***\*THIS GUIDANCE SHOULD NOT BE INCLUDED IN THE CONTRACT\****

*Annual QA checks are required by the DQM Support Center for each pipeline and, unless explicitly stated by the local USACE District, should be completed prior to material being moved. Instrumentation upgrades during the year necessitate an additional QA check.*

#### *Specification Revisions*

*This section tracks all additions, deletions, and other revisions made to this document.*

| ***Sec.No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 08-04-2023*** |
| *Through-out* | *All references to paragraph numbers* | *References to paragraph numbers were removed; references to paragraph titles remain.* |
| 1.2 | Letter of National Dredging Quality Management Program Certification | National Dredging Quality Management Program Certification |
| 1.3 | (Not Applicable.) | Not used. |
| 1.5 | The Contractor shall have a digital copy of the Dredge Plant Instrumentation Plan (DPIP) on file with the DQM Support Center. While working on site, the Contractor shall also maintain on the dredge a copy of the DPIP, which is easily accessible to Government personnel at all times. This document shall accurately describe the sensors used, the configuration of the system, how sensor data will be collected, how quality control on the data will be performed, and how the sensors/data-reporting equipment will be calibrated and repaired if it fails. A description of the computed dredge-specific data and how the sensor data will be transmitted to the DQM database shall also be included. Prior to the start of work, the Contractor shall submit to the DQM Support Center any addendum or modifications made to the plan subsequent to its original submission.  | The Contractor must have a digital copy of the Dredge Plant Instrumentation Plan (DPIP) on file with the DQM Support Center. While working on site, the Contractor must also maintain on the dredge a copy of the DPIP, which is easily accessible to Government personnel at all times. This document must accurately describe the sensors used, the configuration of the system, how sensor data will be collected, how quality control on the data will be performed, and how the sensors/data-reporting equipment will be calibrated and repaired if it fails. A description of the computed dredge-specific data and how the sensor data will be transmitted to the DQM database must also be included. Prior to the start of work, the Contractor must submit to the DQM Support Center any addendum or modifications made to the plan subsequent to its original submission. |
| PART 2 | PRODUCTS (Not Applicable) | PRODUCTSNot used. |
| 3.1 | The Contractor shall provide, operate, and maintain all hardware and software to meet these specifications. The Contractor shall also be responsible for the replacement, repair, and calibration of the sensors and other necessary data acquisition equipment needed to supply the required data.  | Provide, operate, and maintain all hardware and software to meet these specifications. The Contractor is also responsible for the replacement, repair, and calibration of the sensors and other necessary data acquisition equipment needed to supply the required data.  |
| 3.1 | The procedure to complete a repair shall be documented and completed as soon as practical. If repair is not possible within two business days of any sensor failure, a plan and timeline to complete the repair shall be submitted. Upon completion of a repair, replacement, installation, modification, or calibration, the Contractor shall notify the Permit Project Manager. | Document and complete the procedure to complete a repair as soon as practical. If repair is not possible within two business days of any sensor failure, submit a plan and timeline to complete the repair. Upon completion of a repair, replacement, installation, modification, or calibration, notify the Permit Project Manager. |
| 3.1 | The Contractor shall keep a log of sensor repair, replacement, installation, modification, and calibration in the dredge’s onboard copy of the DPIP. The log shall contain a three-year history of sensor maintenance, including the time of the sensor failures (and subsequent repairs), the time and results of sensor calibrations, the time of sensor replacements, and the time that backup sensor systems were initiated to provide the required data. It shall also contain the name of the person responsible for the sensor work.  | Keep a log of sensor repair, replacement, installation, modification, and calibration in the dredge’s onboard copy of the DPIP. The log must contain a three-year history of sensor maintenance, including the time of the sensor failures (and subsequent repairs), the time and results of sensor calibrations, the time of sensor replacements, and the time that backup sensor systems were initiated to provide the required data. It must also contain the name of the person responsible for the sensor work.  |
| 3.1 | Sensors installed shall be capable of collecting parameters within the specified accuracies and resolutions indicated in the following subparagraphs and transmit these parameters to the DQM database. All data shall be transmitted in JSON message bundles. | Install sensors that are capable of collecting parameters within the specified accuracies and resolutions indicated in the following subparagraphs and transmit these parameters to the DQM database. Transmit all data in JSON message bundles. |
| 3.1 | Sensor data shall be transmitted as work event messages, and data which relates to the operational state of the dredge or its sensors shall be transmitted as state event messages. | Transmit sensor data as work event messages, and transmit data which relates to the operational state of the dredge or its sensors as state event messages. |
| 3.1.1 | Every message bundle shall contain descriptive data that relates the message to a given dredge plant and date/time. The start of a message bundle shall be identified by the tag “DQM\_data”. | Every message bundle must contain descriptive data that relates the message to a given dredge plant and date/time. Identify the start of a message bundle by the tag “DQM\_data”. |
| 3.1.1.1 | Messages contain operational data that populates the DQM database for a dredge plant. A message shall consist of an event type and its associated data (as defined in Paragraph 3.1.1.1.3, “Dredge Events”), a date/time stamp indicating when the event occurred or started, and a comment providing clarification or metadata about the situation. | Messages contain operational data that populates the DQM database for a dredge plant. A message must consist of an event type and its associated data (as defined in paragraph DREDGE EVENTS—WORK EVENTS and paragraph DREDGE EVENTS—STATE EVENTS), a date/time stamp indicating when the event occurred or started, and a comment providing clarification or metadata about the situation. |
| 3.1.1.1.1 | The message time shall be reported to the nearest second and referenced to Coordinated Universal Time (UTC) time based on a 24-hour format (YYYY-MM-DD HH:MM:SS). In order to ensure accuracy and reliability, the time stamp shall be synchronized to UTC format from an accurate, unchangeable source (for example, a GPS National Marine Electronics Association [NMEA] datastring). Message time shall be identified by the tag “msg\_time”. | Report the message time to the nearest second, and reference it to Coordinated Universal Time (UTC) time based on a 24-hour format (YYYY-MM-DD HH:MM:SS). In order to ensure accuracy and reliability, synchronize the time stamp to UTC format from an accurate, unchangeable source (for example, a GPS National Marine Electronics Association [NMEA] datastring). Identify message time by the tag “msg\_time”. |
| 3.1.1.1.2 | A comment shall be identified by the introductory tag “comment”, and the comment shall consist of no more than 250 characters. | Identify a comment by the introductory tag “comment”, and limit it to no more than 250 characters. |
| 3.1.1.2 | All work event messages shall be initiated by the header tag “work\_event”. | Initiate all work event messages by the header tag “work\_event”. |
| 3.1.1.2 | Sensor values reported in a work event shall represent a weighted average with the highest and lowest values not included in the calculated average for the given interval. The averaging routine used shall be consistent across all event triggers. This information shall be documented in the DPIP sections that say “Calculations done external to the instrumentation.” | [Deleted] |
| 3.1.1.2.1 | The variation of the water level from the vertical datum for the river stage or tidal gage described in the state events shall be obtained using appropriate equipment to give the water level with an accuracy of ± 0.1 ft. Vertical correction values above project datum described in the dredging specification shall be entered with a positive sign and those below with a negative sign. The tag for vertical correction shall be “vert\_correction”. | Obtain the variation of the water level from the vertical datum for the river stage or tidal gage described in the state events using appropriate equipment to give the water level with an accuracy of ± 0.1 foot. Enter vertical correction values above project datum described in the dredging specification with a positive sign and those below with a negative sign. The tag for vertical correction is “vert\_correction”. |
| 3.1.1.2.2 | The X, Y, and Z components of the cutter/suction head location shall be monitored. | Monitor the X, Y, and Z components of the cutter/suction head location. |
| 3.1.1.2.2.1 | The forwardmost point of the cutter/suction head shall be obtained using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values reported as negative. Position values shall be identified by the tags “ch\_latitude” and “ch\_longitude”. | Obtain the forwardmost point of the cutter/suction head using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values reported as negative. Identify position values by the tags “ch\_latitude” and “ch\_longitude”.  |
| 3.1.1.2.2.2 | Instrumentation shall be capable of reporting to an accuracy of ± 0.5 foot and a resolution to the nearest 0.1 foot with no tidal adjustments.  | Instrumentation must be capable of reporting to an accuracy of ± 0.5 foot and a resolution to the nearest 0.1 foot with no tidal adjustments. |
| 3.1.1.2.2.2 | The tag “ch\_depth” shall be used to identify the cutter/suction head depth. | Use the tag “ch\_depth” to identify the cutter/suction head depth. |
| 3.1.1.2.2.3 | All headings shall be provided using industry-standard equipment. The heading shall be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. The tag "ch\_heading" shall be used to identify the cutter/suction head heading. | Provide all headings using industry-standard equipment. The heading must be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. Use the tag “ch\_heading” to identify the cutter/suction head heading. |
| 3.1.1.2.3 | Dredge activity shall be monitored using a combination of the following parameters. | Monitor dredge activity using a combination of the following parameters. |
| 3.1.1.2.3.1 | A flow-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry velocity to the nearest 0.01 fps with an accuracy of ± 0.5 fps. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. The slurry velocity shall be measured for the same pipeline inside diameter as that used for the slurry density measurement. The tag “slurry\_velocity” shall be associated with this value. | Use a flow-metering device, calibrated according to the manufacturer's specifications, to record the slurry velocity to the nearest 0.01 fps with an accuracy of ± 0.5 fps. If the manufacturer does not specify a frequency of recalibration, conduct calibration prior to the commencement of work. Measure the slurry velocity for the same pipeline inside diameter as that used for the slurry density measurement. Associate the tag “slurry\_velocity” with this value. |
| 3.1.1.2.3.2 | A density-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry density of the material being moved to the nearest 0.01 g/cc. | Use a density-metering device, calibrated according to the manufacturer's specifications, to record the slurry density to the nearest 0.01 g/cc. |
| 3.1.1.2.3.2 | If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. | If the manufacturer does not specify a frequency of recalibration, conduct calibration prior to the commencement of work. |
| 3.1.1.2.3.2 | The tag “slurry\_density” shall be associated with this value.  | Associate the tag “slurry\_density” with this value. |
| 3.1.1.2.3.3 | The shaft revolution rate (rev/min) shall be measured with the highest level of accuracy that is standard on the vessel’s operational displays either at the bridge or in the engine room. This value shall be identified by the tag “rpm”. | Measure the shaft revolution rate (rev/min) with the highest level of accuracy that is standard on the vessel’s operational displays either at the bridge or in the engine room. Identify this value by the tag “rpm”. |
| 3.1.1.2.3.4 | The vacuum pressure of the dredge pump(s) (inches of mercury) shall be measured as near to the eye as practicable in the pump’s suction pipe with the highest level of accuracy that is standard on the vessel’s operational displays either at the leverman’s controls or in the engine room. Vacuum pressure shall be identified by the tag “vacuum”. | Measure the vacuum pressure of the dredge pump(s) (inches of mercury) as near to the eye as practicable in the pump’s suction pipe with the highest level of accuracy that is standard on the vessel’s operational displays either at the leverman’s controls or in the engine room. Identify vacuum pressure by the tag “vacuum”. |
| 3.1.1.2.3.5 | The pump outlet pressure shall be measured in the discharge line on the pump side of the flap valve in terms of pounds per square inch (psi) on a gauge. Pump outlet pressure shall be identified by the tag “outlet\_psi”. | Measure the pump outlet pressure in the discharge line on the pump side of the flap valve in terms of pounds per square inch (psi) on a gauge. Identify pump outlet pressure by the tag “outlet\_psi”. |
| 3.1.1.2.4 | The X and Y position of the terminal end of the outfall pipe shall be monitored continuously and the position reported as part of the work event string.  | Monitor the X and Y position of the terminal end of the outfall pipe continuously, and report the position as part of the work event string. |
| 3.1.1.2.4.1 | The horizontal position of the outfall end of the discharge pipe shall be obtained using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Position values shall be identified by the tags “outfall\_latitude” and “outfall\_longitude”. | Obtain the horizontal position of the outfall end of the discharge pipe using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Identify position values by the tags “outfall\_latitude” and “outfall\_longitude”. |
| 3.1.1.3 | Each type of state event message shall be indicated by a specific header tag as enumerated in the following subparagraphs. | Indicate each type of state event message by a specific header tag as enumerated in the following subparagraphs. |
| 3.1.1.3.1 | The leverman’s time shall be entered to the nearest second as local time and automatically converted to and reported in UTC based on a 24-hour format (YYYY-MM-DD HH:MM:SS). Message time shall be identified by the tag “msg\_time”. | Enter the leverman’s time to the nearest second as local time, and automatically convert it to and report it in UTC based on a 24-hour format (YYYY-MM-DD HH:MM:SS). Identify message time by the tag “msg\_time”. |
| 3.1.1.3.2 | Information concerning the contract under which dredging is being performed shall be reported at the start and completion of each contract using the header tag “contract\_event”. | Report information concerning the contract under which dredging is being performed at the start and completion of each contract using the header tag “contract\_event”. |
| 3.1.1.3.2.1 | The USACE-assigned contract number for the project shall be reported using the tag “contract\_number”. | Report the USACE-assigned contract number for the project using the tag “contract\_number”. |
| 3.1.1.3.2.2 | The start and end of a contract shall be reported using the tag “event\_type” with the appropriate value of “start” or “end”. | Report the start and end of a contract using the tag “event\_type” with the appropriate value of “start” or “end”. |
| 3.1.1.3.3 | Properties associated with the vertical correction (see Paragraph 3.1.1.1.3.1.1, “Vertical Correction”) for the tide station/river stage gage shall be grouped together under the header tag “station\_event”. This information shall be sent at the start of the contract and each time the dredge has moved enough to change the station being used. | Group together properties associated with the vertical correction (see paragraph VERTICAL CORRECTION) for the tide station/river stage gage under the header tag “station\_event”. This information must be sent at the start of the contract and each time the dredge has moved enough to change the station being used. |
| 3.1.1.3.3.1 | The station name is a concise name defining the tide station/river stage gage begin referred to. It shall be introduced by the tag “station\_name”, and it shall consist of a descriptor of no more than 25 characters.  | The station name is a concise name defining the tide station/river stage gage being referred to. It must be introduced by the tag “station\_name”, and it must consist of a descriptor of not more than 25 characters. |
| 3.1.1.3.4 | The leverman’s estimate of the length of pipe downflow from the dredge pump, measured to the nearest whole foot, shall be reported under the header tag “pipe\_length\_event”. This information shall be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time. | Report the leverman’s estimate of the length of pipe downflow from the dredge pump, measured to the nearest whole foot, under the header tag “pipe\_length\_event”. This information must be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time. |
| 3.1.1.3.4.1 | The total length of floating pipe shall be reported with the tag “length\_floating”. | Report the total length of floating pipe with the tag “length\_floating”. |
| 3.1.1.3.4.2 | The total length of submerged pipe shall be reported with the tag “length\_submerged”. | Report the total length of submerged pipe with the tag “length\_submerged”. |
| 3.1.1.3.4.3 | The total length of shore pipe shall be reported with the tag “length\_land”. | Report the total length of shore pipe with the tag “length\_land”. |
| 3.1.1.3.5 | Information concerning the booster pumps being used shall be included under the header tag “booster\_pump\_event”. A message shall be sent to indicate any change in the status of the booster pumps being used. | Include information concerning the booster pumps being used under the header tag “booster\_pump\_event”. A message must be sent to indicate any change in the status of the booster pumps being used. |
| 3.1.1.3.5.1 | Upon the addition or removal of a booster pump, the total number of booster pumps being used shall be reported with the tag “booster\_total”. | Upon the addition or removal of a booster pump, report the total number of booster pumps being used with the tag “booster\_total”. |
| 3.1.1.3.6 | The dredge advance, the total forward progress of the dredge relative to the centerline of the cut, shall be measured to the nearest whole foot and cumulatively calculated over a 24-hour period from midnight to midnight local time. It shall be identified by the tag “advance\_daily”. The msg\_time associated with this tag shall be reported as the first timestamp of the following 24-hour period (based on the local time) rather than as midnight of the day for which the value was calculated, and it shall be reported in Greenwich Mean Time (GMT).  | Measure the dredge advance, the total forward progress of the dredge relative to the centerline of the cut, to the nearest whole foot, and cumulatively calculate it over a 24‑hour period from midnight to midnight local time. Identify it by the tag “advance\_daily”. Report in Greenwich Mean Time (GMT) the msg\_time associated with this tag as the first timestamp of the following 24-hour period (based on the local time) rather than as midnight of the day for which the value was calculated. |
| 3.1.1.3.7 | The X and Y position of the terminal end of the outfall pipe shall be monitored and sent at the start of the contract and thereafter according to the following table.  | Monitor and send the X and Y position of the terminal end of the outfall pipe at the start of the contract and thereafter according to the following table. |
| 3.1.1.3.7 | For beach nourishment, the horizontal X and Y position of the outfall shall be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time. | For beach nourishment, the horizontal X and Y position of the outfall must be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time. |
| 3.1.1.3.7.1 | Information on where the slurry is being discharged shall be reported with the tag “outfall\_location”. | Report information on where the slurry is being discharged with the tag “outfall\_location”. |
| 3.1.1.3.7.2 | The horizontal position of the outfall end of the discharge pipe shall be obtained using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Position values shall be identified by the tags “outfall\_latitude” and “outfall\_longitude”. | Obtain the horizontal position of the outfall end of the discharge pipe using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Identify position values by the tags “outfall\_latitude” and “outfall\_longitude”. |
| 3.1.1.3.7.3 | All headings shall be provided using industry-standard equipment. They shall be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. The discharge heading shall be identified by the tag “outfall\_heading”. | Provide all headings using industry-standard equipment. They must be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. Identify the discharge heading by the tag “outfall\_heading”. |
| 3.1.1.3.7.4 | The tag “outfall\_elevation” shall be used to identify this elevation. | Use the tag “outfall\_elevation” to identify this elevation. |
| 3.1.1.3.8 | Delays and dredge downtime shall be reported at the conclusion of the event. The reason for the non-effective work time shall be submitted under the header tag “non\_eff\_event” within 24 hours of the event. | Report delays and dredge downtime at the conclusion of the event. Submit the reason for the non-effective work time under the header tag “non\_eff\_event” within 24 hours of the event. |
| 3.1.1.3.8.1 | The start and end times for the non-effective work event shall be reported using the tags “msg\_start\_time” and “msg\_end\_time”. | Report the start and end times for the non-effective work event using the tags “msg\_start\_time” and “msg\_end\_time”. |
| 3.1.1.3.8.2 | The dredge operator indication of production delays, as listed on Form 4267, shall be transmitted at the end of the non-effective interval. Dredge function event messages shall be identified by the tag “function\_code” and shall consist of one of the following standardized entries to indicate the operation:  | Transmit the dredge operator indication of production delays, as listed on Form 4267, at the end of the non-effective interval. Identify dredge function event messages by the tag “function\_code” and one of the following standardized entries to indicate the operation: |
| 3.1.1.3.8.3 | The “comment” tag shall be used to provide additional explanation for the noted delays or downtimes. For example, when the code “LDPV” (Loss Due to Passing Vessel) is indicated, the name of the vessel and the number of tows shall be listed with the “comment” tag. | Use the “comment” tag to provide additional explanation for the noted delays or downtimes. For example, when the code “LDPV” (Loss Due to Passing Vessel) is indicated, list the name of the vessel and the number of tows with the “comment” tag. |
| 3.2 | The computer system shall be a standalone system, exclusive to the DQM monitoring system, and shall have USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, then the Contractor shall be responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days. | Provide a standalone computer system, exclusive to the DQM monitoring system, with USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, the Contractor is responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days. |
| 3.2.1 | The Contractor shall provide a dedicated onboard computer for use by the Dredging Quality Management system. This computer shall run the USACE DQM software and receive data from the Contractor’s data-reporting interface. | Provide a dedicated onboard computer for use by the DQM system. This computer must run the USACE DQM software and receive data from the Contractor’s data-reporting interface. This computer must meet or exceed the following performance specifications: |
| 3.2.1 | The Contractor shall install a fully licensed copy of Windows 10 (or higher) Professional Operating System on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware. | Install a fully licensed copy of Windows 10 (or higher) Professional Operating System on the computer specified above. Also install any necessary manufacturer-provided drivers for the installed hardware. |
| 3.2.1 | This computer shall be located and oriented to allow data entry and data viewing as well as to provide access to data ports for connection of external hardware. | Locate and orient this computer to allow data entry and data viewing as well as to provide access to data ports for connection of external hardware. |
| 3.2.2 | No other software which conflicts with this function shall be installed on it. The DQM computer shall also have the USACE-provided Dredge Quality Management Onboard Software (DQMOBS) installed on it by DQM personnel. | Do not install software which conflicts with this function on this computer. The DQM computer must have the USACE-provided Dredging Quality Management Onboard Software (DQMOBS) installed on it by DQM personnel. |
| 3.2.3 | The Contractor shall supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. It shall interface with the DQM computer to communicate UPS status, and it shall provide backup power at 1 kVA for a minimum of 10 minutes. The Contractor shall ensure that sufficient power outlets are available to run all specified equipment. | Supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. It must interface with the DQM computer to communicate UPS status, and it must provide backup power at 1 kVA for a minimum of 10 minutes. Ensure that sufficient power outlets are available to run all specified equipment. |
| 3.2.4 | A web service shall be used to report sensor data to the DQM database. Data shall be transmitted as it is collected in real time and pushed to the DQM web service. If the web service is not available or returns an error message, the data shall be stored in a queue and transmitted upon re-establishment of the connection, starting with the oldest data in the queue and continuing until real-time transmission is restored. | Use a web service to report sensor data to the DQM database. Transmit data as it is collected in real time, and push it to the DQM web service. If the web service is not available or returns an error message, store the data in a queue, and transmit it upon re-establishment of the connection, starting with the oldest data in the queue and continuing until real-time transmission is restored. |
| 3.2.5 | The Contractor shall maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. If connectivity is lost, unsent data shall be queued and transmitted upon restoration of connectivity. | Maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. If connectivity is lost, queue and transmit unsent data upon restoration of connectivity. |
| 3.2.5 | The Contractor shall acquire and install all necessary hardware and software to make the Internet connection available for data transmission to the DQM web service. The hardware and software shall be configured to allow the DQM Support Center remote access to this computer, and the telemetry system shall be capable of meeting these minimum reporting requirements in all operating conditions. | Acquire and install all necessary hardware and software to make the Internet connection available for data transmission to the DQM web service. Configure the hardware and software to allow the DQM Support Center remote access to this computer. The telemetry system must be capable of meeting these minimum reporting requirements in all operating conditions. |
| 3.2.6 | Portions of this Contractor-collected information, as described in this specification, shall be routed to DQM on a real-time basis, utilizing one of the options outlined in sections 3.2.1 through 3.2.5. If the serial transmission option is used, sensor data shall be sent to the DQM computer via an RS-232 serial interface with a baud rate of 9600 or 19200 bps. The serial interface shall be configured as 8 bits, no parity, and no flow control. | Portions of this Contractor-collected information, as described in this specification, must be routed to the DQM computer on a real-time basis, utilizing one of the two options outlined earlier in this section. If the serial transmission option is used, use an RS-232 serial interface with a baud rate of 9600 or 19200 bps to send standard sensor data to the DQM computer. Configure the serial interface as 8 bits, no parity, and no flow control. |
| 3.2.6 | Information regarding changes in the state of the dredge shall be digitally logged and transmitted as close to the time of the occurrence as possible. These events can be included in a separate message bundle transmitted to DQM, entered on the “State” tab in the DQM Pipeline Software, or entered online in the DQM State Data Tool. | Digitally log and transmit information regarding changes in the state of the dredge as close to the time of the occurrence as possible. These events can be included in a separate message bundle going to the DQM onboard computer, entered on the “State” tab in the DQM Pipeline Software, or entered online in the DQM State Data Tool. |
| 3.3.1 | Portions of this Contractor-collected information, as described in this specification, and calculations based on them shall be stored and transmitted to the DQM database on a near real-time basis. Additionally, information regarding the state of the dredge shall be digitally logged and transmitted. | Store and transmit portions of this Contractor-collected information, as described in this specification, and calculations based on them to the DQM database on a near real-time basis. Additionally, digitally log and transmit information regarding the state of the dredge. |
| 3.3.2.1 | Data shall be logged as a series of events. Each event shall consist of a dataset containing dredge information (as defined in Paragraph 3.1, “Requirements for Reported Data”). Each set of measurements (for example, time and position) shall be considered an event, and there shall be a 6-12 second interval between work events. This interval shall remain consistent across event types for the dredge plant. | Log data as a series of events. Each event must consist of a dataset containing dredge information (as defined in paragraph REQUIREMENTS FOR REPORTED DATA). Consider each set of measurements (for example, time and position) an event, with a 6-12 second interval between work events. This interval must remain consistent across event types for the dredge plant. |
| 3.3.2.1 | A standard data string shall be recorded within one second of an event trigger with the time stamp and all parameters reflecting when the event happened. | Record a standard data string within one second of an event trigger with the time stamp and all parameters reflecting when the event happened. |
| 3.3.2.2 | A set of descriptive information (event name, time, description, comment) shall be considered a state event. These events shall be recorded within 24 hours of a change in state with the time stamp reflecting when the event happened. | Consider a set of descriptive information (event name, time, description, comment) a state event. Record these events within 24 hours of a change in state with the time stamp reflecting when the event happened. |
| 3.3.3 | The data shall be formatted as JSON (JavaScript Object Notation, as defined at <http://www.json.org>) strings of arbitrary length. | Format the data as JSON (JavaScript Object Notation, as defined at <http://www.json.org>) strings of arbitrary length. |
| 3.3.3 | No “Null” value strings shall be included in a message bundle. | Do not include “Null” value strings in a message bundle. |
| 3.3.4 | The Contractor shall maintain an archive of all data sent to the DQM computer during the permit. | Maintain an archive of all data sent to the DQM computer during the permit. |
| 3.3.4 | The data shall be provided in the same JSON format as would have been transmitted to the DQM computer. There shall be no line breaks between the parameters, and each record string shall be on separate line. The naming convention for the files shall be <dredgename>\_<StartYYYYMMddhhmmss>\_<EndYYYYMMddhhmmss>.txt. Data submission shall be via a storage medium acceptable to the Permit Project Manager. | Provide the data in the same JSON format as would have been transmitted to the DQM computer. There must be no line breaks between the parameters, and each record string must be on a separate line. The naming convention for the files must be <dredgename>\_<StartYYYYMMddhhmmss>\_<EndYYYYMMddhhmmss>.txt. Data submission must be via a storage medium acceptable to the Permit Project Manager. |
| 3.3.4 | At the end of the dredging contract, the Contractor shall contact the DQM Support Center prior to discarding the data. | At the end of the dredging contract, call the DQM Support Center prior to discarding the data. |
| 3.3.4 | The Contractor shall then record the following information in a separate section at the end of the dredge’s onboard copy of the DPIP: | Record the following information in a separate section at the end of the dredge’s onboard copy of the DPIP: |
| 3.4 | The Contractor’s National Dredging Quality Management Program’s data transmission shall be fully operational at the start of dredging operations. To meet specification requirements for operability, the Contractor’s system shall provide an accurate data string return and be compliant with hardware requirements. | The Contractor’s National Dredging Quality Management Program data transmission must be fully operational at the start of dredging operations. To meet specification requirements for operability, the Contractor’s system must provide an accurate data string return and be compliant with hardware requirements. |
| 3.4 | Repairs necessary to restore data return compliance shall be made within two business days, or a plan and timeline for repair shall be submitted if the repair will take more than two business days. Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see Paragraph 3.2.4, “Internet Access”; Paragraph 3.3.2, “Data Measurement Frequency”; and Paragraph 3.3.3, “Parameter Transmission to the Web Service”) will result in withholding of up to 10% of the contract progress payment per clause 52.232-5. | Make repairs necessary to restore data return compliance within two business days, or submit a plan and timeline for repair if the repair will take more than two business days. Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see paragraphs INTERNET ACCESS, DATA MEASUREMENT FREQUENCY, and PARAMETER TRANSMISSION TO THE WEB SERVICE) will result in withholding of up to 10% of the contract progress payment per FAR clause 52.232-5. |
| 3.5 | LIST OF ITEMS PROVIDED BY THE CONTRACTOR | LIST OF ITEMS TO BE PROVIDED BY THE CONTRACTOR |

| ***Sec. No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 05-12-2023*** |
| *3.2* | *The Contractor’s DQM system shall be capable of collecting and transmitting information to the DQM onboard computer. The applicable parameters from Paragraph 3.1, “Requirements for Reported Data,” shall be recorded as events locally and continuously transmitted to the DQM database anytime an Internet connection is available.**The dredge shall be equipped with a DQM computer system consisting of a computer, monitor, keyboard, mouse, data modem, Universal Power Supply (UPS), and network hub. The computer system shall be a standalone system, exclusive to the DQM monitoring system, and shall have USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, then the Contractor shall be responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days.* | *The Contractor’s DQM system shall be capable of collecting and transmitting data to the DQM system. The applicable parameters from Paragraph 3.1, “Requirements for Reported Data,” shall be recorded as events locally and continuously transmitted to the DQM database anytime an Internet connection is available.* *To accomplish this transmission, there are two options. The first option is to equip the vessel with a DQM computer system consisting of a computer, monitor, keyboard, mouse, data modem, Universal Power Supply (UPS), and network hub. The required system is outlined in section 3.2.1 through 3.2.3. The computer system shall be a standalone system, exclusive to the DQM monitoring system, and shall have USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, then the Contractor shall be responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days.**The second option is to send data directly to DQM’s web endpoint as outlined in section 3.2.4.* |
| *3.2.1* | *Computer Requirements* | *Option 1: Computer Requirements* |
| *3.2.1* | *The Contractor shall install a fully licensed copy of Windows 7 Professional Operating System or later on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware.* | *The Contractor shall install a fully licensed copy of Windows 10 (or higher) Professional Operating System on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware.* |
| *3.2.4* | *[This is a new section; the text originally in this section was renumbered to 3.2.5.]* | *Option 2: Direct Data Transmissions to the DQM Web Service**A web service shall be used to report sensor data to the DQM database. Data shall be transmitted as it is collected in real time and pushed to the DQM web service. If the web service is not available or returns an error message, the data shall be stored in a queue and transmitted upon re-establishment of the connection, starting with the oldest data in the queue and continuing until real-time transmission is restored.* *Contact dqm-support@usace.army.mil to obtain the web service URL and the appropriate key credentials and communication protocol.**If this option is chosen, a display of the raw data being transmitted to DQM must be easily accessible and visible onboard the dredge.* |
| *3.2.5* | *3.2.4* | *3.2.5* |
| *3.2.6* | *3.2.5* | *3.2.6* |
| *3.2.6* | *Onboard sensors continually monitor dredge conditions, operations, and efficiency and route this information to the shipboard dredge-specific system (DSS) computer to assist in guiding dredge operations. Portions of this Contractor-collected information, as described in this specification, shall be routed to the DQM computer on a real-time basis. Standard sensor data shall be sent to the DQM computer via an RS-232 serial interface with a baud rate of 9600 or 19200 bps. The serial interface shall be configured as 8 bits, no parity, and no flow control.**Information regarding changes in the state of the dredge shall be digitally logged and transmitted as close to the time of the occurrence as possible. These events can either be included in a separate message bundle going to the DQM onboard computer, or they can be entered on the “State” tab in the DQM Pipeline Software.* | *Onboard sensors continually monitor dredge conditions, operations, and efficiency and route this information to the shipboard dredge-specific system (DSS) computer to assist in guiding dredge operations. Portions of this Contractor-collected information, as described in this specification, shall be routed to DQM on a real-time basis, utilizing one of the options outlined in sections 3.2.1 through 3.2.5. If the serial transmission option is used, sensor data shall be sent to the DQM computer via an RS-232 serial interface with a baud rate of 9600 or 19200 bps. The serial interface shall be configured as 8 bits, no parity, and no flow control.**Information regarding changes in the state of the dredge shall be digitally logged and transmitted as close to the time of the occurrence as possible. These events can be included in a separate message bundle transmitted to DQM, entered on the “State” tab in the DQM Pipeline Software, or entered online in the DQM State Data Tool.* |
| *3.3.3* | *{* *"DQM\_Data": {* *"messages": [* | *{* *"DQM\_Data": {* *"plant\_identifier": <integer value* *0000-9999>,* *"transmission\_time": <24-hour UTC* *Time YYY-MM-DD HH:MM:SS>,* *"messages": [* |

| ***Sec. No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 03-12-2021*** |
| *3.1.1.3.4.2* | *The total length of floating pipe shall be reported with the tag “length\_submerged”.* | *The total length of submerged pipe shall be reported with the tag “length\_submerged”.* |

| ***Sec. No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 03-11-2020*** |
| *1.2* | *Dredge Plant Instrumentation Plan Revisions or Addendum; CESAM-OP-J*  | *[Deleted]* |

| ***Sec. No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 10-01-2019*** |
| *3.1.1.3* | *There are two types of dredge event messages—work event messages and state event messages. State event messages provide information about the current state of the dredge equipment or operations. They are created and sent only when a state changes. Since state events often cannot be collected in real time, state events are tagged with a date time stamp (referenced to Coordinated Universal Time [UTC]) that indicates when the state change happened relative to the work event message tag. This data is considered to be “true” until another state event tag is received. Each type of state event message shall be indicated by a specific header tag as enumerated in the following subparagraphs. State events can be transmitted along with work event message bundles directly by the contractor using the indicated format, or they can be entered on the “State” tab in the DQM-provided software.* | *There are two types of dredge event messages—work event messages and state event messages. State event messages provide information about the current state of the dredge equipment or operations. They are created and sent only when a state changes. Since state events often cannot be collected in real time, state events are tagged with a date time stamp (referenced to Coordinated Universal Time [UTC]) that indicates when the state change happened relative to the work event message tag. This data is considered to be “true” until another state event tag of the same type is received. Each type of state event message shall be indicated by a specific header tag as enumerated in the following subparagraphs. State events can be transmitted along with work event message bundles directly by the contractor using the indicated format, or they can be entered on the “State” tab in the DQM-provided software. However, they should be sent only if the state value changes.* |

| ***Sec. No.*** | ***Original Text*** | ***Revised Text*** |
| --- | --- | --- |
| ***Revisions made 08-30-2019*** |
| *Pages 1-4* | *[None]* | *\*THIS GUIDANCE SHOULD NOT BE INCLUDED IN THE CONTRACT\***Annual QA checks are required by the DQM Support Center for each pipeline and, unless explicitly stated by the local USACE District, should be completed prior to material being moved. Instrumentation upgrades during the year shall necessitate an additional QA check.**Specification Revisions**This section tracks all additions, deletions, and other revisions made to this document.**[Revisions list]**\*THIS GUIDANCE SHOULD NOT BE INCLUDED IN THE CONTRACT\**  |
| *1.2* | *• Data Appropriately Archived email, Paragraph 3.3.4 (“Contractor Data Backup”)* | *[Deleted]* |
| *3.1.1.2.3.1* | *Slurry Velocity* *A flow-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry velocity to the nearest 0.01 fps with an accuracy of + 0.1 fps. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. The slurry velocity shall be measured for the same pipeline inside diameter as that used for the slurry density measurement. The tag “slurry\_velocity” shall be associated with this value.* | *Slurry Velocity* *A flow-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry velocity to the nearest 0.01 fps with an accuracy of + 0.5 fps. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. The slurry velocity shall be measured for the same pipeline inside diameter as that used for the slurry density measurement. The tag “slurry\_velocity” shall be associated with this value.* |
| *3.1.1.2.3.2* | *A density-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry density to the nearest 0.001 g/cc.* | *A density-metering device, calibrated according to the manufacturer's specifications, shall be used to record the slurry density of the material being moved to the nearest 0.01 g/cc.* |
| *3.2.1* | * *CPU: Intel or AMD processor with a (non-overclocked) clock speed of at least 1.8 gigahertz (GHz)*
* *Hard drive: 250 gigabytes (GB); internal*
* *RAM: 4 gigabytes (GB)*
* *Ethernet adapter: 10 or 100 megabit (Mbit) internal network card with an RJ 45 connector*
* *Video adapter: Must support a resolution of 1024x768 at 16-bit color depth*
* *Keyboard: Standard 101-key keyboard*
* *Mouse: Standard 2-button mouse*
* *Monitor: Must support a resolution of 1024x768 at 16-bit color depth*
* *Ports: 2 free serial ports with standard 9-pin connectors; 1 free USB port*
* *Other hardware: Category 5 (Cat-5) cable with standard RJ-45 plugs connecting the network adapter to the network hub; 1 spare cable*
 | * *CPU: Intel or AMD processor with a (non-overclocked) clock speed of at least 1.6 gigahertz (GHz)*
* *Hard drive: 250 gigabytes (GB); internal*
* *RAM: 4 gigabytes (GB)*
* *Ethernet adapter: Internal network card with an RJ 45 connector*
* *Ports: 1 free serial port with standard 9-pin connectors; 1 free USB port*
* *Other hardware: Keyboard, mouse, monitor*
 |
| *3.2.1* | *The Contractor shall install a fully licensed copy of Windows 7 Professional Operating System on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware.* | *The Contractor shall install a fully licensed copy of Windows 7 Professional Operating System or later on the computer specified above. The Contractor shall also install any necessary manufacturer-provided drivers for the installed hardware.* |
| *3.2.4* | *The Contractor shall maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. The telemetry system shall always be available and have connectivity in the contract area. If connectivity is lost, unsent data shall be queued and transmitted upon restoration of connectivity.* | *The Contractor shall maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. If connectivity is lost, unsent data shall be queued and transmitted upon restoration of connectivity. Delays in pushing real-time data to the DQM database should not exceed four hours. Exceptions to these requirements may be granted by the DQM Support Center on a case-by-case basis with consideration for contract-specific requirements, site-specific conditions, and extreme weather events.* |
| *3.3.4* | *[…] At the end of the dredging contract, the Contractor shall call the DQM Support Center prior to discarding the data to ensure that it has been appropriately archived. The Contractor shall record the following information in a separate section at the end of the dredge’s onboard copy of the DPIP:**• Person who called the DQM Support Center**• Date of the call**• DQM representative who gave permission to discard the data**On the same day that the call is made, but prior to discarding the data, the Contractor shall submit a “Data Appropriately Archived” email to the local USACE District’s COR with the above information and cc: the DQM Support Center representative who granted the permission. In addition to the above information, the following shall also be included in the email:* *• Project name and contract number**• Dredge start and end dates**• Name of the dredge* | *[…] At the end of the dredging contract, the Contractor shall contact the DQM Support Center prior to discarding the data. The DQM Support Center will verify that all data has been received and appropriately archived before giving the Contractor discard permission. The Contractor shall then record the following information in a separate section at the end of the dredge’s onboard copy of the DPIP:**• Person who called the DQM Support Center**• Date of the call**• DQM representative who gave permission to discard the data* |
| *3.4* | *Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see Paragraph 3.2.4, “Internet Access”; Paragraph 3.3.2, “Data Measurement Frequency”; and Paragraph 3.3.3, “Parameter Transmission to the Web Service”) may result in withholding of up to 10% of the contract progress payment per clause 52.232-5.* | *Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see Paragraph 3.2.4, “Internet Access”; Paragraph 3.3.2, “Data Measurement Frequency”; and Paragraph 3.3.3, “Parameter Transmission to the Web Service”) will result in withholding of up to 10% of the contract progress payment per clause 52.232-5.* |
| *3.5* | *QUALITY ASSURANCE CHECKS* *Quality assurance (QA) checks are a part of the DQM dredge certification procedure. They are required prior to the commencement of dredging and, at the discretion of the COR, periodically throughout the duration of the contract. The SOP and criteria for QA checks are presented on the DQM website (https://dqm.usace.army.mil).* | *[Deleted]* |
| *3.6* | *CONTRACTOR QUALITY CONTROL**The Dredging Contractor shall designate a Quality Control Systems Manager (QCSM), who shall develop and maintain daily procedures to ensure quality control (QC) of the dredge Contractor’s DQM system. These methods shall include the procedure by which data being collected is checked against known values, and verification that the telemetry is functioning. These procedures shall be outlined in the DPIP and submitted prior to the Notice to Proceed. In the event a Contractor Quality Control (CQC) Report is required, daily annotations shall be made in the Daily CQC Report, documenting all actions taken on each day of work, including all deficiencies found and the corrective actions taken.* | *[Deleted]* |
| *3.7* | *DPIP: Paragraph 1.5, “Dredge Plant Instrumentation Plan (DPIP)”* | *DPIP: https://dqm.usace.army.mil* |

***\*THIS GUIDANCE SHOULD NOT BE INCLUDED IN THE CONTRACT\****



SECTION 35 20 23.33

NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM
PIPELINE HYDRAULIC DREDGE SPECIFICATION
08-04-2023

# PART 1 GENERAL

# 1.1 DESCRIPTION

This permit requires use of the US Army Corps of Engineers (USACE) National Dredging Quality Management Program (DQM) to monitor the dredge’s status at all times during this permit and manage data history.

This performance-based specification section identifies the minimum required output as well as the precision and instrumentation requirements. The requirements may be satisfied using equipment and technical procedures selected by the Contractor.

# 1.2 SUBMITTALS

* Contractor Quality Control Plan, paragraph CONTRACTOR QUALITY CONTROL
* National Dredging Quality Management Program Certification

# 1.3 PAYMENT

Not used.

# 1.4 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM CERTIFICATION

The Contractor is required to have a current certification from the DQM Program for the cutter/suction head hydraulic dredge instrumentation system to be used under this permit. Standard Operating Procedures (SOP) and criteria for certification are presented on the DQM website (<https://dqm.usace.army.mil>).

# 1.5 DREDGE PLANT INSTRUMENTATION PLAN (DPIP)

The Contractor must have a digital copy of the Dredge Plant Instrumentation Plan (DPIP) on file with the DQM Support Center. While working on site, the Contractor must also maintain on the dredge a copy of the DPIP, which is easily accessible to Government personnel at all times. This document must accurately describe the sensors used, the configuration of the system, how sensor data will be collected, how quality control on the data will be performed, and how the sensors/data-reporting equipment will be calibrated and repaired if it fails. A description of the computed dredge-specific data and how the sensor data will be transmitted to the DQM database must also be included. Prior to the start of work, the Contractor must submit to the DQM Support Center any addendum or modifications made to the plan subsequent to its original submission. Requirements and a template for the DPIP are available on the DQM website (<https://dqm.usace.army.mil>).

# PART 2 PRODUCTS

Not used.

# PART 3 EXECUTION

# 3.1 REQUIREMENTS FOR REPORTED DATA

Provide, operate, and maintain all hardware and software to meet these specifications. The Contractor is also responsible for the replacement, repair, and calibration of the sensors and other necessary data acquisition equipment needed to supply the required data.

Document and complete the procedure to complete a repair as soon as practical. If repair is not possible within two business days of any sensor failure, submit a plan and timeline to complete the repair. Upon completion of a repair, replacement, installation, modification, or calibration, notify the Permit Project Manager. In consultation with the DQM Support Center, the Permit Project Manager may request recalibration of the sensors or other hardware components at any time during the permit as deemed necessary.

Keep a log of sensor repair, replacement, installation, modification, and calibration in the dredge’s onboard copy of the DPIP. The log must contain a three-year history of sensor maintenance, including the time of the sensor failures (and subsequent repairs), the time and results of sensor calibrations, the time of sensor replacements, and the time that backup sensor systems were initiated to provide the required data. It must also contain the name of the person responsible for the sensor work.

Install sensors that are capable of collecting parameters within the specified accuracies and resolutions indicated in the following subparagraphs and transmit these parameters to the DQM database. Transmit all data in JSON message bundles. Each bundle can contain multiple message types. Transmit sensor data as work event messages, and transmit data which relates to the operational state of the dredge or its sensors as state event messages. (See paragraph PARAMETER TRANSMISSION TO THE WEB SERVICE.)

# 3.1.1 Message Bundle Data

Every message bundle must contain descriptive data that relates the message to a given dredge plant and date/time. Identify the start of a message bundle by the tag “DQM\_data”.

# 3.1.1.1 Messages

Messages contain operational data that populates the DQM database for a dredge plant. A message must consist of an event type and its associated data (as defined in paragraph DREDGE EVENTS—WORK EVENTS and paragraph DREDGE EVENTS—STATE EVENTS), a date/time stamp indicating when the event occurred or started, and a comment providing clarification or metadata about the situation. There are multiple event types, but they all fall into one of two categories—work events and state events.

# 3.1.1.1.1 Message Time

In a work event message, message time is the date and time that the data is collected from the sensors; in a state event message, message time is the date and time that the state event begins. Report the message time to the nearest second, and reference it to Coordinated Universal Time (UTC) time based on a 24-hour format (YYYY-MM-DD HH:MM:SS). In order to ensure accuracy and reliability, synchronize the time stamp to UTC format from an accurate, unchangeable source (for example, a GPS National Marine Electronics Association [NMEA] datastring). Identify message time by the tag “msg\_time”.

# 3.1.1.1.2 Comment

Comments concerning the work event or state event messages being transmitted provide descriptive information that relates to the data. An example of a comment for work event data is information about a sensor issue; an example of a comment for state event data is a description of operations. Identify a comment by the introductory tag “comment”, and limit it to no more than 250 characters.

# 3.1.1.2 Dredge Events—Work Event

There are two types of dredge event messages—work event messages and state event messages. Work event messages contain data that are instantaneously collected or calculated from sensors and are logged as a series of events.

Work events are triggered by a time interval change (as described in paragraph WORK EVENT MESSAGES). Initiate all work event messages by the header tag “work\_event”.

# 3.1.1.2.1 Vertical Correction

Obtain the variation of the water level from the vertical datum for the river stage or tidal gage described in the state events using appropriate equipment to give the water level with an accuracy of ± 0.1 foot. Enter vertical correction values above project datum described in the dredging specification with a positive sign and those below with a negative sign. The tag for vertical correction is “vert\_correction”.

# 3.1.1.2.2 Cutter/Suction Head Location and Movement

Monitor the X, Y, and Z components of the cutter/suction head location. Additional calculations made from the observed values determine the rates of movement to track the progress of the dredge.

# 3.1.1.2.2.1 Cutter/Suction Head Horizontal Position

Obtain the forwardmost point of the cutter/suction head using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values reported as negative. Identify position values by the tags “ch\_latitude” and “ch\_longitude”.

# 3.1.1.2.2.2 Cutter/Suction Invert Depth

Cutter/suction invert depth is the depth of the invert of the suction mouth relative to the surface of the water. Instrumentation must be capable of reporting to an accuracy of ± 0.5 foot and a resolution to the nearest 0.1 foot with no tidal adjustments. Minimum accuracies are conditional to relatively calm water. Use the tag “ch\_depth” to identify the cutter/suction head depth.

# 3.1.1.2.2.3 Cutter/Suction Head Heading

The cutter/suction head heading is the angle of the centerline of the cutter/suction head and dredge ladder measured relative to true north. Provide all headings using industry-standard equipment. The heading must be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. Use the tag “ch\_heading” to identify the cutter/suction head heading.

# 3.1.1.2.3 Dredge Activity

Monitor dredge activity using a combination of the following parameters.

# 3.1.1.2.3.1 Slurry Velocity

Use a flow-metering device, calibrated according to the manufacturer's specifications, to record the slurry velocity to the nearest 0.01 fps with an accuracy of ± 0.5 fps. If the manufacturer does not specify a frequency of recalibration, conduct calibration prior to the commencement of work. Measure the slurry velocity for the same pipeline inside diameter as that used for the slurry density measurement. Associate the tag “slurry\_velocity” with this value.

# 3.1.1.2.3.2 Slurry Density

Use a density-metering device, calibrated according to the manufacturer's specifications, to record the slurry density to the nearest 0.01 g/cc. It is understood that the accuracy of this sensor can vary based on several factors, including the type of material, the magnitude of the cut, and the length of time since calibration. If the manufacturer does not specify a frequency of recalibration, conduct calibration prior to the commencement of work. Continuous monitoring of this sensor ensures that drift and other factors inherent in the dredging process can be accounted for in monitoring dredge activity. Associate the tag “slurry\_density” with this value.

# 3.1.1.2.3.3 Pump RPM

The pump rpm is the number of revolutions per minute measured for the slurry pump shaft. Measure the shaft revolution rate (rev/min) with the highest level of accuracy that is standard on the vessel’s operational displays either at the bridge or in the engine room. Identify this value by the tag “rpm”.

# 3.1.1.2.3.4 Pump Vacuum

Measure the vacuum pressure of the dredge pump(s) (inches of mercury) as near to the eye as practicable in the pump’s suction pipe with the highest level of accuracy that is standard on the vessel’s operational displays either at the leverman’s controls or in the engine room. Identify vacuum pressure by the tag “vacuum”.

# 3.1.1.2.3.5 Pump Outlet Pressure

Measure the pump outlet pressure in the discharge line on the pump side of the flap valve in terms of pounds per square inch (psi) on a gauge. Identify pump outlet pressure by the tag “outlet\_psi”.

# 3.1.1.2.4 Outfall Information (Open Water/Spill Barge Disposal)

Monitor the X and Y position of the terminal end of the outfall pipe continuously, and report the position as part of the work event string.

# 3.1.1.2.4.1 Discharge Horizontal Position

Obtain the horizontal position of the outfall end of the discharge pipe using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Identify position values by the tags “outfall\_latitude” and “outfall\_longitude”.

# 3.1.1.3 Dredge Events—State Event

There are two types of dredge event messages—work event messages and state event messages. State event messages provide information about the current state of the dredge equipment or operations. They are created and sent only when a state changes. Since state events often cannot be collected in real time, state events are tagged with a date time stamp (referenced to Coordinated Universal Time [UTC]) that indicates when the state change happened relative to the work event message tag. This data is considered to be “true” until another state event tag of the same type is received. Indicate each type of state event message by a specific header tag as enumerated in the following subparagraphs. State events can be transmitted along with work event message bundles directly by the contractor using the indicated format, or they can be entered on the “State” tab in the DQM-provided software. However, they should be sent only if the state value changes.

# 3.1.1.3.1 Message Time

The state event time is the date and time that the event starts. Enter the leverman’s time to the nearest second as local time, and automatically convert it to and report it in UTC based on a 24-hour format (YYYY-MM-DD HH:MM:SS). Identify message time by the tag “msg\_time”.

# 3.1.1.3.2 Contract Event

Report information concerning the contract under which dredging is being performed at the start and completion of each contract using the header tag “contract\_event”.

# 3.1.1.3.2.1 Contract Number

Report the USACE-assigned contract number for the project using the tag “contract\_number”.

# 3.1.1.3.2.2 Contract Start and End

Report the start and end of a contract using the tag “event\_type” with the appropriate value of “start” or “end”.

# 3.1.1.3.3 Tide Station/River Stage Gage Event

Group together properties associated with the vertical correction (see paragraph VERTICAL CORRECTION) for the tide station/river stage gage under the header tag “station\_event”. This information must be sent at the start of the contract and each time the dredge has moved enough to change the station being used.

# 3.1.1.3.3.1 Station Name

The station name is a concise name defining the tide station/river stage gage being referred to. It must be introduced by the tag “station\_name”, and it must consist of a descriptor of not more than 25 characters.

# 3.1.1.3.4 Length of Pipe Event

Report the leverman’s estimate of the length of pipe downflow from the dredge pump, measured to the nearest whole foot, under the header tag “pipe\_length\_event”. This information must be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time.

# 3.1.1.3.4.1 Floating Pipe

Report the total length of floating pipe with the tag “length\_floating”.

# 3.1.1.3.4.2 Submerged Pipe

Report the total length of submerged pipe with the tag “length\_submerged”.

# 3.1.1.3.4.3 Shore Pipe

Report the total length of shore pipe with the tag “length\_land”.

# 3.1.1.3.5 Booster Pump Event

Include information concerning the booster pumps being used under the header tag “booster\_pump\_event”. A message must be sent to indicate any change in the status of the booster pumps being used.

# 3.1.1.3.5.1 Number of Booster Pumps

Upon the addition or removal of a booster pump, report the total number of booster pumps being used with the tag “booster\_total”.

# 3.1.1.3.6 Dredge Advance

Measure the dredge advance, the total forward progress of the dredge relative to the centerline of the cut, to the nearest whole foot, and cumulatively calculate it over a 24‑hour period from midnight to midnight local time. Identify it by the tag “advance\_daily”. Report in Greenwich Mean Time (GMT) the msg\_time associated with this tag as the first timestamp of the following 24-hour period (based on the local time) rather than as midnight of the day for which the value was calculated.

# 3.1.1.3.7 Outfall Information

Monitor and send the X and Y position of the terminal end of the outfall pipe at the start of the contract and thereafter according to the following table. Discharge Heading and Pipe Elevation may be omitted if the dredge is not discharging into an upland disposal site. For beach nourishment, the horizontal X and Y position of the outfall must be sent at the start of the contract and at the completion of each 24-hour period ending at midnight local time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Discharge Location** | **Horizontal Position** | **Discharge Pipe Elevation** | **Discharge Outfall Heading** |
| **Open Water** | Continuous Work Event | N/A | N/A |
| **Scow** | Upon Change | N/A | N/A |
| **Beach** | Every 24 Hours | N/A | N/A |
| **Upland** | Upon Change | Upon Change | Upon Change |

# 3.1.1.3.7.1 Discharge Location

Report information on where the slurry is being discharged with the tag “outfall\_location”. Acceptable values include “upland”, “open water”, “beach”, and “scow”.

# 3.1.1.3.7.2 Discharge Horizontal Position

Obtain the horizontal position of the outfall end of the discharge pipe using a positioning system operating with a minimum accuracy level of 3‑10 feet horizontal Circular Error Probable (CEP). Report it as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Identify position values by the tags “outfall\_latitude” and “outfall\_longitude”.

# 3.1.1.3.7.3 Discharge Outfall Heading

The discharge outfall heading is the angle relative to true north measured from the centerline of the pipe in the direction of discharge. Provide all headings using industry-standard equipment. They must be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. Identify the discharge heading by the tag “outfall\_heading”.

# 3.1.1.3.7.4 Discharge Pipe Elevation

The discharge pipe elevation is the height of the outfall measured in feet and tenths of a foot relative to the project datum. The required accuracy is contingent upon contract requirements. Use the tag “outfall\_elevation” to identify this elevation.

# 3.1.1.3.8 Non-effective Work Event

Report delays and dredge downtime at the conclusion of the event. Submit the reason for the non-effective work time under the header tag “non\_eff\_event” within 24 hours of the event.

# 3.1.1.3.8.1 Non-effective Work Interval

Report the start and end times for the non-effective work event using the tags “msg\_start\_time” and “msg\_end\_time”.

# 3.1.1.3.8.2 Dredge Function Code

Transmit the dredge operator indication of production delays, as listed on Form 4267, at the end of the non-effective interval. Identify dredge function event messages by the tag “function\_code” and one of the following standardized entries to indicate the operation:

* AGV Assisting Grounded Vessels
* CCH Change Cutterhead
* CCSH Clear Cutter Suction
* CLPJ Change Location Bar
* COLL Collision
* CPPL Clear Pump Pipeline
* CPR Change Impeller
* DR Dike Repair
* FBD Fire Boat Drills
* HPL Handling Pipe Line
* HSL Handling Swing Line
* HSP Handling Shore Pipe
* LDNE Loss Due to Natural Elements
* LDPV Loss Due to Passing Vessel
* LNL Transfer to New Location
* MISC Miscellaneous
* MOB Mobilization & Demobilization
* MSC Miscellaneous/Non-pay
* OC Out of Commission
* OR Operating Repairs
* P Preparation
* PREP Preparation & Making Up Tow
* RPL Repair Pipeline
* SB Sounding & Buoying
* SBT Stand-By Time as Directed
* SH Sundays-Holidays
* TFS Taking on Fuel & Supplies
* TOW Time on Tow
* WAP Waiting Attendant Plant

# 3.1.1.3.8.3 Additional Comments

Use the “comment” tag to provide additional explanation for the noted delays or downtimes. For example, when the code “LDPV” (Loss Due to Passing Vessel) is indicated, list the name of the vessel and the number of tows with the “comment” tag.

# 3.2 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SYSTEM REQUIREMENTS

The Contractor’s DQM system must be capable of collecting and transmitting information to the DQM system. Record the applicable parameters from paragraph REQUIREMENTS FOR REPORTED DATA as local events and transmit continuously to the DQM database anytime an Internet connection is available.

To accomplish this transmission, there are two options. The first option is to equip the vessel with a DQM computer system consisting of a computer, monitor, keyboard, mouse, data modem, Universal Power Supply (UPS), and network hub. The required system is outlined in paragraphs OPTION 1: COMPUTER REQUIREMENTS, SOFTWARE, and UPS. Provide a standalone computer system, exclusive to the DQM monitoring system, with USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, the Contractor is responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days.

The second option is to send data directly to DQM’s web endpoint as outlined in paragraph OPTION 2: DIRECT DATA TRANSMISSIONS TO THE DQM WEB SERVICE.

# 3.2.1 Option 1: Computer Requirements

Provide a dedicated onboard computer for use by the DQM system. This computer must run the USACE DQM software and receive data from the Contractor’s data-reporting interface. This computer must meet or exceed the following performance specifications:

|  |  |
| --- | --- |
| CPU | Intel or AMD processor with a (non-overclocked) clock speed of at least 1.6 gigahertz (GHz)  |
| Hard drive | 250 gigabytes (GB); internal |
| RAM | 4 gigabytes (GB) |
| Ethernet adapter | Internal network card with an RJ‑45 connector |
| Ports | 1 free serial port with standard 9-pin connectors; 1 free USB port |
| Other hardware | Keyboard, mouse, monitor |

Install a fully licensed copy of Windows 10 (or higher) Professional Operating System on the computer specified above. Also install any necessary manufacturer-provided drivers for the installed hardware.

Locate and orient this computer to allow data entry and data viewing as well as to provide access to data ports for connection of external hardware.

# 3.2.2 Software

The DQM computer’s primary function is to transmit data to the DQM shoreside database. Do not install software which conflicts with this function on this computer. The DQM computer must have the USACE-provided Dredging Quality Management Onboard Software (DQMOBS) installed on it by DQM personnel.

# 3.2.3 UPS

Supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. It must interface with the DQM computer to communicate UPS status, and it must provide backup power at 1 kVA for a minimum of 10 minutes. Ensure that sufficient power outlets are available to run all specified equipment.

# 3.2.4 Option 2: Direct Data Transmissions to the DQM Web Service

Use a web service to report sensor data to the DQM database. Transmit data as it is collected in real time, and push it to the DQM web service. If the web service is not available or returns an error message, store the data in a queue, and transmit it upon re-establishment of the connection, starting with the oldest data in the queue and continuing until real-time transmission is restored.

Contact dqm-support@usace.army.mil to obtain the web service URL and the appropriate key credentials and communication protocol.

If this option is chosen, a display of the raw data being transmitted to DQM must be easily accessible and visible onboard the dredge.

# 3.2.5 Internet Access

Maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. If connectivity is lost, queue and transmit unsent data upon restoration of connectivity. Delays in pushing real-time data to the DQM database should not exceed four hours. Exceptions to these requirements may be granted by the DQM Support Center on a case-by-case basis with consideration for contract-specific requirements, site-specific conditions, and extreme weather events.

Acquire and install all necessary hardware and software to make the Internet connection available for data transmission to the DQM web service. Configure the hardware and software to allow the DQM Support Center remote access to this computer. The telemetry system must be capable of meeting these minimum reporting requirements in all operating conditions.

In areas with poor cellular service and at the local District’s discretion, it may be required to manually download the data on a daily basis using the protocol for retrieving and submitting backup files provided by the DQM Support Center. This method of data transmission should be used only if Internet connectivity is unavailable at the dredging site, and it should be considered a temporary measure.

# 3.2.6 Data Routing Requirements

Onboard sensors continually monitor dredge conditions, operations, and efficiency and route this information to the shipboard dredge-specific system (DSS) computer to assist in guiding dredge operations. Portions of this Contractor-collected information, as described in this specification, must be routed to the DQM computer on a real-time basis, utilizing one of the two options outlined earlier in this section. If the serial transmission option is used, use an RS-232 serial interface with a baud rate of 9600 or 19200 bps to send standard sensor data to the DQM computer. Configure the serial interface as 8 bits, no parity, and no flow control.

Digitally log and transmit information regarding changes in the state of the dredge as close to the time of the occurrence as possible. These events can be included in a separate message bundle going to the DQM onboard computer, entered on the “State” tab in the DQM Pipeline Software, or entered online in the DQM State Data Tool.

# 3.3 DREDGE MONITORING DATA

# 3.3.1 General

Onboard sensors continuously collect dredging data in support of the dredge Contractor’s operations. Store and transmit portions of this Contractor-collected information, as described in this specification, and calculations based on them to the DQM database on a near real-time basis. Additionally, digitally log and transmit information regarding the state of the dredge.

# 3.3.2 Data Measurement Frequency

The frequency of data transmission is dependent on the type of message being sent. Work Event messages contain data that are instantaneously collected or calculated from sensors and are logged as a series of events. State event messages are activated by a change in the dredge state.

# 3.3.2.1 Work Event Messages

Log data as a series of events. Each event must consist of a dataset containing dredge information (as defined in paragraph REQUIREMENTS FOR REPORTED DATA). Consider each set of measurements (for example, time and position) an event, with a 6-12 second interval between work events. This interval must remain consistent across event types for the dredge plant.

Record a standard data string within one second of an event trigger with the time stamp and all parameters reflecting when the event happened.

# 3.3.2.2 State Event Messages

Consider a set of descriptive information (event name, time, description, comment) a state event. Record these events within 24 hours of a change in state with the time stamp reflecting when the event happened.

# 3.3.3 Parameter Transmission to the Web Service

Format the data as JSON (JavaScript Object Notation, as defined at <http://www.json.org>) strings of arbitrary length. These JSON strings represent a hierarchical data structure consisting of a message bundle which may contain 0-3 automatic data messages and any number of manual data messages.

A tag/parameter is reported only when it contains a value. Do not include “Null” value strings in a message bundle.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Message bundle

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

{

 "DQM\_Data": {

 "plant\_identifier": <integer value 0000-9999>,

 "transmission\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "messages": [

 {

 "work\_event": {

 "msg\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "vert\_correction”: <floating point 100th decimal place>,

 "ch\_latitude”: <decimal to 6 decimal places>,

 "ch\_longitude”: <decimal to 6 decimal places>,

 "ch\_depth": <floating point 100th decimal place>,

 "ch\_heading": <integer value 000-359>,

 "slurry\_velocity": <floating point 100th decimal place>,

 "slurry\_density": <floating point 100th decimal place>,

 "pump\_rpm": <integer>,

 "vacuum": <floating point 100th decimal place>,

 "outlet\_psi": <floating point 100th decimal place>,

 "comment": <string>},

 }

 },

 {

 "contract\_event": {

 "msg\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "contract\_number": <string>,

 "event\_type": <string - "start" or "end">,

 "comment": <string>

 }

 },

 {

 "station\_event": {

 "msg\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "station\_name": <string>,

 "comment": <string>

 }

 },

 {

 "pipe\_length\_event": {

 "msg\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "length\_floating": <integer>,

 "length\_submerged": <integer>,

 "length\_land": <integer>,

 "comment": <string>

 }

 },

 {

 "booster\_pump\_event": {

 "msg\_time": <24-hour UTC time YYYY-MM-DDHH:MM:SS>,

 "booster\_total": <integer>,

 "comment": <string>

 }

 },

 {

 "advance\_Event": {

 “msg\_time”: <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 “advance\_daily”: <integer>,

 “comment”: <string>

 }

 },

 {

 "outfall\_position": {

 "msg\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 “outfall\_location”: <string-"upland", "beach", "scow", "open water">

 "outfall\_latitude": <decimal to 6 decimal places>,

 "outfall\_longitude": <decimal to 6 decimal places>,

 "outfall\_heading": <integer value 000-359>,

 "outfall\_elevation": <floating point 10th decimal place>,

 "comment": <string>

 }

 },

 {

 "non\_eff\_event": {

 "msg\_start\_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 “msg\_end\_time”: <24-hour UTC time YYYY-MM-DD HH:MM:SS>,

 "function\_code": <string - 1 to 4 characters>,

 "comment": <string>

 }

 }

 ]

 }

}

# 3.3.4 Contractor Data Backup

Maintain an archive of all data sent to the DQM computer during the permit. The Permit Project Manager may require that the Contractor provide a copy of these data covering specified time periods. Provide the data in the same JSON format as would have been transmitted to the DQM computer. There must be no line breaks between the parameters, and each record string must be on a separate line. The naming convention for the files must be <*dredgename*>\_<*StartYYYYMMddhhmmss*>\_<*EndYYYYMMddhhmmss*>.txt. Data submission must be via a storage medium acceptable to the Permit Project Manager.

At the end of the dredging contract, call the DQM Support Center prior to discarding the data. The DQM Support Center will verify that all data has been received and appropriately archived before giving the Contractor discard permission. Record the following information in a separate section at the end of the dredge’s onboard copy of the DPIP:

* Person who called the DQM Support Center
* Date of the call
* DQM representative who gave permission to discard the data

# 3.4 PERFORMANCE REQUIREMENTS

The Contractor’s National Dredging Quality Management Program data transmission must be fully operational at the start of dredging operations. To meet specification requirements for operability, the Contractor’s system must provide an accurate data string return and be compliant with hardware requirements. Data string return is defined as the number of quality records within an event or state tag sent by the contractor’s system to the DQM database. Quality data strings are considered to be those providing accurate values for all parameters reported when operating according to the specification. Make repairs necessary to restore data return compliance within two business days, or submit a plan and timeline for repair if the repair will take more than two business days. Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see paragraphs INTERNET ACCESS, DATA MEASUREMENT FREQUENCY, and PARAMETER TRANSMISSION TO THE WEB SERVICE) will result in withholding of up to 10% of the contract progress payment per FAR clause 52.232-5.

# 3.5 LIST OF ITEMS TO BE PROVIDED BY THE CONTRACTOR

DPIP https://dqm.usace.army.mil

DQM System Paragraph NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SYSTEM REQUIREMENTS, including all subparagraphs

Dredge Data Paragraph DREDGE MONITORING DATA