405205

SYNOPSIZED MINUTES

CONFERENCE ON RUNIT CLEANUP

4-5 OCTOBER 1977

LAS VEGAS, NEVADA

Encl 2

The signatures of the participants recorded on the next page indicate only their agreement that the summarized minutes accurately reflect the discussions, agreements and consensus reached during the conference. Any exceptions to either the minutes or to the chairman's report by any participant are as noted below. Exceptions and explanations provided to the chairman by participants are appended to the minutes or the chairman's report as appropriate.

SUBJECT: Minutes of Conference

1. A conference convened at Las Vegas, Nevada, 4-5 October 1977 to examine means of meeting requirements for a more definitive, quantitative characterization of the scope of work involved in the radiological cleanup of Runit Island, Enewetak Atoll. The message convening the conference is enclosure 1. A listing of participants and observers is enclosure 2.

2. The conference opened with introduction of participants and observers, and brief remarks by BG Grayson D. Tate, Jr. Commander, Field Command, Defense Nuclear Agency, and Mr. Roger Ray, Department of Energy, Nevada Operations Office, DOE Project Officer. General Tate stressed the overall importance of Runit in the cleanup, the necessity to obtain a better definition of the scope of work involved, and the desire to explore alternative methods of meeting cleanup requirements. Mr. Ray addressed the purpose of the conference and the possible alternative of performing cleanup of Runit first in order to determine resources remaining for use on other islands of the atoll.

3. The chairman briefly reviewed the background of the cleanup, the cleanup requirements, the plan of operations to achieve cleanup, and the specific problem relating the scope of work on Runit to total resources and the availability of resources for cleanup of other islands (Encl 3). Mr. McCraw questioned the FCDNA position that cleanup of all soil contaminated to levels of greater than 400 pCi/g is mandatory and has priority over cleanup of contamination levels between 40 and 400 pCi/g. Mr. McCraw stated that the intent of the AEC Task Group had been to place both conditions at equal priority so long as resources were available. LTC (P) Sanches read an extract

from the AEC Task Group report on this subject (Encl 4). The chairman reiterated the FCDNA position and the fact that resources are constrained, limiting the total amount of work which can be done. This condition forces consideration of reducing the scope of work involved on Runit and the placing of priorities on tasks considered to firm requirements.

4. Dr. Bramlitt reviewed the available data, how the data was obtained and showed views of the island as it appeared during test operations and as it appears now. Printed data is at enclosure 5. There were discussions of Plutonium/Americium ratios, plutonium 238 to plutonium 239/240 ratios and uranium contamination levels. Dr. Bramlitt reviewed the work done on the Erie test site and sampling methods used on areas of southern Runit.

5. The chairman asked participants to consider the QUESTION of what can be concluded from the available data and whether that data can lead to a better definition of the scope of work under conditions prevailing on Runit Island. There were discussions of the methods used to obtain available data; the relative degree of preciseness of aerial survey and in situ survey. The aerial survey technique integrates readings over approximately one hectare each second. Aerial survey isopleth lines are probably accurate to ± 100 feet. The in situ survey integrates over a field of view of 68.8 feet diameter and approximately three centimeters depth. It was concluded that the data presently available would not support refinement of the scope of work involved. Further data is highly desirable.

6. The chairman then addressed the obtaining of such data. There was discussion of methods of measuring both surface level and subsurface contamination levels

and the specified removal criteria. Mr. McCraw read extracts from the four removal criteria contained in the operations plan (OPLAN 600-77) (Encl 6). Miss Barnes stated that it would be impossible to reach even the 50 percent confidence level of not having missed significant subsurface contamination without doing much more profile sampling. For example, to find a particular region of contamination two feet wide, under worst case with the seam parallel to the grid lines, would require sampling every four feet. To provide such characterization would require commitment of substantial resources.

If the characterization is done on a simple yes-no criteria the sampling need not be so precise. Using the highest contamination level recorded on the island, 3200 pCi/g, Dr. Crites demonstrated a calculation showing that a pocket of contamination which would average greater than 400 pCi/g over a 21 meter (68.8 ft) field of view would be approximately seven meters in diameter. Thus sampling on a grid of less than seven meters should locate such a minimum pocket size subsurface contamination of interest.

There was discussion of the one half distance technique for determining the presence or absence (yes-no) of subsurface contamination. Available data indicates only a few sample locations showing subsurface contamination at greater than 400 pCi/g levels. Sample locations are spaced on approximately a 200 foot grid. Moving one half the distance between greater than and less than sample points iteratively should provide boundary definition of contamination areas of interest. This investigation would be limited to those areas where available data indicates high subsurface contamination levels, thus reducing the effort involved. The "7 meter" criteria would set the lower bound of the iterative half distance.

7. There were discussions of techniques for taking profile samples centered primarily on advantages of backhoe versus auger. During the Erie test area investigation 40 sample sites were completed in about 10 days using the backhoe. This was accomplished in spite of the delay imposed by operating in anti-contamination clothing as required by rad-safe procedures. It was concluded that the backhoe was probably faster and provided more precise sampling.

8. The chair requested participants to address the northern half of Runit as three distinct areas, the cactus crater area, a central area, and the Fig/Quince area, and what sampling should apply to each. The consensus was that the Cactus area, showing high levels of subsurface contamination should be treated as is the Fig/Quince area, i.e., one half distance yes-no sampling in the vicinity of locations showing high subsurface contamination. The background history of the central area provides no reason to suspect high subsurface contamination in that area. Therefore, sampling in this area should be limited to a few confirmatory samples sites in areas not covered by the available data. (This probably amounts to something on the order of 20 sites or less.)

9. The ejecta (lip) of cactus Crater presents a special problem. Past history and available data tend to indicate that there may be high subsurface contami nation below the pre detonation surface level. This level is now buried under the ejecta. This condition lead to a brief explanation of the cratering operation and the possible extent of the area to be covered by the entombment. Consensus was that this area should be considered after a better knowledge of the extent of the area to be covered is gained. If the area is to be covered by cement/soil mixture no further sampling is needed. If it is not to be covered, then sampling should be done to confirm presence or absence of

greater than 400 pCi/g contamination levels, both in the ejecta and below the pre-detonation surface. Disposal would be by spreading, for levels less than 400 pCi/g, or crater containment for higher levels.

10. The method of analysis of samples was discussed. It was agreed that a gross alpha count was probably the fastest and simplest method to obtain the yes-no answer sought. This would not define the isotopic contamination content but would provide a base to be supplemented by radio-chemistry analysis which would provide the isotopic content and should be correlatable to gross alpha count for any specific area.

11. Discussion turned to sampling increment to be utilized. Increments discussed included the averaged 10 centimeter depth used for most of the available data; averaged 20 centimeter depth, based on a nominal 6-inch cut capability for a dozer; and 20 centimeter increments with a specific 5 centimeter sample from each increment. The operations plan specifies 5 cm sample depth because past experience at Nevada Test Site has indicated that averaging samples of greater depth leads to anomolous data output. Five centimeter depth samples will be the bases for certification of the condition of the islands upon completion of cleanup. Discussion included the advantages and disadvantages of horizontal averaging versus vertical averaging for sampling. Consensus favored vertical averaging. Discussion also included the capability of the laboratory to analyze the samples produced. Maximum capability would be about 150 samples per day for gamma scan and gross alpha count plus about five percent radiochemical analysis. This level would not permit support of other operations. Other operations could be supported at levels of 50 samples per day input. It was agreed that gamma scan of samples at the laboratory could be used to select samples for analysis. Only the "hot" samples would be analyzed. Other

samples would be held for future use depending on the outcome of the "hot" sample analysis. This technique was favored over using gamma scan on sample site sidewalls and only sampling "hot" areas. This concluded the first day's discussion.

12. Discussion resumed on 5 October. The chair outlined the two incremental sampling techniques discussed and proposed adoption of 20 cm sampling increments with a discrete 5 cm sample to be taken from each 20 cm increment. This technique should suffice for characterization and may also meet some certification requirements. The proposal was accepted.

13. The chair requested the group consider depth to which sampling should extend. Consensus indicated that a depth of 120 cm generally will suffice but that the option to go deeper should be left to field personnel. It may be particularly desirable to go to greater sampling depths in areas of ground zeros, in burm or mound areas, and in ejecta areas near Cactus crater. The backhoe may not suffice for some of these depths (greater than 10 feet) and other equipment may be required.

14. Discussion reverted to the sampling grid to be used for characterization. Mr. Church proposed, for consideration, a 10 meter grid for the "hot" areas (Fig/Quince and Cactus Crater areas), and a wider spaced grid for the "clean" area in between. Several members indicated their support for the half distance technique for initial exploration with grid size to be decided later based on data obtained from initial efforts. This lead to extensive discussion of desire for data versus reasonable expenditure of resources and purpose and extent of characterization. The chair maintained that characterization should be limited to determining the extent of known subterranean pockets and the extent of surface contamination areas. The effort should not extend

to exploration to locate other possible subterranean pockets. Mr. Church stated that the available data was not extensive enough to support a contention that other pockets did not exist. For purposes of certification there would have to be additional data taken. The same method of obtaining data for certification applies to all islands. This consists of in-~~sites~~ SITU and surface soil sample surveys, and investigation of suspected burial sites, supplemented by selected soil profiling data. Obviously, the greater the density of soil sampling profile data, the lower the chance of being surprized later in the cleanup.

After extensive discussion, the following was proposed and accepted. The northern half of the island will be gridded on a 50 meter grid. The "cool" area will be sampled first in order to characterize the areas to be used for stockpiling of soil and debris from other islands. Approximately 16 to 50 sample sites will be required, depending on initial findings. Areas are to be decided based on stockpile locations. Sampling transects should be cut through the mounds in this area to characterize the contents thereof. Characterization of the extent of subsurface pockets can use an adaptation of the one half distance technique, working along the 50 meter grid lines. Density of other sampling in the "hot" areas can be decided on basis of data obtained from the "pocket" investigation.

Use of the standard 50 meter grid will permit use of data obtained during characterization for consideration for certification. Although Runit will be no different in method for certification, the history of the island and available data do indicate a probable requirement for higher density survey than may be required for other islands. This led to a discussion of the advantages and disadvantages of placing contaminated stockpiles on relatively uncontaminated areas. It would generally be better to put contaminated stockpiles in areas known to be contaminated to similar or higher levels. The "cool" area requires relatively few sampling sites and to place the contaminated stockpile in the "hot" area may interfere with the characterization effort.

15. It was agreed that when resources permit it would be highly desirable to use one IMP to further refine the area of surface contamination to be removed. These areas are defined, in the Fig/Quince Area, by aerial survey contours. The Cactus Crater area is not defined. In-~~sites~~ SITU survey refinement would assist considerably in refining the estimates of area, and thus volume, to be excised. Mr. Church proposed to use the IMP only to move in toward hot areas and define the periphery of those areas over 400 P ci/g. This would not be a full survey but would refine the area boundries and would avoid risk of high contamination of the IMP. There was discussion of use of this "peripheral" technique as compared to a full survey. It was agreed that the peripheral technique would not totally define the surface area but certainly should provide better estimating data than the

aerial survey. Used on the grid lines the characterization effort would be directly applicable to the full survey for certification and, thus, is not wasted effort.

16. It was recommended by Mr. Dales that the FRST and field instruments be used to search the Fig/Quince area for very localized "hot spots" and "chunks". Removal of such spots, by shovel and bagging techniques, could contribute measurably to reducing the areas measured to be over 400 P ci/g by in-~~sites~~ SITU survey. This should be done prior to soil profiling and in-~~sites~~ SITU survey. It appears that the overlap period for FRST members would be an excellent opportunity to conduct this effort. It would contribute to training with a meaningful effort. This may also apply to soil profiling efforts.

17. The question was raised whether soil profiling in known hot pocket areas would disturb the validity of the in-~~sites~~ SITU survey. It was concluded that it probably would not. It would be desirable to perform the in-~~sites~~ SITU survey before soil profiling but this is not an absolute necessity. "Hot" piles from soil profiling can be shielded from the IMP view.

18. The cost in resources and time required was assessed. It was generally agreed that these costs can not be accurately assessed at this time. Density of profiling efforts and of the in-situ survey effort depends, to some extent, on the initial data obtained. However, the effort does not appear to be excessive. Additionally, as proposed for conduct it largely contributes directly to effort required anyway for certification. This only minimal resource expenditure is devoted exclusively to the characterization effort. The efforts which may not be directly contributory are the delimination of the subterranean pockets and the FRST pick up of "hot spots".

19. Mr Doles ask what priorty would be given to this characterization operation. He indicated that without some priority the operation would be only sporadic and require a long time. The chair replied that this operation should receive the same priority as the beginning of cleanups on Leyor and Boken. Hopefully assets available would permit simultaneous work on cleanup and characterization. Mr. Doles expressed concern that much time would be wasted unless the characterization effort had priority on logistic support, particularly boat transportation support. The chair stated that priority within reason would be afforded to ensure as smooth an operation as possible under circumstances existing on the atoll.

20. The group discussed time frames and future meetings. It was agreed that 90 days appeared to be a reasonable target for obtaining data for the characterization. Data only for certification could be obtained during cleanup of Runit. The group would plan to meet again, at the call of the Chairman, after the characterization data is available.

21. The chair ADDRESSED ~~requested that~~ the question of "plowing" to further homogonize Runit soil, thus reducing the "hot spot" concentrations. Mr. Yoder stated that cleanup experience so far indicates that we have had to go back repeatedly to cleanup to new, lower levels. Plowing will simply make such future cleanup more difficult and he strongly recommends against plowing. Further discussion indicated that ~~while~~ plowing generally tends to lower average concentrations, and if the primary problem is air resuspension, plowing may help. However, in the specific case of Runit plowing might result in increasing surface levels by bringing subsurface contamination to the surface. This condition would be worse than doing nothing. It was generally agreed that plowing should not be used to meet cleanup criteria. After cleanup plowing may be considered to further reduce concentration in "hot" areas. However, if plowing is used, for any reason, it must be fully justified and defensible. Plowing should in all cases be kept shallow, on the order of six inches.

22. The concept of limiting disposal soil quantities by spreading lower level contaminated soil from other islands on Runit was discussed. It was agreed that leaving such soil uncontained on Runit was preferrable to leaving it on other islands of greater potential benefit. If this concept is used the soil should not be spread on Runit. The soil should, instead, be used to fill in holes, left by cleanup of Runit, and/or left in one stockpile. Whichever is done the area should be clearly identified and deliniated for future reference. A re-assay of the soil would be necessary for certification purposes.

23. The group indicated a concensus that amounts of soil excised, amounts of soil entombed, and amounts of soil left uncontained should be recorded. An estimate of the curie content of activity entombed and left uncontained should be recorded for future use. This could be done by sampling truckloads and estimating content thereof.

24. The chair thanked the attendees and outlined his plan for report and minutes submission. The conference adjourned.

RUNIT CLEANUP CONFERENCE

AGENDA

0830 4 OCT 77

1. INTRODUCTION -

2. BACKGROUND -

3. PROBLEM -

4. DATA REVIEW -

5. DISCUSSION -

CF:
FCD/FC
COL HEMMER
LTC SANCHES
DR. BRAMLITT

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RUNIT MEETING
AGENDA

1. INTRODUCTION - COL Treat

2. BACKGROUND/REQUIREMENT/PLAN - COL Treat

   a. BACKGROUND

   View Graph

   Enewetak Evacuated - 1947
   Tests 1947 thru 1958
   Runit worst - 18 tests
   Return to TTPI - 1972
   Auth for Cleanup - 1976
   Limitations - 20 or +

   b. REQUIREMENT

   View Graph

   1. Hazardous nonradioactive debris
   2. Radioactive debris
   3. Burial site(s)
   4. >400 pCi/g - mandatory (NBLB)
   5. 40-400 pCi/g - case by case
   6. <40 pCi/g - no action

   c. PLAN

   View Graph

   1. Classify debris
   2. Clear brush
   3. Rad measurement (survey)
   4. Excise soil
   5. Re-survey
   6. Excise soil
   7. Etc: to level
   8. Concurrent - burial sites
   9. Move to Runit - radioactive
   10. Dump nonradioactive
   11. Stockpile & dispose (crater)

3. PROBLEM

   View Graph

   a. Runit vs Resources
   b. Heterogeneous = uncertainty
   c. Volume - 80% or 63,000 cu yd vs 16,000 cu yd. Validity
   d. Uncertainty $\rightarrow$ uncertainty
   e. Can we get better definition of scope of work - within reasonable expenditure of resources.
   f. Recommend - method
      size of effort

4. DATA REVIEW

   Runit Map

   a. Pace data
   b. EPA data
   c. NVO - 140 data
   d. Crater area
   e. "Clean area"
   f. Fig/Quince area

5. OPEN DISCUSSION
   a. Can we get definition
   b. How (method(s))
   c. Cost (Resources)

options. The numerical guidance therein should be reduced by the factors of 50 percent for individual exposure and 20 percent for gonadal exposure considering that exposures cannot be precisely predicted. The detailed rationale for these reductions is provided in Appendix III. The resulting guides for planning cleanup actions will then be:

Whole body and bone marrow -	0.25 Rem/yr
Thyroid -	0.75 Rem/yr
Bone -	0.75 Rem/yr
Gonads -	4 Rem in 30 yr

- Since there is no adequate scientific information which would support general guidance for cleanup of plutonium contaminated soil, guidance can only be developed on a case-by-case basis using conservative assumptions and safety factors. With this in mind, the Task Group recommends the following for use in making decisions concerning ^{239}Pu cleanup operations at Enewetak:

  a. < 40 pCi/gm of soil - corrective action not required.

  b. 40 to 400 pCi/gm of soil - corrective action determined on a case-by-case basis* considering all radiological conditions.

  c. > 400 pCi/gm of soil - corrective action required.

ASSESSMENT OF DOSES AND THE RESULTS OF ALTERNATIVE CORRECTIVE ACTIONS

The Task Group approach for development of judgments and recommendations for the radiological cleanup and rehabilitation of Enewetak was to consider a number of alternatives for exposure reduction that may be feasible. Basically, the procedure involved four steps:

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*See Appendix III for additional guidance.

Encl 4

g. The concept of phased operations presents the opportunity to make an initial gross survey of the islands to identify those with the highest probability for soil removal. These data will greatly assist in developing working estimates of soil to be removed.

h. An ERDA aerial survey system will be fielded as early as possible (i.e., shipped in mid-June and operational shortly thereafter). This aerial system would proceed to survey the islands where soil removal possibilities exist (see Tabs A and B to Appendix 2 of Annex C).

i. The first van will be shipped approximately 1 July and become operational in mid-July, a second van, will be operational in August and both will commence with the fine surveys. By the August/September time frame, sufficient fine surveys can be completed to allow soil removal to begin in the planned mid-November time frame. As noted in 3.b above, the initial soil samples for van calibrations will be sent to McClellan AFB for analysis. The Radiochemistry Laboratory is expected to become operational on Enewetak in August.

j. A third van is expected to be on Enewetak at the end of September. This van is intended as an operating spare replacement for the operating vans.

4. PU SURVEY CRITERIA:

a. The AEC Task Group recommendations and guidance were by design, general in nature. Subsequently, criteria have been developed by ERDA to guide the in situ soil assay.

b. A case-by-case evaluation by the CJTG (with the advice of the RCC) of the requirements for soil removal, taking into consideration the location

NCL 6

(island), planned use, economics and the AEC/ERDA Task Group recommendations, will be required for each of the islands where contamination is found to exist. The resulting evaluation should lead to one of the four following conditions which have been recommended by ERDA.

(1) Condition A. When an assay area[1] is determined by either direct measurement or extrapolation, to exceed 400 pCi/g (at the 67 percent confidence level[2]), the following actions will be taken:

(a) The area will be fine surveyed and isopleths drawn which define the region which exceeds local background[3].

(b) Vertical soil profiles will be taken to evaluate the effectiveness of excavation as a means of reducing the resuspension potential[4].

(c) An iterative excavation plan will be executed to:

1. Reduce the assay area average concentration below 400 pCi/g[5].

2. Reduce the average concentration of the "defined region" to some lower number which shall be determined by cost-benefit considerations but will usually not be below local background.

(d) The region will be resurveyed and the results documented.

(2) Condition B. When a half hectare is determined by either direct measurement or extrapolation to exceed 100 pCi/g (at the 67 percent confidence level), the following actions will be taken:

(a) The area will be fine surveyed and isopleths drawn which define the region which exceeds local background.

(b) Vertical soil profiles will be taken to evaluate the effectiveness of excavation as a means of reducing the Resuspension Potential.

(c) An iterative excavation plan will be executed to:

1. Reduce the half hectare area average concentration below 100 pCi/g.

2. Reduce the average concentration of the "defined region" to some lower number which shall be determined by cost-benefit considerations but will usually not be below local background.

(d) The region will be resurveyed and the results documented.

(3) Condition C: When a quarter hectare is determined by either direct measurement or extrapolation to exceed 40 pCi/g (at the 67 percent confidence level number), the following actions will be taken:

(a) The area will be fine surveyed and isopleths drawn which define the region which exceeds local background.

(b) Vertical soil profiles will be taken to evaluate the effectiveness of excavation as a means of reducing the Resuspension Potential.

(c) An iterative excavation plan will be executed to:

1. Reduce the quarter hectare area average concentration

below 10 pCi/g.

2. Reduce the average concentration of the "defined region" to some lower number which shall be determined by cost-benefit considerations, but will usually not be below local background.

(4) Condition D: An assay area whose average Pu concentration is any 5 cm thickness of soil below the surface layer when measured[/1] (at the 67 percent confidence level) to exceed 400 pCi/g will be excavated and measured iteratively until its average Pu concentration in the new 5 cm layer is found by measurement (at the 50 percent confidence level) to be reduced in the defined region to some lower number which shall be determined by cost - benefit considerations, but will usually not be below local background.

Footnotes:

[/1] Assay Area. The field of view of the in situ detector in its normal operating position; typically a 28 meter diameter circle of 5 - 5 cm in depth. Scattered measurement can be used to estimate average concentrations between such measurements by means of a linear estimator program known as "Krigging."

[/2] Statistically, two-thirds of the time the actual concentration will be below the guide number. One-third of the time the actual concentration may exceed the number by some percentage which must be empirically determined (up to 20-30 percent, as an estimate). This is similar to using a 50 percent confidence level with a numerical guide 20-30 percent (estimated) lower. If a 90 percent confidence level were used with the numerical guide, the equivalent guide at a 50 percent confidence level would