

## **Annexure No. 4**

### **Construction Quality Assurance**

Initial starter dam and raise construction should be monitored full-time, including the testing of the soil and geomembrane liner components and documented in a form of construction report. The Construction Quality Assurance (QA) should be performed by a third party consultant who has the responsibility to document and confirm that the construction was performed in accordance with the design, drawings, and specifications. This consultant is not just to record the test data, but to track failed tests, document successful retests, and develop a comprehensive as-built construction report for all raise construction.

The construction as-built report should include record surveying of the construction and a comparison of the final construction limits and grades to the design drawings. The construction report should include a narrative that documents the field observation monitoring, field and laboratory testing of construction materials, defines limits of construction (by survey), and include construction sequence photographs. The report will also include and reference the design drawings and specifications as well as document any approved design changes made during construction. This construction documentation is very important since the Engineer-of-Record (EOR) will use the as-built construction report as a basis to determine if the construction meets the requirements of the design report, drawings, and specifications and any approved design changes. An example table of contents for a TSF CQA Report is presented below.

#### **Typical Table of Contents for CQA Report**

##### **1.0 INTRODUCTION**

##### **2.0 PROJECT SITE DESCRIPTION**

- 2.1 Background
- 2.2 Design Basis
- 2.3 Construction Area(s)

##### **3.0 CONSTRUCTION SUMMARY**

- 3.1 Construction Materials and Borrow Sources
- 3.2 Construction Details
  - 3.2.1 Project Staffing
  - 3.2.2 Construction Equipment
  - 3.2.3 Construction activities

##### **4.0 CONSTRUCTION QUALITY CONTROL AND QUALITY ASSURANCE**

- 4.1 Laboratory Tests
- 4.2 Embankment Foundation/Lifts Approval
  - 4.2.1 Compaction Tests
- 4.3 Geotextile Manufacturer QA/QC Submittal

##### **5.0 AS-BUILT SUMMARY**

- 5.1 Design Modifications and Clarifications
- 5.2 Items Not Constructed or Partially Constructed
- 5.3 As-Built Slope Stability

##### **6.0 CONCLUSION**

##### **TABLES**

- Table 1: TSF Stage 4 basis of design
- Table 2: Equipment used for Construction
- Table 4: Incomplete Construction Items
- Table 5: Material Strength and Hydraulic Properties for Slope Stability Analyses
- Table 6: Calculated Factors of Safety

## **FIGURES**

Figure 1: Site Location

Figure 2: Plan Layout

Figure 3: Seepage and Slope Stability - Static Analysis

Figure 4: Seepage and Slope Stability - Pseudo-static Analysis

## **APPENDICES**

**APPENDIX A - DESIGN AND AS BUILT DRAWINGS**

**APPENDIX B - LABORATORY TESTS AND BORROW PITS LAYOUT**

**APPENDIX C - FIELD DENSITY TEST RESULTS AND TRIAL PAD TEST RESULTS**

**APPENDIX D - FIELD REQUEST FORMS**

**APPENDIX E - DAILY REPORTS**

**APPENDIX F - WEEKLY REPORTS**

**APPENDIX G - PROJECT MEETINGS MINUTES**

**APPENDIX H - CONSTRUCTIONAL PHOTOS**

**APPENDIX I - GEOTEXTILE SPECIFICATIONS SHEET**