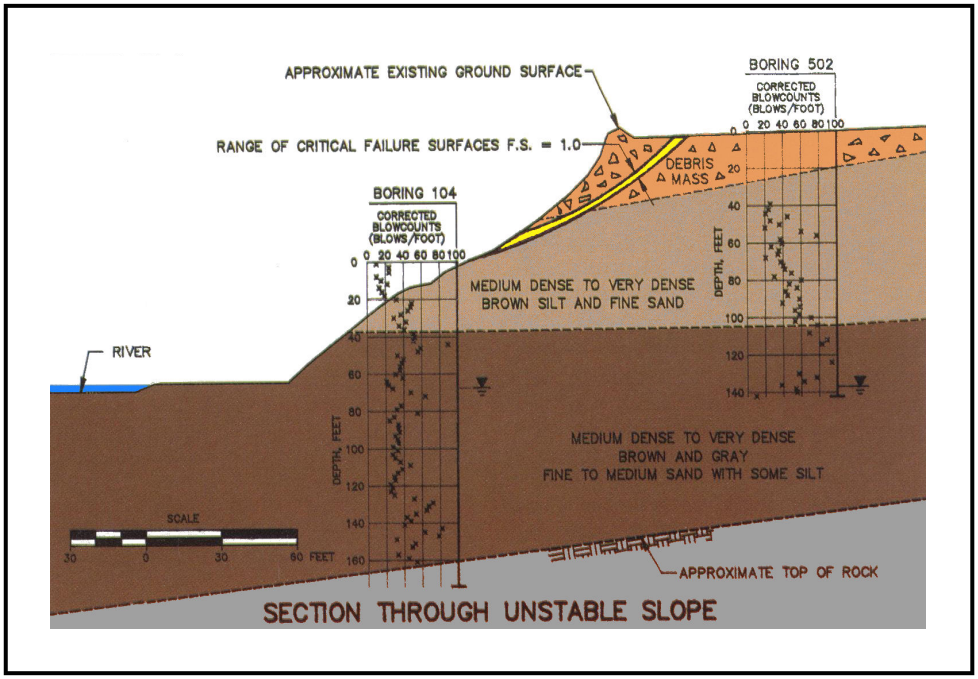
PROJECT PROFILE

SLOPE STABILITY EVALUATION AT NEW ENGLAND SUPERFUND SITE

During a remedial investigation of a Superfund Site that was a former municipal disposal area, two large scarps were observed behind the crest of steep debris slopes on the flanks of the disposal area. Because the disposal area was on a hillside above a river, the steep slopes and scarps caused concern relative to the possibility of continued slope movements and eventual contamination of the river. D'Appolonia was retained to develop a geotechnical exploration program, to evaluate the stability of the debris mass, and to develop remedial design concepts to allow site closure.



Schematic cross section of disposal site showing unstable debris slope.

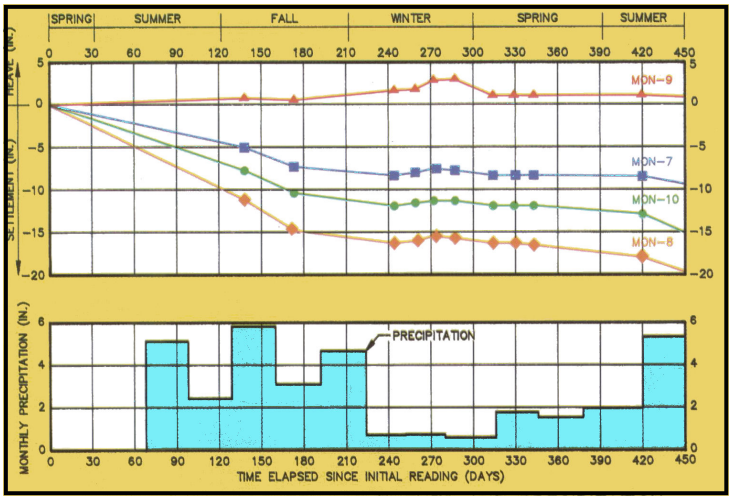
A site exploration program was conducted by D'Appolonia for the purpose of characterizing the physical behavior of the debris and the granular soils underlying the disposal area. Monitoring of vertical and horizontal displacements was performed to establish rates of movement in the debris slopes and native soils. The subsurface exploration program included sampling of the debris materials and native soils. Engineering properties of the native soils were estimated based upon the results of laboratory strength testing of soil samples reconstituted to their in-situ density.

The monitoring program involved installation of monuments, inclinometers and piezometers. The monuments were surveyed to determine the rate of movement near the scarps, and the inclinometers were monitored to measure lateral movements in the debris and underlying soil slopes. The piezometers were used for ground water sampling and measurement of ground water elevations. The results of the monitoring program indicated that:

- Slope movements were confined to failure of the debris mass only, as inclinometer measurements showed no movement in the native soils,
- The rate of movement of the debris slopes was decreasing with time,
- No piezometric level was detected in the distressed debris mass due to its coarse composition, and
- The rate of slope movement correlated well with precipitation.

It was not possible to determine the shear strength of the debris mass by physical testing because of its coarse and variable composition. Therefore, the average shear strength within the zone of movement was estimated by conducting a back-analysis of the failed slopes, considering the geometry of the slopes and failure plane locations. The average shear strength of the debris thus determined was then used in the development of remedial design concepts. Alternatives considered individually or in combination included (1) no action (2) regrading and buttressing, (3) confining the slope with a network (mesh) of steel cables, and (4) regrading and capping the slope area. Closure designs were developed using the HELP Model to estimate the potential amount of percolation through the disposal area.

The results of the D'Appolonia's evaluation indicated that the probability of a failure of the debris slopes extending to the river was negligible and, therefore, the no-action alternative was recommended. Ultimately, the USEPA selected the no-action alternative to resolve the debris slope situation.



Relationship between slope movement and rainfall at site.