Geomorphic Reclamation in New Mexico: A Regulator's Perspective

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New Mexico’s coal fields can be very dry …

…or suddenly,
very wet

Soils and overburden are often of poor quality

Natural vegetation cover can be sparse

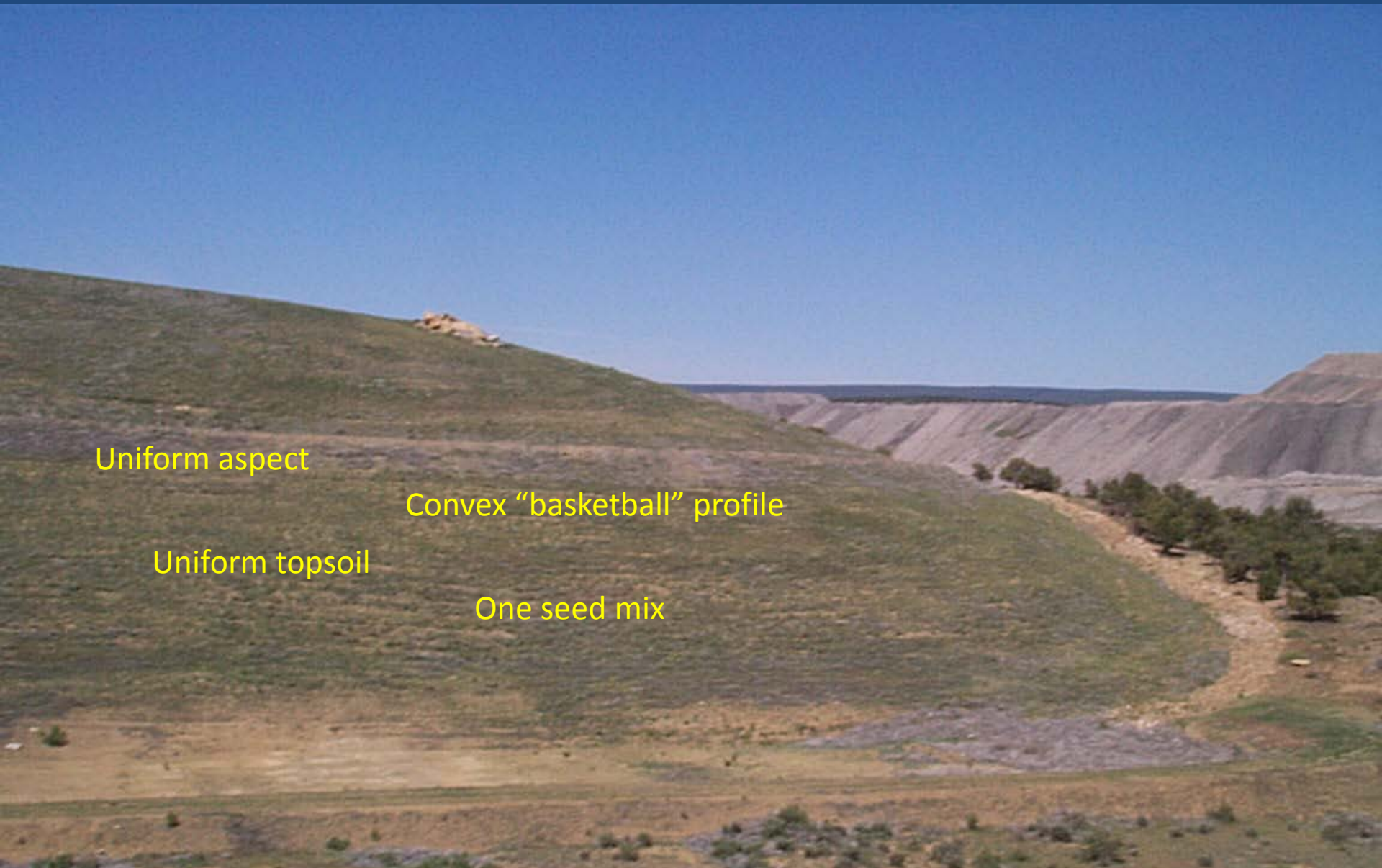
Community diversity requires substrate diversity

Conventional steep slope construction is typified by low gradient terraces that convey runoff across a slope to a rock-armored drop structure that has been designed to pass a specific event. On coal mines, this is typically the local 10-year / 24-hour precipitation event.

Storms that are smaller or larger than the design event cause problems, either by sediment deposition or erosion.

Differential settling may also be a problem.

Traditional slope design, with a gradient terrace, a rock down drain, and a boulder pile



Geomorphic Grading Goals

- Provide long-term drainage stabilization
- Meet runoff water quality criteria
- Reduce long-term maintenance
- Provide topographic diversity to enhance vegetation community development and wildlife habitat
- Promote timely liability bond release

Challenges

- Spoil suitability and mitigation
- Topsoil lay-down and seeding; extremely difficult in rough terrain
- Implement the new 434 NPDES regulation
- Tie in with natural drainages and previous reclamation—need an extremely good survey
- Dozer intensive; overly large mining equipment
- Enhanced operator skills; better communication and feedback; Machine Control
- Rock placement in channels and on slopes; if poorly done can create problems
- Management acceptance
- Regulatory acceptance

McDermott Dump 52-ac “proving ground”

- Geomorphic drainages
- Scallop slope
- Talus slope
- Rock rims
- Suitable spoil
- Rock mulch
- Multiple seed mixtures
- Wildlife pond

Best quality San Juan Mine revegetation prior to geomorphic grading

Failed stands may not have much more than annual wheatgrass cover

Topsoil re-spread underway at Cottonwood Pit

Cottonwood Pit end wall regrade

Highwall reclamation prior to seeding

Highwall reduction in 2008

Irrigating for seedling establishment

Reclaimed drainage channels and tie-in with older reclamation at SJM

Tie-in to a native arroyo

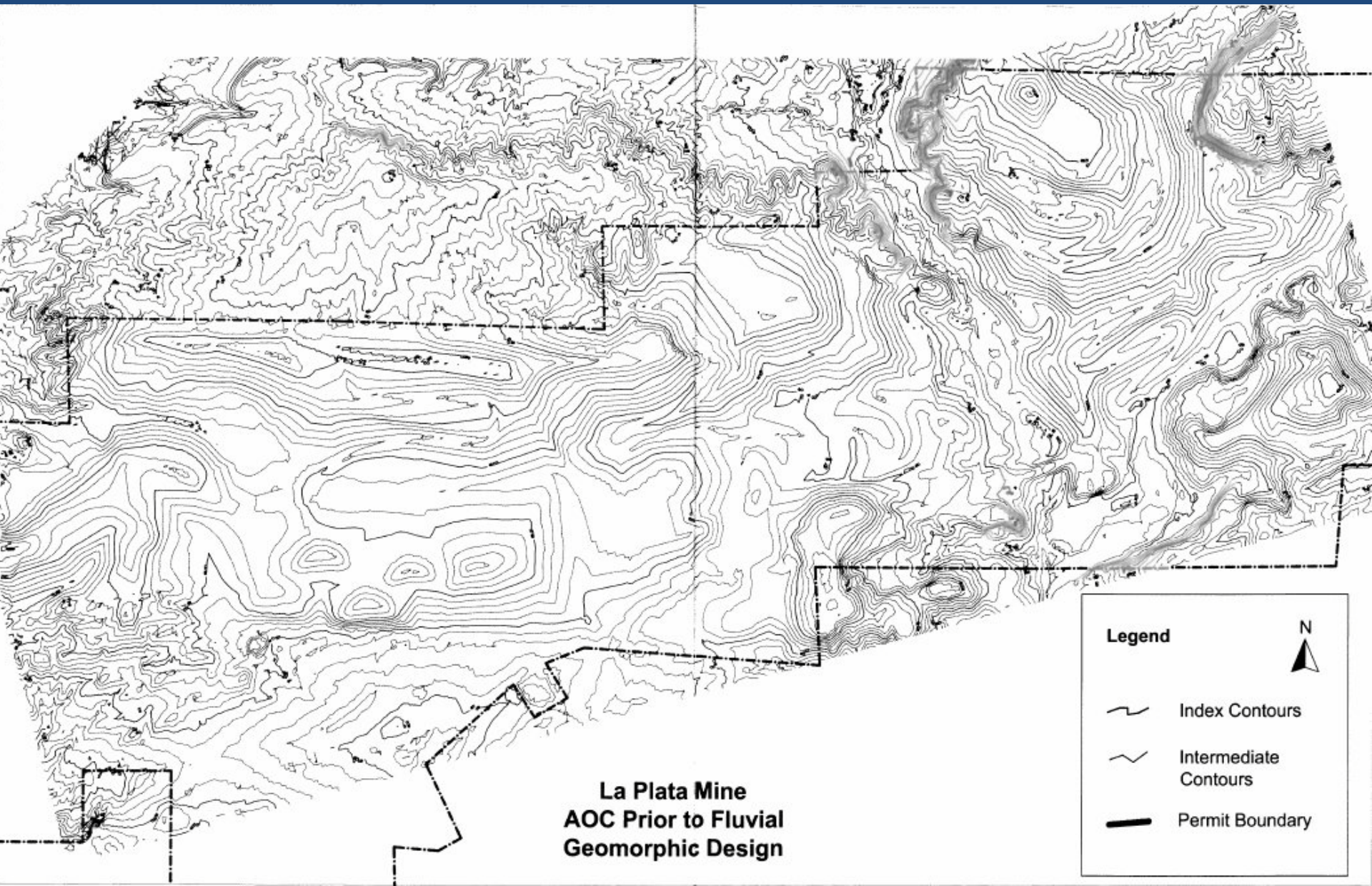
Close up of transition from reclaim to native

Two years after seeding Cottonwood Pit reclamation

Looking west over La Plata Mine in 2001

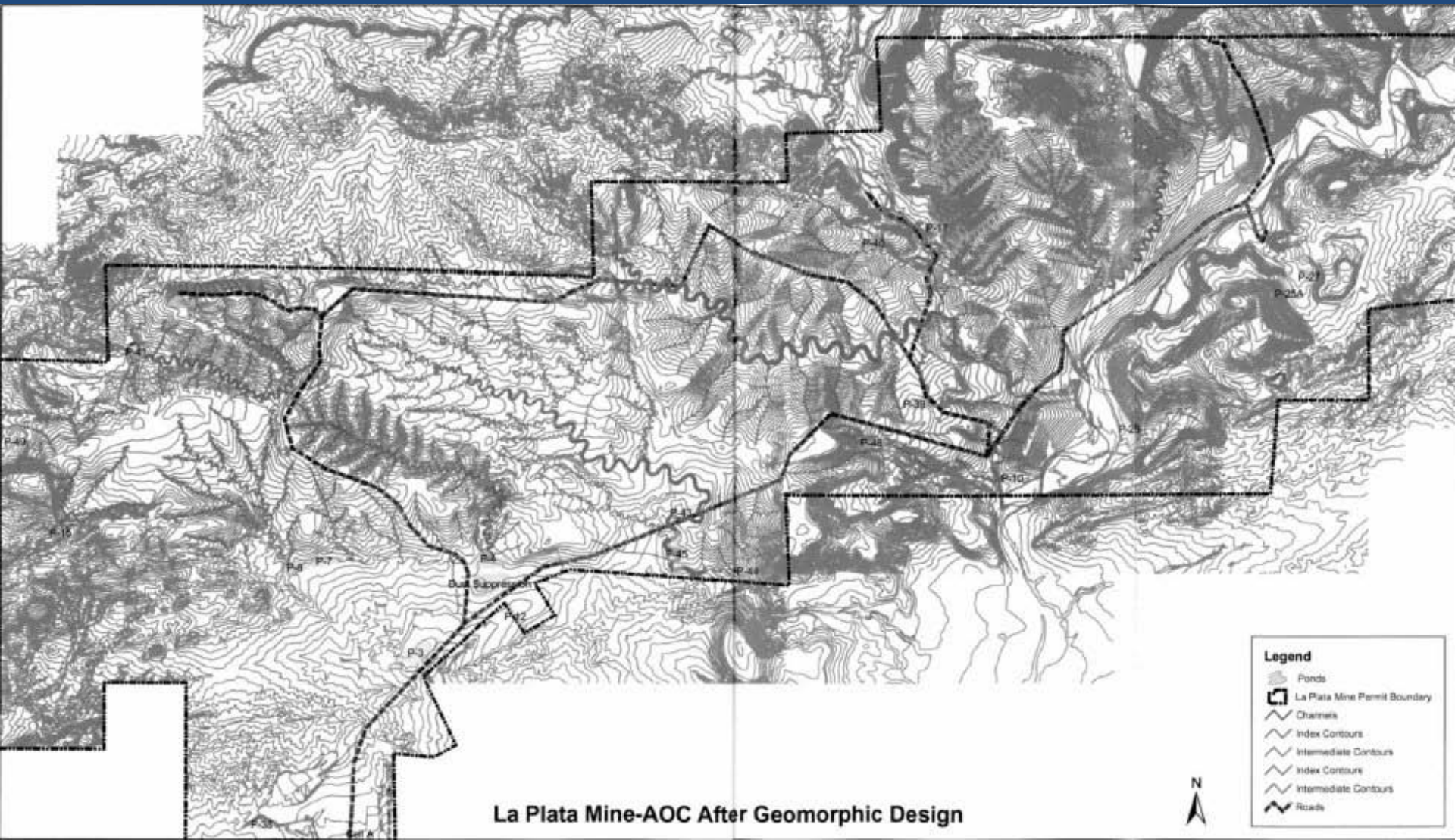
LPM pre-disturbance type topography with cuestas

LPM regrade plan prior to geomorphic design



York Canyon Mine, 1996 reclamation

LPM regrade plan after Natural Regrade was used



La Plata Mine, 2006 reclamation

Artificial outcrops

MMD inspection after a 200-yr/2-hr storm

Wildlife trail down to a permanent pond

Clarity of water in that pond

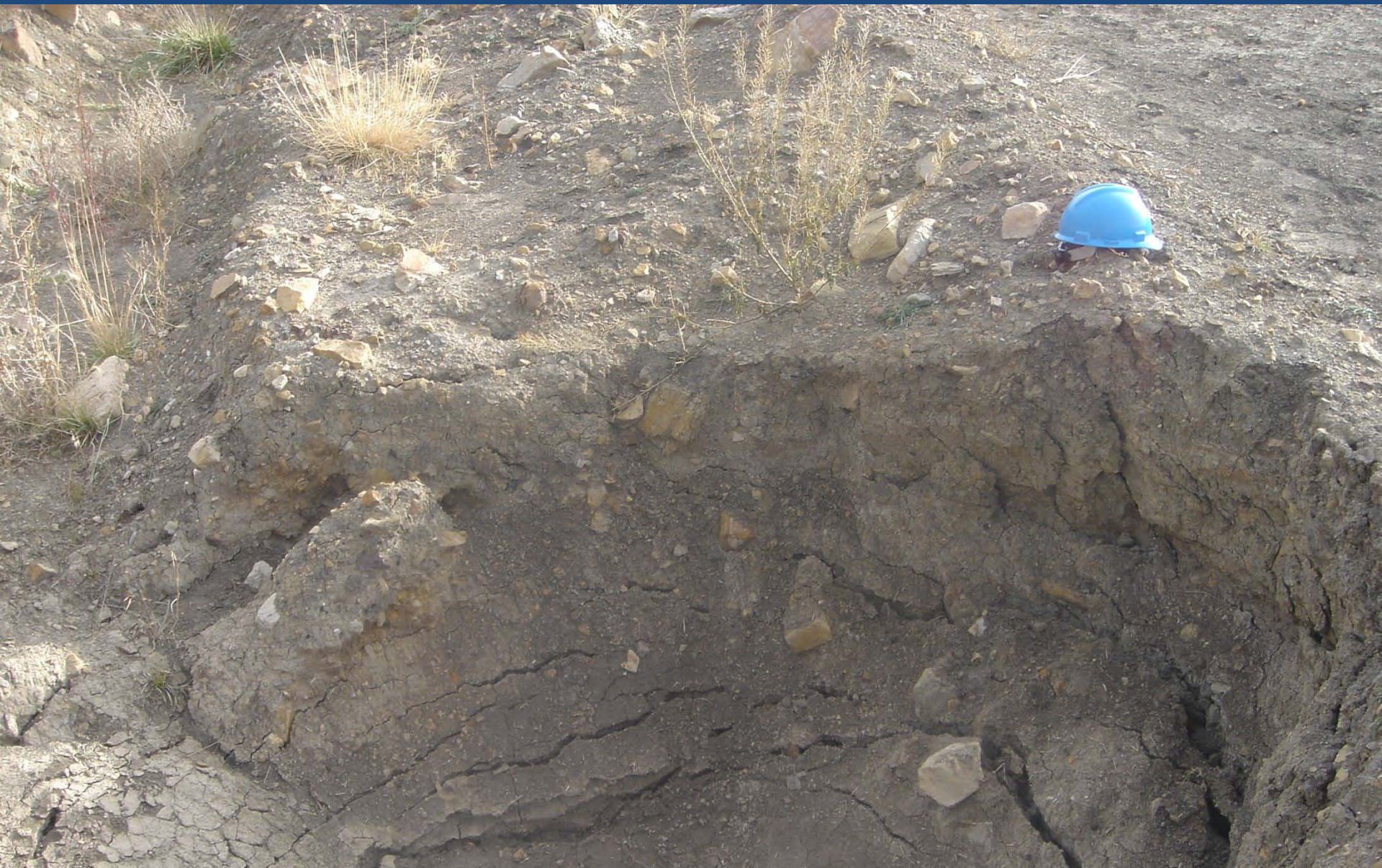
Wildlife watering hole within a permanent pond

McKinley Mine
Subsidence piping features on terraced reclamation

Piping hole

Differential settling on a terrace

Major feature requiring costly repair and creating liability concerns



Area 9 terrace, over-steepened cut slope

Erosion, flow blockage, differential settling, breach

Recently removed terraces

Cattle on a removed terrace

Complex topography, Pit 10 highwall reclamation

Ridges built by dumping excess spoil in windrows

Area 10 pit approaching final grade

Drainage channel constructed in a pit ramp

Swales and soil substitute material on slopes

Revegetation becoming established on Area 11 pit reclamation

2004 National Award recipients

2008 NM EMNRD
Excellence in Reclamation Award recipients

Questions?

Photo by Mickey Ginn, SJCC