LOS ALAMOS SCIENTIFIC LABORATORY
UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87544

# OFFICE MEMORANDUM

TO : Distribution

DATE: Sept. 6, 1973

FROM : Ron Lohrding, C-5

SUBJECT : Risk Analysis of Evaluation of Past TUR waste Disposal Practices (A414)

SYMBOL : C-5

155/ TA 54

Attached is a rough attempt at consolidating the five separate outlines contained in Wayne Hanson's August 31st memo.

I'm not completely familiar with the terminology in all of your fields so I may have misused it considerably.

Please look over the attachment and make corrections, additions, and/or deletions and we can then go over them at our Friday morning meeting, Sept. 7, at 8:15 in the H-8 conference room.

Ron Lohrding

Ron Lohrding

RL/a
cc: file

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TRU WASTE DISPOSAL RISK ANALYSIS

PAST BURIAL PRACTICES INFORMATION NEEDS

I. Locate (map) and identify all individual burial sites, pits, trenches, etc., and for each the following is needed:

A. What were the approximate dates of usage?

B. What are the volumes (and weights) of wastes disposed?

C. What were the type(s) of waste disposed?

1. Relate the amount of combustible waste, the composition of this material, and possibly, if available, the breakdown (volume, weight, etc.) of combustibles by type.

2. Recount the amount of noncombustible waste, types of material, amounts of each type; e.g.,

a. sludges?

b. filters?

c. equipment, building debris?

d. scrap metal?

3. Portray the possible "special" wastes disposed of, in particular, pyrophoric materials, flammable liquids, oils, etc., potentially hazardous chemicals disposed of in bulk quantities, etc. Identify all especially hazardous wastes.

4. What are the primary chemical contaminants that are present in the waste matricies.

D. What are the radioactive contaminants present?

1. What transuranics are present, and in what amounts (wt., curies, etc.)? In particular, identify $^{238}Pu$, $^{239}Pu$, $^{240}Pu$, $^{241}Pu$, $^{241}AM$.

2. What other radioactive isotopes were disposed of by burial at the same location, both fission product and induced radioactivities? Identify and give amounts as available.

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II. Release to the Atmosphere by Fire.

A. What is the probability of a fire at the burial site?

1. What is the probability of a slow smoldering fire?
2. What is the probability of a hot crackling fire?
3. How many fires have you experienced at your burial site and what was the cause of each?

B. Types of radioactive release.

1. What information do you have on aerosols released by any past fires in similar material?
2. Describe combustion rates experienced in activity or mass Pu per unit time.
   a. average
   b. potential extremes
3. Quantities of other combustibles, particularly oil, that might be involved per unit mass or unit activity of Pu.

III. Suspension and Resuspension of Radioactive Particles in the Air.

A. Suspension and resuspension from contaminated ground surface.

1. What is the past history of any spillage on ground surface -- quantities and areas involved.
2. Describe the types of original solvents -- aqueous, aromatic, oils, etc.
3. Pu concentrations in solutions or suppensions.
4. Was all Pu in solution or was some suspended and, if so, how much?
5. If suspended, what were the original particle sized?
6. What is the ground surface?
   a. Type of soil?
   b. Typical types and densities of vegetation cover?
      (1) Plants per unit area.
      (2) Seasonal variation.
7. What is the rate of movement through the ground to the surface?

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E. How were these wastes packaged when buried?

1. Identify the different types of basic container - and waste type contained.
2. Identify any inner "liner" material used, e.g., plastic, PVC bag, etc.
3. How was the primary package sealed - how was any inner packaging sealed?

F. Describe the construction mode of the waste burial container.

1. Are the burial containers pits, trenches, cribs, underground tanks, etc.
2. What is the size of the burial container?
3. What, if any, material lines the container other than soil?
4. What was the original thickness of earth cover of the burial container?
5. What is the condition of that cover today, i.e., intact, settled, partially eroded, planted, etc?

G. Describe the methods of burial.

1. Was waste "dumped" or stacked into burial container?
2. Was waste crushed and compacted in this burial operation?

H. What is the probability of the waste in the burial containers going critical?

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IV. Geology and Hydrology Information Needed.

A. Describe the regional geology, in terms of stratigraphy, structure, and seismicity.

B. Describe the regional hydrology in terms of the following:

1. Surface water.

a. Characterize the drainage basins.

b. Display discharge records.

c. Describe the quality of the water.

d. Tabulate the water usage.

(1) Municipal

(2) Industrial.

(3) Domestic

(4) Recreational

2. Ground Water.

a. What is the occurrence of water in the following:

(1) Artesian systems?

(2) Water table systems?

(3) Recharge, movement and discharge?

(4) Artesian or water table trends?

b. Describe the following aquifer characteristics?

(1) Coefficient of Transmissibility

(2) Coefficient of permeability

(3) Rates of movements

(4) Yields

(5) Specific Capacity

c. What is the general quality of the water?

d. Relate amounts for the following usages:

(1) Municipal

(2) Industrial

(3) Domestic

(4) Agricultural

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C. Describe the site geology in detail.

1. What is the stratigraphy?

a. Describe the soil.

b. What are the geologic units?

2. Characterize the structure.

a. Describe joints and fractures.

b. Show known faults.

D. Give details of the site hydrology.

1. Surface water.

a. Describe in detail site drainage basins.

b. Does local drainage empty into storage pits, etc.

c. Give discharge records.

d. Describe water quality.

e. What are the uses?

2. Ground water

a. Describe the following occurrences of water:

(1) Artesian Systems

(2) Water Table systems

(3) Recharge, movement, and discharge

(4) Artesian or water table trends

b. Give the aquifer characteristics in terms of:

(1) Coefficient of Transmissibility

(2) Coefficient of Permeability

(3) Rates of movement

(4) Yields

(5) Specific Capacities

c. Describe the water quality and its uses.

3. Zone of areation.

a. Describe the soil or rock type in terms of:

(1) Porosity

(2) Effective Porosity

(3) Specific Yield

(4) Specific Retention

(5) Pore size distribution

(6) Permeability

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b. Characterize the soil moisture using at least the following parameters:

(1) Distribution of soil moisture

(2) Rates of infiltration

(3) Evapotranspiration rates

E. Give the miscellaneous data that may be of value, such as:

a. Well and test hole inventory

b. Geologic logs

c. Aquifer tests

V. Meteorological information needed.

A. Provide wind roses for the following:

1. Give wind roses as function of wind speed and stability.

2. Day vs. night or time of day.

3. Seasons of the year.

4. Stable vs. unstable lapse rates.

B. Provide frequencies of inversion conditions.

C. Describe frequencies of occurrence of high winds and there associated wind roses.

1. What is the frequency of tornadoes?

2. What is the frequency of hurricanes?

3. What is the frequency of winds greater than 90 mph?

D. It would be useful to have the rainfall data in terms of the following:

1. .5", 1", 1.5", ...

2. Probability of a daily rainfall greater than 1", 2", 3", ...

3. Give the distribution of the number of days without precipitation.

VI. Locate (map) and identify homes, schools, business, etc. and give populations during working hours, evening and night in areas or sectors. In addition, give the following information about the biosphere:

A. Human population.

1. Describe the composition and distribution in various areas at various times of day.

2. What is the location of human population in relation to surface water?

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B. Agricultural crops.

1. Describe the seasonality of the crops?
2. Where are the crops marketed?
3. What is the local economic importance?

C. Domestic livestock and pets.

1. What are their numbers and distribution by species?
2. What are their feeding practices?
3. What are the grazing allotments in surrounding areas?
4. What is their economic importance?
5. What part of the pets diet consists of wild game?

D. Native Vegetation.

1. Describe the major vegetation types, species and distribution.
2. What are the climax and subclimax successions on disturbed areas?
3. Ecological aspects of vegetation.
   a. What is the food base for terrestrial wildlife and domestic livestock?
   b. How much is the vegetation used for shelter and what are the implications of its removal?
   c. What has been the modification of microclimate?
   d. How has manipulation by agricultural and other agencies affected the following:
      (1) Altered plant succession.
      (2) Introduced species.
      (3) Current vegetative inventory.
      (4) Current radi
4. What sampling of vegetation has been done and what amounts of Pu, Am , etc, have been found?

E. Wildlife Resources.

1. Characterize big game populations in the area.
   a. Relate State and Federal management policies.
   b. Discuss populations and distributions.
   c. Characterize harvesting by sportsment and/or subsistence hunting populations.

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2. Describe the following small game animals:
   a. Mammals.
      (1) Relate management policies
      (2) Portray populations and distributions
   b. Upland game birds.
      (1) Describe management policies
      (2) Portray populations and distributions
3. Migratory waterfowl and shorebirds
   a. What are the management policies?
   b. Describe their population and distribution.
4. What are the populations and distributions of the following non-game animals:
   a. Mammals?
   b. Birds?
   c. Reptiles?
   d. Amphibians?
5. What is the effect on rare or endangered species?
6. What sampling of the wildlife resources has been done and what amounts of Pu, Am, etc., have been found?

F. Supply radiation ecology studies reports.

G. Supply biological monitoring programs reports.

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