

NOTE TO: Dick Cooper, Director, Division of Radiation Safety and Safeguards

THROUGH: Ron Bellamy, Chief, Nuclear Materials Safety Branch

FROM: Marie Miller, Senior Health Physicist, Site Decommissioning Task Force, NMSB

SUBJECT: RESPONSE TO QUESTIONS ON HERITAGE MINERALS, INC. IN PREPARATION FOR PUBLIC MEETING ON APRIL 22, 1992

As you suggested, it is in our best interest to draft written answers to your prepared questions, so that we can have a uniform position in preparation for the public meeting with Manchester Township. In addition to these topics being discussed, I also prepared a brief handout (Attachment 1) which describes the site, an excerpt from Part 40 that describes the scope of our jurisdiction, and some general information on background radiation, with an emphasis on terrestrial radiation.

QUESTIONS FOR HERITAGE MINERALS VISIT

1. Why don't we license the other volume of materials (the combined tailings pile) at Heritage? Why doesn't the state stop trying to get us to?

The waste streams resulting from an unregulated activity are not within the jurisdiction of the NRC unless they meet the definition of source material. Source material is defined as uranium and thorium in any combination and any physical or chemical form or ores that by weight contain .05% of uranium and/or thorium. The previously processed and recombined sands that amount to 102,500 cubic yards are not source material, and were not processed as a result of an NRC licensed process, i.e., mining to produce, extract, or concentrate uranium or thorium from any ore processed primarily for its source material content.

An NRC regulation (10CFR40.13) exempts as unimportant quantities of source material any combination of uranium and thorium which is less than .05% by weight of the mixture compound, solution or alloy. NJ believes that the waste streams produced since 1986 should be under NRC jurisdiction, because the monazite was once separated in the recovery of the zircon from the dry mill and then recombined with the wet mill tailings. NRC staff position that has both NMSS, OGC, and OE concurrence is that from operational and legal considerations the other waste volumes should not be regulated by NRC, and we would not preempt the State if they chose to regulate as NORM the processed sands because the background radiation levels (50-100 uR/hr) are technologically enhanced. The State most likely will regulate these other waste.

B-30

2. What is the environmental impact of the monazite pile? Will we let Heritage mix the licensed material with the non-licensed material? If the mixture (assuming the answer to the last question is "yes") doesn't meet the release limits of the Branch Technical Position, on what basis would we allow release?

There is no immediate threat. The radiation exposure to a hypothetical intruder would be from direct exposure, at a rate of 2mR/hour. The monazite sand was not chemically altered by the licensee's process and appears to be stable in the environment and not to become airborne. Four groundwater samples showed no increase in radioactive contamination.

(We probably won't let Heritage remix the monazite pile with the other processed sand. THIS INFORMATION SHOULD NOT BE MADE PUBLIC)

3. Will the public be safe living by and playing on the golf course if it is built on the Heritage property? If not now, what would Heritage need to do to make it safe (acceptable to the NRC)?

NRC will not terminate the Heritage Minerals license until the monazite pile, and buildings are releasible for unrestricted use. While deed restrictions are an additional layer of protection that can be taken into account when releasing a facility, the decision to terminate a license would not be based on the deed restrictions.

(NMSS estimated using RESRAD (same code used by DOE and NJ) that a residence built on this remixed sand with no deed restrictions would be about 600 mR/year, and 280 mR/year if used as a golf course with deed restrictions. If you assume, mixing, 10 cm new soil cover, and deed restrictions the annual dose would be about 100 mR/yr. Note, if the monazite is removed, and a residence is built on the reprocessed sands, without any deed restrictions, the annual exposure to persons leaving in a residence would be about 200 mR/year which is lower than the annual average background from terrestrial and radon sources of about 300 mR/year.)

4. Are we satisfied with the efforts and the performance of Heritage to date? Will we take some heavy-handed action to force them to cleanup the site faster? What are the actions that we could possibly take, and would all or only some be agreeable to the state?

We are satisfied with the performance of Heritage to date. The licensee is investigating two proposals in preparation of decommissioning the site, namely, recycling the material to another user, or requesting the material be mixed with the formerly processed sands. (We expect to be able to survey the site in 1993. The State may disagree when we attempt to

terminate the license, but we feel they have adequate regulatory authority to seek resolution regarding the other non-regulated radioactive material at the site.)

If the licensee stopped their efforts to decommission their facility efforts, we could issue an order. An Order is not anticipated given that it is in the company's best interest to remediate the site for future development.

5. What security or controls for the monazite pile and the site in general are required by NRC regulations or license conditions, and is Heritage in compliance?

The licensee maintains the area as a restricted area which is any area which is controlled for purposes of protection of individuals from exposure to radiation. The licensee has the area posted with Caution, Radioactive Material signs in accordance with 20.203 (e)(2). These postings are on the fence surrounding the monazite pile and on the dry mill building. The dry mill contains about 120 drums of the monazite sand that was drummed as a sample. Surveillance to the restricted areas during work hours is maintained by the licensee. During off-hours, the licensee relies on the postings, remoteness of its site, and the unusual means an individual would have to take to remove the material. The NRC has found that adequate controls are in place to maintain the area as a restricted area.

The unfenced boundaries of the operating facility that include the recombined sands as well as the monazite, would require people desiring access to the monazite to travel about 3 miles over undeveloped private property. There are a number of no trespassing signs posted from these directions.

With the exception of the fenced monazite pile and the dry mill building, all other areas are unrestricted areas. No security or control measures are required by NRC regulations, because NRC regulated material is not stored or used in these areas. For example, the areas near the two lakes have radiation levels at background about 10 uR/hr.

6. What impact will new Part 20 limits, in particular the limitation of 100 mr/yr. dose to a member of the general public, have on the site and on our licensing of the site (will we have to license more of the materials because the dose rate to a member of the general public in expanded areas of the site will now cause a person "in proximity" to the site to exceed the annual dose limit)?

The new Part 20 limit of 100 mrem/yr (Total Effective Dose Equivalent - 10 CFR 20.1301) applies to a real member of the public exposed to licensed radioactive material. Although we would not license the other material, because it is exempt from our regulations under 40.13, (we may decide that the

licensee should take additional measures to control the material outside of regular operating hours. For example, cap the material or install a higher fence. A licensee may also request an exemption to this limit. The NRC is expecting to receive such requests and will evaluate the each case.)

7. Are we performing an Environmental Assessment of HMI's plan to dispose of the monazite by mixing with other materials onsite, as requested by the state? If not, why not?

The license was granted a categorical exclusion from 51.22 at the time the facility was licensed, so an EA was not required. The licensee's proposal was requesting authorization to remix the monazite. (In response to the Region I TAR, HQ performed a dose assessment. Since there has not been a final decision, the need to have an EA has not been decided.)

8. I believe we submitted a TAR to NMSS some time ago requesting that they provide an answer to the proposal of HMI to dispose of the monazite by mixing it with other materials onsite. What is the status of the response to the TAR; what is our position on HMI's proposal?

(TAR submitted September 3, 1991. Conference call with NMSS 3/92 gave position that they most likely will not endorse mixing. Additional review by HQ before final response. See also response to question 2.)

9. In the 10/25/91 letter from the state, is the state's position that NRC should license the additional large volume of material onsite (the combined tailings pile) based on their view that HMI was producing concentrated source material all along, but diluted it by mixing it with other materials to the extent that the present concentration of source material in the mixture is less than the .05% by weight thorium or uranium?

Yes. Correspondence to OGC and OE in 1990 and 1991 in preparation of the license and in response to the NJ letter reviewed NJ's position, but maintain that NRC should not license this material. The Heritage process was a sorting process which did not involve chemical separation or removal of large quantities of Uranium and Thorium from the original composition of the sand. (Also, NRC permits dilutions by air and water into large bodies of water and air of liquid and gaseous effluents. The Region endorsed the remixing proposal given the available dilution media and that the material is from that location. This information should not be discussed with the public.)

10. How often do we inspect the site, and what, in particular do we look for when we inspect?

License Number SMB-141 is a priority code 3 - inspection every

?

three years. After the 1989 inspection, a license was issued in January 1991, and a routine inspection was conducted in April 1990. A site tour was conducted a year later in response to concerns about the adequacy of the controls of radioactive material at the Heritage facility, and as part of our ongoing review of the licensee's proposal. Region I will periodically inspect the facility to ensure compliance with regulations and license conditions, i.e., no unsafe practices.

We inspect against Part 20 and Part 40 regulations and to assure conditions of license are maintained, i.e., not processing, restricted area being maintained, and follow-up to decommissioning activities.

11. Does the level of radioactive material at the Heritage site require that it be disposed of only by removing it to a waste disposal facility? If not, what other realistic options are available?

If the proposals discussed in question 4 are unacceptable, the material will be disposed of as low level radioactive waste. Although the three commercial disposal facilities are expected to close to NJ waste generators in 1993, Envirocare in Utah may be able to receive this bulk amount of material. (Another alternative would be for the licensee to investigate sending the material to a uranium mill tailings facility although it is not 11.E.2 byproduct material.)

12. Where do we draw the line between what portions of the site or materials are licensed by the NRC, as opposed to the state or not at all?

We only license the buildings and waste streams with source material. (My understanding is that the State has not specifically taken regulatory action other than to perform surveys and evaluations in support of their correspondence to NRC. NJ most likely will exercise its jurisdiction in accordance with the NJ Environmental Clean-up Responsibility Act (ECRA). This act also requires NJ to provide clean-up resources if a responsible party cannot be located or unable to cover the costs.)

13. Should NRC or Heritage provide health and safety information on the "hazard" associated with the monazite pile and the other mining tailings to the police, first aid, fire fighters, and emergency management officials of Manchester Township? If not, why?

NRC regulations do not require emergency plans for the Heritage Minerals Inc., facility or ~~the~~ require them to provide radiation training to the response organization.

Both police, fire, and first aid squads have responded to

events at Heritage Minerals in the past - but it did not involve the monazite.

NRC responds to requests from State and local governments for information about its licensees. We are not aware of any outstanding correspondence with respect to Heritage.

A copy of the license any major action, e.g., enforcement, inspection reports, approval of decommissioning plans and license termination are provided to the State. In NJ, the contact is Jill Lipoti, Assistant Director, Radiation Control Programs, DEPE with respect to all NRC licensees.

**NRC BRIEFING WITH MANCHESTER TOWNSHIP, NJ
TO DISCUSS HERITAGE MINERALS, INC.,
LAKEHURST, NJ**

NRC PRESENTATION BY:

**RICHARD COOPER, DIRECTOR, DIVISION OF
RADIATION SAFETY AND SAFEGUARDS, REGION I
U.S. NUCLEAR REGULATORY COMMISSION**

**MARIE MILLER, SENIOR HEALTH PHYSICIST
SITE DECOMMISSIONING TASK FORCE, DRSS, RI**

SITE DESCRIPTION

THE HERITAGE MINERALS SITE CONSISTS OF 7000 ACRES NEAR LAKEHURST, NEW JERSEY OF WHICH BETWEEN 1000 AND 1200 ACRES HAVE BEEN INVOLVED IN THE MINING AND PROCESSING OF LOCAL ORES. THE PROCESSING PLANT AND THE TAILING PILES OCCUPY ABOUT 278 ACRES.

WITHIN THIS AREA, NRC LICENSES ABOUT 695 CUBIC YARDS OF MONAZITE-RICH SANDS, BECAUSE IT IS SOURCE MATERIAL. SOURCE MATERIAL CONTAINS GREATER THAN .05% BY WEIGHT OF THORIUM AND OR URANIUM IN ANY CHEMICAL OR PHYSICAL FORM. THE PHYSICAL FORM AT HERITAGE IS MONAZITE.

MONAZITE IS A COMPLEX PHOSPHATE OF RARE EARTH ELEMENTS CONTAINING ABOUT 3.5% THORIUM CHEMICALLY BOUND WITH THE RARE EARTH PHOSPHATES.

THE NRC LICENSE IS FOR THE POSSESSION, STORAGE, PACKAGING AND TRANSFER TO AUTHORIZED RECIPIENTS OF MONAZITE-RICH PRODUCTS, AND FOR DECONTAMINATION OF LAND AND FACILITIES CONTAMINATED WITH THE MONAZITE.

THE LICENSE DOES NOT AUTHORIZE THE PRODUCTION OF SOURCE MATERIAL OR THE PROCESSING OF MONAZITE-RICH SAND TO EXTRACT OR CONCENTRATE THE MONAZITE.

HERITAGE MINERALS HAS DECONTAMINATED THE BUILDINGS AND IS WORKING ON TWO PROPOSALS TO TERMINATE ITS NRC LICENSE WHICH WOULD RELEASE THE FACILITY FOR UNRESTRICTED USE.

RECYCLE TO ANOTHER BUYER

DILUTE THE MONAZITE WITH THE OTHER REPROCESSED SANDS AND TAKE ADDITIONAL REMEDIATION ACTIONS

ANY AND ALL DECONTAMINATION OPTIONS REQUIRE NRC APPROVAL. NRC IS CURRENTLY REVIEWING THE DILUTION PROPOSAL.

HISTORY OF FACILITY

FROM 1971 UNTIL 1982 SANDS CONTAINING ECONOMICALLY INTERESTING COMPONENTS AS WELL AS SMALL CONCENTRATIONS OF URANIUM AND THORIUM WERE DREDGED FROM ABOUT 50 TO 70 FEET BELOW THE SITE BY ASARCO, THE ORIGINAL OWNER.

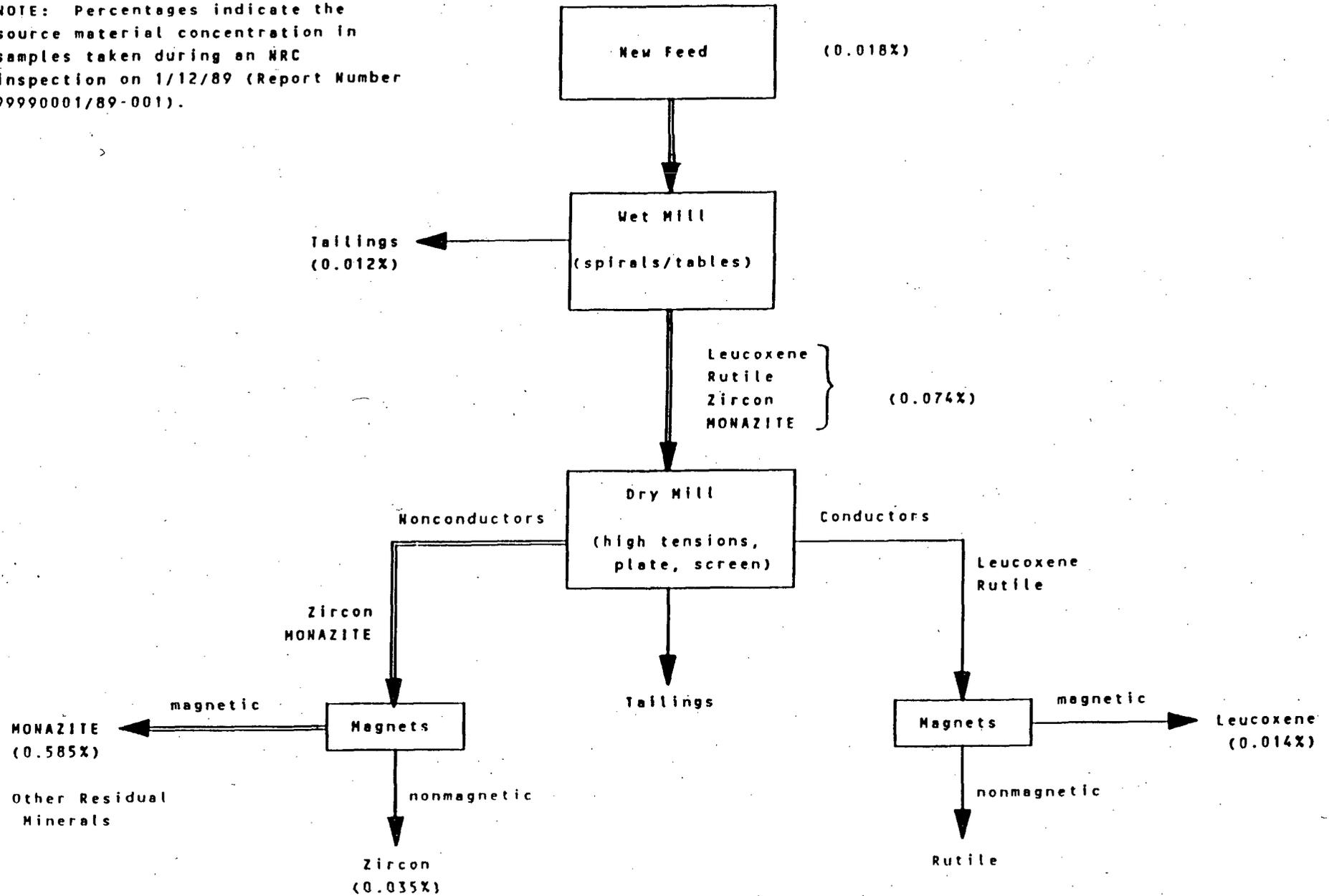
BEGINNING IN 1987, HERITAGE MINERALS PROCESSED THE STOCKPILED SANDS WHICH WERE LEFT BEHIND AS TAILINGS FROM THE PREVIOUS MINING OPERATION. ~~THE SANDS WERE PROCESSED BY PHYSICAL MEANS TO SEPARATE THE ZIRCON AND LEUCOXENE (TITANIUM OXIDE).~~

~~THE STOCKPILED SAND, ALSO REFERRED TO AS "ORIGINAL NEW FEED" WAS THE RAW MATERIAL FOR HERITAGE'S PLANT. UNTIL 1990, THE WASTE STREAMS FROM EACH OF THE SEPARATION PROCESSES WERE RE-COMBINED AND PUMPED FROM THE PROCESSING PLANT ONTO PREVIOUSLY MINED AREAS KNOWN AS THE TAILINGS PILE. THE RE-COMBINED TAILINGS DO NOT MEET THE LEGAL DEFINITION OF SOURCE MATERIAL, SO NRC DOES NOT REGULATE THIS WASTE STREAM.~~

IN 1989, NRC FOUND THAT HERITAGE WAS PRODUCING A WASTE STREAM THAT MET THE DEFINITION OF SOURCE MATERIAL AND DIRECTED HERITAGE TO APPLY FOR AN NRC LICENSE. HERITAGE APPLIED FOR THE LICENSE AND IT WAS ISSUED IN JANUARY 1991.

~~(FIGURE 1 PROVIDES ADDITIONAL DETAILS REGARDING THE HERITAGE PROCESS.)~~

NOTE: Percentages indicate the source material concentration in samples taken during an MRC inspection on 1/12/89 (Report Number 99990001/89-001).



Taken from the Heritage Minerals, Inc. Mineralogical Flowsheet dated 2/26/88

FIGURE (1)

CONTROL OF RADIOACTIVE MATERIAL

SINCE THE LICENSEE MAINTAINS THE AREA AS A RESTRICTED AREA, CONTROLS ARE REQUIRED FOR THE PURPOSES OF RADIATION PROTECTION. THE WORKERS AT THE FACILITY HAVE RECEIVED RADIATION TRAINING COMMENSURATE WITH THE RADIOLOGICAL HAZARD.

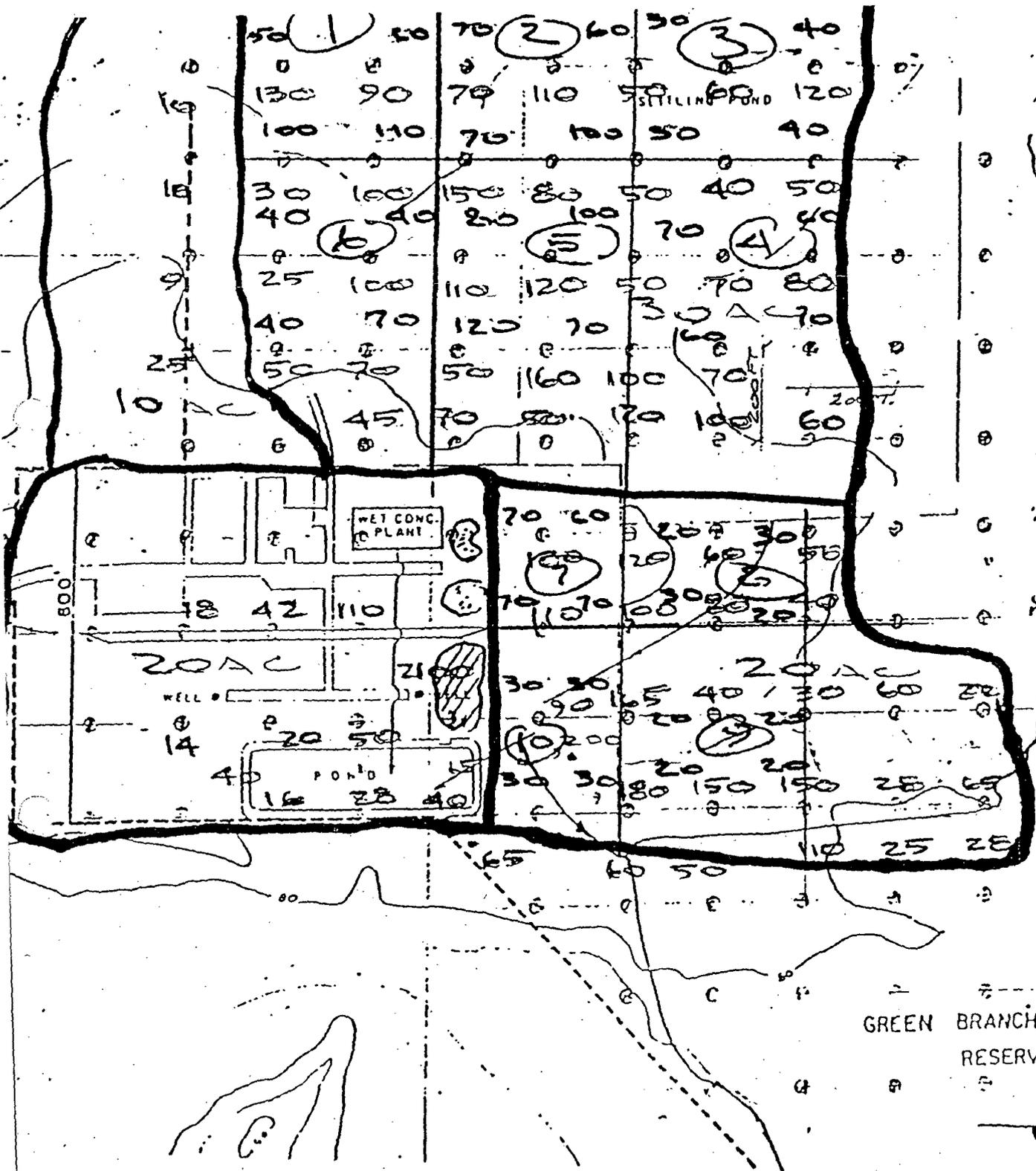
^{1.2}
~~RADIATION EXPOSURE RATES ALONG THE FENCED MONAZITE-RICH WASTE PILE ARE ABOUT 1/2 MILLIREM/HOUR. THIS RADIATION IS FROM THE DECAY OF THORIUM DISTRIBUTED WITHIN 695 CUBIC YARDS OF MONAZITE RICH SANDS.~~ *You would have to stand at the fence for about 100 hrs to receive the equivalent of a chest X-ray.*
RADIATION CAUTION SIGNS ARE POSTED AND ACCESS TO THE RESTRICTED AREA IS CONTROLLED BY THE LICENSEE FOR PURPOSES OF PROTECTION OF INDIVIDUALS FROM EXPOSURE TO RADIATION AND RADIOACTIVE MATERIAL.

DURING NORMAL WORKING HOURS, THE AREA IS UNDER SURVEILLANCE OF THE LICENSEE. DURING OFF-WORK HOURS, ACCESS POINTS OVER LARGE AREAS OF UNDEVELOPED PRIVATE PROPERTY ARE POSTED WITH NO TRESPASSING SIGNS. FOR THOSE INDIVIDUALS WHO WOULD TRESPASS ONTO THE PLANT AREA, RADIATION WARNING SIGNS ALONG THE FENCED MONAZITE PILE AND THE DRY MILL BUILDING ARE IN PLACE TO CAUTION THE INTRUDER.

REMOVAL OF THE RADIOACTIVE MATERIAL WOULD TAKE UNUSUAL MEANS GIVEN THE DISTRIBUTION OF THE THORIUM WITHIN 695 CUBIC YARDS OF SAND.

RADIATION FROM THE PROCESSED SANDS THAT ARE NOT LICENSED BY NRC ~~RANGE FROM 50 TO 150 MICROREM/HOUR.~~ *are about 20 times less than the areas licensed by NRC*
THE BACKGROUND RADIATION FOR THE MAJORITY OF THE HERITAGE SITE IS AROUND 7 TO 10 MICROREM/HOUR. FOR EXAMPLE, THE RADIATION LEVELS AROUND THE THE LARGER OF THE TWO MAN-MADE LAKES ARE AT BACKGROUND. *Background Radiation when we stand tonight and the other areas of the Heritage Site are 200 times less.*

~~(FIGURE 2 PROVIDES ADDITIONAL DETAILS REGARDING RADIATION EXPOSURE RATES WITHIN THE HERITAGE PLANT AND PROCESSED SAND PILES)~~



LIMITED SURVEY
 COMPLETED WITH
 N. R. & S. BETSY ULRICH
 10/11/90

QUADRANT DE
 NOTE: - COMPOSITE
 287.3 AC. SAMPLES ON
 10M GRID
 TAKEN

GREEN BRANCH
 RESERVOIR SURVEY GRID 200 FT. ENTRS

T.V. [Signature]
 FIGURE (2)

TERMINATION OF AN NRC LICENSE

NRC WILL NOT TERMINATE ITS LICENSE WITH HERITAGE UNTIL THE FACILITY CAN BE RELEASED FOR UNRESTRICTED USE.

THE LICENSE THAT IS HELD BY HERITAGE REQUIRES THAT PRIOR TO RELEASE OF ANY PLANT BUILDINGS, EQUIPMENT, AND THE MONAZITE PILE IDENTIFIED AS HAVING RADIATION LEVELS ABOVE NATURAL BACKGROUND (SEE FIGURE 2) THAT THEY MUST BE DECONTAMINATED TO MEET THE CRITERIA FOR RELEASE USING NRC APPROVED RELEASE CRITERIA.

THE LICENSEE SHALL NOT RELEASE ANY OF THESE AREAS FOR UNRESTRICTED USE WITHOUT SPECIFIC AUTHORIZATION BY THE NRC.

EXAMPLE:

~~BUILDINGS AND EQUIPMENT~~

~~FIXED SURFACE CONTAMINATION SHALL NOT EXCEED 3,000 DISINTEGRATIONS PER MINUTE WHEN MEASURED OVER AN AREA OF 100 SQUARE CENTIMETERS.~~

~~REMOVABLE CONTAMINATION SHALL NOT EXCEED 200 DISINTEGRATIONS PER 100 SQUARE CENTIMETERS~~

~~SOIL (SAND)~~

~~CONCENTRATIONS SHALL NOT EXCEED 10 PICO CURIES PER GRAM (THE ABOVE STANDARD IS AN EPA CLEANUP STANDARD WHICH RELATES TO AN EXTERNAL DOSE NOT GREATER THAN 10 MICRO REM PER HOUR ABOVE BACKGROUND)~~

~~UNDER THE SOIL RELEASE CRITERIA, NO MEMBER OF THE PUBLIC IS EXPECTED TO RECEIVE A RADIATION DOSE COMMITMENT IN EXCESS OF 1 MILLIREM PER YEAR TO THE LUNG OR 3 MILLIREMS PER YEAR TO THE BONE FROM INHALATION AND INGESTION UNDER ANY FORESEEABLE USE OF THE MATERIAL OR PROPERTY.~~

PRIOR TO RELEASING A FACILITY NRC REQUIRES THE LICENSE TO PERFORM A SURVEY AND SUBMIT THE RESULTS TO OUR OFFICE FOR OUR REVIEW. NRC ALSO PERFORMS A CONFIRMATORY SURVEY TO CLOSE-OUT THE FACILITY.

TECHNOLOGICALLY ENHANCED

DEF - TECHNOLOGICALLY ACTIVITIES
NOT INVOLVED IN THE
NUCLEAR FUEL CYCLE,
PRODUCTION OF RADIATION OR
RADIONUCLIDES FROM
ELECTRICAL DEVICES WHICH
RESULT IN INCREASED HUMAN
EXPOSURE TO RADIATION

- EXAMPLES - FLYING (COSMIC)
- INDOOR LIVING (RADON)
- SMOKING (Po-210) - *161 cm flight to lung*
- MASONRY BUILDINGS
- INDOOR WATER
- HIGHWAY BUILDING MAT.
- FERTILIZER (K-40, Ra)
- COAL ASH
- Rn IN NATURAL GAS
- URANIUM IN GLAZES
- ZIRCON SAND
- MINING TAILINGS
- ALUMINUM ORE PROCESS.
- ALUMINUM DROSS
- HEALTH SPA WATER

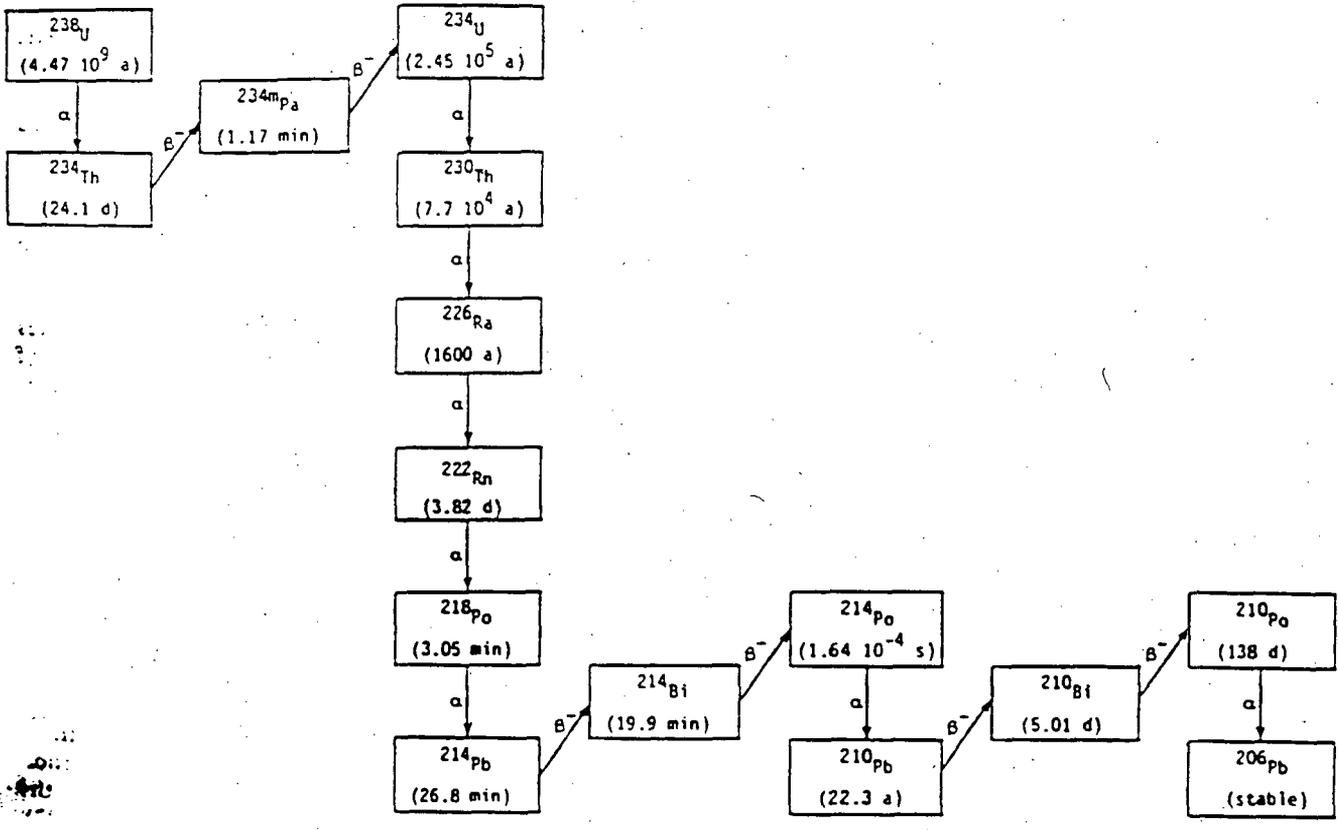


Figure V. Uranium-238 decay series. [110]

*Change over the chain when ...
 Different times & prop. of ...
 ... water ...
 ...*

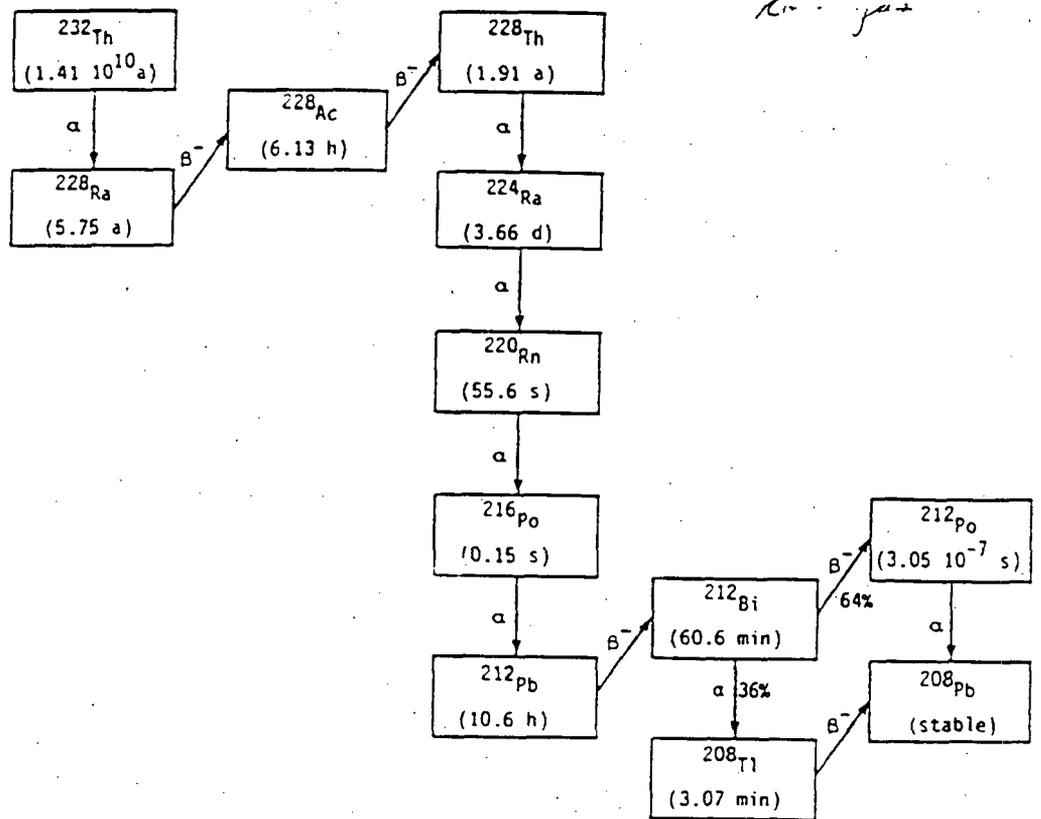


Figure VI. Thorium-232 decay series. [110]

OUTLINE FOR DISCUSSION OF HERITAGE SITE

DISCUSS REVIEW OF DOCKET FILE IN PREPARATION FOR THIS MEETING
AND DEVELOPMENT OF HANDOUT TO ADDRESS MAYOR CONCERNS

NRC JURISDICTION OF SITE

BRIEF HISTORY OF SITE

CONTROL OF RADIOACTIVE MATERIAL AT SITE

DECOMMISSIONING OF FACILITY

SHORT RADIATION PRIMER

WHAT IS RADIATION.

COMPARE THE SOURCE MATERIAL AT HERITAGE TO NATURALLY
OCCURRING RADIOACTIVE MATERIAL

DISCUSS CHART WITH RADIATION SOURCES

DEMONSTRATION WITH METER - MONAZITE AND FIESTAWARE

RADIATION RISK FACTORS