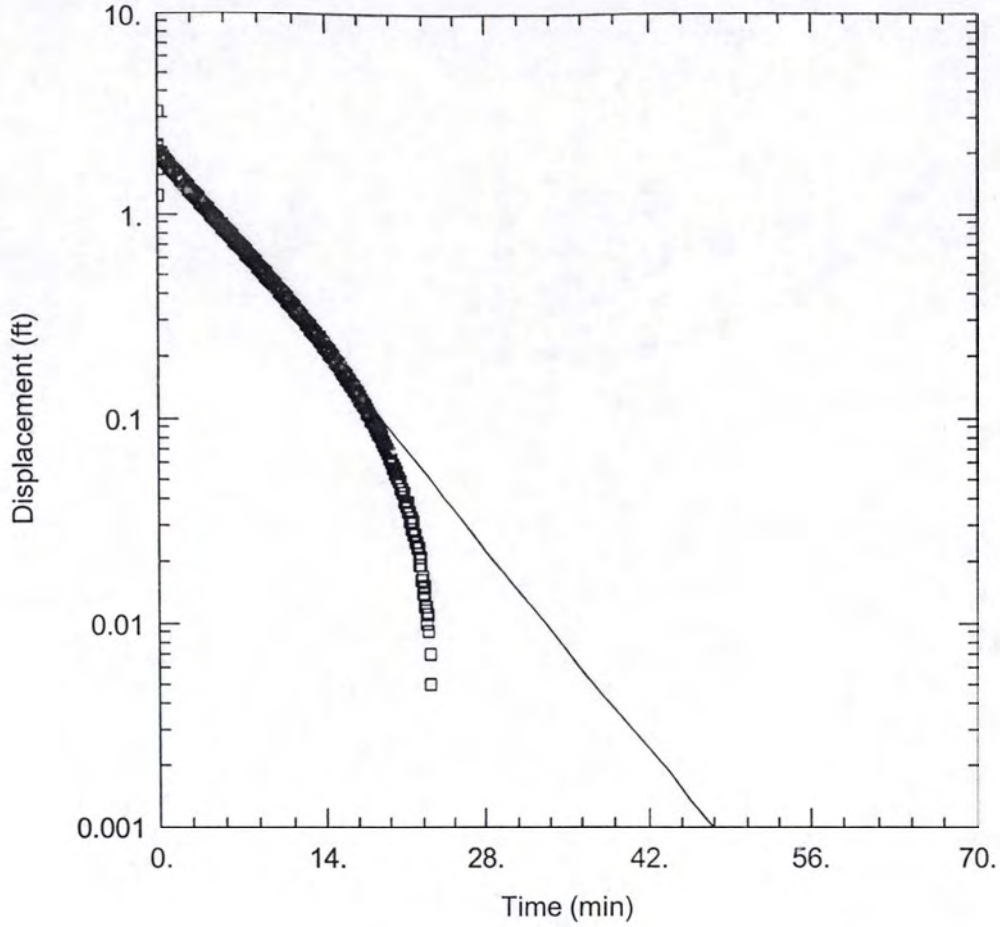
Saturated Thickness: 98.5 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PZ-9)

Initial Displacement: 1.45 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 98.19 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07978 ft/min
y0 = 1.545 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-S-1(IN).aqt
Date: 11/07/03 Time: 08:01:32

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/10/02

AQUIFER DATA

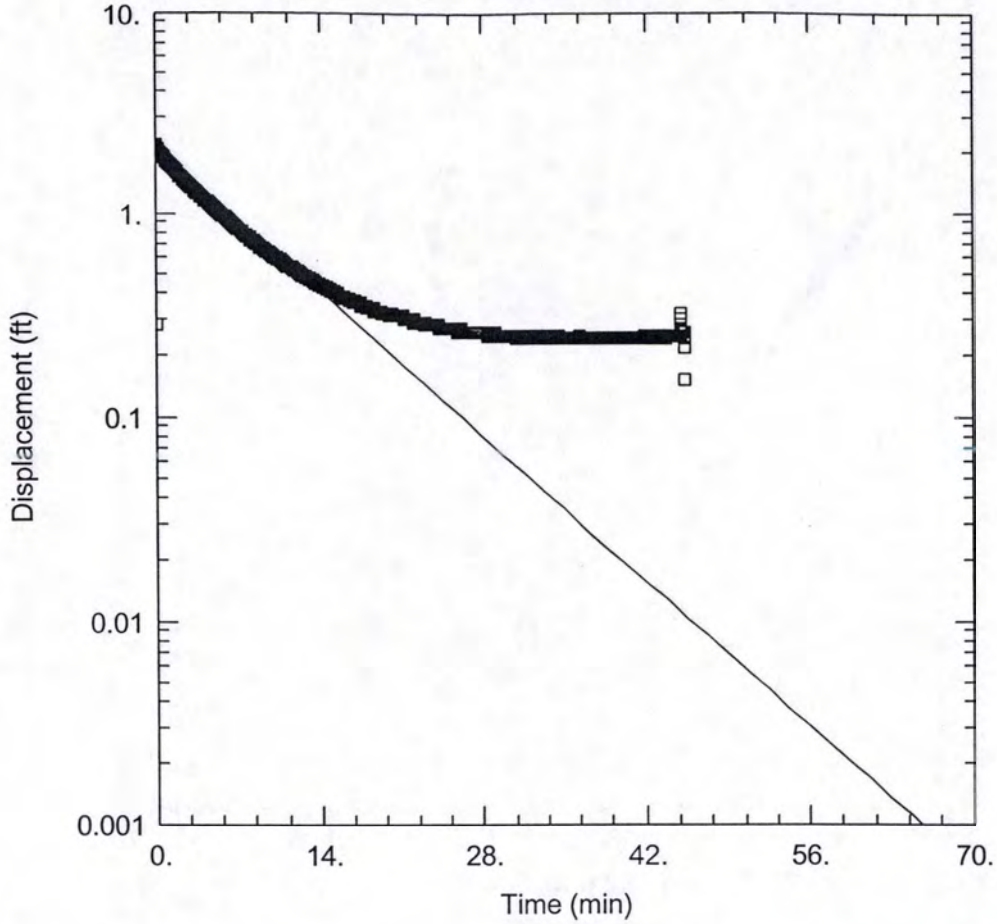
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-S-1)

Initial Displacement: 3.186 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 140.2 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001434 ft/min
y0 = 2.033 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\BDRK-S-1(OUT).aqt
Date: 11/07/03 Time: 08:00:47

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/10/02

AQUIFER DATA

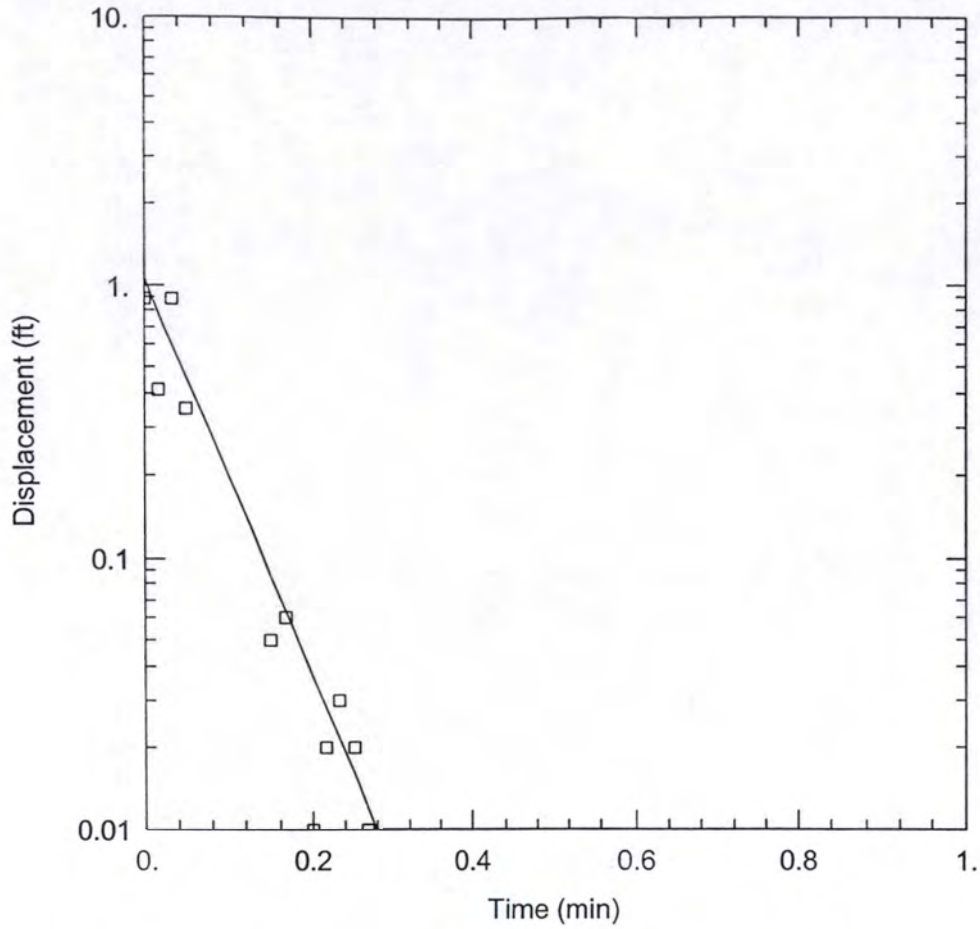
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (BDRK-S-1)

Initial Displacement: 2.18 ft
Casing Radius: 0.083 ft
Screen Length: 5. ft
Water Column Height: 140.2 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001044 ft/min
y0 = 2.098 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-1 (Middle IN).aqt
Date: 11/07/03 Time: 08:00:26

PROJECT INFORMATION

Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

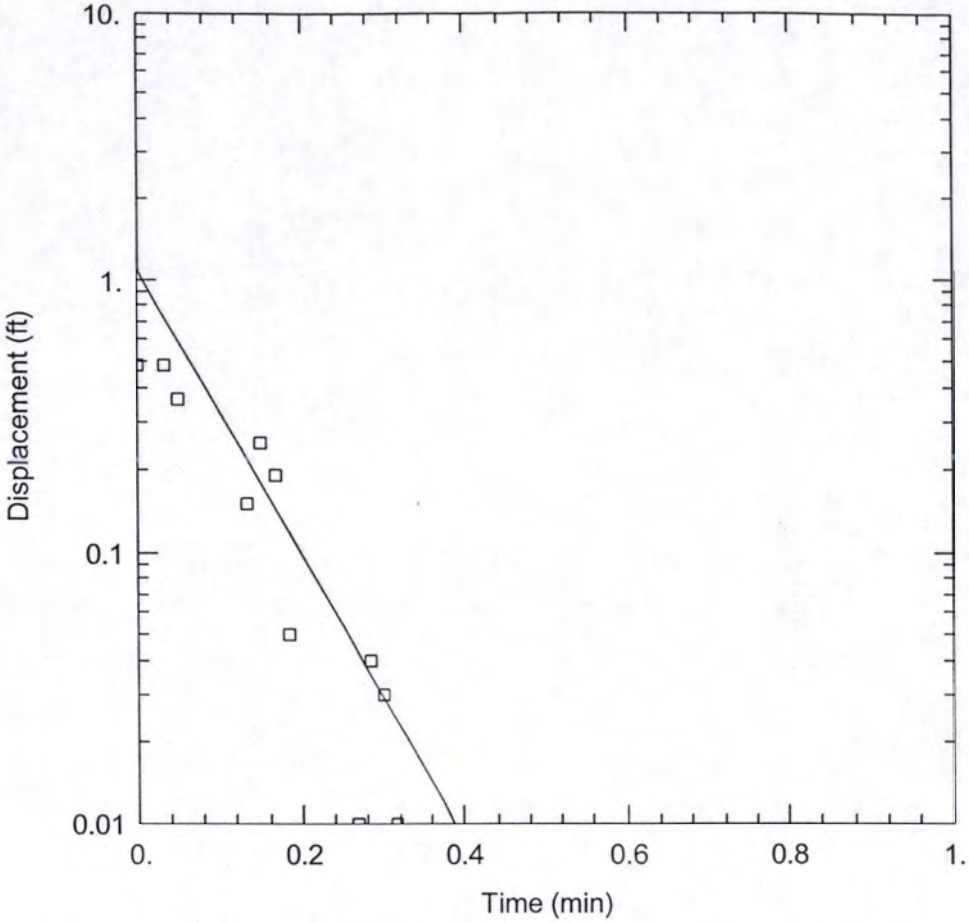
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-1(M))

Initial Displacement: 0.88 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 51.08 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07298 ft/min
y0 = 1.064 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-1 (Middle OUT).aqt
Date: 11/07/03 Time: 08:00:21

PROJECT INFORMATION

Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

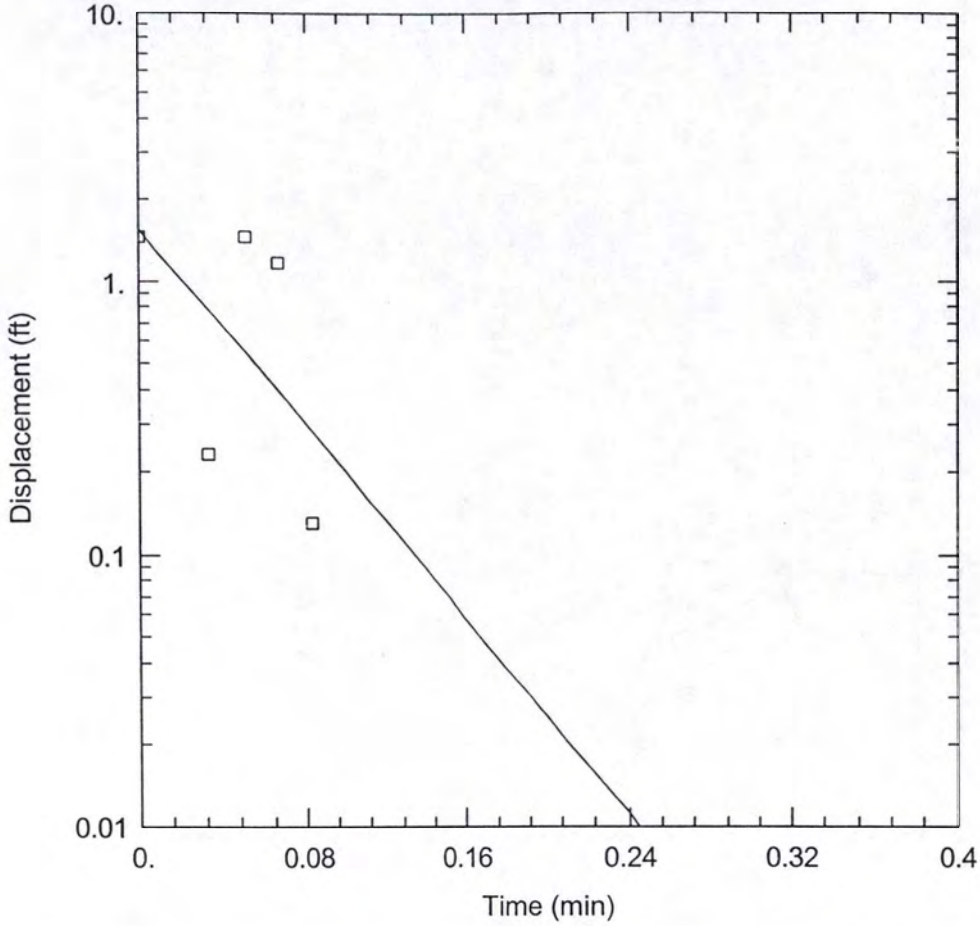
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-1(M))

Initial Displacement: 0.48 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 51.08 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05243 ft/min
y0 = 1.087 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-1 (Deep IN).aqt
Date: 11/07/03 Time: 08:00:37

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

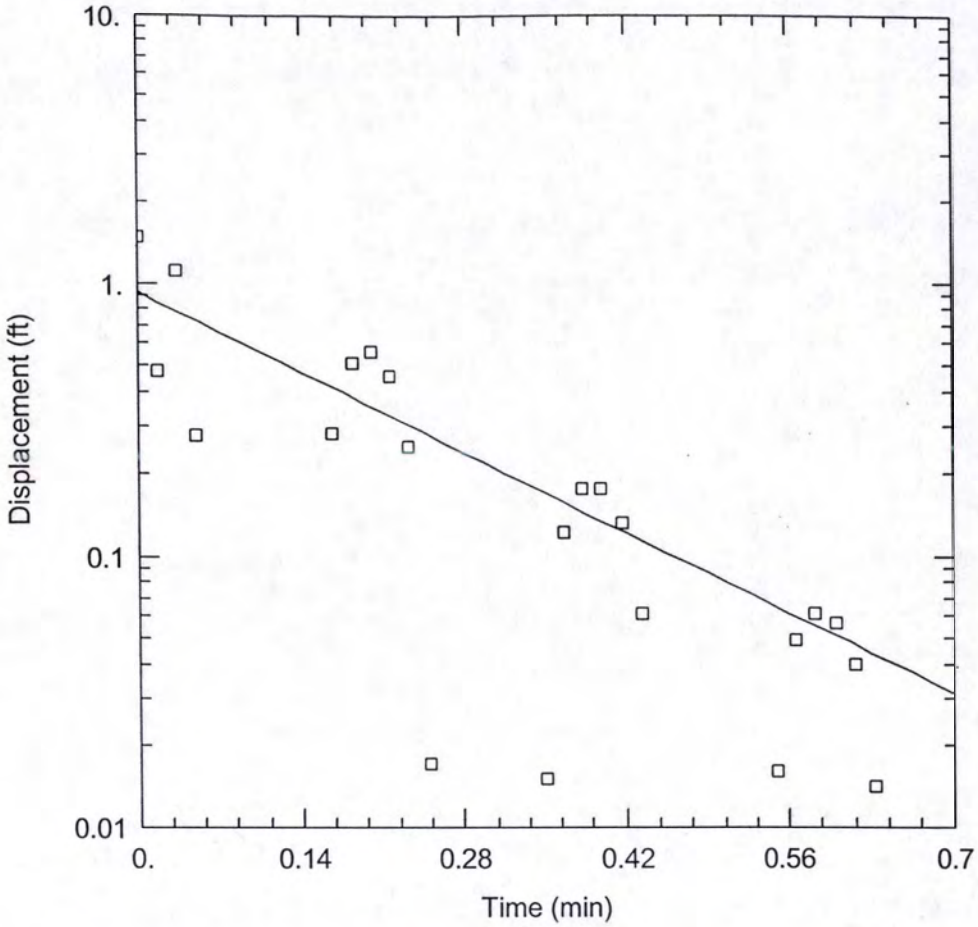
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-1(D))

Initial Displacement: 1.45 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 101.1 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07772 ft/min
y0 = 1.545 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-1 (Deep OUT).aqt
Date: 11/07/03 Time: 08:00:32

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

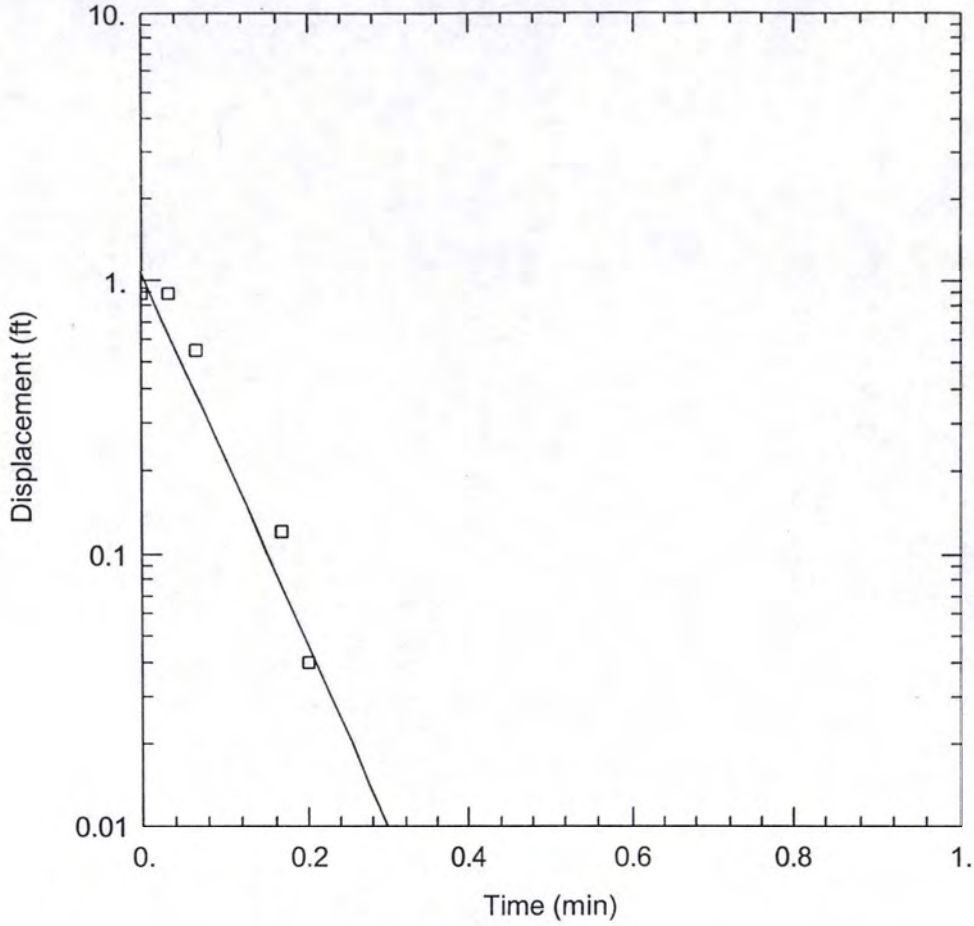
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-1(D))

Initial Displacement: 1.473 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 101.1 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.01828 ft/min
y0 = 0.9252 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-2 (Middle IN).aqt
Date: 11/07/03 Time: 08:00:04

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

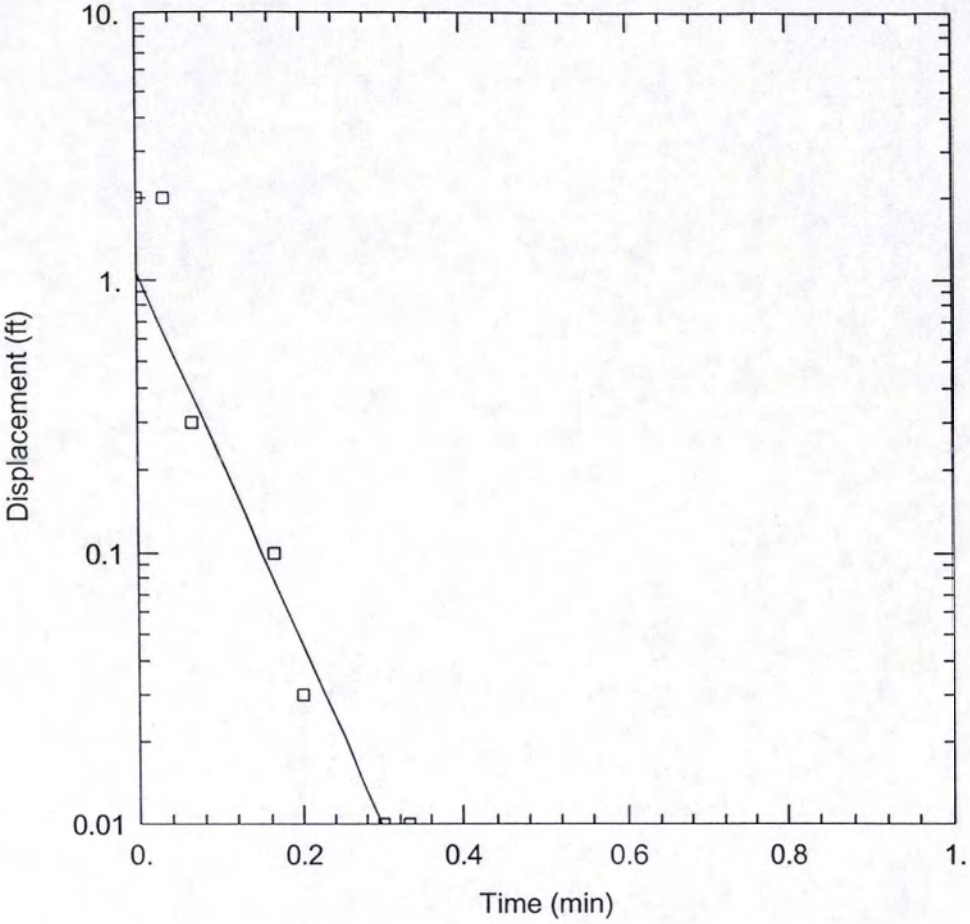
Saturated Thickness: 108.8 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-2(M))

Initial Displacement: 0.89 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 49.84 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06778 ft/min
y0 = 1.064 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-2 (Middle OUT).aqt
Date: 11/07/03 Time: 07:59:59

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

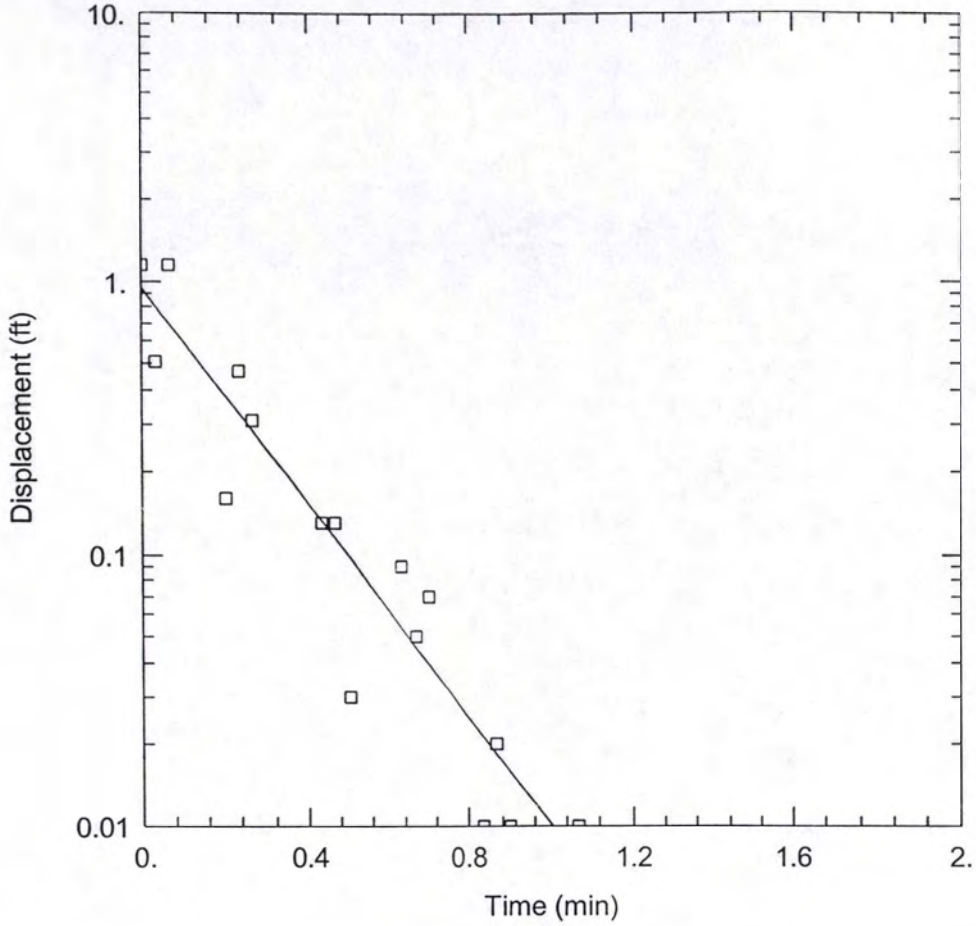
Saturated Thickness: 108.8 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-2(M))

Initial Displacement: 2.01 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 49.84 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06778 ft/min
y0 = 1.064 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-2 (Deep IN).aqt
Date: 11/07/03 Time: 08:00:16

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

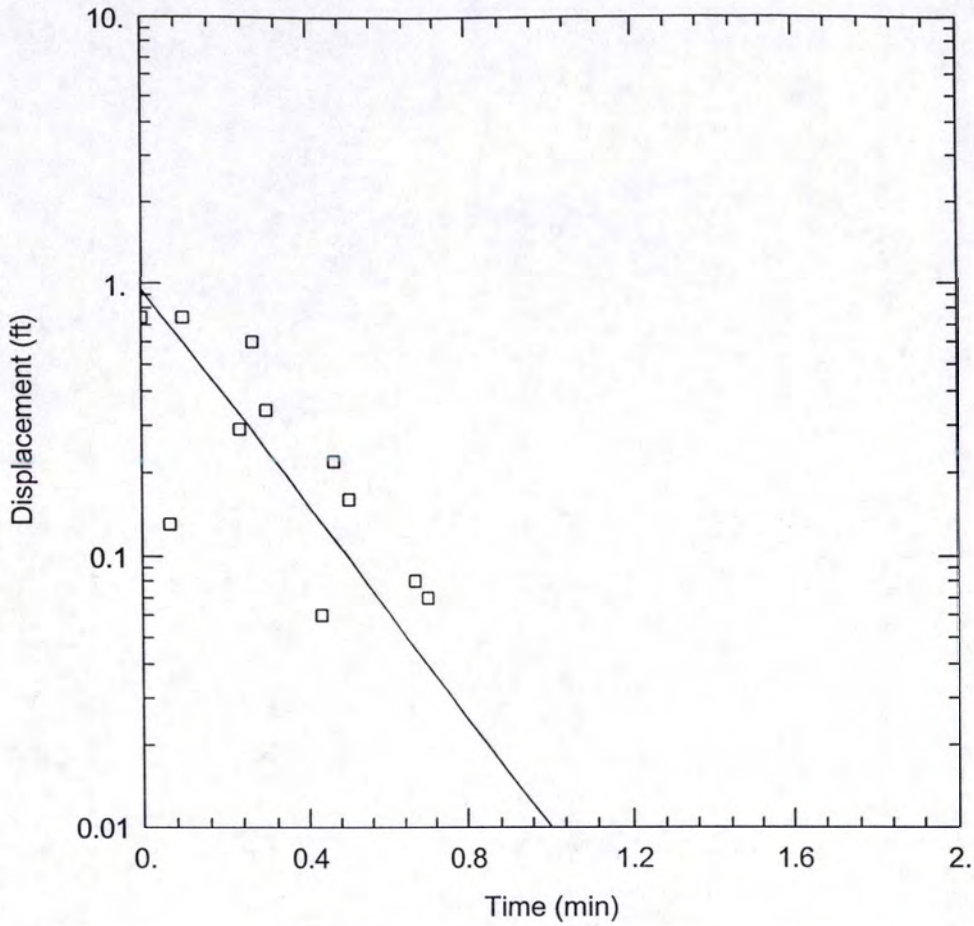
Saturated Thickness: 108.9 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-2 (D))

Initial Displacement: 1.15 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 108.9 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.01734 ft/min
y0 = 0.9464 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-2 (Deep OUT).aqt
Date: 11/07/03 Time: 08:00:10

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

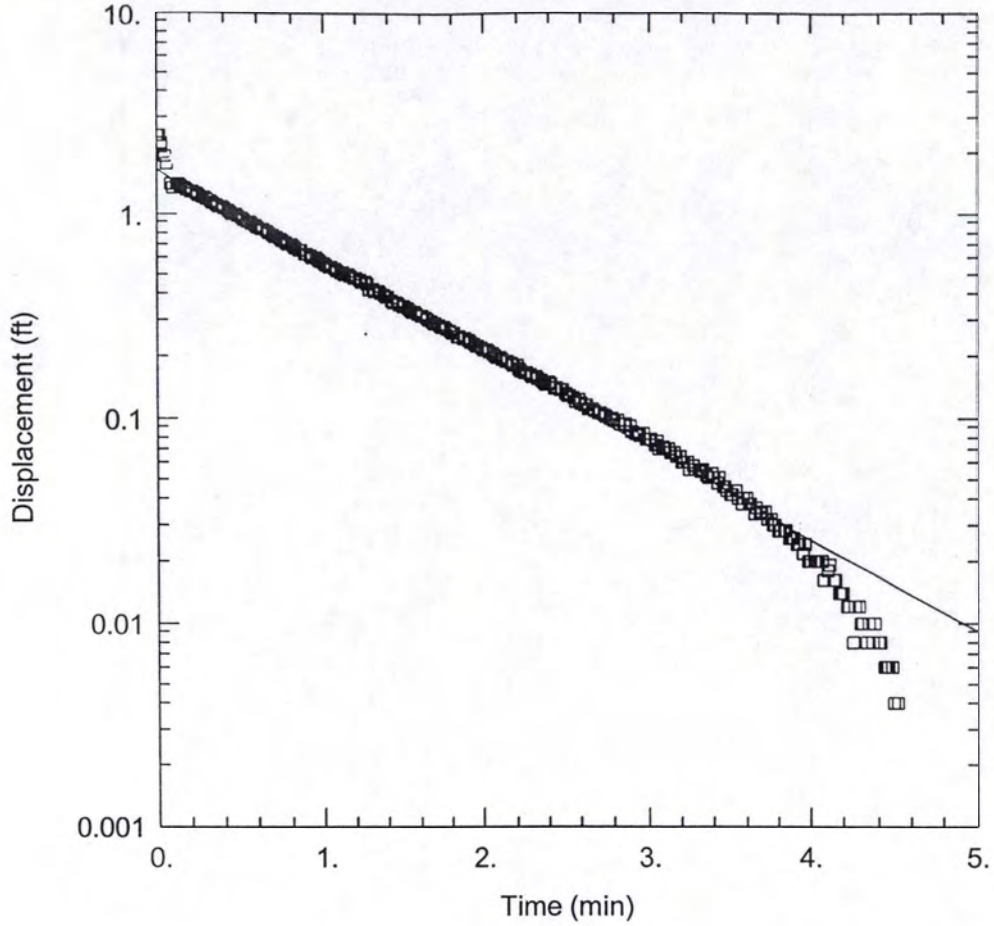
Saturated Thickness: 108.9 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-2 (D))

Initial Displacement: 0.74 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 108.9 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.01734 ft/min
y0 = 0.9464 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-3 (shallow IN).aqt
Date: 11/07/03 Time: 08:19:02

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

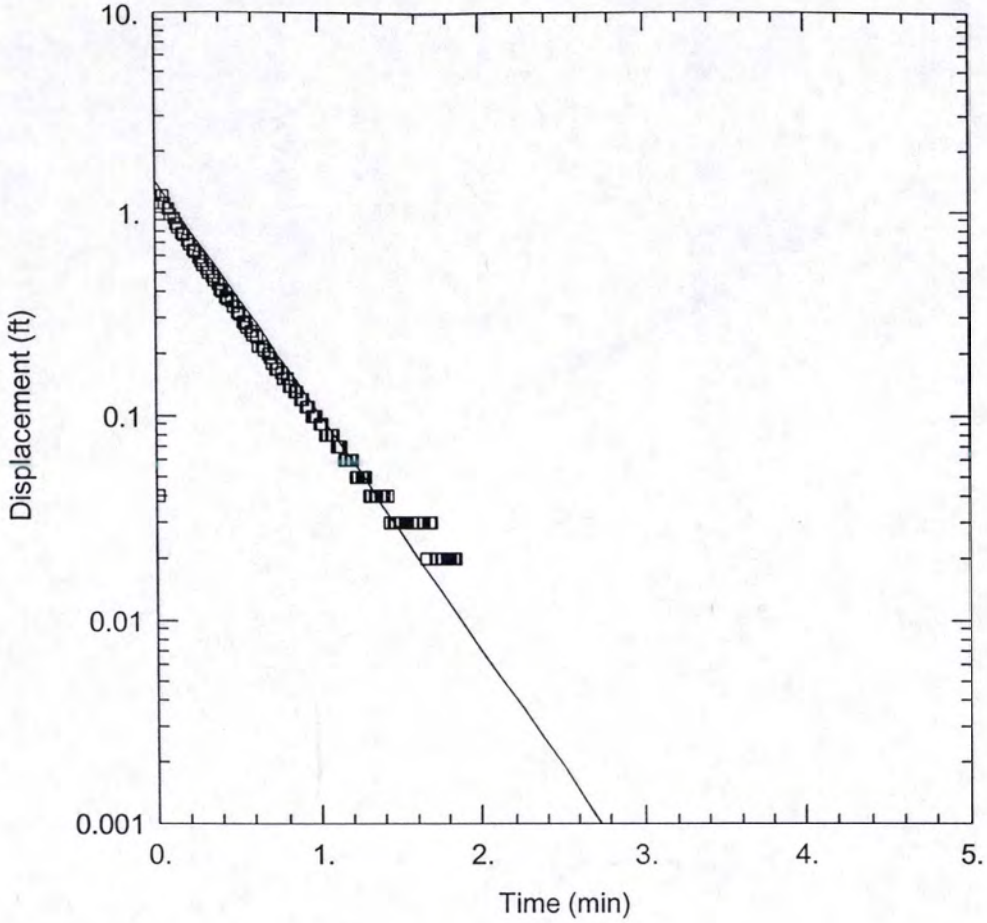
Saturated Thickness: 88.44 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(S))

Initial Displacement: 2.44 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 11.44 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003609 ft/min
y0 = 1.635 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-3 (shallow OUT).aqt
Date: 11/07/03 Time: 08:18:56

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

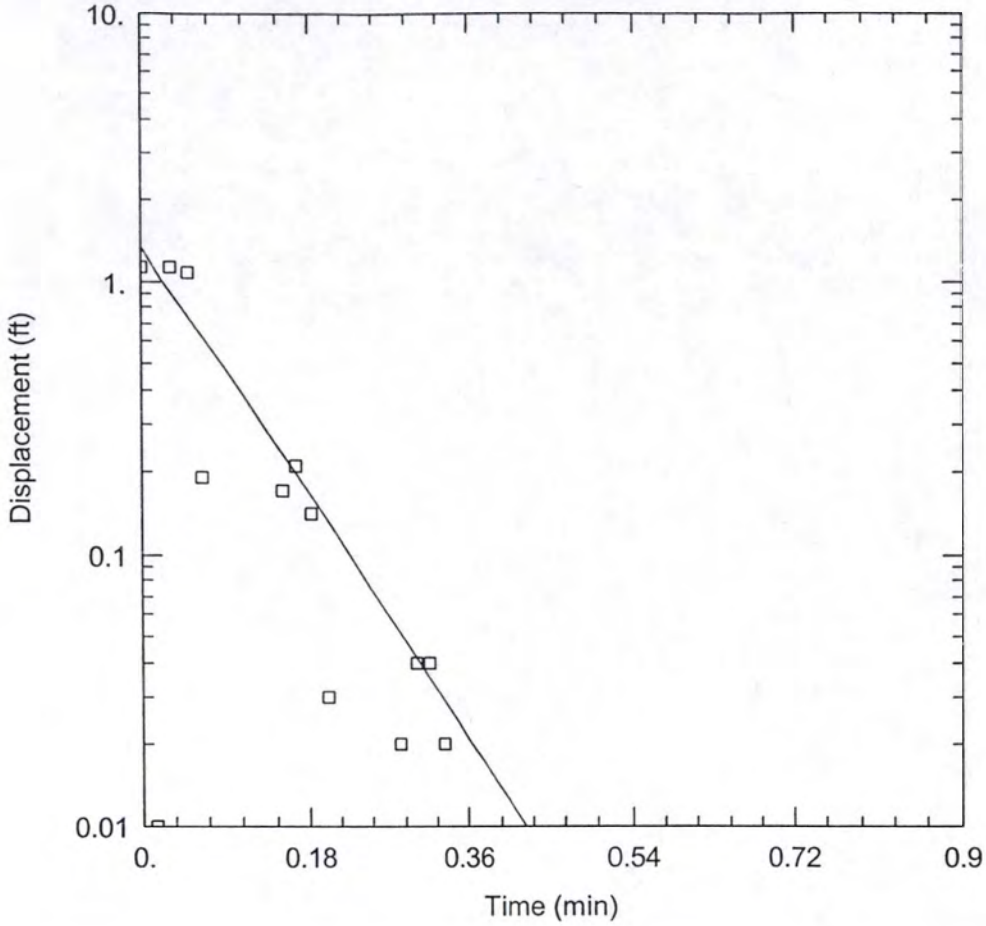
Saturated Thickness: 88.44 ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(S))

Initial Displacement: 1.19 ft Water Column Height: 11.44 ft
Casing Radius: 0.042 ft Wellbore Radius: 0.33 ft
Screen Length: 10. ft Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.00919 ft/min y0 = 1.43 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-3 (Middle IN).aqt
Date: 11/07/03 Time: 08:19:14

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

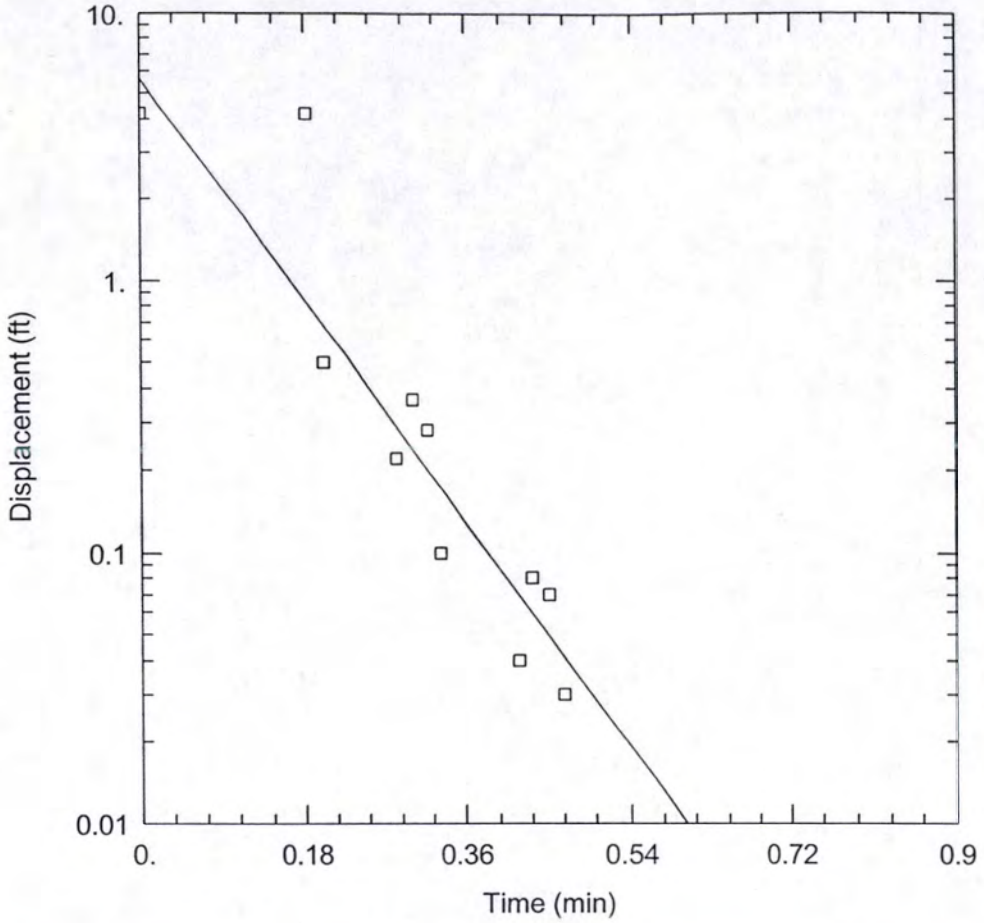
Saturated Thickness: 88.45 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(M))

Initial Displacement: 1.13 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 51.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05078 ft/min
y0 = 1.337 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-3 (Middle OUT).aqt
Date: 11/07/03 Time: 08:19:08

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

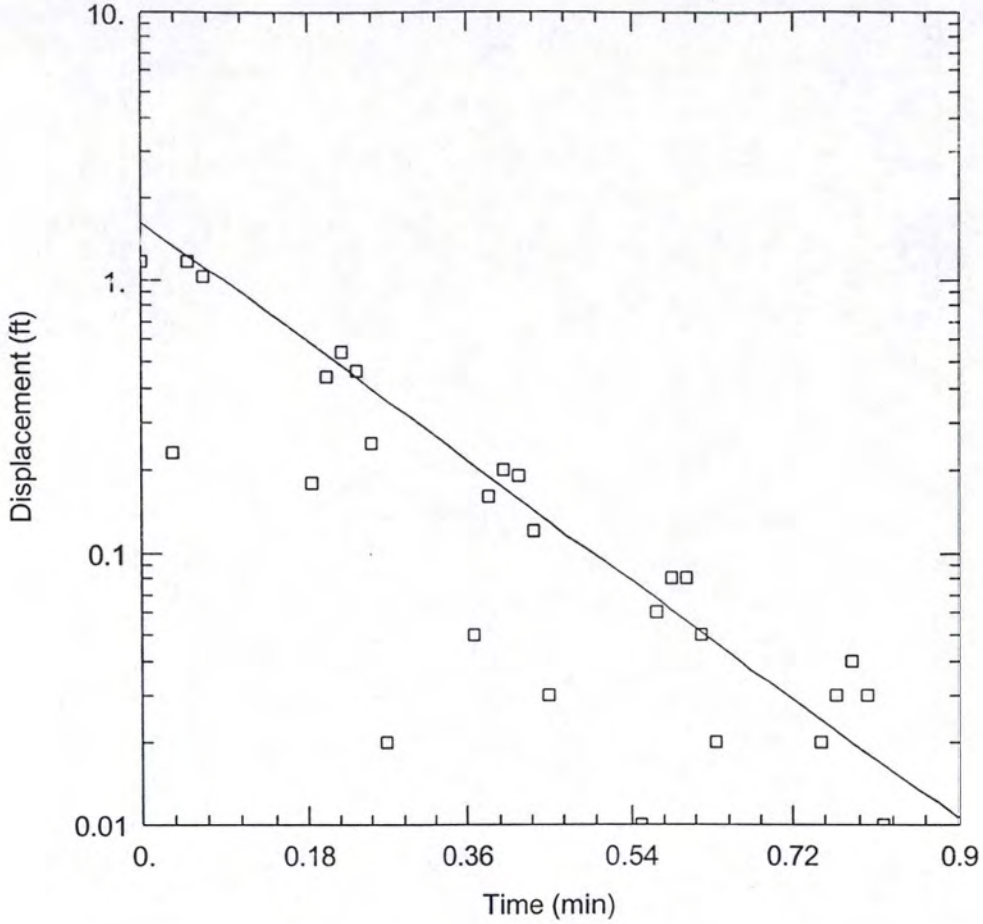
Saturated Thickness: 88.45 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(M))

Initial Displacement: 4.17 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 51.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.04632 ft/min
y0 = 5.639 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-3 (Deep IN).aqt
Date: 11/07/03 Time: 07:59:54

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

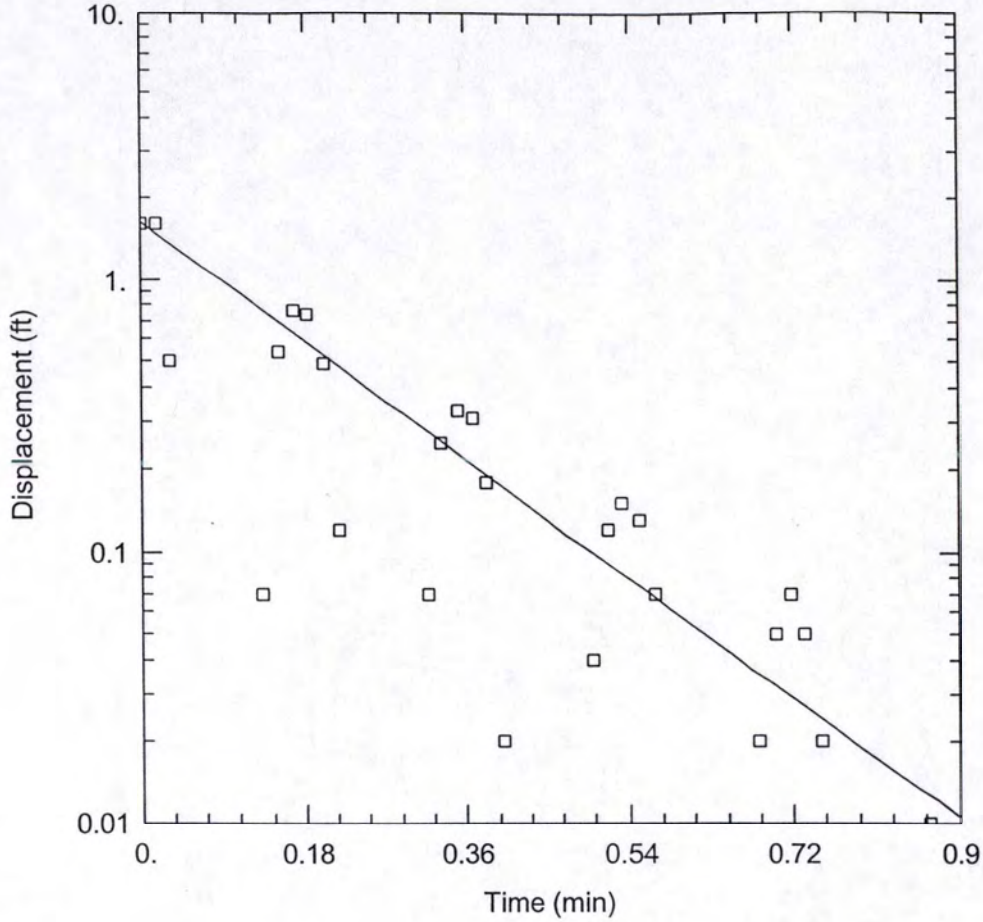
Saturated Thickness: 88.43 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(D))

Initial Displacement: 1.17 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 88.43 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02085 ft/min
y0 = 1.63 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-3 (Deep OUT).aqt
Date: 11/07/03 Time: 08:19:20

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/04/02

AQUIFER DATA

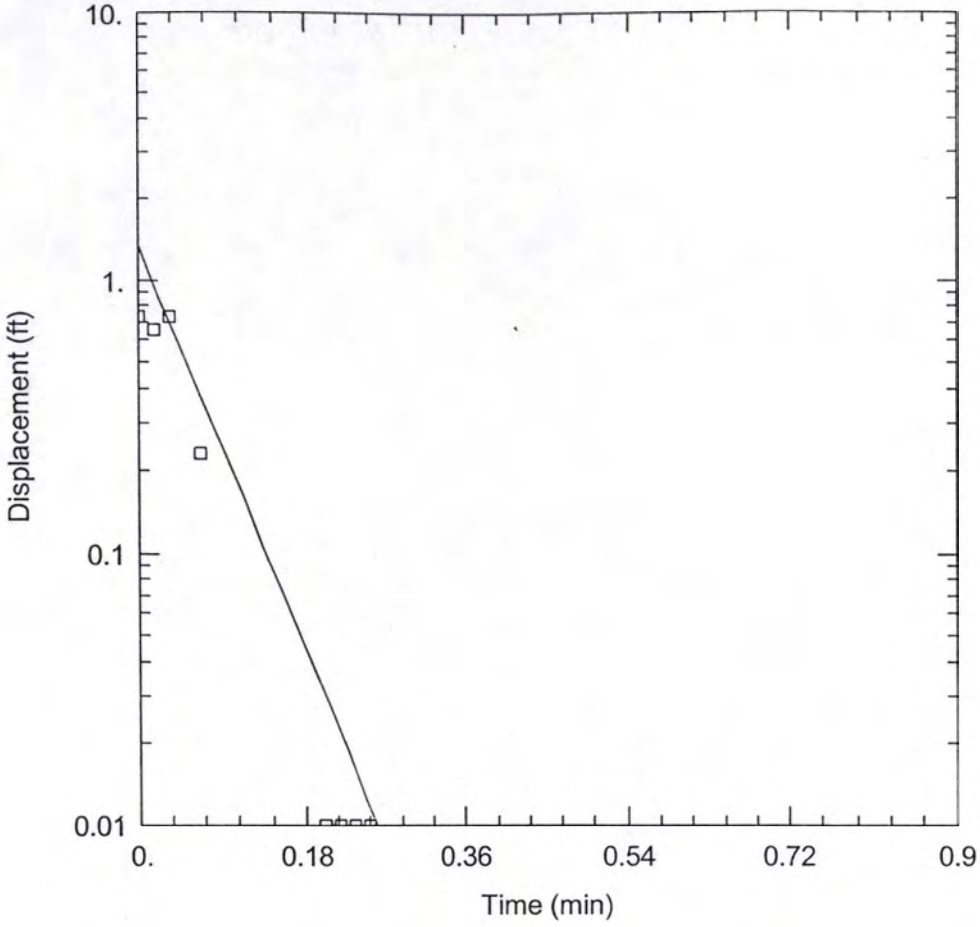
Saturated Thickness: 88.43 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-3(D))

Initial Displacement: 1.61 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 88.43 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02085 ft/min
y0 = 1.63 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-4 (Middle IN).aqt
Date: 11/07/03 Time: 08:18:39

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

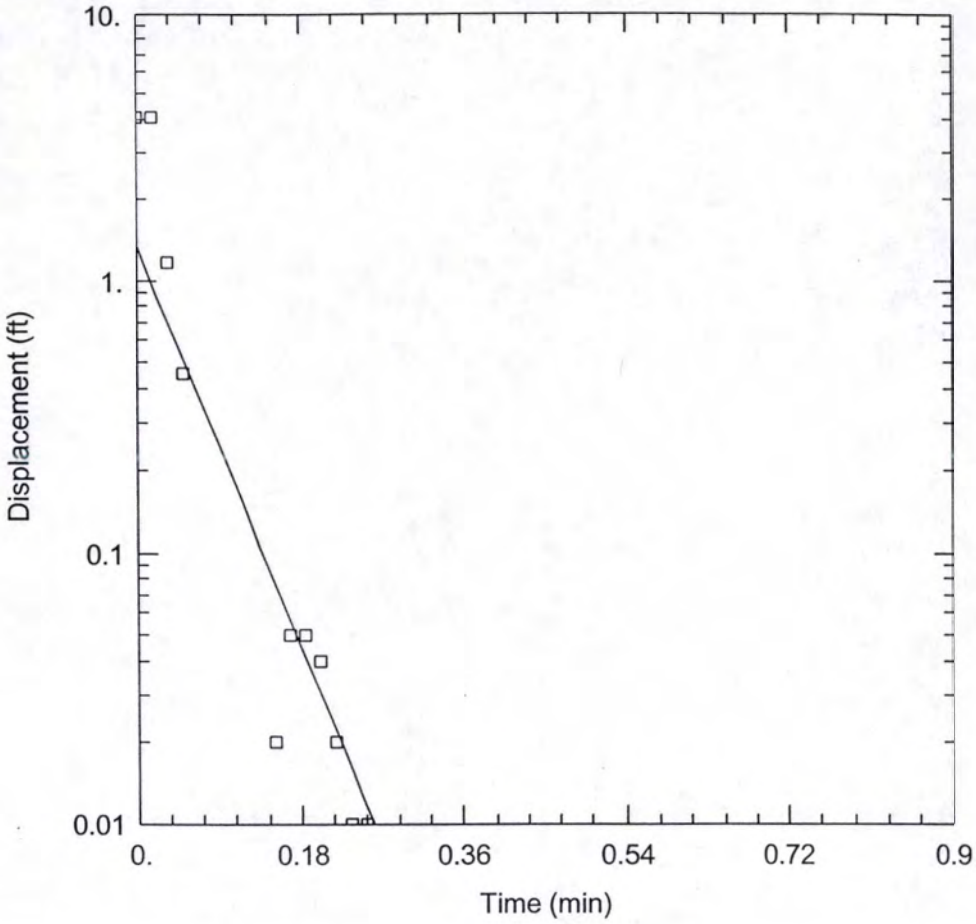
Saturated Thickness: 97.95 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-4(M))

Initial Displacement: 0.73 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 59.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.08446 ft/min
y0 = 1.346 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-4 (Middle OUT).aqt
Date: 11/07/03 Time: 08:18:34

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

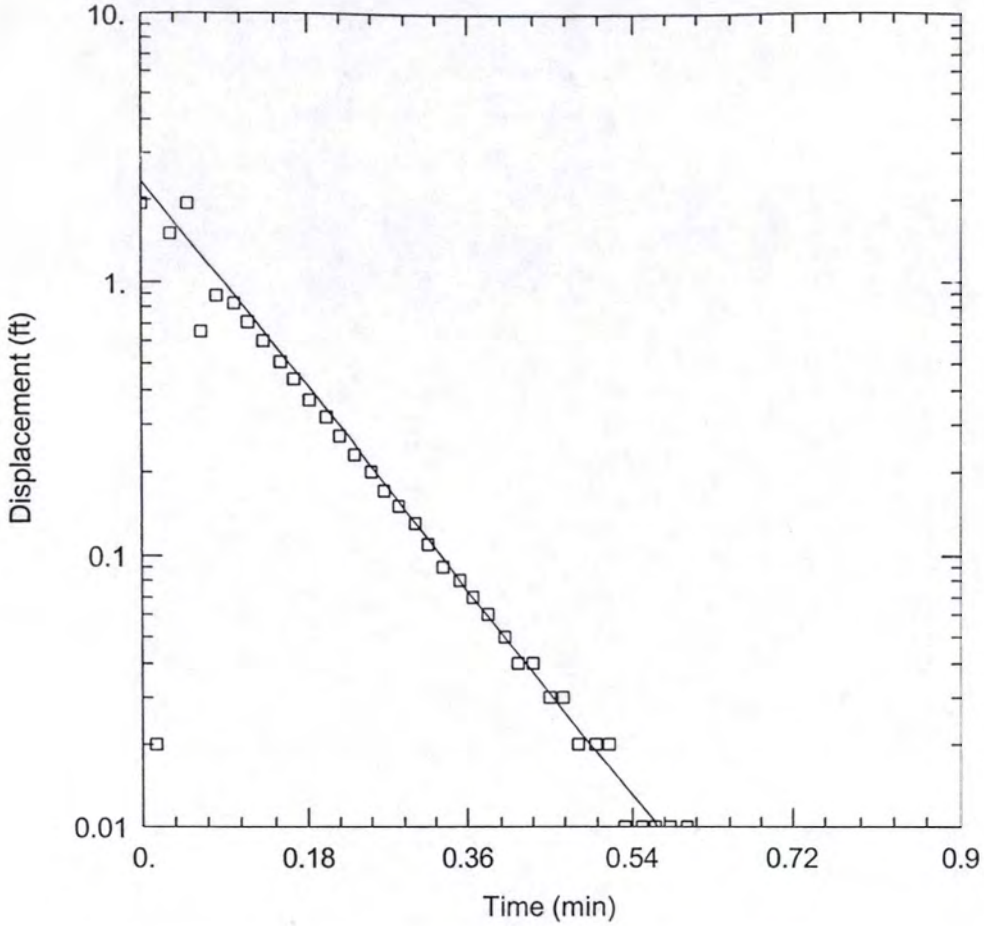
Saturated Thickness: 97.95 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-4(M))

Initial Displacement: 4.02 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 59.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.08446 ft/min
y0 = 1.346 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-4 (Deep IN).aqt
Date: 11/07/03 Time: 08:18:50

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

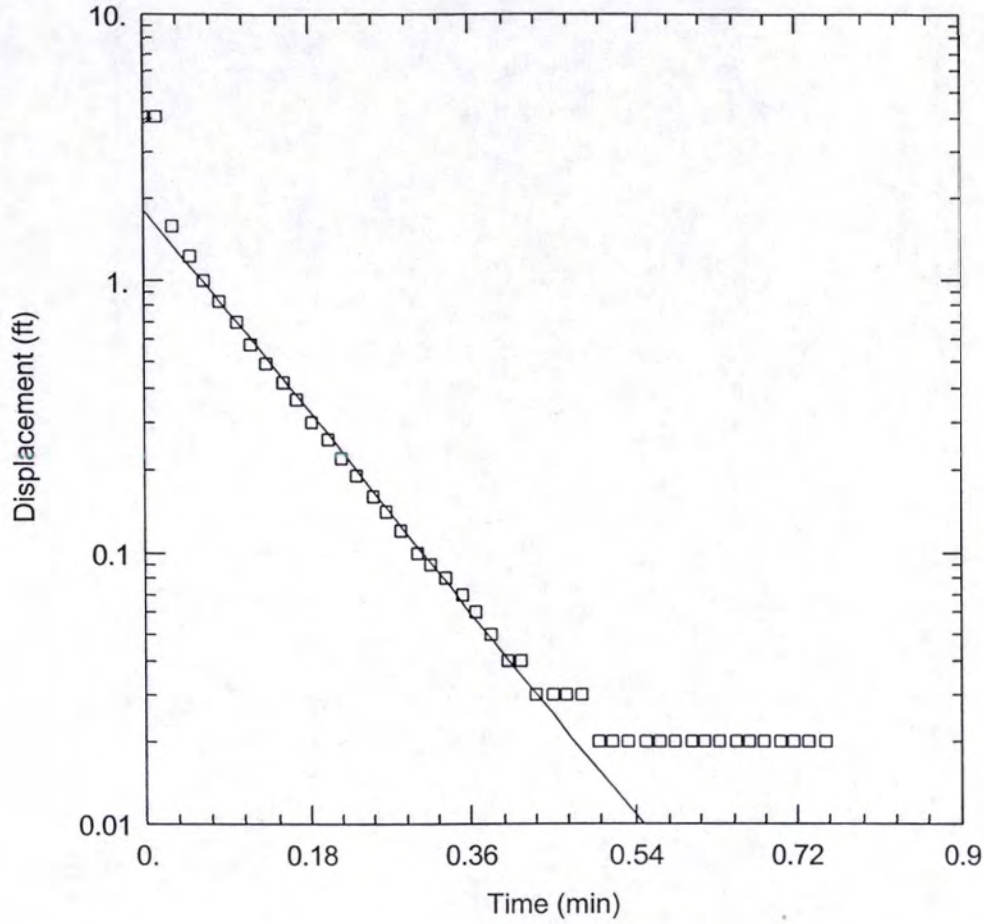
Saturated Thickness: 98.4 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-4(D))

Initial Displacement: 1.94 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 98.4 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.03629 ft/min
y0 = 2.357 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-4 (Deep OUT).aqt
Date: 11/07/03 Time: 08:18:44

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

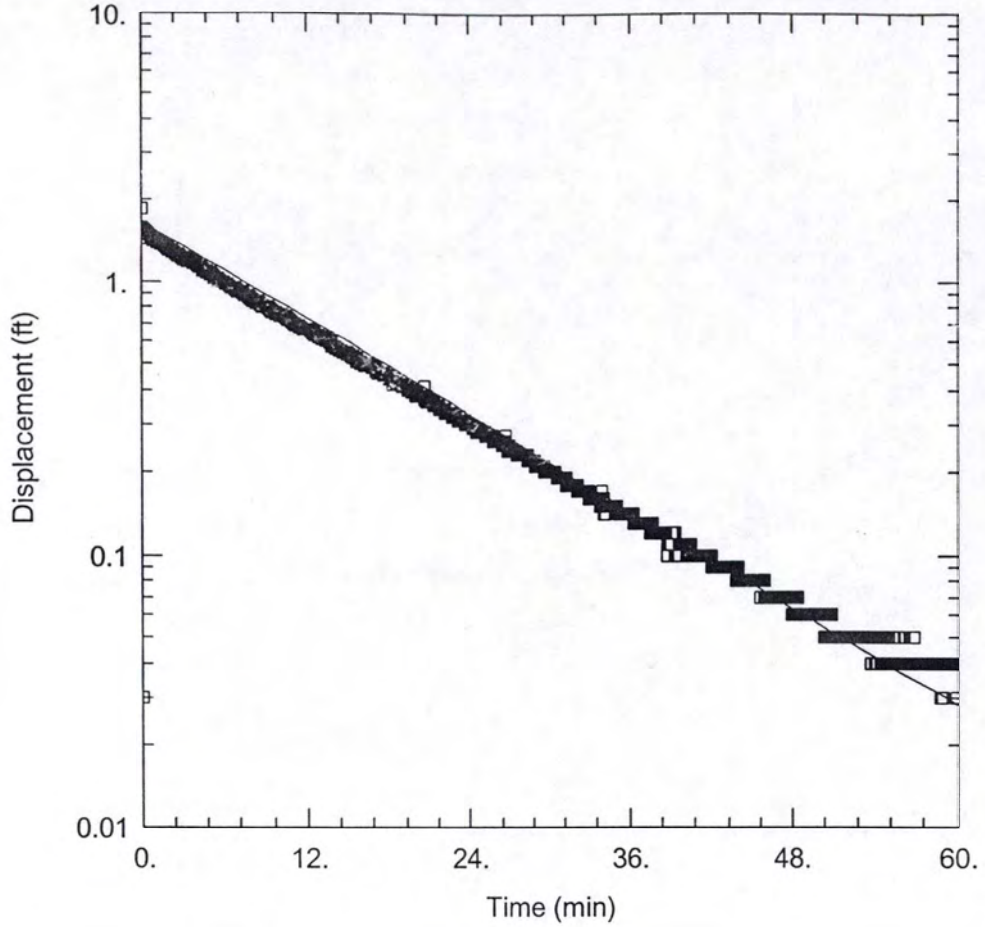
Saturated Thickness: 98.4 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-4(D))

Initial Displacement: 4.07 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 98.4 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.03579 ft/min
y0 = 1.818 ft



WELL TEST ANALYSIS

ata Set: K:\...\Piez-5 (Shallow IN).aqt
ate: 11/07/03 Time: 08:17:26

PROJECT INFORMATION

ompany: URS
lient: Sauget Area 2
roject: 21560888
est Location: Sauget, IL
est Date: 09/03/02

AQUIFER DATA

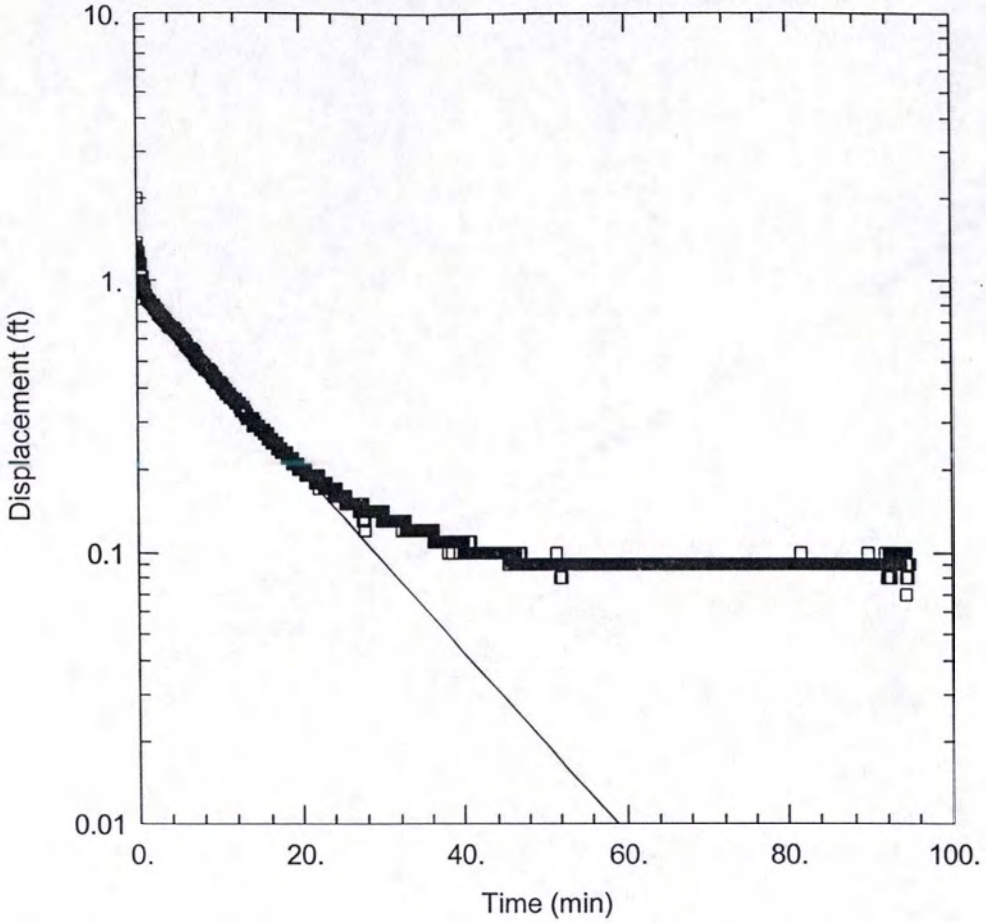
aturated Thickness: 93.67 ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(S))

nitial Displacement: 1.86 ft Water Column Height: 10.67 ft
asing Radius: 0.042 ft Wellbore Radius: 0.33 ft
creen Length: 10. ft Gravel Pack Porosity: 0.25

SOLUTION

quifer Model: Unconfined Solution Method: Bouwer-Rice
= 0.0002325 ft/min y0 = 1.664 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-5 (Shallow OUT).aqt
Date: 11/07/03 Time: 08:18:17

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/03/02

AQUIFER DATA

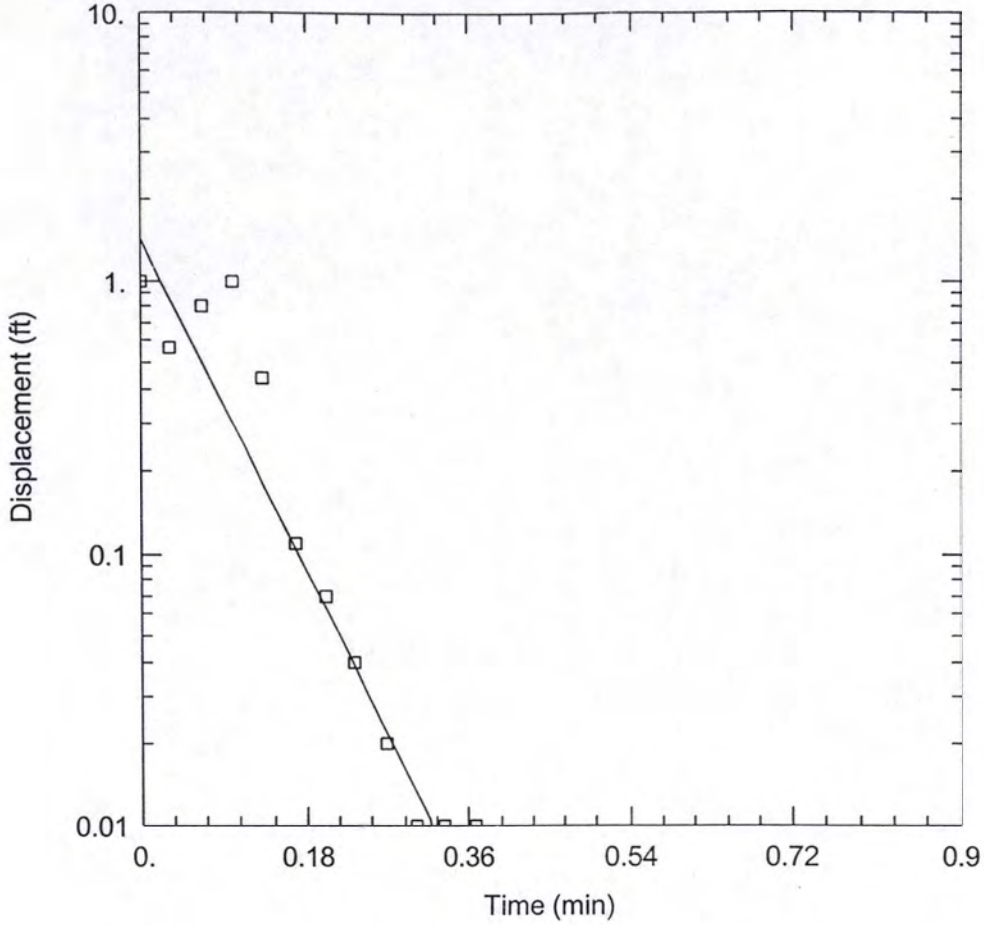
Saturated Thickness: 93.67 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(S))

Initial Displacement: 2.01 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 10.67 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0002617 ft/min
y0 = 0.9047 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-5 (Middle IN).aqt
Date: 11/07/03 Time: 08:18:29

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/03/02

AQUIFER DATA

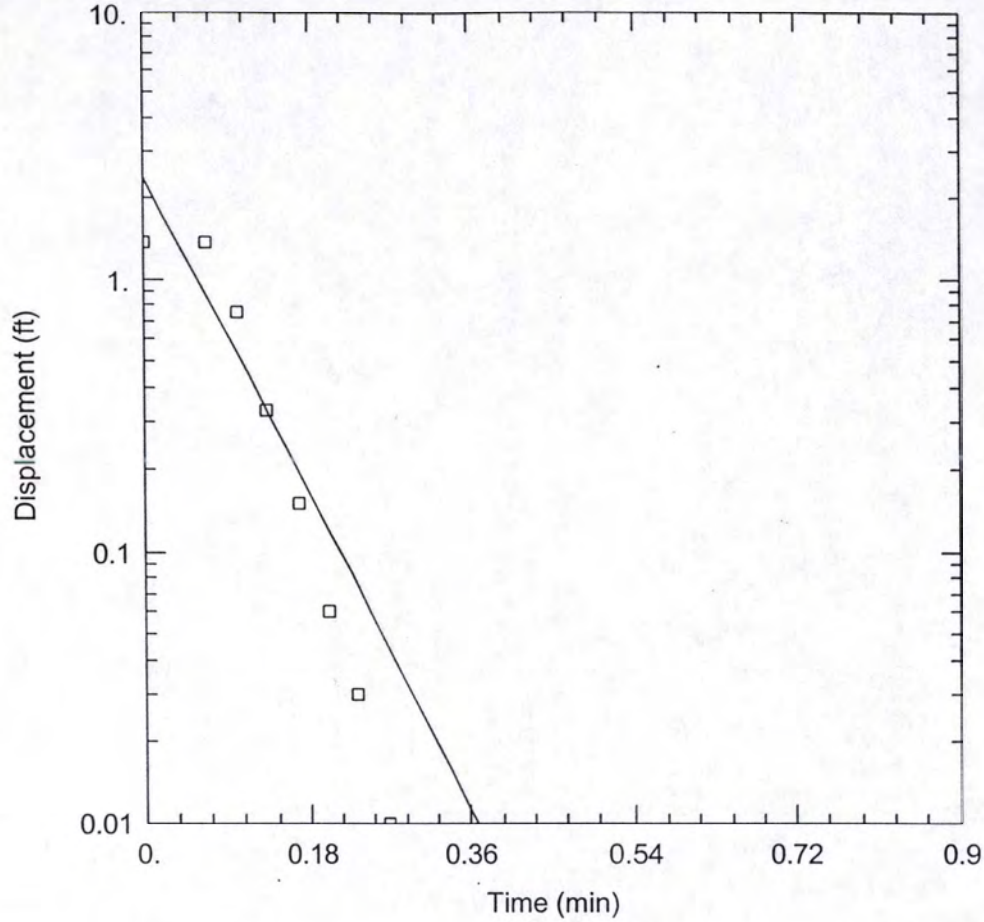
Saturated Thickness: 93.5 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(M))

Initial Displacement: 1. ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 54.5 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06867 ft/min
y0 = 1.422 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-5 (Middle OUT).aqt
Date: 11/07/03 Time: 08:18:22

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/03/02

AQUIFER DATA

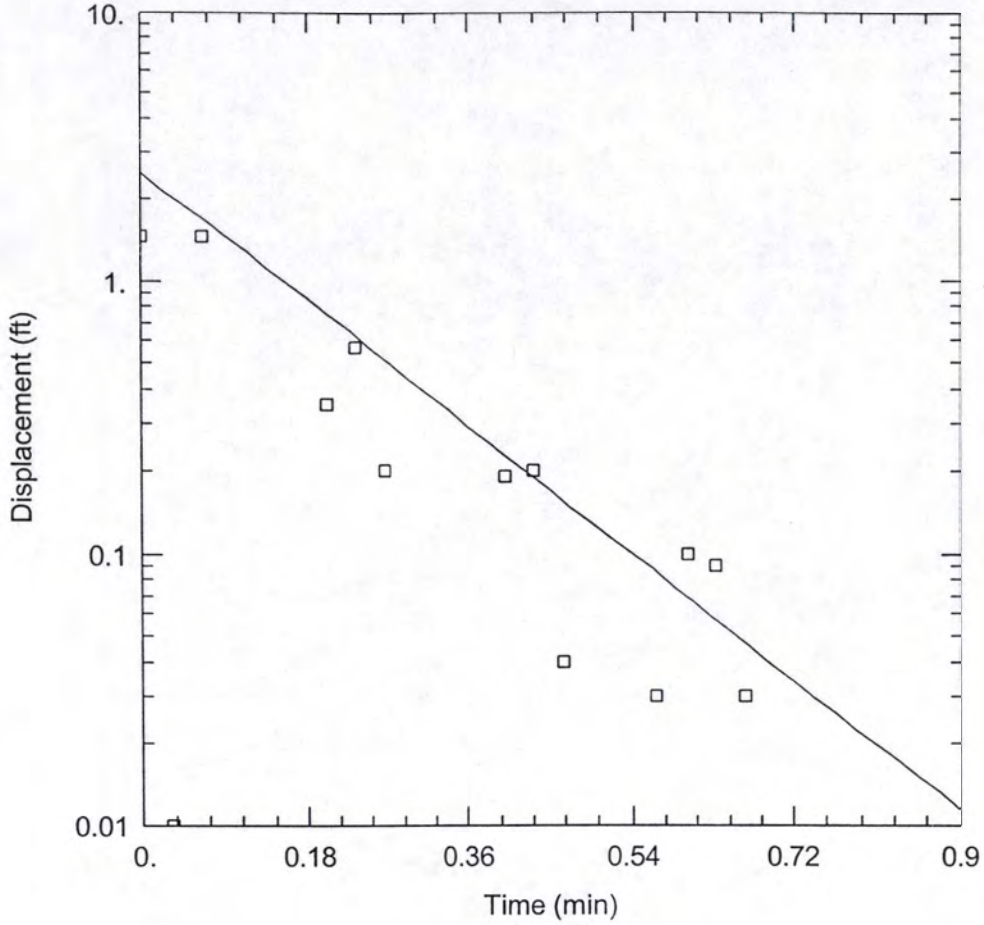
Saturated Thickness: 93.5 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(M))

Initial Displacement: 1.36 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 54.5 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06582 ft/min
y0 = 2.401 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-5(Deep IN).aqt
Date: 11/07/03 Time: 08:18:10

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/03/02

AQUIFER DATA

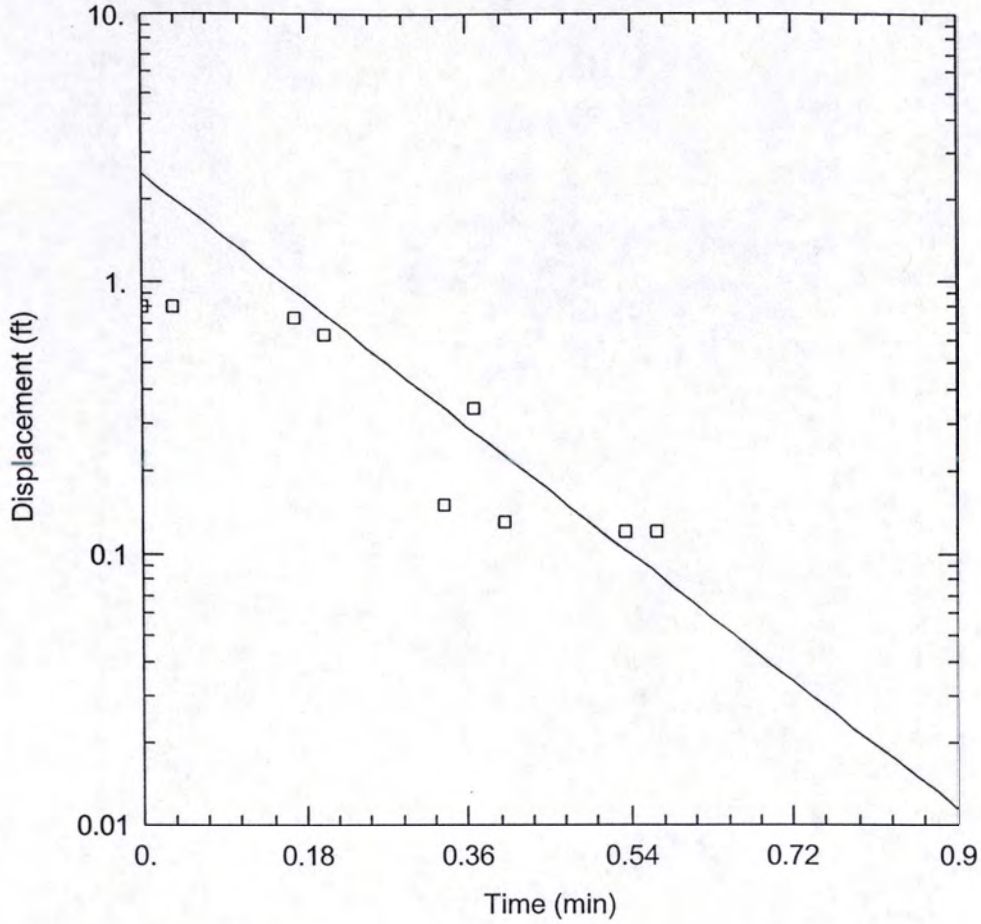
Saturated Thickness: 93.41 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(D))

Initial Displacement: 1.46 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 93.41 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02239 ft/min
y0 = 2.499 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-5(Deep OUT).aqt
Date: 11/07/03 Time: 08:18:05

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/03/02

AQUIFER DATA

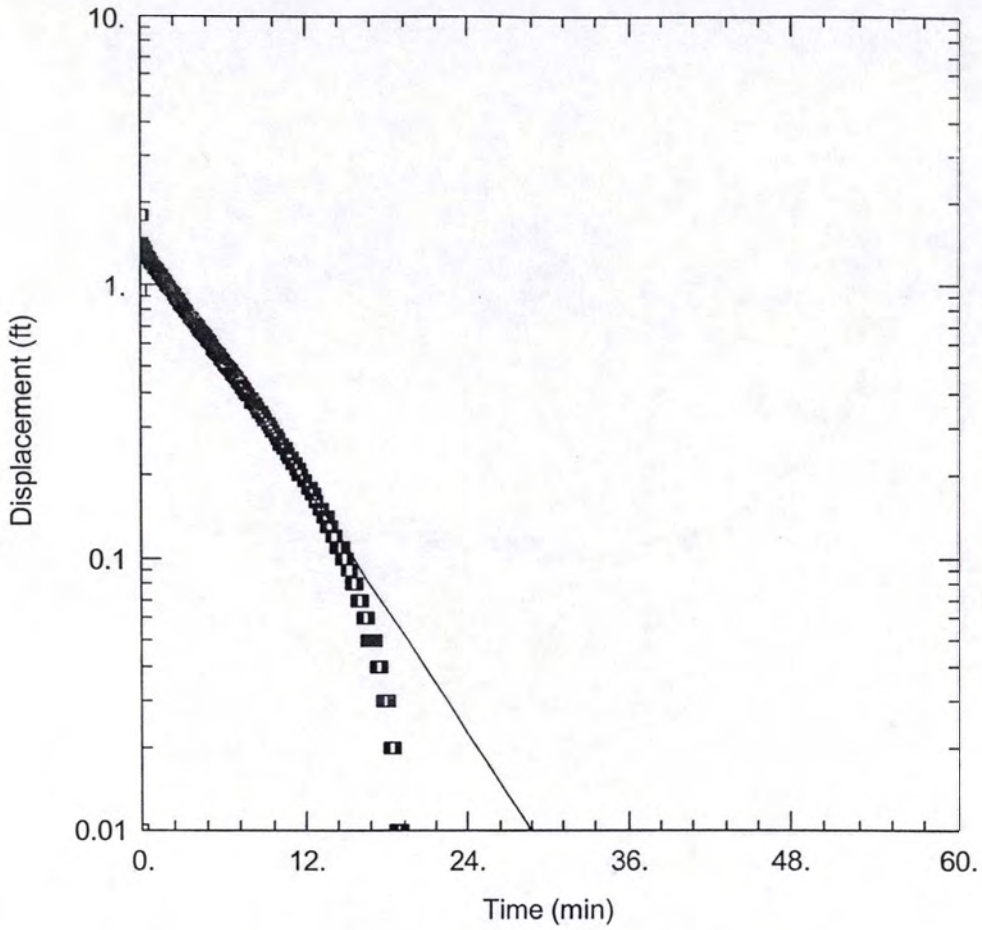
Saturated Thickness: 93.41 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-5(D))

Initial Displacement: 0.8 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 93.41 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02239 ft/min
y0 = 2.499 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-6 (Shallow IN).aqt
Date: 11/07/03 Time: 08:17:46

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

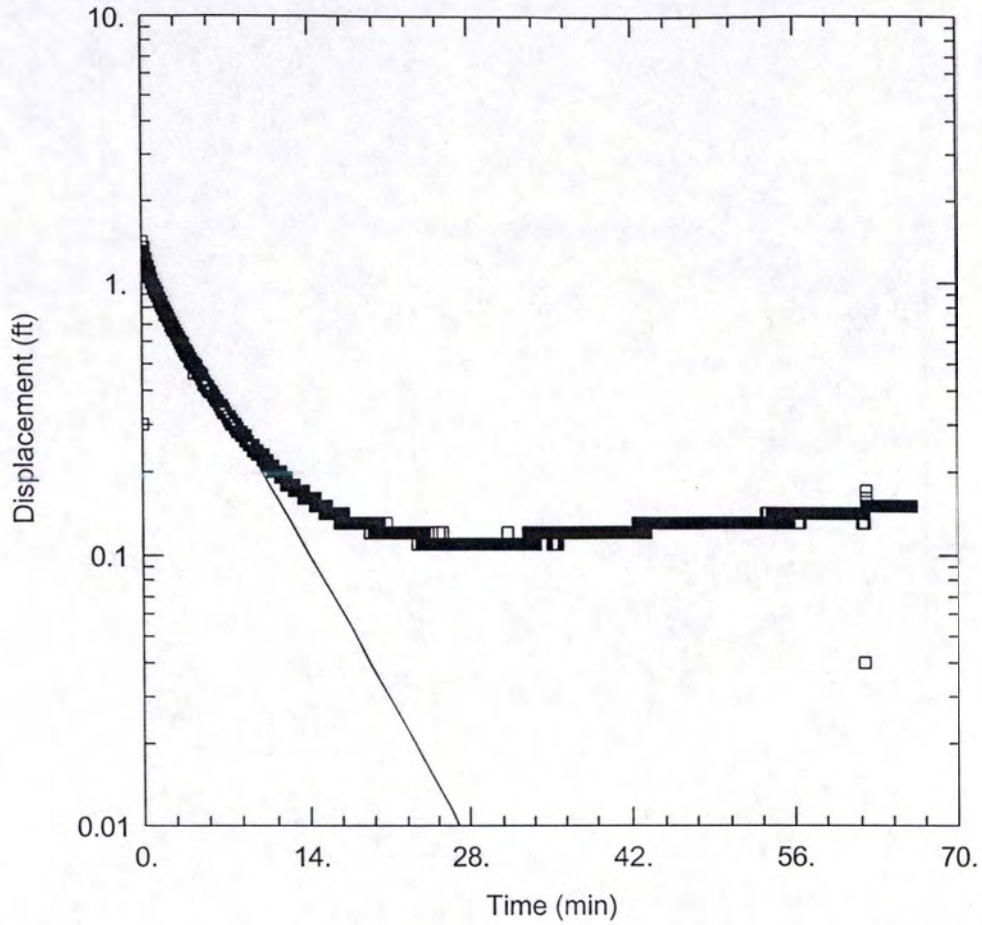
Saturated Thickness: 96.88 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(S))

Initial Displacement: 1.79 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 11.38 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0005994 ft/min
y0 = 1.463 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-6 (Shallow OUT).aqt
Date: 11/07/03 Time: 08:17:41

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

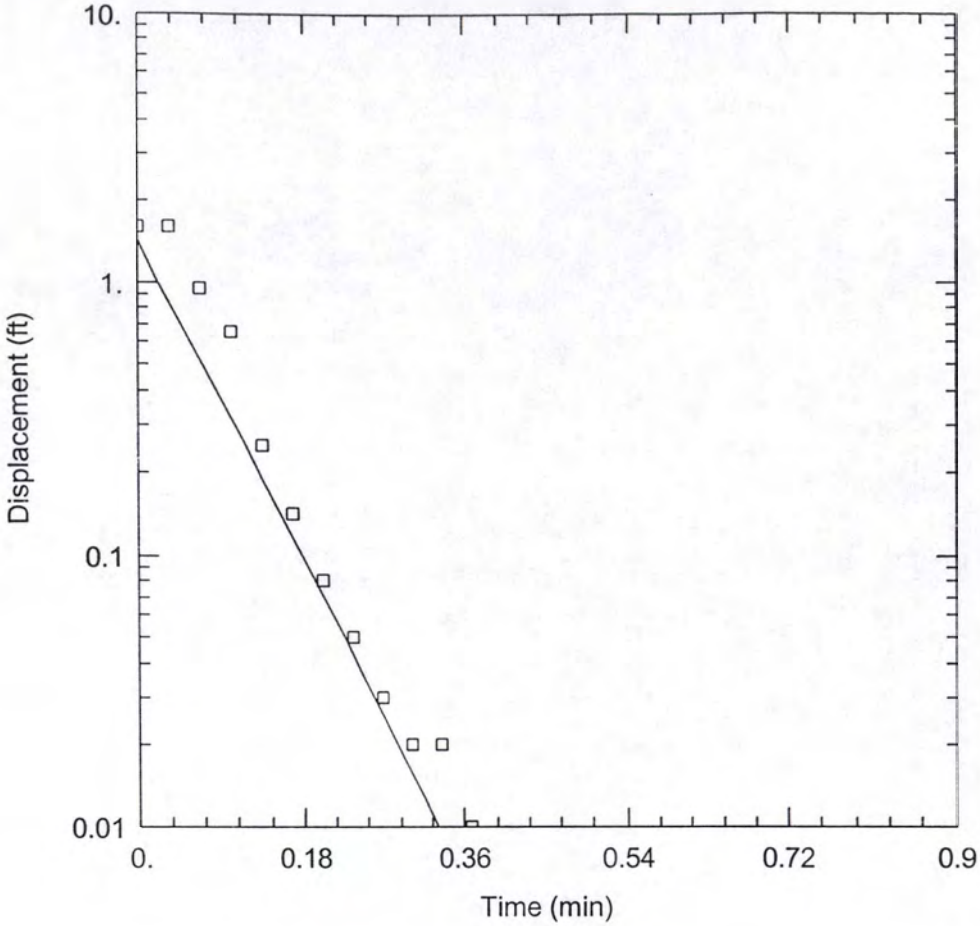
Saturated Thickness: 96.88 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(S))

Initial Displacement: 1.4 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 11.38 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0006101 ft/min
y0 = 1.182 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-6 (Middle IN).aqt
Date: 11/07/03 Time: 08:17:59

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

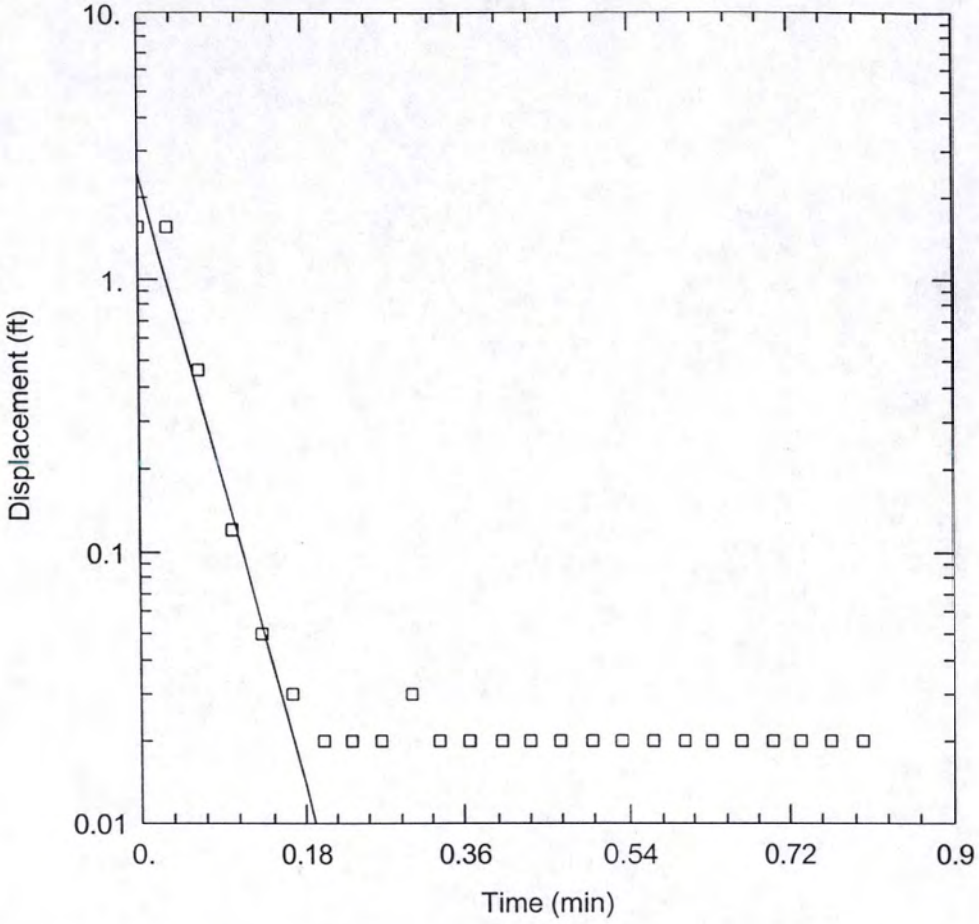
Saturated Thickness: 96.83 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(M))

Initial Displacement: 1.6 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 56.33 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06631 ft/min
y0 = 1.422 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-6 (Middle OUT).aqt
Date: 11/07/03 Time: 08:17:51

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

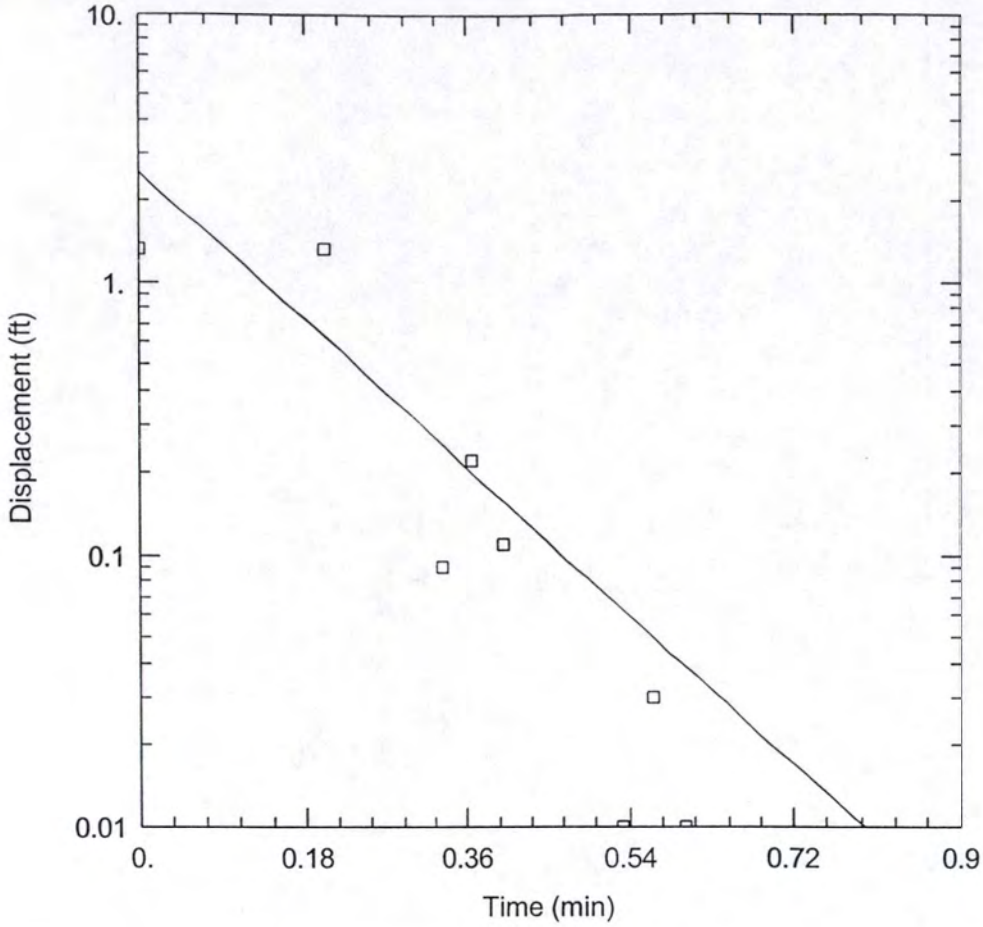
Saturated Thickness: 96.83 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(M))

Initial Displacement: 1.55 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 56.33 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1274 ft/min
y0 = 2.465 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-6(Deep IN).aqt
Date: 11/07/03 Time: 08:17:32

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

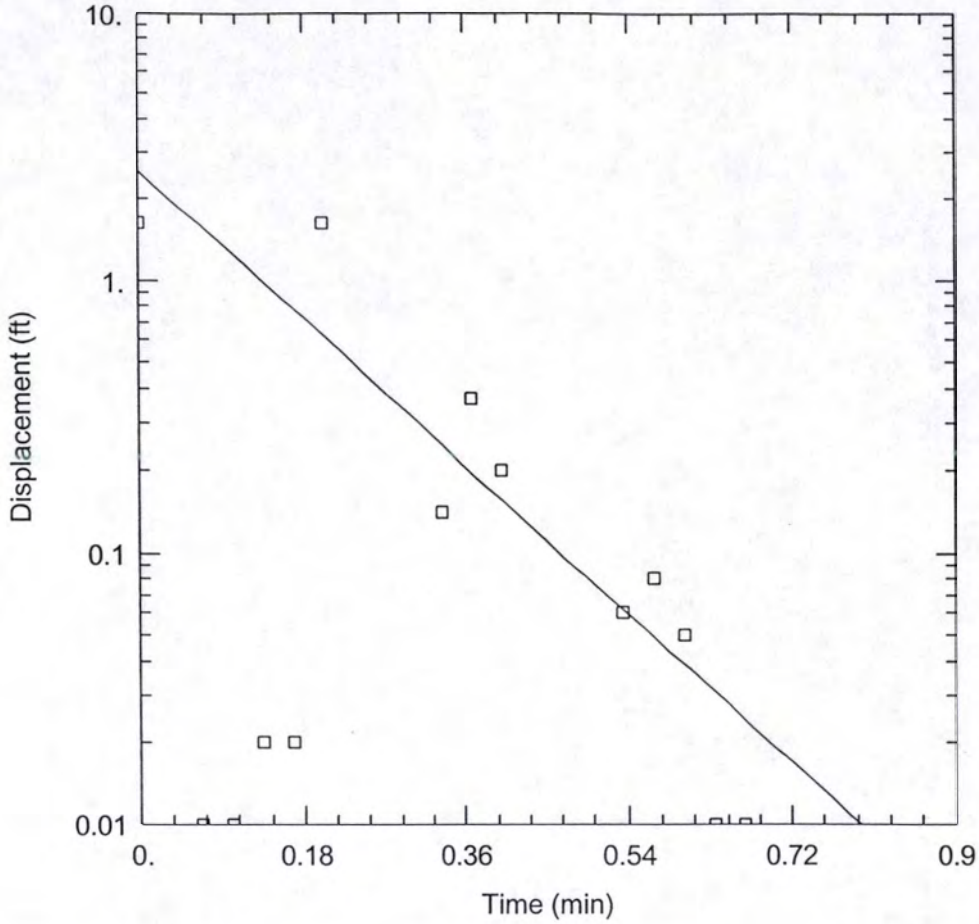
Saturated Thickness: 96.84 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(D))

Initial Displacement: 1.32 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 96.84 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0262 ft/min
y0 = 2.55 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-6(Deep OUT).aqt
Date: 11/07/03 Time: 08:17:18

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/05/02

AQUIFER DATA

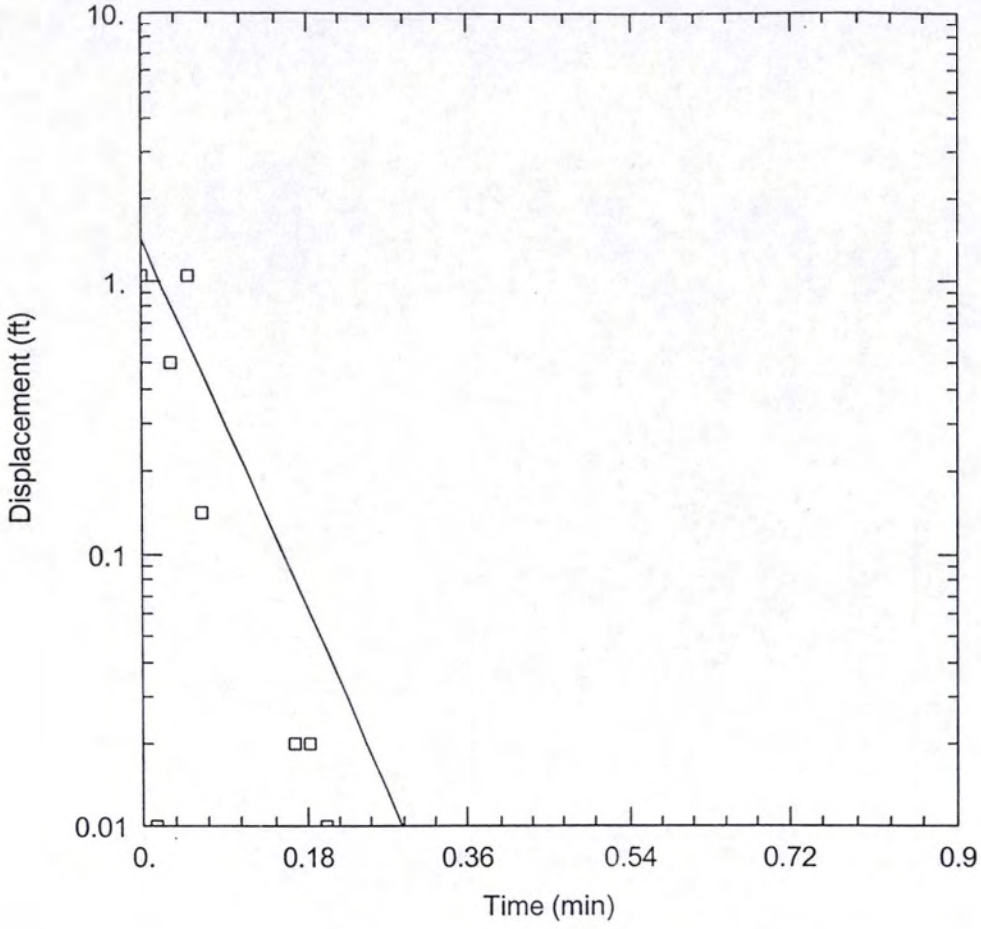
Saturated Thickness: 96.84 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-6(D))

Initial Displacement: 1.62 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 96.84 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0262 ft/min
y0 = 2.55 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-7 (Middle IN).aqt
Date: 11/07/03 Time: 08:17:13

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

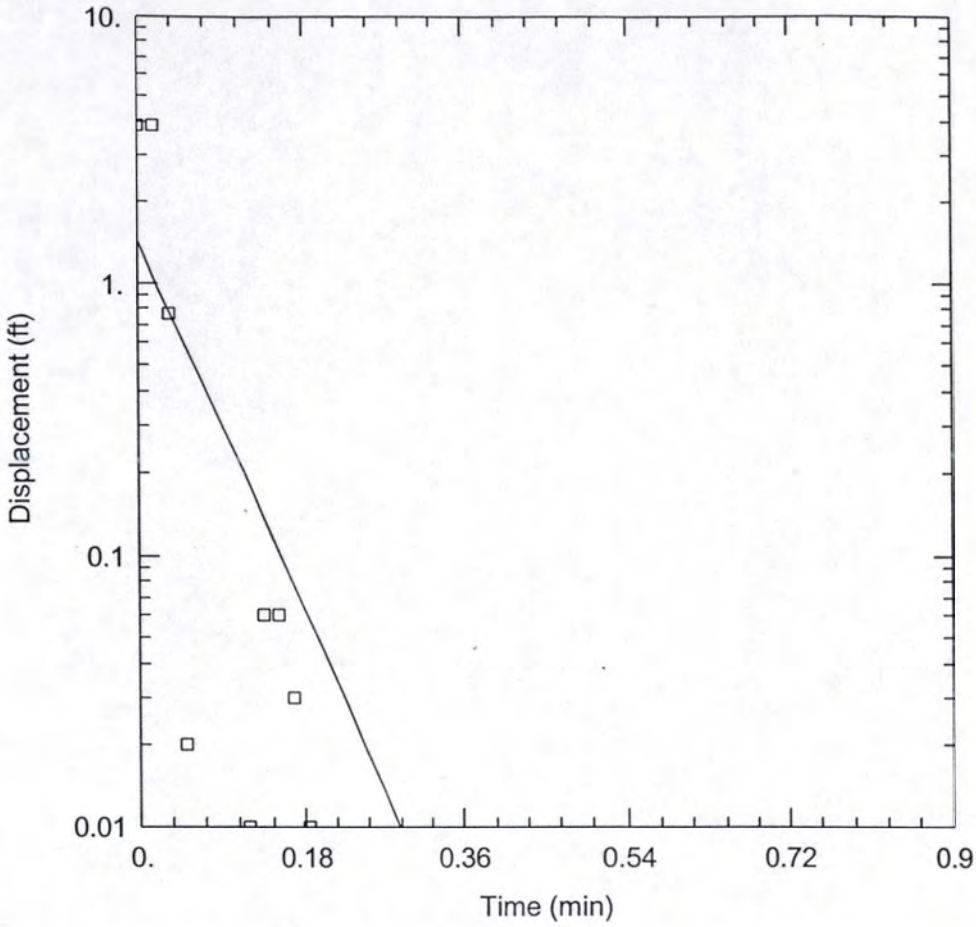
Saturated Thickness: 86.5 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-7(M))

Initial Displacement: 1.04 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 44. ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07423 ft/min
y0 = 1.422 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-7 (Middle OUT).aqt
Date: 11/07/03 Time: 08:17:07

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

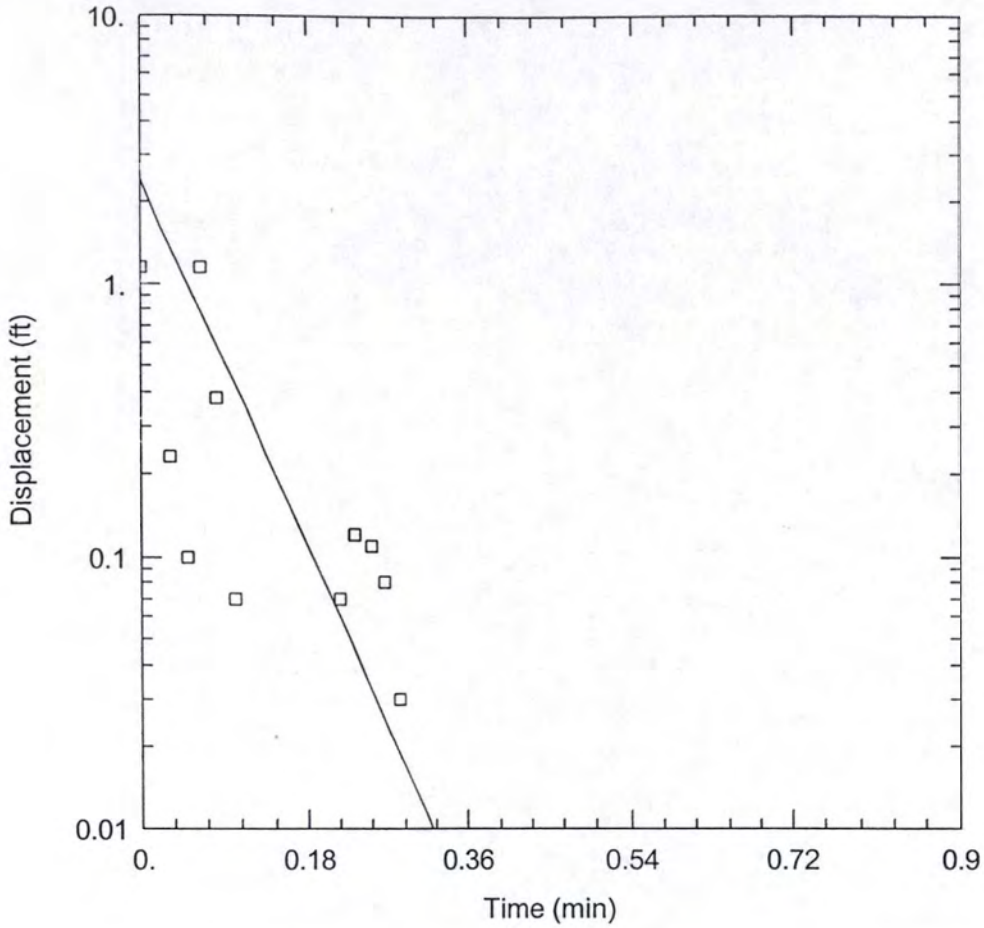
Saturated Thickness: 86.5 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-7(M))

Initial Displacement: 3.88 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 44. ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.07423 ft/min
y0 = 1.422 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-7(Deep IN).aqt
Date: 11/07/03 Time: 08:17:02

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

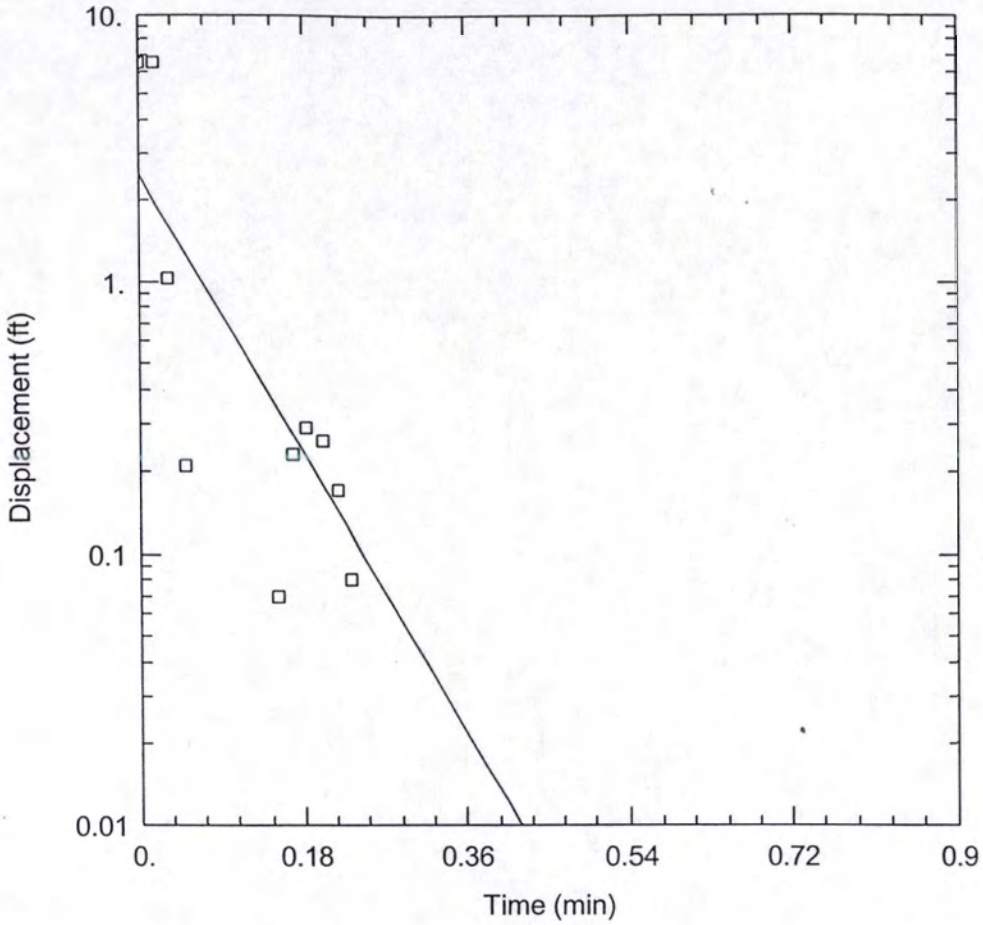
Saturated Thickness: 86.78 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-7(D))

Initial Displacement: 1.14 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 86.78 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.06377 ft/min
y0 = 2.41 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-7(Deep OUT).aqt
Date: 11/07/03 Time: 08:16:55

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

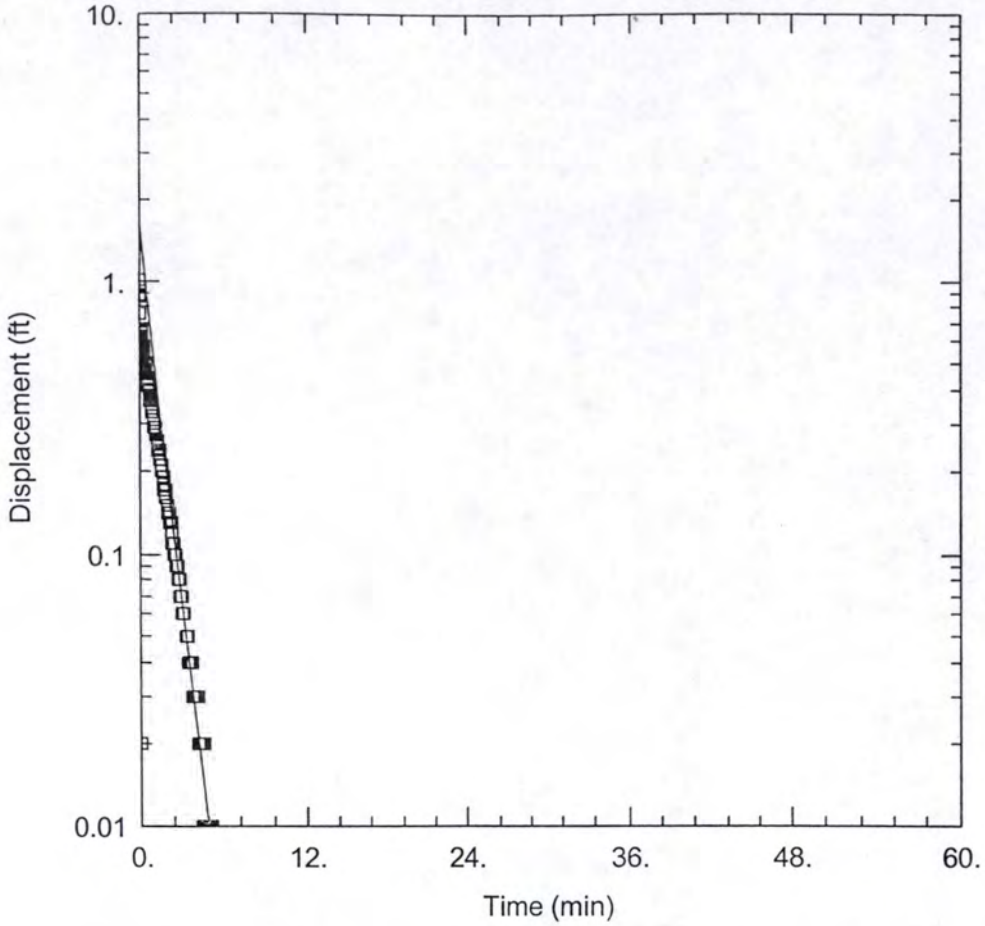
Saturated Thickness: 86.78 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-7(D))

Initial Displacement: 6.55 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 86.78 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.04878 ft/min
y0 = 2.49 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-8 (Shallow IN).aqt
Date: 11/07/03 Time: 08:16:37

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

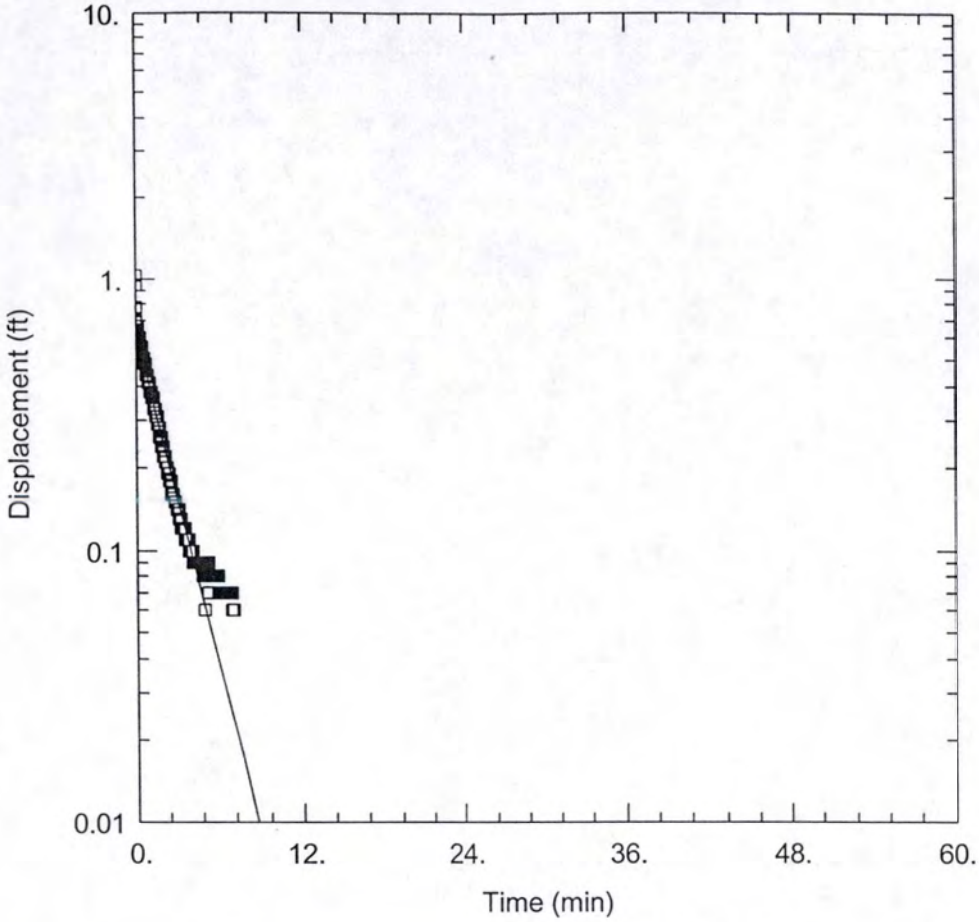
Saturated Thickness: 101.8 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(S))

Initial Displacement: 1.01 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 12.8 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003739 ft/min
y0 = 1.592 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-8 (Shallow OUT).aqt
Date: 11/07/03 Time: 08:16:31

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

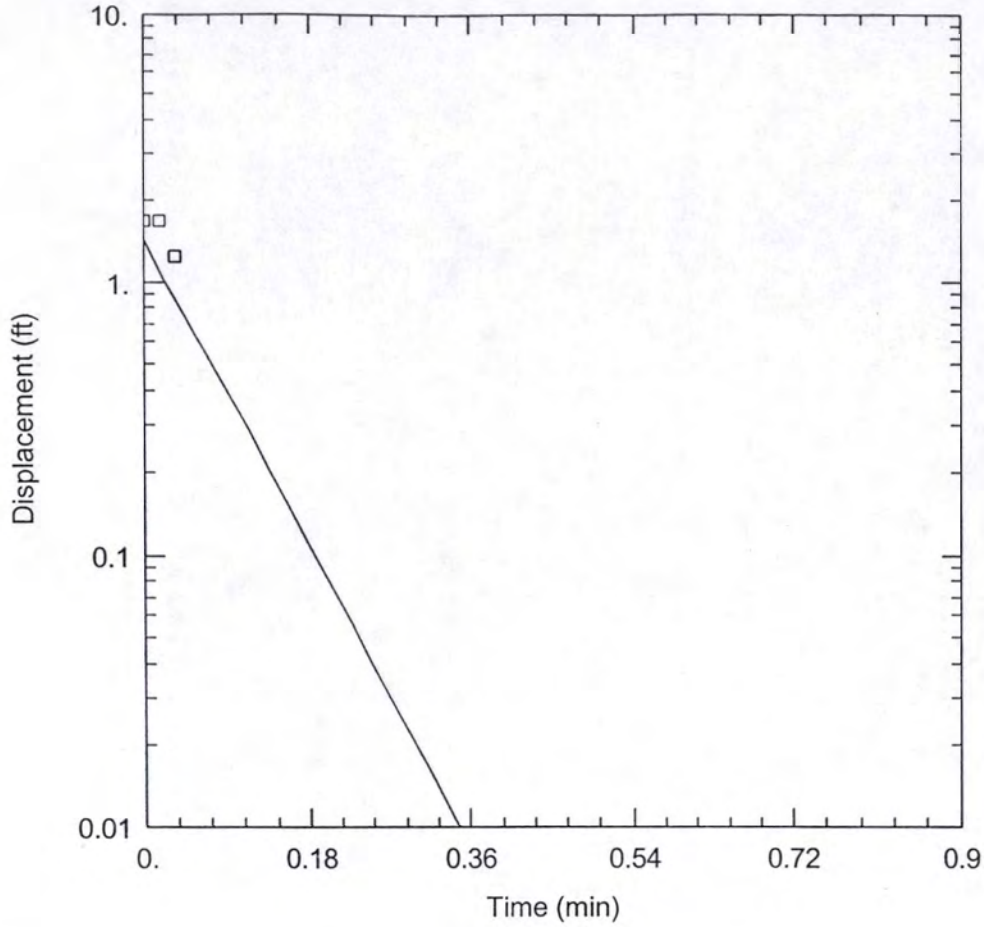
Saturated Thickness: 101.8 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(S))

Initial Displacement: 1.03 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 12.8 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.00169 ft/min
y0 = 0.6518 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-8 (Middle IN).aqt
Date: 11/07/03 Time: 08:16:49

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

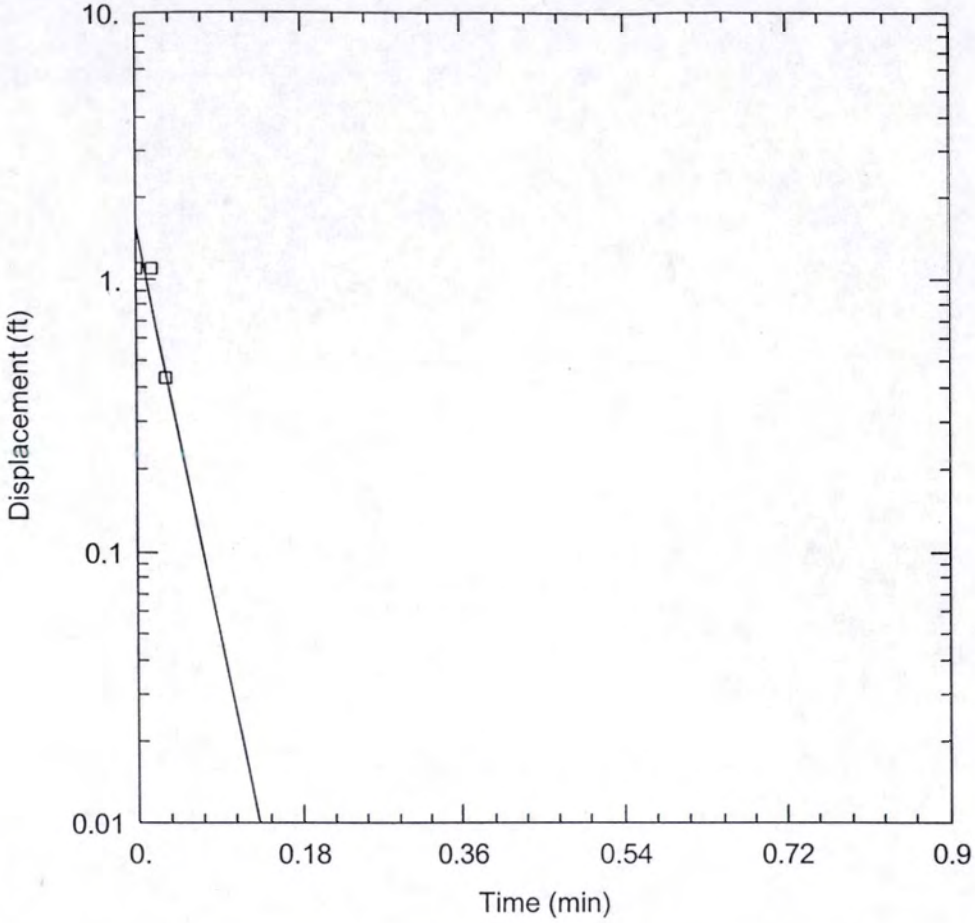
Saturated Thickness: 101. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(M))

Initial Displacement: 1.67 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 58.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0636 ft/min
y0 = 1.422 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-8 (Middle OUT).aqt
Date: 11/07/03 Time: 08:16:43

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

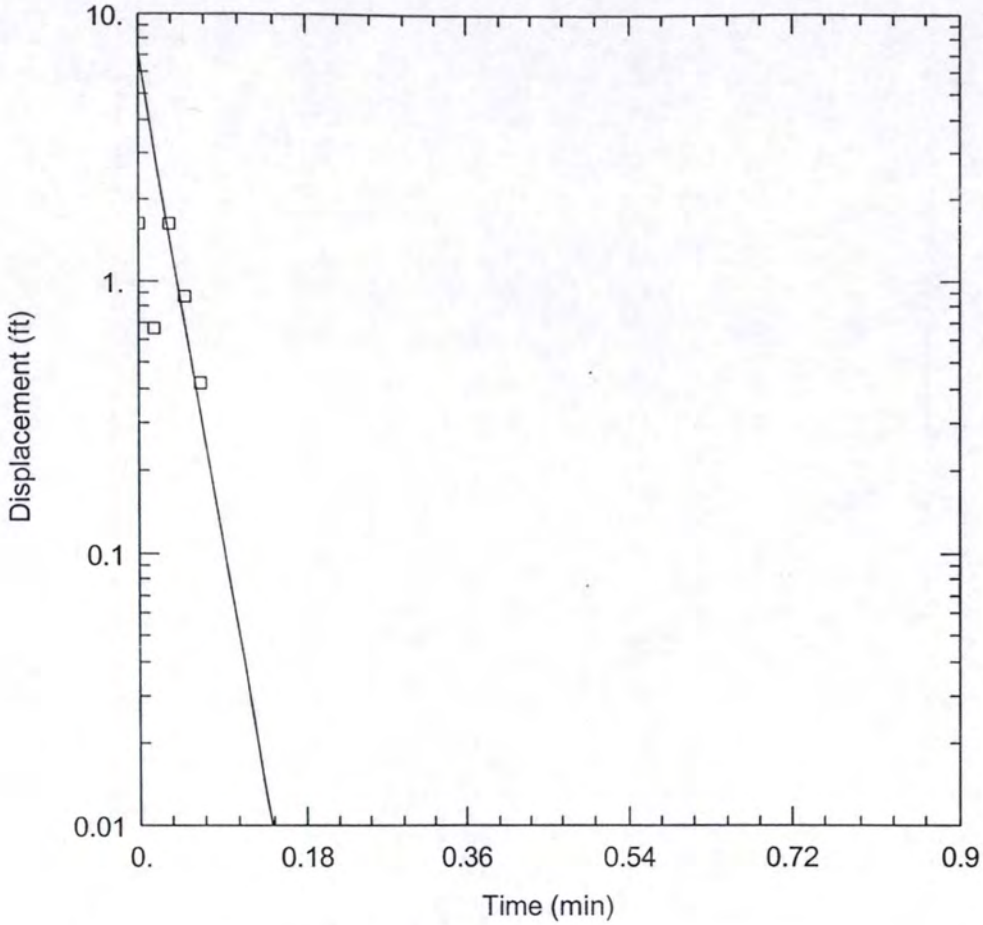
Saturated Thickness: 101. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(M))

Initial Displacement: 1.09 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 58.95 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1713 ft/min
y0 = 1.577 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-8(Deep IN).aqt
Date: 11/07/03 Time: 08:16:26

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

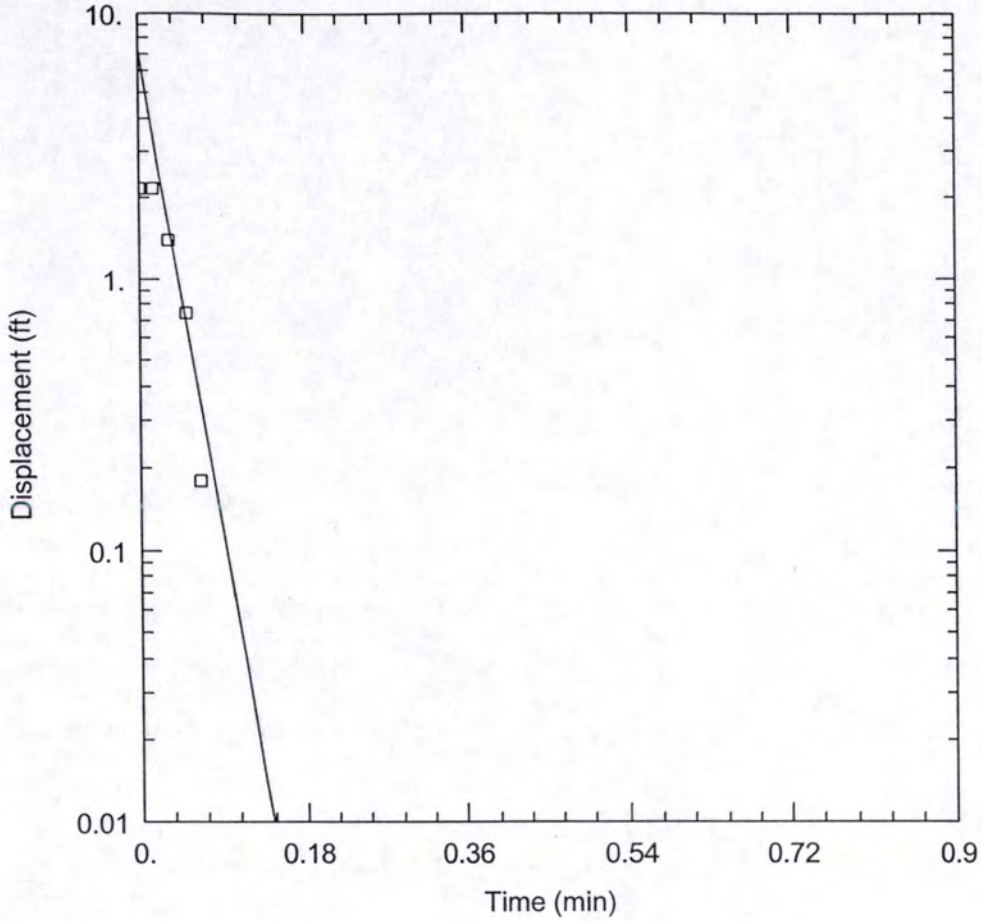
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(D))

Initial Displacement: 1.63 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 101.1 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1748 ft/min
y0 = 7.187 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-8(Deep OUT).aqt
Date: 11/07/03 Time: 08:16:20

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/06/02

AQUIFER DATA

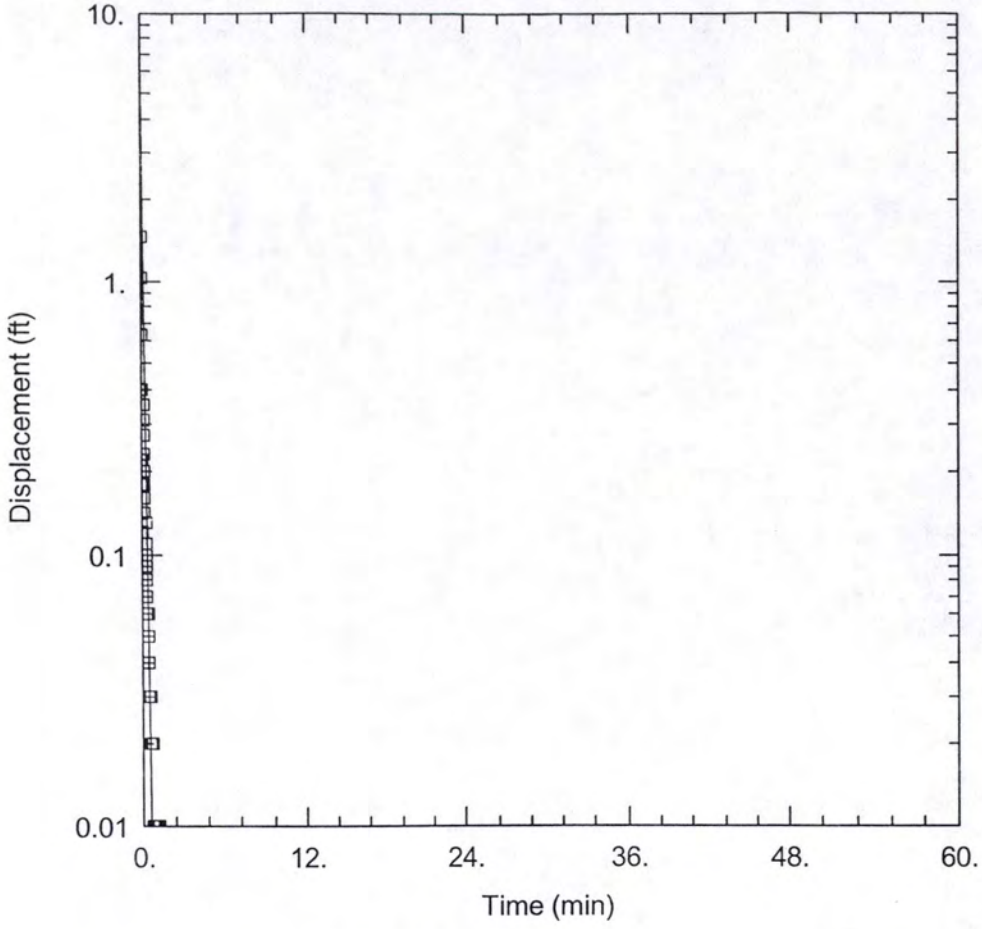
Saturated Thickness: 101.1 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-8(D))

Initial Displacement: 2.18 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 101.1 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.1748 ft/min
y0 = 7.187 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-9 (Shallow IN).aqt
Date: 11/07/03 Time: 08:16:11

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/09/02

AQUIFER DATA

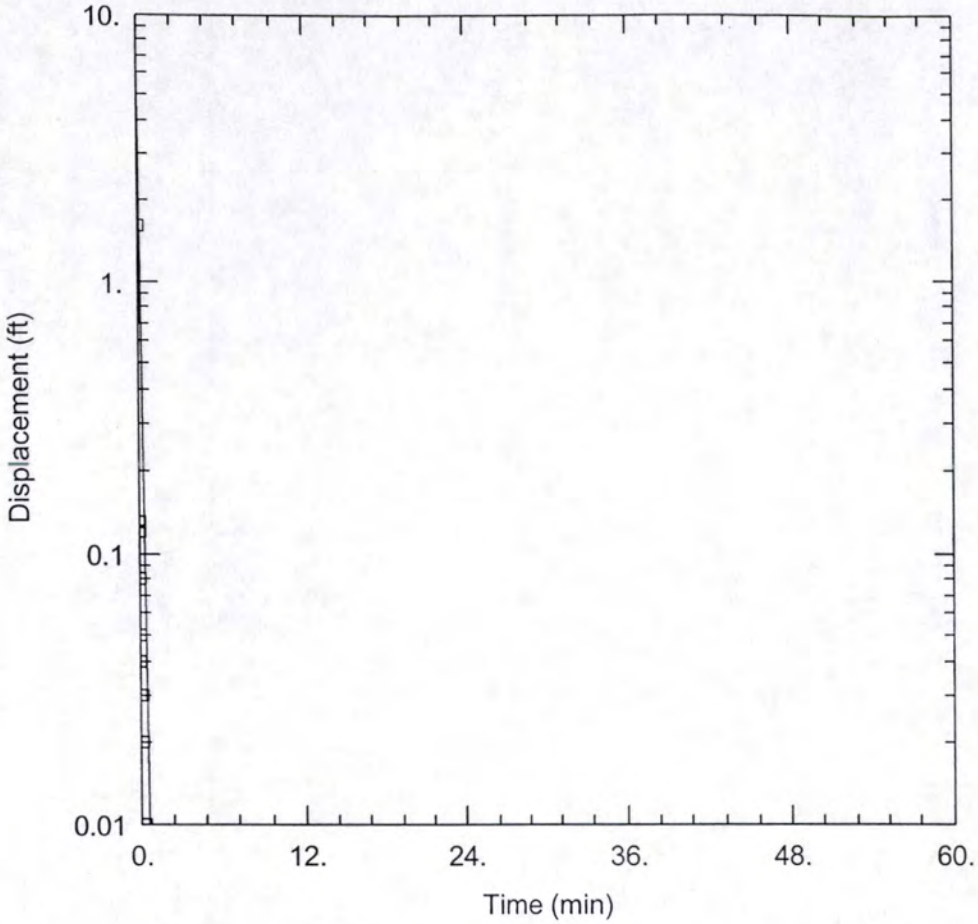
Saturated Thickness: 97.4 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-9(S))

Initial Displacement: 1.45 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 11.4 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0329 ft/min
y0 = 5.883 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-9 (Shallow OUT).aqt
Date: 11/07/03 Time: 08:16:05

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/09/02

AQUIFER DATA

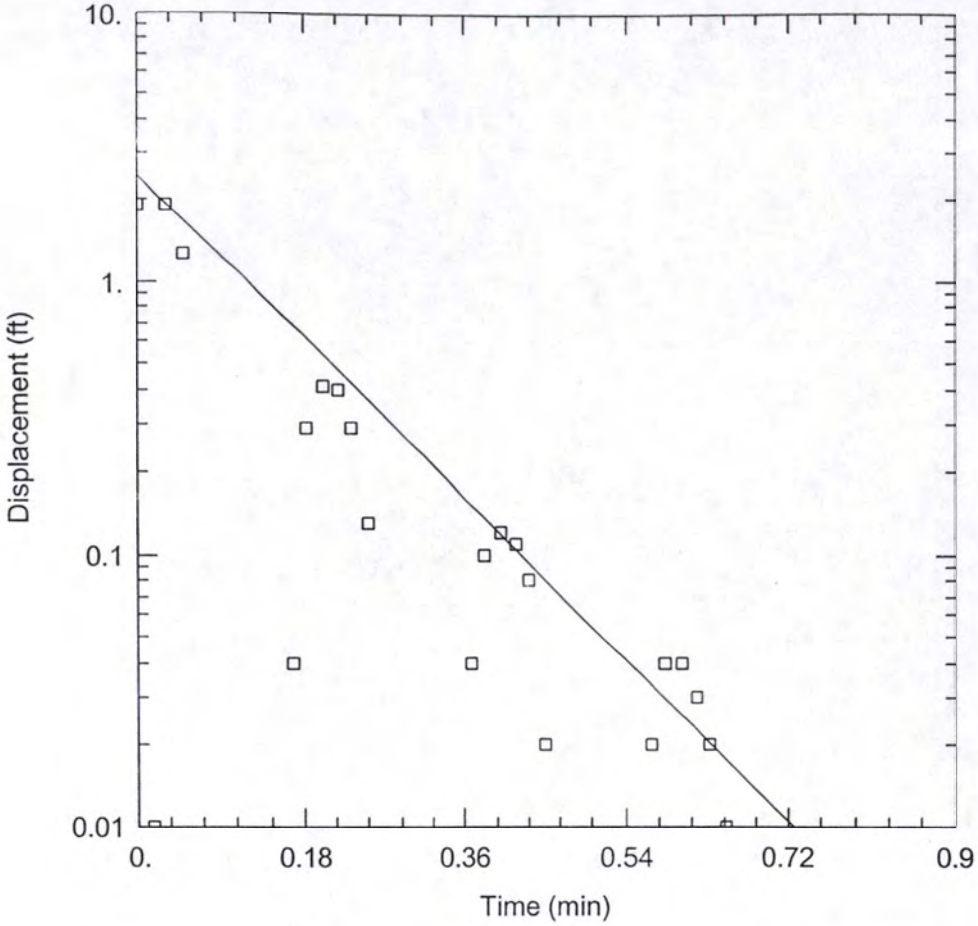
Saturated Thickness: 97.4 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-9(S))

Initial Displacement: 1.61 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 11.4 ft
Wellbore Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0329 ft/min
y0 = 5.883 ft



WELL TEST ANALYSIS

Data Set: K:\ENVIRON\23-20010024.00 (SA2)\Field Files\Slug Tests\Aqutesolv Files\Piez-9(Deep IN).aqt
Date: 11/07/03 Time: 08:15:58

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/09/02

AQUIFER DATA

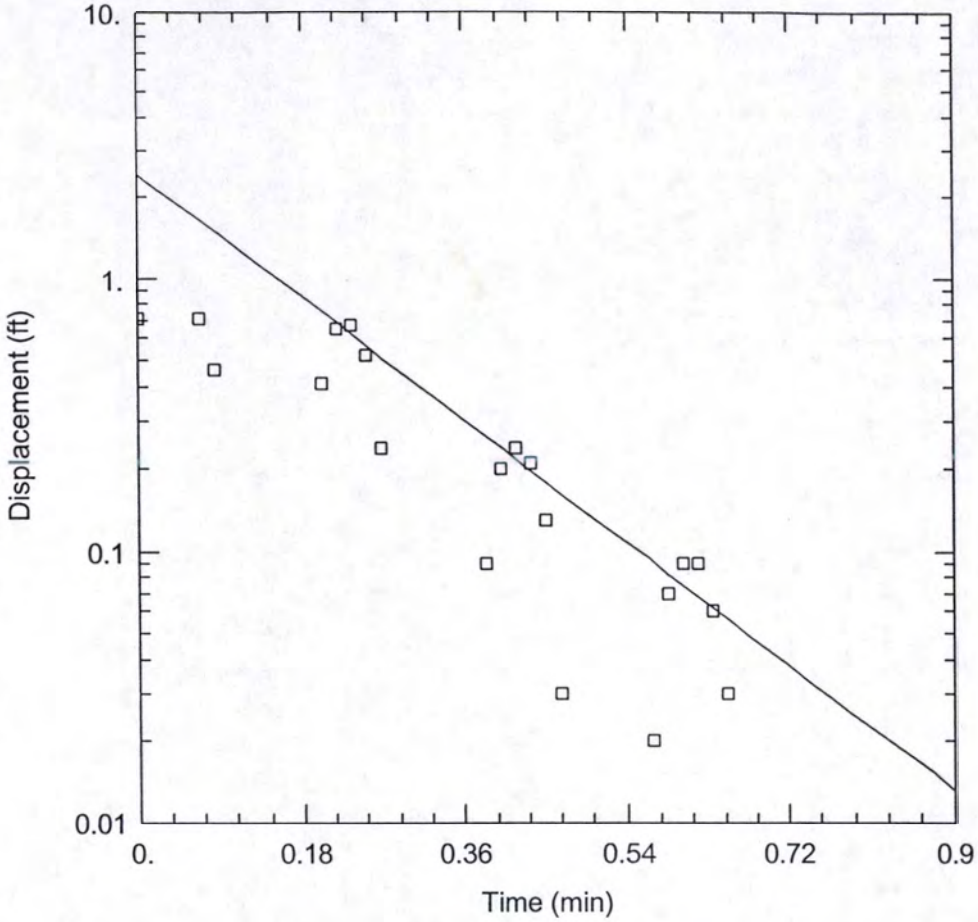
Saturated Thickness: 97.43 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-9(D))

Initial Displacement: 1.91 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 97.43 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.02859 ft/min
y0 = 2.472 ft



WELL TEST ANALYSIS

Data Set: K:\...\Piez-9(Deep OUT).aqt
Date: 11/07/03 Time: 08:15:52

PROJECT INFORMATION

Company: URS
Client: Sauget Area 2
Project: 21560888
Test Location: Sauget, IL
Test Date: 09/09/02

AQUIFER DATA

Saturated Thickness: 97.43 ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (PIEZ-9(D))

Initial Displacement: 0.71 ft
Casing Radius: 0.042 ft
Screen Length: 10. ft
Water Column Height: 97.43 ft
Wellbore Radius: 0.25 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0218 ft/min
y0 = 2.438 ft