QUALITY ASSURANCE PROJECT PLAN FOR THE USE OF SECONDARY DATA

Impact Evaluation of Projected Dissolved Oxygen (DO) Deficits in the NY/NJ Harbor Estuary

Prepared for:

New England Interstate Water Pollution Control Commission (NEIWPCC)

Contract No. 2013-042

EPA Grant # CE98272003

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Version 2: January 9, 2014

SIGNATURE PAGE

Signatures indicate approval of this Quality Assurance Project Plan and commitment to follow the applicable procedures noted.

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Title: GLEC Project Leader
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Title: GLEC Task Leader
Signature: Jim Stricko Date: 4/8/14

Name: Jennifer Hansen
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Name: Bob Newman
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DISTRIBUTION LIST

New England Interstate Water Pollution Control Commission (NEIWPCC)

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Chrono file, GLEC – Traverse City, MI

As directed by NEIWPCC Contract 2013-042, GLEC has prepared this Quality Assurance Project Plan (QAPP) to assure the quality of the secondary data used in this project. This QAPP is responsive to all of the applicable elements specified in EPA's Requirements for QAPPs (U.S. EPA 2001a). This QAPP is a project-specific supplement to GLEC's corporate Quality Management Plan (QMP), dated January, 2009 (GLEC 2009), which was prepared in accordance with EPA Requirements for Quality Management Plans (QMPs) (U.S. EPA 2001b). GLEC's QMP details the responsibilities of the GLEC Quality Assurance Officer (QAO) and the Project Leader (PL), and describes procedures used to plan for, implement, and assess project quality. These procedures, tailored to the needs of the tasked activities, will be used as this project is being performed, along with GLEC's corporate QAPP for Secondary Data, last revised April 30, 2012 (GLEC 2012).

1.0 PROJECT OBJECTIVES, ORGANIZATION AND RESPONSIBILITIES

A secondary data project involves the gathering and/or use of existing environmental data to be used for purposes substantially different from those originally intended for the data. These secondary data may be obtained from many sources, including: the open, peer-reviewed literature; unpublished manuscripts and reports from government and academic sources; industry surveys; compilations from computerized databases and information systems; and, computerized or mathematical models of environmental processes. This QAPP describes how secondary data will be evaluated and used in support of this project ("Impact Evaluation of Projected Dissolved Oxygen (DO) Deficits in the NY/NJ Harbor Estuary"). Document tracking and quality review forms are provided in Appendices A and B, respectively. This QAPP will act as a supplement to GLEC's Programmatic QAPP for Secondary Data (available upon request).

1.1 Purpose of Study

The purpose to this study is to evaluate (using available information and data) existing organism abundance and diversity in the open waters of NY/NJ Harbor, and to determine how marine organism diversity and abundance relates to DO in the Harbor (based on available existing and projected ambient concentrations). This work is an attempt to begin to understand how site-specific (ambient versus laboratory-derived), temporal and spatial circumstances can affect the presence, abundance and ability to thrive of marine organisms in areas of the Harbor (and tributaries to the Harbor) which are not attaining the marine DO criteria, based primarily upon projected DO deficits.

1.2 Objectives of the Study

The goal of this project is to better understand the effects of current and projected DO levels on the living marine resources of the NY/NJ Harbor estuary, which we anticipate will in turn provide insight that will be helpful in making future DO criteria implementation/management decisions. Achieving this goal will require accomplishing several specific objectives:

i. Develop an accurate historic and current list of marine species (fishes and invertebrates) and their abundance in NY/NJ Harbor estuary waters, including adult and juvenile life stages;

ii. Identify critical locations and the associated (present-day) resident marine life expected to be most impacted by, or susceptible to, low DO conditions based on existing aquatic life data and existing DO data and model outputs;

iii. Develop a method to evaluate potential impacts of projected DO deficits at "critical" locations using existing models and data;

iv. Using the developed method, evaluate the spatial and temporal extent of low DO impacts on resident marine life to inform management decisions;

v. Tabulate locations and times of DO deficits of biological concern;

vi. Project conditions in 2050 assuming an available and generally-accepted climate change scenario; and

vii. Prepare detailed recommendations for future work to field-validate the results of this study.

1.3 Types of Secondary Data

Secondary data likely to be acquired will include peer-reviewed journal articles and published reports, and unpublished data and information from government (both federal and state), academia and industry. The data will be used to evaluate biological diversity, abundance and distribution, as well as specific physicochemical (DO in particular) biological requirements. Analysis of the obtained information and data may include water quality and marine species tabulations and summary statistics, metric calculations and correlations of species lists to measured and projected DO levels.

Data limitation, such as geographical area, will be considered (the data must be from the Harbor), as will the specifics of data collection, such as position in the water column and the time of year.

1.4 Evaluation of Project Objectives

The anticipated users of this information include technical staff at the New Jersey Department of Environmental Protection (NJDEP), the New York City Department of Environmental Protection (NYDEP), the New York State Department of Environmental Conservation, the NY/NJ Harbor Estuary Program (HEP), and the U.S. Environmental Protection Agency (EPA).

There are two primary Tasks for this program (Task 2 and Task 3):

Task 2. Collect Information Regarding Harbor Biology and Develop a Method to Evaluate Potential Impacts of Projected DO Deficits; and Task 3. Evaluate Potential Biological Impact of Projected DO Deficits.

The planned approach for evaluating the project objective for Tasks 2 and 3 (Collect Harbor Biology Information and Develop Method to Evaluate Potential Impacts of Projected DO Deficits and Evaluate Potential Biological Impact of Projected DO Deficits) will be feedback

from GLEC internal staff selected by the GLEC Quality Assurance Officer and Project Leader to independently review the summary tables, worksheets and summary report as well as the integrity, applicability and quality of its information as it pertains to the objective. Evaluation of the project objective will also be achieved via feedback from the NEIWPCC Project Manager and the U.S. EPA Project Officer. A positive response in both cases demonstrates applicability and success.

1.5 Roles and Responsibilities

GLEC strongly believes that Quality Assurance (QA) begins with establishing policies and standards for staffing, scheduling, and carrying out projects. It also involves assigning the right staff and monitoring their performance. This QA Project Plan is consistent with the GLEC philosophy on quality assurance. GLEC agrees to conform to the concepts, principles, procedures, and philosophy of this QA Project Plan.

The individuals involved in the Quality Control and Quality Assurance program and their associated responsibilities are described in the following sections.

1.5.1 QC Responsibilities

Project Leader (PL) – Mick DeGraeve

- Takes corrective actions for any QC problems with personnel, technical content, or procedures;
- Reports to NEIWPCC Project Manager and coordinates the tasks with the respective task leaders;
- Manages the QC program;
- Communicates with the NEIWPCC Project Manager to set delivery dates for documents/products and prepares task milestones for NEIWPCC;
- Assumes fiscal responsibility for the project budget;
- Ensures compliance with GLEC and project-specific Quality Control procedures;
- Acts as the Principal Author for the final report;
- Ensures the availability of GLEC team resources; and
- Has responsibility for maintaining and distribution of the final approved QAPP.

Task Leader (TL) – Jim Stricko

- Has responsibility to the PL for ensuring well-managed QC in the task;
- Ensures that quality control in every step of the production of a task deliverable;
- Monitors and expedites task documents through all QC procedures and ensures that documents/products are presented to the GLEC QA Officer;
- Initiates and signs off on the task deliverable and GLEC Quality Review Form (Appendix B);
- Has responsibility for task document control and management;
- Assigns internal peer reviews and sets schedule for review; and
- May also conduct Principal Author roles as outlined below.

Principal Author (PA) – Mick DeGraeve

- Responsible for overall document/deliverable quality;
- Integrates document sections in a logical arrangement following a specified format and synthesizes components to logical interpretations and conclusions;
- Ensures the integrity of data compiled from various data sources and any scientific interpretations;
- Makes all document revisions;
- Submits Document Cover Sheet (see Appendix A) with the task final draft deliverable; and
- Conducts and documents GLEC QC Self Review (see Appendix B).

QC Peer Reviewer(s) – TBD

- Conducts and documents GLEC QC Peer Review;
- Validates primary source information;
- Ensures the integrity of technical abstracting, scientific data, and interpretations;
- Checks the procedures and the basis for any calculated standard, guidance, or reference numbers; and
- Completes QC Peer Review Form (see Appendix B).

Contributing Author(s) (CA) – Jim Stricko, John Waldman, Robin Miller

- Is responsible for the content and quality of the document section(s) within his/her expertise area; and
- Writes or otherwise contributes specialized document sections requiring specific expertise for the PA and revises components within the sections for which he/she is responsible.

1.5.2 QA Responsibilities

The following specific roles and responsibilities will be carried out by GLEC staff with respect to QA responsibilities:

GLEC President – Dennis McCauley

- Resolves overall performance problems on client deliverables based on QA/QC evaluations and input from the client; and
- Provides final review of project for conflict of interest.

QA Officer – Jennifer Hansen

- Monitors the QC process and independently audits QC performance;
- Reviews and approves the QAPP;
- Coordinates and tracks reports through the QC/QA process reviews;
- Conducts or designates Quality Reviews as needed;

- Reviews completed QA Review Form; and
- Maintains final Quality documentation.

QA Reviewer(s) – TBD

- Conducts and documents GLEC QA independent review of completed draft documents and/or deliverables and data.
- Completes QA Review Form (see Appendix B).

GLEC is ultimately responsible for high quality deliverables/products that meet or exceed NEIWPCC requirements and expectations. Our dual process of QA/QC also provides management with a tool to evaluate individual personnel performance as well as evaluate GLEC's performance on the project. GLEC's QA program, implemented by the QA Officer, Ms. Jennifer Hansen, on behalf of the GLEC President, monitors the product quality as well as the entire QA/QC process.

NEIWPCC may implement, at their discretion, various audits or reviews of this project to assess conformance and compliance to the quality assurance project plan in accordance with the NEIWPCC Quality Management Plan.

2.0 SOURCES OF SECONDARY DATA

2.1 Sources of Secondary Data

GLEC will collect existing information and data from peer-reviewed literature, unpublished reports, databases compiled by federal and state agencies, local authorities, universities, industry and other private research efforts. These data, originally collected for a different purpose, are known as secondary data. Once the data are obtained, they will be reviewed for quality, completeness and applicability to the objectives of the project.

The underlying data contained in federal, state, academic or private sources are assumed accurate and of sufficient quality to be reviewed for use in this study. In addition, the quality of peer-reviewed and published literature is assumed to be acceptable, as long as no corrections or revisions have taken place within a year of publication or release. If limitations are identified in the quality of information or data taken from published literature or federal/state/university/private generated sources that may impact decisions regarding the overall direction of further data collection efforts or the quality of deliverables, these data quality issues will be communicated to NEIWPCC.

2.2 Rationale for Selecting Sources of Secondary Data

The rationale for selecting the wide assortment of sources of secondary data for Tasks 2 and 3 is to include all the potentially useful and acceptable secondary data for the project. This approach has been used successfully for other similar projects and should be suitable for this project as well.

2.3 Sources of Secondary Data will be identified in any Project Deliverable

Any data compilations, maps, or GLEC-generated recommendations will include a list of all sources of secondary data. Raw data will be maintained in a manner easily traceable to its source.

3.0 ASSURING THE QUALITY OF SECONDARY DATA

A critical concern for projects that require the incorporation of secondary data is ensuring the integrity of the data that are obtained and used. This section addresses that concern by identifying the data quality objectives (DQOs) for the secondary data to be used for this project, and the criteria that will be used to evaluate these objectives.

The first DQO is that the data should come from sources of known and appropriate quality. In addition to the data sources discussed under Task 2.1, other literature or reference materials that will be accepted as sources of secondary data include:

- Academic, federal or state agency-developed or approved databases (e.g., EPA's ECOTOX database, the World Register of Marine Species and the Ocean Biogeographic Information System);
- Peer-reviewed government and other gray literature reports (e.g., from EPA, National Marine Fisheries Service and USGS);
- Published peer-reviewed journal articles;
- Articles that have been approved by a peer-reviewed journal, but were not published (in this case, a copy of the pre-published article and documentation that it was approved is required); and
- Personal communications with experts in the field (as identified by a member of the Technical Advisory Committee (TAC) or the GLEC team, and approved by the GLEC Program Manager), provided that a written statement or documented approval is received from the expert.

In cases when the secondary data preliminarily appear to be relevant and potentially useful to the project, but upon further review we determine that the source does not exactly fit into one of the above categories, GLEC will seek technical direction/clarification (at the discretion of the GLEC Program Manager) from the EPA marine sciences laboratory in Narragansett, RI and/or the chairman of the TAC. We will use these individuals to help us determine if the secondary data are from a reputable source, and therefore acceptable for inclusion in our summary and analysis.

The second DQO relates to the requirement that the data are appropriate for the purpose for which they will be used. To conform to that DQO, GLEC will carefully consider each study (data source) from that DQO perspective. In making this determination, GLEC will take into

consideration a variety of factors. For example, results of laboratory assays with standard designs (e.g., adequate controls, clean dilution water, measured concentrations) and endpoints (e.g., LC50, NOEC) will take precedence over alternative response variables (e.g., avoidance behavior and field studies), which usually report more qualitative changes (abundance or presence/absence, for example). Other considerations for determining data acceptability will include the study design, the measured endpoint, the duration of exposure to low dissolved oxygen concentrations, as well as the presence of contaminants.

For transparency of process, GLEC will track, to the maximum degree possible, each individual datum to its original reference for published manuscripts and reports, and will code the datum (using a simple coding system) as to its "acceptability" or "non-acceptability" for this project. A coding system with a user's key will allow for the efficient tracking of reference materials that were used and not used for this project, and will facilitate any required audits and QA/QC evaluations. Once the decision has been made to use the data, they will be checked for consistency in units and values. When data for a particular variable (species and life stage, for example) are available from two or more sources, GLEC will only retain the datum from the sources determined to be very reliable. The factors that will be used to make this decision will be based on the focus of the source studies, the study authors' experience and publication record and their institutional affiliations. After an "acceptable" or "non-acceptable" decision has been made by a member of the GLEC team working on this program, the reviewed study will be coded (as discussed above), and the "non-acceptable" references will be listed in an appendix to the final report. That appendix will provide a brief explanation of the reason that the study was not used in this investigation.

4.0 DATA REPORTING, DATA REDUCTION AND DATA VALIDATION

The GLEC Project Leader will be responsible for implementing Tasks 2 and 3 in accordance with this QA Project Plan. A Quality Assurance Documentation Report (QADR) will be prepared and submitted with the final deliverable for this project. This document, among other things, will describe how GLEC assured that data and source materials relied upon to conduct efforts associated with each task specified in the proposal are accurate and correct.

4.1 Data Reporting

All data will be compiled electronically and made available to NEIWPCC in MS Excel spreadsheet, and/or MS Word files. Any use of secondary data will be noted where applicable, and will include, at a minimum, author, date, title and source (corresponding person, date, and affiliation in the case of personal communication).

A final report will be prepared by GLEC that will summarize the information obtained in each of the Tasks and Sub-tasks, the analyses/evaluations performed and the conclusions reached. Recommendations for future data collection, evaluation and synthesis will be included in the final report.

4.2 Data Reduction

Data reduction procedures specific to the project, including calculations and equations, will be described in data summaries and/or reports. This includes the calculation of summary statistics, biological metrics, and data comparisons (e.g., biological diversity to DO level).

4.3 Data Validation

Any data validation procedures used to ensure the reporting of accurate project data will be described in data summaries and/or reports. This independent QA verification is part of a three tier review process to be conducted based on the GLEC Quality Review Form (Attachment B). The Quality Review Form requires documentation of the specific quality review elements and the acceptability of each element within the context of the overall project objectives.

Every deliverable and associated data is submitted to a three-tiered review prior to submission to NEIWPCC. The first two tiers of review take place through GLEC's customary QC Review, the third by an independent QA review. The first tier review is a Self Review conducted by the author of the table, spreadsheet, map or report. This review ensures that the requirements in the project and QAPP were addressed and that the materials and data are compiled and ready for use in QC and QA reviews and subsequent archival. When the author has completed the review and is satisfied with the final draft, he/she submits the document for the QC Peer Review.

The second tier review is a Quality Control Peer Review conducted by a scientist with appropriate technical expertise. The GLEC Project Leader (Mick DeGraeve) will be responsible for selecting an appropriately experienced scientist for the second tier review. In the event that Mick's selection of a second tier reviewer does not meet NEIWPCC's expectations, the Chairman of the Technical Advisory Committee (Phil DeGaetano) will be consulted for his recommendation of an appropriate second tier reviewer. This review ensures that the document or deliverable is technically sound, and that the document has been interpreted objectively and has solid conclusions. Types of checks include determinations that: the description of the technical procedure accurately reflects the work performed; the document contains a data quality assessment; examination of the data quality and verification (for accuracy, presentation and interpretation); review of computer code or algorithms; appropriate application of statistical tests or modeling assumptions; and, a critical review of the narrative, including assumptions, evaluations and conclusions. The QC Review also checks that any deviations from planned activities are documented, and that any suspect data are described in the data verification review, and that the possible effects of these on data interpretation are discussed. The data verification form (to be developed) is returned to the author, and the author is responsible for making sure that the corrections are made, subject to the GLEC Project Leader's approval. Corrective actions for those errors that are recurring or major in scope, are discussed further in GLEC's corporate Quality Management Plan, dated January, 2009 (QMP).

The third tier of the review process is the Independent Quality Assurance Review. The QA review verifies that the Self Review and the QC Peer Reviews were completed and that review comments were appropriate and addressed. The QA review is an independent review and evaluation of a deliverable before its submission to the client, and is conducted by the Quality

Assurance Officer or a senior scientist assigned by the QA Officer. QA reviewers will be chosen outside of the project, based on their technical expertise and independence from the assignment. There may be two reviewers assigned if necessary, depending on personnel areas of expertise. The review evaluates the technical approach, computations performed, interpretations, conclusions, and overall appearance of the document. An independent review of a percentage of data for accuracy and traceability is also completed at this time. It will be the responsibility of the PL to satisfactorily address any of the QA reviewer's comments and concerns.

5.0 SCHEDULE

Task 1. Development of an approvable quality assurance project plan	August 2013 – January 2014
Task 2. Collect information regarding harbor biology and develop a method to evaluate potential impacts of projected DO deficits	
Task 2.1 Summary of qualitative and quantitative health of the existing aquatic life in the NY/NJ Harbor Estuary	February – April 2014
Task 2.2 Determine expected species and life stages in the Harbor, and salinity, temperature, and habitat preferences	February – April 2014
Task 2.3 Identify critical locations and time periods of current and projected DO conditions that might impact juvenile/adult aquatic life survival as well as larval recruitment and growth of juvenile and adult aquatic life	February – May 2014
Task 2.4 Identify the aquatic life that would be most impacted by the DO conditions in the critical locations. Indicate the nature of the likely impact to the extent possible	March – May 2014
Task 2.5 Based on existing information, develop, if possible, a method to assess the relative biological impact of different DO conditions	March – July 2014
Task 2.6 Compile biological data requirements needed to evaluate significance of DO deficits in limited portions of the Harbor	August – September 2014
Task 2.7 Identify any site specific or Use Attainability Analysis (UAA) dissolved oxygen standards that have been approved by EPA	February – June 2014
Task 3. Evaluate potential biological impact of projected DO deficits	
Task 3.1 Compare current conditions in critical areas to those conditions existing in similar areas of DO attainment	August – October 2014
Task 3.2 Based on the methodology developed above, and the data collected in this section, develop a method to evaluate whether the spatial extent of low DO is widespread enough to warrant	July 2014 – October 2014
Task 3.3 Apply the evaluation method to the information assembled above and tabulate the locations and times of DO deficit of biological concern	September – November 2014
Task 3.4 Provide an evaluation of projected conditions in 2050 based on currently expected conditions as a consequence of climate change	April – July 2014
Final report preparation	October – December 2014

6.0 REFERENCES

Great Lakes Environmental Center. 2012. Quality Assurance Project Plan for Secondary Data. Last revised, April 30, 2012.

Great Lakes Environmental Center. 2009. Quality Management Plan. January, 2009.

U.S. Environmental Protection Agency. 2001a. EPA Requirements for Quality Assurance Project Plans QA/R-5, EPA/240/B-01/003, Office of Environmental Information. March 2001.

U.S. Environmental Protection Agency. 2001b. EPA Requirements for Quality Management Plans QA/R-2, EPA/240/B-01/002, Office of Environmental Information.

APPENDIX A

Document Cover Sheet

Rev 4.11.12

DOCUMENT COVER SHEET

- *This sheet is **Required by GLEC policy***
- *This sheet **begins with the originator's document** and is **to be attached to each new version** of the document throughout the production process.*
- *After the document is finalized, it is **to be attached to the chrono copy** (**or library copy** when appropriate)*

Name	*Initials*	*Date*
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Word Processing:		
Reviewer: *(Other than Originator)*		
Edits Made: #1		
Reviewer:		
Edits Made: #2		
Reviewer:		
Edits Made: #3		
Reviewer:		
Edits Made: #4		
Final Approval: (Management Team Member)		
Project Information:		
Project #:		
Project Manager: *or*		
Deputy Project Manager:		

Circle all that apply:	Mail	Fed Ex Priority	Fed Ex Ground	Fed Ex Standard	Fax E-mail

Circle one:

Does the FINAL deliverable involve primary or secondary data? YES / NO

If yes, include the QA/QC review sheet.

Location of QA review:	Where document is archived:
Traverse City / Columbus	Traverse City / Columbus

Distribution

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										CHRONO			

cc: Kim *All deliverables **TC** - (for GLEC files) via e-mail (provide a hard copy to accompany all electronic deliverables, unless otherwise directed). **CO** -Provide Doc cover/QA/QC docs.*

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Program Used *(Circle one)*: **WORD / Word Perfect / Excel / Power Point / Lotus / Adobe PDF / Other:**
These programs are required for (unless otherwise specified by client): EPA and MDEQ – WORD or Adobe; PVSC - WORD

Location of RFP *(if proposal)*:

Date Final Copy Due to Client: ***Date Delivered to Client: (official Chrono date)***

Attach additional notes and/or Instructions to this document cover sheet (i.e. instructions for Dividers/ CD/ Disclaimer Page/ Headers and Footers/ Table of Contents/ etc.) *Reminder: Place notes and comments on this sheet, directly on the document, or attach your additional instructions to this document cover sheet. Avoid using sticky notes for directions/corrections. Use them only for marking the location of corrections and/or changes.*

PROPOSED PURGE DATE : _____

APPROVED PURGE DATE: **APPROVAL SIGNATURE (Management Team Member):**

APPENDIX B

GLEC Quality Review Form

- Self Review
- QC Peer Review
- QA Independent Review

updated:1.11.10	**GLEC QUALITY REVIEW FORM**			**Page 1 of 2**
SELF REVIEW				
Circle one for each question below:	Y = YES (Acceptable)	N = NO (Unacceptable)	N/A = (Not Applicable)	
1) Was a critical self review of the final draft deliverable and associated work materials completed?			Y	N	N/A
2) Were SOPs created and/or updated and used for this WA?			Y	N	N/A
• If yes, were applicable SOPs attached to QAPP?			Y	N	N/A
• If SOPs were used but not attached to QAPP, please attach copies of applicable SOPs to this review form *or* provide a list of the applicable SOPs that includes the date of the SOPs. Are SOPs or list of SOPs attached?			Y	N	N/A
3) Was training for this Work Assignment completed, documented, and were copies of training documentation sent to GLEC administration?			Y	N	N/A
4) Have all associated data, spreadsheets and materials been compiled and are ready for use in QC and QA reviews and subsequent archival?			Y	N	N/A
5) Have all of the QAPP and WP QA and data quality requirements been addressed?			Y	N	N/A
6) Have QA/QC results been reported in the report (or appendices)?			Y	N	N/A
7) If there is no text report QA/QC results should be summarized and stored with data and delivered to client with data report.			Y	N	N/A
8) Did GLEC receive a subcontractor statement of QA/QC compliance?			Y	N	N/A
Self Review Signature				
►Principal Author (PA):				

GLEC QC PEER REVIEW

Document Information	
Document Name & Location (include version number and date):	QC Review Due Date:
Client/Project/Agency/Division:	Charge No.:
Work Assignment Leader (WAL):	Principle Author (PA) (if different than WAL):
Program or Deputy Program Manager (PM or DPM):	
Contributing Personnel:	

Quality Control Review Elements

Circle one for each question below:	Y = YES (Acceptable)	N = NO (Unacceptable)	N/A = (Not Applicable)

Technical Approach				***Interpretation and Communication***			
1) Are the analytical methods valid?	Y	N	N/A	8) Were the data quality objectives addressed and followed?	Y	N	N/A
2) Are the data sources appropriate?	Y	N	N/A	9) Are the formulations and calculations acceptable?	Y	N	N/A
3) Are the data sources referenced?	Y	N	N/A	10) Was the computer code verified?	Y	N	N/A
4) Are the assumptions valid?	Y	N	N/A	11) Are the method QC checks included in the report and acceptable?	Y	N	N/A
5) Are the computer models appropriate?	Y	N	N/A	12) Was the Work Assignment scope addressed?	Y	N	N/A
Data Validation				13) Are the conclusions logical?	Y	N	N/A
6) Were 100% of data and associated spreadsheets/materials checked during this review?	Y	N*	N/A	14) Is the deliverable appropriate for intended purpose?	Y	N	N/A
*If NO, what percent? %				***Format and Editorial Review***			
7) Are the data sources traceable, accurate, and fully referenced?	Y	N	N/A	15) Is the overall appearance and presentation of the document acceptable?	Y	N	N/A

Recommendations of QC Reviewer(s) (if applicable). Attach continuation sheets if needed:

QC Approval Signatures	
►QC Peer Reviewer(s):	Date:
►Work Assignment Leader (WAL):	Date:
►Principal Author (PA) (if different than WAL)	Date:

updated: 1.11.10	GLEC QUALITY REVIEW FORM			Page 2 of 2
GLEC QA INDEPENDENT REVIEW				
Quality Assurance Elements				
Circle one for each question below:	Y = YES (Acceptable)		N = NO (Unacceptable)	N/A = (Not Applicable)
Deliverable Review				***Comments: (attach continuation sheets if needed)***
1) Independent reviewer has read the deliverable. The deliverable is acceptable in its content, clarity, and presentation.	Y	N	N/A	
Data Review				***Comments: (attach continuation sheets if needed)***
2) An independent review of at least 10% of the data has been completed, and is acceptable.	Y	N	N/A	
3) Data, QA/QC results and associated project documentation has been archived with Admin; or specify location*[1].	Y	N	N/A	
Circle location: *Traverse City* *Columbus* *Farmington Hills*				
**Data, etc. location detail (i.e. employee office)* *[1]Data Package includes: raw lab data, QA/QC results, project documentation, etc.*				
QC Resolution				***Comments: (attach continuation sheets if needed)***
4) Any QC issues from the peer review have been addressed appropriately.	Y	N	N/A	
5) Are audit results (if an audit is required in QAPP) attached and acceptable?	Y	N	N/A	

QA Approval Signatures	
►Work Assignment Leader (WAL):	Date:
►Principal Author (PA) (if different than WAL):	Date:
►Independent QA Reviewer (IQAR):	Date:
Final Approval Signatures	
►QA Officer (QAO) or Management Team Member:	Date:
►Program or Deputy Program Manager (PM or DPM) or Management Team Member:	Date: