

PROJECT PROFILE

PREPARATION OF DESIGN MANUALS AND MANUALS OF PRACTICE

Since the firm's inception in 1956, D'Appolonia has undertaken research and development projects with the goal of advancing the state of practice within the firm and industry. We have developed design manuals, manuals of practice and specifications for the design and construction of structures for use by government agencies and industry. Two representative examples are pictured herein: the new *Engineering and Design Manual: Coal Refuse Disposal Facilities*, which was completely revised and updated by a team of engineers and scientists led by D'Appolonia for the Mining Safety and Health Administration (MSHA) in 2009 and *Recommended Practice for Evaluation of Metal-Tensioned Systems in Geotechnical Applications*, which was prepared for the National Cooperative Highway Research Program in 2002.

The new Engineering and Design Manual for Coal Refuse Facilities is an 800-page document that covers facility planning, site evaluation, subsurface and foundation engineering, slope stability analysis, hydrology and hydraulics, construction monitoring, water quality, vegetation and facility abandonment. Some additions to Manual include discussions of: impounding facility concepts, site exploration methods including surface and borehole geophysics, evaluation of the potential for breakthrough, seismic issues associated with the design of coal refuse impoundments, mine entry barriers and bulk-

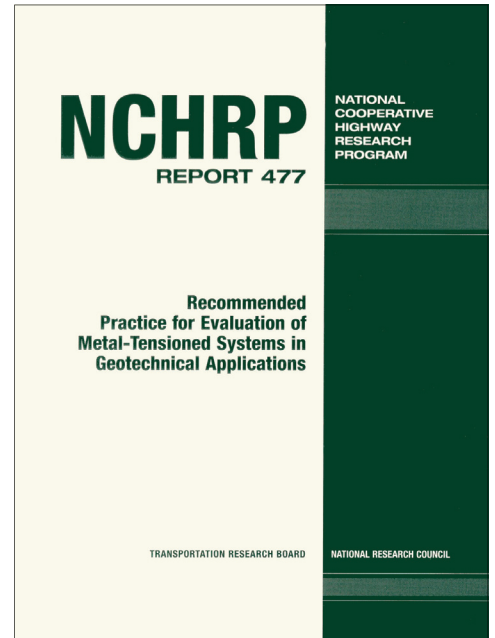
heads, stability and seepage analyses, dam safety instrumentation, and preparation of emergency action plans.

In addition, D'Appolonia previously developed for MSHA a field manual for training mine inspectors to inspect and monitor coal refuse disposal facilities. These documents were developed with the purpose of transferring state-of-the-art engineering practices in dam engineering to the design and construction of coal refuse disposal facilities.

NCHRP Report 477 presents the results of a three-year study to develop a recommended practice, suitable for adoption by the American Association of State Highway Transportation Officials (AASHTO), for procedures to evaluate the condition and remaining useful service life of in-place soil nails, rock bolts and permanent ground anchors. The initial phase of the study involved a survey and review of nondestructive methods used to evaluate the performance of metallic ground reinforcements and development of models to estimate remaining service life. The second phase entailed a two-year effort to implement the field evaluation programs, develop a provisional practice for monitoring the in-situ condition and estimating the remaining service life of metal-tensioned systems, and assess the viability of the provisional practice.

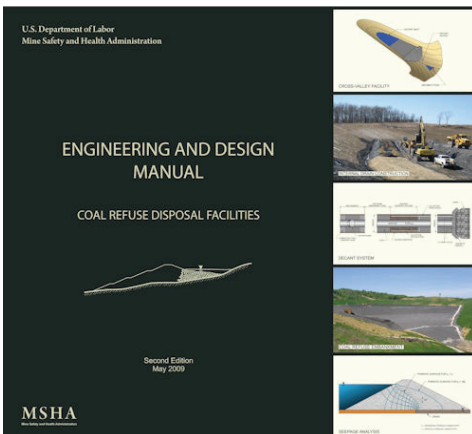
Other examples of D'Appolonia projects involving design manual and manual of practice preparation include:

- Design Manual and Training Course for Substructure Design Using AASHTO LRFD Bridge Design Specifications; FHWA, Washington, DC.
- Update of Design Manual DM-4; Pennsylvania Department of Transportation, Harrisburg, PA.
- Demonstration Project – Mine Void Detection Using DC Resistivity and TDEM; MSHA, Pittsburgh, PA.



NCHRP report prepared by D'Appolonia.

- Environmental Effects of Slaking of Surface Mine Spoils - Eastern and Central United States; U.S. Department of Interior, Denver, CO.
- Nationally-based Technical Evaluations of MSE and Other Earth Retaining Systems; Highway Innovative Technology Evaluation Center, Reston, VA.
- Abandoned Mine Void Detection Using Electrical Geophysical Methods; U.S. Department of Interior, Washington, DC.
- Subsidence Monitoring above Operating Longwall Mine; U.S. Department of Energy, U.S. Bureau of Mines, Denver, CO.
- Engineering Evaluation and Design of INSERT Walls; Nicholson Construction Company, Bridgeville, PA.
- NCHRP 12-35 - Recommended Revisions to Sections 4, 5 and 7 of the AASHTO Standard Specifications for Highway Bridges; Transportation Research Board (TRB), Washington, DC.



New MSHA Engineering and Design Manual for Coal Refuse Disposal Facilities.