NEBRASKA

DEPT. OF ENVIRONMENT AND ENERGY

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Municipal Solid Waste Disposal Areas
Construction Quality Assurance

This document provides additional guidance addressing the information requested in a permit application with respect to the construction quality assurance during construction of a municipal solid waste disposal area. This document is intended to supplement the EPA's Solid Waste Disposal Facility Criteria – A Technical Manual. Both documents should be used when preparing information for the permit application. The manual is available from the National Technical Information Service (NTIS). The telephone numbers are 1-800-553-NTIS or (703) 487-4650. The order number is PB94-100-450.

There are two interrelated functions within the process of constructing a municipal solid waste disposal area that will perform in the manner envisioned in Title 132 – Integrated Solid Waste Management Regulations. They are Quality Control (QC) and Quality Assurance (QA). Based on past American Society for Testing Materials (ASTM) definitions, quality control can be thought of as a planned system of activities, or the use of such a system, whose purpose is to provide a level of quality that meets the needs of users. The objective of quality control is to provide stable quality that is safe, adequate, dependable, and economic. Quality assurance is a planned system of activities whose purpose is to provide assurance that the overall quality control program is in fact being effectively implemented. This involves verifications, audits, and the evaluation of the quality factors that affect the specification, production, inspection, and use of the product, service, system, or environment. Together QA/QC comprise Construction Quality Assurance (CQA).

The construction quality assurance plan must be a written part of the permit application. A construction report documenting that the facility was constructed according to the permit application, including CQA tests and activities, must be submitted for review and approval prior to any final permit issuance and waste disposal activities. CQA begins with the delineation of site materials and conditions. In general, all soils, differentiated in the test holes by the investigating geologist, should be sampled sufficiently to provide material for complete index testing. Index tests are Atterberg limit, gradation, specific gravity, natural moisture content and density, and compacted density (standard or modified). On the basis of the geologic test hole logs and the index tests, detailed tests can be assigned. Detailed tests may include triaxial and direct shear, bearing strength, shrink-swell ratio, consolidation potential, and hydraulic conductivity. This part of the CQA process should feature discussion and agreement between the applicant, designer, and investigator that the conditions and soils at the site are adequately delineated and will produce the desired end result.

The following specific subjects should be addressed:

1. Soil(s) should be identified to the extent that CQA personnel can verify that specified soils have been used. Soil designated to be used as clay liner, should be used in the clay liner, soils designated for daily cover should not appear in the clay liner, and soils to be wasted should be wasted and not reused. It should be emphasized that the first people at the site who will need to identify the proper soils are the equipment operators.

2. Test methods should be appropriate for the range of the soil property being tested. This is especially true of hydraulic conductivity tests. The Department recommends that hydraulic conductivity testing for quality assurance and design be done in accordance with the standards in ASTM D 5084-90 test method. Saturation of the test specimen should be measured by the "B" parameter prior to permeation. Allowable effective stress during the test should be no more than 3psi. All information specified in the ASTM test method should be reported.

3. Soil tests for quality assurance should be "standard" tests that are completed by current procedures. ASTM is a good source for these tests.

4. Items such as bentonite amendment should be tested through a range of density, moisture content, and percent amendment to ensure the proper use of the constituents to meet the required hydraulic conductivity.

5. "Pass-Fail" criteria for each kind of soil used in the construction should be specified.

6. Remedies for failed tests should be specified. These remedies may include such things as removal, retesting at the failure site, additional tests around the failure site, reworking, recompacting, etc.

7. Skill and/or work qualifications required to perform the quality assurance work on soils should be specified. A good source for these qualifications is ASTM D 3470-92

8. The CQA plan should clearly delineate when CQA personnel will be on the site. NDEE recommends that CQA personnel be at the site to perform their duties whenever construction of the liner, leachate collection system, or final cover system is proceeding. Personnel substitution procedures at the site should also be delineated. Generally, substituting personnel with lesser skills or experience is not recommended.

9. Lines of authority and responsibility should be clearly specified.

10. Test fills should be designed to mirror the construction equipment and method(s) used at the site. Test type and location should be delineated to evaluate the test fill performance. Some tests to be considered should be the number of equipment passes needed to achieve a certain density on both slopes and bottom of the site. The density changes with changing water content and the corresponding hydraulic conductivity changes should be checked. Also, the percentage of amendment, density, moisture and hydraulic conductivity relationships on both level and sloped surfaces should be checked.

11. Transportation of test specimens from the site to the laboratory should be in accordance with the standards in ASTM D 4220-89.

Geomembrane Installation and Testing

Many installers and vendors of flexible membrane liners have written their own quality assurance plans. The Department does allow these programs to be incorporated into the application. Some specific

items which should be included are:

1. The CQA plan should specify testing to verify that the material on-site meets specifications.

2. The CQA plan should contain a clear description of the experience and training qualifications required of those CQA personnel doing flexible membrane liner CQA tasks. A good source for these requirements is “Geosynthetic Materials Installation Inspection” NICET Manual 1030-10-0, National Institute for Certification in Engineering Technologies.

3. Prior to construction, the plan should specify a meeting to resolve outstanding issues and coordinate liner installation and/or other design features.

4. The CQA plan should contain a clear delineation of project lines of responsibility and authority. It should establish who will make the decision that the clay liner base is acceptable for flexible membrane liner installation.

5. Chemical seaming compounds, if used, should be described along with a description of tests to be performed as CQA activities.

6. The CQA plan should indicate when the record drawings should be presented to the owner. Record drawings should include panel dimensions, panel locations, panel and seam identification, patch and repair locations, and location of destructive test samples.

Structure Installation and Testing

Specific items which should be included are:

1. The type, number, and locations of tests to be performed at the work site. Some possible tests are slump, air content, cylinder, and beam tests taken from fresh concrete.

2. Test sample storage and handling while samples are still on site. Portland Cement Association publications are a good source for standard procedure and practice.

3. Concrete strength tests (cylinder and/or beam breaks) at periods other than 28 days.

4. When determined by the designer to be necessary, the approval of reinforcing steel placement prior to placing concrete.

5. When determined by the designer to be necessary, the approval of form installation before any concrete is placed.

6. Concrete placement procedures are affected by temperature extremes because concrete strength is lowered or impaired by those same temperature extremes. Therefore, a clear definition of the temperature(s) that will initiate cold weather or hot weather placement procedures must be in the CQA plan.

RESOURCES:

- NDEE Home Page http://DEE.ne.gov/

Contacts:

- NDEE Waste Management Section (402) 471-4210
- NDEE Toll Free Number (877) 253-2603
- NDEE Hazardous Waste Compliance Assistant (402) 471-8308
- Email questions to: NDEE.moreinfo@nebraska.gov

NDEE Publications:

- Title 132 – Integrated Solid Waste Management Regulations
  Titles are available on the NDEE Home Page under "Laws/Regs & EQC", "Rules & Regulations"

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