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been discontinued. It is proposed that they be encased in concrete casks coated with asphalt, 2 drums per cask, and stored in a trench in the LASL contaminated waste area under cover of plastic sheeting and approximately 3 feet of earth backfill.

Lamar Johnson, H-8 Group Leader, has asked us for our opinions of the suitability of the proposed cask storage for temporary or interim (possibly up to 20-year) storage. These opinions are needed quickly; it is recognized that there is not time for any experimentation to corroborate the answers given. The opinions are offered concerning failure of the various parts of the containment:

1. It seems likely, either from heat, or radiolysis, or both, that the 12-mil plastic bag inside the paint can will fail. MacDougall and Barry<sup>(1)</sup> have demonstrated serious degradation of PVC in contact with  $^{238}\text{Pu}$  in a preliminary radiolysis experiment. J. J. Koelling, ENG-7<sup>(2)</sup> has made heat transfer calculations on  $^{238}\text{Pu}$  package models based on above description, and has concluded: "...clearly indicates that a problem exists with respect to: a) melting of PVC inside the 3-gallon container, b) HCl formation within the container, and c) possible melting of PVC outside the container if an outer bag containment is used. All of the above depend completely on the heat transfer capability of the container contents, heat source, and the material used between the container and the 30-gallon drum."
2. The paint can itself probably will be breached from the corrosive action of the HCl, water vapor, and  $^{238}\text{PuO}_2$  present, acting both individually and collectively.
3. The outside 5-ml PVC bags probably will fail for the same reasons given above.

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4. Once the can and PVC bags are breached, it is probable that the  $^{238}\text{Pu}$  will not migrate to the drum wall if the drums are in static storage. Although not under the same conditions, MacDougall & Barry<sup>(3)</sup> have shown that Pu does stick on Vermiculite to some extent. Without a driving force in the form of vibration, air flow, liquid flow, etc., the  $^{238}\text{Pu}$  should not be very mobile in Vermiculite.
5. It is possible that the 30-gallon drum will be breached by internal corrosion, but on the basis of existing knowledge, one cannot state that it is probable. If the HCl, water vapor, Pu, and possibly other corrosive materials from the degradation of the waste inside the package can reach the inside of the mild steel drum, they will certainly attack the drum, and in time will probably breach it. The rate will depend on the quantities of corrosive agents generated and the holding capacity of the Vermiculite.
6. There will be gas pressure buildup from the various chemical and physical reactions taking place in the contaminated trash, based on preliminary data already referred to in paragraph 1. We do not have sufficient data to postulate whether there would be sufficient pressure to breach the seal of the concrete container.
7. Bituminous coatings, either asphalt base or coal-tar base, are known for their ability to adhere to metal or concrete underground, to resist corrosion and moisture, and to respond well to changes in temperature. Their resistivity to a combination of Pu, HCl,  $\text{H}_2\text{O}$ , and possible other corrosives supplied by degradation of waste materials is unknown. Neoprene is known to be attacked by  $^{238}\text{Pu}$  solution or oxide. We have no data available on epoxy coating. If the  $^{238}\text{Pu}$  migrates very little through the Vermiculite, the cask sealant should be very lightly exposed and should not be breached.

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The small amount of HCl and moisture should be insufficient to seriously damage the concrete itself.

The plan to provide temporary or interim storage for the  $^{238}\text{Pu}$ -contaminated waste by placing the 30-gallon drums in concrete casks seems reasonable, in the opinion of the writer, in the light of the present knowledge of waste management. It should be emphasized that this is only an opinion, and that we need to perform some experimental work to answer questions that we have concerning the validity of these opinions. Some of these experiments are set up ready to go; we will devise others to be started as soon as possible.

#### REFERENCES

1. Alpha-Waste Repository Program (A-412) Report for the period 3-1 to 6-30, 1973, to Harry Jordan, H-DO, from G. R. Waterbury, CMB-1, p 14.
2. Heating of Pu-238 Storage Containers, to V. J. Stephens, ENG DC/DC, from J. J. Koelling, Eng-7, 8-14-73, p 2.
3. Alpha-Waste Repository Program (A-412) Report for the period 3-1 to 6-30, 1973, to Harry Jordan, H-DO, from G. R. Waterbury, CMB-1, p 21.