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# Solution mining pumps new life into Cane Creek potash mine

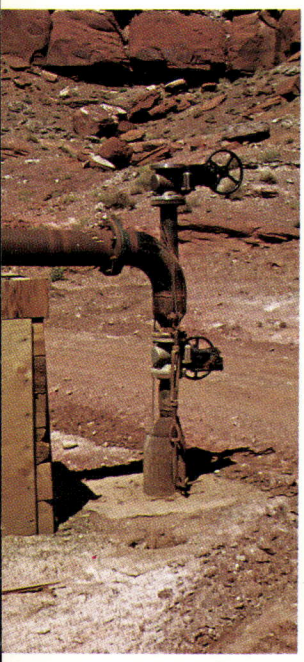
**Daniel Jackson, Jr.,** Western editor

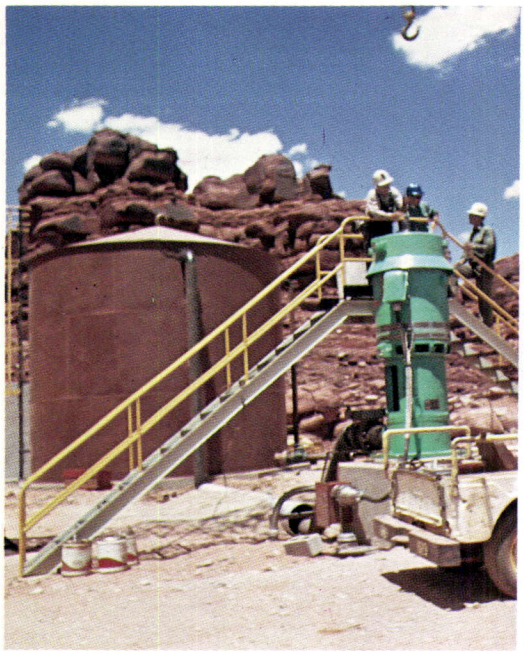
MANAGEMENT OF TEXASGULF INC. pumped new life into its ailing Cane Creek potash complex near Moab, Utah, through a uniquely creative approach. By combining solution mining of a defined sylvite bed with solar evaporation, Texasgulf rescues deep potash reserves which had proved uneconomic to recover by conventional underground continuous mining methods because of geological conditions.

Company success with this bold maneuver permits potash production at costs substantially below those experienced during the former room and pillar stoping program and places the recovered product on a competitive footing with that of other producers. In the latest annual report to stockholders, Texasgulf described the new processes as "continuing to demonstrate success." Cane Creek is expected to produce about 300,000 tpy of pure white muriate of potash containing approximately 61% $K_2O$—a premium quality for the industry.

The turnaround at Cane Creek projects Texasgulf more prominently into the potash industry, with two established product sources—the revitalized Utah operation and Allan Potash Mines in Saskatchewan, Canada, where the company has a 40% interest in a 1.5 million-tpy operation. Noteworthy achievements and features of Cane Creek include:

- Converting a conventional room and pillar underground mine to solution mining.
- Design and construction of evaporation ponds to establish an economical and commercial system based on solar energy.
- Processing 450 tph of feed, consisting of 150 tons of solids and 300 tons of brine, while using basically the same mill and product treatment circuits built for the problem-plagued underground operation. With modifications, the plant has achieved a high degree of quality control through automation and the change in the type of raw feed to the mill.





**Injection well** (left) is one of several feeding fresh water to the mine; brine is withdrawn by deepwell (center) and pumped to evaporation ponds. Pipelines (right) link ponds and plant, handling mine and recycled brines, solar crystallized slurry, and water.

Texasgulf's corporate management, in appropriating adequate funds to research and develop this project, must receive a large share of the credit. If management had lacked absolute confidence in the Cane Creek operating staff, it would never have totally committed developed underground potash reserves to solution recovery. Once water was injected into the salt formation, the process would become irreversible—there could be no retreat.

"Solution mining has been tried before," says R. L. Curfman, general superintendent, "but the Texasgulf approach is unique. It is the only one of its type in the world. While solution mining has been employed for some time at a Saskatchewan potash mine, the brines there go directly into crystallizers without making use of solar energy to precipitate potash on a commercial scale. Studies showed that this approach was not economically feasible for our operations at Moab."

## Defining the problem

Realigning ore recovery toward solution mining was not an easy decision to make. Engineers and others in management had been discussing the conversion since 1966 because of continuing problems with underground mining. The mine, which first started production late in 1964, was gassy and the scene of an explosion during early development.

In addition, the orebody was at a depth of about 3,000 ft in heavy country rock. Rock pressures were high and rock temperatures were about 100°F. The potash bed pitched about 800 ft in a mile. The ore horizon had an average $K_2O$ content of 23%, but it was carried in a bed that contained rolling undulations, which complicated normal continuous mining techniques. On top of this, roof conditions were bad, requiring a great amount of potash in the mining bed for pillar purposes, with a consequent loss in ore extraction.

After extensive research into the feasibility of solution mining, a full report was submitted in August 1969. Management was convinced that solution mining was, in fact, a practical and economic plan. The board of directors approved the project in July 1970, and the unique program was launched.

All underground equipment was removed and the mine was sealed by mid-November. While this was being done, borehole communications from the surface to the mine were being established by drilling 12 wells. By mid-December everything was go—mine sealed and wells ready to fill the mine with water.

The filling operation began on Christmas Day 1970, at a rate of 4,000 gpm, using five wells. This operation was expected to take 4½ months. However, on Jan. 13, 1971, while drilling well No. 7, a large aquifer was encountered which broke into the mine, flooding it by January 23. The aquifer dumped 500 million gal of water into the mine at a rate of 35,000 gpm.

Although this incident saved considerable time in pumping, the well had to be plugged because it was impossible to control water flow into the mine—which is a vital step in solution mining.

The original charge required 750 million gal of water, and since then some 500 million additional gallons have been pumped.

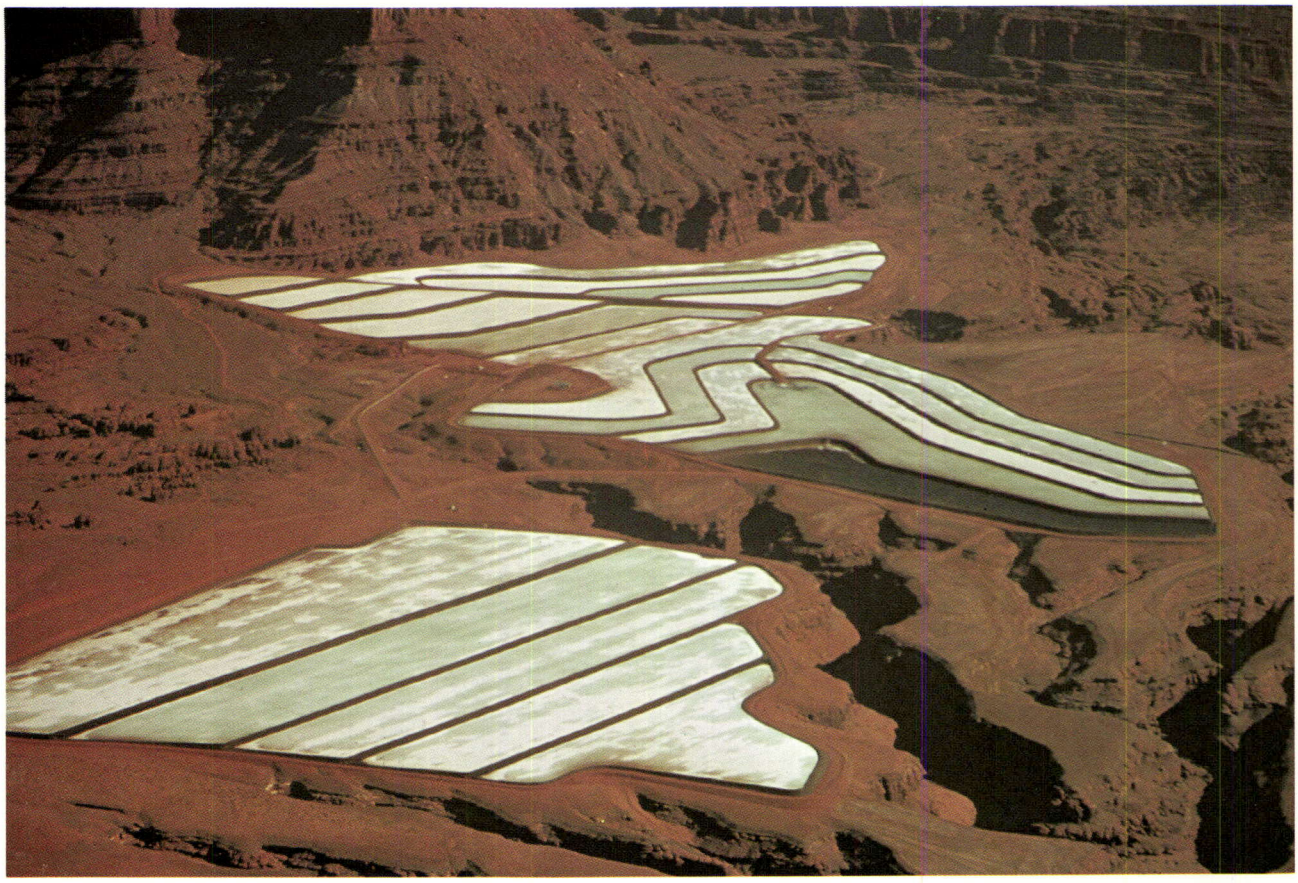
All water is pumped from the nearby Colorado River. The company has the physical capabilities to pump an adjudicated water supply of 9 cu ft per sec, or about 4,050 gpm, under a water-use certificate from the state of Utah. During periods of high evaporation, it is necessary to pump approximately 4,000 gpm for processing and mine injection. However, this amount of water is not required at all times.

Water is injected into the mine at the same time brine is being withdrawn, to maintain a flooded brine-water balance within the potash horizon. Approximately 4½% more water is injected than is withdrawn as brine to fill the voids of salts that go into the solution.

At the present rate of production and water injection, it takes from 300 to 350 days' retention to produce brine in the mine. The injection points are a maximum of 800 ft above the points of withdrawal. As the brine becomes heavier with salt saturation, migration by gravity moves the brine toward the extraction point.

Tg pumps water only about seven months out of the year, and during four or five of these months the temperature of water pumped into the mine can be as high as 70°F and as low as 32°F.

Brine is withdrawn from the mine at a temperature of 91-93°F. This increase in temperature is due entirely to the natural heat flow in the mine—at depths of 3,000 to 3,400 ft—



**Terraced evaporation ponds** at Cane Creek operation occupy nearly 400 acres of lowland in Colorado River canyon area of the mine. Arranged in three areas, a total of 23 ponds are rotated through evaporation; settled salts are harvested using scraper-loaders.

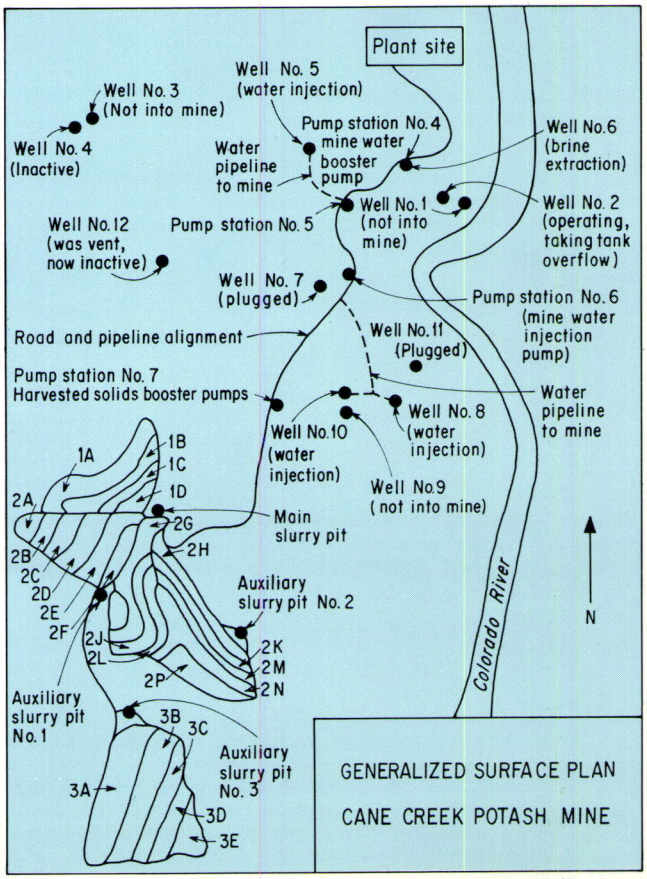
where the temperature runs 100°F plus. Chemical reactions are endothermic and do not contribute to the heating process but actually work against it.

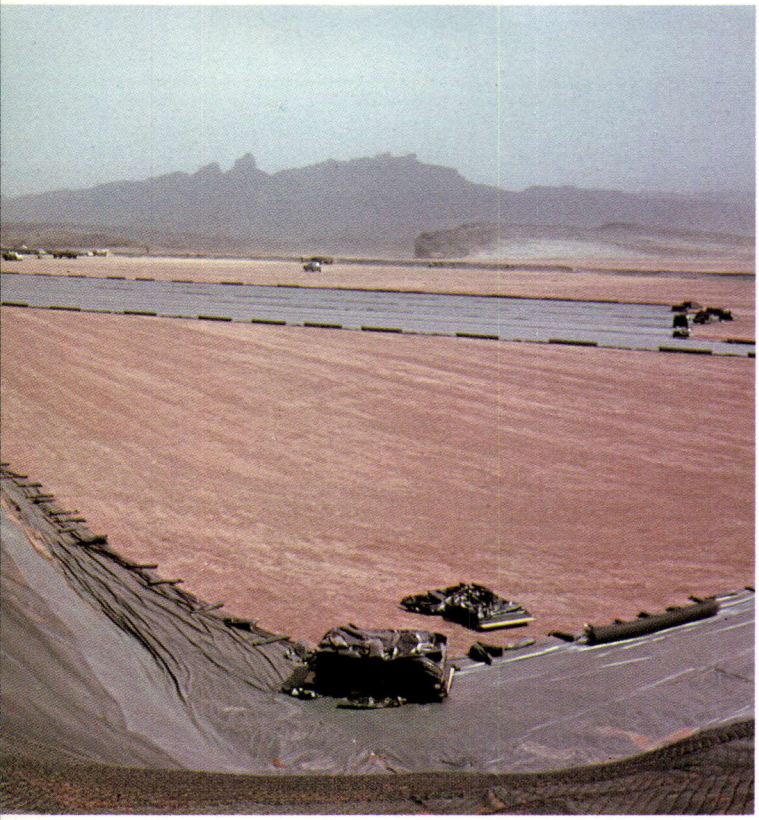
Extensive heat flow studies, conducted by the University of Texas prior to filling the mine, indicate that the geological formation is an infinite heat source. According to a computer analysis included in the studies, the mine will not be cooled by injected water.

Actually, there are 340 mi of headings in the potash bed created by past underground mining. Pillars and the walls of the entry system will eventually dissolve. At the rate Tg is producing, it is expected that penetration rates will be ap-

### Surface area of evaporation ponds

| Pond | Elev. (ft) | Area (acres) | Pond | Elev. (ft) | Area (acres) |
|---|---|---|---|---|---|
| 1A | 4,345 | 24.0 | 2J | 4,270 | 15.32 |
| 1B | 4,330 | 18.0 | 2K | 4,270 | 14.32 |
| 1C | 4,320 | 8.7 | 2L | 4,260 | 11.03 |
| 1D | 4,310 | 7.1 | 2M | 4,260 | 13.26 |
| 2A | 4,370 | 5.97 | 2N | 4,250 | 27.47 |
| 2B | 4,350 | 7.16 | 2P | 4,235 | 17.93 |
| 2C | 4,330 | 10.66 | 3A | 4,210 | 52.05 |
| 2D | 4,310 | 17.82 | 3B | 4,195 | 33.34 |
| 2E | 4,290 | 18.72 | 3C | 4,185 | 18.47 |
| 2F | 4,280 | 10.24 | 3D | 4,175 | 14.52 |
| 2G | 4,280 | 26.42 | 3E | 4,165 | 12.85 |
| 2H | 4,280 | 14.33 | **Total** | | **399.67** |





**More than 2 million sq yd of heavy-duty plastic** were used to seal the 23 pond beds and containment berms against possible leakage.

**Electric seaming machines** join 68 x 600-ft panels of PVC prefabricated at a Tg product warehouse from delivered 78-in. rolls.

proximately 6-8 in. and possibly as much as 1 ft per year. The highest production will come from the pillars and sidewalls in the active sections around the injection wells.

The company began actual solution mining on June 30, 1971 by injecting water into the mine as brine was being withdrawn. After more than one year of operation, Curfman reports: "Water-brine balance is within less than 0.2%. We're sure that the mine is not leaking and that there is no great inflow of uncontrolled water. The solution mining phase is under control. This means that we will be able to selectively solution mine."

Active portions of the mine are confined to areas where fresh water is injected. When the brine becomes saturated and reaches maximum temperature, leaching activity on the salts stops. Regulation of water input controls the dissolving rate.

The Cane Creek operation is expected to produce 300,000 tpy for 20 years, and the project may last even longer. Curfman states, "We feel that as expertise is developed in this type of mining, there is a very real potential of better control. In time Texasgulf may be able to extend mining activities. Admittedly, though, this is so far down the road that we have not given it serious consideration."

The final annual production rate has not yet been established. To a great degree, the yield is at the mercy of the weather and rate of evaporation. Production also is limited by the size of the pond area.

Texasgulf's production in 1972 closely approached the target estimate. All phases of the operation are meshing, but improvements are being made as management learns more about the overall system.

Since Texasgulf is one of the few companies using solar energy for commercial potash production, it had to start at the beginning, collecting data and adjusting the system as results dictate.

The company plans to install a weather station this year to correlate solar radiation intensity with evaporation, to gain additional information on the production of potash as related to solar energy.

Experiments also are being conducted with green dye, which reportedly increases the effect of solar evaporation intensity. Green dye also prevents reflection and has a high absorption factor. Results to date look very encouraging; however, considerable data must yet be evaluated before final conclusions can be drawn.

The State of Israel, working in the Dead Sea area, has already done extensive work with dyes. Representatives from Israel who visited the Cane Creek operation last year shared considerable information on the use of dyes, and Texasgulf is presently corresponding with Israel on other approaches to increasing solar evaporation.

## Solar evaporation

With the exception of the pond construction, the entire conversion of mining was supervised and completed by Texasgulf personnel. While preparations for solution mining were underway, the company was busy moving and rearranging more than 2 million cu yd of dirt to create 23 evaporation ponds in terrace style over a 400-acre site approximately 1 mi from the Colorado River and about 3½ mi from the mine site. Ponds vary in surface area from 5.97 to 52.05 acres. Topography dictated the arrangement and sizing.

One of the more difficult problems encountered in constructing the ponds was making them totally leakproof. What method and material could be used to cover the floors of these ponds to achieve this? County, state, and Federal agencies had to be assured that there would be no chance of brine leaking through the lining and entering the river.

Company engineers tested more than 50 different linings

**Self-loading Caterpillar scrapers** harvest crystallized salts in 15.5-ton loads by swathing alternating cuts in the solar ponds.

**Laser beam tracking receiver** on harvester units is shown in above closeup. It homes on fixed beams to control blade cutting depth.

before selecting polyvinyl chloride (PVC), manufactured to their specifications. Texasgulf issued an order for more than 2 million sq yd of the PVC, the largest single order placed up to that time—enough plastic to cover 900 football fields.

The penny-thick black plastic sheeting was shipped from New York in 58 railroad cars. Packaged in 600-ft rolls 78 in. wide, the plastic was then fabricated into panels 68 ft x 600 ft, weighing 3,500 lb each. Fabrication was performed in one of the product warehouses at the mine site, using 10 electric seaming machines which produced some 660 mi of seams. Panels were then loaded onto fork-lift trucks which distributed them over the pond areas. Workers laid the PVC panels with a very real assist from the consistently strong winds in the area.

Pond berms were covered first, then the floors. Two layers of the plastic were placed on the berms and topped with wire mesh. Dual layers were used on exposed areas because PVC is subject to ultraviolet ray deterioration. If the top layer deteriorates, it can be replaced to protect the bottom layer. Wire mesh simply serves to hold the plastic down during high winds.

Surface drainage facilities have been built around the ponds to prevent damage and loss of brine should flash flooding occur. Catch basins are also located at various low points around the area to capture any possible lost brine for impoundment and pumping back to the ponds.

When the ponds were completed, salt from the waste tailings was pumped in to provide a 6-in. base over the plastic liner. This bottom bed remains in the ponds to protect the liner and to support the 20-ton scraper-loaders used to harvest the potash.

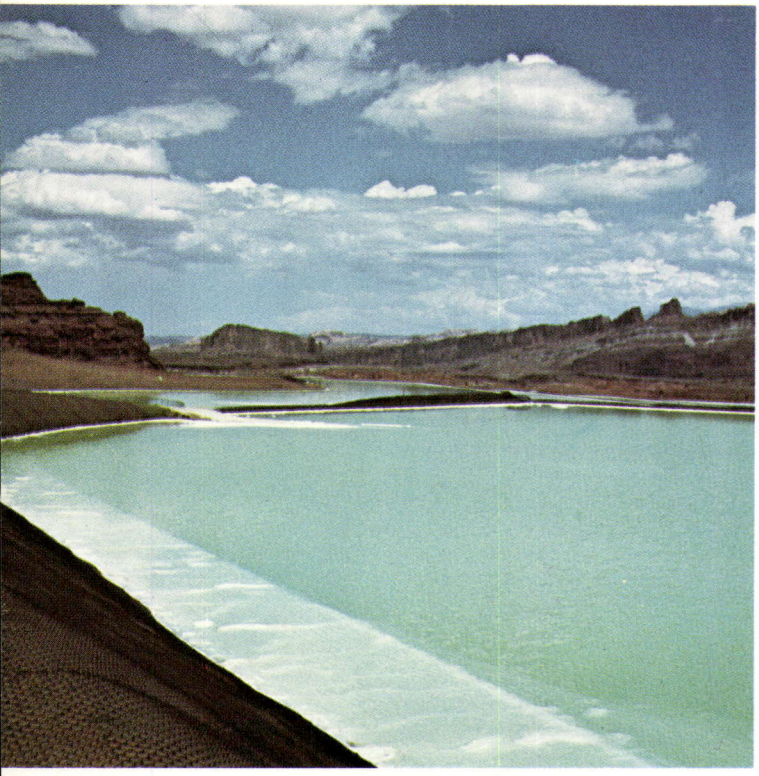
Ponds also are equipped with 30-in. depth markers which provide a means for recording the amount of solids and brine in a particular pond. Markers are installed at the mean elevation of the bottom-base solids. Ponds are surveyed weekly to record evaporation rates and the depth of solids being deposited due to evaporation.

**Hydraulically controlled scraper blade** is referenced from laser and won't cut below 6-in. protective bedding over plastic sealant.

Since the ponds are only 30 in. deep, there is little danger of the berms collapsing from the weight of the brines.

## Pumping and piping

A deep well pump, equipped with an 800-hp motor, has a capacity of 2,480 gpm at a depth of 600 ft and is dedicated to pumping the entire production from the mine.



**Experimental use of green dye** is under trial in an attempt to increase solar evaporation rate—a successful technique in Israel.

**Brine from solution mining** yields a white potash product, in contrast to the pink product recovered from past underground mining.

The brine is delivered to a surge tank located next to the extraction well. The tank is equipped with an overflow arrangement that discharges into another well, to make sure that no brine escapes.

An elaborate network of booster pumping stations and piping is used to deliver mine brine to solar ponds and to return the harvested product to the mill along a 3½-mi corridor.

Approximately 26 mi of piping and 23 pumps were required to complete the overall installation. In addition, some 140,000 ft of power cable was installed. Saturated brines from the mill are recycled to the ponds and used as the vehicle for slurrying harvested product to 35% solids for pumping to the mill. At the mill the carrier brine is separated from the slurry for return to the ponds.

Initially, Texasgulf's biggest problem in converting to solution mining and solar evaporation was pipelines and pumps. "Actually," says Curfman, "we made some errors as far as velocity was concerned with this particular type of material. Plain sodium chloride pumps rather easily, but sodium chloride in slurry with potassium chloride is a different situation altogether. It produces a different type of crystal formation and is more difficult to pump because the crystals are larger."

Crystals have to be reduced in size before they can be transported. Changes in velocities, flows, and the amount of brine used as the transportation medium had to be made before an efficient pumping system was achieved. Texasgulf has now developed considerable experience and has solved the problems of pumping potash.

Approximately 6,000 additional pumping horsepower was required when Texasgulf converted to solution mining. However, not all of this is in use at the same time—some 3,500 hp is operational while 2,500 is on standby. Emergency standby generators also are available to serve key pumps and agitators to prevent pipeline plugging and solids settling in slurry storage tanks. Much of the electrical equipment—substations, and power cables—used in this installation was salvaged from the underground operation.

All main pipelines carrying brine and slurry are equipped with valves and quick couplers every 500 ft for flushing out prior to idle periods.

## Harvesting

Harvesting and processing potash began on March 1, 1972. Once the ponds were filled with brine to the proper level and solids buildup took place, it was only a matter of time—depending on the rate of evaporation—before the ponds could be harvested.

The remaining brine in a pond, after reaching the proper solids buildup, is pumped into an adjacent pond until the pond to be harvested contains approximately 3 in. of brine.

Harvesting with 20-ton scraper-loaders is done under the 3-in. brine level. During certain times of the year when evaporation is at its lowest, all of the brine can be removed prior to harvesting without loss of significant evaporation area.

The harvesting machines are conventional heavy road machinery. Texasgulf has three units, of which two are required in harvesting and one is a spare. The self loaders are equipped with a conveyor for loading and unloading. Depth of cuts made by the machine is adjustable by hydraulic means but the actual depth that a machine cuts in any one pond is controlled by a laser beam. The laser will not permit a harvester to cut into the 6-in. layer of salt initially put down to protect the liner.

In the harvesting operation, one machine with its scraper lip locked on the laser beam loads the solids deposited by evaporation, and then stockpiles them nearby. Another unit, not controlled by the laser, loads approximately 15½ tons of material from this stockpile and transports it to a main slurry pit or one of three auxiliary pits in the pond area.

The laser-controlled scraper loads by making one pass traveling 150 to 200 ft in 40 to 50 sec. The operator then skips one path width and loads again. The space between the two previous loading swaths is then loaded. This pattern is essential because the machine must remain level at all times during the loading cycle. All four wheels must present the cutting edge at the same elevation.

**Non-laser referenced scraper-loaders** team with harvesters, which work in ponds. They reclaim salts stockpiled by harvesters and deliver them to one of several slurry pits, where they are reslurried with saturated brine and pumped to the processing plant.

Scraper-loaders travel on special tires to distribute weight over a larger area. Equipped with a 390-hp diesel, each scraper weighs 87,000 lb unloaded.

A total of 54 lasers are mounted on fixed bases spaced around the 400-acre pond area. Each laser projects a level beam from an outside data plane. So precise are these units that they are mounted on wooden, rather than metal, posts to eliminate movement caused by expansion and contraction due to temperature changes. Each laser is housed inside a 36-in.-dia concrete pipe with an opening to transmit the beam.

Harvesters are equipped with a tracking receiver which homes in on the laser beam controlling the depth of cut of each loading cycle. All the operator does is drive the machine.

## How the evaporites are handled

The Texasgulf operation has one main slurry pit and three auxiliaries. Space is available in each pit for three crushers installed directly under the area where the scraper-loaders discharge the harvested material.

Crushers reduce the feed to a pumpable size of minus ½ in. Slurry is maintained at approximately 35% solids, since a greater solids content raises the horsepower requirements of the pumps. While Tg has pumped slurry containing as much as 40% solids, the viscosity increases rapidly with the increase in solids. The ratio of solids is controlled by the rate of flow of the brine to the pit and the flow of slurry from the pit. This is metered at the mill as a final check.

The overall evaporation program is predicated on harvesting each pond about once every year. However, in order to maintain production and perform research, the company must develop a program to achieve harvesting flexibility. Information on harvesting is now being fed into a computer to set up a game plan.

## The processing phase

Although the mill had been shut down for more than a

**At the processing plant,** feed is subjected to coarse and slime flotation, leaching, crystallization, and sizing of products.

**Twin product storage warehouses** are 650 ft long and provide a total holding capacity of 250,000 tons. Energy needs are met by electricity (Utah Power and Light), with natural gas (Utah Gas Service) as primary fuel, and standby fuel oil during curtailed gas delivery.

**Bulk railroad loadout center** serves 37-mi Denver & Rio Grande spur that includes a 7,000-ft tunnel which eliminated 9½ mi of track.

year, it was ready on March 1, 1972 to receive slurry from the ponds. Product was produced on this day, and the first shipment of potash was made on March 28.

The production schedule called for 600 tons of muriate of potash daily for the first two months and double that amount after May 1, 1972. "We feel certain that we can produce 300,000 tpy or roughly 25,000 tpm," says Curfman. "It takes approximately 1,677 tons of salt from the ponds to produce 675 tons of product. We know what we have to do."

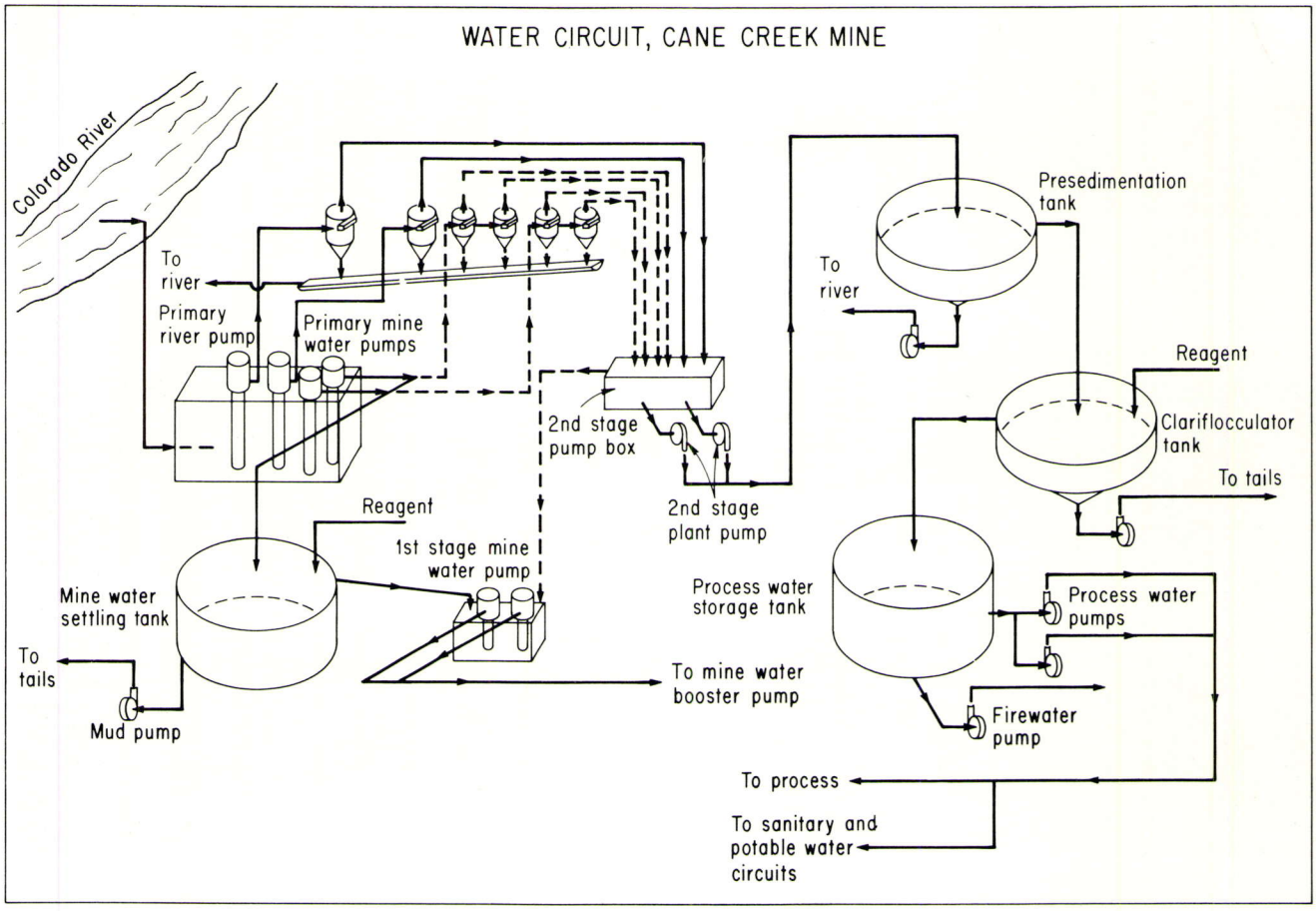
## Desliming and flotation

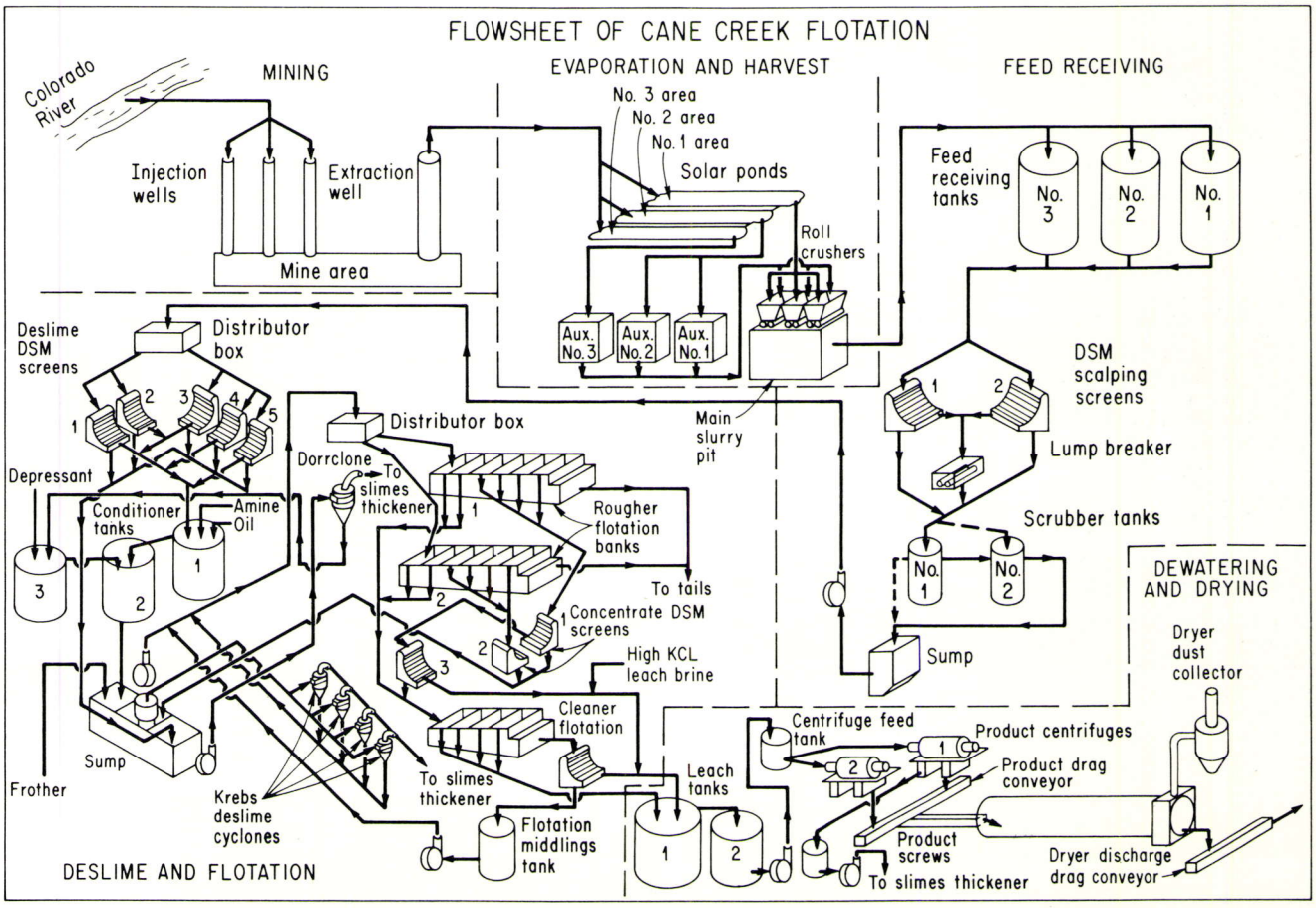
Slurry from the ponds is pumped to 16 x 16-ft storage tanks with a capacity of approximately 23,000 gal. Feed from these tanks, consisting of 150 tons of solids and 350 tons of brine, passes over to DSM scalping screens. Oversize goes to a lump breaker to reduce it to flotation size. It is then combined with screen undersize and dropped into scrubber tanks operated in series to liberate potash. Scrubber overflow is sumped and pumped to a distributor box feeding five DSM screens operating in parallel at the head of the desliming circuit.

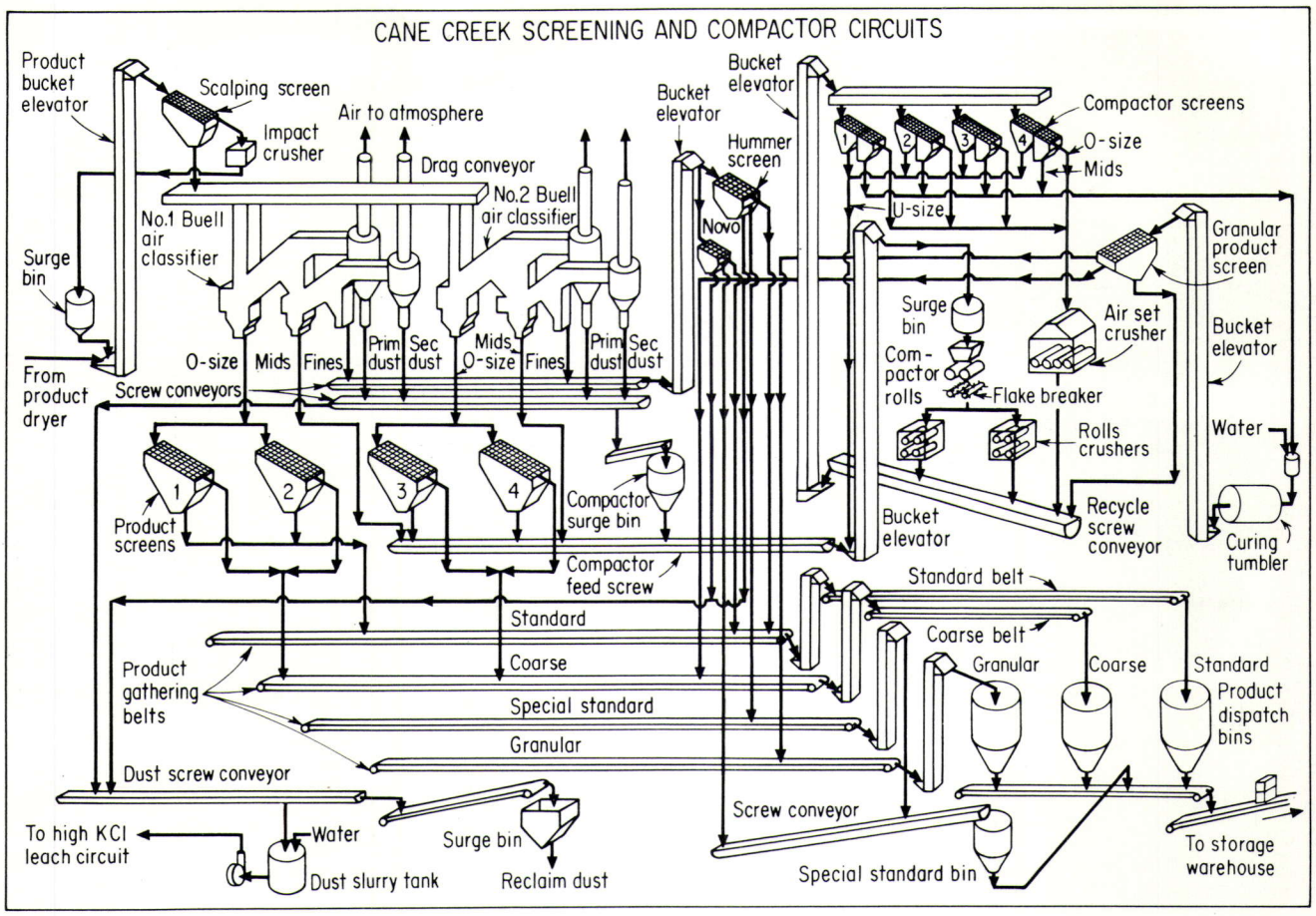
The DSM screens make a split at 10 mesh. The oversize is conditioned in a pair of agitators with amine and oil for rougher flotation. The undersize reports to a multi-service pump box. This fraction is cycloned in a bank of Dorrclones for removal of minus 100 mesh fines. The latter, consisting primarily of calcium sulphate, goes to a thickener in the slimes flotation circuit.

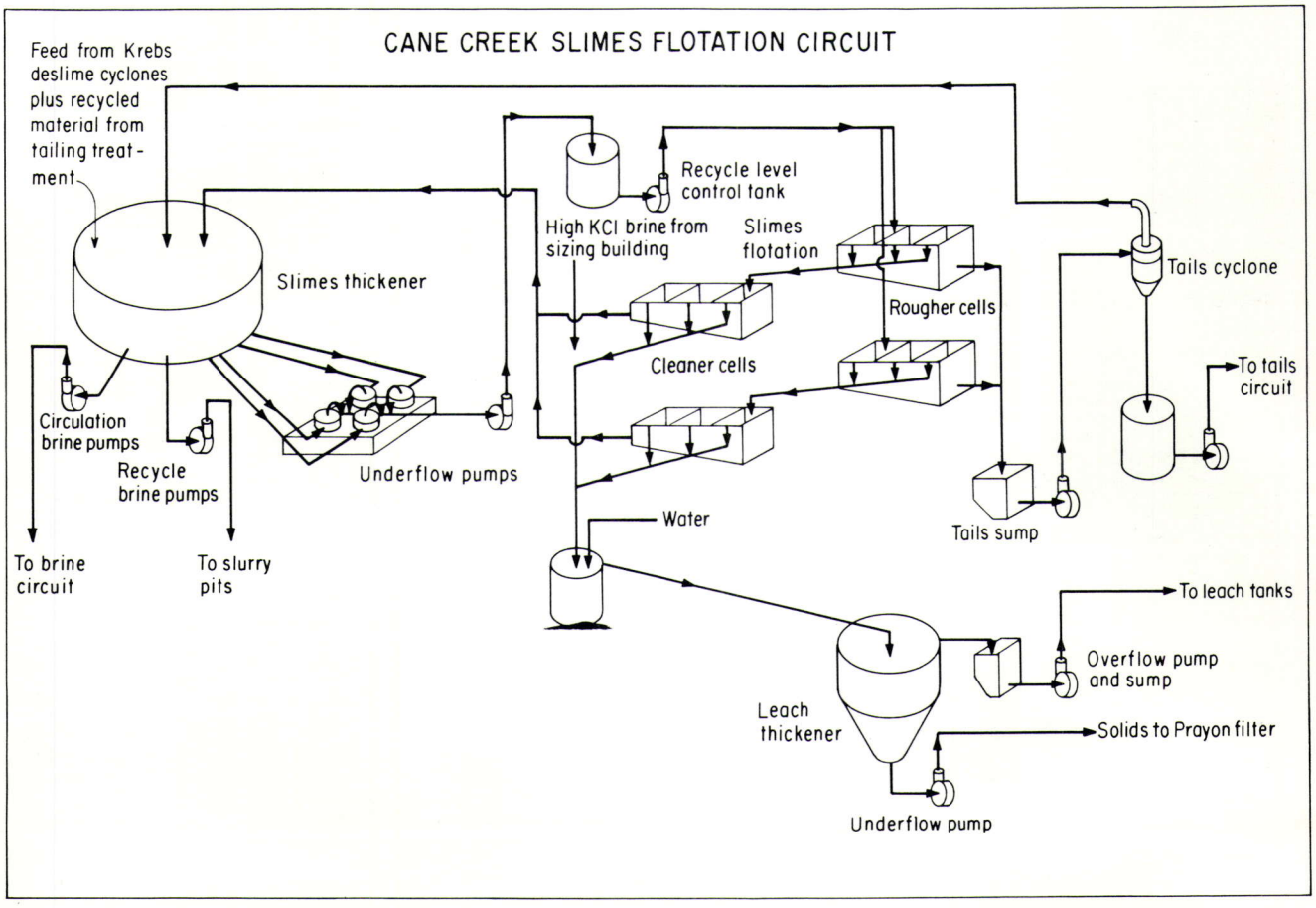
The Dorrclone underflow is conditioned with a depressant prior to flotation. It is handled separately in the conditioner circuit because only the fine feed fraction going to flotation needs a depressant.

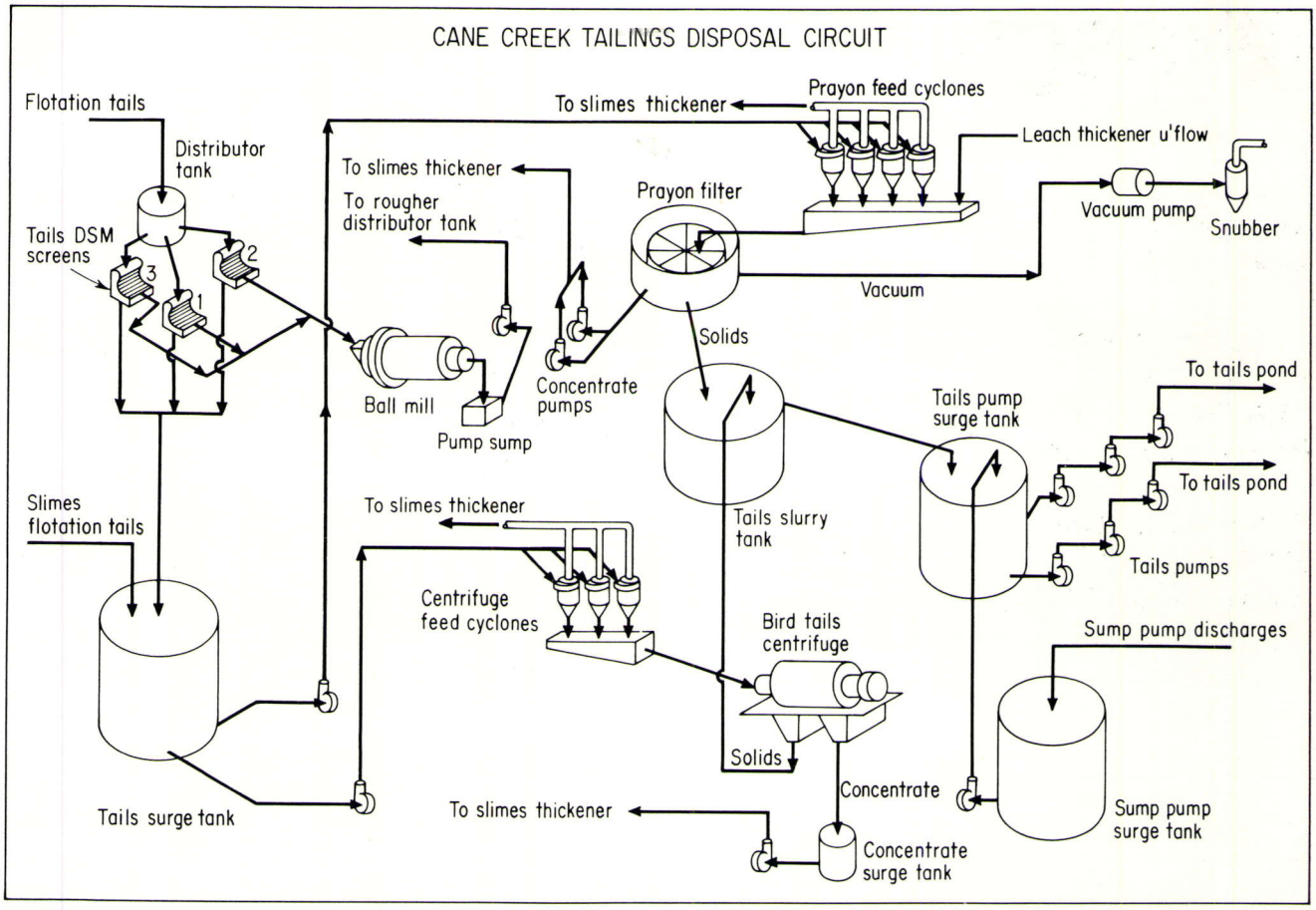
Flotation feed is split between two banks of rougher flotation machines. The froth from the first two cells in each bank is normally taken directly to cleaner flotation cells, although


WATER CIRCUIT, CANE CREEK MINE
Colorado River
To river
Primary river pump
Primary mine water pumps
2nd stage pump box
2nd stage plant pump
Presedimentation tank
To river
Reagent
Clariflocculator tank
To tails
Reagent
1st stage mine water pump
Mine water settling tank
To tails
Mud pump
Process water storage tank
Process water pumps
To mine water booster pump
Firewater pump
To process
To sanitary and potable water circuits


FLOWSHEET OF CANE CREEK FLOTATION
Colorado River
MINING
EVAPORATION AND HARVEST
FEED RECEIVING
Injection wells
Extraction well
Mine area
No. 3 area
No. 2 area
No. 1 area
Solar ponds
Roll crushers
Aux. No. 3
Aux. No. 2
Aux. No. 1
Main slurry pit
Feed receiving tanks
No. 3
No. 2
No. 1
DSM scalping screens
Lump breaker
Scrubber tanks
No. 1
No. 2
Sump
Deslime DSM screens
Distributor box
Distributor box
Depressant
Conditioner tanks
Amine
Oil
Dorrclone
To slimes thickener
Rougher flotation banks
To tails
Concentrate DSM screens
High KCL leach brine
Cleaner flotation
Sump
Frother
Krebs deslime cyclones
To slimes thickener
Flotation middlings tank
Leach tanks
Centrifuge feed tank
Product centrifuges
Product drag conveyor
Product screws
To slimes thickener
DEWATERING AND DRYING
Dryer dust collector
Dryer discharge drag conveyor
DESLIME AND FLOTATION


CANE CREEK SCREENING AND COMPACTOR CIRCUITS
Product bucket elevator
Scalping screen
Impact crusher
Air to atmosphere
Drag conveyor
No.1 Buell air classifier
No.2 Buell air classifier
Surge bin
From product dryer
O-size
Mids
Fines
Prim dust
Sec dust
Mids O-size
Fines
Prim dust
Sec dust
Screw conveyors
Product screens
Compactor surge bin
Compactor feed screw
Bucket elevator
Hummer screen
Novo
Bucket elevator
Compactor screens
O-size
Mids
U-size
Granular product screen
Surge bin
Com-pactor rolls
Air set crusher
Flake breaker
Rolls crushers
Bucket elevator
Water
Recycle screw conveyor
Curing tumbler
Standard belt
Standard
Coarse belt
Coarse
Granular
Coarse
Standard
Product gathering belts
Special standard
Granular
Product dispatch bins
Dust screw conveyor
Screw conveyor
To high KCl leach circuit
Water
Surge bin
Dust slurry tank
Reclaim dust
Special standard bin
To storage warehouse


CANE CREEK SLIMES FLOTATION CIRCUIT
Feed from Krebs deslime cyclones plus recycled material from tailing treat-ment
Recycle level control tank
High KCl brine from sizing building
Slimes flotation
Slimes thickener
Rougher cells
Tails cyclone
Cleaner cells
To tails circuit
Circulation brine pumps
Recycle brine pumps
Underflow pumps
Water
Tails sump
To brine circuit
To slurry pits
To leach tanks
Overflow pump and sump
Leach thickener
Solids to Prayon filter
Underflow pump




this procedure may be altered from time to time because of slight differences in the composition of flotation feed. The flotation cleaner concentrate grades about 59.5% $K_2O$, slightly below specifications. Therefore the concentrate is leached with a nominal amount of water to remove NaCl, to bring the grade up to at least 60.5%.

The froth from the last four cells in each rougher bank is screened on a pair of DSM units. The oversize from these screens is fed in series to No. 3 concentrate screen. The coarse fraction from rescreening joins the rougher concentrate and is fed to the leaching tanks.

Undersize from Nos. 1 and 2 screens which contains some fine salt returns to the multi-service sump, from where it is pumped to a bank of Krebs desliming cyclones. The cyclone overflow goes back to the thickener in the slimes flotation circuit. The underflow is recycled to the rougher flotation.

Tailing from the cleaner flotation cells passes over a DSM middlings screen, with the oversize going to the leach tank. The undersize, which is a middlings, is pumped back to the rougher flotation distributor box. At many points in the circuit, provisions are made to recirculate certain sizes to recover as much potash as possible.

No. 1 leach tank, which receives the near-grade potash, dissolves the remaining salt trapped in the product. This tank overflows into a second leach tank which is nothing more than a pump box. From here the product is pumped to a feed tank serving two centrifuges. Centrifuged solids are fed to a dryer, and the slurry goes to the slimes flotation thickener because there is some KCl left in the effluent.

Dried potash goes directly to a bucket elevator serving a scalping screen. Oversize is broken by an impact crusher which is in closed-circuit with the scalping screen.

Scalped undersize, 6 to 5 mesh, discharges onto a drag conveyor which feeds Nos. 1 and 2 Buell air classifiers in parallel. Sizes produced include coarse, standard, soluble, and granular, as shown in the flowsheet.

Fines from the air classifier discharge onto a screw conveyor and then go to a bucket elevator which feeds a Hummer or Nova screen to make various products.

Undersize from this screen goes to KCl brine makeup. Dust from the Buell classifiers goes by screw conveyor to a dust slurry tank, and from there to the high KCl leach circuit. Primary dust goes to the high KCl brine or to the compactor.

As much of the fines product as possible is fed to the compactor circuit. Compacted product is then crushed, screened, and sized. The middlings product from these screens is cured in a tumbler and passed over a granular product sizing screen.

## Slimes flotation

Underflow from the slimes thickener is pumped up to a recycle level control tank which feeds rougher flotation cells. The rougher concentrate receives single-stage cleaning. Froth from the cleaners goes to a leach thickener. Overflow from this tank is pumped to the 59.5% $K_2O$ leach tank serving the coarse flotation circuit, and underflow is pumped to a solids Prayon filter.

Rougher tailing is cycloned, with the overflow recycled to the thickener at the head of the circuit and the underflow processed through the above tailing disposal circuit.

## What the rebirth of Cane Creek means to Utah

Solution mining is doing the job for Texasgulf. As management would say, "We think solution mining is the solution." The success of Cane Creek means a great deal to the workers there and also to the community of Moab. In the five years preceding 1971, the Cane Creek mine paid out approximately $1.3 million in property and state taxes, $2.4 million for utilities, and $16.5 million for materials and supplies, of which $7 million was spent in Utah, and $2.1 million in Moab alone. □

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Texasgulf, a diversified natural resources company, is one of the world's largest producers of zinc, silver, sulphur and agricultural fertilizer materials – including phosphatic products and potash. The company is a significant producer of copper, lead and cadmium. Texasgulf is also involved in the production of oil, gas, iron ore and forest products, and in the future will be a producer of tin and soda ash. To diversify further, Texasgulf is continuing worldwide exploration activities.

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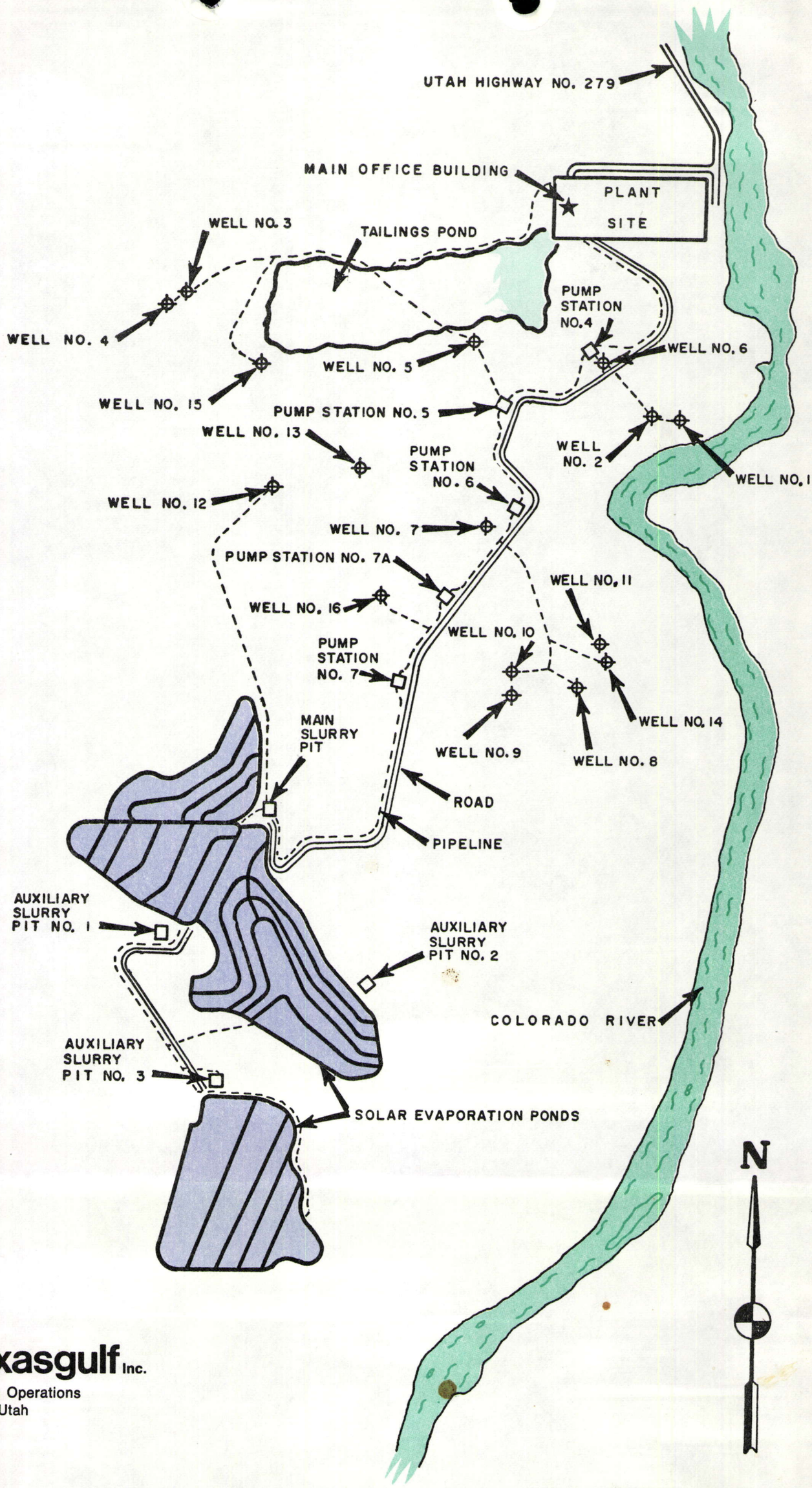
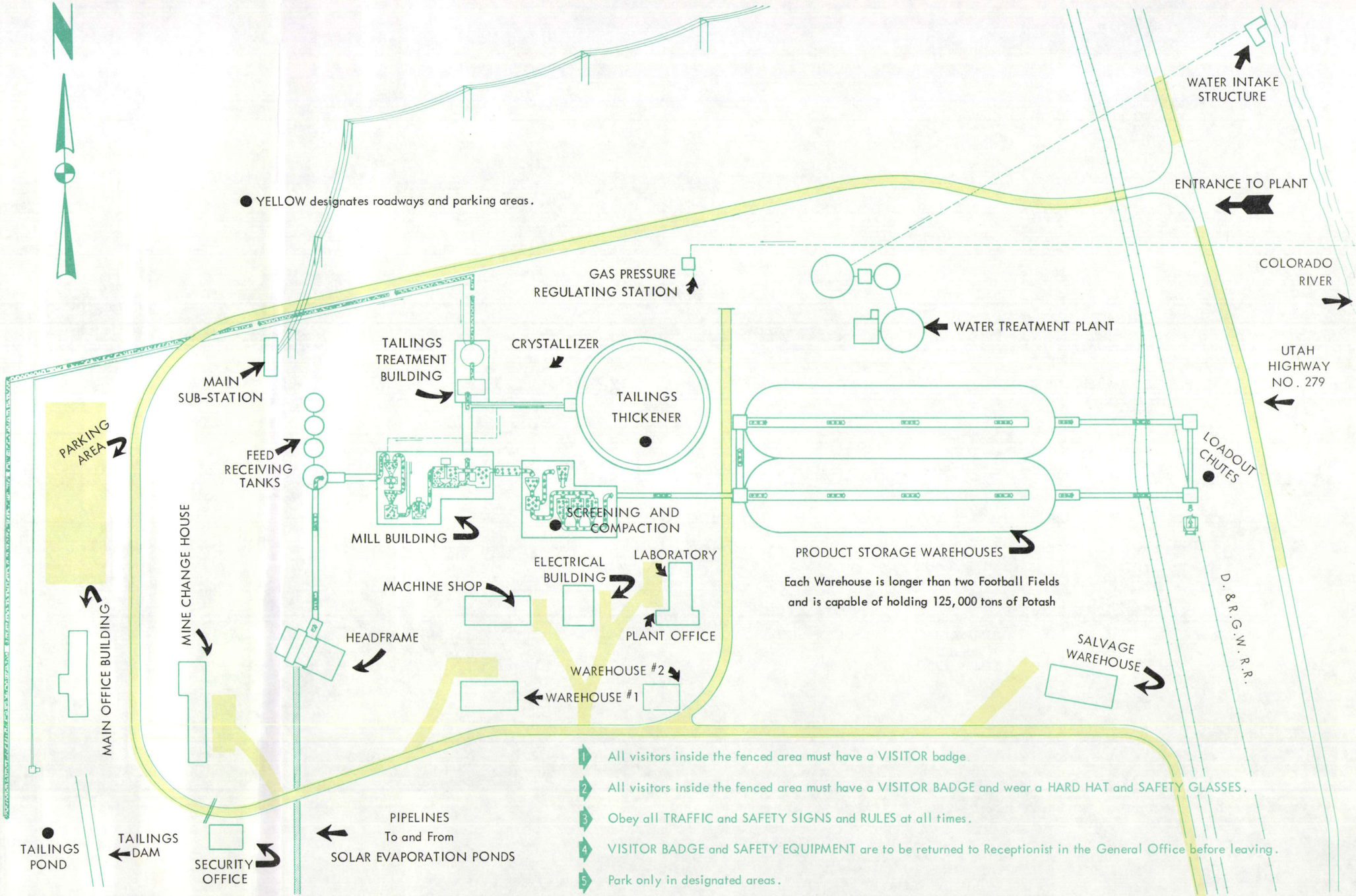



**Texasgulf Inc.**
Potash Operations
Moab, Utah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YELLOW designates roadways and parking areas.
WATER INTAKE STRUCTURE
ENTRANCE TO PLANT
COLORADO RIVER
UTAH HIGHWAY NO. 279
GAS PRESSURE REGULATING STATION
WATER TREATMENT PLANT
TAILINGS TREATMENT BUILDING
CRYSTALLIZER
TAILINGS THICKENER
MAIN SUB-STATION
PARKING AREA
FEED RECEIVING TANKS
MILL BUILDING
SCREENING AND COMPACTION
LOADOUT CHUTES
PRODUCT STORAGE WAREHOUSES
Each Warehouse is longer than two Football Fields and is capable of holding 125,000 tons of Potash
MINE CHANGE HOUSE
ELECTRICAL BUILDING
LABORATORY
MACHINE SHOP
PLANT OFFICE
HEADFRAME
SALVAGE WAREHOUSE
D. & R.G.W. R.R.
WAREHOUSE #2
WAREHOUSE #1
MAIN OFFICE BUILDING
TAILINGS POND
TAILINGS DAM
SECURITY OFFICE
PIPELINES To and From SOLAR EVAPORATION PONDS
1 All visitors inside the fenced area must have a VISITOR badge.
2 All visitors inside the fenced area must have a VISITOR BADGE and wear a HARD HAT and SAFETY GLASSES.
3 Obey all TRAFFIC and SAFETY SIGNS and RULES at all times.
4 VISITOR BADGE and SAFETY EQUIPMENT are to be returned to Receptionist in the General Office before leaving.
5 Park only in designated areas.
6 No visitors will be allowed on TGS roadway to Pond Area unless accompanied by authorized TGS personnel.