UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
1990 N. CALIFORNIA BOULEVARD
SUITE 202, WALNUT CREEK PLAZA
WALNUT CREEK, CALIFORNIA 94596

April 24, 1981

MEMORANDUM FOR: Leo B. Higginbotham, Chief
Radiological Safety Branch
IE:HQ

FROM: H. E. Book, Chief
Radiological Safety Branch
Region V

SUBJECT: EVALUATION OF WASTE BURIAL AREA AT VETERANS ADMINISTRATION HOSPITAL, LOS ANGELES - LICENSE NO. 04-00181-04

Consideration is being given to the conversion of certain property under the control of the subject licensee to use as a public park. Between 1960 and 1968 this licensee utilized a portion of that property for the burial of radioactive waste from the medical diagnostic, therapeutic, and research programs at this hospital. Such burials were authorized by NRC (formerly AEC) Regulation 10 CFR Part 20, paragraph 20.304. The licensee, by letter dated April 15, 1981, has formally requested approval from the NRC for conversion of the property to public use. NMSS is in the process of evaluating this request. Region V has made an independent evaluation, and it is hereby submitted for your information and use.

No burials have been made by the licensee since 1968. At the time burials ceased, Region V collected all available information on the burials. The licensee had kept rather good records, so the information in the Region V files is detailed and complete. In 1969 the General Services Administration (GSA) began proceedings to dispose of 50 acres of the Veterans Administration property. Included in that 50 acres was the area where burials of radioactive waste had taken place. GSA asked the U.S. Atomic Energy Commission (AEC) if there should be any "restrictive or limiting conditions" imposed on future use of the property. The AEC (Materials Licensing Branch) evaluated the situation. Information available to them was exactly what is available now, since no additional disposals were made after 1968. The results of the AEC evaluation in 1969 were that the property could be disposed of with no restrictions related to the presence of any radioactive materials. For some reason, there was a subsequent decision not to release the property at that time, and it remained under the control of the Veterans Administration. Documents associated with that 1969 evaluation and decision are enclosed as Attachments A, B, C, D and E to this memo.

Considerable time (12 years) has passed since the evaluation in 1969 and I believe it would be useful to look at the data at this time. This will permit credit for any radioactive decay, and re-evaluation in light of present knowledge and present requirements. A summary of the isotopes and quantities buried was developed in 1969. Some general information on the disposals, a summary of isotopes and quantities, and a map showing the locations of the disposals are enclosed as Attachments F, G, and H. A review of the summary information

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(Attachment G) reveals that it does not include information on burials made at this location in 1960, 1961, and 1962. Copies of the original disposal records for those years are in the Region V files. They were reviewed. That review revealed that no isotopes other than those listed on Attachment G were disposed during those three years. The quantities of those medical program isotopes disposed were considerably lower than in the later years. Quantities of H-3 and C-14 buried were as follows:

	1960	1961	1962
H-3, mCi	0.020	6.720	298.695
C-14, mCi	0.553	2.320	5.280

~ 305 mCi

~ 8 mCi

The original record of Attachment G did not include values for radioactive half lives. The handwritten half life values in the extreme right hand column were added by Region V. For the purpose of this evaluation, it is useful to look at the isotopes in two groups. Consider H-3 and C-14 as one group, and all other isotopes as the other group.

First we will consider this "other" group. A look at the half lives indicates that all of those isotopes except Cl-36 have decayed to essentially background levels. Of the longest lived isotope (Na-22, 2.6 years), less than 5% of the original activity remains. This amounts to less than 19 microcuries remaining. ICRP lists 10 microcuries of Na-22 as a body burden and the whole body as the critical organ. The Na-22 was disposed over three separate years, so that the remaining 19 microcuries is distributed and diluted over a rather wide area and volume of the burial site, and could not possibly result in a hazard.

The records indicate that 0.017 millicuries of Cl-36 was buried during the years 1960, 1961 and 1962. Attachment G records 0.260 millicuries of that isotope disposed in 1963, and none buried subsequent to that date. With a half life of 300,000 years, radioactive decay of this isotope was very small and can be ignored. Therefore, we can assume that the total of 0.277 millicuries (277 microcuries) still remains in the disposal site. With a half life of 300,000 years it is obvious that Cl-36 would have a very low specific activity, is barely radioactive, and is almost a stable element. It emits only beta radiation at 0.7 Mev. ICRP lists 80 microcuries as a body burden. The element Chlorine is not concentrated by plants, nor is it reconcentrated in food chains or in the human body. The critical organ is listed as the whole body. It is inconceivable that 277 microcuries diluted and dispersed in soil could result in any hazard.

Therefore, our evaluation shows that the radioactive materials in the "other" group are not a hazard and will not affect any future use of the property.

Precise calculations are not possible with the available data, but approximately 450 millicuries of H-3 remain in the ground at the site. For all practical purposes, all of the C-14, or about 53.5 millicuries, remain in the ground at the site. Both H-3 and C-14 are radioisotopes of very low toxicity. Both

emit beta radiation only of the very low energies of 0.0186 Mev for H-3 and 0.156 Mev for C-14. ICRP lists 1000 microcuries (1 millicurie) as the body burden of H-3 with all body tissue as the critical organ. For C-14, the body burden is 300 microcuries (0.3 millicurie) and body fat is the critical organ. Again, neither of these isotopes is reconcentrated in plants, animals or other biological processes, including man.

Most of the H-3 and C-14 waste buried by the Veterans Administration Hospital at this location consisted of animal carcases and scintillation liquids. Review of the burial records reveals only occasional smaller quantities of those isotopes as tritiated water and as paper and other dry waste. Effective March 11, 1981, the NRC Regulations were amended to exempt biomedical wastes such as these, containing H-3 and C-14, from the regulations. Before this was done, very careful evaluations were made by the NRC to determine the possible effects of removing controls on such disposals. Those evaluations show that the effects on the population or the individual are zero for all practical purposes. One of the calculated values was 0.4 health effects during the next 1000 generations. Thus, today the hospital could dispose of those materials containing H-3 and C-14 without limit and without any controls because of the radioactive content. It follows that there can be no possible hazard resulting from the H-3 or C-14 which has been buried in the past and their presence will not affect any future use of the property.

In addition to the scientific evaluation documented above, we want to record our position on the public relations, agency image and credibility aspects of this question. The authorization to bury radioactive materials was included in the original issuance of 10 CFR Part 20. This part of the regulations was established only after evaluations showed that no significant hazards could result from such burials. No controls were found to be necessary on location of the burials (the licensee was not even required to have control of the property) or on subsequent use of the property. The only limitations were on quantity of isotopes, depth, spacing, and number of burials per year. The licensee complied with all of those restrictions. In fact, review of the quantities disposed by this hospital reveal that less than one tenth of the permissible quantities were actually buried. Any extremely small problem that could be visualized has become vanishingly small by the passage of time. In light of this and our recent decontrol of biomedical wastes containing H-3 and C-14, it would seem totally irresponsible and incredible if the NRC should decide that controls or conditions should apply to future use of the property. This would be especially so in the face of the AEC decision in 1969 to place no restrictions on subsequent use of the same property.

The matter of precedence is also worthy of consideration. If for some reason we were to place restrictions on future use of this property or if we should require corrective actions before its release, then we should follow the same requirements for all other such locations. Logically, we would be compelled

to search out all other such locations and place similar requirements on those properties. This, we believe is impractical and totally unnecessary.

We recommend that the property at the Veterans Hospital in Los Angeles be released with no restrictions on its future use.

H. E. Book

Herbert E. Book, Chief
Radiological Safety Branch

Enclosures:
As stated