MINE DRAINAGE TREATMENT

A POUND OF PREVENTION

IS WORTH A TON OF TREATMENT

WEST VIRGINIA MINE DRAINAGE

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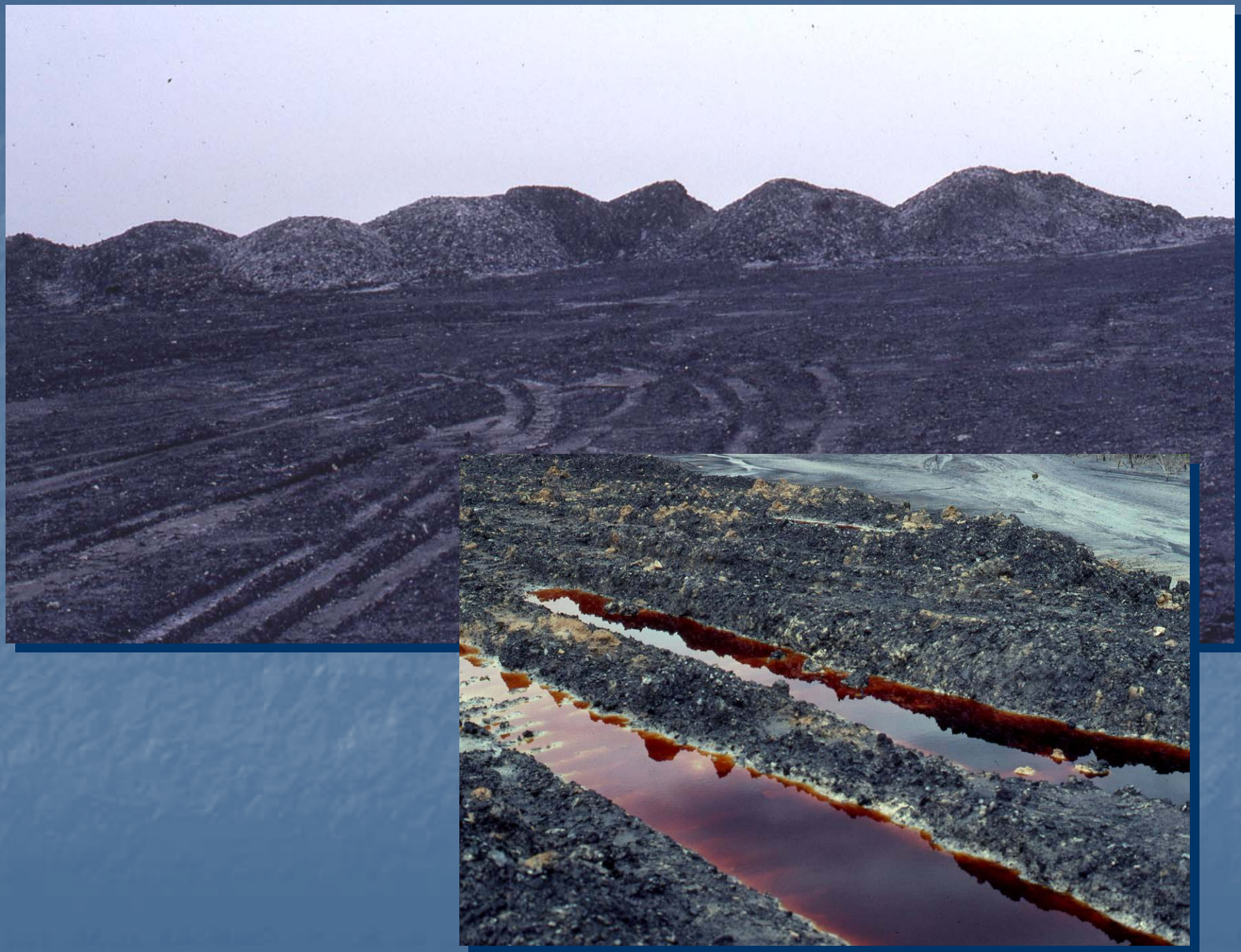
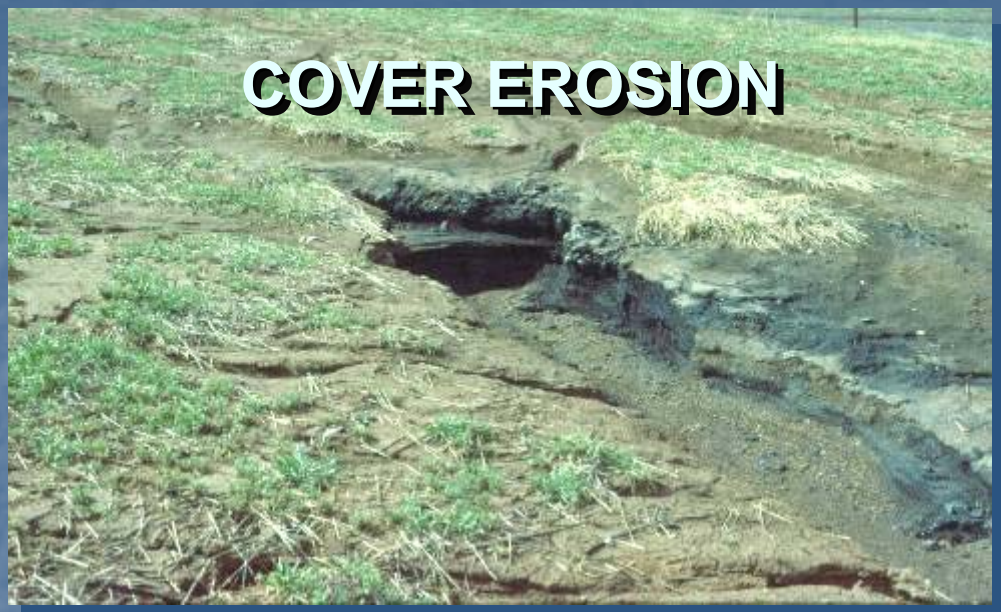
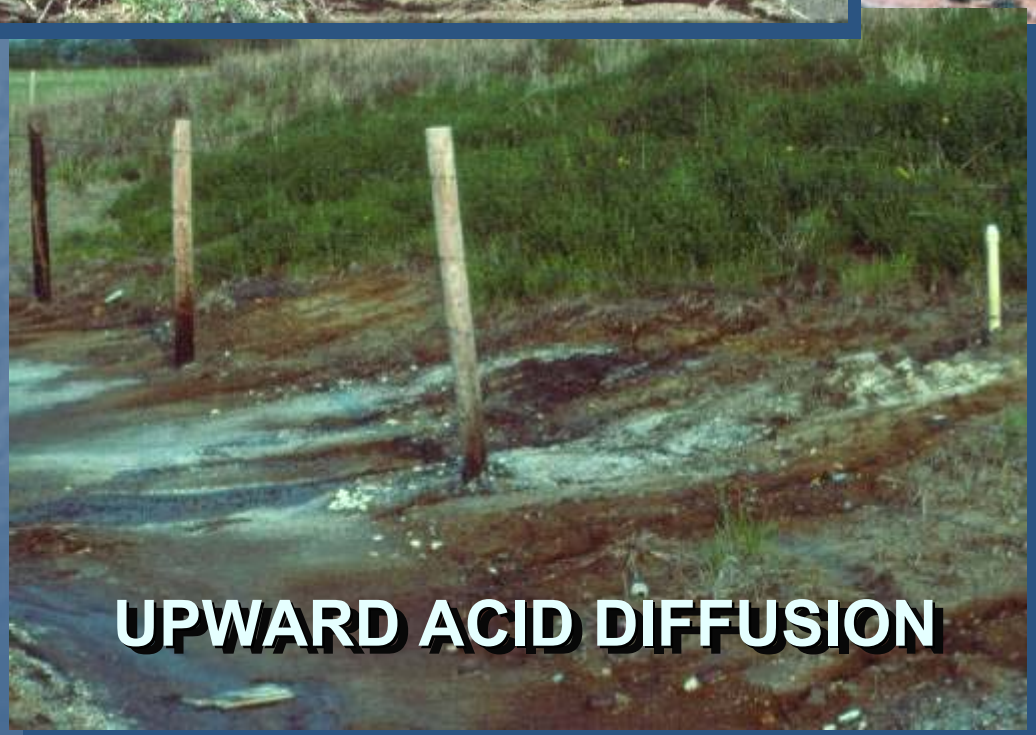
TASK FORCE SYMPOSIUM



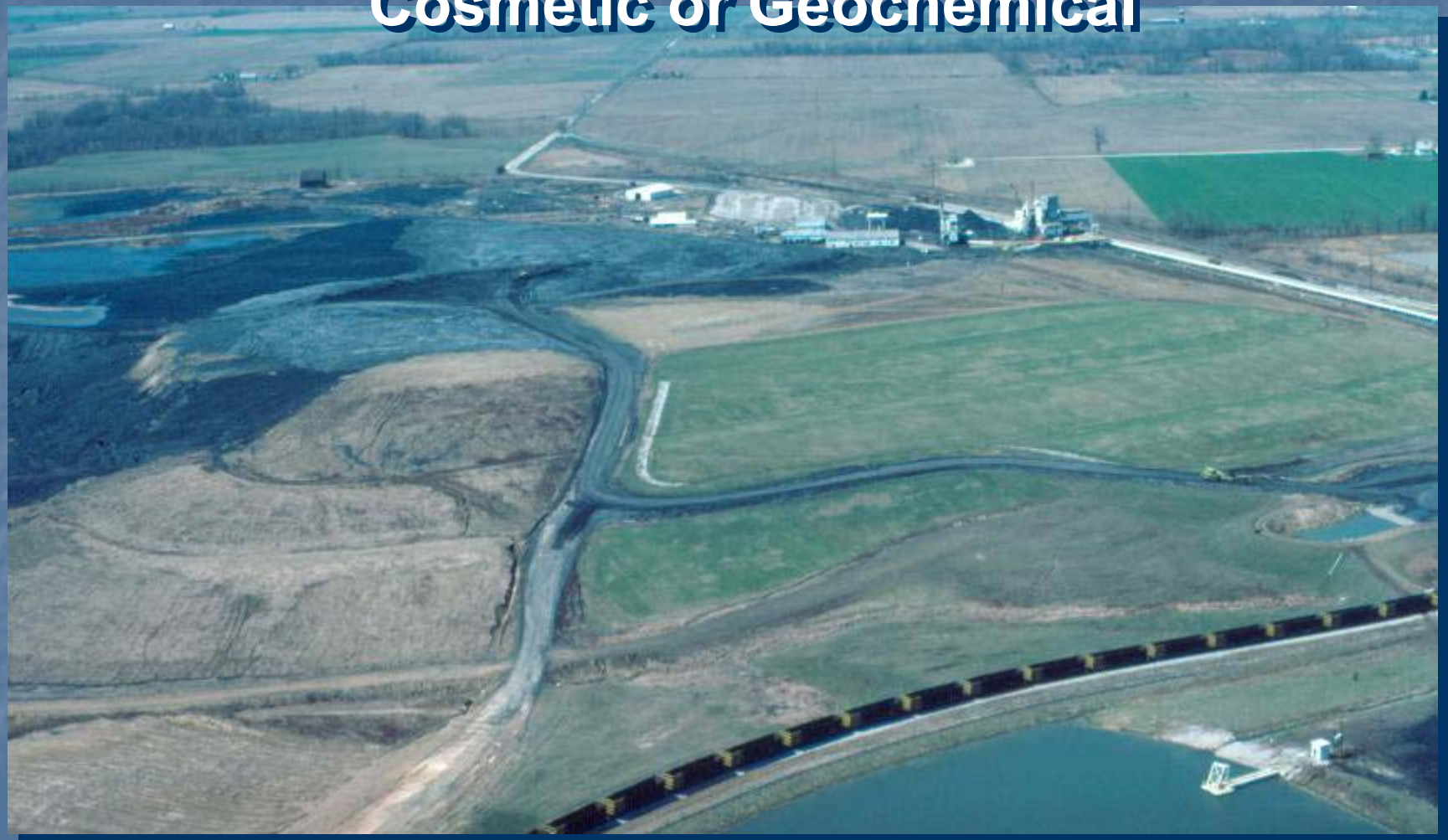

COVER EROSION


ACID SEEPS

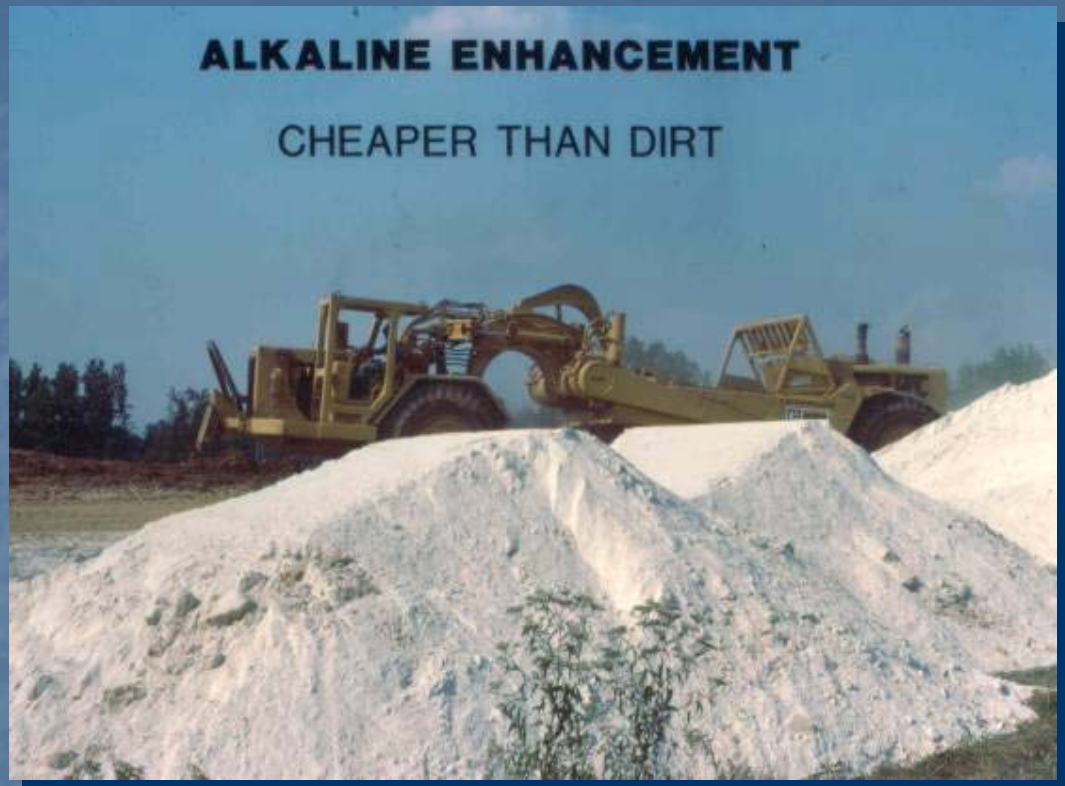

UPWARD ACID DIFFUSION

COAL WASTE: SOIL COVER ALTERNATIVES

Cosmetic or Geochemical

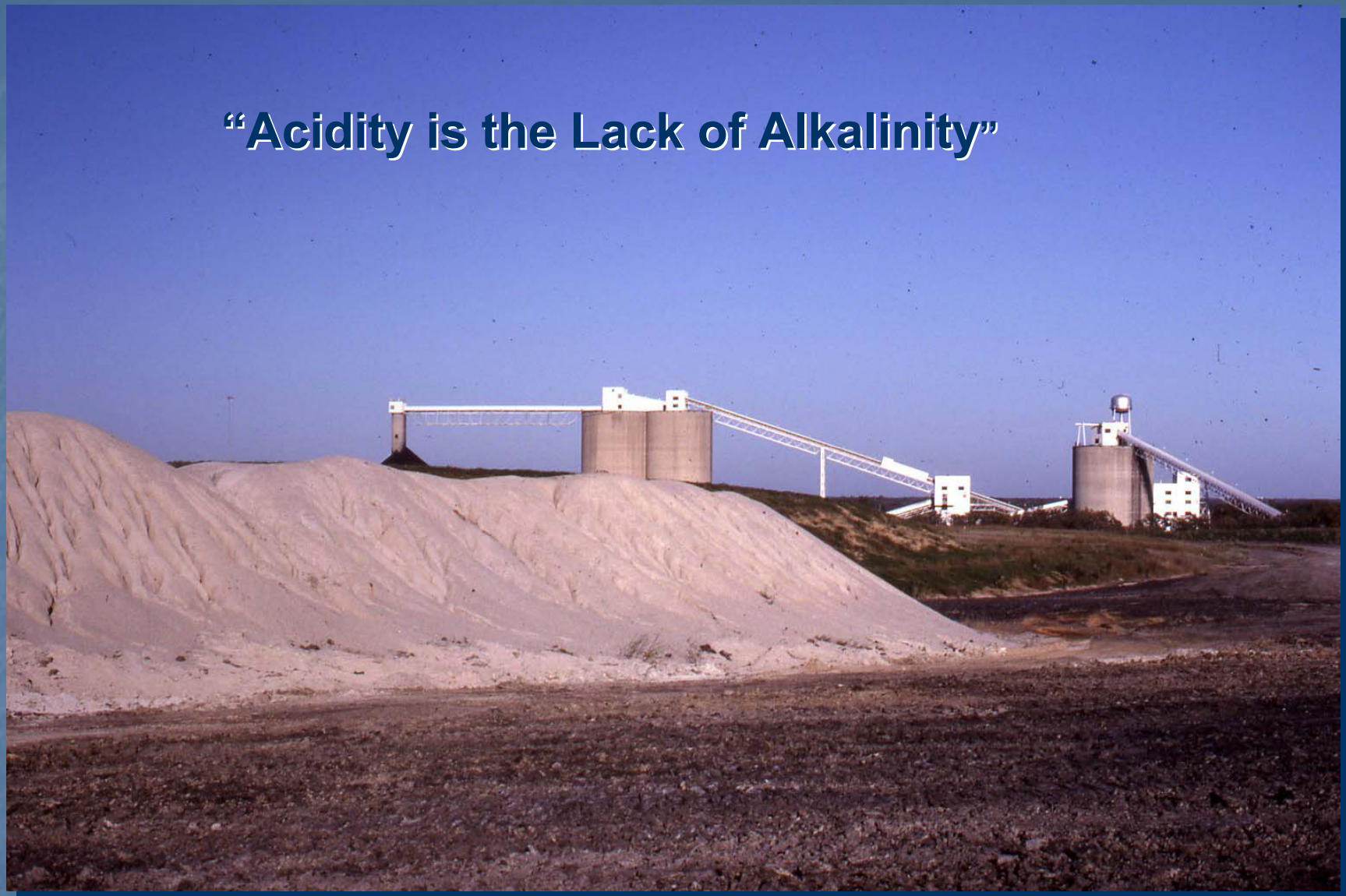


LIMESTONE AND SOIL COVER




RECLAMATION ALTERNATIVES
COVER
TREAT & COVER
TREAT
'SOIL' SUBSTITUTE

“Acidity is the Lack of Alkalinity”



LIMESTONE AMENDMENT

CCE 31 tons/1% pyrite

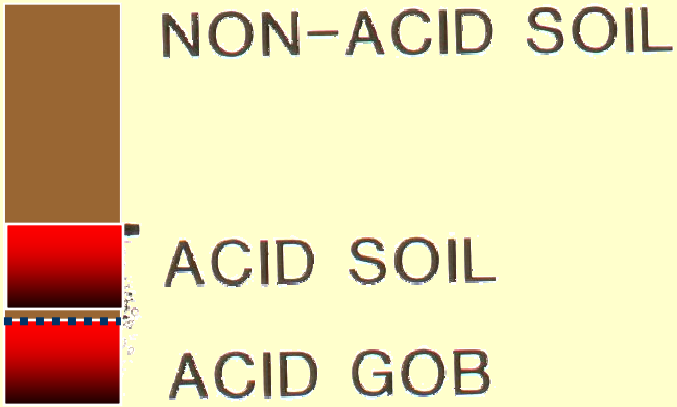
Depth Effect >2 ft (5x safety factor)


0 TONS/ACRE
150 TONS/ACRE
1′
2′
3′
4′
50 TONS/ACRE
15 TONS/ACRE
N
0
50
100
FEET

'TREAT &/OR COVER'
ROOTING DEPTH

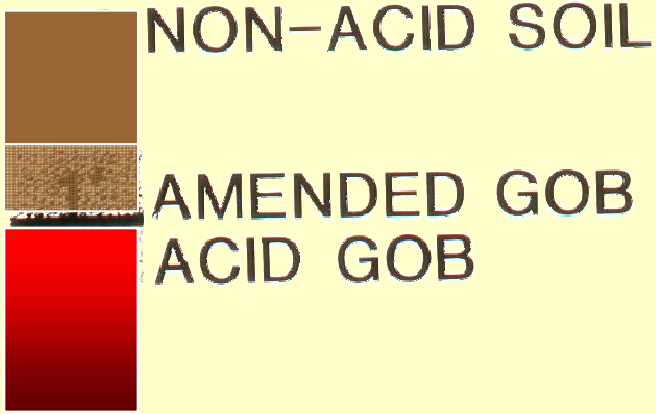
COVER – 4'

(NO Limestone)



2' COVER – 1' TREAT

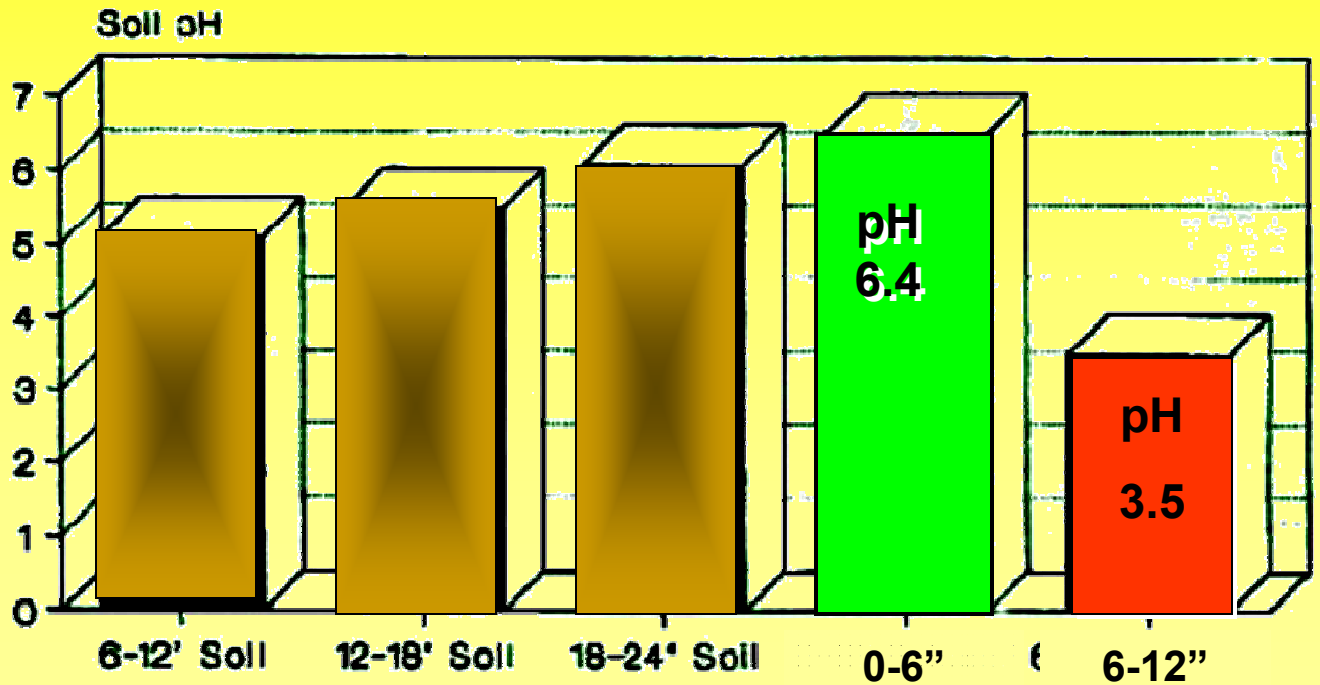
(150 – 200 ton/ac Limestone)



3-foot "effective" non-acid cover

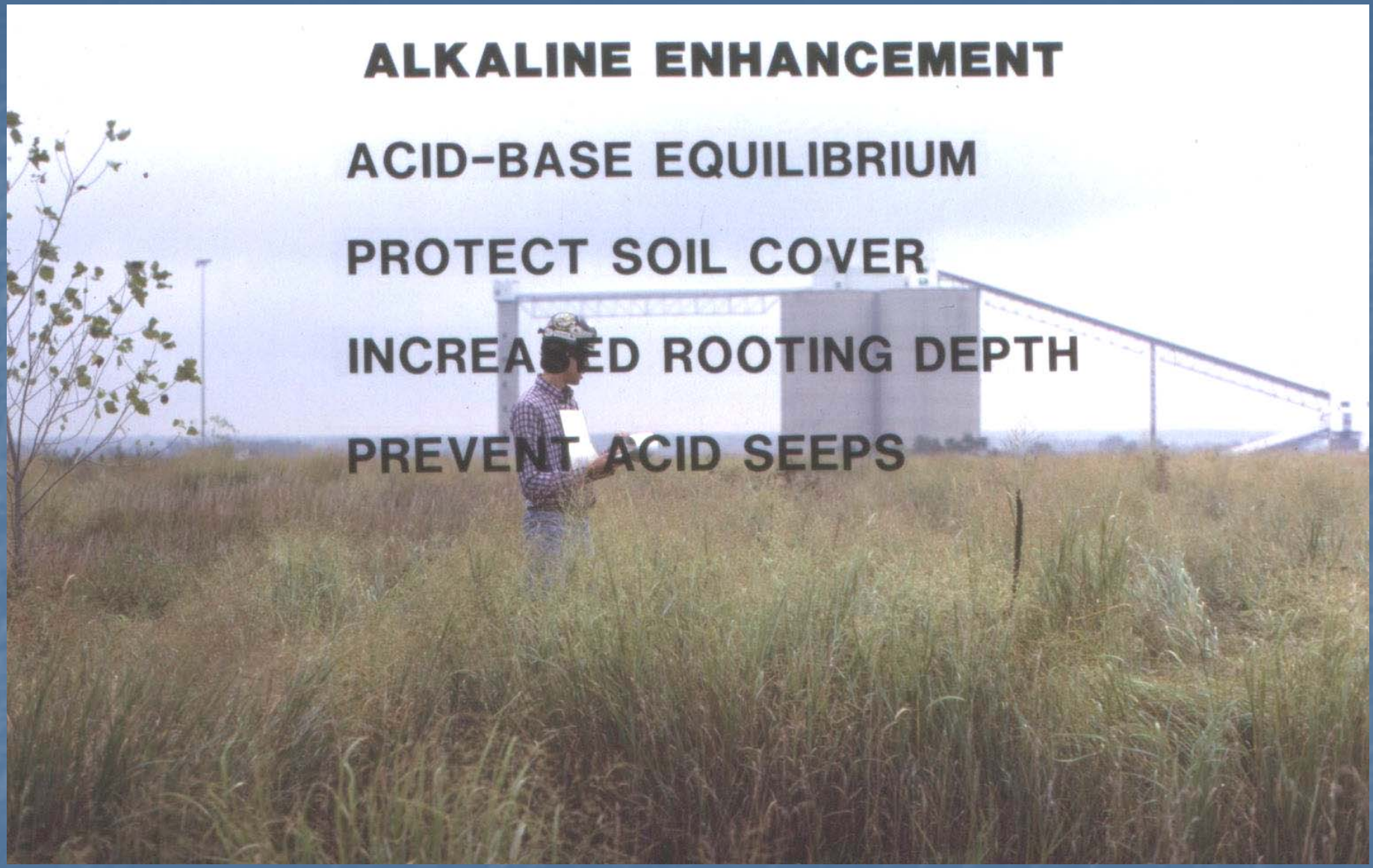
MCC #1 Refuse Areas 1 And 4

2' Soil Cover



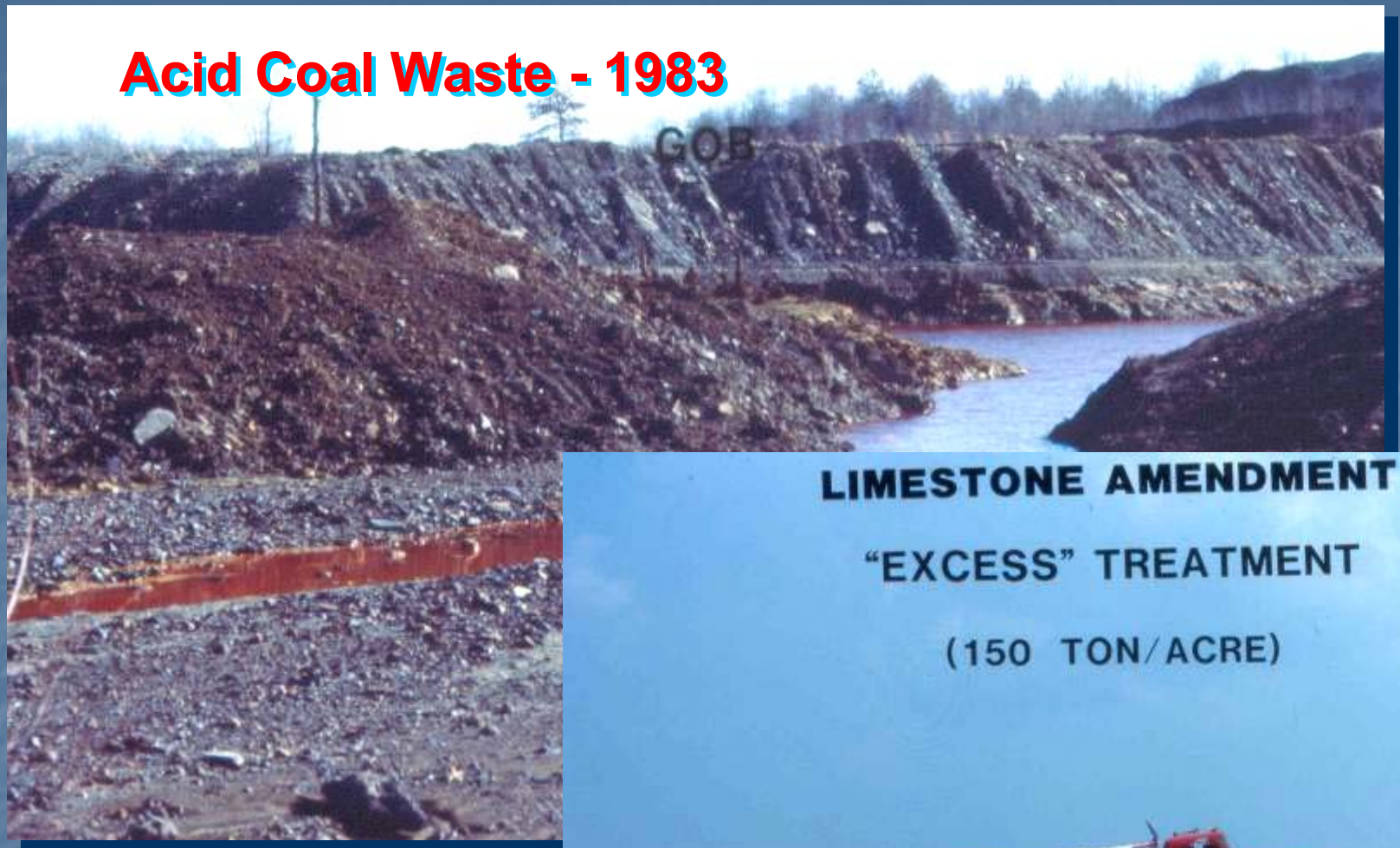
Limestone @ 150 ton/acre

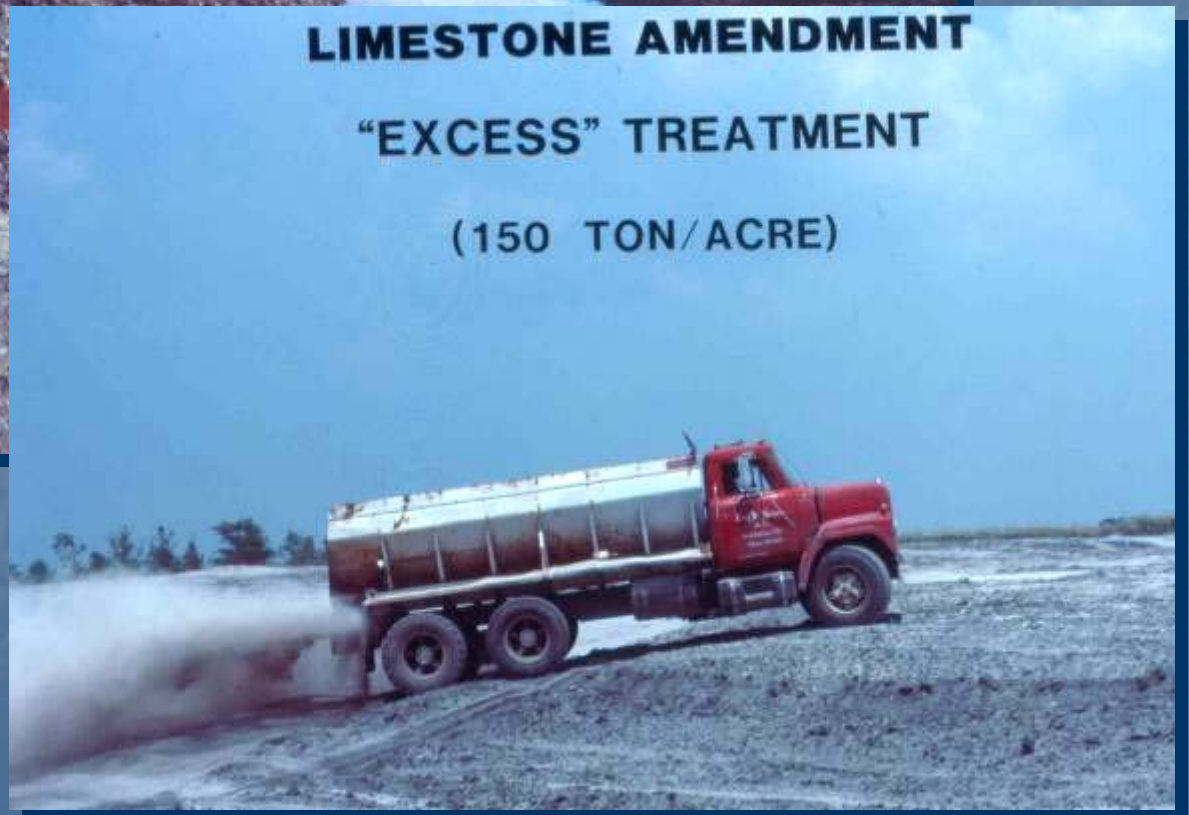
• = amended (150t/ac); + = unamended


ALKALINE ENHANCEMENT
ACID-BASE EQUILIBRIUM
PROTECT SOIL COVER
INCREASED ROOTING DEPTH
PREVENT ACID SEEPS


ALKALINE ENHANCEMENT
CHEAPER THAN DIRT
“SOIL” SUBSTITIUTE

Acid Coal Waste - 1983






Acid Coal Waste (pH 3.1)
150 tons/ac $CaCo_3$ - No Soil


Direct Seeding - No Soil
1983


"SOIL" DEVELOPMENT
AGING
WEATHERING
AMENDMENT

WILL SCARLET MINE

USA

1998

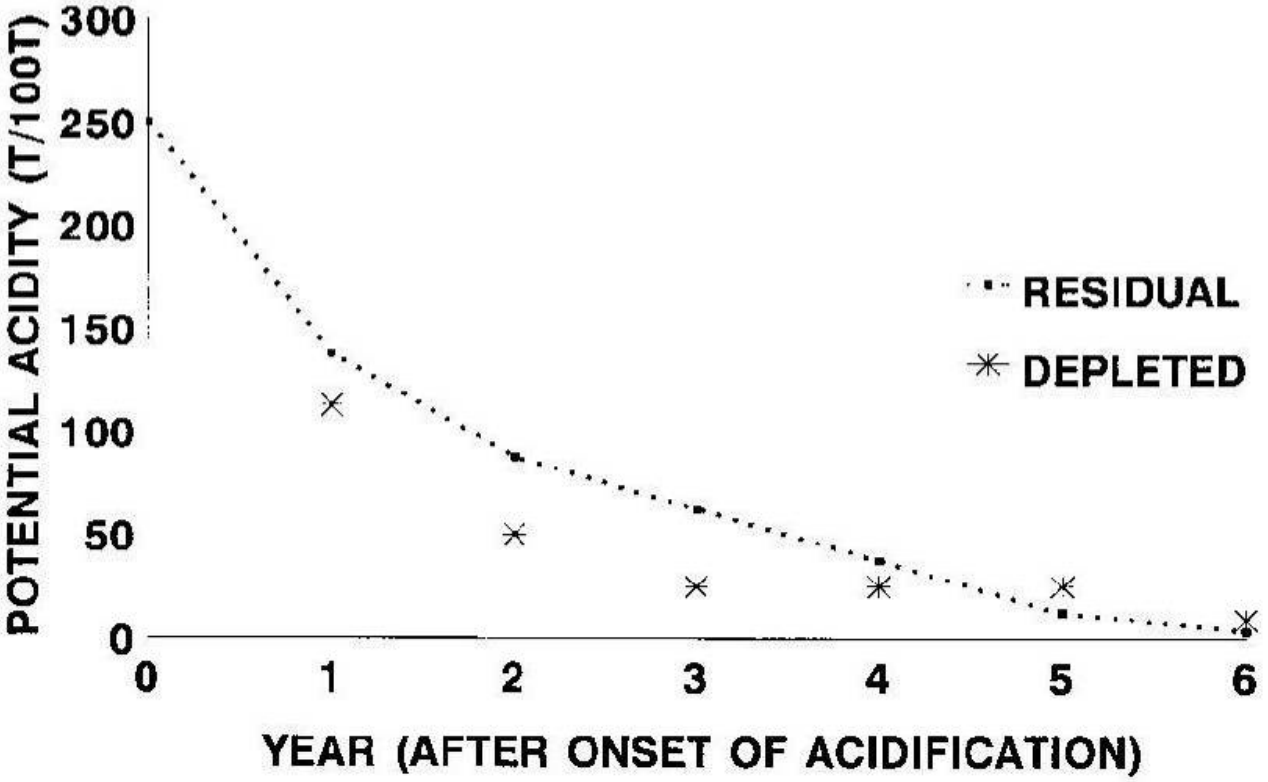
Minimize Grading – DO NOT expose Fresh Pyrite

"First Do No Harm"

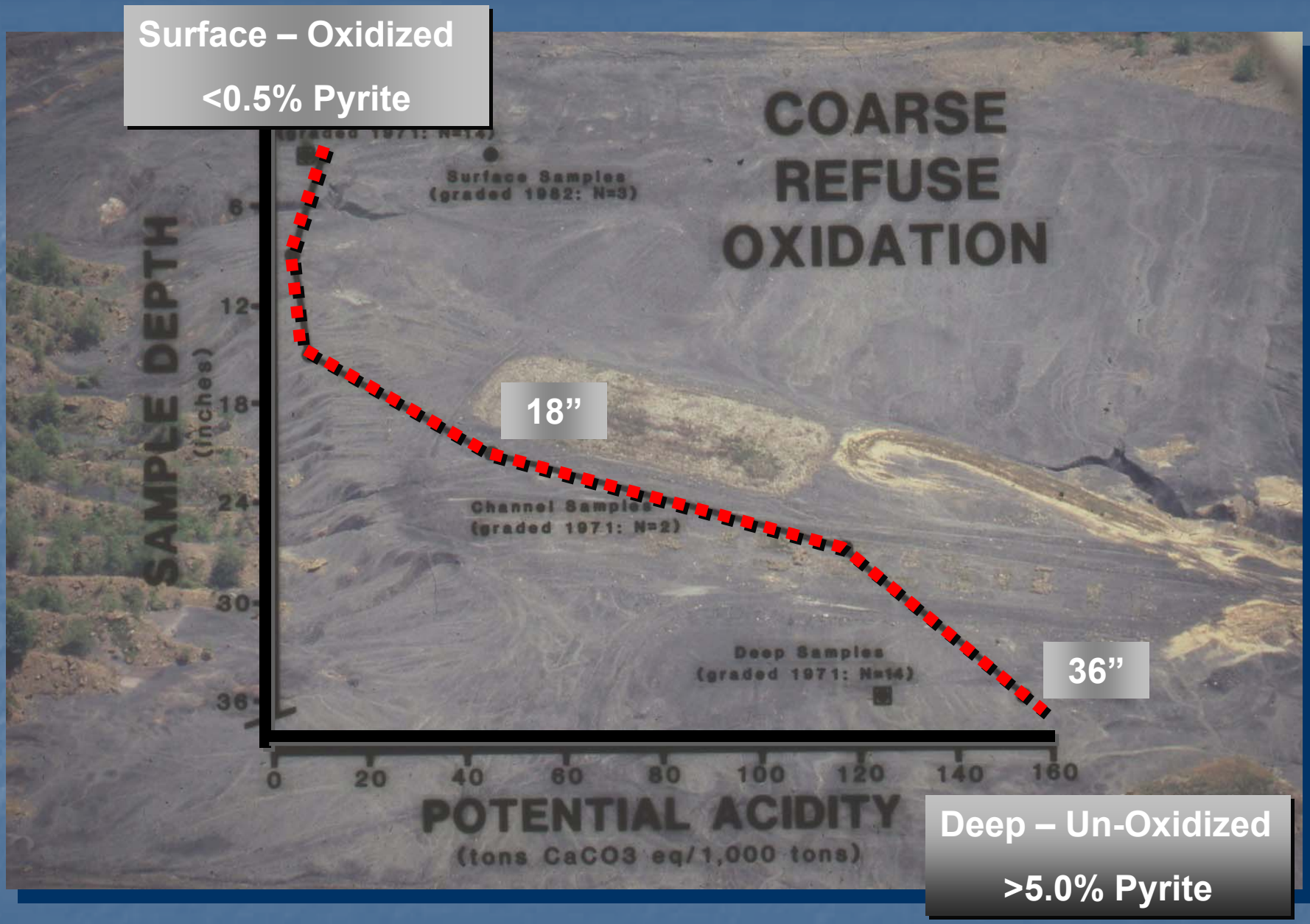
Maximize - Alkaline Enhancement


OXIDIZED – Pyrite Depletion
UNOXIDIZED

COARSE REFUSE OXIDATION

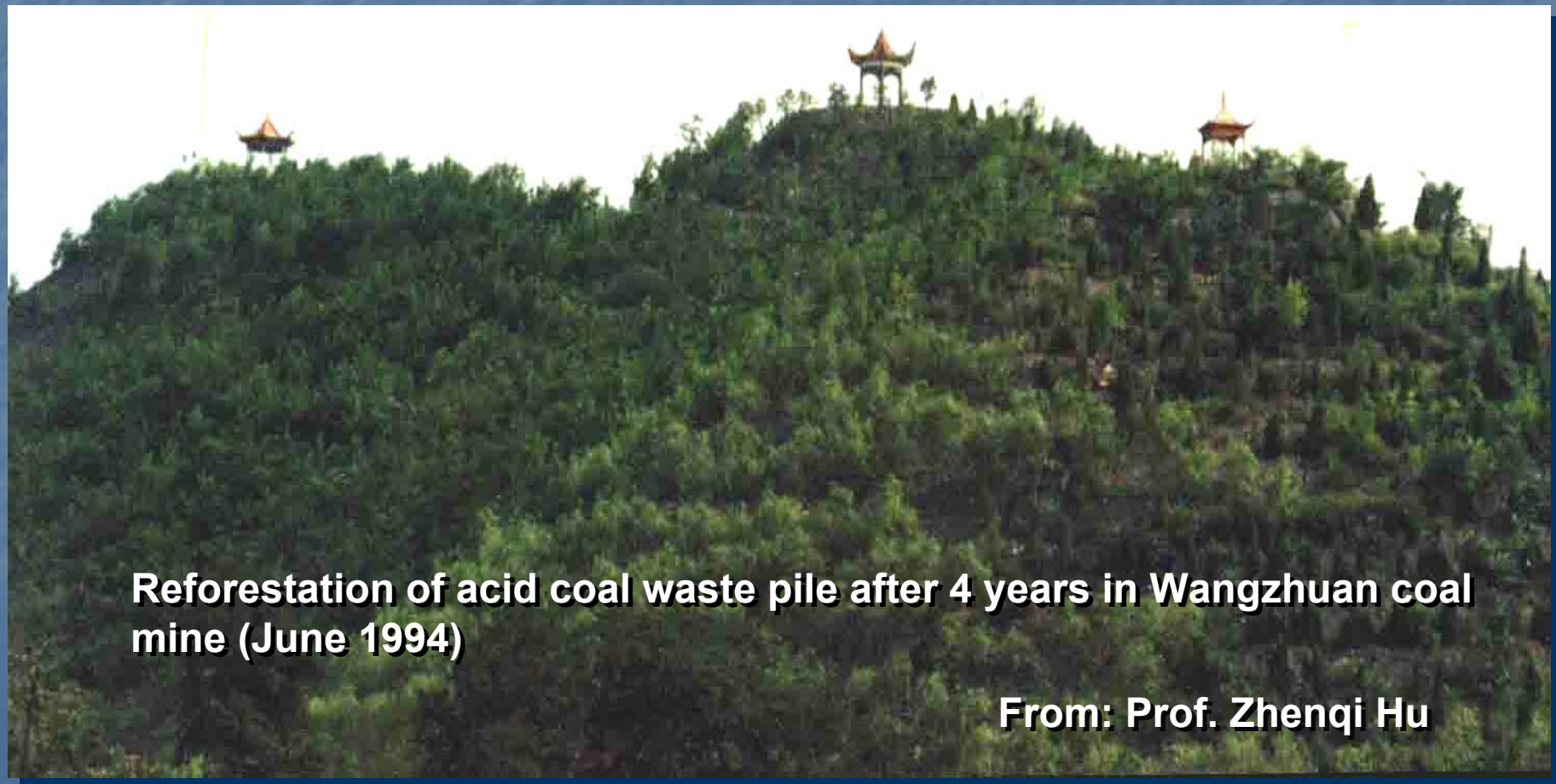


(Based on "worst case" 8% pyrite)


Surface – Oxidized
<0.5% Pyrite
COARSE
REFUSE
OXIDATION
Surface Samples
(graded 1982: N=3)
SAMPLE DEPTH
(inches)
6
12
18
24
30
36
18”
Channel Samples
(graded 1971: N=2)
Deep Samples
(graded 1971: N=14)
36”
0
20
40
60
80
100
120
140
160
POTENTIAL ACIDITY
(tons CaCO3 eq/1,000 tons)
Deep – Un-Oxidized
>5.0% Pyrite


COARSE REFUSE RECLAMATION
WEATHERING AND AGING
MINIMAL EXPOSURE
SURFACE AND DEEP AMENDMENT
ALKALINE ENHANCEMENT ZONE

Wangzhuan Coal Mine
CHINA



Reforestation of acid coal waste pile after 4 years in Wangzhuan coal mine (June 1994)

From: Prof. Zhenqi Hu

REFUSE DISPOSAL MANAGEMENT


1993