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RADCON
PLAN

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RADIOLOGICAL CLEANUP PLAN FOR ENEWETAK ATOLL

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RADIOLOGICAL CLEANUP PLAN FOR ENEWETAK ATOLL

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RADIOLOGICAL CLEANUP PLAN FOR THE ENEWETAK ATOLL

I. PURPOSE

This Plan serves as the basis on which the radiological cleanup of Enewetak Atoll will be conducted. (Nonradiological cleanup is included only where necessary to differentiate the two.) The Plan attempts to structure a cleanup which incorporates the AEC Task Group Recommendations and other established radiation principles and practices with engineering methods and technology available for cleanup within the major constraint of limited funds authorized by the Congress. It covers the cleanup of contaminated soil and debris in accordance with the Environmental Impact Statement, and the radiation safety necessary to accomplish these endeavors in a satisfactory manner. Following approval of this Plan, detailed Standing Operating Procedures (SOPs) will be prepared as necessary.

II. SOIL CLEANUP

A. GENERAL.

1. The only contaminated soil to be removed as part of Cleanup is that which is contaminated with plutonium and its decay products. A basic assumption of the Cleanup Plan is that the AEC Enewetak Radiological Survey (AEC Report NVO-140, Oct 73) located all significant areas of such contamination. The Survey did not investigate every "square inch" of the Atoll; however, a random-sampling method was employed which was biased to increase sampling frequency in areas suspected of being contaminated because they were previously surface ground zeros and/or in fallout patterns, and in areas which were considered likely to be inhabited someday. Sufficient samples were taken and analyzed from other areas such that the probability of any significant "hot spots" being missed is considered negligibly small. In other words, the Survey will be accepted as an authoritative source for having identified all areas potentially requiring plutonium-contaminated soil removal and no additional areas or "hot spots" are expected nor will any be searched for intentionally. Only if additional evidence is forthcoming will other areas be investigated for plutonium contamination.

2. Areas will be investigated as potentially requiring soil Cleanup only if the Survey reported them to have plutonium at concentrations greater than 40 pCi/g. Further, the numerical concentration values reported in NVO-140 will be the deciding factor irregardless of

sample dimensions or configuration. Thus, for example, samples which were 10-cm thick will be considered equally with samples which were 15-cm thick if they both were reported to have the same plutonium concentrations. Accordingly, islands or portions of islands which the Survey showed to have plutonium at less than 40 pCi/g will ~~not be investigated.~~

Before this should be one of well look other places as
B. PU SUSPECT AREAS. *Research part to add documentation of these low level (if any other from historical study area)*

1. Enclosure 1 differentiates those islands and portions of islands which might require soil removal from those which will definitely not require soil removal. (Approval of this Plan by ERDA is tantamount to a certification that the islands and portions of islands excluded from cleanup according to Enclosure 1 do not have plutonium contamination; namely, 40 pCi/g.) Without strong and new evidence to the contrary, only the areas designated for sampling in Enclosure 1 will be investigated. These areas will be referred to henceforth as "Pu suspect areas."

Sampling of
2. ^{with} Pu suspect areas will be ~~sampled at the locations specified~~ *begin at the plan* in Enclosure 1. ~~Each Pu suspect area will be surveyed to establish the~~ *advising that changes may occur as data is collected* horizontal coordinates and elevations of locations to be sampled. These sample locations will be uniquely marked so that on subsequent visits to a Pu suspect area the sampling locations can be readily identified. For areas having dense or tall vegetation that might interfere with survey-

ing and sampling, paths will be made. In so doing, vegetation will be removed with the least possible disturbance to the underlying soil; e.g., brush will be mowed down by either manual or mechanical means which attempt to leave root structures intact. Any brush which is cut will be collected and removed from the Pu suspect area and mechanically chopped to make mulch. All vegetation thus removed will be assumed to be noncontaminated with plutonium, but will be treated respectfully as though it might contain other radioactive contaminants. Accordingly, it will not be burned.

appropriate
3. ~~FIDLER~~ readings will be made while the soil sampling is being performed. Locations which give a clear plutonium response will be documented (by the surveyors) along with the reading.

C. SAMPLING METHODS.

1. Samples will be taken at either the air-ground interface (surface) or at depths beneath the interface (profile). Surface samples will be obtained by using a "top-soil cutter" tool which will facilitate removing sod to a depth of 5 cm within a well-defined area. The cutter area (or total area sampled) will be sufficient to give a sample mass which can be analyzed for plutonium by gamma spectroscopy (absolute counting of Am-241 gammas) down to the 40 pCi/g range. The mass is to be determined but probably will be in the order of 0.5 kg. Profile sam-

ples will be obtained by digging a trench immediately adjacent to the area to be sampled and removing soil from the trench wall by pushing into it a square pan with cutting edges on one open side. The pan will have a top-to-bottom distance of 5 cm and total mass collected will be the same as with surface samples.

2. Sample locations will be described; e.g., location is open savannah, brush-covered, or forested, and level, mounded or depressed, as such information might provide additional clues for defining the bounds of cleanup areas.

3. Other techniques may prove useful in the field and soil stations.

D. SAMPLE PREPARATION.

Samples will be prepared for gamma spectroscopy by breaking up aggregates and pulling apart topsoil plugs (consisting of vegetation and root mat) as necessary. Any vegetation will be cut up so that it can eventually be distributed homogeneously. Samples will be dried sufficiently to allow successful mixing. Except for large rocks, which will be separated and discarded without taking any special efforts to remove surface deposits, the entire sample will be blended to give a more-or-less homogeneous matrix. A weighed quantity of the mixed sample will be packed into a standard-size container for analysis.

E. PU ANALYSIS.

1. Plutonium assay will be by nondestructive analysis whenever possible, employing high-resolution gamma-ray spectrometers with either intrinsic or lithium-drifted germanium detectors. The 64 keV gamma ray from the decay of Am-241 will be the indicator of plutonium. The counting system will be calibrated with Am-241-spiked soil samples equivalent to plutonium concentrations covering the range of interest, say 10 to 2000 pCi/g. The activity ratio of Am-241/Pu-239 will be assumed to be 0.4 as reported in NVO¹⁴⁹, pg 97. In determining the total Pu activity, the Pu-238/Pu-239 ratio of 0.1 will be used, and no other Pu isotopes will be considered. Each sample will be analyzed (counted) once for a specified time, on the order of 50 minutes.

2. For samples whose Pu concentration is deemed critical to the conduct of Cleanup, analysis will be by standard radiochemical means using an acid-extraction, electro-deposition of unknown plutonium with tracer, and counting by alpha spectrometry.

F. PU CLEANUP AREAS.

Sample analyses will be correlated with survey data, any on-site FIDLER readings and qualitative observations. If no samples yield Pu concentrations greater than 40 pCi/g, the Pu suspect area will be considered as noncontaminated and certified to be clean. If any positive readings (greater than 40 pCi/g) are obtained, they will either indicate

areas to be sampled in greater detail or will serve to define areas potentially (see Cleanup ranking below) to be cleaned. If more data is deemed necessary in order to better define cleanup areas, the survey/sampling process described above will be repeated.

G. CLEANUP.

1. The border of areas to be cleaned will be marked by surveyors. The entire enclosed area will then be devegetated in the manner which causes the least disturbance to underlying soil. Mowed vegetation will be removed for mulching. Easily removable contaminated and noncontaminated debris will also be taken away (see Part III B Criteria). Large structures and concrete slabs which likely were in place prior to the deposition of any plutonium and which do not interfere with Cleanup will not be removed unless "swipes" show excessive removable plutonium is present.

2. For those Pu-contaminated areas which have highest concentrations near the air-ground interface (the majority of the Pu suspect areas), the soil will be removed in thin layers, one layer at a time, to a depth of at least 15 cm. The layers of soil and root mats will be assembled at central collection points, loaded into open bed trucks, covered and transported to the ultimate disposal site.

3. For Pu-contaminated areas which have high Pu concentrations at great depths, soil will be removed in conveniently thick layers until approaching the required excavation limits, then they will be removed in thin layers as described above.

4. Cleanup areas will be sampled at some to-be-determined frequency during soil removal operations to permit decisions on removing additional soil or certifying the area as cleaned. The scraping/sampling will be repeated iteratively, presumably reducing the area for cleanup with each pass, until an acceptable level has been reached. The endpoint to Cleanup at any site will be when plutonium concentration is assuredly below 40 pCi/g according to the gamma spectroscopy counting method employed. Areas that ERDA certifies as clean will subsequently be sown with grass seed.

H. RANKING.

The Pu suspect areas together encompass an area of approximately 150 acres. This total is probably on the high side, however, as suspect area bounds were liberally placed. As summarized in Enclosure 1, nearly 4,000 samples are initially programmed for analysis to ~~eliminate the suspicions~~ and define the areas deserving Cleanup. The last column in Enclosure 1 summarizes an attempt to estimate the quantity of material which would be excised if the entire 150 acres must be cleaned up. The volumes were calculated by assuming that areas with significant contamination at the surface only will require cleanup to a depth of 15 cm, and areas which are contaminated to greater depths will be cleaned up to a depth approximately at the point where the AEC Survey shows Pu con-

centration to decrease to 40 pCi/g. The total volume according to these estimates is about 120,000 cubic meters (157,000 cubic yards). As such quantities might exhaust resources available, contaminated areas will be ranked following their initial definition. The ranking will consider factors such as the depth of burial, Pu distribution in each area, range and absolute values of concentrations, time and efforts required to perform soil removal, location of areas, etc, and will be negotiated with the ERDA Representative. The areas will be cleaned up according to their ranking.

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III. DEBRIS CLEANUP

A. GENERAL

1. The AEC Task Group recommended that "all radioactive scrap metal and contaminated debris now or later identified" should be removed from Enewetak Atoll as part of Cleanup. Holmes & Narver, Inc, made the initial identification (H&N-1348) based on radiation measurements made during a brief two-week period of the Engineering Survey (12 Oct-21 Dec 72) by monitorings from the EPA working under the direction of the AEC. The Cleanup EIS estimates that materials identified as contaminated in H&N-1348 occupy a total volume of 7,262 cubic yards.

2. The two-week contaminated debris survey was limited to the detection of gamma contamination (alpha and beta contamination were not sought) present on the ten islands which had either surface ground zeros or heavy, close-in fallout. Additionally, only structures and scrap which were on the surface, visible and accessible were inspected, and no

attempt was made to search for structures not shown on as-built drawings. Thus, although H&N-1348 lists about 400 items of debris for the ten islands, the AEC (in report NVO-140) reports radiation measurements for only half of them (about 190 items).

3. The AEC did not establish any criteria for designating debris as contaminated. NVO-140 merely reports a single gamma exposure rate (presumably the highest) for the general area of an item of debris. Thus, for example, a "scattered junkpile" on Alice is given a value of 120mR/h and without any indication of the quantity of junk which has that exposure rate or whether any of the junk should be labeled as contaminated or noncontaminated. Cleanup will make the differentiation by comparison against specific criteria.

Handwritten notes:
Alice
120mR/h
junkpile
contaminated

B. CRITERIA

1. No material is totally devoid of radioactivity. However, not every material should be considered as a radioactive pollutant worthy of decontamination. Some level of radioactivity below which a material should not be regarded as "contaminated" is proper. This is particularly appropriate at Enewetak since the general background to remain after Cleanup will in many places be greater than the radiation level from any individual item. No Federal or International rules and regulations are directly suitable for Cleanup, so this Radiological Plan will promulgate criteria for Cleanup.

2. The AEC Task Group and the Cleanup EIS note that materials which might be used by people in place or removed for use elsewhere are the ones of concern. Since there are post-Cleanup constraints on use of



"contaminated" organic materials (plants and animals), the Cleanup materials available for differentiation (contaminated or noncontaminated) are metal and concrete. These materials will collectively be called "debris."

3. The radioactivity of debris can be removable surface contamination or fixed (nonremovable) contamination either on the surface or distributed throughout, as might result from activation. Cleanup will assume that any alpha radioactivity is present only as removable contamination, beta radiation is the predominant fixed contamination of concrete debris, and gamma radiation is the predominant fixed contamination of metallic debris.

4. Debris will be considered as contaminated and programmed for radiological Cleanup if it gives either:

(a) to a filter-paper swipe over a 100cm^2 area, an alpha radiation disintegration rate ≥ 20 dpm;

(b) an absorbed dose rate ≥ 100 $\mu\text{rad/h}$ when measured at a one cm distance through not more than seven mg/cm^2 absorbing material;
or

(c) an exposure rate ≥ 15 $\mu\text{R/h}$ at a 30 cm distance.

C. PROCEDURES

1. Cleanup will assume that the only islands which might have contaminated debris are those listed in Enclosure 2. ^(Approval of this Plan by ERDA is tantamount to a certification that the islands excluded from Enclosure 2 do not have contaminated debris.) These islands comprise about 900 acres including the 150 acres to be investigated for soil Cleanup. The entire 900 acres will be searched for debris, and all which is found will be monitored for classification according the above contamination criteria. The search will include thinning over-grown areas as necessary to permit a visual search for concrete and metallic debris. The only buried debris to be investigated will be at locations reported to be radioactive material burial sites.

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Handwritten notes:
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2. Each item of debris will be filter-paper swiped and large items will be swiped at least once for every 10 m² of exposed surface. The swipes will be counted for alpha radiation. Exposed surfaces of concrete debris will be monitored for beta/gamma radiation according to criterion in para III.B.4(b) at a frequency of at least one reading for every square meter. Metallic debris will be thoroughly monitored for gamma radiation according to criterion in para III.B.4(c). All debris which qualified as "contaminated" will be uniquely marked for disposal.

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The noncontaminated debris will also be marked but disposed of only if it poses a physical hazard or is an obstruction to intended use of the site on which it is located. Records will be maintained of radiation readings for each item.

3. Contaminated debris will be collected and loaded in open-bed trucks ^(Conditioned) for transport by barge to the disposal site. The trucks will be monitored to assure that the absorbed dose rate at no point on the external surface exceeds 0.5 mrem/h. Any contaminated debris which might cause this limit to be exceeded will be separated and safely packaged for transport. Debris for Cleanup that is not contaminated as defined herein will be disposed of as noncontaminated debris regardless of any residual contamination it might possess.

IV. RADIATION SAFETY

A. GENERAL.

The level of radioactivity at Enewetak Atoll, as reported in the AEC Radiological Survey, is sufficiently low that persons may visit almost every location there without ^{concern} ~~fear~~ of being exposed to radiation in excess of established radiation protection guides. Cleanup is needed, however, because these guides would be exceeded if persons were to dwell throughout the Atoll. Cleanup itself needs radiation safety precautions because possibilities exist that previously undetected contamination will be uncovered, stockpiling of contaminated debris will enhance local radiation intensity, and cleanup activities will make plutonium more readily available for assimilation before it is contained. The safety precautions will result from a cleanup radiation safety policy which complies with the established guides, as well as makes every reasonable effort to maintain radiation exposure as low as is reasonable achievable taking into account the state of technology and the economics of improvements in relation to benefits to health and safety, and other societal and socioeconomic considerations.

B. APPLICABILITY.

1. Cleanup is a responsibility assigned to the Department of Defense and delegated to the Defense Nuclear Agency (DNA). Army engineer personnel will be assigned to perform the physical and radiological cleanup for, under the overall management of, a DNA Joint Task Group. Although support will also come from other military services, federal agencies, and contractors, the Cleanup will be primarily an "Army Job." Accordingly, radiation safety will comply with Army Regulations insofar as is practical.

2. The Army Regulations will apply to all individuals who are at Enewetak Atoll during the period of Cleanup. Personnel not under control of DNA shall comply in all respects with the regulations or be denied access to Enewetak Atoll. The Cleanup Commander may permit variances however, if, in his judgement, an essential task cannot otherwise be accomplished. In such cases, adequate alternate safety procedures will be established.

C. CONTROLLED AREAS.

A "controlled area" is a defined area in which the exposure of personnel to ionizing radiation is under the supervision of an individual responsible for radiation protection. Initially, islands listed in Enclosure 2 will be designated as controlled areas. Controls will not be removed until the ERDA representative issues a certification acknowledging that the defined area is rid of contaminated debris and soil as defined in Parts ^{II} and ^{III} of this Plan.

D. RADIATION PROTECTION STANDARDS.

1. A "radiation worker" is an individual who might be exposed to more than 10 percent of the basic radiation protection standards (See Enclosure 3) as a result of his employment or duties in a controlled area. An "occasionally exposed individual" is one whose work is not normally performed in a controlled area and whose duties do not normally involve exposure to ionizing radiation; however, the individual may have reason to enter a controlled area in the performance of duties. Occasionally exposed individuals will not receive an exposure to ionizing radiation in excess of that allowed for any individual in the population at large.

2. Essentially all of cleanup can be accomplished by personnel categorized as occasionally exposed individuals; accordingly, the majority of the workforce will be treated as such insofar as radiation limits are concerned. If, on the other hand, radiation areas (See IV G.4) should be established, they will be assigned to personnel having the most experience with radiation, and qualifying as radiation workers.

E. MEDICAL EXAMINATIONS.

1. Preplacement and termination medical examinations will be given to all cleanup personnel. The examinations will include a review of prior occupational exposure and a description of any unusual exposure resulting from previous occupations, accidents, incidents, or therapeutic procedures, for the purpose of evaluating an individual's acceptability into the cleanup operation. Also, the examinations will include a lung count for any individual who may have worked with plutonium at some previous time.

*will include
from plutonium
for*

2. Plutonium represents the greatest radiation hazard facing Cleanup workers. Although plutonium at Enewetak is harmless while it remains outside the body, it could cause deleterious effects if it enters the body. Precautions will be taken to prevent the inhalation or ingestion of plutonium, but a bioassay program will be prescribed to monitor the effectiveness of the precautions.

3. The principal bioassay method will be urine analysis. Urine samples will be taken on a periodic basis from all workers who at

*will be monitored via nose or fecal samples,
if quantitative additional sampling will be implemented
(this is, probably, they (units))*



any time are in the vicinity of plutonium contamination. Urine samples will be analyzed for plutonium to a sensitivity of at least 0.3 pCi. If positive readings should be obtained, additional bioassays; e.g., fecal analysis or lung counts, will be prescribed.

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F. TRAINING.

All personnel who may at any time frequent or work in any controlled area will be informed by such means as lectures, briefings, handouts and notices, of:

(a) Health hazards associated with exposure to radioactive material or radiation,

(b) precautions or procedures to minimize exposure,

(c) purposes and functions of protective devices employed,

(d) decontamination purposes and procedures,

(e) responsibility of each individual to promptly report any condition which may lead to or cause a violation of radiological safety regulations and procedures or unnecessary exposures,

(f) radiation exposure reports which will be maintained on each person, and

(g) management's commitment to keep occupational exposures as low as is reasonably achievable.

Such training will be sufficient to ensure that the workers can correctly answer questions on radiation protection as it relates to their job.



G. PERSONNEL DOSIMETRY.

1. The primary dosimetry device will be the film badge, and the Army Photodosimetry Service shall be employed. The film badge contains one or more photographic emulsions and is designed to differentiate between beta particles, gamma rays, and x-rays.

2. A film badge will be worn by all personnel upon entering a controlled area. It will be worn on the front surface below the shoulders, above the hips, and on the outside of clothing, except where contamination of the badge could occur, or in difficult working conditions where the film badge might be lost or damaged. In such cases, the film badge will be worn under protective clothing.

3. The film badge wearer will be responsible for his badge and the contained film and will take care to avoid its exposure to excessive heat, humidity or moisture.

4. A self-reading pocket dosimeter will be worn, in addition to the film badge, at all times when an individual is in a radiation area; i.e., in any area in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose equivalent in excess of 2 mrem or in any five consecutive days a dose equivalent in excess of 100 mrems. Radiation areas will be identified during the initial radiological reconnaissance of each island. Exposure accumulated by the pocket dosimeters will be documented.

H. PROTECTIVE CLOTHING.

1. Plutonium is the only radiological threat of Cleanup which requires a protective-clothing response. As previously noted, Pu in the

ground is not a hazard, but if the ground is disturbed, personnel may come into contact with the Pu and be harmed. Persons operating in the vicinity of the disturbed ground might either inhale resuspended Pu directly, or become externally contaminated and susceptible to subsequent internal contamination of themselves or others. All Cleanup operations which disturb Pu-contaminated soil will thus be performed by personnel adequately protected.

2. The protective clothing prescribed for Pu operations may range from shoe covers and a surgical mask to a full compliment of shoe covers, coveralls, gloves, head covers and facepieces with either filters or air lines. Although it is proper to don adequate protective clothing, there are numerous reasons for not overdressing. For example, full-suiting may be intolerable when worn for extended periods in the warm, humid climate indigeneous to Enewetak. The "protection" provided by the clothes could in fact cause harm by leading to heat injuries. Thus, there is an incentive to wear just what is necessary and no more. The proper and minimum clothing will only be known precisely following an evaluation of on-site monitoring (e.g., air samples and nose swipes) against permissible contamination limits (See Enclosure 3); nevertheless, some initial protective-clothing requirements are described below.

3. With perhaps the exception of Pu suspect areas on Runit, no surface locations at Enewetak Atoll have a sufficiently high Pu concentration that they pose a hazard to persons merely walking on them; i.e., ordinary "foot traffic" is assumed to not create any resuspension prob-

lems and accordingly it requires no protective clothing. Likewise, the vegetation-thinning operations with minimum disturbance to root structures (to permit surveying and soil sampling) will be performed without protective clothing. In the case of Runit, air sampling results reported in the AEC Survey indicate that some caution should always be observed; therefore, the minimal precautions prescribed in the FCDNA Interim Quarantine for Runit Island will continue to be observed on Runit.

4. Personnel who collect surface soil samples from Pu suspect areas conceivably could come into intimate contact with Pu or cause slight local resuspension; consequently, they will wear gloves and surgical masks while performing such tasks.

5. Operations which are likely to stir up dust, such as profile soil sampling in Pu suspect areas, soil excavation, loading and sampling in Pu cleanup areas and contaminated soil disposal, will be performed by personnel fully suited. Further, since any resuspended Pu might be spread downwind from these operations, all personnel in the immediate downwind area will also be fully suited.

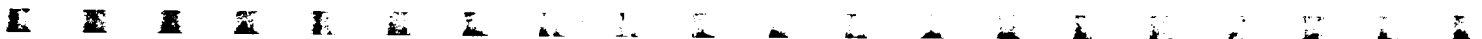
6. Transportation of soil from excavation sites to the disposal sites will not require protective clothing as the contaminated soil will be under adequate cover.

I. DECONTAMINATION

1. In addition to making the Atoll safe for re-inhabitation, an objective of cleanup is to prevent contaminated debris from becoming available on the world market. Since decontamination of contaminated debris (See II.B) is not a viable alternative, all such debris which is collected will be encrypted along with contaminated soil in the burial crater. Cleanup equipment, on the other hand, may possess a residual value which merits decontamination. Thus, all equipment deemed worthy will be decontaminated to permissible levels (See Enclosure 3) before they are returned to use in contamination free sites (on or off the Atoll). If the permissible levels cannot be achieved following thorough decontamination efforts, the equipment will either be transferred safely to users having appropriate licenses or disposed of in the same manner as contaminated debris. All unworthy contaminated equipment will likewise be encrypted.

2. To prevent the spread of contamination by personnel, each person will be thoroughly monitored and decontaminated as necessary prior to exiting from any controlled area.

It is suggested that an air sampling program be conducted for several seasons.



SCHEDULE OF INITIAL SOIL SAMPLING FOR ENEWETAK CLEANUP

ISLAND	SURFACE SAMPLES ^a (pCi/g)	PROFILE SAMPLES ^a			PU SUSPECT AREAS	NUMBER OF SAMPLES TO BE TAKEN	CLEANUP VOLUME ESTIMATE (m ³)
		MAX CONC (pCi/g)	DEPTH MAX CONC (cm)	DEPTH EQUALS 40 CONC (cm)			
Alice	68	170	3.5	9	Samples were from a field approximately 100 m by 100 m near the center of the island. The field will be sampled to a depth of 5 cm at 20 m intervals.	36	1.5X10 ³
		120	1.0	3			
		100	1.0	3			
Belle	48 70 43 46 94 56 100	200	3.5	14	All but one sample was from a field approximately 120 m by 400 m covering about half of the island. The field will be sampled to a depth of 5 cm at 20 m intervals. The isolated sample (100 pCi/g) was from the lagoon-side beach. Ten samples will be collected from that general area.	157	7.2X10 ³ .1X10 ³
		110	1.0	2			
		220	1.0	4			
Clara	45 55 88 44	65	12.5	16	All but one sample (55 pCi/g) was from a field approximately 140 m by 22 m, toward the northeast end of the island. The field only will be sampled to a depth of 5 cm at 20 m intervals along 4 equally-spaced rows running the length of the field.	32	.5X10 ³
		96	3.5	8			
		85	1.0	6			
Daisy	54 51 90 98	64	12.5	15	All samples were from the southwest side of the island, in two fields approximately 120 m X 180 m and 120 m X 80 m. Both fields will be sampled to a depth of 5 cm at 20 m intervals.	105	3.1X10 ³ 1.4X10 ³
		46	30	none ^b			
		190	1.0	4			
Edna	0	0	0	0	None.	0	0

^aAEC Report NVO-140 "ENEWETAK RADIOLOGICAL SURVEY" Oct 73, concentrations ≥ 40 pCi/g.

^bIncreases to max depth sampled (30 cm).

Irene	280	74	80	84	Samples were from an annular field about 600 m long surrounding the Seminole crater and extending landward about 80 m and from a field approximately 100 m X 350 m on the southern coast. The annulus gave a single very-high value (670 pCi/g) sample from the northern end. An area approximately 60 m X 100 m, enclosing this sample location, will be sampled to a depth of 30 cm in 10 cm increments, at 20 m intervals (384 samples). The remainder of the annulus will be sampled to a depth of 5 cm at 40 m intervals (48 samples). The rectangular field will be sampled every 10 cm to a depth of 40 cm at 50 m intervals (96 samples).	528	4.8x10 ³
	95	100	30	57			6.0x10 ³
	210	170	30	none ^c			14.0x10 ³
		670	12.5	none ^d			
		170	30	43			
Janet	41	65	1.0	2.0	Samples were from two fields: 720 m X 220 m and 180 m X 540 m. A qualifying sample outside of these fields was from a 12-acre site which ERDA is using for experimental purposes and has claimed to have no significant Pu contamination. Thus, that sample will be ignored. Samples will be collected from the fields to a depth of 5 cm and at 20 m intervals.	686	2.4x10 ³
	45	55	2.5	9.0			1.5x10 ³
	170	110	3.5	8.0			
	41						
	51						
	46						
	67						
	48						
	52						
	120						
	66						
	40						
	57						
Kate	50	62	1.0	2.0	Samples were from opposite sides of the island and suggest that no significant hot spots are present. However, as there is a paucity of data for locations closely surrounding the two sampled-points, ten 5 cm deep samples will be collected from the general area of each.	20	.1x10 ³ .1x10 ³

^cEssentially 110 to max depth sampled (60 cm).

^d115 at max depth sampled (37 cm).

Lucy	0	48	1.0	1.5	Samples were from opposite sides of the island and suggest that no significant hot spots are present. Since all analyses are nominally the same as the lower Guideline, the island will be considered to have no Pu suspect area; no samples will be taken.	0	0
Percy	0	43	7.5	8.0	The single analysis which exceeds 40 pCi/g is sufficiently close to that limit that no additional samples will be taken. The island will be considered to have no Pu suspect area.	0	0
Mary	0	55 40	3.5 3.5	5.0 3.5	Both analyses are close to the 40 pCi/g Guideline and in each case the samples were from locations within 20 m of locations which gave Pu concentrations less than 40 pCi/g. The island will be considered to have no Pu suspect area; no samples will be taken.		
Nancy	0	42	7.5	8.0	The sole sample exceeds 40 pCi/g by a small margin, and it was from a location near to ones which gave Pu concentration less than 40 pCi/g. The island will be considered to have no Pu suspect area; no samples will be taken.	0	0
Olive	0	85 85 47	1.0 1.0 3.5	2.0 2.5 4.0	Samples were from a field approximately 120 m X 180 m toward the northern end of the island. The field will be sampled to a depth of 5 cm at 20 m intervals.	70	1.4x10 ³

Pearl	170 530 63 55 83 85 81 50 83 89 100 170	410	1.0	5.0	All but one sample was from a field running north-to-south, approximately 160 m X 340 m. The field will be sampled to a depth of 5 cm at 20 m intervals. The isolated sample (170 pCi/g) was taken from the lagoon-side beach toward the western end of the island. Ten samples will be collected from that general area.	172	.8X10 ³ .1X10 ³
Ruby	0	0	0	0	None.	0	0
Sally	44 130	40 64 68	130 1.0 1.0	130 2.0 2.0	Samples reading 44 and 64 pCi/g were from the islet (often called "Sally's Child") which is approximately 60 m X 220 m. Ten additional samples will be taken from the general area toward the center of the islet. The remaining samples were from locations spaced along the lagoon-side beach. Ten samples will be taken from the area toward the western trip which gave the 130 pCi/g value.	20	.1X10 ³ .1X10 ³
Tilda	0	0	0	0	None.	0	0
Ursula	0	0	0	0	None.	0	0
Vera	0	0	0	0	None.	0	0
Wilma	0	0	0	0	None.	0	0
Yvonne A	75 180 54 150	5 15 55 25	14 19 & 108	14 19 & 108 58 44	Samples were from a field approximately 80 m X 300 m toward the north-western periphery of the island. The field will be sampled to a depth of 60 cm at 10 cm increments and at 50 m intervals (84 samples).	84	14.4X10 ³

Yvonne	150	800	95	112
B		520	15	23
		820	70	140
		480	35	55
		75	75	77
		110	35	48
		95	25	30
		100	15	20
		450	5	32
		220	5	8
		730	5	9
		310	5	32
		320	5	9
		370	5	23
		62	5	6
		52	2.5	4
		52	5	6
		300	5	30
		62	5	7
		160	5	11
		150 or 15 ?		?

Samples were from a field centered in the island (portion) approximately 140 m (from lagoon to ocean) by 520 m. Although many high readings are near the air-ground interface, concentrations at depths up to 140 cm are significant. Except for four locations, clustered near the "right-side" of the field, profiles decrease to less than 40 pCi/g within about the top 35 cm. Samples will be taken to a depth of 40 cm at 10 cm increments and at 20 m intervals (864 samples). At the high-value area (140 m X 200 m), samples will be taken to additional depths of 100 cm (880 additional samples).

1744 29.2X10³
28.0X10³

Yvonne	50	62	14	15
C	40	290	75	93

Samples were from widely separated locations, each with adjacent analyses that did not exceed 40 pCi/g, which suggests that no extended hot spots are present. The one high reading, from the middle, northern side of the runway, will be investigated. Samples at 10 cm increments to depths of 100 cm will be collected from 10 locations in an area approximately 50 m X 80 m encompassing the high value.

100 4.0X10³

TOTALS 3754 120.8X10³

ENEWETAK ISLANDS TO BE SEARCHED

FOR CONTAMINATED DEBRIS

<u>ISLAND</u>	<u>TOTAL AREA*</u> (acres)	<u>PU SUSPECT AREA</u> (acres)	<u>OVERGROWN AREA**</u> (acres)
Alice	22	3	15
Belle	30	12	12
Clara	7	1	5
Daisy	21	8	2
Edna	10	-0-	-0-
Irene	45	20	6
Janet***	291	63	100
Kate	16	-0-	14
Lucy	20	-0-	18
Percy	2	-0-	-0-
Mary	12	-0-	9
Nancy	11	-0-	11
Olive	41	5	36
Pearl	54	13	36
Ruby	4	-0-	-0-
Sally	99	-0-	50
Tilda	52	-0-	45
Ursula	40	-0-	36
Vera	33	-0-	38
Wilma	-0-	-0-	12
Yvonne	<u>94</u>	<u>25</u>	<u>35</u>
	909	150	480

*from TABLE 5-16, EIS

**Pu suspect areas excluded

***Approximately 12 acres under experimental cultivation by ERDA will be excluded from Cleanup

Encl 2



RADIATION PROTECTION STANDARDS FOR CLEANUP

A. Control of Occupational Exposure to Ionizing Radiation (AR 40-14)

(1) The accumulated dose equivalent of radiation of the whole-body, head and trunk, active blood-forming organs, gonads, or lens of the eye will not exceed--

(a) 1.25 rems in any calendar quarter,

nor

(b) 5 rems in any 1 calendar year.

(2) The accumulated dose equivalent of radiation to the skin of the whole-body (other than hands and forearms), cornea of the eye, and bone will not exceed--

(a) 7.50 rems in any calendar quarter,

nor

(b) 30 rems in any 1 calendar year.

(3) The accumulated dose equivalent of radiation to the hands and wrists or the feet and ankles will not exceed--

(a) 18.75 rems in any calendar quarter,

nor

(b) 75 rems in any 1 calendar year.

(4) The accumulated dose equivalent of radiation to the forearms will not exceed--

(a) 10 rems in any calendar quarters,

nor

(b) 30 rems in any 1 calendar year.

(5) The accumulated dose equivalent of radiation to the thyroid, other organs, tissues, and organ system will not exceed--

(a) 5 rems in any calendar quarter, nor

(b) 15 rems in any 1 calendar year.

(6) Individual(s) under 18 years of age, females known to be pregnant, and occasionally exposed individual(s) will not be exposed to a whole-body dose equivalent of more than--

(a) 2 millirems in any 1 hour, nor

(b) 100 millirems in any 7 consecutive days nor

(c) 500 millirems in any 1 calendar year,

(d) nor more than 10 percent of the values in (2), (3),

(4) and (5), above, for other areas of the body.

(7) Individuals over 18 years of age, but who have not yet reached their 19th birthday, may be occupationally exposed to ionizing radiation provided that they do not exceed 1.25 rems dose equivalent to the whole-body in any calendar quarter, nor 3 rems in the 12 consecutive months prior to their 19th birthday.

B. Permissible Contamination Levels

(1) Soil:

Less than 40 pCi (Pu)/g (AEC Task Group)

(2) Debris, vehicles and other equipment released after any cleanup:

(a) Transuranic alpha emitters--less than 20 dpm/100 cm²

(NRC Regulatory Guide 1.86)

(b) Beta/Gamma emitters--less than 0.1 mrad/hr at 1 cm

(ERDA Property Management Instruction 109-45 and

NRC Regulatory Guide 1.86)

(3) Personnel:

No removable contamination (AR 700-64)

(4) Air:

Less than 4.4 dpm (Pu-239)/m³ (10 CFR 20)



OWN EXPENDS

TITLE: MARSHALL ISLANDS
MEDICAL FACILITY
PLANNING ESTIMATE

HOLMES & NARVER, INC.
ENGINEERS - CONSTRUCTORS
PACIFIC TEST DIVISION

SUMMARY ESTIMATE
CONTRACT AT (29-2)-20

SUB. ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	LABOR		MATERIAL TOTAL \$	EQUIP. USE		SUB-CONTRACT TOTAL \$	TOTAL
				MAN HOURS	TOTAL \$		HOURS	TOTAL \$		
<p>THIS PLANNING ESTIMATE IS IN ACCORDANCE WITH LETTER FROM B.N.L.A.U.I. BY DR. ROBERT A. CONRAD WITH ATTACHED SKETCHES DATED 7/25/73 TO MR. WILLIAM STREEMAN OF U.S.A.E.C. PACIFIC AREA SUPPORT OFFICE</p>										
<p>MEDICAL TRAILER (32'x18')</p>										
150	CARPENTRY			566	3849	1696		120		5657
410	MILLWORK			30	215	173				488
420	PLUMBING			224	2550	2536		150		6025
430	MECH. CONDITIONING			48	504	690				1174
600	ELECTRICAL			176	1543	1530		120		3213
620	SPECIAL EQUIPMENT			96	1005	5072		230		6410
650	PAINTING			36	203	75				645
680	FURNISHINGS			204	2142	4333		60		2790
700	ELECTRICAL UTILITIES SYSTEM			72	756	8322		60		9133
712	FUEL UTILITIES SYSTEM			64	612	763		60		1430
780	SUPERVISION			144	1512					1512
SUB-TOTAL MEDICAL TRAILER				1480	15540	82280		760		38580
<p>WHOLE BODY COUNTER TRAILER</p>										
150	CARPENTRY			508	3534	2053		120		7512
420	PLUMBING			76	1003	1373		60		2391
430	MECH. CONDITIONING			24	252	410				712
620	ELECTRICAL			96	1005	635		60		1701
650	SPECIAL EQUIPMENT			76	1003	4813		280		6031
680	PAINTING			76	588	75				663
700	ELECTRICAL UTILITIES			24	252	170				422
780	SUPERVISION			52	762					762
SUB-TOTAL WHOLE BODY COUNTER TRAILER				988	10374	9552		460		20386
SUB-TOTAL CARRIED FORWARD				2468	25914	31832		1220		58966

402994

APPROVED DATE 9/1 SITE 9/13 ESTIMATE NO. 80375 SHEET 1 OF 2

BEST COPY AVAILABLE

SUMMARY ESTIMATE
CONTRACT AT(29-2)-20

HOLMES & HARVER, INC.
ENGINEERS - CONSTRUCTORS
PACIFIC TEST DIVISION

TITLE: MARSHALL ISLANDS
MEDICAL FACILITY
PLANNING ESTIMATE

SUB. ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	LABOR		MATERIAL TOTAL \$	EQUIP. USE		SUB-CONTRACT TOTAL \$	TOTAL
				MAN HOURS	TOTAL \$		HOURS	TOTAL \$		
	SUB-TOTAL BROUGHT FORWARD			2413	25914	31332		1220		58966
	FIELD ENGINEERING & AS BUILT - 8% ESTIMATING & M.T.O.								(ROUNDED)	4734 600
	SUB-TOTAL									\$64,300
	CONTINGENCY - 15%								(ROUNDED)	9750
	SUB-TOTAL									74,050
	M & O SUPPORT (+ 3300MH @ \$1.50)									4950
	SUB-TOTAL									\$79,000
	DESIGN ENGINEERING									3,000
	ESTIMATED TOTAL COST.									\$82,000

Reviewed for Scope
WJ 8/13/73

NOTE: THIS ESTIMATE DOES NOT INCLUDE COST FOR LCU, MODIFICATION,
TRANSPORTATION COST OR PORT HANDLING OF LCU TO ANY LOCATION
THAT MAY BE REQUIRED

Approved: _____
H&H

DETAIL ESTIMATE

OPERATION

ITEM #

SHEET NO. 3 OF 13

MARSHALL ISLANDS MEDICAL FACILITY

JOB

EST. NO. 70575

EST. BY

AFH

DATE 8/6/73

SUB ACTY. NO.	DESCRIPTION	QUANTY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
	THIS PLANNING ESTIMATE IS IN ACCORDANCE WITH BROOKHAVEN NATIONAL LABORATORY LETTER DATED 7/25/73 W/ ATTACHED SKETCHES									
	MEDICAL TRAILER									
150	CARPENTRY									
	(PARTITIONS)									
	XRAY RM. 8' W X 8' H ± 64 SF									
	MISC. MAT'L					15	192			192
	CARPENTER	24	HR.	10.50	252					252
	LABORER	8	HR.	10.50	84					84
	LAB. SHIELD RM. 1' 9" W X 8' H ± 32 SF									
	MISC. MAT'L					15	160			160
	CARPENTER	16	HR.	10.50	168					168
	LABORER	4	HR.	10.50	42					42
	DENT. RM. 1' 6" W X 8' H ± 28 SF DOOR TRIM & HARDWARE									
	MISC. MAT'L					15	144			144
	DOOR W/ TRIM & HARDWARE					15	75			75
	CARPENTER	24	HR.	10.50	252					252
	LABORER	8	HR.	10.50	84					84
	TOILET RM. 1' 6" W X 8' H ± 28 SF DOOR, TRIM & HARDWARE									
	MISC. MAT'L					15	144			144
	DOOR W/ TRIM & HARDWARE					15	75			75
	CARPENTER	24	HR.	10.50	252					252
	LABORER	8	HR.	10.50	84					84
	LAB. BENCH 6' L X 3' H X 1' 6" W									
	MISC. MAT'L						10			10
	TOP						15			15
	MISC. HARDWARE						10			10
	CARPENTER	8	HR.	10.50	84					84
	LABORER	4	HR.	10.50	42					42
	METAL TYPE CABINETS OVER WORK BENCH 8' ± 36" WIDE									
	CARPENTER	6	HR.	10.50	63					63
	SUB-TOTAL CARRIED FORWARD 154 1407 825 2032									

DETAIL ESTIMATE

FORM 4773

OPERATION

ITEM NO.

SHEET NO. 4 OF 13

MARSHALL ISLANDS MEDICAL FACILITY

JOB

EST. NO. 90575

EST. BY AFA

DATE 8/6/73

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
150	CARPENTRY									
	SUB-TOTAL BROUGHT FORWARD	134			1407		825			3232
	DISC. TABLE 36" X 36" X 2" W.						GFE			
	MISC. MATERIAL					1.5	10			10
	T.P. ± 6"					1.5	10			10
	MISC. HARDWARE					1.5	5			5
	CARPENTER	8	MH.	10 ⁵⁰	84					84
	LABORER	4	MH.	10 ⁵⁰	42					42
	MEDICINE CABINETS									
	4' LONG X 16" WIDE X 18" HIGH PANELS						GFE			
	CARPENTER	6	MH.	10 ⁵⁰	63					63
	LABORER	2	MH.	10 ⁵⁰	21					21
	DIETETIC WELDED ALUMINUM CABINET									
	CARPENTER	6	MH.	10 ⁵⁰	63		GFE			63
	LABORER	2	MH.	10 ⁵⁰	21					21
	WOOD STAIRS & PLINTHS									
	ALLOW FOR (1) ONE ONLY									
	MISC. MATERIAL & HARDWARE						1.50			1.50
	CARPENTER	16	MH.	10 ⁵⁰	168					168
	LABORER	4	MH.	10 ⁵⁰	42					42
	MISC. CARPENTRY THAT WILL BE NEEDED TO ALTER TRAILER									
	TRAILER 5A7	32	MH.	10 ⁵⁰	336	1.5	100			436
	MISC. CARPENTRY TO DO WHAT'S NEEDED TO SHIP TRAILER TO OUTER ISLAND									
	TRAILER	24	MH.	10 ⁵⁰	252	1.5	25			277
	PACKING & CRATING AS MAY BE REQUIRED									
	TRAILER	80	MH.	10 ⁵⁰	840	1.5	250			1090
	MISC. FIELD WORK						100			100
	TRAILER	32	MH.	10 ⁵⁰	336					336
	MISC. EQUIPMENT WORK									
	MATERIAL HANDLING 15%	16	MH.	10 ⁵⁰	168			7 ⁵⁰	120	288
							221			221
	TOTAL S/P	366			3843		1696	120		5659

DETAIL ESTIMATE

OPERATION:

Marshall Islands Medical Facility

ITEM NO.

SHEET NO. *5 OF 13*

JOB

EST. NO. *92575*

EST. BY

AFH

DATE

8/6/73

OBJ. ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
<i>410</i>	<i>Millwork</i>									
	<i>CUT OPENING @ END OF TRAILER FOR NEW DOOR.</i>									
	<i>MISC. WOOD</i>					<i>15</i>	<i>50</i>			<i>50</i>
	<i>1 DOOR W/ HARDWARE & TRIM</i>					<i>65</i>	<i>100</i>			<i>100</i>
	<i>CARPENTER</i>	<i>28</i>	<i>MH 10⁰⁰</i>		<i>252</i>					<i>252</i>
	<i>LABORER</i>	<i>6</i>	<i>MH 10⁰⁰</i>		<i>63</i>					<i>63</i>
	<i>MAT'L HANDLING 15%</i>						<i>23</i>			<i>23</i>
	<i>Total S/A</i>	<i>30</i>			<i>315</i>		<i>173</i>			<i>483</i>
<i>460</i>	<i>PLUMBING</i>									
	<i>(SINK w/ HOT WATER TANK)</i>									
	<i>METAL SINK</i>	<i>8</i>	<i>MH 10⁰⁰</i>		<i>84</i>	<i>15</i>	<i>50</i>			<i>134</i>
	<i>FANCIET & TAPPER</i>	<i>8</i>	<i>MH 10⁰⁰</i>		<i>84</i>	<i>15</i>	<i>50</i>			<i>134</i>
	<i>BASE CABINET (WOOD OR METAL)</i>	<i>8</i>	<i>MH 10⁰⁰</i>		<i>84</i>	<i>15</i>	<i>50</i>			<i>134</i>
	<i>TAPPER COMPLETE</i>	<i>16</i>	<i>MH 10⁰⁰</i>		<i>168</i>	<i>1.5</i>	<i>150</i>			<i>318</i>
	<i>WATER CLOSET, CERAMIC TILED COMPLETE w/ all CONNECTIONS</i>	<i>24</i>	<i>MH 10⁰⁰</i>		<i>252</i>	<i>1.5</i>	<i>250</i>			<i>502</i>
	<i>HOT WATER HEATER</i>	<i>8</i>	<i>MH 10⁰⁰</i>		<i>84</i>	<i>1.5</i>	<i>75</i>			<i>159</i>
	<i>MISC PIPING & ETC.</i>	<i>40</i>	<i>MH 10⁰⁰</i>		<i>400</i>	<i>1.5</i>	<i>250</i>			<i>670</i>
	<i>REFRIGERATOR (21 CUFT)</i>	<i>4</i>	<i>MH 10⁰⁰</i>		<i>40</i>	<i>1.5</i>	<i>450</i>			<i>490</i>
	<i>DEEP FREEZER (21 CUFT)</i>	<i>4</i>	<i>MH 10⁰⁰</i>		<i>40</i>	<i>1.5</i>	<i>400</i>			<i>440</i>
	<i>WATER TANK & PIPING</i>	<i>24</i>	<i>MH 10⁰⁰</i>		<i>252</i>	<i>1.5</i>	<i>250</i>			<i>602</i>
	<i>WATER TANK (1000 gal)</i>	<i>24</i>	<i>MH 10⁰⁰</i>		<i>252</i>		<i>1000</i>			<i>1252</i>
	<i>FIELD CONNECTIONS</i>	<i>40</i>	<i>MH 10⁰⁰</i>		<i>400</i>					<i>400</i>
	<i>MISC EQUIPMENT w/ CORR.</i>	<i>16</i>	<i>MH 10⁰⁰</i>		<i>168</i>			<i>7⁰⁰</i>	<i>120</i>	<i>288</i>
	<i>MAT'L HANDLING 15%</i>						<i>461</i>			<i>461</i>
	<i>Total S/A</i>	<i>224</i>			<i>2552</i>		<i>2536</i>		<i>120</i>	<i>6008</i>

DETAIL ESTIMATE

OPERATION

ITEM

SHEET NO. 6 OF 12

MARSHALL ISLANDS MEDICAL FACILITY

JOB

EST. NO. 90575

EST. BY AFEA

DATE 8/6/73

S/S AMT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
470 AIR CONDITIONING										
	MAKE OPENING TO RECEIVE A/C UNIT									
	2-1 TON UNITS (\$13000 ETC)	32	MH. 10 ³⁰		336		600			936
	MAT'L HANDLING 15%						90			90
	MISC FIELD WORK	16	MH. 10 ³⁰		168					168
	TOTAL S/A	48			504		690			1194
600 ELECTRICAL										
	INSTALL DISTRIBUTION PANEL, NEW LIGHT FIXTURES, FLECK OUT LETS FOR WORK BENCHES, REFrigerator, XRAY MACHINE Etc.	120	MH. 10 ³⁰		1260					1260
	MISC MAT'L ETC.					15	1200			1200
	MISC FIELD WORK	40	MH. 10 ³⁰		420					420
	MISC EQUIPMENT w/WORK	16	MH. 10 ³⁰		168			7 ⁵⁰	120	288
	MAT'L HANDLING 15%						180			180
	TOTAL S/A	176			1848		1380		120	3348
620 SPECIAL EQUIP										
	TRANSFORMER 24' x 8' 3150 + 15%						(2520)			—
	TRANSMISSION						(175)			—
	SHIPPING TO HONO						(1173)			—
	PORT HANDLING						(476)			—
	ESTIMATED COST						5372			5372
	PIPEWARE FOR SHIPPING	40	MH. 10 ³⁰		420					420
	HANDLING & TRANSPORT	16	MH. 10 ³⁰		168				100	268
	MISC FIELD WORK	24	MH. 10 ³⁰		252					252
	MISC EQUIPMENT	16	MH. 10 ³⁰		168			7 ⁵⁰	120	288
	TOTAL S/A	96			1003		72		220	1600

DETAIL ESTIMATE

OPERATION: WORTHALL ISLANDS MEDICAL FACILITY ITEM NO.: _____ SHEET NO. 7 OF 13
 JOB: _____ EST. NO. 90575
 EST. BY: AFA DATE: 8/6/73

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
<u>630</u>	<u>PRINTING</u>									
	<u>PRINT NEW PARTITION, DOORS & MIRRORS</u>	<u>56</u>	<u>MH 10¹³</u>		<u>133</u>	<u>15</u>	<u>65</u>			<u>163</u>
	<u>MAT'L HANDLING 15%</u>						<u>10</u>			<u>10</u>
	<u>TOTAL S/A</u>	<u>56</u>			<u>133</u>		<u>75</u>			<u>163</u>
<u>640</u>	<u>ELECTRICAL UTILITIES SYSTEM</u>									
	<u>50 KW GENERATOR w/ INSTRUMENT PANEL L 420 ± 5% = 6741 TRANSPORTATION 300</u>						<u>7041</u>			<u>7041</u>
	<u>PREPARE GENERATOR FOR SHIPMENT & IN CASE FRAME FOR PANEL BOARD</u>	<u>42</u>	<u>MH 10¹³</u>		<u>504</u>	<u>15</u>	<u>225</u>			<u>729</u>
	<u>TRUCK w/ OTR</u>	<u>8</u>	<u>MH 10¹³</u>		<u>84</u>			<u>7⁵⁰</u>	<u>60</u>	<u>144</u>
	<u>MISC. FIELD WORK</u>	<u>16</u>	<u>MH 10¹³</u>		<u>168</u>					<u>168</u>
	<u>MAT'L HANDLING 15%</u>						<u>1056</u>			<u>1056</u>
	<u>TOTAL S/A</u>	<u>72</u>			<u>756</u>		<u>8322</u>		<u>60</u>	<u>9133</u>
<u>712</u>	<u>FUEL UTILITIES SYSTEM</u>									
	<u>FUEL TANK ± 400 GAL</u>					<u>15</u>	<u>400</u>			<u>400</u>
	<u>WOOD SKID FOR TANKS</u>	<u>24</u>	<u>MH 10¹³</u>		<u>252</u>	<u>15</u>	<u>100</u>			<u>352</u>
	<u>MISC. TUBING, BRICK TANK TO GENERATOR</u>	<u>16</u>	<u>MH 10¹³</u>		<u>168</u>	<u>15</u>	<u>150</u>			<u>318</u>
	<u>MISC. FIELD WORK</u>	<u>16</u>	<u>MH 10¹³</u>		<u>168</u>					<u>168</u>
	<u>MISC. EQUIPMENT FOR</u>	<u>8</u>	<u>MH 10¹³</u>		<u>84</u>			<u>7⁵⁰</u>	<u>60</u>	<u>144</u>
	<u>MAT'L HANDLING 15%</u>						<u>98</u>			<u>98</u>
	<u>TOTAL S/A</u>	<u>64</u>			<u>672</u>		<u>743</u>		<u>60</u>	<u>1430</u>

DETAIL ESTIMATE

OPERATION

ITEM NO.

SHEET NO. **B 0513**

Marshall Islands Medical Facility

JOB

EST. NO. **20572**

EST. BY

AFB

DATE

2/6/58

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	PERCENT	
600	FINISHINGS									
	WAX MACHINE & ACCESSORIES									
	FLAKE PBD TAPETER									
	SURFICIAL CHAINER									
	SPRINKLER WATER VALVE									
	PORTABLE SAND PUMP LIGHT									
	PORTABLE LAIRY MACHINE									
	GENERALIZER									
	GENERAL CHAIR									
	(DASH) MICROSCOPE, REG.									
	FRSTEN DRAIN TIE									
	TRUCK EQUIPMENT #5									
	LOGGING EQUIPMENT #5									
	CAMPBELL	96	M.H. 10 ⁰⁰	1008						1008
	LAMPBURNER	48	M.H. 10 ⁰⁰	504						504
	PORTABLE PUMP	18	M.H. 10 ⁰⁰	126						126
	MISC. MOUNT. EQUIPMENT				1.5	250		750	60	250
	TRUCK WORK	3	M.H. 10 ⁰⁰	84						144
	MISC. FIELD WORK	40	M.H. 10 ⁰⁰	400						400
	MAT. & HANDLING					38				38
	TOTAL S/A	204		2142		388		60		2490
750	CONCRETE									
	CONCRETE	104	M.H. 10 ⁰⁰	1092						1092
	MISC. MATERIAL	40	M.H. 10 ⁰⁰	400						400
	TOTAL S/A	144		1512						1512

DETAIL ESTIMATE

OPERATION

ITEM NO.

SHEET NO. 9 OF 13

MARSHALL ISLANDS MEDICAL FACILITY

JOB

EST. NO. 90575

EST. BY AEA

DATE 8/7/73

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
	WHOLE BODY COUNTER TRAILER (25'x8')									
150	CARPENTRY									
DRESSING RM.	PARTITIONS, BENCHES ETC 1 10'x8' H. ± 80 ^{SE}					1.5	240			240
BENCH	± 9' ± 30 ^{SE}					1.5	20			20
	MISC. HARDWARE ETC					1.5	10			10
	CARPENTER	24	MH 10 ⁵⁰	252						252
	LABORER	8	MH 10 ⁵⁰	84						84
WAITING RM.	± 5'x8' ± 64 ^{SE}					1.5	192			192
BENCH	± 10' ± 40 ^{SE}					1.5	30			30
	DOOR W/ TRIM & HARDWARE					1.5	75			75
	MISC HARDWARE ETC.					1.5	15			15
	CARPENTER	32	MH 10 ⁵⁰	336						336
	LABORER	8	MH 10 ⁵⁰	84						84
DOORS	PROVIDE DOORS TO TRAILER AS PER SKETCH. 5 UT OPENINGS TO RECEIVE 3 DOORS W/ HARDWARE									
	MISC. MNT'L. & HARDWARE					1.5	225			225
	CARPENTER	64	MH 10 ⁵⁰	672						672
	LABORER	16	MH 10 ⁵⁰	168						168
A/C.	PREPARE OPENINGS TO RECEIVE A/C UNITS									
	MISC MNT'L.					1.5	30			30
	CARPENTER	24	MH 10 ⁵⁰	252						252
	SUB-TOTAL CARRIED FORWARD	176		1848		837				2685

DETAIL ESTIMATE

OPERATION:

ITEM NO.

SHEET NO. 10 OF 13

MARSHALL ISLANDS MEDICAL FACILITY

JOB

EST. NO. 90575

EST. BY AFA

DATE 8/1/73

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
WHOLE BODY COUNTER TRAILER (CONT.)										
150	CARPENTRY									
	SUB-TOTAL BROUGHT FORWARD	176	MH		1848		837			2685
	SHIELD COUNTER									
	5TH. 3/8" X 4 1/2" = 856"	16	MH 10 ⁵⁰		168	L.S.	260			428
	LEAD BRICKS. 1600 EA.	48	MH 10 ⁵⁰		504		GFE			504
	3/4" LYWOOD TO FACE BOTH SIDES OF LEAD BRICKS AS PER SKETCH & COUNTER									
	E.P.E. 3/4" X 4 X 8	256 ^{SE}	40	MH 10 ⁵⁰	420	L.S.	154			574
	E.P.E. 1" X 4 X 8	64 ^{SE}	8	MH 10 ⁵⁰	84	L.S.	65			149
	MISC LUMBER & MATL.	16	MH 10 ⁵⁰		168	L.S.	125			293
	WORK BENCH									
	1PS. 1" X 4 X 8 LYWOOD									
	MISC LUMBER FOR BENCH & SHELF w/ WOOD BRACKET									
	CARPENTER	24	MH 10 ⁵⁰		252			L.S.	100	100
	LABORER	4	MH 10 ⁵⁰		48					42
	CRYSTAL ASSEMBLY									
	WOOD STAIRS & PLATFORMS ALLOW FOR (3) THREE									
	MISC MATL & HARDWARE									
	CARPENTRY	48	MH 10 ⁵⁰		504					504
	LABORER	8	MH 10 ⁵⁰		84					84
	PACKING & CRATING AS MAY BE REQUIRED	40	MH 10 ⁵⁰		420	L.S.	150			570
	MISC CARPENTRY TO DO WHAT'S NEEDED TO SHIP TRAILER TO OUTER ISLAND	24	MH 10 ⁵⁰		252	L.S.	25			277
	MISC FIELD WORK	40	MH 10 ⁵⁰		420	L.S.	100			520
	TRUCK W/OPR	16	MH 10 ⁵⁰		168			T ²	120	283
	MATL HANDLING 15%						270			270
	TOTAL S/A	508			5334		2088		120	7542

DETAIL ESTIMATE

OPERATION

ITEM NO.

SHEET NO.

110513

Marshall Islands Medical Facility

JOB

EST. NO.

90575

EST. BY

APF

DATE

8/17/53

JOB NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				AMOUNT	HOURS	AMOUNT	HOURS	AMOUNT	HOURS	
	WHOLE BODY COUNTER ROLLER (CONT)									
A10	MILLWORK (SEE DOOR IN SPA 1501)									
A10	PLASTERING									
	SHOWERS COMPLETE	16	MH 10 ⁵⁰	168	15	150				318
	WATER TRAP & PIPING	24	MH 10 ⁵⁰	252	15	350				602
	WATER SINK (+ 500 GAL)	16	MH 10 ⁵⁰	168	15	200				663
	MISC PIPING ETC	16	MH 10 ⁵⁰	168	15	125				293
	FIELD CONNECTIONS	16	MH 10 ⁵⁰	168		25				193
	TRUCK WORK	8	MH 10 ⁵⁰	84		75				144
	MAT'L HANDLING 15%					173				173
		96		1008		1323		60		2391
A10	AIR CONDITIONING									
	2 1/2 TON R.T. UNITS (SEE SPA 150 ME)	8	MH 10 ⁵⁰	84		400				484
	MISC FIELDWORK	16	MH 10 ⁵⁰	168						168
	MAT'L HANDLING 15%					60				60
	Total SPA	24		252		460				712

DETAIL ESTIMATE

OPERATION: MARSHALL ISLANDS MEDICAL FACILITY ITEM NO. _____ SHEET NO. 13 OF 13
 JOB _____ EST. NO. 90-575
 EST. BY AFR DATE 8/7/73

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
	<i>WHOLE BODY COUNTER TRAILER (CONT)</i>									
630	<i>PAINTING</i>									
	<i>PAINT NEW PARTITIONS, DOORS, BENCHES & METAL</i>	<i>56</i>	<i>MM 10⁵⁰</i>	<i>588</i>	<i>1.5</i>	<i>65</i>				<i>653</i>
	<i>MAT'L HANDLING 15%</i>					<i>10</i>				<i>10</i>
	<i>TOTAL S/A</i>	<i>56</i>		<i>588</i>		<i>75</i>				<i>663</i>
640	<i>FURNISHING</i>									
	<i>CRYSTAL ASSEMBLY</i>						<i>GFE</i>			
700	<i>ELECTRICAL UTILITIES</i>									
	<i>MAKE UP POWER CONNECTION FROM TRAILER TO GENERATOR</i>	<i>16</i>	<i>MM 10⁵⁰</i>	<i>168</i>	<i>1.5</i>	<i>150</i>				<i>318</i>
	<i>MISC. FIELD WORK</i>	<i>8</i>	<i>MM 10⁵⁰</i>	<i>84</i>	<i>1.5</i>	<i>20</i>				<i>104</i>
	<i>TOTAL S/A</i>	<i>24</i>		<i>252</i>		<i>170</i>				<i>422</i>
780	<i>SUPERVISION</i>									
	<i>MISC. FIELD WORK</i>	<i>16</i>	<i>MM 10⁵⁰</i>	<i>168</i>						<i>168</i>
	<i>TOTAL S/A</i>	<i>88</i>		<i>904</i>						<i>904</i>

DETAIL ESTIMATE

OPERATION: MARSHALL ISLANDS MEDICAL FACILITY ITEM NO. SHEET NO. 18 OF 18
 JOB: EST. NO. 90575
 EST. BY: AFA DATE: 8/7/75

SUB ACCT. NO.	DESCRIPTION	QUANTITY	UNIT	DIRECT LABOR		MATERIAL		EQUIPMENT		TOTAL
				UNIT	AMOUNT	UNIT	AMOUNT	UNIT	AMOUNT	
<u>WHOLE BODY COUNTER TRAILER (CONT)</u>										
<u>600</u>	<u>ELECTRICAL</u>									
	<u>INSTALL DISTRIBUTION PANEL, NEW LIGHT FIXTURES, ELECTRIC OUTLETS FOR WORK BENCH & WATER PUMP</u>	<u>64</u>	<u>MH 10⁵⁰</u>	<u>672</u>	<u>1.5</u>	<u>550</u>				<u>1222</u>
	<u>MISC. FIELD WORK</u>	<u>24</u>	<u>MH 10⁵⁰</u>	<u>252</u>						<u>252</u>
	<u>TRUCK w/OPR</u>							<u>7⁵⁰</u>	<u>60</u>	<u>144</u>
	<u>MISC EQUIPMENT w/OPR</u>	<u>8</u>	<u>MH 10⁵⁰</u>	<u>84</u>			<u>83</u>			<u>83</u>
	<u>MAT'L HANDLING: 15%</u>									<u>83</u>
	<u>Total S/A</u>	<u>96</u>		<u>1008</u>		<u>633</u>		<u>60</u>		<u>1701</u>
<u>620</u>	<u>SPECIAL EQUIPMENT</u>									
	<u>TRUCKER 25' X 8' 2850+15%</u>					<u>(3278)</u>				
	<u>TRANSPORTATION</u>					<u>(175)</u>				
	<u>SHIPPING</u>					<u>(950)</u>				
	<u>PORT HANDLING</u>					<u>(400)</u>				
	<u>ESTIMATED COST</u>					<u>4803</u>				<u>4803</u>
	<u>PREPARE FOR SHIPPING</u>	<u>40</u>	<u>MH 10⁵⁰</u>	<u>420</u>						<u>420</u>
	<u>HANDLING & TRANSPORT</u>	<u>16</u>	<u>MH 10⁵⁰</u>	<u>168</u>				<u>100</u>		<u>268</u>
	<u>MISC FIELD WORK</u>	<u>24</u>	<u>MH 10⁵⁰</u>	<u>252</u>						<u>252</u>
	<u>MISC EQUIPMENT w/OPR</u>	<u>16</u>	<u>MH 10⁵⁰</u>	<u>168</u>				<u>7⁵⁰</u>	<u>120</u>	<u>288</u>
	<u>Total S/A</u>	<u>96</u>		<u>1008</u>		<u>4803</u>		<u>220</u>		<u>6031</u>