Enzymes in the Construction Industry

Enzymes are organic catalysts which occur naturally in the environment.

This presentation looks at two enzyme applications which can contribute positively, in both economic and environmental terms, to constructions related projects

EKO-SOIL
Soil Stabiliser

"The 21st Century Road Building Technology"

Presented by:

Norwood Hall (Asia) Pty Ltd

Australian distributor for EKO-SOIL

IN 1998 A WESTERN AUSTRALIAN QUARRY REBUILT ITS ACCESS ROAD

QUARRY ACCESS, FLYNN'S ROAD, WUNDARRIE W.A.

LAID IN 1998, THIS ROAD HAS HAD NO MAINTENANCE IN 10 YEARS, DESPITE 120 “B DOUBLE” MOVEMENTS DAILY

FLYNN’S ROAD WUNDARRIE, 2006

EKO-SOIL
Soil stabiliser

- A Unique
- Multiple enzyme based stabiliser
- Fermented from organic materials
- Environmentally safe & 100% biodegradable
- Non-toxic & non-hazardous
- Now used in over 30 countries world wide
- Made in the USA

WHAT DOES EKO-SOIL DO?

- **Increases soil density & load bearing capacity**
- **With less compaction effort**
- **Decreases the need for costly aggregates**
  (Allowing for the use of existing cheaper materials)
- **Lowers permeability**
- **Results in savings of up to 50% on conventional construction costs**

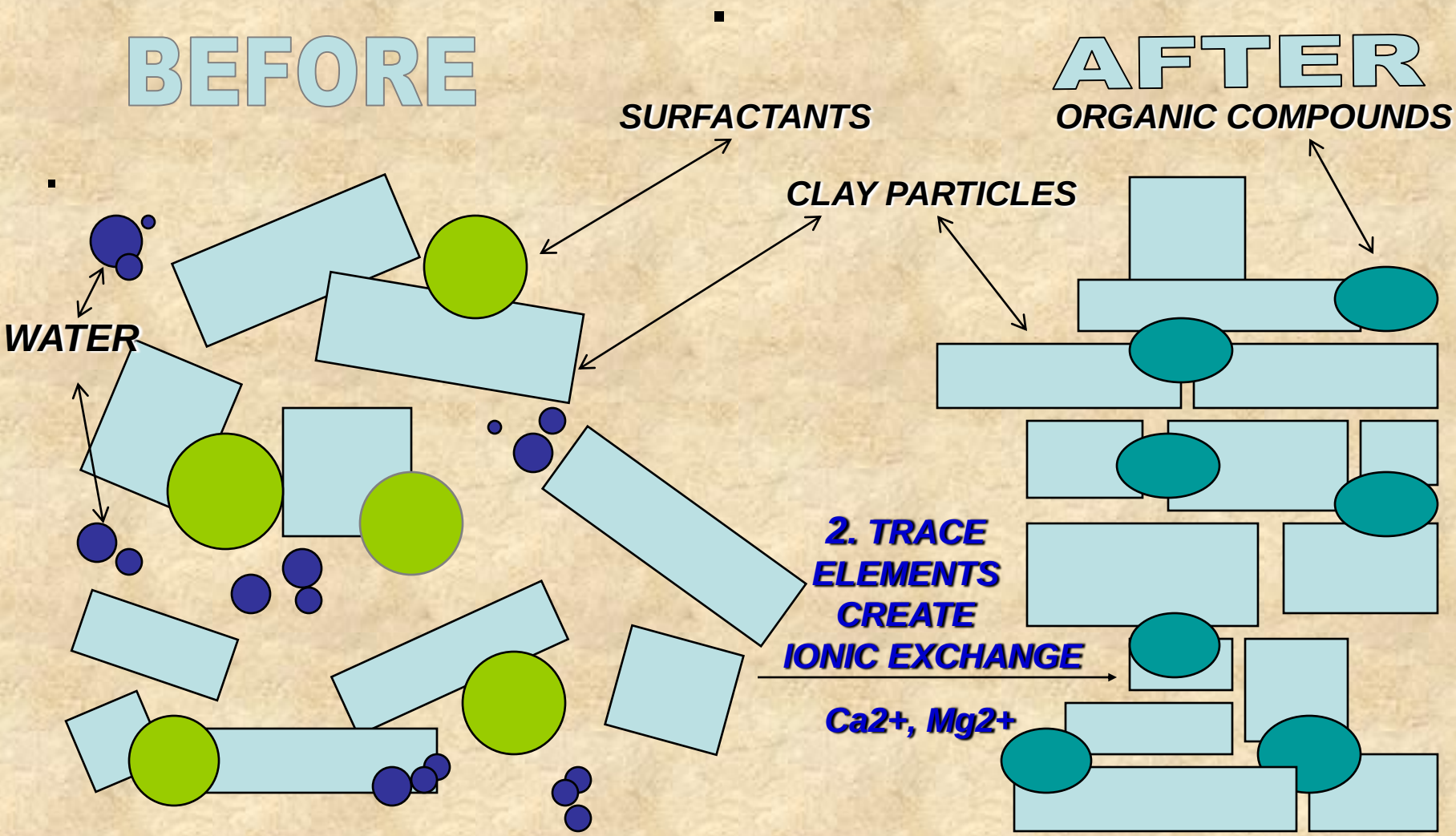
HOW DOES IT WORK?

- ***EKO-SOIL Soil Stabiliser*** **interacts with clay changing the soil's molecular structure**
- **This accelerates the cohesive bonding of soil particles**
- ***EKO-SOIL*** **uses less water than normally needed in bonding**
- **Finally producing a dense permanent base,**

Termites have been building with enzymes for millions of years!

African termites make rock hard structures with the enzymes in their saliva acting on the clay content of soils.

Visual of the Molecules:

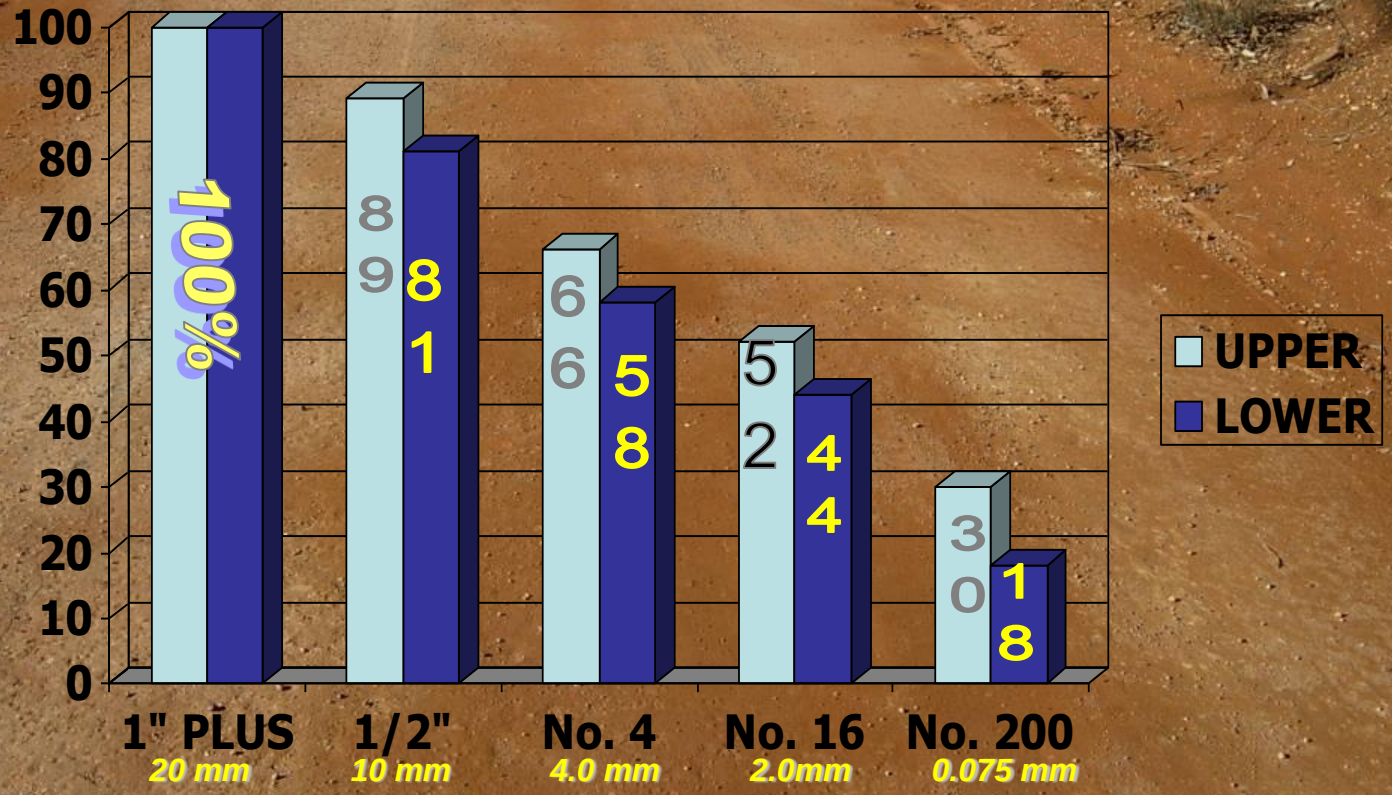


STEP 1.

THE PRE-REQUISITES: SOILS ANALYSIS

1. GRADATION, INCL AT LEAST 18% COHESIVE FINES PASSING THE 75 MICRON SCREEN

2. MINIMUM PLASTIC INDEX OF 6%



STEP 2.

RIP THE SOIL

ITS JUST LIKE BUILDING A CONVENTIONAL ROAD

- RIP & SHAPE EXISTING ROAD BASE

ROAD PREPARATION - SHAPE EXISTING ROAD BASE


STEP 3
LIGHTLY WATER
AND MIX THROUGH THE BROKEN SOIL
STEP 4
ADD EKO SOIL
TO A STANDARD WATER TRUCK AND MIX AGAIN
THROUGH THE SOIL
ADD PERMA-ZYME WITH WATER AND APPLY TO BASE MATERIAL

STEP 5

PROCEED TO SPREAD
COMPACT
AND SHAPE

SPREAD AND SHAPE MATERIAL, THEN COMPACT

COMBINED MIXING VEHICLE AND WATER TRUCK FURTHER REDUCES CONSTRUCTION TIME

OTHER APPLICATIONS

HIGH IMPERMEABILITY DRAMATICALLY REDUCES LOSS DUE TO SEEPAGE

STABILISED LAGOON CONSTRUCTION (Nevada USA)

LAGOON IN CONSTRUCTION

AFTER FILLING

ON COMPLETION (6 YEARS LATER)

LANDFILL COVER AND TOXIC DUMPS

MINIMUM DATA REQUIRED

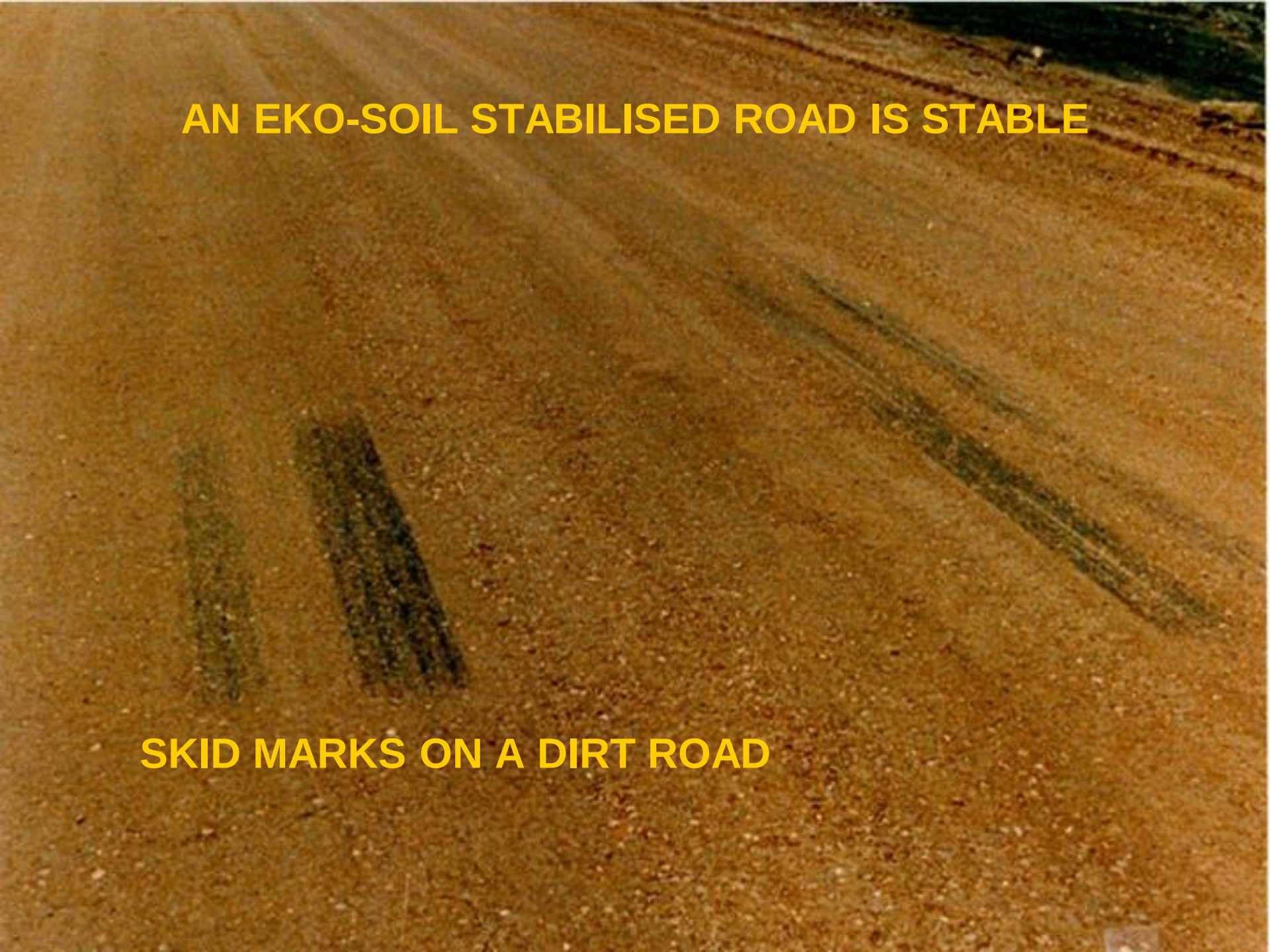
SOILS ANALYSIS

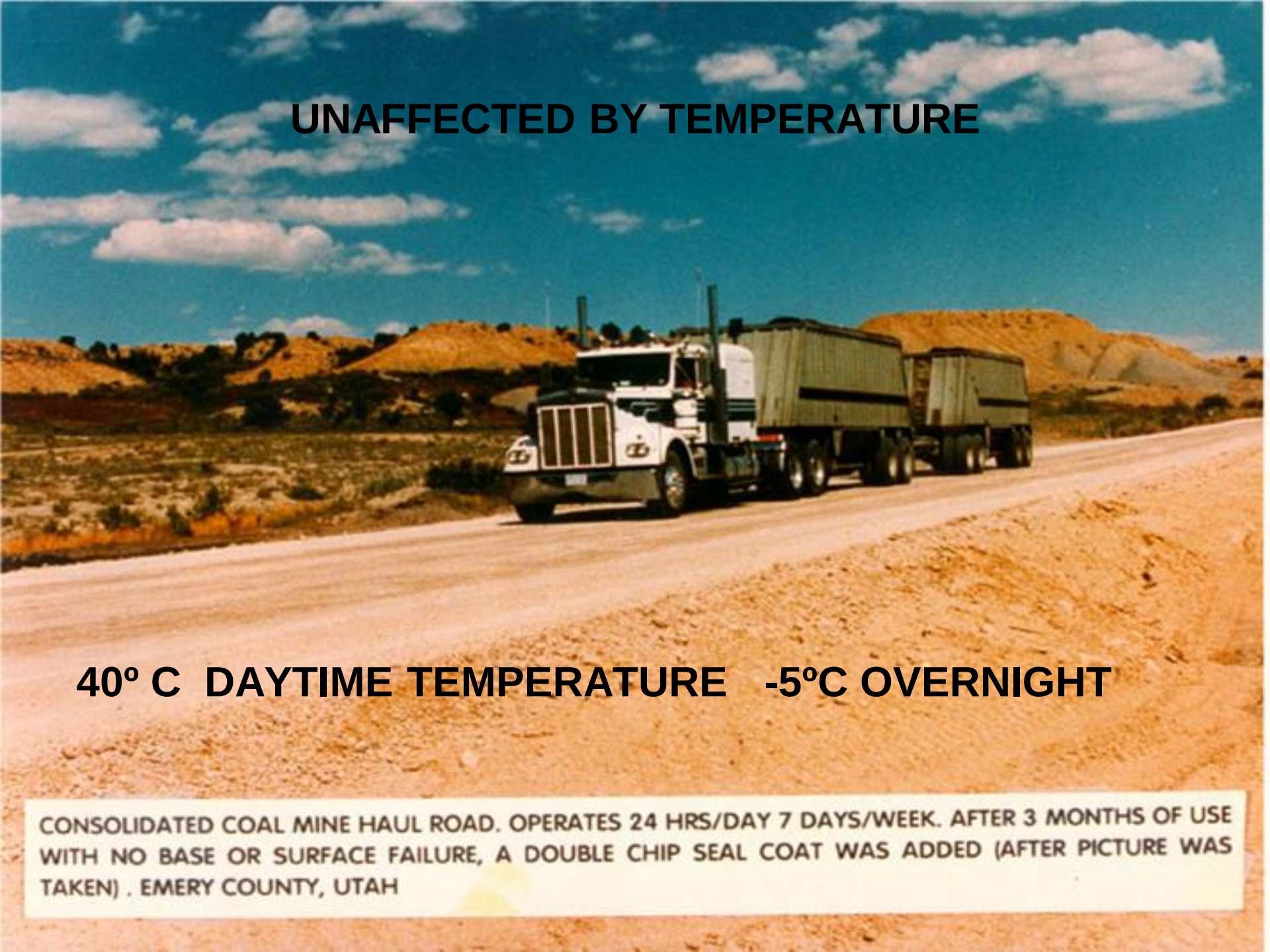
- **GRADATION** ***(NOTE MINIMUM REQUIREMENTS)***
- **PLASTIC INDEX** ***(MINIMUM PI of 6%)***
- **MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE*****(FOR CALCULATING WATER VOLUME)***
- **pH SHOULD BE IN THE RANGE 4.5 – 8.0**

THEN

- **GRADER WITH RIPPER**
- **WATER TRUCK**
- **ADEQUATE SUPPLY OF WATER**
- **STEEL DRUM ROLLER**


SAMPLE ROAD, MORNINGTON, VICTORIA, AUSTRALIA
SHOWS CHANGE FROM TREATED ROAD TO UNTREATED ROAD


AN EKO-SOIL STABILISED ROAD IS STABLE
SKID MARKS ON A DIRT ROAD


UNAFFECTED BY TEMPERATURE
40º C DAYTIME TEMPERATURE -5ºC OVERNIGHT
CONSOLIDATED COAL MINE HAUL ROAD. OPERATES 24 HRS/DAY 7 DAYS/WEEK. AFTER 3 MONTHS OF USE WITH NO BASE OR SURFACE FAILURE, A DOUBLE CHIP SEAL COAT WAS ADDED (AFTER PICTURE WAS TAKEN) . EMERY COUNTY, UTAH


RESISTS WATER DAMAGE
HOLDS UP TO REPEATED FLOODINGS

FOR UNPARALLED ECONOMY

- EKO SOIL WILL HELP YOU BUILD THE STRONGEST
- MOST DURABLE DIRT ROAD
- WITH LESS IMPORTED MATERIALS
- ZERO ENVIRONMENTAL IMPACT
- AND NEGLIGIBLE LONG TERM MAINTENANCE

EKO-SOIL

SOIL STABILISER

Contact: Brian O'Donnell +61 (0) 409 683 537

ENZYMES IN THE CONSTRUCTION INDUSTRY

EKO-WATER


EKO-WATER
WASTE WATER TREATMENT
"The 21st Century Water Treatment Technology"

EKO-WATER
Water Treatment

- A Unique
- Multiple enzyme based additive
- Fermented from organic materials
- Environmentally safe & 100% biodegradable
- Non-toxic & non-hazardous
- Now used in over 30 countries world wide
- Made in the USA

WHAT DOES EKO-WATER DO?

- Eliminates odor to as little as 3 PPM *(and less!)*
- Greatly facilitates growth in resident bacteria populations by making nutrients more available.
- Facilitates separation & settling, reducing suspended solids *(precipitates particles, clarifies water)*
- Buffers drastic swings in the pH
- Reduces use of costly and voluminous pH additives
- Helps protect resident biomasses
- Improves BOD & COD in final wastewater

HOW DOES IT WORK?

SPEEDS UP AND INCREASES BACTERIAL ACTION AND BIODEGRADATION

HOW IS IT APPLIED?

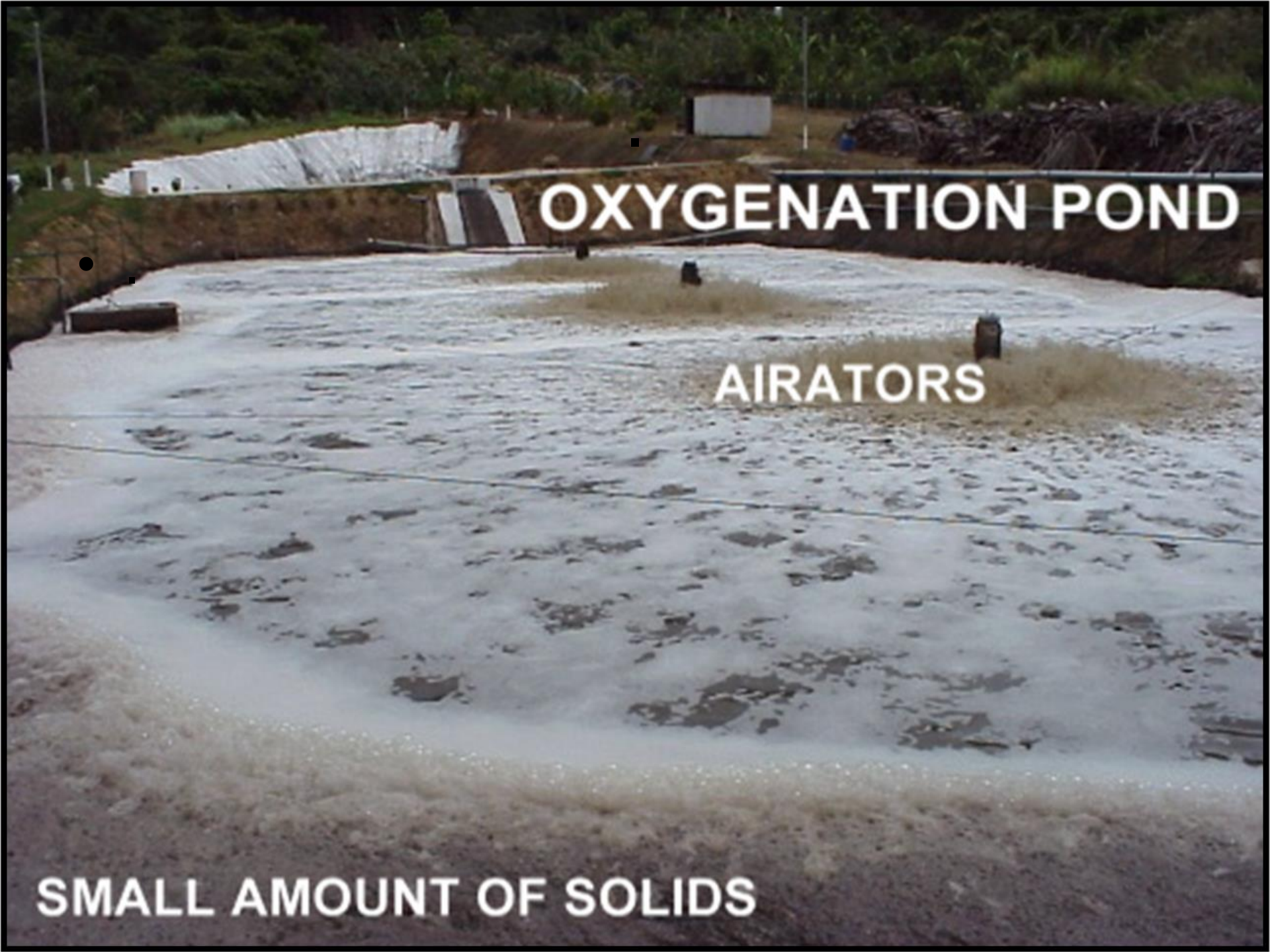
- **SIMPLY ADD ECO-WATER TO THE TURBULENT WATER** *(an automated system is suggested).*
- **CALCULATE AT 3-5 PARTS PER MILLION FOR INFLUENT STREAM.**
- **FOR A QUICKER START UP , THE LAGOONS OR TANKS MAY ALSO BE "CHARGED" BY DIRECT, MANUAL SPRAYING.**
- **IF FOR ODOUR REMEDIATION, SURFACE SPRAYING WITH A LOW PRESSURE HOSE & DISPENSING NOZZLE IS VEY EFFECTIVE.**
- **CONTINUE TO CHECK AND ADJUST pH AS REQUIRED.**

Eko-Water should be added to the system in a collection tank, where the wastewater is most turbulent, for thorough mixing.

PROBLEM LAGOONS MAY BE “TOP SPRAYED” FOR ODOUR AND INSECT CONTROL

Lagoons may be surface sprayed with Eco-Water in order to control odor and insects or directly “charged” in the lagoon to help precipitate solids and improve the water quality.

This will also give a “push” to the resident bacteria population.


OXYGENATION POND
AIRATORS
SMALL AMOUNT OF SOLIDS

TREATED WATER IS RETURNED TO THE RIVER

EKO-WATER

WATER TREATMENT

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