



**Memorandum from the Office of the Inspector General**

May 15, 2019

Rebecca C. Tolene, WT 7B-K

**REQUEST FOR MANAGEMENT DECISION – EVALUATION 2018-15603 – RELIABILITY OF INVENTORY DATA IN MAXIMO**

The Tennessee Valley Authority's (TVA) Enterprise Asset Management system, Maximo, stores and maintains data about assets, facilities, and inventory. Maximo's inventory module helps maximize the availability of items while reducing excess inventory balances. Based on concerns regarding the reliability of data in Maximo, we initiated an evaluation of inventory data in Maximo. The objectives of our evaluation were to determine if (1) data entered into key inventory fields in Maximo was valid and (2) key inventory fields were utilized consistently. The scope of our evaluation did not include verifying the accuracy of the information in the fields; we limited our evaluation to the data in the key inventory fields on November 8, 2018.

In summary, we found most key inventory fields were utilized; however, some of the key fields contained invalid data. Specifically, we determined there was invalid data in fields related to (1) quality assurance (QA) levels,<sup>1</sup> (2) inventory status,<sup>2</sup> (3) item descriptions, (4) units of measure, and (5) sites.

We recommend the Vice President, Supply Chain, evaluate the records with invalid or missing data and take steps to correct the issues and implement validation controls, as appropriate.

In response to our draft report, TVA management concurred with our conclusions and associated recommendation. See the Appendix for management's complete response.

**BACKGROUND**

TVA's Supply Chain organization is responsible for maintaining controls that ensure all materials management activities are performed in a manner that accurately portrays TVA's inventory assets. Supply Chain carries out its responsibilities through established Standard Programs and Processes and TVA's Enterprise Asset Management system, Maximo. Maximo supports a number of functions including asset management, work management, materials management, and purchasing capabilities. Maximo's Inventory module works to maximize the availability of items and reduce excess inventory balances.

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<sup>1</sup> QA levels characterize items and services with respect to the importance of their function in the overall safe and reliable operation of nuclear plants.

<sup>2</sup> Inventory status indicates current status (e.g., "active," "canceled," "pending obsolete," and "obsolete") of an item at a specific storeroom.

Maximo’s inventory module stores and manages information used for the classification, procurement, and management of inventory items. Table 1 below shows a list of TVA’s key inventory fields in Maximo.

| <b>Key Field</b>              | <b>Description/Purpose</b>  |
|-------------------------------|---|
| Item                          | Identifies an item with a unique item identifier.   |
| Site                          | Indicates the site level location for an item.  |
| Storeroom                     | Identifies the primary location of an item.   |
| Item Description              | Names or describes an inventory item.   |
| Item Status                   | Indicates current status of an item (e.g., active, canceled, pending obsolete, and obsolete). |
| Inventory Status              | Indicates current status of an item at a specific storeroom.                                  |
| QA Level                      | Indicates an item’s QA level with a numerical value.  |
| Safety Class                  | Displays an item’s quality level.   |
| Safety Class Long Description | Describes the value entered in the Safety Class field.  |
| Commodity Group               | Identifies the standard classification code for products and services purchased.              |
| Commodity Group Description   | Describes the commodity group used to classify items.   |
| Inventory Type                | Indicates the type of inventory with a numerical value.                                       |
| Inventory Type Description    | Describes the value entered in the Inventory Type field.                                      |
| Issue Unit Of Measure         | Used to issue an item from the storeroom.   |
| Order Unit of Measure         | Used to order an item.  |
| ABC Code                      | Segments items for inventory cycle-count frequency.   |
| Delivery Lead Days            | Number of days it takes from ordering an item to receiving the item.                          |
| Economic Order Quantity       | Reorder quantity that provides the best economic value.                                       |
| Reorder                       | Specifies whether to include an item in the inventory reorder process.                        |
| Reorder Point                 | Minimum quantity of inventory stock items required.   |
| Average Cost                  | Average cost for an item.   |
| Current Balance               | Total current balance of an item in the inventory system.                                     |
| On-Hand Amount                | Dollar amount calculated Current Balance x Average Cost.                                      |

**Table 1**

Based upon concerns regarding the reliability of data in Maximo, we conducted an evaluation of inventory data in Maximo.

## **OBJECTIVE, SCOPE, AND METHODOLOGY**

The objectives of our evaluation were to determine if (1) data entered into key inventory fields in Maximo was valid, and (2) key inventory fields were utilized consistently. The scope of our evaluation did not include verifying the accuracy of the information in the fields; we limited our evaluation to the data in the key inventory fields on November 8, 2018. To achieve our objectives we:

- Reviewed the Maximo User Guide and Maximo training documents to gain an understanding of Maximo as it relates to inventory data.
- Reviewed pertinent Standard Programs and Processes and interviewed TVA Supply Chain personnel to (1) gain an understanding of TVA's inventory data and (2) identify key inventory fields.
- Obtained information from Maximo to define key inventory fields and identify key field value formats.
- Obtained and analyzed November 8, 2018, inventory data for 23 key inventory fields, which contained 914,056 records.
- Reviewed *TVA Nuclear Quality Assurance Plan* to gain an understanding of QA requirements for items at nuclear sites.<sup>3</sup>
- Determined if the data in the fields was valid by:
  - Testing the reasonableness of the data. For example, we compared data included in the "Commodity Groups" field to a listing of available commodity groups obtained from Maximo to verify the commodity groups in our data were valid.
  - Comparing relationships between data elements. For example, we compared data elements that contained like data to be certain they did not include conflicting information.
  - Testing format of values in key fields to determine if data conformed to field definitions and value formats.
  - Testing for duplicate records.
- Determined if the key fields were utilized consistently by testing for (1) blank fields and (2) missing data elements.

This evaluation was performed in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*.

## **FINDINGS**

We determined most key inventory fields were utilized;<sup>4</sup> however, some of the inventory fields contained invalid data. Specifically, we determined there was invalid data in fields

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<sup>3</sup> TVA's inventory management process includes QA-level assignments for all material inventory. Since QA levels are only required for inventory at nuclear plants, our report focused on QA levels at TVA nuclear sites.

<sup>4</sup> We tested 914,056 records and found only 49 records were missing data.

related to (1) QA levels, (2) inventory status (3) item descriptions, (4) units of measure, and (5) sites.

### **SOME KEY INVENTORY FIELDS CONTAINED INVALID DATA**

We determined some key inventory fields contained invalid data. Specifically, we determined there was invalid data in fields related to (1) QA levels, (2) inventory status, (3) item descriptions, (4) units of measure, and (5) sites.

QA Levels – QA levels, as set forth in the *TVA Nuclear Quality Assurance Plan*,<sup>5</sup> characterize items and services with respect to the importance of their function in the overall safe and reliable operation of nuclear plants. QA levels ensure significant items and services have more stringent control and verification measures compared to items or services of lesser significance in regard to safe and reliable plant operation. Data related to QA levels is located in four fields: QA Level, Item Description, Safety Class, and Safety Class Description. We identified the following QA Level value issues related to items assigned to nuclear site storerooms:

- Five hundred twenty-two values in the Item Description field did not align to the Safety Class field.
- Four hundred forty-eight values in the QA Level field did not align to the Safety Class field.
- Thirty-four values in the QA Level field did not match the QA value in the Item Description field.

It is critical to make sure items related to the safe and reliable operation of nuclear plants are properly classified.

Inventory Status – The Inventory Status field indicates the current status of an item at a specific storeroom (e.g., active, canceled, pending obsolete, and obsolete). We identified 74,097 records with an active inventory status that were located at coal plants retired in 2012, 2015, and 2016. Although we verified there were no quantities or cost associated with these items, maintaining the inventory status as active is not accurate.

Additionally, 13,453 records in this field are listed as pending obsolete and have a zero balance on hand. According to the Maximo field description and value format for this field, when all quantity is used, items listed as pending obsolete will be set to obsolete.

Item Description – The Item Description field names or describes an inventory item. We identified eight item descriptions that contained invalid data, because the data did not name or describe the item, such as a pipe or a motor. Examples of invalid data contained in the field included “a,a,” “”, and “bet532x.”

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<sup>5</sup> The *TVA Nuclear Quality Assurance Plan* defines nuclear QA requirements and establishes responsibilities for their implementation to ensure safe and reliable nuclear operations.

Units of Measure – The Issue Unit of Measure field indicates the unit of measure used to issue an item from the storeroom, and the Order Unit of Measure field indicates the unit of measure used to order an item. We identified 58 records in both the Issue Unit of Measure and Order Unit of Measure fields that contained units of measure that were not reasonable based upon the item description. For example, “days,” “job,” and “seconds” are not reasonable units of measure to describe filters, valves, or conduit, respectively.

Site – The Site field indicates the site level location for an item. We found the combustion turbine and combined cycle generating sites are not listed individually in the Site field. Unlike coal and nuclear generating sites, which are listed individually, all of the gas plants are listed as “CT” in the Site field.

### **RECOMMENDATIONS**

We recommend the Vice President, Supply Chain, evaluate the records with invalid or missing data and take steps to correct the issues and implement validation controls, as appropriate.

In response to our draft report, TVA management concurred with our conclusions and associated recommendation. See the Appendix for management’s complete response.

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This report is for your review and management decision. You are responsible for determining the necessary actions to take in response to our findings. Please advise us of your management decision within 60 days from the date of this report. In accordance with the Inspector General Act of 1978, as amended, the Office of the Inspector General is required to report to Congress semiannually regarding evaluations that remain unresolved after 6 months from the date of report issuance.

If you have any questions or wish to discuss our observations, please contact Jamie M. Wykle, Senior Auditor, at (865) 633-7382 or E. David Willis, Director, Evaluations, at (865) 633-7376. We appreciate the courtesy and cooperation received from your staff during the evaluation.



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OIG File No. 2018-15603

May 6, 2019

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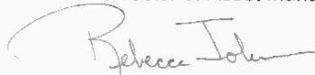
RESPONSE TO DRAFT FOR EVALUATION 2018-15603 - RELIABILITY OF  
INVENTORY DATA IN MAXIMO

Supply Chain (SC) leadership appreciates the opportunity to review and respond to the Evaluation from the Office of Inspector General regarding the reliability of inventory data in Maximo.

SC organization concurs with the conclusions in the report and its associated recommendation as stated below.

- Evaluate the records with invalid or missing data and take steps to correct the issues and implement validation controls, as appropriate.

We would like to thank Jamie Wykle and the OIG staff for their professionalism in conducting this evaluation. If you have further questions please contact Jessica Baker, Director of Asset Management & Performance and Material Operations, at 423-751-7421.



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