**Modified EPA R-5 Checklist for Review of Quality Assurance Project Plans for Modeling Projects Using Secondary Data**

This checklist is an example of what could be used to either write or review a QA Project Plan, especially those that call solely for the collection and use of secondary data. The items noted follow those elements found in *EPA Requirements for QA Project Plans (QA/R-5)* (EPA, 2001a) as applicable, and *EPA New England QAPP Guidance for Projects Using Secondary Data, Revision* 2 (EPA, 2003).

**PROJECT TITLE:**

**Preparer:**       **Date Submitted for Review:**

**Reviewer:**       **Date of Review:**

*Note: A=Acceptable; U=Unacceptable; NI=Not Included; NA=Not Applicable*

**DOCUMENT CONTROL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| Document control information is indicated in header of each QAPP page | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Project title is indicated | [ ]  | [ ]  | [ ]  | [ ]  |       |
| QAPP version number and date are indicated | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Page number is indicated in “Page X of Y” format | [ ]  | [ ]  | [ ]  | [ ]  |       |

**PROJECT MANAGEMENT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| **A1. Title and Approval** |
| Contains project title | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Indicates revision number, if applicable | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Indicates EPA grant number | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Indicates organization(s)’ name(s) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Signature and date lines for organization(s)’ project manager(s) present | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Signature and date lines for organization(s)’ QA manager(s) present | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Other signatures, as needed | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A2. Table of Contents** |
| Lists QA Project Plan information sections and relevant page numbers | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Document control information indicated | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A3. Distribution List** |
| Includes all individuals who are to receive a copy of the QA Project Plan and identifies their organization | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| **A4. Project/Task Organization** |
| Identifies key individuals involved in all major aspects of the project, including contractors | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses their responsibilities | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Project QA Manager position indicates independence from unit generating data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies individual responsible for maintaining the official, approved QA Project Plan | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Organizational chart shows lines of authority and reporting responsibilities | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A5. Problem Definition/Background** |
| States decision(s) to be made, actions to be taken, or outcomes expected from the information to be obtained | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Clearly explains the reason (site background or historical context) for collecting secondary data and how that data will be used to meet project goals | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies regulatory information, applicable criteria, action limits, etc., necessary to the project | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Explains why a modeling approach is appropriate to address the problem | [ ]  | [ ]  | [ ]  | [ ]  |       |
| If a particular model has been selected, explains why that model is better to address the problem than other similar models | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A6. Project/Task Description** |
| Summarizes work to be performed, for example, secondary data files to be obtained, analyses to be performed etc., that support the project’s goals | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Provides work schedule indicating critical project points, e.g., start and completion dates for activities such as secondary data collection, analysis, data or file reviews, and assessments | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Indicates QAPP end date | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Details geographical locations to be studied, including maps where possible | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses resource and time constraints, if applicable | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A7. Quality Objectives and Criteria** |
| Description of specific task requiring modeling and the intended uses of modeling output to achieve the task | [ ]  | [ ]  | [ ]  | [ ]  |       |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| Identifies performance/measurement criteria for all information to be collected for use in the model, including acceptance criteria for information obtained from previous studies, project action limits and laboratory detection limits and range of anticipated concentrations of each parameter of interest | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses types of secondary data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Addressed the age of data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses geographical representation of data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses temporal representation of data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses technological representation of data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Lists required hardware/software configurations for those studies involving software evaluation | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A8. Special Training/Certifications** |
| Identifies any project personnel specialized training or certifications | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses how this training will be provided | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Indicates personnel responsible for assuring these are satisfied | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies where this information is documented | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **A9. Documentation and Records** |
| Identifies report format and summarizes all data report package information | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Lists all other project documents, records, and electronic files that will be produced, potentially including model science formulation reports, peer review/model evaluation group reports, model assessment reports, model calibration reports, a model users’ manual, configuration and code maintenance manuals, and reports describing model code standards, code auditing and code testing, etc. | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies where project information should be kept and for how long | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses back up plans for records stored electronically | [ ]  | [ ]  | [ ]  | [ ]  |       |
| States how individuals identified in A3 will receive the most current copy of the approved QA Project Plan, identifying the individuals responsible for this | [ ]  | [ ]  | [ ]  | [ ]  |       |

**DATA ACQUISITION AND MODEL USE OR DEVELOPMENT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| **B1. Sources of Secondary Data** |
| Identifies sources of required secondary data, including the originating organization(s), and the report/publication title and date. May be displayed in tabular format | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies the generators of required secondary data (if different from source), including the originating organization(s) and data collection date(s) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Specifies the hierarchy of sources for the gathering of secondary data, where applicable | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses the rationale for selecting the data sources(s) identified | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Specifies that all sources of secondary data gathered will be identified in project reports and deliverables | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **B2. Quality of Secondary Data** |
| Discusses quality requirements of secondary data and corresponding acceptance criteria | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses accuracy requirements | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses precision requirements | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses representativeness requirements | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses completeness requirements | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses comparability requirements | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes the procedures that will be employed to determine the quality of secondary data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Includes disclaimer to be used in all project work products and reports if no quality requirements are being employed or when the quality of secondary data cannot be determined | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **B3. Data Management and Hardware/Software Configuration** |
| Describes data management and storage scheme. | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies data handling equipment/procedures that should be used to process, compile, analyze and transmit data reliably and accurately | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies individual(s) responsible for data management | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes the process for data archival and retrieval | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes procedures to demonstrate acceptability of hardware and software configurations | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes or attaches any data forms, checklists, or on-line interactive screens used in the modeling process | [ ]  | [ ]  | [ ]  | [ ]  |       |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| Includes any necessary graphics to document the data management process (e.g., process flow diagrams, modeling flow charts, etc.) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how internal checks used during data entry should be documented | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how uncertainty and variability in the model results will be determined or characterized (e.g., summary statistics, frequency distributions, goodness-of-fit tests) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Lists equipment, both hardware and software, that will be used on the project | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes system performance requirements, addressing security issues, software installation needs and associated documentation | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes plan for development of model coding standards | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes plan for model testing | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes plan for development of model user’s manual and/or maintenance manual | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how model source code will be stored and maintained | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Includes configuration management plan to control software/hardware configuration during model development or application | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **B4. Model Calibration** |
| Describes the objectives of model calibration activities, including acceptance criteria | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes expected frequency of model calibration activities | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Details the model calibration procedure | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes the method(s) of acquiring input data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes types of output generated by the model calibration | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes the approach being used to characterize uncertainty (e.g., sensitivity analysis) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Details corrective action to be taken if acceptance criteria are not met | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Details resources and responsibilities related to model calibration | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Discusses the analysis of model output relative to acceptance criteria | [ ]  | [ ]  | [ ]  | [ ]  |       |

**ASSESSMENT and OVERSIGHT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| **C1. Assessments and Response Actions** |
| Lists the number, frequency and type of assessment activities that should be conducted, with the approximate dates | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies individual(s) responsible for conducting assessments, indicating their authority to issue stop work orders and any other possible participants in the assessment process | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes procedures for both internal QA assessments (review of input data, code verification, calibration, benchmarking) and external assessments (peer review of model theory and/or structure) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how and to whom assessment information should be reported | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies how corrective actions should be addressed and by whom, and how they should be verified and documented | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Includes standard NEIWPCC assessment language: “NEIWPCC may implement, at its 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. NEIWPCC may issue a stop work order and require corrective action(s) if nonconformance or noncompliance to the Quality Assurance Project Plan is found.” | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes planned model code performance testing | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes planned model performance evaluations | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes planned sensitivity analysis for model outputs | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes planned uncertainty analysis for model outputs | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **C2. Hardware/Software Assessments and Configuration Tests** |  |  |  |  |  |
| Describes how hardware and software configurations will be tested | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes model code development inspections and verification tests | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how programming errors will be screened and corrected | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how model equations will be checked for correct placement/relationships | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how linkages between model code and uncertainty analysis will be checked | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how model framework will be tested | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| Describes planned integration tests (to check computational and transfer interfaces between model modules) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes any planned regression tests | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes stress testing of complex models (to ensure that maximum model load does not exceed system limitations) | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes process for beta testing of pre-release materials | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **C3. Model Peer Review** |
| Describes process for peer review of the theoretical basis for the model | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes process for peer review of the mathematical model structure | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes process for peer review of model outputs and predictions | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes process for peer review of model calibration procedures | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes process for peer review of final technical products | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **C4. Reports to Management** |
| Identifies what project QA status reports are needed and how frequently | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Identifies who should write these reports and who should receive this information | [ ]  | [ ]  | [ ]  | [ ]  |       |

**DATA VALIDATION AND USEABILITY**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| **D1. Validation Criteria** |
| Describes data reduction and evaluation procedures specific to the project, including calculations and equations | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes criteria used to review and validate input data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes criteria used to review and validate model components such as theory, mathematical structure, code, and calibration | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes criteria used to test model performance | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes criteria used to review and validate model outputs | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **D2. Verification and Validation Methods** |
| Describes methods for review of model components such as theory, mathematical structure, code, and calibration | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes methods used to test model performance | [ ]  | [ ]  | [ ]  | [ ]  |       |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **A** | **U** | **NI** | **NA** | **Comments** |
| Describes methods for assessment of model output and usability | [ ]  | [ ]  | [ ]  | [ ]  |       |
| **D3. Reconciliation with User Requirements** |
| Describes procedures to evaluate the uncertainty of the validated data | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how limitations on data use should be reported to the data users | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes any potential uncertainties related to decisions made based on limitations in model input data and/or limitations in the model and how this will be reported | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes how any departures from assumptions set in the planning phase of the model will be documented and reported to users | [ ]  | [ ]  | [ ]  | [ ]  |       |
| Describes procedures for final acceptance testing (testing needed before a new model or model application is accepted by the end user) | [ ]  | [ ]  | [ ]  | [ ]  |       |