FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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SECRETARY

VIA EMAIL

October 12, 2015

Daniel Hammond
Cardno
3905 Crescent Park Drive
Riverview, FL 33578
Email: daniel.hammond@cardno.com

Re: Final Audit Report for Stream Condition Index Laboratory Audit of Cardno; OGC Case No. 15-0617.

Dear Mr. Hammond:

Thank you for responding to the preliminary audit report for this Stream Condition Index (SCI) Laboratory Audit. The Florida Department of Environmental Protection (Department) has reviewed your response and determined that the proposed corrective actions are acceptable, and have been implemented. The indicated corrective actions will improve the quality assurance system for your freshwater invertebrate taxonomic identifications and SCI determinations.

Attached is the final audit report detailing the audit procedure and the Department's recommendation for usability of the data. The final audit report will also be posted on the Department's website at http://www.dep.state.fl.us/labs/cgi-bin/reports/search.asp. The details of the Department's review are provided in the audit findings tables. As noted in the report, the Department has determined that your invertebrate taxonomy analysis procedures meet the data quality objectives for SCI data, and may be used to support establishing Water Quality Based Effluent Limitations (WQBELs) under Chapter 62-650, Florida Administrative Code (F.A.C.), or Site Specific Alternative Criteria (SSAC) under Chapter 62-302, F.A.C., and for impaired waters determinations under Chapter 62-303, F.A.C.

Under Chapter 120 of the Florida Statutes, you and any other person whose substantial interests are affected by the Department's agency action, may challenge the attached final audit report, including the corrective actions and the data usability analysis. The process to challenge any portion of this agency action is described below in the Notice of Rights section.

If you have any questions or concerns about this final audit report, please feel free to contact Nia Wellendorf at (850)245-8190 or Joy Jackson at (850)245-8074.

Notice of Rights

This action is final and effective on the date mailed (via e-mail) unless a sufficient petition for an administrative hearing is timely filed under sections 120.569 and 120.57 of the Florida Statutes as provided below. If a sufficient petition for an administrative hearing is timely filed, this agency action becomes only proposed agency action, subject to the result of the administrative review process. Therefore, on the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because an administrative hearing may result in the reversal or substantial modification of this action, the petitioner is advised not to proceed until the deadlines noted below for filing a petition for an administrative hearing or request for an extension of time have expired. Mediation is not available.

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under sections 120.569 and 120.57 of the Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. The petitioner shall also mail a copy of the petition to Cardno at the address indicated above at the time of filing.

Under rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the applicable deadline. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon. If a request is filed late, the Department may still grant it upon a motion by the requesting party showing that the failure to file a request for an extension of time before the deadline was the result of excusable neglect.

If a timely and sufficient petition for an administrative hearing is filed, other persons whose substantial interests will be affected by the outcome of the administrative process have the right to petition to intervene in the proceeding. Intervention will be permitted only at the discretion of the presiding officer upon the filing of a motion in compliance with rule 28-106.205, F.A.C.

In accordance with rules 28-106.111(2) and 62-110.106(3)(a), F.A.C., petitions for an administrative hearing by the petitioner must be filed within 21 days of receipt of this written notice. Petitions filed by any persons who were not entitled to written notice under section 120.60(3) of the Florida Statutes must be filed within 21 days of publication of the notice, if published, or within 21 days of receipt of the written notice, whichever occurs first. Under section 120.60(3) of the Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within 21 days of receipt of such notice, regardless of the date of publication.

The failure of any person to file a petition for an administrative hearing within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under sections 120.569 and 120.57 of the Florida Statutes.

A petition that disputes the material facts on which the Department's action is based must contain the following information: (a) The name and address of each agency affected and each agency's file or identification number, if known; (b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination; (c) A statement of when and how the petitioner received notice of the agency decision; (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate; (e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action; (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by rule 28-106.301, F.A.C.. Under paragraphs 120.569(2)(c) and (d) of the Florida Statutes, a petition for administrative hearing must be dismissed by the agency if the petition does not substantially comply with the above requirements or is untimely filed.

This determination constitutes an order of the Department. Subject to the provisions of paragraph 120.68(7)(a) of the Florida Statutes, which may require a remand for an administrative hearing, the applicant has the right to seek judicial review of the order under section 120.68 of the Florida Statutes, by the filing of a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when the final order is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



David Whiting, Deputy Director
Division of Environmental Assessment and Restoration
2600 Blair Stone Road
Tallahassee, FL 32399
Tel No.: (850) 245-8191

Attachments:
Final Audit Report

Copies furnished to:

Stacey Cowley, DEP Office of General Counsel
File

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this agency action, including all copies, was e-mailed before the close of business on October 12th, 2015, to the above listed persons.

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to 120.52(7)
Florida Statutes, with the designated Department Clerk,
receipt of which is hereby acknowledged.

Eric R. Sivers 12 OCT 2015

Clerk Date

Final Audit Report

Cardno

SCI Laboratory Audit
OGC Case No. 15-0617

Aquatic Ecology and Quality Assurance Section
Water Quality Standards Program
Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection
October 2015

2600 Blair Stone Road, MS 6511
Tallahassee, Florida 32399-2400
www.dep.state.fl.us

STREAM CONDITION INDEX LAB AUDIT REPORT

Scope of Audit
Mosaic Fertilizer, LLC, has provided the Florida Department of Environmental Protection (Department or DEP) Stream Condition Index (SCI) data in support of Water Quality Based Effluent Limitation (WQBEL) development at its Fort Meade and South Pasture Mines and to inform waterbody assessments for the Peace and Alafia Rivers. The sampling and analysis for these SCI data were conducted by Cardno and a subcontracted macroinvertebrate taxonomist. Cardno submitted a list of SCI samples that were processed during a specified 12 month period. From this list, DEP selected three samples to review: Alafia near Bell Shoals (Z4-LR-3004), sampled on November 13, 2013; South Prong Alafia upstream of Lithia (ALAFTP601), also sampled on November 13, 2013; and Little Charlie Creek (PRMP-9), sampled on November 17, 2014. DEP conducted a records audit of the required documentation associated with the three samples to determine how closely the lab complies with the procedures in DEP SOP SCI 2000, including laboratory sample handling and sorting, taxonomic identification, and calculation and reporting of the SCI metrics and final score.

Samples Z4-LR-3004 and ALAFTP601 were collected at the Alafia River near Bell Shoals and the South Prong Alafia River upstream of Lithia, respectively, in Hillsborough County. Sample PRMP-9 was collected from Little Charlie Creek in Hardee County. All samples were collected and sorted by Cardno staff. Sorted samples were sent to John Epler, Ph.D., for taxonomic identification. Cardno performed metric and final SCI score calculations. Some of the audit findings are unique to the individual SCI samples, while other findings and comments pertain to the overall laboratory protocols for the handling and processing of SCI samples.

Summary of Findings/Acceptance of Corrective Actions
A preliminary audit report was sent to Cardno on August 14, 2015, outlining the initial findings. Cardno responded to the preliminary report on September 12, 2015. The findings, Cardno's responses, and the Department's comments are provided in Tables 1 and 2.

The Department found that Cardno's macroinvertebrate taxonomy lab procedures complied with DEP SOP SCI 2000 for sample sorting, taxonomic identification, and index calculation with a few minor deficiencies, as noted below. Cardno has provided acceptable responses to all of the listed findings, and the Department accepts the corrective actions to the deficiencies indicated in Table 2. Based on the results of this audit, the Department auditors have concluded that Cardno follows all appropriate Department SOPs for SCI sample analysis.

Data Usability Recommendation
Based on the results of this audit, the Aquatic Ecology and Quality Assurance Section has determined that the SCI data produced by Cardno meet the Department's data quality objectives, and recommends that the data be used to support WQBEL development and for waterbody assessments under the Impaired Waters Rule (Chapter 62-303, F.A.C.).

Records Evaluated
The following records (with file names) were submitted to DEP by Daniel Hammond of Cardno on June 2, 2015, and evaluated for this audit:

- Taxonomic keys most frequently used (1_Epler_List of identification references FDEP 2015*)*

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- Description of corrective actions (6_Cardno_SCILaboratorySortingQCProcedure and 6_Epler_QAQC letter 14-iv-15)
- QC records for sorting for the previous 12 months (3_Cardno_SortingEfficiencyTracker)
- List of SCI samples analyzed in the previous 12 months (Cardno_SCI_Audit_Samples_2015*)*
- Sample sorting bench sheets (7_Cardno_SortingBenchSheets)
- Taxonomic identification bench sheets (7_Epler_BenchSheets and 7-Epler_Z4-LR-3004_BenchSheets*)*
- Taxonomic attributes for metrics, Metric values and SCI score value (8&9_Cardno_Invert Data and SCI Calculations and 8&9_Cardno_Z4-LR-3004_Invert Data and SCI Calculations)
- List of verified taxa in reference collection (2_Epler_Chironomidae inventory 18, 2_Epler_Coleoptera inventory WORKING, and 2_Epler_Heteroptera Inventory WORKING)
- QA records for taxonomic QC for the previous 12 months (4_Epler_QAQCRecords)
- Collapsed taxa list and metric calculations (8&9_Cardno_Invert Data and SCI Calculations and 8&9_Cardno_Z4-LR-3004_Invert Data and SCI Calculations*)*
- SCIAudit_CardnoResponse_09112015

Lab Quality System: Cardno originally submitted an extensive list of Heteroptera, Coleoptera, and Chironomidae, maintained by Dr. Epler in his reference collection. The auditor noted in the preliminary report that these groups represent only a small portion of the organisms found in the samples reviewed for this audit. In response to this finding, Dr. Epler provided an additional list of taxa to supplement those submitted with the other documents for this audit (Attachment A in SCIAudit_CardnoReponse_09112015). It should be noted that Dr. Epler's bench sheet for the S Prong Alafia sample said downstream of Lithia and in parentheses "upst. Lithia." There should be a unique, unambiguous linkage among all elements of the sample (e.g. vials, slides) and all of the associated documentation (e.g.QA/QC records, Chain of Custody records, bench sheets, etc.). Cardno acknowledged this ambiguity and will use a standardized bench sheet for future samples.

Sample Sorting and Identification Process: Overall, Cardno properly followed DEP SOPs for sample sorting and sub-sampling. DEP noted that there was a 20 point difference in the SCI scores between the replicates of the sample collected in Little Charlie Creek (PRMP-9 – 11/17/14) and that this difference is beyond what is typically encountered. Cardno acknowledged this finding and took extra steps prior to submittal to make sure no errors were made. They noted that the vial with the higher scores had a few additional individual species that happened to be ones that added points to the overall score, and concluded that the difference in scores was mostly due to the chance occurrence of rare taxa and their contribution to the overall score, rather than sample processing issues.

Dr. Epler used abbreviations for many of the organisms on the bench sheets, and in several instances, the abbreviations could not be easily discerned. In their response, Cardno stated that Dr. Epler also provides electronic spreadsheets with the taxa data for each sample, which Cardno checks against the original bench sheet for transcription errors. In addition, Dr. Epler has agreed to limit the use of abbreviations in the future and provided a list of common abbreviations for reference (Attachment E in SCIAudit_CardnoReponse_09112015).

Sample Sorting QC: Most of Cardno's sample sorting protocols and documentation were thorough and clearly documented. However, it was unclear in the initial information submittal whether precautionary or corrective action was taken when an analyst's (J. Jendrucko) cumulative sorting efficiency was below the

required 95%. In response to the preliminary report, Cardno clarified that the samples were during Mr. Jendrucko's training and were subject to 100% QC checks and would make this clear in future documentation. The percent sorting efficiency was calculated correctly, and all other instances indicated that the analysts achieved the required 95% cumulative sorting efficiency.

Taxonomic Identification QC: Dr. Epler conducted quality control (QC) for his own samples at the prescribed rate and with the required accuracy. However, DEP SOPs require the use of a second analyst for performing QC checks. In addition to performing self-checks, Dr. Epler must have a minimum of 5% of his samples re-analyzed by a second analyst to ensure accurate identifications, especially for those organisms not contained in his reference collection. As a result of this finding, Cardno sent the three samples reviewed as part of this audit to a second taxonomist for QC checks and has made arrangements to have 5% (or one sample per year) of Dr. Epler's samples checked by a second taxonomist in the future.

SCI Index Calculation: Cardno correctly classified taxa according to their attributes, assigned the SCI Bioregion, and calculated the SCI metrics and final score correctly.

Table 1. Lab records audit criteria and preliminary findings for stream condition index sample processing and data analysis for selected Cardno data submitted to DEP. Taxonomic identifications were performed by John Epler, Ph. D.

Lab Records Audit Checklist for SCI sampling processing and data analysis			
Lab	Cardno		
Samples	Alafia near Bell Shoals (Z4-LR-3004 – 11/13/13), SPAR upstream of Lithia (ALAFTP601 – 11/13/13), and Little Charlie Creek (PRMP-9 – 11/17/14)		
PERFORMANCE MEASURE		**Assessment**	**PERFORMANCE ASSESSMENT** **Remarks**
1. Lab quality system (SCI 2200 General Requirements)		***Refer to list of taxonomic keys and list of reference collection specimens to address the following requirements.***	
1.1	Lab maintains copies of appropriate taxonomic identification keys.	YES	Reviewed *1_Epler_List of identification references FDEP 2015.*
1.2	Lab maintains taxonomic specimen collection.	YES	Reviewed *2_Epler_Heteroptera Inventory WORKING, 2, Epler_Coleoptera inventory WORKIN, 2_Epler_Chironomidae inventory 18, and SCIAudit_CardnoResponse_09112015.*
1.3	Taxa found in samples are represented in the reference collection.	YES	Reviewed *2_Epler_Heteroptera Inventory WORKING, 2_Epler_Coleoptera inventory WORKIN, and 2_Epler_Chironomidae inventory 18, and SCIAudit_CardnoResponse_09112015*. The initial submittal represented only a small fraction of all the organisms found in these samples. Taking the Alafia near Bell Shoals sample (Z2-LR-3004) as an example, these three orders represent 21% of the Orders, 15% of the Families, 43% of the Genera, and 58% of the total individuals identified in the sample. In response to the preliminary report, Dr. Epler submitted a more complete list of verified specimens that satisfies this requirement.
1.4	Lab retains extramural experts to verify identifications.	YES	A number of expert taxonomists were listed as verifiers but none appeared to be recent. DEP accepts the response that with over 45 years of experience identifying aquatic organisms, Dr. Epler rarely encounters specimens that he has never seen before, and that when he encounters a new specimen, Dr. Epler does consult other experts for confirmation and notes it on his bench sheet.

1.5	Specimens in collection are verified by extramural expert.	YES	Reviewed 2_Epler_Heteroptera Inventory WORKING, 2_Epler_Coleoptera inventory WORKIN, and 2_Epler_Chironomidae inventory 18. A number of expert taxonomists are listed as verifiers.
1.6	Lab contains basic equipment necessary for sorting and taxonomic analysis (compound and dissecting microscopes, divided trays, #30 sieve) [applicable to lab visit audit only]	N/A	The auditor did not visit the lab.
2. Sample sorting and identification process (SCI 2100)		***Refer to raw bench sheets to address the following requirements.***	
2.1	Sample homogenized and subdivided at prescribed levels; records indicate fractions of samples sorted and reflects that 2 or 3 trays were used (may only have 2 if insufficient material to warrant 3 trays)	YES	Reviewed *7-Cardno_Z4-LR-3004_SortingBenchSheets and 7_Cardno_SortingBenchSheets.*The bench sheets indicate that the samples were subdivided properly. However, DEP noted that there was a 20 point difference in the two replicates for the Little Charlie Creek sample (PRMP-9). Compared to all the SCI samples processed by DEP this year (n = 83), this represents the 99 percentile of differences between replicates. Cardno acknowledged this difference and took measures to ensure no errors were made during the homogenization process.
2.2	Two aliquots of 150 (±10) organisms picked from sample material.	YES	Reviewed 7-Cardno_Z4-LR-3004_SortingBenchSheets and 7_Cardno_SortingBenchSheets.
2.3	The X qualifier is used if insufficient organisms are in the sample to obtain 2 replicates of 150. (only applicable if <300 organisms were in the sample)	N/A	Reviewed 7-Cardno_Z4-LR-3004_SortingBenchSheets and 7_Cardno_SortingBenchSheets. All samples had adequate numbers of organisms.
2.4	Analysts prepare slides and use a compound microscope for identification of appropriate groups when needed (typically worms, midges, mites)	YES	Reviewed *7-Epler_Z4-LR-3004_BenchSheets and 7_Epler_BenchSheets.* Auditor did not visit the laboratory and was initially unable to determine what equipment was used, but noted that organisms appeared to be taken to the lowest practical taxonomic level, suggesting that the appropriate equipment was used and that the required documentation linking slides and vials was not apparent.
2.5	Individual taxon names and counts are recorded on bench sheet.	YES	Reviewed *7-Epler_Z4-LR-3004_BenchSheets and 7_Epler_BenchSheets. Abbreviations were used for many of the organisms and photocopies were difficult to read. Some abbreviations were not obvious to the auditor.* In addition to the hand-written bench sheets submitted to Cardno from Dr. Epler, they also receive an electronic spreadsheet that is checked against the original bench sheet. In addition, a list of common abbreviations were submitted. Cardno wil use standardized bench sheets in the future to reduce and confusion with taxon names and counts.

2.6	Slides clearly identified and linked to the sample vials and sample data sheets by unique sample ID and specimen ID	YES	Reviewed 7-Epler_Z4-LR-3004_BenchSheets and 7_Epler_BenchSheets. It was not initially clear if any specimens had been mounted. In Cardno's response, they agreed that the information was not clearly presented and was difficult to interpret and showed where it could be found. Cardno will rectify this confusion with the use of standardized bench sheets in the future.
2.7	Taxonomic bench sheet indicates when specimens are removed from sample vial for any reason (e.g., placed in reference collection or sent to extramural expert).	YES	Reviewed 7-Epler_Z4-LR-3004_BenchSheets and 7_Epler_BenchSheets.
2.8	Taxa collapsing routine conducted per SOP SCI 2100 section 4. or LT 7040. Original and collapsed taxonomic lists maintained.	YES	Reviewed *8&9_Cardno_Invert Data and SCI Calculations and 8&9_Cardno_Z4-LR-3004_Invert Data and SCI Calculations.*
2.9	Documentation available for items listed in SCI 2110	NO	Reviewed *5_Epler_Cardno Sample Logs, 6_Cardno_SCILaboratorySortingQCProcedure, 7_Cardno_SampleCOC, 7_Cardno_SampleTrackingSheets, 7_Cardno_SortingBenchSheets, 7_Epler_BenchSheets, 7-Cardno_Z4-LR-3004_SortingBenchSheets,7-Epler_Z4-LR-3004_BenchSheets, 8&9_Cardno_Invert Data and SCI Calculations, and 8&9_Cardno_Z4-LR-3004_Invert Data and SCI Calculations.* Most of the documentation was available, however the individual taxon names were difficult to read for several specimens and some abbreviations were not recognizable by the auditor. Required documentation linkage for slides and vials was not apparent.
3. Sample sorting QC (SCI 2210)		***Refer to sorting efficiency tracking records, corrective action protocol, list of analyzed samples, and raw bench sheets to address the following requirements.***	
3.1	Sorting efficiency check conducted for a minimum of 10% of aliquots per sample.	YES	Reviewed *6_Cardno_SCILaboratorySortingQCProcedure*
3.2	Sorting efficiency calculation conducted per SOP (LQ 7410 1.4)	YES	Reviewed *3_Cardno_SortingEfficiencyTracker*
3.3	Sorting efficiency tracked for each analyst.	YES	Reviewed *3_Cardno_SortingEfficiencyTracker*
3.4	Cumulative sorting efficiency 95% or greater for each analyst.	YES	Reviewed 3*_Cardno_SortingEfficiencyTracker and 6_Cardno_SCILaboratorySortingQCProcedure*. There was one instance of an analyst (J. Jendrucko) being below 95% cumulative sorting efficiency. The *SCILaboratorySortingQCProcedure* document indicates that precautionary measures are taken in these instances, but it is unclear from the initial documentation in *SortingEfficiencyTracker* that any action was taken as the sample was not distinguished in any way from the other

			samples. Cardno clarified that Mr. Jendrucko was in training at the time and that their protocol is to re-check every sample during the training period. They will make this information clear in future documentation.
3.5	Precautionary measures taken when single-analyst cumulative sorting efficiency falls below 95%.	YES	Reviewed 3_*Cardno_SortingEfficiencyTracker and 6_Cardno_SCILaboratorySortingQCProcedure.* See Note in Section 3.4.
3.6	Corrective action taken when single-analyst cumulative sorting efficiency falls below 90%.	YES	Reviewed *3_Cardno_SortingEfficiencyTracker and 6_Cardno_SCILaboratorySortingQCProcedure.* See Note in Section 3.4.
3.7	Documentation available for items listed in SCI 2211	YES	Reviewed *3_Cardno_SortingEfficiencyTracker*
4. Taxonomic identification QC (SCI 2220)		***Refer to taxonomic QC tracking records, corrective action protocol, list of analyzed samples, and raw bench sheets to address the following requirements.***	
4.1	For freshwater sampling, identify taxa to the lowest practical taxonomic level as listed in Table LT 7900-1 or SCI 2230.	YES	Reviewed *7-Epler_Z4-LR-3004_BenchSheets and 7_Epler_BenchSheets*
4.2	Quality control performed on 5% of samples (or SCI replicates), per LQ 7420 section 3.	NO	Reviewed *6_Epler_QAQC letter 14-iv-15*. Dr. Epler QCs his own samples. According to SCI 2220 3.2, the QC check is to be performed by a second analyst. In response to this finding, Dr. Epler will have 5% of his samples re-identified by an external taxonomist for future samples.
4.3	Taxonomic discrepancies associated with the QC check resolved through use of extramural expert when needed. (may only be able to evaluate this element if corrections were made on bench sheet)	N/A	Reviewed 4_Epler_QAQCRecords, *6_Epler_QAQC letter 14-iv-15.* This information was not available for this audit.
4.4	The single-analyst cumulative correct identification rate is 95% of the total number of individual organisms and 95% of taxa identified in all samples or subsamples enumerated by the analyst (5% cumulative error rate over 12 months)	N/A	Reviewed *6_Epler_QAQC letter 14-iv-15, 4_Epler_QAQCRecords, and 7_Cardno_SampleTrackingSheet.* This information was not available for this audit.
4.5	Corrective action undertaken if single-analyst cumulative correct identification rate is < 95% of the total number of individual organisms or < 95% of taxa identified in all samples or subsamples enumerated by the analyst	N/A	Reviewed *6_Epler_QAQC letter 14-iv-15.* This information was not available for this audit.
4.6	Documentation available for items listed in SCI 2221.	NO	Reviewed *6_Epler_QAQC letter 14-iv-15 and 4_Epler_QAQCRecords* Documentation was not available showing the results of external QC checks

			as this was not being performed, but will be done for the samples reviewed as part of this audit as well as for 5% of future samples.
5. SCI Index calculation (SOP SCI 2100)		***Refer to SCI metric and index calculation records to address the following requirements.***	
5.1	Taxa correctly labeled as long-lived, sensitive, and very tolerant per SOP SCI 2100 section 5.1-5.3	YES	Reviewed *8&9_Cardno_Invert Data and SCI Calculations.*
5.2	Taxa correctly assigned to the following taxonomic groups, as required for metric calculations in SOP SCI 2100 section 5.4: Ephemeroptera, Trichoptera, Tanytarsini tribe	YES	Reviewed 8&9_Cardno_Invert Data and SCI Calculations.
5.3	Taxa correctly labeled as having a clinger or filter feeder habit, per Merritt and Cummins, An Introduction to the Aquatic Insects of North America (SOP SCI 2100 section 5.5)	YES	Reviewed 8&9_Cardno_Invert Data and SCI Calculations.
5.4	Sample correctly assigned to SCI region	YES	Reviewed 8&9_Cardno_Invert Data and SCI Calculations.
5.5	Metrics and index calculated for each replicate following instructions in SOP SCI 2100 Table SCI 2100-1 and steps 1-6 following the table.	YES	Reviewed 8&9_Cardno_Invert Data and SCI Calculations.
5.6	Did this sample compare well with most recent DEP samples at this site?	YES	Reviewed *8&9_Cardno_Invert Data and SCI Calculations and 8&9_Cardno_Z4-LR-3004_Invert Data and SCI Calculations.* Alafia near Bell Shoals (Z4-LR-3004) and S Prong Alafia upstream of Lithia (ALAFTP601) have been sampled by DEP. The metrics and final score for S Prong Alafia upstream of Lithia had a few notable differences from the DEP sample. For example, the final score for the DEP sample was 41 compared to 51 for the Cardno sample. In the DEP sample, there were no long-lived or Ephemeroptera taxa compared to 3 and 6, respectively in the Cardno sample. The Alafia near Bell Shoals samples analyzed by Cardno and DEP had very similar individual metrics and final score.

Table 2. Audit findings, corrective actions, and auditor's comments for the SCI Laboratory Audit of Cardno conducted by the Florida Department of Environmental Protection Aquatic Ecology and Quality Assurance Section.

Finding number	SOP reference	Audit Finding	Cardno Response	Corrective Action Implementation Date	DEP Comments
1.2	SCI 2100 3.3.2.4 – 3.3.2.6	The reference collection was incomplete. It only represents a small fraction of the organisms encountered in the Cardno samples.	The initial reference collection lists provided by Dr. Epler did not reflect every specimen in his reference collection, only those from certain taxonomic groups that he had in an easily shared format. In response to this audit finding, Dr. Epler reviewed his collection and has provided an additional list of taxa to supplement those submitted with the other documents for this audit. The additional list is provided with this response as Attachment A. Dr. Epler maintains an extensive reference collection and continues to add to it when he encounters new taxa in Cardno's samples.	NA – Currently in place	This response is acceptable and considered complete.
1.3 1.4	SCI 2100 3.3.2.4 – 3.3.2.6	Taxa found in samples were not represented in the reference collection. The only organisms in the reference collection were Heteroptera, Coleoptera, and Chironomidae, which represents a small fraction of the types of organisms found in the Cardno samples. Auditor was unable to determine whether Dr. Epler currently consulted with extramural experts to verify or confirm identifications.	Please see response above and Attachment A. With over 45 years of experience identifying aquatic organisms, Dr. Epler rarely encounters specimens that he has never seen before. However, if Dr. Epler finds a specimen in Cardno's SCI samples that he cannot identify he does consult other experts for confirmation and notes it on his bench sheet.	NA – Currently in place	This response is acceptable and considered complete.

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2.1	SCI 2100 3.1.2.2 – 3.1.2.6.	There was a 20 point difference in the two replicates for the Little Charlie Creek sample. Care should be taken to ensure adequate homogenization.	A difference between vial scores this large is unusual for Cardno as well. Compared to all the SCI samples processed by Cardno in the last two years, this represents the 97th percentile of differences between replicates. Cardno analysts take care to adequately homogenize every sample during processing. In a case like this, where the scores are very different, we take extra steps reviewing the taxonomic data and calculations to make sure no errors were made. In addition, we look for signs of poor sample homogenization. In the case of this sample, when we reviewed the data, we noticed that, overall, both samples were dominated by the same few species in similar abundances. The species that were unique to the vial with the higher score (Vial 1) usually only had one or two individuals per species, but those species also happened to be ones that add points to the overall score: Ephemeroptera, Trichoptera, sensitive species, etc. For example, one species found in Vial 1 but not the Vial 2 was a sensitive, filter-feeding, Trichopteran so it increased three separate metric scores. We concluded that the difference in scores was mostly due to the chance inclusion of rare taxa (relative to this sample) and their contribution to the overall score, rather than sample processing issues.	NA – Currently in place	This response is acceptable and considered complete.
2.4. 2.6 2.7	SCI 2100 3.2, 3.2.2.7., 3.3.2.6. – 3.3.2.9	There was no mention of slides on the bench sheets or of any organisms being removed for placement in the reference collection or for verification by an external expert.	This is noted on the bench sheet (please refer to the red circled areas on Attachment B to see how slides are noted), but we recognize that Dr. Epler's shorthand notation and format may not be clear to those outside his and our labs. Thus, Cardno has created a standardized bench sheet which will be used by Dr. Epler in the future. Please see Attachment C for an example of the standardized bench sheet and how the	9/11/2015	This corrective action is acceptable and considered complete.

			information from the bench sheets provided in our original audit submission would be reflected on the new forms.		
2.5	SCI 2100 3.3.2.10	Some taxon names were abbreviated and illegible on the original bench sheets. The use of abbreviations, the quality of the copies, and the hand-written notes made it difficult to determine the names of some of the organisms.	In addition to the hand-written bench sheets, Dr. Epler provides an electronic spreadsheet with the taxonomic data (using full names instead of abbreviations) to Cardno with each batch of samples; see Attachment D for an example. Cardno is able to use the data in the electronic spreadsheet for SCI calculations. (Please note that Cardno QC checks the electronic version against the original bench sheet for transcription errors and verifies taxonomic names with current FDEP SCI taxa lists and/or ITIS before final score calculation.) As noted in the comment above, we recognize that this is unclear to a third-party and we believe this issue will be rectified with the use of standardized bench sheets. Dr. Epler has agreed to limit his use of abbreviations in the future and has provided a list of common abbreviations for reference (Attachment E).	9/11/2015	This corrective action is acceptable and considered complete.
2.9	SCI 2100 3.2, 3.2.2.7., 3.3.2.6. – 3.3.2.10	Documentation was not available for all items listed in SCI 2110. Individual taxon names were difficult to read for several specimens and some abbreviations were not recognizable by the auditor. Required documentation linkage for slides and vials was not apparent, and there was some ambiguity in the site name on one of the taxonomic bench sheets.	Please see comments and corrective actions stated above. Dr. Epler's slides are labeled with the sample ID, vial number, sample date, and slide number. Dr. Epler has agreed to use the Cardno sample ID on all documentation and the new bench sheet provides a specific place for sample ID to eliminate ambiguity; he will add his notes about the sample locality to the "Notes" section of the datasheet if he would like to reference that information later.	9/11/2015	This corrective action is acceptable and considered complete.
3.4 – 3.6	SCI 2210 2.1.1 – 2.1.2.	It was unclear from the documentation that any precautionary or corrective action	At the time that the cumulative sorting efficiency of our analyst (J. Jendrucko) fell below the actionable thresholds (95% or 90%), he was still	NA – Currently in place	This response is acceptable and

		was taken when an analyst's cumulative sorting efficiency fell below 90%.	in his training period, i.e. these were the first two samples he had ever sorted at Cardno. Thus, samples processed by this analyst were already being subjected to 100% QC checks. The other appropriate corrective/precautionary measures of having the first analyst check each aliquot twice and conferring about which organisms were missed by the first analyst were also already in place as a standard part of our training methods for new analysts. We apologize that the version of our tracking sheet provided for the audit was not clear on this point.		considered complete.
4.2 – 4.6	SCI 2220, 3.2 – 3.6 and SCI 2221 1.7	The records indicate that Dr. Epler QCs his own samples. Dr. Epler must have a minimum of 5% of his samples re-analyzed by a second analyst to be in full compliance with the SOP.	Up to this point, Dr. Epler's taxonomic identifications have not been subjected to QC checks by a second analyst. However, we have already taken steps to correct this. First, all three Cardno samples selected by FDEP for review in this audit have been sent to a second taxonomist for QC checks. This represents at least 5% of Cardno's SCI sampled collected in 2013 and 2014, and satisfies the QC frequency dictated in the SOP. The results and documentation from those QC samples will be provided to FDEP once the process is complete. Second, Cardno has made arrangements with Dr. Epler to have 5% (or at least one per year) of Cardno's SCI samples QC checked by a second taxonomist from this point forward.	9/11/2015	This corrective action is acceptable and considered complete.