DEEP MINING 2030

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with

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MAN NEEDS MINERALS

MINERALS NEED MAN

MINING, EXTRACTION MARKETING
2030
MAJOR EXISTING SURFACE DEPOSITS
GOING TO BE DEPELTED

HAVE TO GO DEEP AND DEEPER
FOR THE MINERALS

1990, KOLAR AT 3.2 KM DEPTH
ROCK TEMPERATURE WAS 76 °C
MINES WILL BE AT 5 TO 10 KM DEPTH

ROCK TEMPERATURE 125-250°C

CHILLED AIR PUMPED DOWN AT 5°C BUT HAS 100% HUMIDITY

PIPE IT DOWN TO 5 KM DEPTH
PROVISIONS OF FOOD, AIR, WATER WASTE DISPOSAL

HUMAN INFRASTRUCTURE WILL COST MORE 60% OF THE MINING COST.

A 2.2 KM DEEP S. AFRICA GOLD MINE TRAVEL TIME, BLAST CYCLE AND UNION REST IS 32%
AT PRESENT 4 KM? WHAT ABOUT AT 8 KM?

- Traveling time, 3 hours out of 8: 37.5% lost
- Vacate for blast, 8 hours: 33% lost
- 11 days out of 14: 21% lost

Total access to face: 33% of available time
ROCK TEMPERATURE AROUND 125-175°C

Conventional fuels, hydraulics, rubber tires, seal or any of the present material will not work

DESIGNS AND DEVELOPMENTS ARE REQUIRED GRAPHITE BASED DRY OR WET LUBRICANTS,

Heat shielded electric motors and well shielded processor and communication protocols
ROCKS BECOME MORE PLASTIC AND ROCK BURST MUCH MORE FREQUENT

CONVENTIONAL EXPLOSIVES WILL NOT WORK

ROAD HEADERS, CONTINEOUS MINES

WHO WILL WORK THEM???
CAN MAN SURVIVE IN THIS HOSTILE SETUP

BUT ROBOTS CAN

SO FUTURE

ENVIRONMENTALLY SAFE

TELE-ROMBOTIC
TELE-ROBOT VIEWER AND SURFACE CONTROLLER
SELF REPAIRING, MULTI TASKING

ACID RAIN, EMI AND ABRASION
PROCESSOR TERRA FLOPS AND TERRABYTES

ROBOTS

INTERCHANGEABLE

MULTI TASKING APPENDAGE

CARBON COMPOSITE SKIN
UG PROCESSING OF ORES AND WASTE BACK FILLING

\CONVENTIONAL PYRO-METALLURGICAL PROCESS OR
BIOMINING DIRECTLY CRUSHED OR CHEMICALLY TREATED ORES

NOT POSSIBLE

TRANSPORTATION ORE TO SURFACE MANDATORY
ORE PROCESSING

BACTERIAL LEACHING AT SUB-SURFACE

SUPER CRITICAL STEAM & CARBON DIOXIDE

AND A PART OF THE ENERGY GEOTHERMAL DEVICES.
BACTERIAS
WHAT THEY LOOK LIKE
SEM IMAGES OF TWO BACTERIAS

Fig. 11.1. A scanning electron microscope image of (a) *L. ferrooxidans* DSM2705 (magnification =18,000X) and (b) *T. ferrooxidans* ATCC33020 (magnification =15,000X).
PRESENT SITUATION
ONLY THERE ARE THREE
THIOBACILLUS FERROOXIDANS
LEPTOSIRILLUM FERROXIDAN
THIOBACILLUS THIOOXIDANS
THIOBACILLUS FERROOXIDANS
MICROBIAL METABOLISM PRODUCE CITRIC ACID THAT LEACHES

TIME TAKEN WEEKS TO MONTHS

NOT POSSIBLE UG NO WATER
CUPRIAVIDUS METALLIDURARS & DELFTIA ACIDOVORANS

YES THEY RELEASE GOLD

NOT ORE BUT FROM CHLORIDE SOLUTION

MORE THAN THE MARKET COST (EVEN IN India)
FOR RECOVERY OF OTHER METALS

THE FUNGI

ASPERGILLUS NIGER

PENICILLIUM SIMPLICISSIMUM

CAN EXTRACT

Cu Sn (65%) Al, Ni, Pb Zn

FROM E- WASTE,

CAR CATALYTIC CONVERTERS

AND

MUNICIPAL WASTE FLY ASH.
OTHER METALS

Mn, V, P, Cd

Ti, SILVER, TUNGSTEN

THE REE
NO BODY TOLD

FOR THE OTHER METALS

BIOLOGIST THIS IN PAST

WE CAN MODIFY

WHO WILL PAY FOR THE TIME AND COST?

EXISTING BACTERIA

CREATING LIFE IS STILL ??
COMBINED SECTION AND 4D VIEW OF ORE BODY FROM REAL TIME GEOPHYSICAL DATA
REQUIRED INTERACTIVE DEPOSIT MODELLING EXPLORARTION DATA INTERPRETATION MINE PLANNING AND PRODUCTION CONTROL

S/W FOR FOR THE ROBOTS

ALL ON REAL TIME BASIS

PICKMAN IS UNEDR DEVELOPMENT
UG COMMUNICATION

VERY HIGH SPEED AND ULTRA BROAD-BAND BI-DIRECTIONAL DATA NETWORK

INTERFACE PROTOCOL OPTICAL FIBRE, WI-FI LASER CONNECTION

PACKET COMMUNICATION TO WORK UNDER VERY HOSTILE ENVIRONMENT
THIS IS THE END OF THE STORY
REMEMBERING

STEVE

POONAM

IRENE