



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

HEATSHIELD
TECHNOLOGIES, INC.

*Glenn & Doolin file
Mohave County*

VIVA LUZ
MINING PROJECT

February 24, 1992

**HeatShield Technologies, Inc.
Viva Luz Mine Project**

Table of Contents

INTRODUCTION.....	1
THE COMPANY.....	3
Ownership Structure.....	3
Management.....	3
Officers.....	4
Board of Directors.....	6
THE PROJECT.....	9
Project Concept.....	9
Geology.....	9
Trial Mining.....	9
Marketing and Research & Development.....	9
Plant Construction.....	9
Project Description.....	10
Location.....	10
Mineralogy, Geology, Exploration and Reserves.....	11
Mineralogy.....	11
Geology.....	12
Exploration.....	12
Reserves.....	13
Production Schedule.....	14
Infrastructure and Services.....	14
Mining Rights and Regulations.....	15
Insurance.....	15
Environment, Health and Safety.....	15
Project Schedule.....	17
PROJECT COST AND FINANCIAL PLAN.....	18
Project Cost.....	18
Financial Plan.....	18
THE MARKET.....	20
Product Applications.....	20
Filler Components.....	20
Specialty Applications.....	21
Ultraviolet blockers for plastics.....	22
Photon diffusive coatings.....	22
Fire retardant coatings.....	22
Radar signal scattering.....	22
Sales Arrangements.....	22
Akro Shield, Inc.....	23
Chemtech of California.....	23
CONCLUSION.....	23

INTRODUCTION

HeatShield Technologies has a silica deposit in Mohave County, Arizona containing at least 166,000 short tons of high grade material. A drilling program will be undertaken. The goal is to show 1 million tons of proved and probable reserves. The ore, called Klannerite™, has several special properties which make it an ideal product for the filler market and for specialty applications. HeatShield has already obtained sales contracts for 250 tons at \$800 per ton. Most competing filler products sell for \$350-\$400 per ton and it is evident that Klannerite's superior qualities will command a premium price.

HeatShield plans to erect a processing plant to produce commercial quantities of Klannerite™ for sale. The plant installed capital cost, including land, buildings, and working capital, is estimated at \$1.9 million, and the plant can be erected and operating by the first quarter of 1993. The plant will have an initial capacity of 4,000 tons per year. As the market develops, future expansions are envisioned.

This project will bring several important benefits to the local economy:

- 1) Total employment will be 15 people in the first year of operation, growing to 52 jobs with subsequent plant expansions. The annual pay-roll is projected to grow from \$458,000 to \$1,528,000. About two-thirds of the jobs will be created locally. There will be a group health plan, and in the future there may be pension and profit-sharing plans.
- 2) The project will depend on local suppliers for operating materials and small equipment; the plant will be a major customer of the local power company, consuming about 4 million kilowatt hours annually; local repair shops will be used for equipment maintenance; local trucking companies will be used to haul both the raw ore and the Klannerite™ product; and local companies may be contracted to mine the ore.

- 3) Annual gross sales in the first full year of operation will be about \$4,000,000. Corresponding State Corporate Income and Mining taxes will be \$167,000 and Federal Income Tax will be \$295,000. As production grows, taxes may increase five-fold.
- 4) The product will be of high quality and will be used in advanced technology applications. Its production will involve both quality control (our quality control laboratory will be at the plant site) and research and development efforts. This translates into educational opportunities for the local community.
- 5) It is believed that the production process selected will be dry and that no undue demands will be made on the local water supply. Strict dust control techniques will be employed eliminating any major adverse environmental impact. The product is inert and not flammable.

THE COMPANY

Ownership Structure

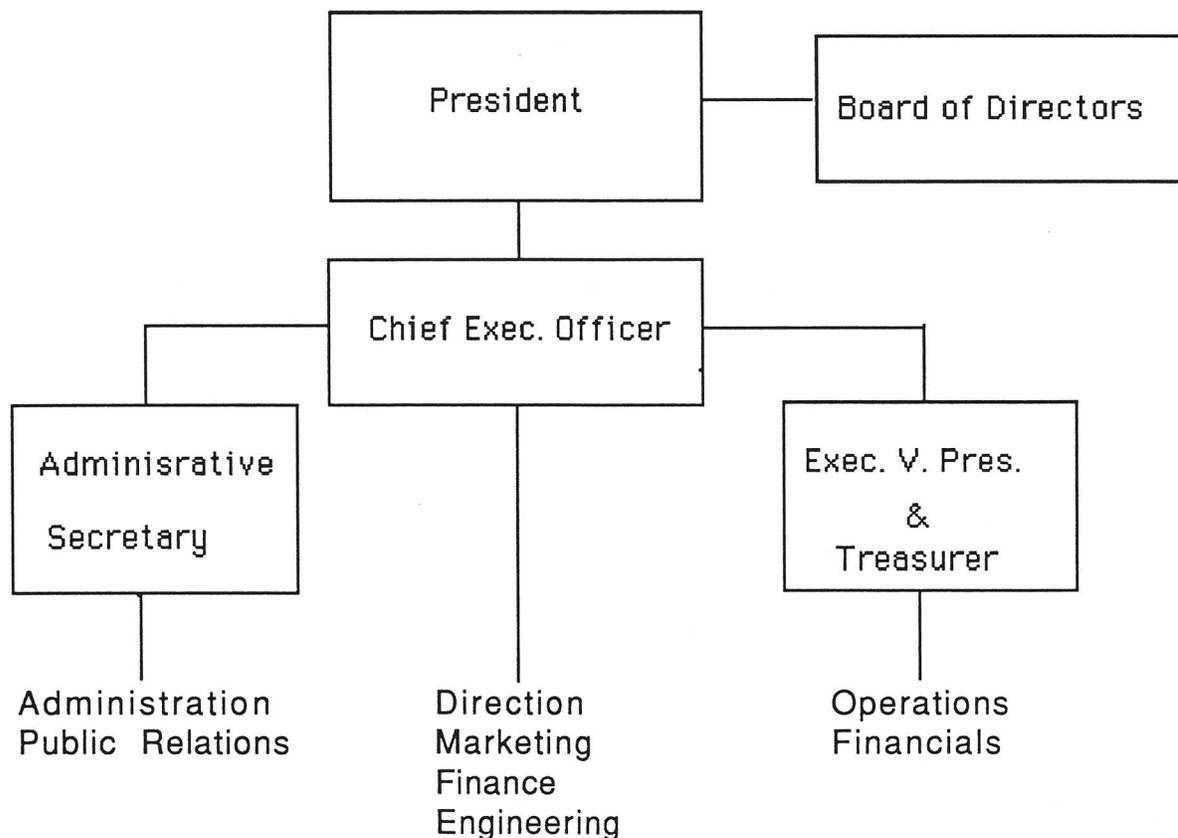
HeatShield Technologies, Inc. is a Florida corporation formed in May, 1991. Under a Joint Venture Agreement with PDC Industrial Coatings, Inc., HeatShield has acquired 100% of the rights to explore, mine, remove and market the minerals from the "Viva Luz Mine" in Mohave County, Arizona.

In exchange, HeatShield has agreed to manage and finance the mining operations, beneficiation process, and the fabrication and marketing of products thereof. Profits are to be shared between the partners on a 50-50 basis.

The lease is valid to February, 2004 or longer provided the mine generates a minimum annual royalty of \$50,000. The royalty is 5% of gross sales on an FOB plant basis.

Management

Below is the organizational chart showing the corporate structure of Management and the Board of Directors for HeatShield



Officers

The information set forth below is the background and experience of the officers and directors of the Company, each of who has served in such capacity since May 13, 1991, the date of the inception of the Company.

<u>Name</u>	<u>Age</u>	<u>Title</u>
Paul R. Arena	33	Chairman of the Board, and President
Robert Needham	50	Chief Executive Officer
Shawn P. Durand	36	Executive Vice President and Treasurer
Jenni Yachelson	38	Secretary

Paul R. Arena, is the President, a Director, and the principal owner and founder of the Company. He also serves as a director of P.D.C. Industrial Coatings, Inc.

From June of 1990 to August of 1991, Mr. Arena served as Vice President of Finance and a director of Safron, Inc. From February of 1988 to January of 1990, he was a Senior Vice President and partner of Gulfstream Financial Associates, a subsidiary of the Kemper Group. Previous thereto (April of 1986 to June of 1988), he was the President of the Arena Venture Group, a Boca Raton firm which engaged in aircraft leasing operations. From March of 1987 to February of 1988, Mr. Arena was also employed as a Vice President by Interstate Securities of Fort Lauderdale, Florida and from March of 1985 to February of 1987 he was a Vice President for Drexel Burnham Lambert.

Duties: Mr. Arena directs the management team in the planning and implementing of HeatShield's strategy for the mining, processing, manufacturing, and the national and international marketing of Klannerite™ and it's proprietary products. He is responsible for the financial requirements of the company and is involved with all facets of the executive decision making regarding mining, manufacturing, research and development, and marketing.

Robert Needham, is the Chief Executive Officer. He is a Mining Engineer and Geologist. Mr. Needham received his Master Degree in Geology in 1970 from the University of Georgia, and also his Master Degree in Mining Engineering from the University of Nevada, Mackay School of Mines in 1973. Mr. Needham brings to HeatShield over 20 years experience in the areas of project engineering, evaluation and development of mineral projects. Mr. Needham's past background involved the design and construction, along with project management, of multi-million dollar mineral deposits in South America. His past employers include Western Mining, BP Minerals (British Petroleum), Rio Tinto Zinc, Brascan and Citicorp.

Responsibilities: Mr. Needham directs the company in the mine engineering, reserve calculation, geostatistical analysis, engineering, procurement and construction (EPC) of plant facility, on site preparation of Mining Plan of Operation and marketing.

Shawn P. Durand, is the Executive Vice President and Treasurer of the Company. For fourteen years previous to joining the Company, he was employed by the Minnesota Department of Revenue in St. Paul, Minnesota. During his last six years there, he developed, managed and supervised the Technical, Integrated Mainframe Systems and PC Training Programs, along with the design and writing of Technical Policy and Procedure Manuals for the department. Prior to that, he assisted the Director of the Individual Income Tax Division for two years, resolving disputed technical issues. For the other six years, Mr. Durand performed field audits of corporation, sales and individual income tax returns.

Mr. Durand is the founder and President of the Northeast Minneapolis Lions Foundation. He also served on the Governor's Cabinet for the International Association of Lions-District 5M5, and as Chairman of the Board for the Northeast Minneapolis Lions Club. He received a certificate in accounting from Minneapolis Technical College in 1976.

Responsibilities: Mr. Durand is responsible for the infrastructure design and operational aspects of the company. These aspects include financial forecasting and reporting, pricing/ cost analysis and planning, working capital management and operations.

Jenni Yachelson, is the Secretary of the Company. From December of 1981 to March of 1991, she was engaged in the ownership and operation of a restaurant business in Marbella, Spain. Previous thereto (December of 1974 to August of 1979) Ms. Yachelson served as assistant to the President of Outer Scene Ltd, a division of Sidney Bitterman, located in New York, New York. She also held the title of Showroom Manager and Sales Account Executive for this firm.

Responsibilities: Ms. Yachelson is responsible for the administrative functions of the company as well as providing purchasing and sales support.

Board of Directors

An outside Board of Directors, consisting of highly qualified business and industry professionals/experts, assists our management team in strategically planning direction and in technical and marketing decision making.

<u>Name</u>	<u>Age</u>	<u>Title</u>
Paul R. Arena (See Officers)	33	Chairman
Dr. Edwin Ruh	67	Director
Bruce B. Corden	63	Director
Theodore Friedman	67	Director
Timothy Calvo	41	Director
James L. Austin	43	Director

Dr. Edwin Ruh, is a Director of the Company. Since September of 1984, Dr. Ruh has also served as a Research Professor for Rutgers University's Center for Ceramic Research, where he conducted research in the area of thermal conductivity and thermal diffusivity of ceramic materials. From 1976 to 1984 he was an adjunct Professor in the Department of Metallurgy and Material Science for Carnegie-Mellon University where he instructed courses in ceramics, glasses and refractories. Also, from 1977 to 1983, Dr. Ruh was the Editor of Metallurgical Transactions, an international journal published by the metallurgical society of AIME and the American Society for Metals. Dr. Ruh is the author of over 35 technical publications in the field of ceramics, most of which relate to refractories and their properties. He is a member of the American Association for the Advancement of Science, the American Ceramic Society, the American Institute of Mining, Metallurgical and Petroleum Engineers, the American Society of Testing Materials, the Australasian Ceramic Society, the Institute of Ceramics, UK, Keramos and the National Institute of Ceramic Engineers. He served as the President of the American Ceramic Society in 1985-86. Dr. Ruh received a Bachelor of Science Degree in Ceramic Engineering from Rutgers University in 1953 and his Ph.D. in Ceramics from Rutgers in 1954.

Bruce B. Corden, is a Director of the Company. For the past ten years Mr. Corden has been a petroleum consultant on projects located throughout North America. In addition, he served on the Board of Directors of the Michigan National Bank for the past fifteen years. From 1969 to 1981 he founded and became Chairman of the Board and President of Petrotech, Inc., a publicly traded petroleum exploration and production company with operations in the United States and Canada. Mr Corden received his Bachelors of Science Degree in Mining, Geology and Engineering from the University of Toronto in 1949. He is a member of the Society of Industrial Earth Scientists, the Petroleum Engineers and Geologists, the American Institute of Mining and Manufacturing, the American Association of Petroleum Geologists and the Ontario Petroleum Institute.

Theodore M. Friedmann, is a Director of the Company. For the past ten years, he has also served as the Chief Executive Officer of Allied Paint and Color Works, located in the Bronx, New York. Previous thereto (1975 - 1981) he was employed by the Lauwen Chemical Corporation. He is currently Chairman of the New York Paint and Coatings Association. Mr. Friedmann is also President of the Environmental Coatings Council in Washington D.C.

Timothy M. Calvo, is a Director of the Company. He is also an Application Manager for Micron Powder Systems which is located in Summit, New Jersey. Mr. Calvo has been employed by Hosakawa Micron Powder Systems since September of 1988. Previous thereto (June 1979 - September 1988) he was a Sales Engineer and Office Manager for Ideel Electric Co. of Mansfield, Ohio.

James L. Austin, is a Director of the Company. For the past 21 years Mr. Austin has been engaged in various positions with the paper industry. Since October of 1989, Mr. Austin has served as the president of MoDoCell Inc. which operates paper processing mills throughout North America and is the a subsidiary of MoDo Inc. of Sweden, one of the worlds largest paper processors. Prior to MoDoCell Inc., Mr. Austin held such positions as North American Sales Manager for Georgia-Pacific, sales manager for Willamette Industries, Gottesman-Central National, Brown Company and was an International Market Research Associate for Schering-Plough Corporation.

THE PROJECT

Project Concept

The project concept is to install a mining facility and to build a beneficiation and packaging plant to initially produce 4,000 tons per year of ground silica products for sale in the western United States to the filler and specialty coating industries.

To achieve this goal, the project is divided into four areas of development:

1) **Geology.** The property will be surveyed at a scale 1:50 and topographic and geologic maps will be made. Next, a reverse circulation drilling program is planned to examine the deposit to a depth of 250 feet and to produce about 12 tons of samples for test work and beneficiation studies. The drill results will be used to generate Proved, Probable, and Possible ore reserves using industry accepted methods. Testing will include normal rock analyses as well as industry-specific tests such as GE Brightness.

2) **Trial Mining.** HeatShield Technologies has won a contract to produce and sell 250 tons of ground product at a price of \$800 per ton. This sale will serve to introduce the Klannerite™ product to the western United States market.

3) **Marketing and Research & Development.** Markets have been identified as a substitute for current filler materials and for new applications in thermal and energy radiation applications. The former require traditional marketing efforts and the latter involve research & development efforts. HeatShield has developed separate efforts for each area. In the filler markets, regional sales representatives have been appointed. For new applications, research programs have been established with American universities.

4) **Plant Construction.** HeatShield is in contact with several manufacturers of grinding equipment to determine the best configuration needed to produce a high quality product at reasonable cost. Three different grinding systems have been identified, and test work and engineering studies are in progress.

Project Description

The project will consist of an open pit mine, a beneficiation facility, packaging and warehousing facilities, and ancillary units including a quality control laboratory, general offices, and a repair shop and spare parts facility.

Mining will be by open pit method, employing an excavator to mine and load the ore, and dump trucks to haul the ore to the beneficiation plant. There is little or no overburden to remove. Selective mining based on rock color or multiple face mining will be used to maintain a constant, high quality mill feed.

The ore will be hauled to the beneficiation plant in dump trucks. Tarp covers on the trucks will prevent wind loss and dust.

The beneficiation plant will consist of a bulk ore bin, a feeder, a crushing unit, a crushed ore bin, a grinder or milling unit, a product classification or sizing system, bulk product bins for each product, and ancillary dust abatement and dust collection systems.

The product will be packaged in 50 pound bags using automated, dust free bag fillers and then placed on pallets. Covered storage will be provided.

Location

The Viva Luz Mine is located in Mohave County, Arizona in township 17N, range 19W, section 35; it occupies the southeast quarter of section 35. The mine is accessed by 6.5 miles of dirt road (Franconia Road) from Interstate 40. There is a railroad siding at the road intersection.

Mineralogy, Geology, Exploration and Reserves

a) Mineralogy

The Klannerite™ rock is mineralogically composed of approximately 88% cristobalite and 11% kaolinite with other minor constituents (quartz, opal, volcanic glass, biotite, zeolites). At the surface the rock is very fine grained with particle sizes of 1-3 microns, white, massive and has a chalky consistency. There are patches and veins of stained or darker material, and there is some variation in whole rock chemical analysis:

	<u>range</u>	<u>average</u>
SiO ₂	77.40 - 89.63	83.39%
Al ₂ O ₃	3.77 - 15.85	10.95
CaO	0.03 - 0.10	0.12
Fe ₂ O ₃	0.03 - 0.15	0.08
K ₂ O	0.05 - 0.17	0.08
MgO	0.02 - 0.49	0.15
Na ₂ O	0.02 - 0.23	0.11
TiO ₂	0.11 - 0.50	0.35
LiO ₂	0.00 - 0.01	0.00
MnO	0.00 - 0.02	0.00
P ₂ O ₅	0.00 - 0.03	0.00
LOI	4.09 - 5.95	4.74
		<hr/> 100.00%

Of special interest is the nature of the cristobalite crystal structure. Normal cristobalite is isometric (three axes at 90 degrees, all axes of equal length), but electron micrographs of the cristobalite in Klannerite™ show a crystal shape which appears to be orthorhombic (three axes at 90 degrees, all axes of different length). Thus the cristobalite appears to be pseudomorphous. There has been recent interest in the use of orthorhombic materials for heat control applications.

b) Geology

The regional setting is of Miocene tuffs, rhyolitic flows, and porphyritic andesites underlain unconformably by plutonic and metamorphic Proterozoic amphibolites and gneisses.

Within the study area, a NW-SE trending fault has brought the Proterozoic rocks to the west in contact with the Miocene tuffs. Hydrothermal action of hot reactive waters along the fault has acted upon the tuffs to produce the characteristic Klannerite™ rock. Moving to the east and northeast, away from the fault, the degree of alteration diminishes. The fault contact is marked by massive blue-grey chalcedony.

Five units are identified at the Viva Luz Mine:

- 1) Moderately altered tuff with lithic fragments, tan, green, and buff coloration.
- 2) Klannerite™ ore: white, intensely altered tuff with ghosts of lithic fragments.
- 3) Blue-grey massive chalcedony along the fault contact.
- 4) Transitional rock between the blue-grey chalcedony and the Klannerite™.
- 5) Crystalline basement rocks.

c) Exploration

To date the property has been subject to surface reconnaissance study only. Cominco has made a site investigation for the Klannerite™ rock, and Bond Gold has carried out a stream sediment sampling program for gold.

HeatShield has planned a detailed exploration program. The first step will consist of topographic mapping of the study area at a scale of 1:50 to 1:100, and with a contour interval of 5 feet. Next, a geologic mapping program will be undertaken. Finally, a reverse circulation dry drilling program will be done. About 8 to 12 holes, each about 200-250 feet deep are planned. A hole diameter of 5.25"

will be used to produce the required volume of mineral needed for industrial test work. Samples will be collected at 5 foot intervals and composited prior to testing.

Test work on the samples will be extensive, including:

- 1) Whole rock analysis.
- 2) X-ray diffraction to identify cristobalite.
- 3) Thin section studies and modal analysis.
- 4) Trace element for Pb (lead) and Hg (mercury).
- 5) Oil absorption, ASTM D281.
- 6) Specific surface area, BET multi-point.
- 7) Brightness, GE method.
- 8) pH (acidity), ASTM E70.
- 9) Fineness of grind, ASTM 1210.
- 10) Bond work index.
- 11) Paddle wheel abrasion.
- 12) Product bulk density, packed and loose.
- 13) Ore density.

d) Reserves

Upon completion of the drilling program, ore reserves, classified as Proved, Probable, and Possible, will be calculated. A series of vertical geologic cross sections will be constructed from the drilling data, and section by section tonnages will be measured.

The current estimate of ore reserves is based on the central portion of the purest Klannerite™ with a surface expression of 350 x 100 ft, and a depth of 95 feet as exposed by the local relief. Assuming a bulk density of 1.6, the equivalent reserve is 166,000 short tons.

However, white transition rock of unproved quality has a surface expression of 300 x 800 ft. Should this rock be shown by the drilling and testing program to be of good quality, and extend to a depth of 200 feet, then the reserve could be as large as 2.4 million short tons. A target of 1.0 million tons is expected.

Production Schedule

The projected production schedule envisions a three year build-up of sales as the Klannerite™ product penetrates the market. Projected production is:

Year 1	3,118 short tons of Klannerite™ product
Year 2	7,068
Year 3	14,968

Because there is little or no overburden, and because the beneficiation process produces practically no tailings, the mining tonnage and the ore tonnage will be essentially equivalent to product tonnage.

Infrastructure and Services

Being a relatively small project, the required infrastructure and service requirements are minimal.

At the Viva Luz Mine, the existing 6.5 mile unpaved road will be improved to allow the free movement of dump trucks. Should drilling show that the ore is hard at depth, then provision will be made for a powder magazine and separate cap house. A small storage building will be required for storage of materials and supplies. Loading should be directly into the trucks and thus no loading facilities are required. If the mining produces much oversize, then a grizzly will be constructed above a loading chute.

At the beneficiation plant, services will consist of compressed air, potable water, minimal industrial water, three phase power at 4160 volts, and sewage for human waste. Buildings in structural steel or concrete block will be erected for the beneficiation plant, the bagging and storage facility, offices and laboratory, and a small repair shop and warehouse. The plant site will be fenced for security. Total constructed covered area is estimated as 7500 square feet. The battery limits of the beneficiation plant should be about 4 acres to serve as an environmental barrier.

Mining Rights and Regulations

The Viva Luz Mine is located on privately owned land. The land is owned by the New Mexico and Arizona Land Company.

In March, 1984 the New Mexico and Arizona Land Company leased the property to PDC Industrial Coatings. PDC Industrial Coatings is the joint venture partner with HeatShield Technologies for development of the Klannerite™ mineral.

In October, 1991 the New Mexico and Arizona Land Company consented to PDC's transfer of one half of the lease interest to HeatShield Technologies, Inc.

Under the terms of the original lease, still in effect, the lessee may explore and mine any quantity of the silica ore and make any land improvements necessary to carry out mining. The lease continues in effect for 20 years (until March, 2004) as long as the lessee pays a minimum royalty of \$5000. Should the property be in production, a 5% of gross sales FOB plant royalty must be made.

Insurance

HeatShield will provide a health plan and Workmen's Compensation insurance to its workers. HeatShield will also obtain General Liability Insurance covering the Klannerite™ operation with a general aggregate limit of \$5,000,000. Necessary automobile insurance will also be provided.

It is believed that product liability insurance can only be obtained approximately one year after the project is in production. Before this time the Klannerite™ product will be considered as a new and untested material.

Environment, Health and Safety

All efforts will be taken to build an environmentally friendly project, operating within all appropriate local, state, and federal rules and regulations.

The Klannerite™ product is an inert, non-flammable, non-toxic substance which differs only slightly from ordinary beach sand. It does not contain any heavy metals such as mercury or lead, nor any

Environment, Health and Safety (Con't)

asbestiform particles. Its only health restriction is a limit on respirable dust of 0.05 mg/m₃.

The Viva Luz Mine is located in a remote region and sporadic mining over the years has already produced a series of haul roads and mining benches. Mining will continue on the same pattern, gradually reducing the elevation of the topographic high. During the dry season, dust masks will be issued to the operators, and the haul road will be periodically watered or treated with a dust suppressant. In terms of blast vibration damage or air blast, assuming a limiting charge weight of 20 pounds, shock wave velocities at a distance of 90 feet will be too low (25 mm/sec) to cause structural damage to civil works. There are no civil works within miles of the mine site. The trucks transporting the ore to the beneficiation plant will be covered with tarps to prevent wind or drop off loss. The raw ore will have a mean particle size of about 2 to 5 inches and is not conducive to dust operation.

The beneficiation plant will include complete dust suppression and dust collection equipment meeting OSHA BAT (best available technology) standards. At the unloading and crushing area dust will be controlled with mist water sprays as necessary. The grinding circuit will be attached to a dust collector with ducts, and fed into a bag house where the dust will be trapped. Periodically the bag house will be cleaned and the dust will be reincorporated into the product.

The product bagging system will employ screw type feeders which produce little dust.

In addition, workers will be required to wear dust masks in the vicinity of operating machinery. The process equipment is generally automatic in its operation and requires little worker attendance or physical strain. All belts and drive parts will be adequately shielded to avoid accidental contact.

Project Schedule

The project is scheduled to be in production by early March, 1992. The task with the longest lead time is manufacture of the (ACM) Air Classifier Mill system. Should an alternative grinding system be chosen, such as ball mill, the production date may be shortened as much as three months.

Task	Start Date	End Date
Geology	Jan 27, 92	Apr 15, 92
Trial Sample	Jan 27, 92	May 29, 92
Marketing, R&D	Jan 27, 92	Dec 10, 92
Plant Construction	Apr 7, 92	Mar 8, 93

The HeatShield project schedule is controlled by a 68 task computerized CPM (critical path method) program.

PROJECT COST AND FINANCIAL PLAN

Project Cost

The project cost to plant startup in the first quarter of 1993 is divided into seven parts:

1) Beneficiation Plant	\$ 1,350,000
2) Mine	150,000
3) Working Capital	400,000
4) Geology and Drilling	51,800
5) Marketing and R&D	31,100
6) Overhead	327,000
7) Advance Sales	(130,000)
Contengency, 10%	<u>218,000</u>
 TOTAL	 <u>\$ 2,397,900</u>

An additional capital investment of \$2,250,000 plus \$225,000 contingency will be needed in year 2 and 3 to bring plant installed capacity up to 14,968 tons per year. The company expects to fund the expansions through cash flow and additional financing.

Financial Plan

The absolute plant capacity, operating 6000 hours per year, is 16,632 tons, or 2.77 tons per hour. A plant capacity utilization of 90 % is assumed, yielding a maximum operating tonnage of 14,968 tons. It is assumed that three years are required to build up the market to utilize full plant capacity. Thus the annual production and sales will be:

Year 1	3,118	tons
Year 2	7,068	
Year 3 on	14,968	

Sales are made up of Klannerite™ product and Klannerite™ contained in coatings produced by HeatShield. The coatings manufacturing will be subcontracted to a coating manufacturer, thus there is no associated capital investment for coatings. Klannerite™, in its filler applications, competes with products selling for \$200 - \$3,000 per ton. A current sales contract is for \$800 per ton, and as

Financial Plan (Con't)

the product proves itself in the market place, the sales price is expected to improve. A sales price FOB plant site of \$1000 per ton has been assumed. Adding in net proceeds from coating manufacture and sales, the equivalent combined sales price for Klannerite™ is \$1,314 per ton.

Manufacturing costs are made up of labor, electric power, and supplies. Depending on production volume, manufacturing costs vary from \$315 to \$269 per ton. Sales costs are 8 to 9 % of gross sales. The project overhead and administration costs are 7% of gross sales in year 1, and fall to about 3 % of gross sales in year 3 on. The major portion of operating expenses is payments to the joint venture partner, PDC Coatings, and debt interest payments. Debt payments are based on a \$2,750,000, seven year loan. The remaining project cost will be financed out of cash flow.

HeatShield Sales and Income Projection is:

	<u>FY93</u>	<u>FY94</u>	<u>FY95</u>
Tons	3,118	7,068	14,968
Sales	\$4,098,500	\$9,938,600	\$21,058,600
Cost of Sales	<u>\$982,720</u>	<u>\$1,962,442</u>	<u>\$4,031,935</u>
Gross Profit	\$3,115,780	\$7,976,158	\$17,026,865
Operating Expenses	<u>\$2,254,060</u>	<u>\$5,280,469</u>	<u>\$10,747,767</u>
Income - Operations	\$861,720	\$2,695,689	\$6,279,098
Interest Income	<u>\$35,000</u>	<u>\$70,000</u>	<u>\$150,000</u>
Income Before Taxes	\$896,720	\$2,765,689	\$6,429,096
Fed. Income Taxes	<u>\$295,020</u>	<u>\$909,911</u>	<u>\$2,115,173</u>
Net Income	<u>\$601,700</u>	<u>\$1,855,778</u>	<u>\$4,313,925</u>

THE MARKET

Product Applications

The end uses for the Klannerite™ product can be conveniently divided into two areas: 1) filler components for paints, plastics, and paper; and 2) specialty applications with unique thermal and electromagnetic reflective properties.

a) Filler Components

The United States ground filler market is large, geographically diversified, and includes many different mineral products with prices ranging from \$10 to more than \$1000 per ton. The US market in 1980, for 19 different ground mineral filler products, was 11.3 million short tons.

Mineral fillers make up the solid phase of paints. They may be used as extenders, to add bulk to the paint, or as pigments to give color and hiding characteristics. Klannerite™ has shown itself to be applicable in both cases. As an extender its fine grain size and chemical inertness yield a product with good scrub resistance and that does not "chalk" upon weathering. As a hiding pigment its low index of refraction make it an excellent spacer used to decrease the loading of expensive titanium dioxide pigment. As a general rule, fillers should have a low index of refraction as they then reflect more light, imparting brightness. A low density is also desirable, as a given weight of filler creates a greater volume of paint. The following table compares Klannerite™ (cristobalite) with competing filler products:

	<u>Specific Gravity</u>	<u>Index of Refraction</u>
Klannerite™	2.32	1.49
Quartz	2.65	1.55
Calcite	2.71	1.49 & 1.69
Kaolinite	2.62	1.62
Al trihydrate	2.42	1.57

Product Applications-Filler Components (Con't)

The paint market is divided into the Architectural or "trade" sector (50%) and Industrial Coatings, further subdivided into OEM (original equipment manufacturers) 32%, and Repair & Maintenance, 18%. HeatShield is targeting its sales to the Industrial Coatings and Repair & Maintenance sectors which together represent half of the total paint market.

The US paint market is about 530 million gallons, with an average loading of 4 pounds of filler per gallon of paint. Half of the market is thus 530,000 tons of filler equivalent. HeatShield's projected sales of 16,000 tons in the third year of operation only represents 3% of the market. The paint market is growing slowly at 2-3% per year. For paint filler applications, Klannerite™ will be produced in a size P₉₇ 20 microns (97% passing 20 microns).

The US plastics industry uses ground filler both as an extender and to impart special qualities to the plastic. For the plastics market the filler must be low in abrasiveness to avoid undue die wear, and easy flowing to smoothly fill the mould. For plastics applications, Klannerite™ will be produced in a size P₉₇ 6 microns. An advantage of the plastics market is that it is growing at more than 6% per year.

The US paper industry consumes about 4.0 million tons of filler, mostly kaolinite, per year. Most kaolinite comes from the southeast US, giving Klannerite™ a freight advantage for west coast markets. For paper applications, Klannerite™ will be produced in a size P₉₇ 6 microns.

b) Specialty Applications

Specialty applications take advantage of Klannerite™ specialty properties-low index of refraction, low density, and radiation scattering ability. Most of these are new applications, where research and development is required and new applications may need to be invented. Some potential applications are:

Specialty Applications (Con't)

1) Ultraviolet blockers for plastics. To protect plastics from degradation under the influence of intense sunlight, ultraviolet blockers are added to the plastic formula. Current organic blockers cost more than \$2000 per ton and they are engineered materials with low index of refraction. Klannerite™ is a potential low index of refraction substitute which could be sold at lower cost. Alcoa, a producer of vinyl siding, is currently testing Klannerite™ for this application.

2) Photon diffusive coatings. Ceramic coatings with Klannerite™ have been shown, in tests performed by US Steel, to reflect heat back into soaking pits and to thus effect a 17% fuel savings. Alternative products are photon emitters, that is they absorb heat and then radiate it back into the hot body, a less efficient method. HeatShield has already formulated Klannerite™ into coatings and has a third party manufacturer who can produce the special formulations. The total market potential is about 540,000 gallons per year for steel industry soaking pits and furnaces, equivalent to 1,080 tons of Klannerite™. Other markets may be found for the ferrous metals industry, cement kilns, etc.

3) Fire retardant coatings. Tests have been carried out on the use of Klannerite™ as a fire retardant coating. In one test, the burn through time for a aluminum plate was increased from 4 minutes to 30 minutes at 3500° through the application of a Klannerite™ formulated coating.

4) Radar signal scattering. Tests have been carried out by Boeing Corporation and the Argon National Laboratory for the use of Klannerite™ to scatter and render radar signals undetectable.

Sales Arrangements

HeatShield has entered into sales agreements with two organizations: Akro Shield and Chemtech. The two agreements cover both the filler (paints, plastics) end of the business and the specialty heat properties mentioned above.

Sales Arrangements (Con't)

Akro Shield, Inc.

Akro Shield, Inc. is based in Kansas and is a producer of ceramic coatings and other refractory products. The agreement entitles Akro Shield to produce ceramic coatings employing Klannerite™. Akro Shield will pay \$1,700 per ton for the Klannerite™, FOB mine basis. For Klannerite™-based formulations sold by Akro Shield, HeatShield will receive a 5% royalty; for third party sales of Klannerite™ made by Akro Shield, HeatShield will pay a 15% commission.

Chemtech of California

Chemtech is based in California and is a distributor of high-performance specialty chemical products. They have an exclusive 11 western state sales territory agreement under which HeatShield will pay Chemtech a 5% commission on their sales of Klannerite™ and Klannerite™ - containing products. Recently, Chemtech has placed an initial order for 250 tons of Klannerite™ at a price of \$800 per ton, with an option to purchase an additional 250 tons at the same price. The Chemtech agreement runs for a one year period which may be extended upon the achievement of certain sales levels.

HeatShield recognizes the need to expand its marketing efforts and is in the process of securing the services of a marketing specialist.

CONCLUSION

The company has a high growth potential with unique proven natural reserves. Continued efforts will be made to market Klannerite™ to new product applications especially in the coatings and industrial minerals markets.

New agreements are currently in negotiation with major Fortune 500 companies to purchase Klannerite™ on a continued basis. While in the process of establishing its own grinding facility, the company intends to sub-contract with other custom grinding operations to enable cash flow to begin much before the intended date of plant completion.

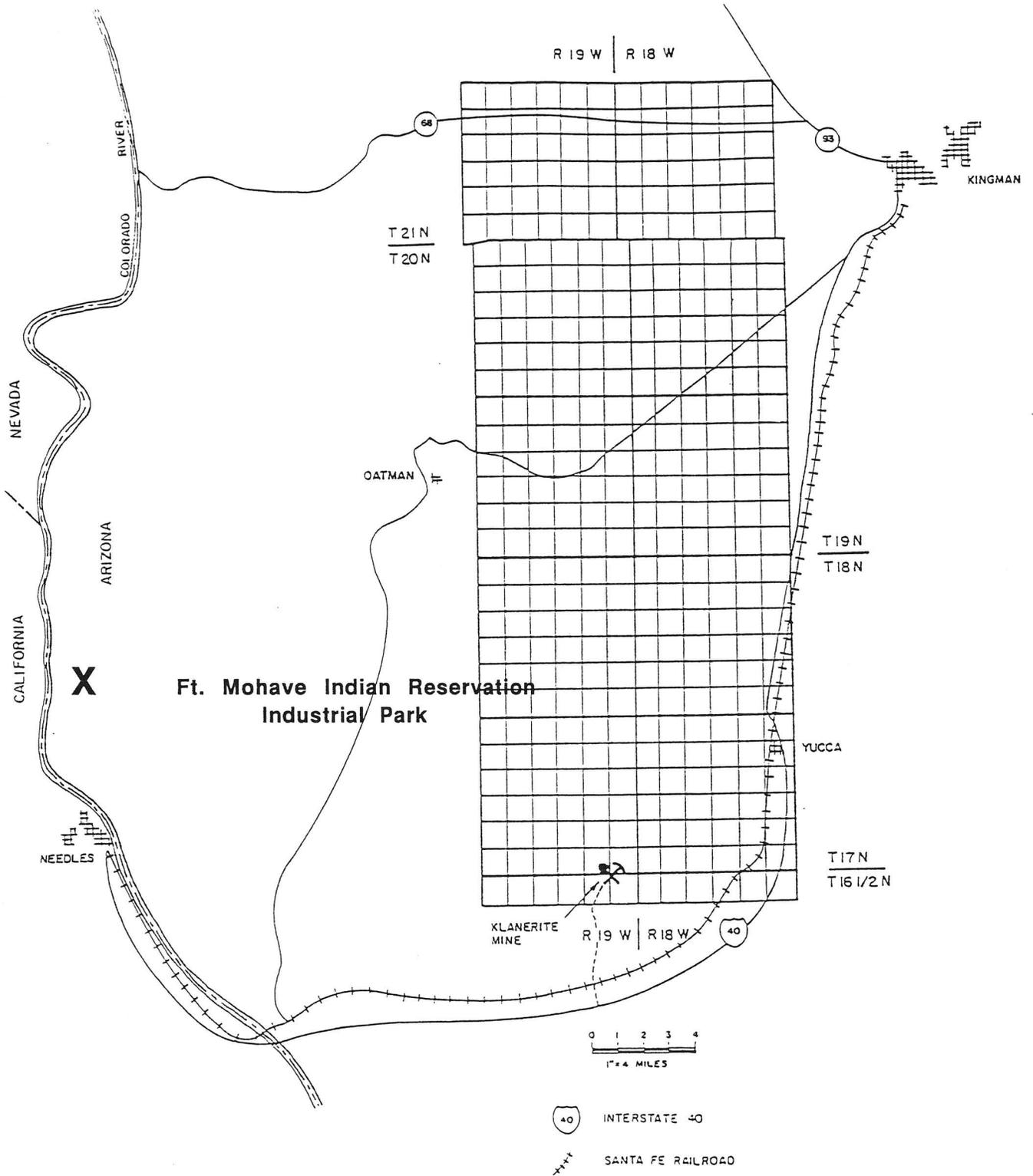
HeatShield Technologies, Inc.

Viva Luz

Mining Project

Presentation Visuals

Location Map

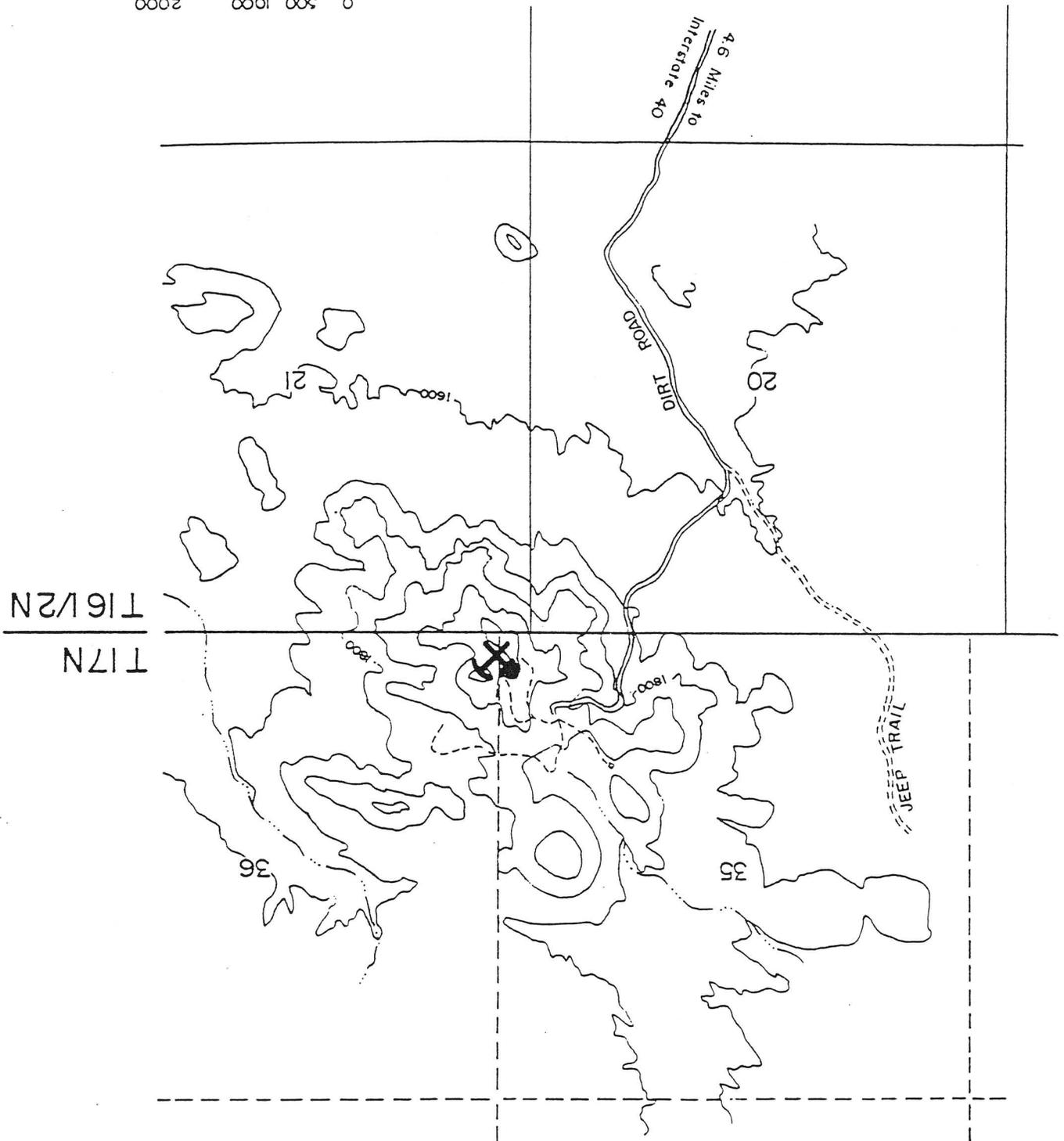
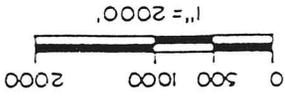


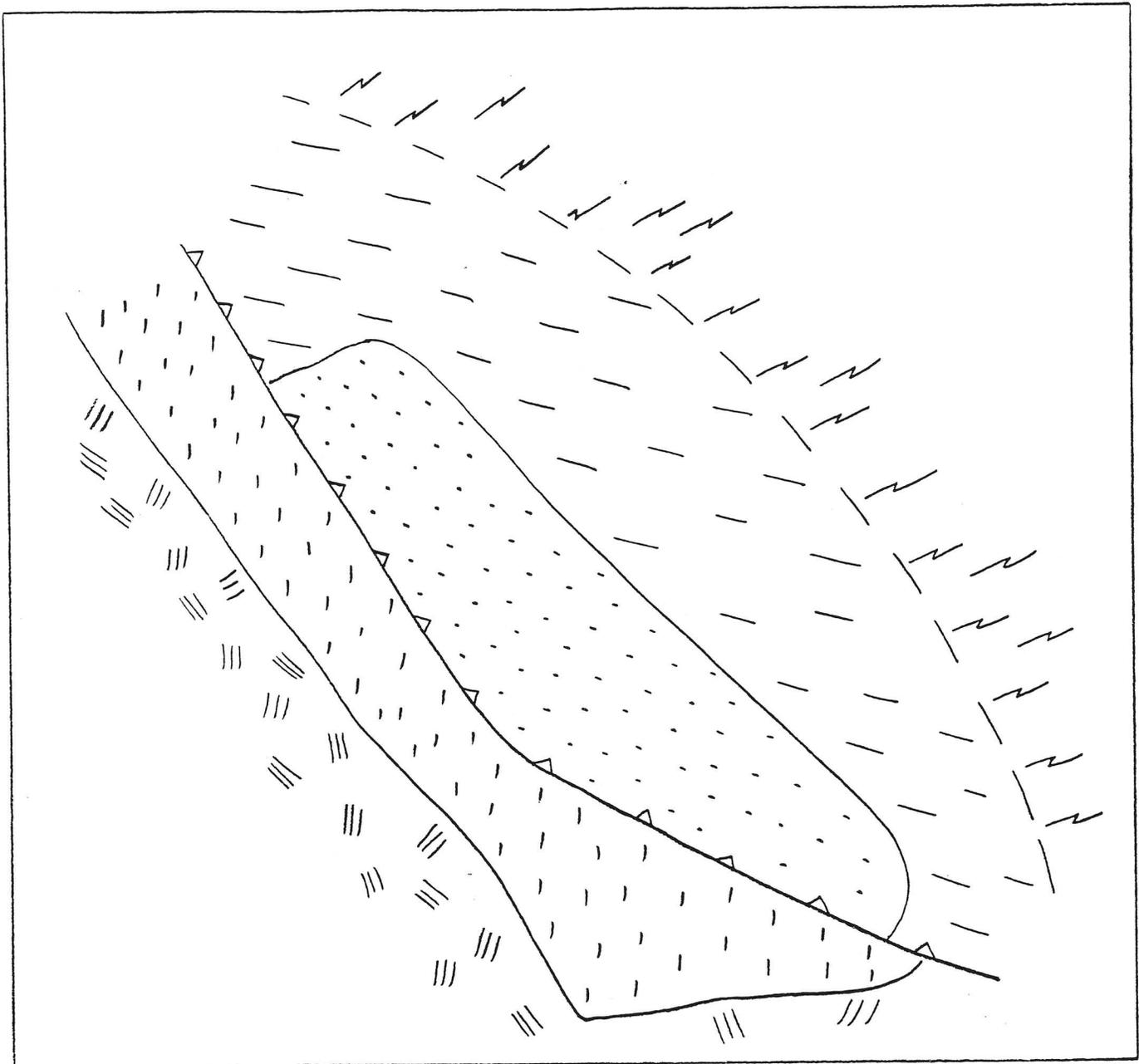
Mine Location Map

R 19 W

T 17 N

T 16 1/2 N





KLANNERITE TM



CHALCEDONY



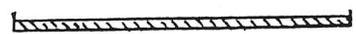
TRANSITION ZONE



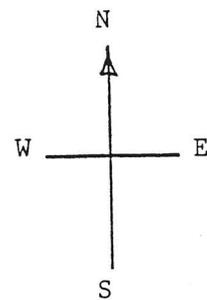
ALTERED TUFF



BASEMENT ROCKS



Scale=200 ft.



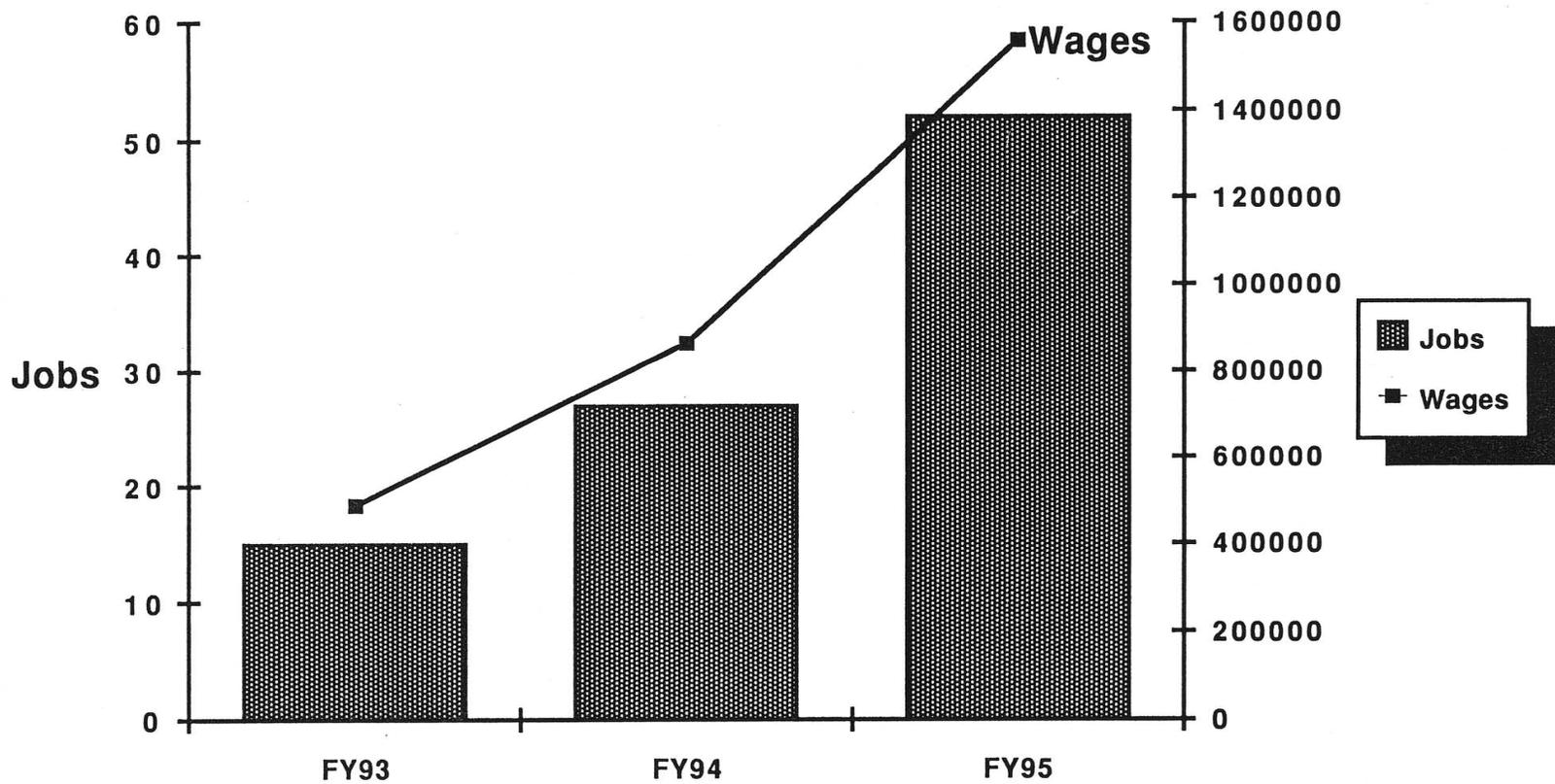
GEOLOGIC MAP OF THE VIVA LUZ MINE
(preliminary)

HeatShield Technologies, Inc.

Local Impact

- **Job Creation**
- **Local Economic Benefit**
- **Educational Opportunities**
- **No Negative Impact on the Environment**

HeatShield's Employment Impact



HeatShield Technologies, Inc.

Local Economic Benefit

- **Wages Paid - 1st year over \$400,000**
- **Local Purchases**
- **Use of Local Services**
- **State Taxes Paid - 1st year over \$160,000**

HeatShield Technologies, Inc.

Educational Opportunities

- **HeatShield's ore Klannerite™ will be marketed in the advanced technologies areas, therefore employees will be educated and trained as to its uses and the minerals' potential.**

HeatShield Technologies, Inc.

Environmental Impact

- **Minimal Water Consumption**
- **Minimal Overburden To Be Disposed Of**
- **The Mine Is In A Remote Location**
- **The Product Is Inert, Not Flammable, Non-Toxic**
- **The Beneficiation Plant Produces Minimal Tailings**
- **The Beneficiation Process Does Not Use Reagents**
- **The Beneficiation Plant Employs Dust Abatement And Dust Collection Equipment**

HeatShield Technologies, Inc.

Estimated Project Costs

Processing Plant Site

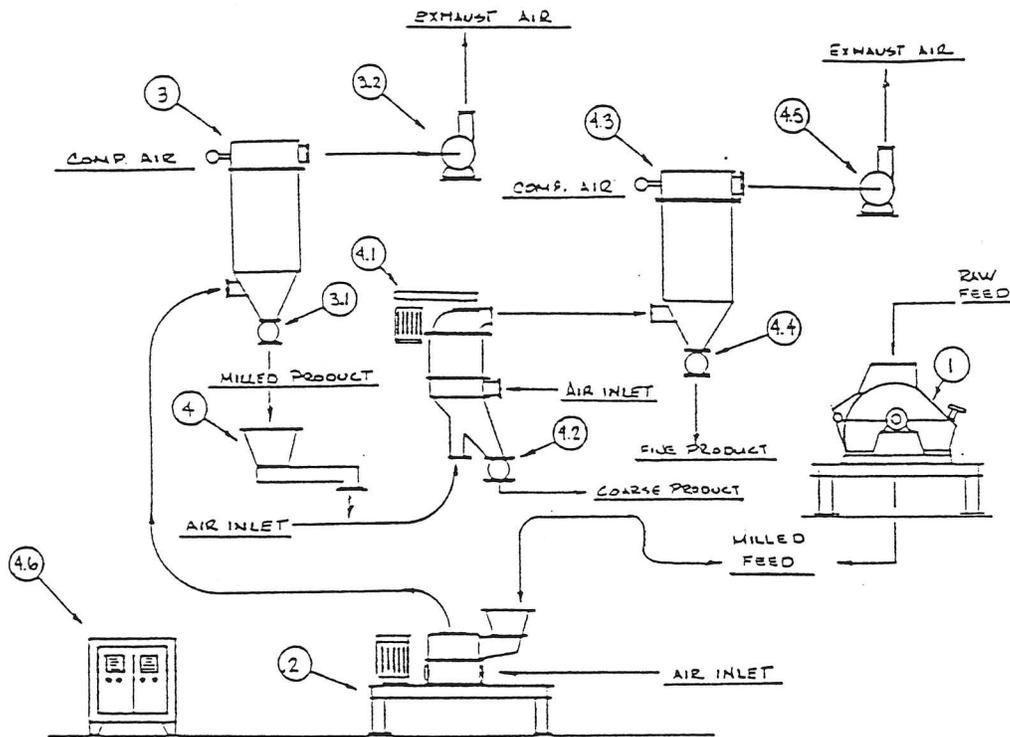
• Land acquisition	
Estimated Cost	\$100,000
• Building and Civil Works	
Estimated Cost	\$300,000
• Engineering, Procurement, and Construction Management	
Estimated Cost	\$200,000
• Processing and Refining Equipment	
Estimated Cost	<u>\$750,000</u>
Processing Plant Fixed Capital Investment	<u>\$1,350,000</u>

Mine Site

• Road Improvements to the Mine Site	
Estimated Cost	\$50,000
• Mining Equipment Needs	
Estimated Cost	<u>\$100,000</u>
Mine Site Capital Investment	<u>\$150,000</u>
Total Estimated Capital Investment Needed	<u>\$1,500,000</u>

HeatShield Technologies, Inc.

Processing Equipment Schematic



- 1.0 Model 40/32 Omniplex Hammer Mill
- 2.0 Model 300 ACM Air Classifying Mill with Integral Feed Screw and Hopper
- 3.0 Model 289-10-40C Mikro-Pulsaire Filter Receiver
- 3.1 Rotary Discharge Valve for Item 3
- 3.2 Exhaust Blower to Induce the Required Air Flow through the Pulverizer (Item 2.0)
- 4.0 Screw Feeder with Integral 5 cu. ft. Hopper for Classification System
- 4.1 Model MS-4H Micron Separator
- 4.2 Rotary Discharge Valve for Item 4.1
- 4.3 Model 109-8-100 Mikro-Pulsaire Filter Receiver
- 4.4 Rotary Discharge Valve for Item 4.3
- 4.5 Exhaust Blower to Induce the Required Air Flow through Micron Separator
- 4.6 Control Panel and Instrumentation

HeatShield Technologies, Inc.

Klannerite™ Market By Application

Fillers **Price Per Ton**

A. Paints-OEM and Maintenance Sector
US market = 530,000 tons/year

1. Extenders	\$300-\$3000
2. Pigment Spacer	\$400-\$1000

B. Plastics
US Market = In excess of 1,000,000 tons/year

1. Filler	\$400-\$2000
2. UV blocker	\$1000-4000

C. Paper
US market = 4,000,000 tons/year

1. Coating	\$200-\$800
------------	-------------

Specialty Applications

A. Photon Diffusive Coatings
US market = >1000 tons/year

(incorporated in our product)	\$10,000
-------------------------------	----------

B. Fire Retardant Coatings
US market = >1000 tons/year

(incorporated in our product)	\$4,000
-------------------------------	---------

C. Radar Signal Scattering
Market Unknown

(very high technology)	Unknown
------------------------	---------