To: Col Johnson

From: M. Boldy

DRAFT

MEMORANDUM FOR Director, U.S. Army Research Laboratory (ARL),
ATTN: AMSRL-CS-IS-IH, Mr. Borisky, 2800 Powder Mill Road,
Adelphi, MD 20783-1197

Subject: Underground Storage Tank (UST) Removal at the Diamond Ordnance Radiation Facility (DORF)

1. References:

a. Army Regulation AR 50-7, Army Reactor Program, 16 Aug 96.

b. Army Reactor Office Memorandum for ARL, Subject: Nuclear Possession Permit, 3 Jun 97.

c. AMSRL-CS-IS-SH Memorandum for the Army Reactor Office, Subject: Diamond Ordnance Radiation Facility (DORF) - Detention Tank Removal, 27 Mar 98.

2. This memorandum conveys the regulatory requirements for permit compliance and suggestions for work practices for Walter Reed Army Medical Center's (WRAMC) and ARL's removal of the three underground detention tanks at DORF.

3. Request ARL provide the ARO a written plan specifying how ARL and WRAMC will remove the three underground detention tanks at DORF. As a minimum, the plan must include:

a. Procedures to mitigate hazards.

b. Procedures to control exposure to radiation and preclude the spread of radioactive contamination.

c. Procedures and techniques for surveys before removal of the tanks, during the removal to ensure appropriate precautions are taken if radioactive soil is uncovered, and after the removal to ensure the appropriate release standards are met.

d. Appropriate standards, references, and procedures for remediation and disposal of potentially low-level contaminated soil, residual water and sludge from inside the tank, and the tanks themselves.

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4. The following standards apply to the removal of the tanks and remediation of the site and must be adequately referenced in the submitted plan:

a. The standard for remediation is less than 25 millirem/year by all-paths to any member of the public. Appropriate models must be run to convert this into the appropriate concentrations of radioisotopes in the soil.

b. The standards for surface contamination of the tanks are those in NRC Regulatory Guide 1.86. If the tanks are contaminated above the acceptable levels, they must be cleaned to acceptable levels, or disposed of as radioactive waste. In addition if the tank is released as scrap metal for, quantify the fixed contamination levels in the tank material and demonstrate that subsequent reuse or recycling will not result in spread of contamination or doses of more than 25 milliRem/year to any member of the public. [We want to make sure that, if the tank is released, it doesn't contaminate the workers or machinery used in the recycling process and doesn't pose a hazard to anybody in the future in whatever state it winds up in. Concern is that there is very little detectable surface contamination, but some level of contamination in a layer within the walls of the tank. Does this make sense?]

c. The standard for discharge of the water and sediment from the tanks is 10 CFR as well as any state or local regulations concerning deletion and discharge into sewers. If the water and sludge from the tanks is found to contain radioisotopes, then the 10 CFR 20, discharge limits, and 10 CFR 30, exempt concentrations, should be used to determine if it should be treated as radioactive waste and the appropriate disposal technique. Ensure that local laws are considered and document in the submittal to the ARO.

d. The standards and procedures for disposal of low-level contaminated material must be coordinated with the Army Industrial Operations Command.

5. It should be assumed that the tanks have leaked, so the surrounding soil is potentially contaminated. The plans should consider this, and appropriate industrial and radiological hygiene precautions should be taken. In developing the plan consideration may be given to appropriate protective clothing, air monitoring, dust control and mitigation, field surveying for radioactive contamination and bioassays for field workers. Additionally, take precautions to ensure known uncontaminated soil does not become mixed with actually or potentially contaminated soil for waste minimization and cost control purposes.

6. The ARO does not require a unique document. If it satisfies the ARO's requirements, the documentation presented to the NRC by WRAMC in support of their storage facility license will suffice.

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7. The point of contact is MAJ Brent Bredehoft at 703-806-7861, bredehof@usanca-smtp.army.mil.

FOR THE DIRECTOR:

BRENDAN M. BURNS
Army Reactor Program Manager

CF:
OTSG, MCHL-HP (COL Johnson)

9/18/98

TO: Dave Burton
(202) 356-0086

From: Michael Borich

A start. Also sent to you on e-mail, so you can edit as you wish.

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394-6310

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DORF Retention Tank Removal Plan

1. Background.

a. WRAMC desires to remove three 5000 gallon underground retention tanks located on WRAMC property at the past DORF facility. During DORF operations, the tanks were used to store reactor pool water before the water was either returned to the pool, or pumped to the sanitary sewer.

b. In 1980, during the decommissioning of the DORF facility, the water in the tanks was sampled to support unrestricted release of the facility. The water in the tanks was found to be well below even today's license exempt concentrations for Co-60 and H-3. Since the decommissioning, WRAMC has been discharging low levels of short-lived radionuclide medical waste to the sanitary sewer through tank #3.

c. More recently, to support the removal of the tanks, tank water and sludge from the tanks was removed and sampled for radioactivity. Results were as follows:

(1) Tank water was analyzed by gas proportional counting for alpha and beta activity, by liquid scintillation for H-3 activity, and by gamma spectrometry for photon activity. Water in tanks 2 and 3 was negative for activity, with the exception of 15,000 - 26,000 pCi/l of H-3. This level of tritium is well below the NRC's license exempt concentration of 30,000,000 pCi/l. Water in tank 3 showed H-3 activity of 210,000 to 300,000 pCi/l, which is still well below the NRC license exempt concentration. Water in tank 3 also showed 20 pCi/l for Co-57, and 3,000 pCi/l for Cr-51. These levels are also well below the respective NRC license exempt concentrations of 5,000,000 pCi/l, 20,000,000 pCi/l, respectively. Tank 3 also showed 100 pCi/l of K-40. NRC does not specify a license exempt activity for K-40, but 10CFR20 specifies an effluent release limit of 4,000 pCi/l. The water in all three tanks was negative for the presence of alpha activity, with the exception of tank 3, which showed 200 pCi/l, which is above the NRC's 2 pCi/l effluent release limit. In summary, all tank water appears below a level capable of creating a significant health hazard, with perhaps the exception of the alpha activity in tank 3.

no alph counts in water samp ?

Cr-51 not alpha

(2) Sludge samples were collected off the bottom of each tank. The 0.1 pCi/gm Co-60 activity detected is well below the 500 pCi/gm NRC license exempt limit. The 0.3 pCi/gm Cs-137, and 3 pCi/gm Co-57 activity detected is well below the 5000 pCi/gm NRC license exempt limit that applies to each. And the 200 pCi/gm Cr-

51 activity detected is well below the 20,000 pCi/gm NRC license exempt limit. Alpha activity was again detected in tank 3.

(3) Alpha spectroscopy was performed on the sludge from tank 3 to determine the radionuclide present. Is it naturally occurring, or from license exempt uranium nitrate solutions discharged down the drain?

d. To ensure that there is no gross contamination in the soil surrounding the tank that could create a hazard, a BICRON microrem/hr meter was lowered into each tank. A reference below-grade background measurement was also taken by lowering the instrument into a manhole. The measurement in each tank was approximately the same as that in the reference manhole, namely about 15 urem/hr. Experience shows the surveyor would have easily been able to discern an increase of 5 urem/hr, and considering the tank diameter is 6 feet, and using the gamma factors for Cr-51, Co-57, Co-60, and Cs-137, a 5 urem/hr increase would correspond roughly to activity levels of 313 uCi, 55 uCi, 3.8 uCi, and 15 uCi, respectively, assuming the activity is 1 meter from the detector, and no significant shielded by soil or the tank. If these activities were distributed into only 7.6 kg, 3 kg, 11 kg, and 15 kg of soil, they would meet the NRC's license exempt concentration, and therefore would not constitute a significant health and safety hazard from either internal or external exposure. This is admittedly a rough estimate, but it scopes the potential for a health hazard from contamination at the outside surface of the tank. Th~~is~~ese examples illustrate~~s~~ that the presence of any potentially dangerous gamma emitting contamination outside the tank would probably be visible on the urem/hr meter when placed inside the tank.

2. Tank Removal Plan. Based upon the measurements presented above, removal of the tank is not expected to involve a significant radiation safety hazard. Nonetheless, precautions will be taken as described. Following removal of the tanks, the surveying and sampling of the excavations will be performed as a separate effort, to document the condition of the soil, and allow back filling.

1. To remove the small amount of residual contamination measured in the tank, and to facilitate disposal of the tank as non-radioactive, before the tanks are removed, the sludge will be removed from the tanks and be containerized for disposal as appropriate. The inner tank surfaces will then be flushed with water. This will not present a radiological hazards to the worker because of the license exempt level of radioactivity in the tanks. Nonetheless, workers entering the tank will be instructed ~~of~~ the radiological conditions, and may be equipped with ~~an Army dosimeter,~~ dust mask, and anti-c clothing. No air

monitoring or bioassay will be required. As a precaution, the workers exiting the tanks will be monitored with a pancake probe for contamination upon exiting the tank. OHSA requirements that apply to a confined space will be met.

2. The soil above and around the tanks will then be excavated to expose the outer walls of the tank. Every so often, digging will cease, and soil samples will be collected from against the sides, ends, and bottom of the tank outer surface, to total approximately 30 samples for tank # 3, and 15 each for tanks 2 and 1. These samples will serve as indicators as to whether the tank ever leaked. Also, before the tanks are removed, the sides, ends and bottom of the tank will be monitored for contamination, and smear samples will be taken. Once the tanks are found to be clean, the tanks will be released for recycling or disposal. If the tanks are multi-walled, it will be necessary (by cutting access ports) to gain access to the space between to ensure there is no contamination between the layers. Once the limits in the NRC April 1993 document entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material" are met, the tanks will be release for recycling or disposal. If the tanks are found to contaminated, they will be left in the excavation for decontamination before they are removed. For the purposes of soil analysis, the soil contamination values tabulated in NRC DRAFT NUREG-1549 may be applied. To help ensure the state and EPA will be satisfied with the limits applied to the soil, if and when they have concern as during base closure or realignment, it might be advisable to discuss limits with the state and EPA, and meet them if technically and economically feasible to do so. EPA's risk criteria applied to CERCLA sites can correspond (through modeling) to dose limits much lower than the NRC's 25 mrem/yr limit.

3. Once the tanks are removed, the excavation will remain open to allow sampling of the soil. The samples taken from against the sides, ends, and bottom surfaces of the tank will serve as scoping survey samples. If these samples are clean, the excavations will be surveyed as Class 3 areas, using approximately 15 random sample locations in the tank 1 excavation, 15 in the tank 2 excavations, and 30 in the tank 3 excavation. Once the excavation is shown to be clean, the excavation will be back filled. If soil contamination beyond the release limit is found, the contaminated soil will be removed and containerized for proper disposal.

4. In the unlikely event that contamination exceeding unrestricted area limits is found on the tank or in the surrounding soil, work will stop, and the tank and excavation

will remain in place and undisturbed until a more detailed hazard analysis is completed, and appropriate procedures and precautions are formulated. In such a case, Radiation Control Areas will be controlled and posted as described in the WRAMC byproduct material license, and the provisions of the WRAMC Radiation Protection Program will be applied as appropriate. It will also be necessary in the event of significant contamination to survey the excavations as Class 1 or 2 areas before back filling, and to obtain clean soil for back filling.

3. Radioactive Waste Disposal Any radioactive waste disposal required by this action will be as directed by the U.S. Army Industrial Operations Radioactive Waste Disposal Office, Rock Island, Ill.