JUN. 06 1991

Docket No. 040-08980 License No. SMB-1541

State of New Jersey
ATTN: Robert Stern, Ph.D., Chief
Bureau of Environmental Radiation
Department of Environmental Protection
Division of Environmental Quality
CN 415
Trenton, New Jersey 08625-0415

Dear Dr. Stern:

Subject: Heritage Minerals, Lakehurst, New Jersey

This refers to your letters dated February 9, 1991, March 20, 1991 and May 28, 1991 regarding Heritage Minerals, Inc. I provided some of the information requested in my letter dated March 13, 1991. Thank you for informing us of the results of your inspection at the site. We inspected the site on April 10, 1991 and a copy of the results of the inspection are enclosed for your information.

The following information is provided in response to the specific concerns expressed in your letters.

With regard to your concern about the controls on the monazite pile, the fence was standing and posted correctly during the April 10, 1991 inspection. The Radiation Safety Officer and the Manager are the only employees currently at the Heritage Minerals site and the gate to the site is locked when neither employee is present. This represents adequate control of access to the monazite pile at this time. If long-term on-site storage of the monazite is necessary, we may require the licensee to further contain the monazite to prevent erosion by wind or rain. We are currently considering the licensee's proposal to dispose of the monazite pile by dilution with clean sand as described in their letter dated February 28, 1991. We will keep you informed of our progress on this request.

With regard to your concern about the area between the dry mill and the wet mill, our inspector performed surveys during the inspection using a Ludlum Model 19 micro R meter. The highest radiation levels measured were 400 microroentgen per hour near the kiln outside the dry mill. The licensee is aware that soil outside the wet and dry mills is contaminated from spillage of feed sand and monazite, and plans to clean these areas following disposition of the monazite. Cleaning of equipment inside the mills is complete, but final surveys are not planned until remedial activities outside the mills and disposal of the monazite is complete.

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You asked for NRC's legal rationale for not licensing various areas and materials on the Heritage property. As part of the licensing process, the NRC staff concluded, based on the advice of the Office of General Counsel (OGC), that the NRC does not have jurisdiction over the areas on the Heritage Mineral property known as the "original new feed area", "recycled tailings area" (the blue area on the Perkins/Cole analysis) and the "salvage storage area". The sand in these areas contains less than 0.05% source material by weight, a concentration which does not meet the definition of source material in 10 CFR 40.4 and is defined in 10 CFR 40.13 as exempt from NRC regulations and the requirement for an NRC license. These areas were generated as a result of the primary activity of Heritage Minerals, Inc. which is the separation of minerals such as rutile and ilmenite from the sand, an activity which is not regulated by the NRC. The waste streams resulting from an unregulated activity are not within the jurisdiction of the NRC unless they meet the definition of source material. Since these areas are not source material and were not generated by an NRC licensed or licensable operation, they cannot be regulated by NRC. In fact, many of these areas were generated at a time when Heritage was using a process which did not produce a monazite-rich waste stream. Furthermore, because the primary activity does not require an NRC license, the staff concluded that the NRC cannot use the authority in the National Environmental Policy Act (NEPA) to regulate these areas of the site. Therefore, the staff concluded it can regulate only the monazite-rich waste stream since it contains 0.05% source material by weight and the areas in and around the plant which are contaminated by this material.

We understand that there are plans to review the Branch Technical Position, but no revision is yet available. The other documents you requested are enclosed.

Thank you for your cooperation in this matter. Please contact me if you have any other questions.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

Enclosures:
1. Letter dated February 21, 1989, including Inspection Report No. 99990001/89-001 and Notice of Violation.
2. Letter dated July 25, 1990 from Heritage Minerals, Inc. to NRC, including Map A.
3. Letter from NRC to Heritage dated January 2, 1991
4. License No. SMB-1541
5. Letter from NRC to Heritage dated March 22, 1991.
6. Letter from NRC to Heritage dated May 22, 1991.

bcc:
Region I Docket Room (w/concurrences)
M. Miller, RI
J. Kinneman, RI
E. Ullrich, RI

RI:DRSS	RI:DRSS	RI:SLO
Ullrich/bj	Kinneman	Miller
06/5/91	06/6/91	06/ /91

FEB 21 1989

[redacted]

Docket No. 99990001 Non-Licensee

Heritage Minerals, Inc.
ATTN: John F. Lord, P.E.
Plant Manager
P.O. Box 12
Lakehurst, New Jersey 08733

Gentlemen:

Subject: Routine Inspection No. 99990001/89-001

On January 12, 1989, Laurence F. Friedman, Ph.D., C.H.P., of this office conducted a routine safety inspection at Route 70, Mile Marker 41, Lakehurst, New Jersey of activities involving source material. The inspection was an examination of your activities as they relate to radiation safety and to compliance with the Commission's regulations. The inspection consisted of observations by the inspector, interviews with personnel, and a selective examination of representative records. The findings of the inspection were discussed with yourself at the conclusion of the inspection. A copy of the NRC inspection report is enclosed.

Based on the results of this inspection, it appears that your activities were not conducted in full compliance with NRC requirements. A Notice of Violation is enclosed as Appendix A and categorizes each violation by severity level in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (Enforcement Policy). You are required to respond to this letter and in preparing your response, you should follow the instructions in Appendix A.

During the discussions of our findings at the conclusion of the inspection, Dr. Friedman explained that one of your options to correct the violation cited in Appendix A to this letter is to apply for and obtain an NRC license authorizing the possession and use of source material. For your convenience, we have enclosed an application form and a licensing guide.

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Please keep in mind that the enclosed licensing guide was written for a facility which may be larger or smaller than yours or employ different materials. For example, if you can demonstrate that the maximum radiation levels in your plant are less than some acceptable value, it may not be necessary to have a radiation monitoring program or to issue personnel monitoring devices. The same principal can be extended to air monitoring, contamination control, and other areas of the radiation safety program. Include your rational for omitting any element of the radiation safety program in your application. The services of a health physics consultant may be helpful in completing the application. If you have any questions, you may contact Dr. Friedman at (215) 337-5276.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and your reply will be placed in the Public Document Room.

The responses directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

Enclosures:
1. Appendix A, Notice of Violation
2. NRC Region I Inspection Report No. 99990001/89-001
3. 10 CFR Part 19, 20, 40, 51, 170
4. Decommissioning Rule
5. Branch Technical Position for Onsite Disposal of Source Material
6. Form NRC-313
7. Licensing Guide

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey

Heritage [redacted]

bcc:
Region I Docket Room (w/concurrences)
Management Assistant, DRMA
L. Rouse, NMSS/IMSB
J, Kinneman, RI

RI:DRSS	RI:DRSS
Friedman/bc	Kinneman
02/17/89	02/17/89

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02/16/89

APPENDIX A

NOTICE OF VIOLATION

Heritage Minerals, Inc.
Lakehurst, New Jersey 08733

Docket No. 99990001
Non-Licensee

As a result of the inspection conducted on January 12, 1989, and in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (Enforcement Policy) (1988), the following violation was identified:

> 10 CFR 40.3 requires that no person receive title to, own, receive, possess, use, transfer, or deliver any source material after removal from its place of deposit in nature, except as authorized in a specific or general license issued by the NRC pursuant to the regulations in 10 CFR Part 40. Source material is defined [10 CFR 40.4(h)] as (1) uranium or thorium, or any combination thereof, in any physical or chemical form, or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium, or (iii) any combination thereof. 10 CFR 40.13, "Unimportant quantities of source material," provides an exemption for any person who receives, possesses, uses, transfers, or delivers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than one-twentieth of one percent (0.05%) of the mixture, compound, solution, or alloy.
>
> Contrary to this requirement, as of January 12, 1989, Heritage Minerals, Inc., possessed and used table concentrate and monazite waste in which the concentrations of source material were greater than 0.05% by weight, and was not authorized to do so in a specific or general license issued by the NRC.
>
> This is a Severity Level IV violation. (Supplement VI)

Pursuant to the provisions of 10 CFR 2.201, Heritage Minerals, Inc., is hereby required to submit to this office within thirty days of the date of the letter which transmitted this Notice, a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved. Where good cause is shown, consideration will be given to extending this response time.

APPENDIX A

NOTICE OF VIOLATION

Heritage Minerals, Inc.
Lakehurst, New Jersey 08733

Docket No. 99990001
Non-Licensee

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>
> Contrary to this requirement, as of January 12, 1989, Heritage Minerals, Inc., possessed and used table concentrate and monazite waste in which the concentrations of source material were greater than 0.05% by weight, and was not authorized to do so in a specific or general license issued by the NRC.
>
> This is a Severity Level IV violation. (Supplement VI)

Pursuant to the provisions of 10 CFR 2.201, Heritage Minerals, Inc., is hereby required to submit to this office within thirty days of the date of the letter which transmitted this Notice, a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved. Where good cause is shown, consideration will be given to extending this response time.

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 99990001/89-001

Docket No. 99990001

License No. none Priority ___ Category ___ Program Code ___

Licensee: Heritage Minerals, Inc.
P. O. Box 12
Lakehurst, New Jersey 08733

Facility Name: Heritage Minerals, Inc.

Inspection At: Route 70, Mile Marker 41, Lakehurst, N. J.

Inspection Conducted: January 12, 1989

Inspector: Laurence F. Friedman 2/17/89
Laurence F. Friedman, Ph.D., C.H.P. date
Senior Health Physicist

Approved by: John D. Kinneman 2/17/89
John D. Kinneman, Chief date
Nuclear Materials Safety Section B

Inspection Summary: Special Safety Inspection Conducted January 12, 1989 (Report No. 99990001/89-001)

Areas Inspected: Location, geology and hydrology of site; history of site; current process; tour of plant; collection and analysis of samples.

Results: One violation was identified: Possession of source material without an NRC license.

DETAILS

1. Persons Contacted

Heritage Minerals, Inc.

*John F. Lord, P.E., Plant Manager
Tony V. Cuculic, Chief Engineer

State of New Jersey, Department of Environmental Protection

*Peter C. Taylor, Central Bureau of Field Operation, Division of Hazardous Waste Management
*Karl W. Muessig, Ph.D., Geologist, N. J. Geological Survey, Division of Water Resources

*indicates those present at Exit Interview

2. Location, Geology and Hydrology of the Site

The Heritage Mineral, Inc., site is located in Manchester Township, Ocean County, New Jersey. A map showing the general location of the site is included as Attachment 1. A more detailed map showing the location of the settling pond and dredge pond (see below) is included as Attachment 2. Maps showing the layout of the plant are included as Attachments 3 and 4.

The Plant Manager stated that the entire site has an area of 7000 acres. He estimated that 1000-1200 acres had been involved in the mining operation. He stated that the balance of the site had not been disturbed. The plant itself, including the feed pile, settling pond and tailings piles occupies, an area estimated by the Plant Manager at 450-500 acres.

According to the New Jersey Geological Survey, the site is located on the Atlantic Coastal Plain. The formations are sandy and permeable to at least 1500 feet, where some clay is encountered, and bedrock is not encountered until at least 3000 feet.

The uppermost aquifer at the site is the Cohansey. Depth below grade to seasonal high water of this aquifer is approximately six feet.

3. History of Site

The following information was obtained from the New Jersey Department of Environmental Protection, and was confirmed by the Plant Manager. In 1957, ASARCO Incorporated purchased the previously undeveloped site, and initiated studies to delineate an ilmenite ore body. The New Jersey Geologist estimated that this ore contained 70% quartz (SiO_2), 29% ilmenite (TiO_2), and the remaining 1% zirconium, monazite, etc.,

including rare earths and uranium and thorium. Development of the site began in 1971, and active mining operations began in 1973.

Mining consisted of a hydraulic dredge operating on the exposed surface of the Cohansey aquifer which extracted a sand slurry for transfer to a dewatering barge. Water and gravel was separated and returned to the dredge pond, and the sand slurry was pumped to the wet mill. At the wet mill, the heavier minerals were separated from the lighter fraction by physical methods. This lighter fraction, comprising approximately 96% of the original mass, was returned to the dredge pond.

The heavier ore fraction, containing titanium dioxide, zircon, quartz, kyanite, sillimanite, and other trace minerals, was stockpiled to allow for dewatering. This material was fed to a rotary kiln for drying, and was then screened to remove coarse material, more than 99% quartz, which was deposited in a pile behind the dry mill.

The electrically conductive titanium dioxide-bearing minerals were separated from the non-conductive materials electrically, and the product was further refined magnetically to produce the final ilmenite product. This product represented approximately 2.5% of the original mass. The dry-mill tailings were stockpiled for future processing, and comprise the present "New Feed" pile to the east of the dry mill.

ASARCO halted operations in March 1982. The hydraulic dredging operations stopped, but the processing plant was used for experimental purposes under a lease to Humphreys Engineering until September 1982. Humphreys evaluated the possibility of producing a zircon product from the stockpiled dry-mill tailings.

In 1984-85, Kerr-Magee considered buying the property, and brought in Hazen Research, Inc., to perform studies of the process. Attachment 5 is a table from the Hazen report showing source material concentrations at various points in the process. The table was furnished to the inspector by the licensee during the inspection.

The property was purchased by the present owner, the Houson Corporation, which is owned by the Hovnanian family, in 1986. The facilities were leased to Mineral Recovery, Inc., and operated by them until August 1987. From August 1987 to the present, operations have been conducted by Heritage Minerals, Inc., which is owned by Houson.

4. Current Process

The current operation, which the Plant Manager stated is identical with the process studied by Kerr-Magee, processes the dry-mill tailings from the ASARCO operation to extract zircon and leucoxene (titanium dioxide). A flow chart of the process is included as Attachment 6. The "New Feed" on the chart is the dry-mill tailings from ASARCO. The material is

physically processed using water spirals and tables to separate light material, which is sent to a hopper where it is combined with the tailings from the dry mill.

The remaining, heavy material is kiln dried and passed to the dry mill where it is screened and separated electrically and magnetically. The non-conductors zircon and monazite are separated from the conductors, leucoxene (65% titanium dioxide) and rutile (92+% titanium dioxide).

Both streams are then further refined magnetically. The zircon product is separated from the monazite in the dry mill. The monazite goes into a hopper where it is combined with the tailings from the wet mill. The contents of the hopper are mixed with water and piped out to the combined tailings pile, located behind (to the north of) the wet mill. Some of the leucoxene is separated as product, and some is further refined into rutile by magnetic separation from residual zircon, which is recycled. Both the rutile and leucoxene are sold as product.

The Plant Manager stated that the stock of New Feed at the start of operations in November 1986 was approximately 1.2-1.6 x 10^6 short tons, of which an estimated 250,000-300,000 tons remain. Except for product shipped, an estimated 50,000-60,000 tons reported as TiO_2, the balance, approximately 1.0 x 10^6 tons, is in the combined plant tailings pile. Approximately 2600 tons of zirconium product and 800 tons of titanium product are produced each month. Approximately 25,000 tons of wet-mill tailings and 300 tons of dry-mill tailings are produced each month. Twenty per cent of the dry-mill tailings is monazite, a sand which contains source material. The Plant Manager estimated that present supplies of feed stocks (the "New Feed") would last approximately eight more months. Current plans are to reprocess the combined plant tailings, using the current process, to recover the same products. This process is expected to take another three years. No decision has been made as to whether to continue operations beyond that time.

The inspectors also discussed a housing and recreational development proposed for the site by the present owner. The development is planned around the lakes left by the dredging operation and is currently awaiting various state and local permits. The Plant Manager stated that development would start at the east end of the site and that the present plant location would be developed last. The entire project is expected to take 20 years.

5. <u>Tour of Plant</u>

The inspectors from the NRC and the State of New Jersey toured the plant. The plant operates 24 hours a day, seven days a week, and employs a total of 50 workers. The plant consists of the wet mill, a 200 by 100 foot building, half of which is used, and the dry mill, a 100 by 100 foot

building, all of which is used. There are also a service and office building and various small out buildings.

Background radiation levels were measured at the turn-off from Route 70 with a Ludlum Model 19 micro-R meter, and observed to be 7 uR/hr. Ambient radiation levels in the wet mill building and the dry mill building were approximately 50 uR/hr, except in the area of the dryer product discharge (dry mill feed) where levels of 300 uR/hr were measured. Levels of 240 uR/hr were measured in the vicinity of the dry-mill tailing discharge.

Workers were observed to be wearing single use, disposable dust masks while working in the dry mill. Little dust was actually observed, as virtually all fines are removed in the wet mill.

The inspectors noted that there was no health physics program, and the Plant Manager stated that no surveys for radiation or radioactive material were performed.

The inspectors also toured the combined plant tailings pile. Radiation levels over the pile were approximately 30 uR/hr.

6. Collection and Analysis of Samples

Six samples of plant feed stock, in-process material, and tailings were collected. The position of each sample in the process stream is indicated on Attachment 6. The samples ranged in mass from 786 to 1544 grams. Each sample was analyzed by gamma spectroscopy using an intrinsic germanium detector calibrated for the geometry of the samples (Marinelli beaker) with NBS-traceable standards. No attempt was made to dry the samples, which makes the reported weight-per cent values low. The activity of lead-212 was taken as the activity of thorium in the sample, and the activity of protactinium-234m was taken as the activity of uranium. These nuclides were assumed to be in equilibrium with the thorium-232 and uranium-238 parents, respectively. Activities were converted to masses using specific activities of 1.09E-1 uCi/g for thorium-232 and 3.33E-1 uCi/g for uranium-238. The weight-per cent of thorium, uranium, and total source material in each sample is reported in Table 1. Based on the analysis of the sample of combined plant tailings and the estimate of the total mass of these tailings, there appears to be approximately 62 tons each of uranium and thorium in the combined plant tailings pile.

The table concentrate had a source material concentration of 0.074% and the monazite waste has a source material concentration of 0.585%.

"Source material" is defined [10 CFR 40.4(h)] as (1) uranium or thorium, or any combination thereof, in any physical or chemical form, or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of

(i) uranium, (ii) thorium, or (iii) any combination thereof. 10 CFR 40.13, "Unimportant quantities of source material," provides an exemption from the requirements for an NRC license for any person who receives, possesses, uses, transfers, or delivers source material in any chemical mixture, compound, solution, or alloy in which the source material is by weight less than one-twentieth of one percent (0.05%) of the mixture, compound, solution, or alloy. Except for this exemption, 10 CFR 40.3 provides "that no person . . . shall receive title to, own, receive, possess, use, transfer, or deliver . . . any source material after removal from its place of deposit in nature, except as authorized in a specific or general license issued by the Commission pursuant to the regulations in [10 CFR Part 40]."

The finding that Heritage Minerals, Inc., possessed and used table concentrate and monazite waste in which the concentrations of source material were greater than 0.05% by weight without being authorized to do so by an NRC license is an apparent violation of 10 CFR 40.3.

7. Exit Interview

The results of the inspection were discussed with the individuals indicated in Section 1. The inspector explained the provisions of 10 CFR Part 40, and that whether Heritage Minerals, Inc., would have to apply for an NRC license depended on the results of the analysis of the samples.

The Plant Manager showed the inspectors a memorandum of a meeting in August 1986 between the then Plant Manager and a consultant, and a representative of the NRC, at which the NRC representative stated that, since the intermediate process streams were combined with other material before discharge to the tailings pile, the process could be viewed as a "black box," and that an NRC license was not required. The Plant Manager stated that he would cooperate in applying for a license if one was now deemed to be required.

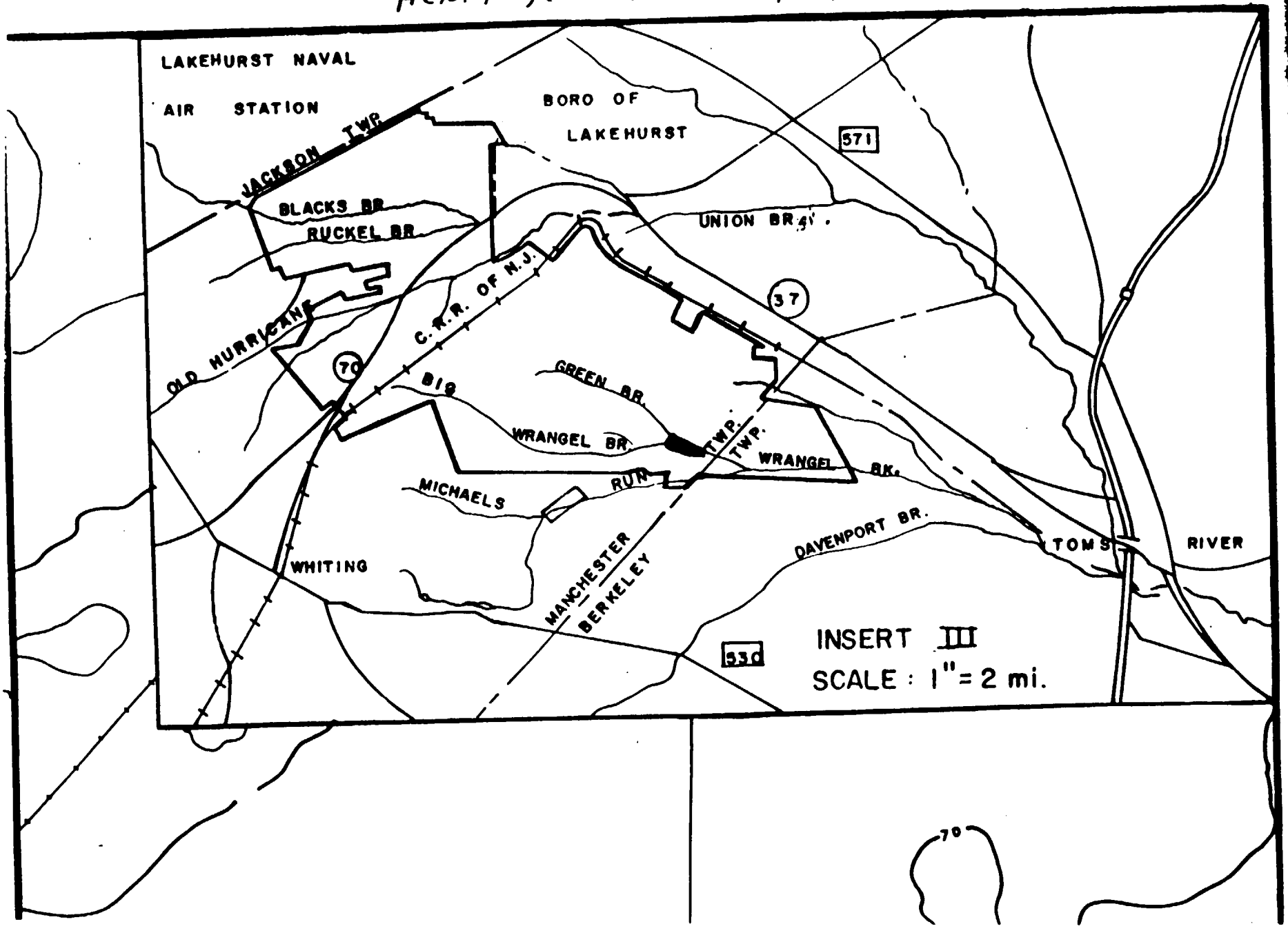
[redacted]

TABLE 1

SOURCE MATERIAL CONCENTRATION IN SAMPLES (WET BASIS)

Sample No.	Sample Identity	% Th	% U	% Source Mat.
1	table concentrate	0.048	0.026	0.074
2	new feed	0.009	0.009	0.018
3	combined plant tailings	0.006	0.006	0.012
4	monazite waste	0.539	0.047	0.585
5	zircon product	0.007	0.029	0.035
6	leucoxene product	0.010	0.004	0.014

Heritage mineral property



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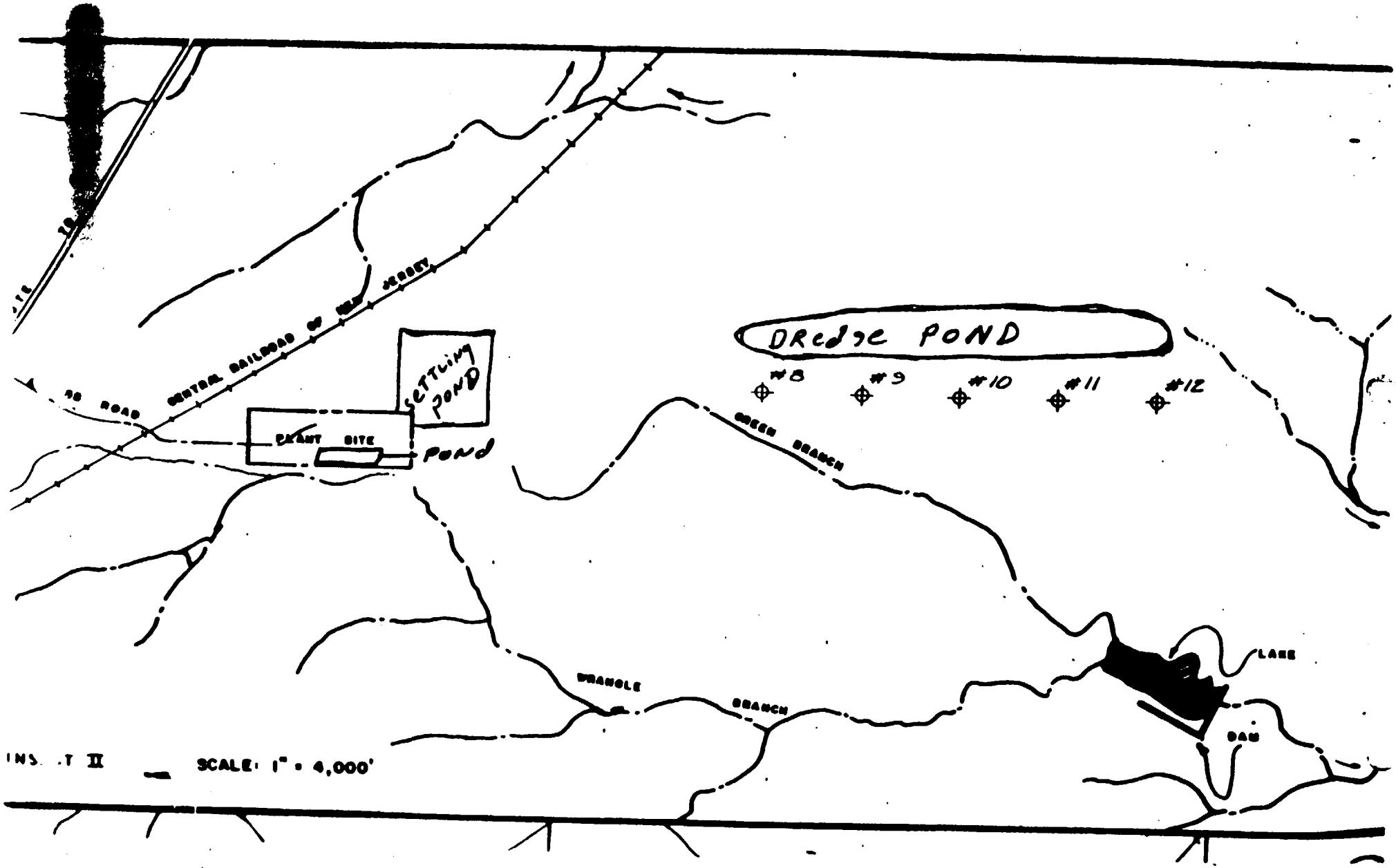

Attachment 2
99990001[redacted]9-001

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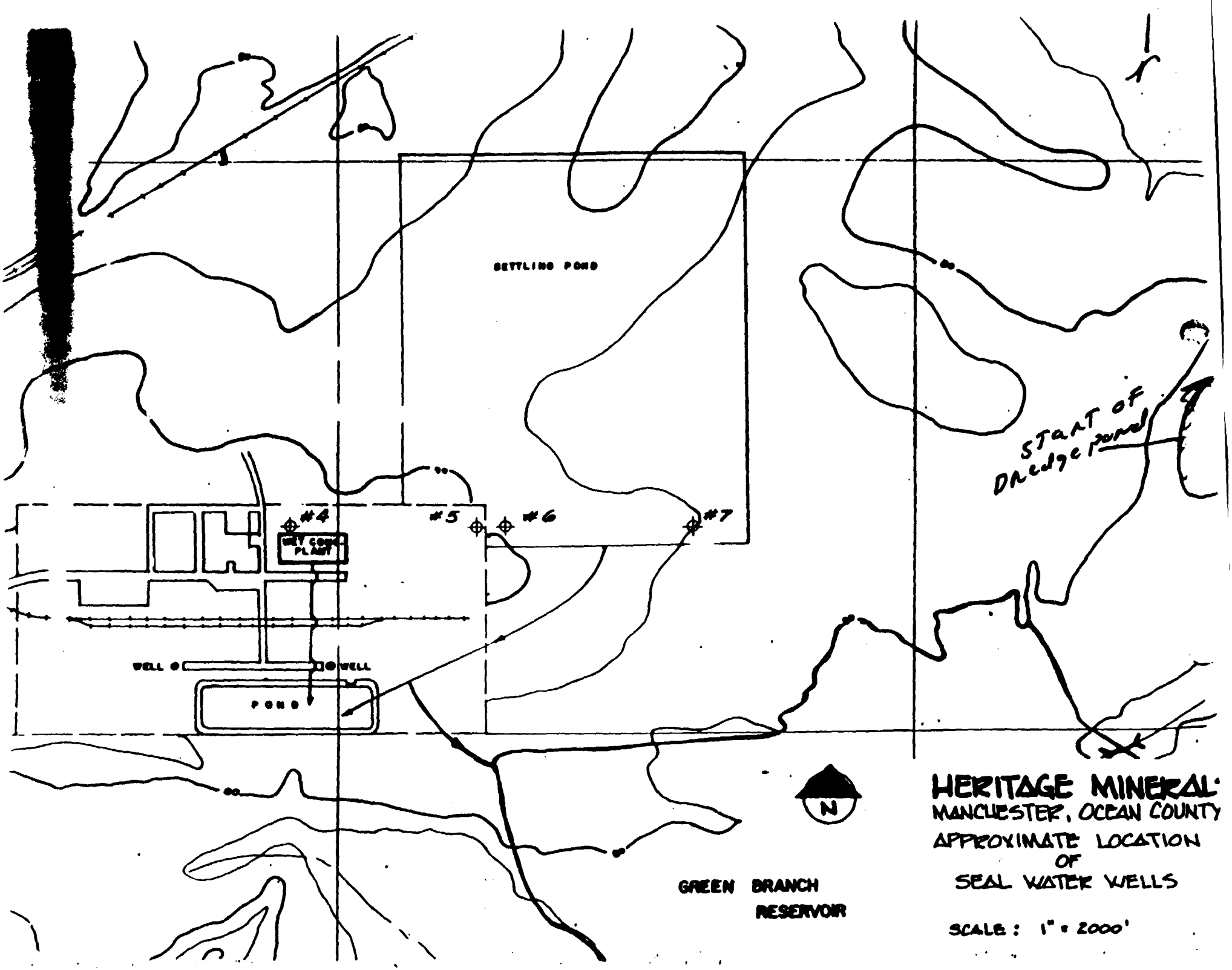
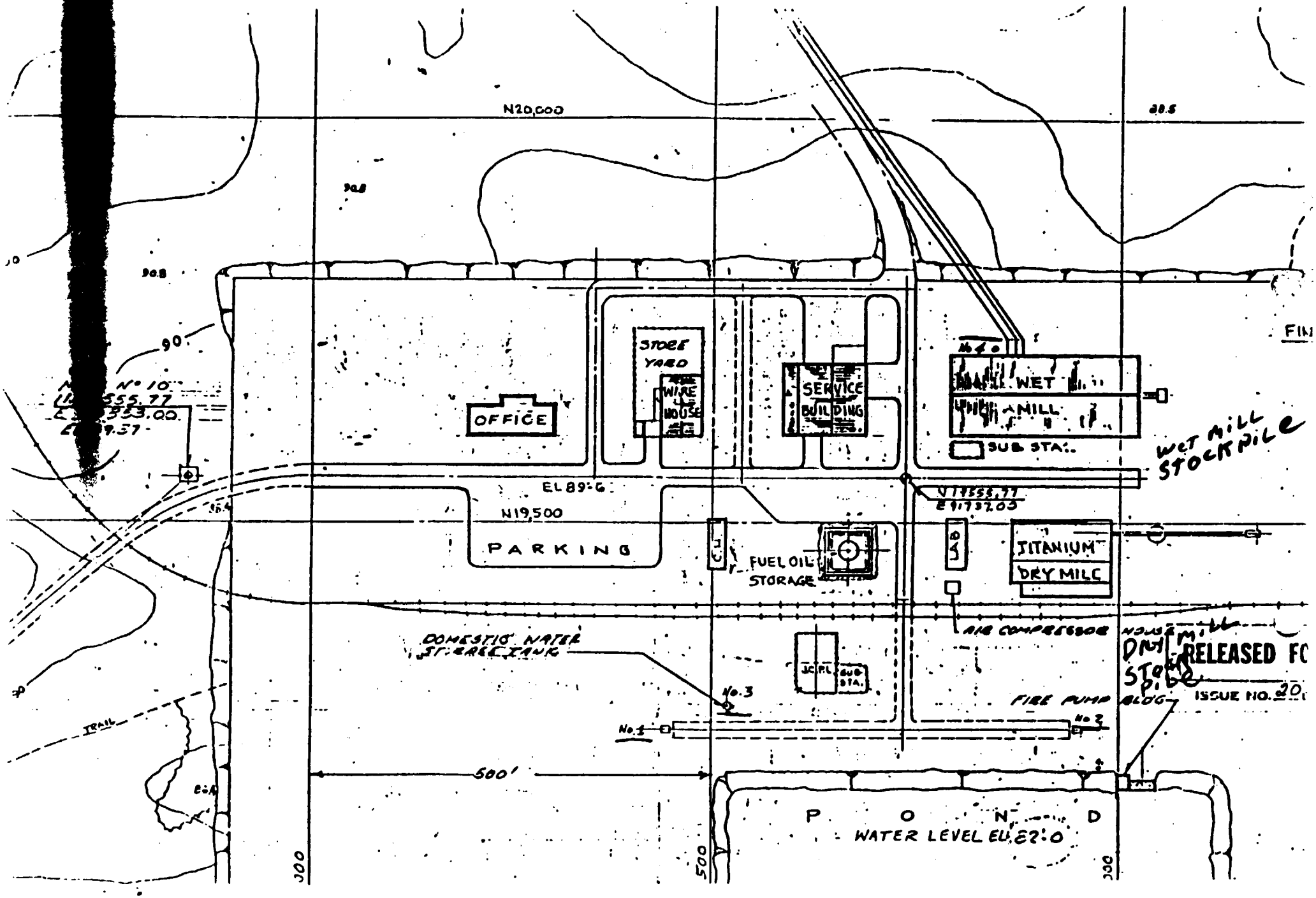
HERITAGE MINERAL
MANCHESTER, OCEAN COUNTY
APPROXIMATE LOCATION
OF
SEAL WATER WELLS

SCALE: 1" = 2000'



Attachment 3



Attachment 4
99990001/89-001

Final Zircon Conc	% Fe_2O_3
Unscrubbed	0.17
10 min scrub	0.066
4 min scrub	0.070

Screen Analyses of Various Products

Screen analyses were made on various products during the course of testing, mainly to determine if certain sized particles were being retained or lost preferentially. These screen analyses are contained in Appendix C-1.

Table 5 gives the screen analyses for the bulk zircon concentrate. Table 6 contains the screen analyses for the three TiO_2 products. As mentioned previously, all of the valuable minerals are in the 60- x 200-mesh size range.

Thorium and Uranium Assays and Distribution throughout the Flowsheet

Radiometric assays on the as-received sand showed 130 ppm ThO_2 and 55 ppm U_3O_8. Radiometric analyses throughout the flowsheet are summarized in Table 7. The thorium and uranium are enriched in the induced roll magnetic product from the table concentrate which is where the monazite concentrates. This product assays 20791 ppm ThO_2 (approx 2.08% ThO_2), and 1120 ppm U_3O_8.

The spiral plant tailings assay 0.7 ppm ThO_2 and 3 ppm U_3O_8. If the monazite-rich products are added to these tailings, the calculated assays increase to around 140 ppm ThO_2 and 11 ppm U_3O_8.

Rare Earth Content of Monazite-rich Product

The total rare earth plus thorium and P_2O_5 content of the monazite-rich product (induced roll magnetic from table concentrate) was determined by wet chemical methods.

Table 7

U_3O_8 and ThO_2 Distribution in Current Flowsheet

	ThO_2			U_3O_8	
	Wt %	ppm	Distr %	ppm	Distr %
Feed to spiral plant (calc)	(100.00)	(130)	(100.0)	(55)	(100.0)
Spiral plant tail (calc)	(67.93)	(0.7)	(0.4)	(3)	(4.1)
Scavenger tail	59.8	0.5	0.2	3	3.5
Recleaner scavenger tail -65 mesh	8.13	3	0.2	4	0.6
Spiral plant concentrate	(32.07)	(407)	(99.6)	(152)	(95.9)
TiO_2 conc (calc)	(6.26)	(55)	(2.8)	(27)	(3.3)
Lower TiO_2	4.36	52	1.8	25	2.1
70% TiO_2	1.06	78	0.6	30	0.6
+90% TiO_2	0.84	55	0.4	30	0.6
TiO_2 plant tailing (calc)	(25.16)	(500)	(96.6)	(188)	(92.5)
Table conc (calc)	(10.88)	(965)	(85.8)	(300)	(64.1)
Mag	0.46	20791	73.3	1120	10.2
Nonmag (zircon)	10.42	156	12.5	264	53.9
Table mid	7.73	163	9.7	178	27.0
Table tail	6.55	23	1.1	11	1.4
Miscellaneous mids	0.65	NA	-	NA	-

1/ Based on data from Deister Co. Test and Flowsheet D-4 through D-6.

Attachment 6
99990001/89-001

[redacted]

New Feed sample #2

1.2 - 1.6 $\times 10^6$ tons at start
short tons
250,000 - 300,000 tons remain
difference is in tailings
less product

H - Heavy
L - Light
L/H - In Between
C - Conductor
NC - Nonconductor
M - Magnetic
NM - Nonmagnetic

Mineral	Properties	Major Constituents
Zircon	H - NC - NM	ZrO_2
Leucoxene	H - C - M	TiO_2 - Fe_2O_3
Rutile (H.C. Leucoxene)	H - C - NM	TiO_2
Monazite	H - NC - M	Rare Earths
Kyanite	L/H - NC - NM	Al_2O_3
Sillimanite	L/H - NC - NM	Al_2O_3
Staurolite	L/H - NC - M	Al_2O_3 - Fe_2O_3
Tourmaline	L/H - NC - M	Al_2O_3 - Fe_2O_3
Silica	L - NC - NM	SiO_2

WET MILL
SPIRALS & TABLES

Tailings (L & L/H)
Silica
Kyanite
Sillimanite
Staurolite
Tourmaline
Some Leucoxene

sample #3
Combined plant tailings

Conc (H)
Zircon
Leucoxene
Rutile
Monazite

sample #1
~ 300 μR/hr

DRY MILL
HIGH TENSIONS, PLATE SCREEN

Nonconductors
Zircon
Monazite

Conductors
Leucoxene
Rutile

Screen Oversize
Coarse Material
(Tailings)

MAGNETS

Magnetics
Monazite
Residual
Staurolite,
Tourmaline,
Leucoxene
(Tailings)

~~Samples~~
sample #4
residue
240 μR/hr

Nonmagnetics
Zircon
#5

MAGNETS

Magnetics
Leucoxene
#6
TiO_2
65% TiO_2

Nonmagnetics
Rutile

FINISHER
HIGH TENSION

Nonconductors
Residual Zircon
(Recycled)

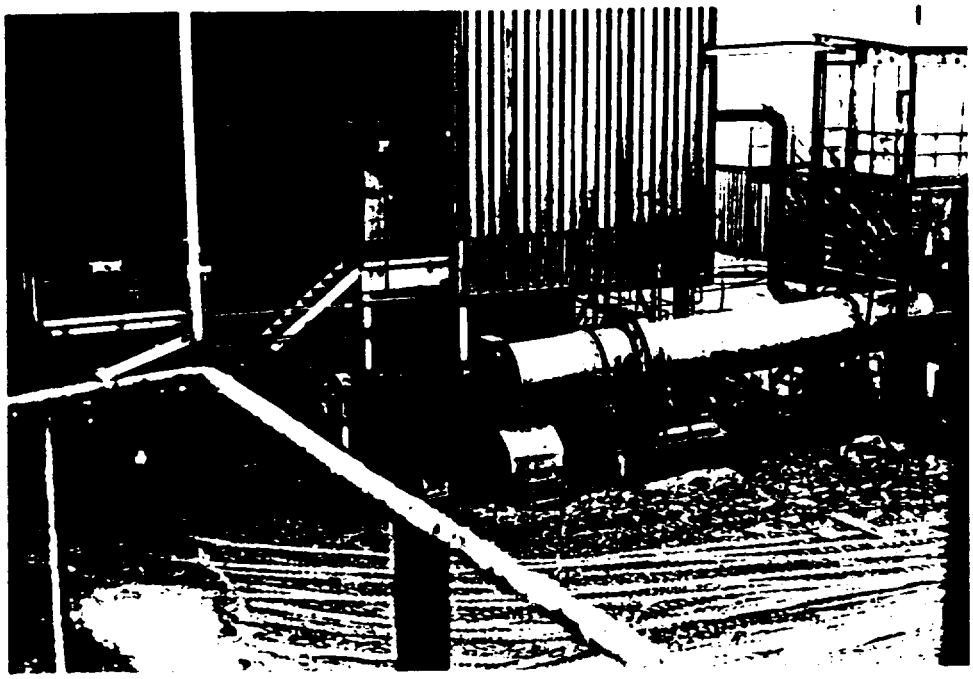
Conductors
Rutile (High Grade Leucoxene)
92+% TiO_2

MINERALOGICAL FLOWSHEET

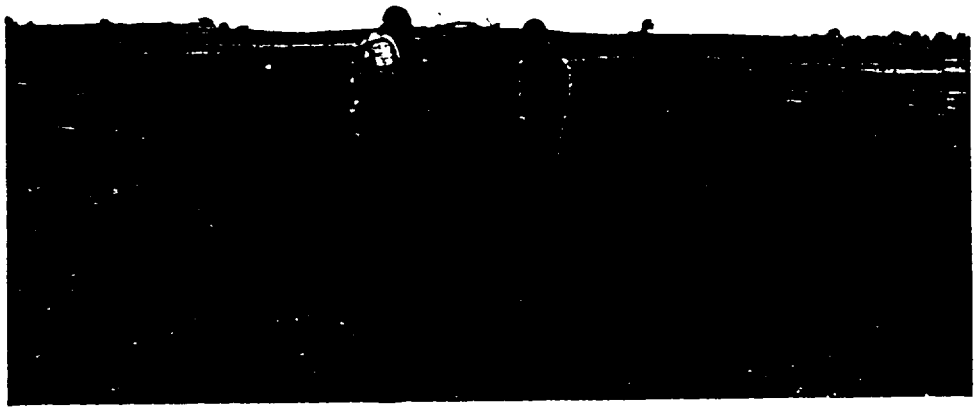
February 26, 88

over last 2 years 50,000 - 60,000 tons product shipped.

Two views of plant from entrance road

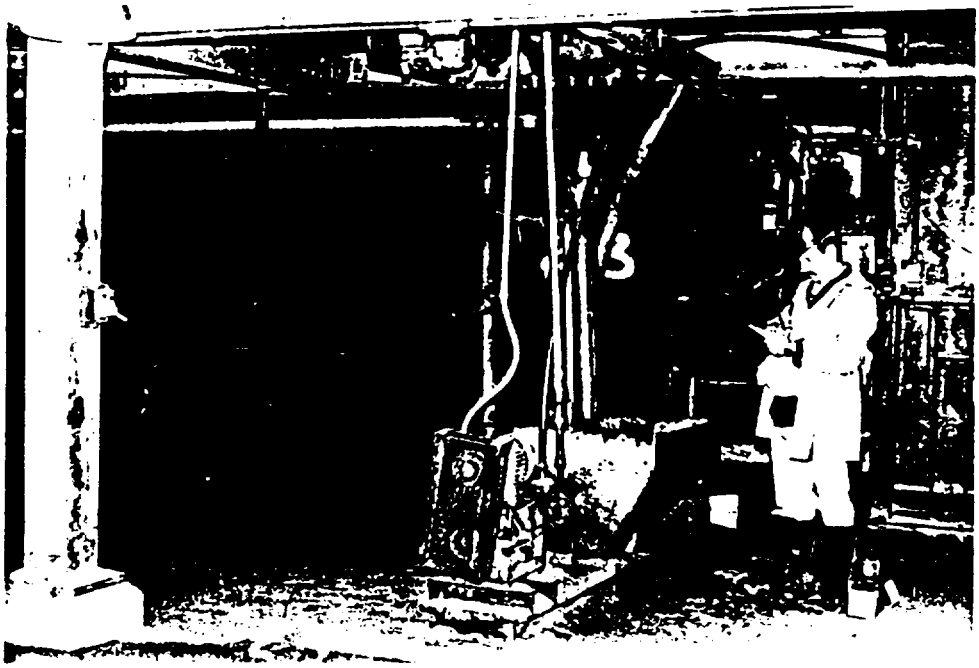


From wet mill, looking East to dryer and dry mill
(location of sample #1)

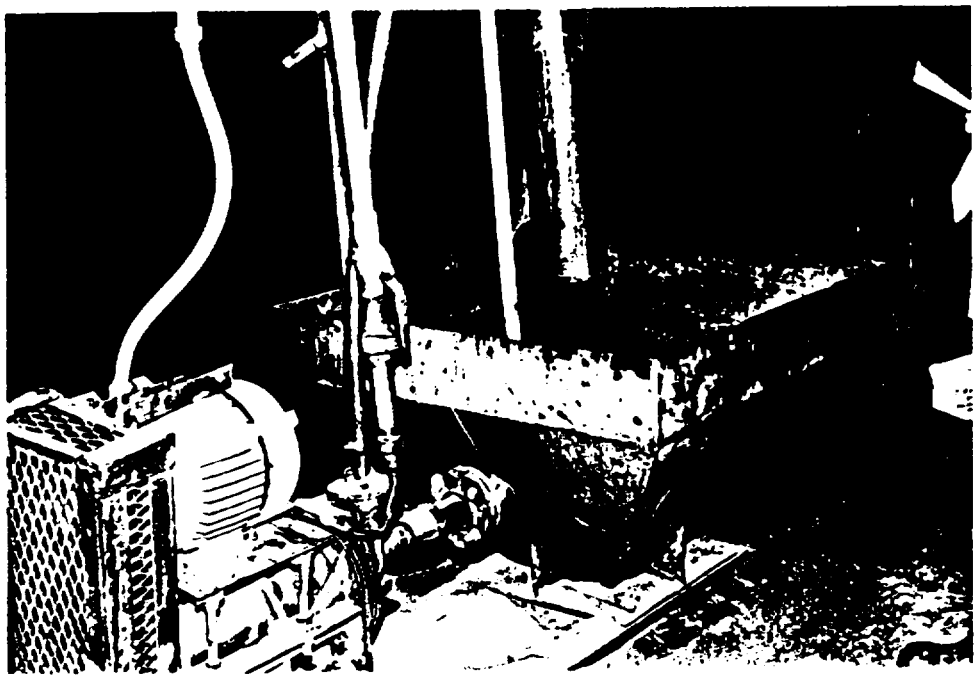


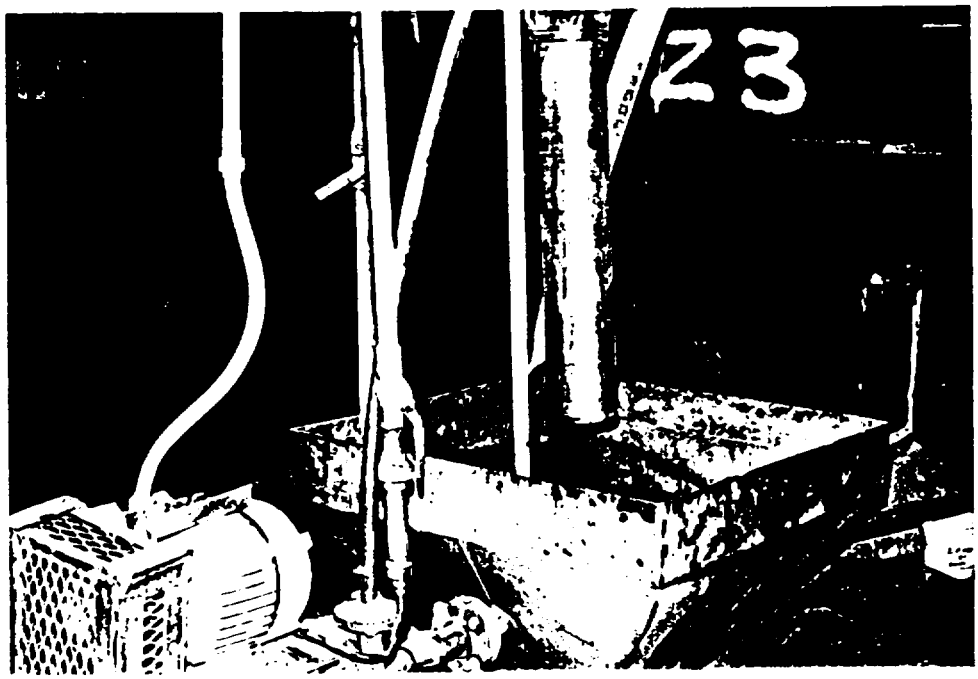
Combined plant tailings concentrate
From wet mill, looking NE

Looking SE towards New Feed pile
Settling pond contains process water which is recirculated



Sampling point for Monazite Waste
(Sample #4)





Sampling point for Monazite Waste
(Sample #4)

MS-16
Q5

Heritage Minerals, Inc.

ROUTE 70 MILE MARKER 41
P.O. BOX 12, LAKEHURST, NJ 08733
201-657-9022 FAX 201-657-5184

July 25, 1990

United States Nuclear Regulatory Commission
Region I, Nuclear Material Section B
475 Allendale Road
King of Prussia, PA 19406

Attention: Mr. John D. Kinneman, Chief

Re: Mail Control No. 110418
Docket No. 99990001

Dear Mr. Kinneman:

Thank you for your letter of July 5, 1990, in which you requested additional information regarding our application for a source material license for our facility. We appreciate the opportunity to respond and look forward to meeting with you in Washington to discuss this matter further.

As you note in your letter, the NRC's jurisdiction over materials at the site is limited. In particular, you noted that material which has resulted strictly from the mining or dredging of ore is not subject to NRC regulation. Since the mining activities at this site have been directed at producing mineral products other than source material, we have taken pains to delineate as clearly as possible the points at which source material presently occurs in Heritage's processing operations. Therefore, in order for NRC to properly evaluate appropriate licensing requirements for Heritage's operations, we have provided a history of operations, a description of current operations and maps that demonstrate the limited circumstances where source materials appear in our operations.

ASARCO processed sand naturally present at the site from 1972 until March, 1982. The ASARCO process, designed to recover ilmenite, generated wet mill tailings and dry mill tailings. Both of these materials were stockpiled on the site in the area shown on Map A (color coded as gray). These materials did not contain sufficient concentrations of thorium and uranium to be considered source material. Recent analysis shows that the ASARCO dry mill tailings contained approximately

0.018% combined thorium and uranium. Thus, the areas from ASARCO's operations, which include the clean sand pile, revegetated areas, unused settling ponds, the initial dry mill tailings site and the oversize pile shown on Map A are not appropriate for or relevant to NRC regulation.

Hovson's Inc. acquired the site in 1986 and leased the plant site (approximately 287 acres) to Mineral Recovery, Inc. to process the stockpiled dry mill tailings for titanium and zircon recovery. Prior to beginning operations at the site, Mineral Recovery, Inc. sought and obtained from NRC a determination that a license for the possession and use of source material was unnecessary. Since no recovery of uranium or thorium was taking place, no by-product material was present either. Therefore, NRC declined jurisdiction over the site and any materials present at the site.

Mineral Recovery, Inc. (and subsequently Heritage Minerals, Inc.) proceeded to process the entire volume of ASARCO dry mill tailings through the plant. During Heritage's involvement in this production phase, (referred to hereafter as "Heritage Phase I"), a single waste stream, which combined the tailings from both the wet plant and the dry plant, was produced and deposited in the area color coded blue on Map A for future reprocessing. These tailings fall well below the concentration level for source material.

On January 12, 1989, NRC, Region I representatives inspected the site. Based on the results of that inspection, NRC determined that Heritage possessed materials containing sufficient concentrations of uranium and thorium to be considered source material. As a result of that inspection, Heritage submitted an application for possession and use of source material.

When the ASARCO dry mill tailings stockpile was exhausted, the plant was modified for reprocessing the tailings from Phase I (in the blue area). The reprocessing phase, (hereafter referred to as "Heritage Phase II"), which began in April, 1990, includes isolating a monazite-rich material for stockpiling and ultimate transferral to another party. This corresponds to the current and potential future operations at Heritage.

The Heritage Phase II process (as discussed in the response to item 6) first generates source material as table concentrate. The primary waste material (i.e., material that

will remain on site and which is not to be sold as a commercial product or transferred for offsite disposal) generated by the entire Heritage process is the clean tailings. These materials consist of screen oversize and scavenger spiral tailings which are all created and collected prior to the generation of source material in the form of table concentrate. These clean tailings are deposited on the site in the areas color coded green on Map A. As discussed more fully below in the response to item 6, the table concentrate is processed through the dry mill with no waste streams being generated. Currently, three concentrates result from this operation titanium (leucoxene and rutile) zircon, and crude monazite. The crude monazite is stored in the segregated monazite storage area for possible further concentration and sale or transfer to another party.

Based on the brief description above, the red-colored area on Map A shows the locations in the plant where source material occurs in the process. These areas include only the wet mill after the point where table concentrate is produced, the dry mill and the monazite storage pile. At present, our plan is to proceed as follows. Upon decommissioning, plant areas where material containing source material has been present will be decontaminated by rinsing with water until required decontamination levels are reached. Any source material collected during this decontamination process will be added to the monazite pile for future transferral. The monazite pile will be considered a restricted area in accordance with the requirements of 10 CFR 20. Upon decommissioning, the monazite pile will be removed entirely and transferred to another party so that source material is no longer present at the site.

Heritage will continue to operate the plant as long as market conditions for zircon and titanium remain favorable. When it becomes uneconomical to do so, the operation will be discontinued. At that time, the plant facilities and the monazite storage area will be decommissioned and decontaminated as noted.

I hope this somewhat general description of our process plans and the site history is useful to you as you read the specific answers to your questions which are set out more fully below. Your attention to this matter is appreciated.

Sincerely,

John F. Lord

John F. Lord
Vice President/Manager
Heritage Minerals, Inc.

cc: Robert Fonner
U.S. Nuclear Regulatory Commission

Additional Information Requested by the NRC

1. Please refer to Map A which shows the various categories in different colors. The uncolored portion denotes virgin land that has never been disturbed. The gray-colored areas indicate land and water that were affected by ASARCO through dredging, mining and processing for the recovery of ilmenite. The only areas that can be categorized as "disturbed only by mining or dredging" are the dredge ponds (shown as Lake No. 1 and Lake No. 2) and are included in the gray-colored areas. The areas labeled "previously mined and reclaimed" have been back filled with wet mill tailings, then covered with top soil and revegetated.

Also included in the gray-colored areas is the site that contained ASARCO's dry mill tailings, which have been removed by Heritage for processing during the Heritage Phase I operation. Nothing else was placed in that location.

The blue-colored area denotes the current storage for the tailings from the Heritage Phase I operation. The tailings are deposited on top of settling ponds previously used by ASARCO for water clarification. The ponds contain several feet of semi-dry consolidated clay slimes which resulted from ASARCO's activities. The Heritage Phase I tailings were deposited directly over the slimes.

The green-colored areas represent the clean sand and clean water discharges from current and future operations, known as Heritage Phase II operations.

The red-colored areas represent the processing plant facilities and the monazite stockpile. The red-colored areas are the only areas where source material (material with >0.05% Th+U) exists.

Heritage intends to decontaminate those areas of the mills that are affected by source material. The present plan is to remove the monazite pile from the site pursuant to applicable NRC license requirements.

2a. Description of Plant and Site: (See Exhibit I)

The plant facilities are situated in the east end of the 287-acre site. The wet mill building is a 3-story steel structure erected on a 229'x 99' concrete slab. The dry mill, also a 3-story steel structure is erected on a 120'x 95' concrete slab. Other buildings include the laboratory, the service building, the warehouse, the change house, the compressor house and the main office building.

The plant feed (Heritage Phase I tailings) occupy a 50-acre site north of the wet mill, whereas the monazite stockpile area is a 50'x 50' location southeast of the dry mill.

2b. Plant Location: (See Exhibit II)

The plant entrance is located at Mile Marker 41 on N.J. State Highway No.70, about 50 miles east of Camden, N.J. and 12 miles west of the Garden State Parkway. The nearest town is Lakehurst, N.J. which is located 2 miles east of the plant entrance on highway 70.

2c. Features: (See Exhibit III)

In referring to the exhibit, please note that all distances are from the plant site:

Summit Park, a small residential area, 11,000' northeast;
Manchester Municipal Complex, 12,000' northeast;
Borough of Lakehurst, 10,000' north;
Manchester High School, 9,000' northeast;
Crestwood Village, a small residential area, 8,000' southwest.

2d. Land and Water Usage:

Land surface in the vicinity of the plant area is not used for any specific purpose. All activities are conducted within the plant boundary limits.

Ground water usage is limited to the amounts removed from two deep wells (1,600') and one shallow well used for sanitary water supply. The ground water is not suitable for drinking because of its high iron content.

2e. Geohydrology: (See Exhibit IV)

Exhibit IV is a copy of the relevant pages from a hydrologic report prepared for Heritage by Fellows, Read and Associates, a consulting firm in Toms River, N.J.

3. History:

Geological studies and mineral exploration in the area were started by Asarco in 1956 and led to the construction of a plant for the extraction of ilmenite (titanium mineral). This was done by dredging the sand, pumping it to the wet processing plant to reject the majority of the silica by gravity separation. The silica (wet mill tailings) was used to back fill the mined out area except for the initial one million tons which was stockpiled.

The heavy concentrate was subsequently dried and further processed by electrostatic and magnetic separation in the dry mill. The dry mill product (ilmenite) was sold for titanium pigment manufacture.

The dry mill tailings were stockpiled for future recovery of the zircon values and additional titanium minerals which were lost during processing. Virtually all of the monazite was concentrated in the dry mill tailings, which contained approximately 0.018% Th+U.

For economic reasons, Asarco discontinued operations in March 1982, but maintained ownership of the property until February 1986.

In March 1986 the property was purchased by Heritage Minerals, Inc. for the purpose of developing the land into a residential community. Shortly after the purchase, however, the plant site and surrounding area (a total of 287.3 acres) was leased to Mineral Recovery, Inc., a new corporation which was formed for the purpose of processing the stockpiled tailing for zircon and titanium recovery using the old ASARCO plants after rehabilitation.

On August 28, 1986 the President of Mineral Recovery Inc., Dr. A.G. Naguib, accompanied by Dr. Max El Tawil, his technical consultant, visited the Region I offices of the NRC in King of Prussia, PA. They met with Dr. John E. Glenn, then Chief of Nuclear Material Safety at Region I. During the meeting, the operational plans and the source material analyses available from past test work were presented to Dr. Glenn. This was done in order to seek guidance from the NRC on whether it would be necessary to apply for a license for possession and use of source material. Based on the fact that material entering the processing plant (Asarco tailings) and material leaving the processing plant (zircon, leucoxene, rutile and tailings) were all below 0.05% U+Th and since processing was not to be done for the purpose of recovering uranium or thorium, Dr. Glenn determined that Mineral Recovery, Inc. was not required to apply for a license. This determination would be further reviewed at a future date if and when it was decided to concentrate a monazite product for sale for its rare earth content.

Mineral Recovery, Inc. started production in October 1986 and continued until August 1987 when the land owner, Heritage Minerals. Inc. assumed the management and control of the operation. Heritage continued to operate the plant in the same mode until March 31, 1990 when the stockpiled tailings (the ASARCO dry mill tailings) were exhausted. The tailings produced during this phase of operation contained sufficient residual

concentrations of titanium and zircon to justify reprocessing this material through the plant to extract additional values for sale. This was true because the markets for these products continued to be favorable.

On January 12, 1989 the plant was inspected by Dr. Laurence F. Friedman, Ph.D., C.H.P. of NRC's Region I. Based on the results of the inspection, Heritage was notified that the activities at the site were not conducted in full compliance with NRC requirements. A notice of violation was issued which stated that "Heritage Minerals, Inc. possessed and used table concentrate and monazite waste in which the concentrations of source material were greater than 0.05% by weight and was not authorized to do so in a specific or general license issued by NRC".

A license application was submitted on March 6, 1989 and is now pending.

In anticipation of potential decommissioning requirements, and at the recommendation of the NRC staff, a process modification was incorporated in the on-going recycling phase. This modification involves isolation of the monazite as a separate concentrate, which is being accumulated and stockpiled separately. The clean sand tailings produced in the wet mill remain separate from the monazite and are placed on the ground to the east of the plant. These materials are generated in the process prior to the time at which source material (table concentrates) is produced and fall well below the 0.05% Th+U level for source material.

4. The land (3,500 acres) is owned by Heritage Minerals, Inc., a wholly owned subsidiary of Hovson's, Inc. Future land use will probably be residential in nature. A residential community with recreational facilities is planned. The area associated with the current activities (287.3 acres) is included in this land ownership. Since only a small portion of this 287.3-acre area is associated with source material concentrations, its ultimate use has not yet been decided and would be considered in long-range development plans.

5. There has been a misunderstanding associated with this inquiry. None of the ponds on the site contain any source material and, therefore, they are not relevant to the licensing process or any release criteria such as those in option 2.

6. PROCESS DESCRIPTION: (Please refer to attached flow diagram)

The stockpiled tailings produced during the first phase of the Heritage operation are hauled back to the feed hopper using a front-end loader. A 200-ton capacity storage silo is fed from the hopper via a conveyor belt.

The material is metered out of the storage silo using a disc feeder at the bottom of the silo at the rate of 50-60 tons per hour of dry sand. The sand is transferred via another conveyor belt to a vibrating screen with 1/4 inch openings to remove oversize trash (pebbles, tree branches, etc.). The sand is mixed with water at the screen. The oversize debris is allowed to fall to the ground and is removed via a small loader "Bobcat" for disposal.

The screened material, now in the form of a slurry as it passes through the screen is received in a 6' X 6' inverted pyramid steel tank fitted with a centrifugal pump. The slurry is pumped into the top floor of the wet mill building and is fed to a pair of vibrating screens with a one millimeter equivalent opening in order to remove coarse sand which is troublesome in processing and contains no values. The oversize from both screens is combined and treated over another similar screen to separate any entrapped fine sand. The oversize is then gravity fed to the final tailings pump tank for disposal.

The screened sand is then pumped through to the Humphreys spirals. The function of the spirals is to employ gravity and centrifugal forces to separate the heavy minerals (zircon, leucoxene, and rutile) from the light minerals (silica and alumina). The small amount of naturally occurring monazite present in the feed ends up with the heavy minerals. The plant contains several stages of spirals in series to maximize the yield of titanium and zircon while producing a high grade concentrate. The tailings from the last stage (scavenger spirals) constitute the final plant tailings and are sluiced to the tailings pump tank for final disposal.

The spiral concentrate is pumped to the shaking tables to remove any remaining silica and alumina, thereby producing a very high quality heavy mineral concentrate. A hydraulic classifier is subsequently used to float off some of the residual fine silica which is difficult to remove with spirals and tables. The product of the hydroclassifier is then pumped to a vacuum filter for dewatering.

The table circuit tailings, in addition to silica and alumina, also contain a large percentage of the leucoxene which has become light weight as a result of weathering over thousands of years. To recover this leucoxene, which is feebly magnetic, the table

circuit tailings are pumped to a cyclone to remove the bulk of the water then to a high intensity magnetic separator wherein the leucoxene is retained by the magnetic field and later released as a concentrated product which is stockpiled outside the mill for future processing in the dry mill. The nonmagnetic material is pumped to a separate set of scavenger spirals to recover any escaping zircon. The concentrate from these spirals is pumped to a separate shaking table for further processing whereas the tailings are rejected along with the rest of the scavenger spiral tailings.

The wet mill tailings, which consist of screen oversize and scavenger spiral tailings are estimated to be 45-50 tons per hour on a dry basis. They are pumped out as a slurry to a dewatering cyclone which separates most of the water for recycling while depositing the sand for final disposal.

The final concentrate from the wet mill (the table concentrate which had been desilicified in the hydroclassifier) is pumped to a cyclone for partial dewatering then to a horizontal vacuum filter to remove the rest of the water thus producing moist sand with about 5% moisture remaining in it.

The moist sand goes into a rotary dryer which is a cylindrical steel shell 54 inches in diameter and 35 feet long. The dryer shell is mounted with a down-hill slope which allows the sand to cascade down by gravity. At the lower end of the dryer shell is a brick furnace fitted with an oil burner. Fuel oil is burned in the furnace and the resulting hot gases are forced into the dryer shell. As the moist sand comes in contact with the hot gases the remaining moisture is driven off by evaporation and the sand is heated to about 350-400 degrees Fahrenheit at the point of discharge from the dryer.

The hot dry sand flows from the dryer, through a trash screen and onto a conveyor belt which carries the sand into the dry mill. The hot sand is transferred from the conveyor belt to a bucket elevator whereby it is carried to the top floor of the dry mill and discharged into the feed hoppers of the high-tension machines.

High-tension machines, also known as electrostatic separators are machines that utilize high voltage D.C. current to separate mineral particles by virtue of differences in their surface electrical conductivities. Minerals with high electrical conductivity (leucoxene and rutile) are separated from those with low conductivity (zircon, alumina and silica).

Monazite is a nonconductor and will go with the zircon. Three stages of high-tension separation are employed to effect complete separation of conductive minerals from nonconductors.

The clean conductors contain leucoxene and rutile which are separated from each other using high intensity magnetic separators. The magnetic product is the final leucoxene and is conveyed to a storage bin for shipping. The nonmagnetic product is impure rutile which is further cleaned using electrostatic separators then transferred to a separate storage bin for shipping.

The nonconductor product from the high tension separators contains the zircon and any residual alumina and silica that might have escaped the wet mill. The monazite is also present in this product. High intensity magnetic separators are used for final cleaning of the zircon. The magnetic impurities (monazite and ferroaluminum silicates) are collected on a belt conveyor which discharges into a slurrying tank wherein the monazite-containing material is mixed with water and pumped to the monazite storage area which is located outdoors, south east of the dry mill and is fenced off to control access. The monazite stockpile is maintained in a moist state to prevent drying and wind blowing.

It is worth mentioning that the nature of these minerals, including monazite is such that there is virtually no leaching of any metals as a result of contact with water. This was verified by analyzing process water and ground water (both upstream and downstream from the plant). No trace of uranium or thorium was detected in any of the water samples.

The water that accompanies the wet mill tailings and the monazite sand is allowed to drain and collect in the process water pond where it is clarified by settling and pumped back to the plant for reuse. Excess water overflows to the holding pond for further clarification and, during the rainy season, may be allowed to overflow to the Green Branch of the Wrangle Brook as clear water.

7 - Plant equipment which process source material include the shaking tables, the hydroclassifier, the dryer, the high tension separators and the zircon magnets. These facilities are marked in red on the process flow diagram. In addition, the monazite concentrate is stockpiled in a separate fenced-in area outside the dry mill. The monazite stockpile is the only area that may require posting in accordance with 10CFR 20-203(e)(2).

8 - The length of the remaining operation will depend entirely on the economics of the marketplace for the plant products. If market conditions remain favorable, the remaining reserves will require approximately two years to process. On the other hand, if the operation becomes uneconomical, it may be discontinued at any time. There are no other sand piles in the area that can be

processed. However, it is possible that similar material may be brought in from other locations for processing at the Heritage plant facilities. Alternatively, it is possible that the plant feed (recycled tailings) may be sold to others for processing elsewhere.

9 - The primary waste produced during the Heritage operation is the clean tailings which result from screen oversize material and scavenger spiral tailings which are created in the wet mill. As noted before, these materials are produced in the plant prior to the time that source material is created. These tailings take the form of a slurry which is subsequently dewatered by cycloning and deposited on the ground east of the plant. The water generated from cycloning the clean wet mill tailings is returned to the process water pond where it is held prior to recycling into the wet mill. Approximately 47 tons per hour of sand (dry basis) and 500 gallons per minute of water (in the form of combined wet mill tailings slurry) are discharged from the plant during operation.

Some spillage of material occurs in the wet mill, the dryer and the dry mill. These spillages are collected frequently and returned to the wet mill for reprocessing.

Finally, a relatively small amount of water is generated by the cyclone and filter ahead of the dryer which is used to dry the table concentrate. This water is recirculated to the wet mill. Since monazite is highly insoluble in water, virtually no radioactive contamination is present in the water. Note also that the monazite concentrate produced in the dry mill is mixed with water and pumped as a slurry to the storage area where the water is allowed to drain. Again, this drainage water contains little or no radioactivity.

10 - As discussed in item 9 above, the primary waste stream generated by the Heritage operation is the wet mill tailings which arise prior to the time that source material appears in the process. Spillages from the plant are not in fact waste since they are returned to the process. All water in the plant contains little or no radioactivity since the monazite is highly insoluble in water.

It is proposed that a daily sample of the clean tailings be taken and used to form a monthly composite which would then be tested for radium content. This material is expected to meet Option I of the Branch Technical Position. Past analysis show that this material contains 6.3 pci/g Ra-226 plus Ra-228 which is 5 pci/g above background. This figure will be considered as action level. A reporting level of 15 pci/g is proposed as it is not expected to occur under current operating conditions.

Because of the highly insoluble nature of the monazite, it is believed that virtually no radioactivity will be leached into the surface waters or the ground water. This was verified by performing gross-alpha and gross-beta measurements on surface waters, both upstream and downstream from the plant and the ground waters. These results are summarized below:

	Plant Upstream	Plant Downstream	Deep Well	Shallow Well
Alpha: (pci/l)	<1.0	1.1	<1.0	<1.0
Beta: (pci/l)	<2.0	2.0	2.5	2.2

Furthermore, a recent gamma spec. analysis of plant discharge waters from the process water pond and the holding pond gave readings of <1.0 pci/l Ra-226 and <0.8 pci/l Ra-228.

Based on the above evidence and due to the fact that the current process is not expected to change, it is believed that regular monitoring of surface and ground waters will be unnecessary.

11 - Exhibit V is the survey form proposed for use and a layout of the plant facilities showing the locations of the monthly direct gamma surveys. These surveys would be conducted to ascertain the continued safety and cleanliness of the workplace.

12 - A regular monthly survey program for the plant facilities and the monazite pile is proposed using a direct gamma micro-R survey meter. It is recognized that during plant operation direct gamma readings in the plant area will be higher than those specified by the Branch Technical Position. However, regular surveys, as shown in Exhibit V, will assist in monitoring the radiation levels in the workplace. After decommissioning and decontamination, the direct gamma readings in the plant area are expected to meet the Branch Technical Position.

Air monitoring for dust and radon need not be done on a regular basis since past inspections by MSHA and the State DEP have verified that the plant is dust free. This was also confirmed by recent radon analyses in both the wet mill and the dry mill, and dust analyses in the dry mill. These results are attached as Exhibits VI (radon) and VII (dust).

13 - Radon analysis kits were placed in locations where radon gas is likely to concentrate, as shown in Exhibit VII. The analytical report marked Exhibit VI shows these results. Dust monitoring was conducted by a commercial concern (Teledyne Isotope, Westwood, NJ).

These results confirm that the workplace is free of dust and radon contamination. These conditions are expected to continue since no process changes are contemplated.

14 - Under current operating conditions, the monazite-containing sand is being stockpiled. It represents the only source material stored at the site. The accumulated monazite will be analyzed to determine whether the monazite stockpile contains in excess of 100 millicuries of thorium or uranium. Once the license is issued it will be possible to begin shipping the monazite and reducing accumulations. At the present time, there exists approximately 1000 tons of monazite-containing material which contains about 9000 kilograms of thorium and 200 kilograms of uranium.

Upon termination of operations, the plant facilities and the monazite stockpile will be decontaminated to appropriate levels. Thus, the decommissioning plan consists of the following steps:

a. Decontamination of the mill equipment.
b. Removal of monazite pile and mill sweepings from site.
c. Survey the plant facilities and monazite area.

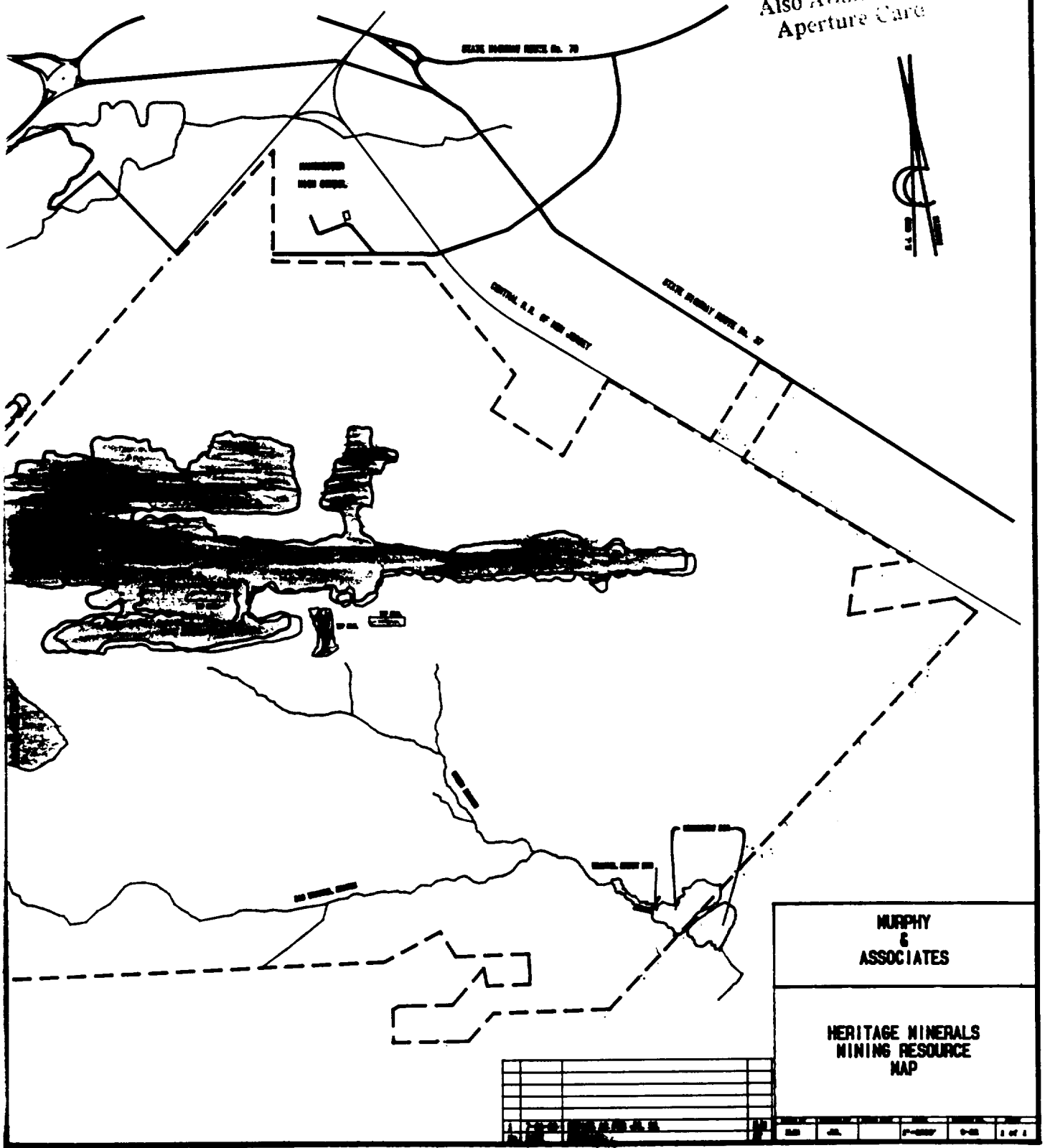
15 - Material which falls under the definition of source material, i.e. containing more than 0.05% U+Th will be transferred to another licensee in accordance with the regulations described in 10CFR 40.51

16 - A copy of Mr. Cuculic's training course curriculum is attached

17 - Duties of the Radiation Safety Officer:

a. to ensure that radiation safety surveys and monitoring programs are performed
b. to perform routine inspections of locations where radioactive materials are stored or handled
c. to ensure that the terms and conditions of the license are met and that required records are maintained

18 - The monazite area is fenced for controlled access and will be posted. The Radiation Safety Officer gives general instruction to those who have reason to be in the vicinity of the monazite to observe the necessary precautions. Form NRC-3 is posted by the time clock. When activities related to monazite shipping begin to take place, those individuals who will be involved in the handling, loading and shipping will be properly instructed and provided with personnel monitoring devices such as film badges or docimeters.



JAN 0 2 1991

License No. SMB-1541
Docket No. 040-08980
Control No. 110418

Heritage Minerals, Inc.
ATTN: John F. Lord, Manager
P.O. Box 12
Lakehurst, New Jersey 08733

Gentlemen:

Please find enclosed your NRC material license.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the Region I Material Licensing Section, (215) 337-5093, so that we can provide appropriate corrections and answers.

Please be advised that you must conduct your program involving licensed radioactive materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, please note the items in the enclosed, "Requirements for Materials Licensees."

You must have specific, written permission to release your facility for unrestricted use. The facilities must meet the criteria in the enclosed "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source, or Special Nuclear Material". You should submit a report of the results of the surveys you performed to this office and refer to this letter when you request release for unrestricted use.

As discussed during a meeting on October 2, 1990, we have concluded that you will be required to decontaminate all areas of your site prior to release for unrestricted use. This is reflected in Condition 15 of the enclosed license. Since you disagree with NRC jurisdiction over some of the areas where this condition requires decontamination and did not agree to the license condition, you may request a hearing on this matter in accordance with 10 CFR 2.1201 (Subpart L).

Since serious consequences to employees and the public can result from failure to comply with NRC requirements, the NRC expects licensees to pay meticulous attention to detail and to achieve the high standard of compliance which the NRC expects of its licensees.

"SECTION COPY"

You will be periodically inspected by NRC. A fee may be charged for inspections in accordance with 10 CFR Part 170. Failure to conduct your program safely and in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in prompt and vigorous enforcement action against you. This could include issuance of a notice of violation, or in case of serious violations, an imposition of a civil penalty or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions, 10 CFR Part 2, Appendix C.

We wish you success in operating a safe and effective licensed program.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

Enclosures:
1. License No. SMB-1541
2. Requirements for Materials Licensees
3. NRC Forms 3 and 313
4. 10 CFR Parts 2, 19, 20, 40, and 170
5. Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Heritage Minerals, Incorporated	3. License number SMB-1541
2. Route 70, Mile Marker 41 P. O. Box 12 Lakehurst, New Jersey 08733	4. Expiration date December 31, 1995
	5. Docket or Reference No 040-08980

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Natural thorium	A. Monazite	A. 15,000 kilograms
B. Natural uranium	B. Monazite	B. 300 kilograms

9. Authorized use

A and B. 1. Decontamination of land and facilities.
2. For possession, packaging, storage, and transfer to authorized recipients of monazite-rich product.

CONDITIONS

10. Licensed material may be used only at the licensee's facilities at Heritage Minerals, Incorporated, Route 70, Lakehurst, New Jersey.

11. A. Licensed material shall be used by, or under the supervision of, Tony V. Cuculic.

B. The Radiation Safety Officer for this license is Tony V. Cuculic.

12. This license does not authorize the production of source material in the form of monazite-rich sand during the processing of ore to extract titanium and zircon mineral sands.

13. This license does not authorize the processing of monazite-rich sand to extract or concentrate the monazite.

14. Plant buildings and equipment shall be cleaned so that fixed surface contamination does not exceed 3,000 disintegrations per minute (dpm) when measured over an area of 100 square centimeters (100 cm^2) or 1,000 dpm/100 cm^2 averaged over an area not to exceed one square meter; and removable contamination does not exceed 200 dpm/100 cm^2 before releasing them for unrestricted use. For measurement purposes all contamination may be assumed to be natural thorium in equilibrium with its daughters.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: SMB-1541

Docket or Reference number: 040-08980

(continued) CONDITIONS

15. All areas in the plant buildings and at the monazite pile identified as having radiation levels above natural background on a map of the licensee's site attached to the letter dated September 27, 1990, shall be decontaminated to meet the criteria for release for unrestricted use described in Option 1 of the Branch Technical Position "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations," 46 Federal Register 52061 (October 23, 1981), before the area is released for unrestricted use. The licensee shall not release any of these areas for unrestricted use without specific, written authorization from the NRC. This license condition does not prohibit the licensee from making specific application to the NRC for approval of other limits or methods of disposal.

16. The licensee may transport licensed material in accordance with the provisions of 10 CFR 71, "Packaging and Transportation of Radioactive Material."

17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Application dated March 6, 1989
    B. Letter dated April 27, 1989
    C. Letter dated August 21, 1989
    D. Letter dated March 13, 1990
    E. Letter dated July 25, 1990 with attachments
    F. Letter dated August 23, 1990

For the U.S. Nuclear Regulatory Commission

Date JAN 0 2 1991

By Original Signed By: John D. Kinneman

Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406

MAY 22 1991

Docket No. 040-08980 License No. SMB-1541

Heritage Minerals Incorporated
ATTN: John F. Lord
Manager
P.O. Box 12
Lakehurst, New Jersey 08733

Gentlemen:

Subject: Routine Inspection No. 040-08980/91-001

On April 10, 1991, Betsy Ullrich of this office conducted a routine safety inspection at Route 70, Lakehurst, New Jersey of activities authorized by the above listed NRC license. The inspection was an examination of your licensed activities as they relate to radiation safety and to compliance with the Commission's regulations and the license conditions. The inspection consisted of observations by the inspector, interviews with personnel, and a selective examination of representative records. The findings of the inspection were discussed with Tony Cuculic at the conclusion of the inspection.

We understand that all production activities have ceased, and no more monazite is being accumulated. Your proposal for on-site disposal of the monazite is in review.

We also understand that the equipment inside the wet mill and dry mill has been thoroughly cleaned and decontaminated. Ten wipe tests did not detect any removable contamination. However, the ambient radiation levels from the monazite pile requires that detailed radiation level surveys inside the mills be delayed until the monazite is removed.

Also, additional wipe tests will be delayed until the remediation areas outside the mills is completed, so that a final cleaning to remove wind-blown sand and monazite can be performed. We further understand that detailed records of areas surveyed and results of measurements will be submitted when decontamination activities are complete, along with a request to terminate the license. If any of our understandings are incorrect, please contact us in writing.

Within the scope of this inspection, no violations were identified.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room. No reply to this letter is required.

OFFICIAL RECORD COPY ML DL HERITAGE - 0001.0.0
04/22/91

RETURN ORIGINAL TO REGION I IE:07

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Nuclear Materials Safety Section B
Division of Radiation Safety
and Safeguards

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey

bcc:
Region I Docket Room (w/concurrences)
Management Assistant, DRMA

RI:DRSS
Ullrich/bj
04/24/91

RI:DRSS
Kinneman
05/22/91

OFFICIAL RECORD COPY

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04/22/91