

An aerial photograph of a large, grassy hillside. In the background, there is a waste-rock repository with several large, rectangular piles of rock. The sky is clear and blue. The text "Gilt Edge Mine NPL Site" is overlaid in white at the top.

Gilt Edge Mine NPL Site

**Ruby Gulch Waste-Rock Repository
July 2001 – June 2003**

**Gilt Edge Mine NPL Site
Lawrence County, SD
Ruby Gulch Waste-rock Repository**

*Gilt Edge Mine Superfund Site, South Dakota
September 25, 2003*



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Early-stage (circa-1985) mining operations: Sunday Pit excavations and crusher to upper left; process-plant & heap-leach pad to upper right; foreground- Upper Ruby Gulch watershed with waste-rock being dumped into south-fork (left) and spent-ore being dumped into north-fork (right).

*Gilt Edge Mine Superfund Site, South Dakota
September 25, 2003*

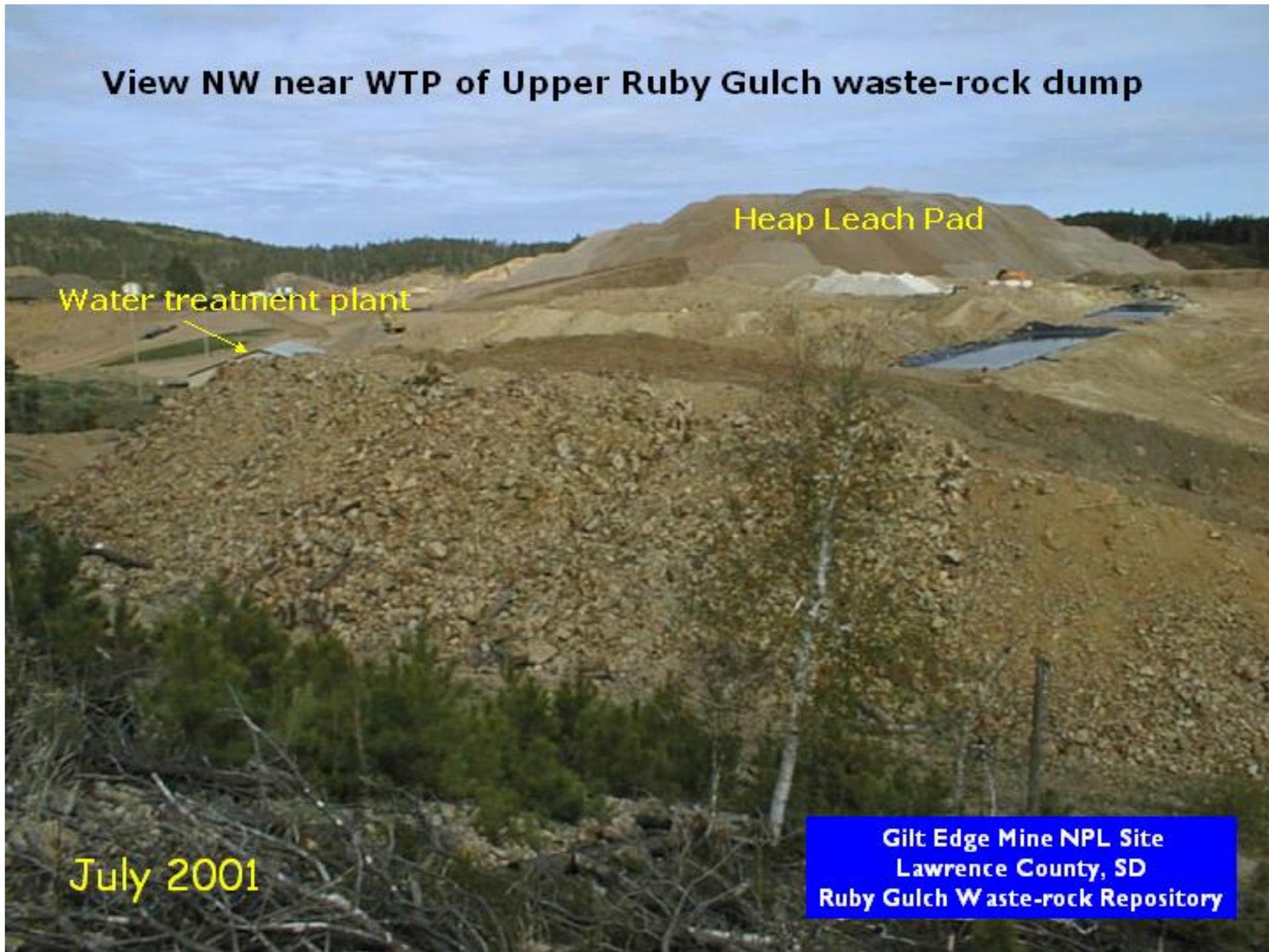
**Gilt Edge Mine NPL Site
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Ruby Gulch Repository

During mining, sulfur-rich waste-rock excavated from the open-pits, and spent-ores from the heap-leach pad were dumped into the Ruby Gulch valley. Rain and snow and atmospheric-oxygen, reacting with the sulfide materials, produced 30-million gallons/year of acid, metal-toxic water requiring costly treatment. This isolation-containment facility was designed and built to prevent infiltration, shed clean runoff, and suppress ARD-generation and internal flow-regimes.

- valley-fill containing 10,500,000 cubic yards of acid-generating waste-rock; 450-foot high; reshaped to 3.5:1 for geotechnical stability; 2,100 foot triangular shape.
- 65-acre cap-cover system; 7,000 ft. of perimeter diversions; 9,500 ft. of lateral-drain benches with internal french-drain system.
- 1,360,000 cubic yards of waste-rock excavated & moved during re-grading and diversion construction (2,040 house basements).
- 30,000 truckloads of Hwy 385 rock-soil material imported; 250,000 cu. yds of 385-rock crushed for 18-inch drain-layer.
- 312,000 sq. yards of 80-mil low-linear density polyethylene geo-membrane; 17,000 sq. yards of geocomposite ditch liner (enough to “carpet” 15,000 homes).
- 3-foot soil cover over liner and drainage layer, with native-species revegetation.
- Channel hydraulics & riprap designed to safely pass 100-year storm.
- Monitoring system: 4 paired wells sampling water, pore-gas, pressure, & temperature; 560 electrodes beneath liner for resistivity-geophysics imaging; connected to remote-control data-center with 272,000 feet (50 miles) of wiring.

View NW near WTP of Upper Ruby Gulch waste-rock dump



Heap Leach Pad

Water treatment plant

July 2001

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June 2001 – May 2002. Excavating and placing 2,500,000 cubic yards of acid-generating waste rock into North Ruby Gulch valley (far left background).

July 2001

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June 2002. Monitoring well installations; (right) pulling casing to (above) install pressure transducers, lysimeters, and electrical resistivity electrodes.



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August 2002. Spreading and roller-compacting heap leach pad rock as geomembrane liner base.



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14 August 2002. Comanco crew heat-welding seams on roll-sheets of low-density polyethylene liner.



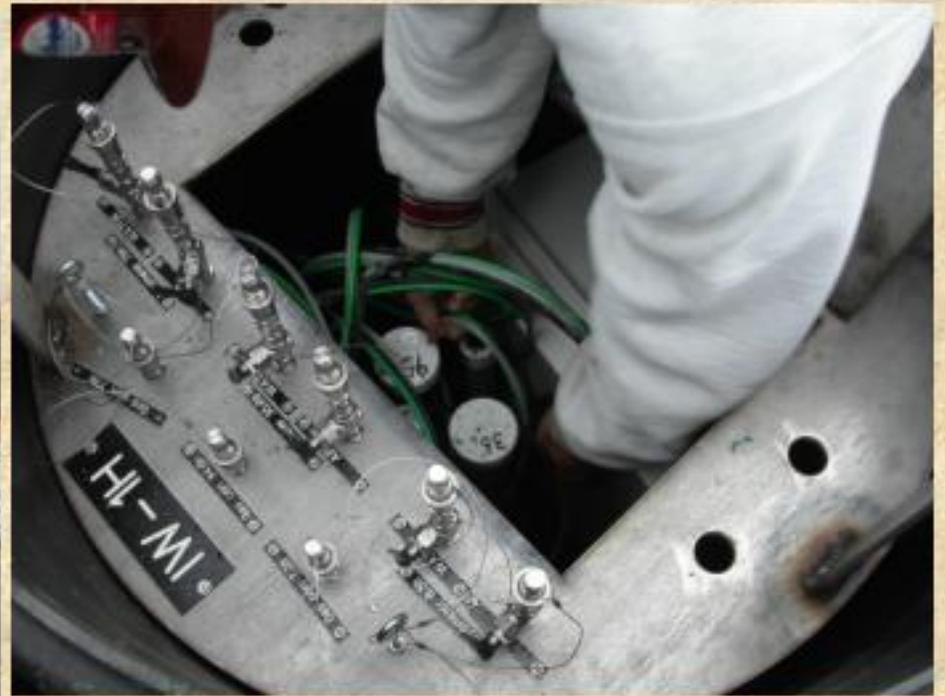
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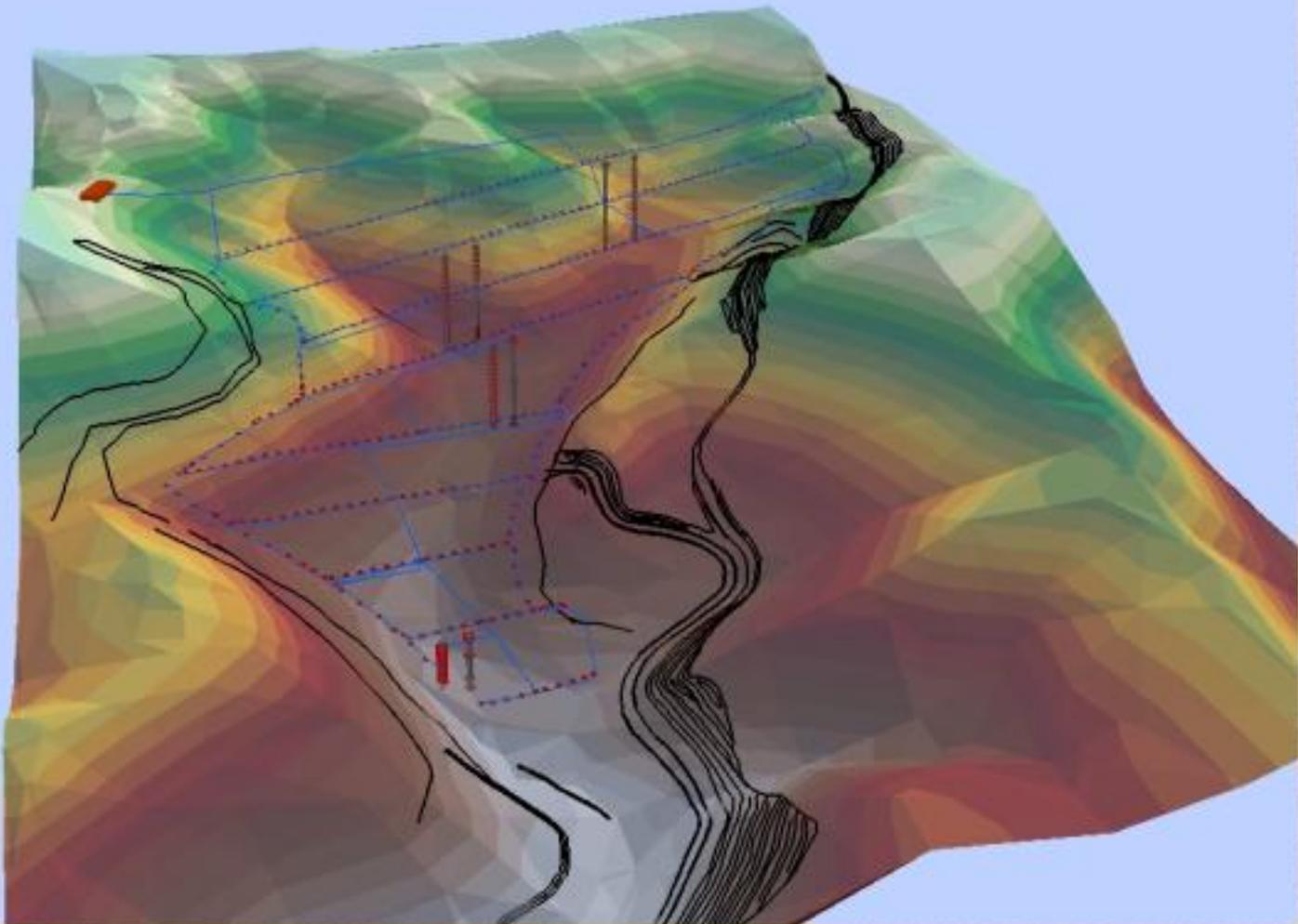
**October 2002. Geomembrane line laydown on Bench 9 and
18-inches of clean crushed Hwy 385 rock being placed over liner
for drainage layer.**



Monitoring system wells and resistivity components: electrode wires in foreground; well housings distant right.



Repository Monitoring System: 3-D view of wells, resistivity electrode arrays, and trunk-lines to control center located in water treatment plant.



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29 August 2002. Drain-layer rock being spread onto Bench 5.



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October 2002. Trenching and placing perforated drain pipe into benches.

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October 2002. Geo-composite liner and riprap installation in perimeter diversion ditch.

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6 May 2003. Geocomposite liner and riprap installation in perimeter diversion.

Oct 2002. Geomembrane liner and approaching top of repository above bench 9; note gray rock-piles to be crushed for drain-layer and transferred to slopes so “plateau” can be capped.



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April 2003. Spreading 3 feet sub- and topsoil cover; lateral drain channels being formed; electrical cable trenches for monitoring system.



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30 April 2003. Spreading soil onto riprap-filled lateral drain filled; note depth of cover system to completed well housings.

June 30, 2003. Completing liner tie-in to asphalt around WTP; repository crest upper right.



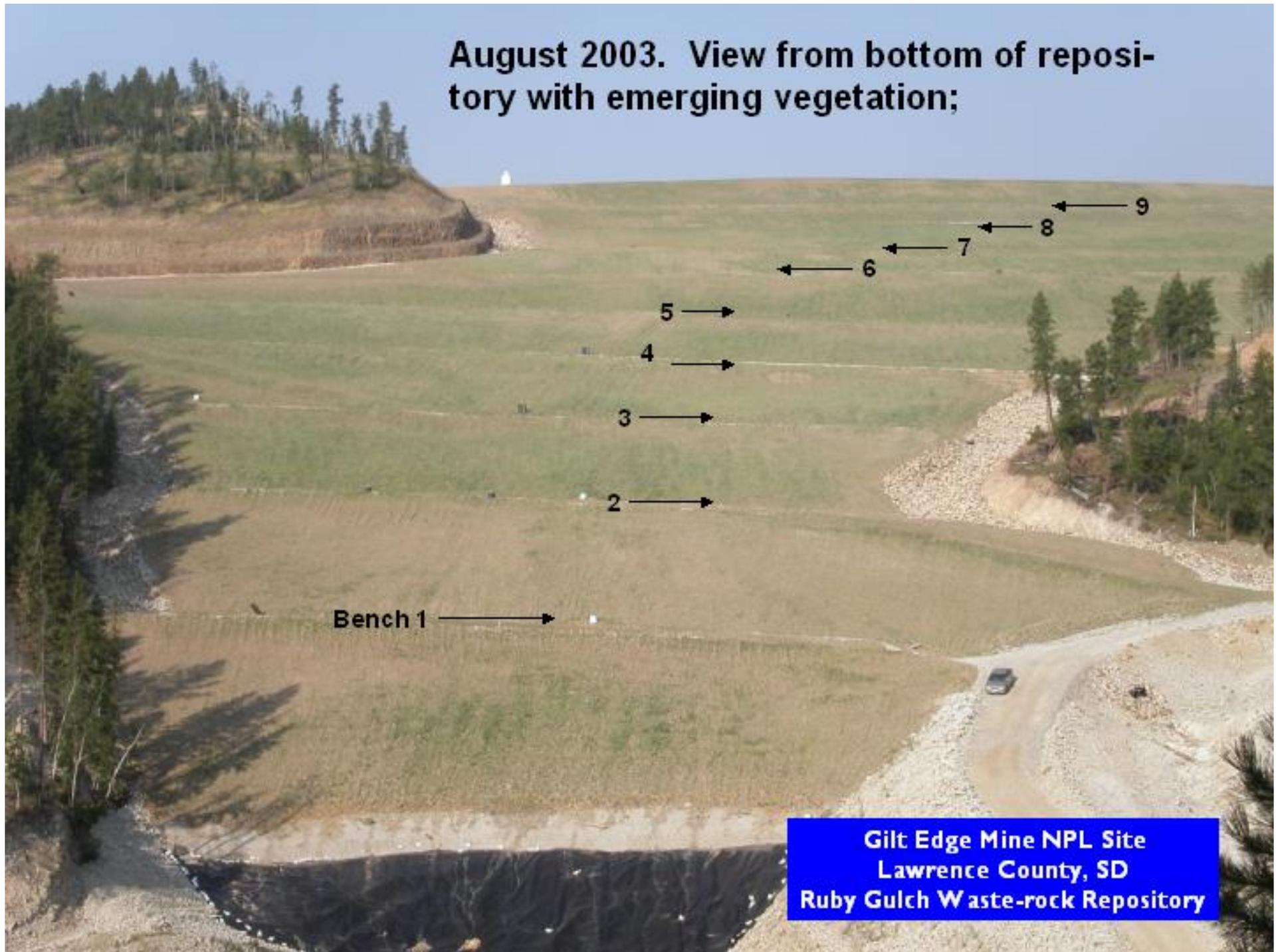
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June 2003. Hydro-seeding on Bench 5.



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August 2003. View from bottom of repository with emerging vegetation;



Bench 1 →

2 →

3 →

4 →

5 →

← 6

← 7

← 8

← 9

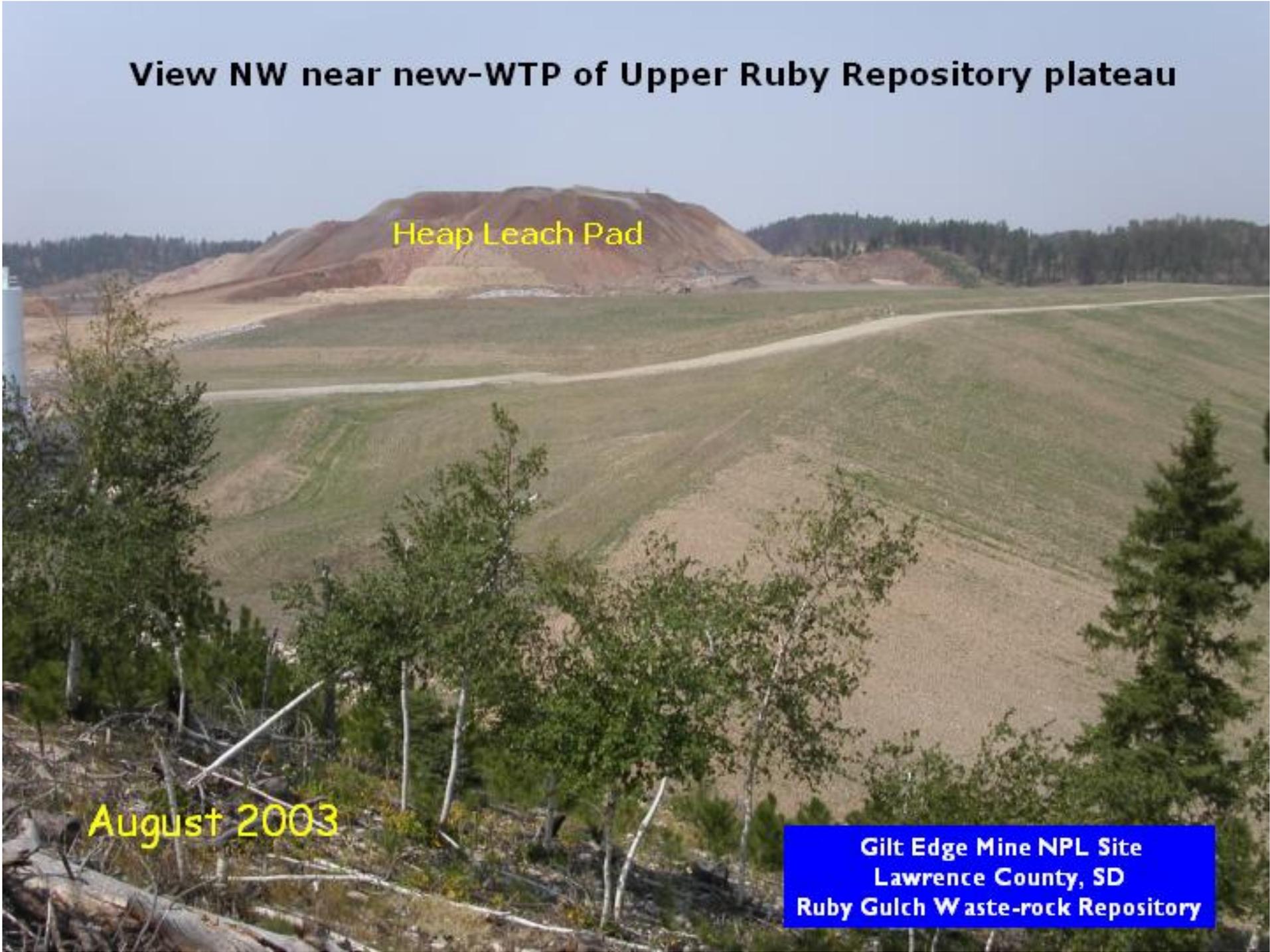
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View NW near new-WTP of Upper Ruby Repository plateau

Heap Leach Pad

August 2003

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August 2003. View of the five uppermost repository slopes & drainage benches with emerging vegetation cover.



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