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November 30, 1998

Mr. Mark C. Roberts, Chief
U.S. Nuclear Regulatory Commission
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety
Region 1
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Dear Mark:

Enclosed are Heritage Minerals Incorporated's (HMI's) responses to The Nuclear Regulation Commission's (NRC's) and New Jersey Department of Environmental Quality (NJDEQ's) comments on HMI's proposed final status survey plan (FSSP) for license termination. We hope HMI's responses adequately address to the comments on the FSSP. Please do no hesitate to call if you have any further questions.

I am also taking this opportunity to report to NRC on several matters that were addressed during the August 4, 1998, inspection of the site and/or in the August 31, 1998 inspection report (Docket No. 040-08980) as follows:

(1) The potentially hazardous chemicals in the laboratory at the site were removed on October 25, 1998;

(2) The eight (8) radiation signs around the monazite pile have been replaced twice since the inspection with the proper signs and the few damaged pickets in the fence around the pile have been replaced;

(3) The original fabric cover for the monazite pile was more damaged than originally thought. As a result, new fabric has been received and was put in place by the labor crew on October 22 1998. The crew also put fill dirt around the low areas underneath the fence;

(4) As noted during the inspection, there continues to be no indication of any vandals attempting to intrude inside the fence around the monazite storage area;

(5) A revised schedule based on some recent progress with Malaysia and the assumptions in the previous proposed decommission schedule submitted December 30, 1996 is contained in the attached response to the NRC and NJDEP comments on the FSSP.

Please call me or John Lord at HMI if you have any questions.

With all best wishes,

Sincerely,

Anthony J. Thompson

AJT/cls
cc: Craig Gordon
Marie Miller

#669441

Document #: 669441 v.6

RESPONSE TO NRC'S AND NJDEP'S COMMENTS ON HMI'S FSSP

I. **NRC Comments.**

1. Section 3.0 Decommissioning Activities -

Comment: NRC noted that proposed dates outlined in the December 30, 1996 letter regarding completion of decommissioning at the facility will not be met and, therefore, requests a revised schedule including expected milestones to complete final remediation.

Response: As noted, the political situation in Malaysia has definitely slowed progress in obtaining approval to ship the monazite. However, it now appears that L & T Minerals has made some favorable progress in satisfying the relevant Malaysian government bureaus which suggest that a definitive answer will be received. A copy is attached of the September 7, 1998 fax request for a 5 kilogram sample of the material to be sent to Malaysia, as well as the sample results obtained by an independent U.S. laboratory. The U.S. lab samples were easily obtained, analyzed and submitted to L & T Minerals, copy attached. The 5 kilogram sample was received in Kuala Lumpur on October 12, 1998. Delays were entirely due to customs protocols. Assuming that the Malaysian response is favorable, the schedule would track the schedule provided to NRC on December 30, 1996 as follows:

(a) Complete agreement with L&T Mineral Company **(Estimated time for completion - December 31, 1998 to March 15, 1999).**

(b) Purchase and receive delivery of steel drums and freight containers and complete agreements with necessary freight forwarders, trucking and shipping companies and assemble and train necessary work crew. **(Estimated time for completion - March 15, 1999 to June 15, 1999).**

(c) Fill steel drums with monazite sands, load drums into containers and perform verification analyses of soils underneath the monazite pile, surveys and wipe tests of the mill facility and, if necessary, scrape up additoinal soils for loading and transport with the monazite sands and perform any necessary additional decontamination of the mill facility. **(Estimated time for completion - June 15, 1999 to August 15, 1999).**

(d) Complete final inspection and verification by NRC. **(Estimated time for completion - September 15, 1999).**

(e) Load containers on to flatbed trailers, transport to port and load on board ship. **(Estimated time for completion September 15, 1999 - October 15, 1999).**

(f) Apply for and receive license termination and contingency period for unexpected delays. **(Estimated time for completion October 30, 1999 - December 31, 1999).**

Comment: The organization and individuals involved in accomplishing remediation and having management responsibilities to implement the project components, oversee field operations, sample collection analyses, etc. were not included in the FSSP and this information will need to be developed prior to initiation of full scale remediation efforts.

Response: A contract has not been negotiated with an appropriate contractor to provide the management and oversight services for decommissioning the mill and the monazite pile. Discussions are ongoing with several potential contractors and the contractor chosen will provide a "work plan" to NRC that will address these management and oversight issues. HMI has received proposals from two (2) qualified firms (RSI and CDM) to act as the project manager to pack and ship the monazite, then complete the decontamination and decommissioning. Two more proposals are being prepared by other qualified firms who understand that they may be too late.

2. 4.0 Release limits -

Comment: Information described in this section appears to relate only to alpha emissions without consideration of the presence of beta emitting isotopes. When comparing soil concentration and surface activity to Table 2 release limits, each type of exposure should be considered independently. The exposure rate release limit of 10 microR/hr should be used as a guideline for outdoor measurements and 5 microR/hr for indoor release limits.

Response: The language in Section 4.0 was derived from Reg. Guide 1.86 and the Branch Technical Position (BTP) (46 Fed. Reg. 52061, October 23, 1981), Option 1, and the language in HMI's license condition in Section 14.

3. Section 4.3 Exposure Rate -

Comment: Radiation survey and scanning techniques should be described for potentially contaminated indoor areas.

Response: Exposure rate surveys will be conducted by holding the meter at waist level and walking slowly in parallel lines approximately 10 feet apart over the entire indoor area. The surveyor will stop at the center of each grid and record the reading. Elevated readings will be recorded on the field notes.

4. **Comment:** Soil concentration to exposure calculations must demonstrate that both the soil release guideline limit from the exposure rate guideline limit from the BTP are met. Since 10 C.F.R. Part 20.11101(b) requires occupational doses and doses to members of the public to be ALARA some clarification is needed on the FSSP statement that final soil cleanup "will meet the spirit of ALARA ."

Response: The soil exposure rate is based on the language contained in the BTP, Option 1, which will be compared with background concentrations and exposure rates as set forth in the RSI Background Report. With respect to ALARA, process knowledge regarding the monazite pile content as compared to the site background levels leads to the presumption that radionuclide concentrations in the monazite are sufficiently higher than background concentrations that post-cleanup soil concentrations and exposure rates will be far below the BTP guidance levels. In addition, since as a practical matter, removal of the monazite will necessarily involve picking up some of the uncontaminated soil beneath the monazite pile leaving essentially natural background levels in the soil remaining after cleanup, ALARA will be satisfied.

5. Section 5.0 - Appendix B -- Affected and Unaffected Survey Units.

Comment: Although process trains are clearly identified, it appears that certain areas require further review to determine the potential for contamination. NUREG 5849 specifies that "affected" areas include "areas immediately surrounding or adjacent to locations where radioactive materials were used or stored." From review of information provided in previous correspondence and the FSSP, the following areas should be reexamined as being "affected:"

a. Laboratory (adjacent to dry mill) - used for sample analysis.

Response: Laboratory (adjacent to dry mill) was not used for sample analysis.

b. Tails Transfer Sump (SU 12) - sample analysis shows possible contamination.

Response: It is not clear what sample analysis is being cited that indicates possible contamination. The 120 ppm Th + U used in the FSSP is well below the 500 ppm for source material.

c. Table Spirals (SU 16) - proximal to table feed sump, involved material concentration.

Response: Although Table Spirals (SU 16) were in close proximity to the Table Feed Sump, they were upstream from the Table Feed Sump and the material flowed by gravity. Therefore, it is physically impossible for material to go backwards from the Table Feed Sump to the Table Spirals. Thus, the Table Spirals are "unaffected."

d. Non-magnetics Feed Sump (SU 24) - contains residual separated monazite.

Response: Regarding the Non-magnetic Feed Sump (SU 24), the description in the FSSP states that it received the non-magnetic sand "still containing the monazite." However, it did not state that the monazite was separated or concentrated. The High Intensity Wet Magnetic Separator at this point in the process does not have sufficient field strength to pull the monazite as a magnetic product. Only the leucoxene was separated magnetically in this part of the process. Later in the process, when a much stronger High Intensity Dry(?) Magnetic Separator was used in the dry mill, the monazite was magnetically separated.

e. Tails Sump (SU 28) - final process release point.

Response: The Tail Sump (SU 28) only handled plant tailings (light minerals) and excess process water. It is, therefore, unaffected.

f. Wet Mill Floor (SU 45) - potential for contamination (proposed grid survey adequate).

Response: The Wet Mill Floor (SU 45) should not be considered "affected," except perhaps the area around the table operation where there was a potential for spillage of table products to take place. In accord with NUREG-5849, identification of indoor hotspots in "unaffected" areas with activity levels that exceed 25% of the guideline value requires reclassification of the area as "affected." Similarly, if outdoor hotspots exceed 75% of the guideline value, it is reclassified as "affected."

6. Section 6.1 - Affected Survey Units Outdoor

Comment: Instrument information is incomplete with regard to detection methodologies for fixed removable contamination on surfaces and for soil measurements. The minimal number of samples expected to be taken from the monazite pile should be shown and from the process trains is unclear whether individual process units that could be potentially contaminated would be included in the survey.

Response: The instrument information will be included in a detailed "work plan" provided by HMI's D&D contractor. Because individual process units in a given survey unit are identical with respect to the material processed, surveying 10% of them will reveal any contamination, which would then reclassify the entire survey unit as affected, thereby necessitating a

survey of all of the individual units. One sample will be collected from each 10 meter by 10 meter grid beneath the monazite pile.

7. Section 7.1 - Buildings and Equipment

Comment: Information described in this section relevant to decontamination of equipment is limited only to surface layers and does not relate to what is likely to be required following dismantling and scanning the equipment noted in Section 6.1.

Response: All of the equipment in the affected areas as set forth in FSSP was cleaned (including dismantling pumps and other equipment requiring cleaning of interior parts) in 1991. In fact, some of that equipment was not fully reassembled and remains in semi-disassembled state today. After closure, the two mill buildings and the operating equipment (Survey Units) were repeatedly cleaned and measurements taken until an acceptable level of readings were obtained. The radioactivity is entirely in the sand grains, thus only surface contamination would occur. Since there was no immediate intention to use the buildings or process equipment the following practice was used:

Initially, cleaning in the wet mill was done by operating on water alone until the surface reading of the units averaged about 20m R/hr. Second stage cleaning was done by high pressure water, steam and physically removing any accumulated sand until the readings were within the 20m R/hr. range. Where necessary, access holes were cut in the larger sumps to assure that any free running or packed wet sand was removed. Unfortunately, readings were not recorded separately for all units but the attached tabulations of field records show an average range and in some cases readings for specific units. The same procedure was followed in the dry mill but their cleaning was done by blowing, dusting and sweeping, but an attempt was always made to reduce the readings to levels that would not be hazardous to humans. An inspection was made by NRC technicians after the original decontamination was finished and random gamma readings were taken by one of the technicians (Betsy Ullrich). I thought there were some records of this but none can be located so I doubt that any exist. This was not an official visit, but readings were comparable to HMI's.

All of the smaller pumps were disassembled but only the face plate of the larger units were removed for cleaning. Not all units were reassembled or replaced on the pump bases or racks. This makes it difficult to determine to which unit various parts belong. As noted before there was no intention to reuse the units, therefore, routine inventories or records were not kept to identify what may have happened to individual pieces. As a result, a survey has been made of both mills to determine the status of the units. Some assumptions were made but as shown on the attached tabulation most units were accounted for. These data were developed based on the best of our recollection and review of any available data. Importantly, as nearly as can be determined all of the "affected" units or separate parts of the dry mill equipment from "affected" units were never removed and remain in the building except for Survey Unit #43 which was removed from the dry mill and stored in the wet mill. The attached Table A shows the present location of the various survey units which have been moved or can not be located. Fortunately all parts from the "affected" wet mill units are either in place or stored in the wet mill. (E.g., as can be seen

from Table "A", all parts of the two (2) affected units, 30 and 32, are either in place or stored in the mill. As shown on Table "A", unit 43, located in the dry mill, was removed to the wet mill "affected" area and stored.) We believe that four of the listed not-in-place "unaffected" pumps and possibly another unused sump which is not on the flowsheet were sold. However, since a lot of trespassing and vandalism occurs at the site it is possible that some of these components and some electrical equipment, miscellaneous parts, tools, etc. may have been stolen. HMI believes that any pieces of equipment that were stolen, put into the trash or sold, presented and present no significant public health hazard.

8. Section 10 - Quality Assurance

Comment: The QA program needs to be set forth including how surveys are to be performed, experience of individuals taking surveys, instrument calibrations, review of data and survey results, and conduct of independent audits.

Response: These matters will be addressed in the contractor's "work plan" and will comport with NUREG 5849 and MARSSIM.

9. Report of Site Background, Page 2

Comment: For the number of U238 samples the data shown in the statistical analyses chart for mean background measurements, .31, and standard deviation, .11, differ from the page two calculation.

Response: To determine the number of samples necessary to characterize background a limited number of samples are collected (in this case ten) and the mean and standard deviation used to determine how many more samples should be collected. On page two of the Background Determination Report, the mean and standard deviation of the ten initial samples is .36 and .18, respectively. The statistical analysis worksheet uses all 32 samples to calculate the mean and standard deviation (.31 and .11), which are the values used as the best estimate of background.

II. **New Jersey DEP Comments.**

1. **Comment:** NRC's unrestricted release limits may not comply with the "proposed" unrestricted release limits for the State of New Jersey when the sum of the fraction method is considered. With ALARA considerations and NRC gamma exposure criteria for unrestricted use, the state's limit likely will be met. NRC should inform the licensee that the state's limits must also be met.

Response: The state's limits are preempted by NRC's limits in accordance with the Atomic Energy Act (AEA), as amended with respect to licensable source material. Therefore, the state's limits do not have to be met with respect to decommissioning of the mill or the monazite pile. However, given the difference between radionuclide concentrations in the monazite pile and natural background concentrations and given that some of the uncontaminated soil beneath the pile will necessarily be scraped up during site cleanup, the soil surface remaining after

removal of the monazite pile will contain radionuclide concentrations within the range of natural background and, therefore, will satisfy state limits and ALARA.

2. **Comment**. Is the NRC going to require a determination of the vertical extent of the residual radionuclides in soil?

Response: HMI knows the process by which the monazite was put in place (i.e., there was no excavation) and, therefore, FSSP surveys after removal of the monazite will satisfy any concerns about the vertical extent of residual radionuclides in the soil. See also the Response 1 above.

3. **Comment**. The blue area should be considered "affected" because monazite was diluted and then disposed there.

Response: The blue area is not "affected" as it does not contain source material (i.e., either uranium, thorium or any combination thereof) at licensable "source material" levels and, therefore, is not subject to NRC's jurisdiction. See SECY-96-207, Update of Policy and Program Issues at SDMP Sites." Sept. 25, 1996 at p. 23.

4. **Comment:** Figure 2 has no indication of north.

Response: A copy of a revised Figure 2 from the RSI FSSP showing an N arrow is attached. Also, please note that the hatching indicating the extent of the NRC areas of interest has been removed from the service building, warehouse, change house and office. The legend *"all other areas NJDEP"* was not clearly defined and the scale being incorrect were removed.

5. **Comment:** In the discussion of outdoor properties, it is stated that all outdoor properties are "unaffected." However, in a letter dated June 16, 1991 from John Kinneman to Dr. Stern, NJDP, there was some mention of an area between the dry mill and wet mill as being contaminated from spilling free sand and monazite. Highest radiation levels were 400 microR/hr. The entire area between the wet and dry mill must be considered "affected."

Response: The area between the wet mill and the dry mill was not contaminated by the spillage of free sand and monazite. The monazite was taken out in the dry mill and put directly in the current monazite pile or in barrels which are now in the pile so the monazite never traveled between the two mills. Additionally, the materials traveling from the wet mill to the dry mill did so in a slurry form through a pipe underground and, therefore, did not contaminate the surface between the two mills. In any event, as noted in Response to Comments to NRC, if any outdoor hotspots exceed 75% of the guideline during the ten percent survey in accordance with NUREG-5849, then the area will be reclassified from "unaffected" to "affected."

6. **Comment:** If monazite was analyzed in the laboratory as a product sample, should the laboratory be considered an "affected" area.

Response: There was no monazite sampling in the laboratory.

7. **Comment:** In Section 6.1, "affected area surveys," what does one hundred percent survey mean? Will a ten-by-ten grid pattern be used, as is recommended in NUREG-5849? If so, this should be stated clearly. If higher readings are obtained, what procedure will be followed to further clarify them.

Response: Samples will be taken on a ten-by-ten grid pattern according to NUREG-5849. The work plan will detail procedures for additional sampling where contamination indications are above release guidelines. When contamination is indicated, grids will be subdivided into four quadrants and resampled in an attempt to localize the contamination. Areas of elevated activity discovered during the scanning survey will be delineated in spray paint to aid in localized remediation.

8. **Comment:** The discussion of representative data is unclear. What does "F" stand for in equation for representativity?

Response: This equation if from "Data Quality Objectives Process for Superfund" EPA/540/G-93/071. F is the number of times a premise the data are intended to show fails. For example, a soil sample are obtained at every area of elevated dose rate. If the premise is a high dose rate indicates soil contamination and one out of ten locations of high dose rate does not yield a contaminated soil sample. The data is considered;

$$1-\frac{1}{10} \times 100\% = 90\% \text{ representative}$$

#649369

TABLE A

SUMMARY OF CURRENT LOCATING OF MILLS OPERATING EQUIPMENT

SURVEY UNIT NUMBER	IDENTIFICATION	UNAFFECTED/ AFFECTED	EQUIPMENT LOCATION -WET MILL- SUMP	PUMP	
3	Wet Mill Screen Feed Sump	Un	In Place	Floor	
5	Cleaner Spirals Feed Sump	Un	Not in Place	In Place	S. Sold
10	Scavenger Spiral Feed Sump	Un	In Place	Not in Place	P. Sold
12	Tails Transfer	Un	In Place	Not in Place	P. Sold
13	Thickner Sump	Un	In Place	Not in Place	P. Sold
15	Table Spiral Feed Sump	Un	In Place	In Place	
18	Screw Feed Sump	Un	In Place	Not in Place	
19	Screw Classifier	Un	Not Used	Not Used	Removed
23	Mag Feed Sump	Un	In Place	In Place	
24	Non-mag Feed Sump	Un	In Place	In Place	
28	Tails Feed Sump	Un	In Place	Not in Place	P. Sold
30	Classifier Feed Sump	Aff	In Place	Floor	
32	Dryer Filter Feed Sump	Aff	Stored in back of wet mill		
			-DRY MILL-		
43	Monazite Transfer Sump	Aff	Cleaned and stored in wet mill All other units still remain in dry mill		

A:10-13TBL.A

DECONTAMINATION SURVEY

DIRECT GAMMA RAY READINGS in Micro R/hr

WET MILL

Area Description	Dates											Remarks
	7/6/90	7/10/90	[illegible]	9/20/90	7/23/90	10/10/90	11/5/90	11/16/90	11/26/90	12/7/90	12/20/90	
Tables	38	36	38	30	30	30	30	30	40	24	22	TABLE #6
Launders	70	44	30	40	18	15	50	48	34	30	26	CLASSIFIED
Sumps	50	50	110	40	28	28	28	38	25	25	20	#7 P-14A
Pumps	28	25	22	18	18	18	18	18	18	18	20	
Piping	20	20	20	17	17	20	20	20	20	20	18	
1st Floor	30	40	24	19	30	20	30	20	22	—	22	
2nd Floor	30	44	[illegible]	16	16	15	16	15	15	15	15	
3rd Floor	22	22	22	22	22	22	22	22	22	22	44	EAST END
Office	24	9	7	9	[illegible]	10	10	10	10	10	9	
P-10 SUMP				60	60	38	38	38	40	15	20	
[illegible]					14	15	25	30	[illegible]	18	32	SOUTH [illegible]
P-17 SUMP						[illegible]	38	38	[illegible]	30	20	
P-17 [illegible]						[illegible]	48	38	25	26	26	
EXTERIOR TANK TO 2ND FLOOR							180	170	180	180	165	
FLOOR SUMP								150	—	—	-16	

NOTE: Survey applies only to areas where source material was prese

DECONTAMINATION SURVEY

DIRECT GAMMA RAY READINGS in Micro R/hr

DRY MILL

Area Description	Dates												Remarks
	7/6/70	7/10/70	7/23/70	10/16/70	11/5/70	11/12/70	12/7/70	2/28/70					
Filter	120		70	70	60	46	46	47					
Chutes	220		130	150	110	*	100	120					
Dryer	160		150	150	- *	*	*	170					* NO READING
Flue	170	220	120	120	- *	*	*	*					* NO READING
Dust Cyclone	500	750	750	430	400	*	*	400					* NO READING
Dryer Area	500	500	500	500	250	250	220	170					
Hot Belt	160			60	22	22	22	*					* NO READING
Rougher Elev.	140		100	110	16	12	12	12					
Dist. Belts	80		50	24	20	20	20	18					
Rougher Hopper	110		30	28	20	15	16	18					
R. H. T.	80		50	14	14	10	10	18					
Cleaner Belt	110		60	28	24	32	32	21					
Cleaner H.T.s	90		60	22	22	20	16	16					
Recleaner Belt	60		40	22	20	20	20	18					
Recleaner HTs	80		50	14	12	9	10	10					
Ti Mags.	24		25	18	12	18	10	10					
Zr Mags.	100		70	30	16	28	26	40					
Top Bins	70		30	40	60*	38	30	35					* BIN 4
Storage Bins	130		60	50	20*	20	24	22					* ALL
Dust Piping	175		80	70	110	34	16	22					
1st Floor	50		70	20	20	20	20	16					
2nd Floor	50		40	18	22	14	12	12					
3rd Floor	50		30	26	33	20	22	18					
4th Floor	70		40	24	24	24	24	30					
Office	22		22	18	17	18	18	15					
SCALE ROOM			34	30	30	20	20	18					

T.N. C[illegible] 2/28/70

DECONTAMINATION SURVEY

DIRECT GAMMA RAY READINGS in Micro R/hr

DUST COLLECTOR

Area Description	Dates												Remarks
	9/6/90	9/20/90	10/4/90	11/6/90	12/7/90	12/28/90							
Dust Piping	110	110	110	110	110	80							
Internals	170	170	170	170	100	75							
Screw Conv.	260	260	260	260	260	75							
Ground	600	600	600	600	600	170							

T. C. Di 9/28/90

NOTE: Survey applies only to areas where source material was present.

SUMMARY OF RADIOLOGICAL DATA

I. WATER ANALYSES

Date	Sample	Analysis, pCi/l	
		Gross Alpha	Gross Beta
5/8/89	Plant Upstream	< 1.0	< 2.0
	Shallow Well	< 1.0	2.2 ± 1.3
	Deep Well	< 1.0	2.5 ± 1.3
	Plant Downstream	1.1 ± 0.9	2.0 ± 1.2

Date	Sample	Analysis, pCi/g	
		Ra-226	Ra-228
4/19/90	Process Pond water	< 1.0	< 0.8
	Holding Pond water	< 1.0	< 0.8

II. Solids Analyses (Th & U)

Date	Sample	Analysis, %		
		Th	U	Total
Feb. 1989	Table Conc.	0.048	0.026	0.074
(By NRC)	New Feed	0.009	0.009	0.018
	Comb. Plant Tailings	0.006	0.006	0.012
	Monazite Waste	0.539	0.047	0.585
	Zircon Product	0.007	0.029	0.035
	Leucoxene Product	0.010	0.004	0.014
11/15/89	Recycled Tailings (Low)	0.0058	0.0017	0.0075
	Recycled Tailings (Med.)	0.0180	0.0037	0.0217
	Recycled Tailings (High)	0.0270	0.0071	0.0341
3/8/90	Soil Samples from Unused Settling Pond Shores (under water)			
	# 1 – 7	<0.0010	<0.0010	<0.0020
	8	0.0016	<0.0010	0.0016
	9	<0.0010	<0.0010	<0.0020
	10	0.0012	<0.0010	0.0012

III Solids Analyses (Radium)

Date	Sample	Analysis, pCi/g		
		Ra-226	Ra-228	Total
11/15/89	Recycled Tailings (Low)	6	--	--
↓	Recycled Tailings (Med.)	13	--	--
	Recycled Tailings (High)	24	--	--
4/19/90	3 Cropped Tailings Area	3.5 ± 0.4	1.4 ± 0.2	4.9
↓	Bottom of Holding Pond	1.3 ± 0.5	0.81 ± 0.18	2.1
	Monazite Material	186 ± 19	1190 ± 120	1376
4/23/90	Six Background Samples	<0.2 – 0.76	0.16 – 0.57	0.16 – 1.3
↓	Asarco Wet Mill Tails	<0.3	<0.08	<0.38
	Clean Tailings (current)	4.6 ± 0.5	1.7 ± 0.2	6.3
5/11/90	Table Circuit Tailings	25 ± 0.3	8.8 ± 0.9	33
6/5/90	New Feed (Recycled Tailing)	15 ± 2	23 ± 2	38
↓	Zircon Comp.	67 ± 7	14 ± 1	81
	Rutile Comp.	13 ± 1	1.5 ± 0.2	14.5
	Leucoxene Comp.	16 ± 2	51 ± 5	67
6/27/90	Leucoxene Truck	10 ± 1	24 ± 2	34
7/5/90	Clay Slimes	2.6 ± 0.7	1.6 ± 0.2	4.2

SMEAR SAMPLE REPORT
Alpha results for the Heritage Minerals

SURVEYED BY: HeritageMineral DATE: 1/28/91
COUNTED BY: M. Sullivan DATE: 2/ 4/91
ANALYSED BY: theresa DATE: 2/ 7/91

COUNTER USED: MS-2 EFFICIENCY: .270
BACKGROUND COUNT TIME: 1 minutes SAMPLE COUNT TIME: 0.5 minutes
BACKGROUND COUNTS: 1 AREA SURVEYED: 200 square cm.

SAMPLE #	COUNTS	NET DPM	DPM/100cm2
1	0	< 17	< 9
2	1	< 17	< 9
3	0	< 17	< 9
4	0	< 17	< 9
5	1	< 17	< 9
6	0	< 17	< 9
7	0	< 17	< 9
8	0	< 17	< 9
9	0	< 17	< 9
10	0	< 17	< 9

Number of samples reported: 10

APPROVED BY: Sean Demerchi DATE: 2/8/91

EAR SAMPLE REPORT
Beta results for the Heritage Minerals

SURVEYED BY: HeritageMineral DATE: 1/28/91
COUNTED BY: M. Sullivan DATE: 2/ 4/91
ANALYSED BY: theresa DATE: 2/ 7/91

COUNTER USED: MS-2 EFFICIENCY: .440
BACKGROUND COUNT TIME: 1 minutes SAMPLE COUNT TIME: 0.5 minutes
BACKGROUND COUNTS: 31 AREA SURVEYED: 200 square cm.

SAMPLE #	COUNTS	NET DPM	DPM/100cm2
1	19	< 59	< 29
2	14	< 59	< 29
3	19	< 59	< 29
4	23	< 59	< 29
5	21	< 59	< 29
6	19	< 59	< 29
7	18	< 59	< 29
8	14	< 59	< 29
9	23	< 59	< 29
10	18	< 59	< 29

Number of samples reported: 10

APPROVED BY: Sean Demerchi DATE: 2/8/91

HERITAGE MINERALS, INC.

CONTAMINATION SURVEY

Sample No.	Location	CPM's	Micro R/Hr	Type
WM-1	Table 5 middle deck feed	1K	22	R
WM-2	Table 5 middle deck conc.	150	20	F
WM-3	Sump 7	200	23	R
WM-4	Fin. Spiral S.E. unit	180	19	R
WM-5	Sump 14 Q	100	19	R
DM-6	Dryer discharge	100	70	F
DM-7	Dryer cyclone dump	1.2K	230	R
DM-8	Jiscon Mag feed conveyor	120	32	R
DM-9	Jiscon Mag & lower mag. chute	100	15	F
DM-10	Top Jiscon bin 4	100	33	R
	~~Per Scott all negative~~			

NOTE: 1. CPM's taken with Eberline E120 c/w HP260
2. Micro R/Hr taken with Ludlum Model 19
3. Type - "F" Fixed, "R" Removable

T. V. Cuculic 1/28/92
R.S.O., Chief Engineer