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K-65 SILOS NEAR-TERM ACTIVITIES AND FINAL REMEDIATION PLAN

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WORK PLAN

Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831—

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January 10, 1989
DOE-400-89

Dr. Richard L. Shank, Director
Ohio Environmental Protection Agency
1800 WaterMark Drive
Columbus, Ohio 43266-1049

Dear Dr. Shank:

K-65 SILOS NEAR-TERM ACTIVITIES AND FINAL REMEDIATION PLAN

Reference: Letter, DOE-305-89, J. A. Reafsnyder to W. E. Muno, "Development of Alternatives Study", dated December 16, 1988.

The purpose of this letter is to address the near-term activities and the final remediation of the K-65 residues including the silos and the adjacent silo area. Near-term activities include actions in response to FFCA requirements, the addition of sand to the silos, and an investigation of possible methods for final remediation. Final remediation will be specified by the RI/FS Record of Decision.

SCOPE OF PLAN

Near-term activities cover actions taken to-date with regard to meeting the requirements of the Federal Facilities Compliance Agreement (FFCA), and the planned addition of sand to the K-65 Silos to achieve further reductions in radon emissions and reduce gamma radiation. As outlined in the FFCA, there were four specific items which were to be addressed:

- Provide interim controls for radioactive emissions.
- Provide interim controls to ensure the structural integrity of the K-65 Silos.
- Implement a radon and radon decay product monitoring program for the fence line and off-site evirons.
- Maintain an effective emergency response capability in the event of an unplanned release from the silos.

In support of the final remediation, near-term activities also include development work and an engineering investigation of alternatives to be evaluated in the Feasibility Study. Possible methods to be investigated include packaging and disposal, chemical processing and disposal, in-situ stabilization, vitrification and disposal, and material transfer to another on-site location. In parallel, sampling of the residues will be performed in accordance with the K-65 Sampling Plan which has been delivered and approved by U. S. and Ohio EPA's. The data and information obtained will be incorporated into a Feasibility Study. Final remediation of the K-65 residues including the silos and adjacent underlying areas, is being addressed in the sitewide Remedial Investigation/Feasibility Study (RI/FS). Final remediation activities will be determined by the RI/FS Record of Decision (ROD), currently scheduled for November, 1990.

NEAR-TERM ACTIVITIES

In response to the FFCA requirements, a number of actions have been completed, all of which have either satisfied or exceeded the FFCA mandates. These actions are listed below followed by their completion date or current status:

- Installation of protective caps over the center thirty (30) foot diameter of the K-65 Silo domes. (Prior to FFCA)
- Application of a foam layer over the exterior surface of the K-65 Silo domes. (Dec. 1987)
- Installation of tower-mounted closed circuit TV cameras for continuous remote surveillance capability. (Prior to FFCA)
- Videotaping of the interior of the K-65 Silos--results show the dome underside in better condition than anticipated. (June 1988)
- Monitoring of the interior pressure of the K-65 Silos. (As req'd)
- Establishment of radon monitoring program at the FMPC site boundary, K-65 Silo exclusion fence and also offsite. (Ongoing)
- Construction and operation of a radon treatment system utilizing radon/charcoal absorption techniques. (As req'd)
- Issuance of the FMPC Emergency Plan (FMPC-2046) which documents a detailed emergency response procedure in the event of an unplanned release from the K-65 Silos. (Feb. 1988)

The FMPC radon and radon decay product monitoring program includes sixteen monitoring stations along the FMPC site boundary fence, and at the K-65 Silo exclusion fence, plus nine offsite monitoring stations. The monitoring data are compiled quarterly and include both radon-222 and radon-220 (thoron). Quarterly data compiled during 1987 show an average radon concentration of 6 pCi/L at the monitoring stations around the K-65 Silo exclusion fence and an average of 1.3 pCi/L at the FMPC site boundary stations (see Attachment 1). Quarterly data compiled for the first half of 1988, following the silo dome foaming, show the corresponding radon concentrations reduced to 4 pCi/L and 0.8 pCi/L (see Attachment 2). These reported levels of radon concentrations for 1987 and 1988 include natural background radiation.

Interim Stabilization - Sand Fill

The engineering design and specification for the addition of a four-foot layer of sand over the surface of the K-65 residue material is proceeding. The significant benefits from the addition of the sand layer include a reduction in the maximum individual dose to FMPC personnel and offsite individuals. Dose calculations performed by Oak Ridge National Laboratories, prior to the foaming of the K-65 domes, show the maximally exposed offsite individual to receive a lung dose of 190 mrem per year and an effective whole body dose of 17 mrem per year, as a result of total FMPC airborne emissions. Current annual dose limits for the general public, as set by DOE Order 5480.XX, are 830 mrem for lung dose, or the equivalent of 100 mrem for an effective whole body dose. Preliminary calculations and lab tests for sand fill confirm a possible further reduction of radon emissions approaching 95 to 99%. These efforts reinforce FMPC's commitment to reduce radiation exposure in accordance with ALARA objectives and to surpass minimum safety requirements whenever possible.

Additionally, computer modeling computations indicate that a potential reduction of 75% (refer to Attachment 3) in gamma radiation is attainable from the addition of this four-foot layer of sand. The combination of reduced gamma and reduced radon levels will allow for longer work periods, in the event that facilities and equipment would need to be operated on or in the vicinity of the silos prior to and during removal of residue materials. Most significantly, however, will be the reduced dose rates received by neighbors adjacent to Paddy's Run Road; the present radiation level of twice background will be substantially reduced.

The addition of sand will increase the waste volume by approximately 24%, but in turn, will provide a safe material for demonstrating the effective operation of residue removal equipment, if a removal alternative is selected in the RI/FS Record of Decision. Conversely, the addition of sand in relation to the total volume of residue material, concrete silos, berm material, and underlying two feet of soil, translates into a relatively insignificant volume increase of only 3.7%. With all facts considered, preliminary evaluations indicate the addition of sand to be beneficial even though some increase in total waste volume will occur. As a result, and Invitation for Bid (IFB) package has been prepared which specifies plans to complete the sand fill by the middle of CY-89. In parallel, a workplan for the project will be submitted to EPA in order to obtain approval.

INVESTIGATION OF ALTERNATIVES

The referenced "Development of Alternatives (Task 12) for the Feasibility Study", provides an initial evaluation of final remediation alternatives. The Feasibility Study will evaluate (1) available technology, (2) environmental considerations, (3) waste form, (4) waste characteristics, (5) residue removal methods, (6) project costs, (7) implementations schedule, (8) on-site storage options, (9) off-site disposition options. Information concerning the residue form and characteristics is extremely important in the evaluation of the alternatives; this information will be obtained from sampling and subsequent testing of the residues.

FINAL REMEDIATION

Final remediation activities are being addressed in the sitewide Remedial Investigation/Feasibility Study (RI/FS). Final remediation activities will be determined by the Record of Decision (ROD), currently scheduled for November, 1990. Because of the hazards inherent in the removal of the K-65 residue material from the silos, and alternative that must be considered is to allow the residue to remain in the silos. The feasibility of this option would require an absolute and definitive finding that neither the silos nor the areas beneath the silos, could pose any future environmental consequences. This determination could be made only as a result of a thorough and exhaustive EIS-RI/FS process followed by a no-impact Record of Decision.

SUMMARY

In summary, it is evident that the actions completed to-date on the K-65 Silos have fulfilled and exceeded the requirements of the FFCA. With respect to personal and environmental safety, the FMPC is further committed to seeing this remediation process through to a safe endpoint, and as such, is proceeding with the actions outlined above for additional near-term activities to further reduce radon emissions and to substantially reduce gamma radiation. This safe endpoint will be reached only after completion of the preferred final remedial action.

Sincerely,

James A. Reafsnyder
Site Manager

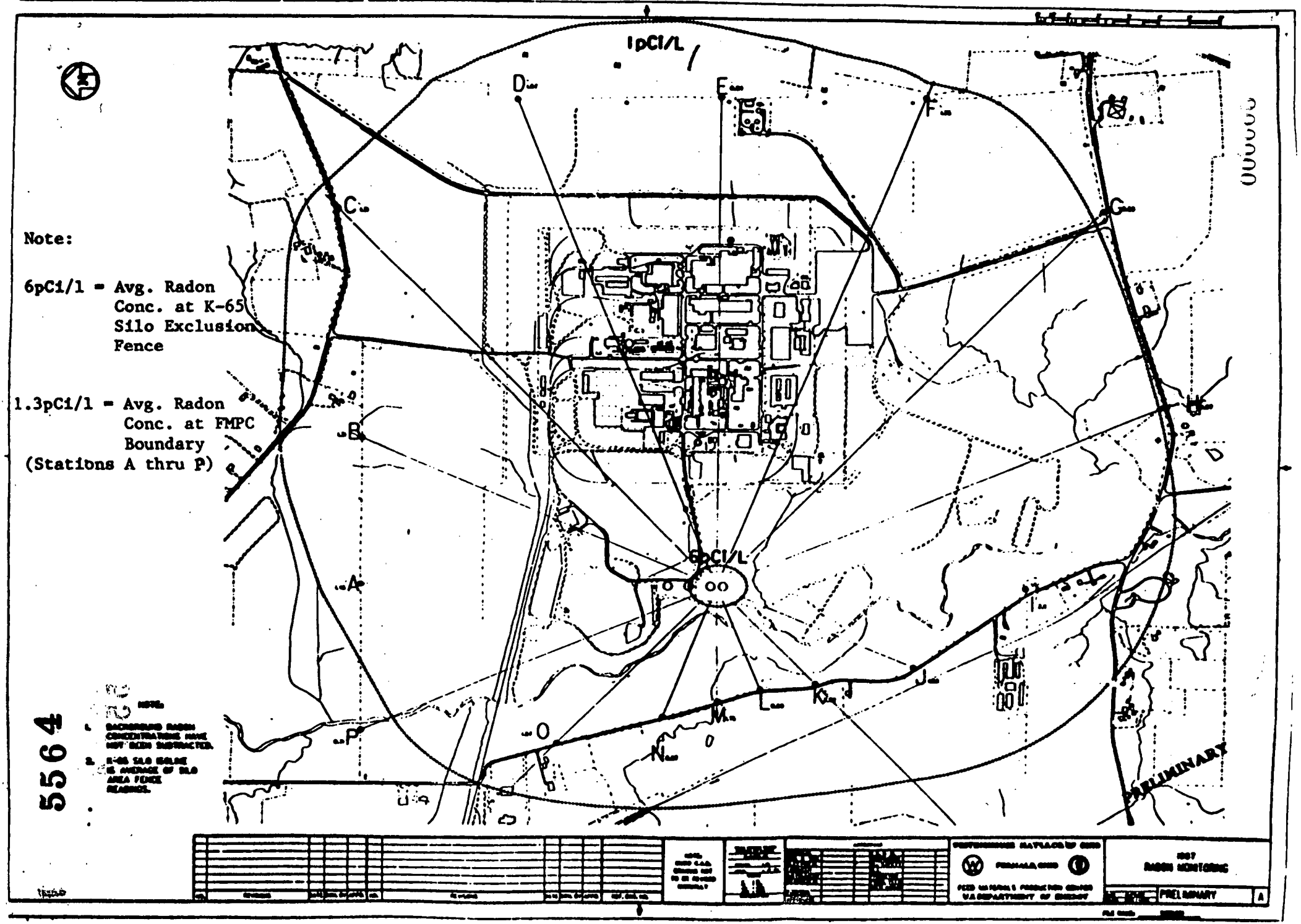
DP-84:Craig

Attachments (3):
1. 1987 Radon Monitoring Data
2. 1988 Radon Monitoring Data
3. Gamma Reduction

cc w/att.:
J. R. Craig, DP-84, DOE/FMPC
G. Mitchell, OEPA - Dayton

cc w/o att.:
M. E. Stone, DP-84, DOE/FMPC
L. C. Bogar, WMCO
C. R. Conner, WMCO
R. C. Kispert, WMCO

Attachment 1 - 1987 Radon Monitoring Data



Attachment 2 - 1988 Radon Monitoring Data

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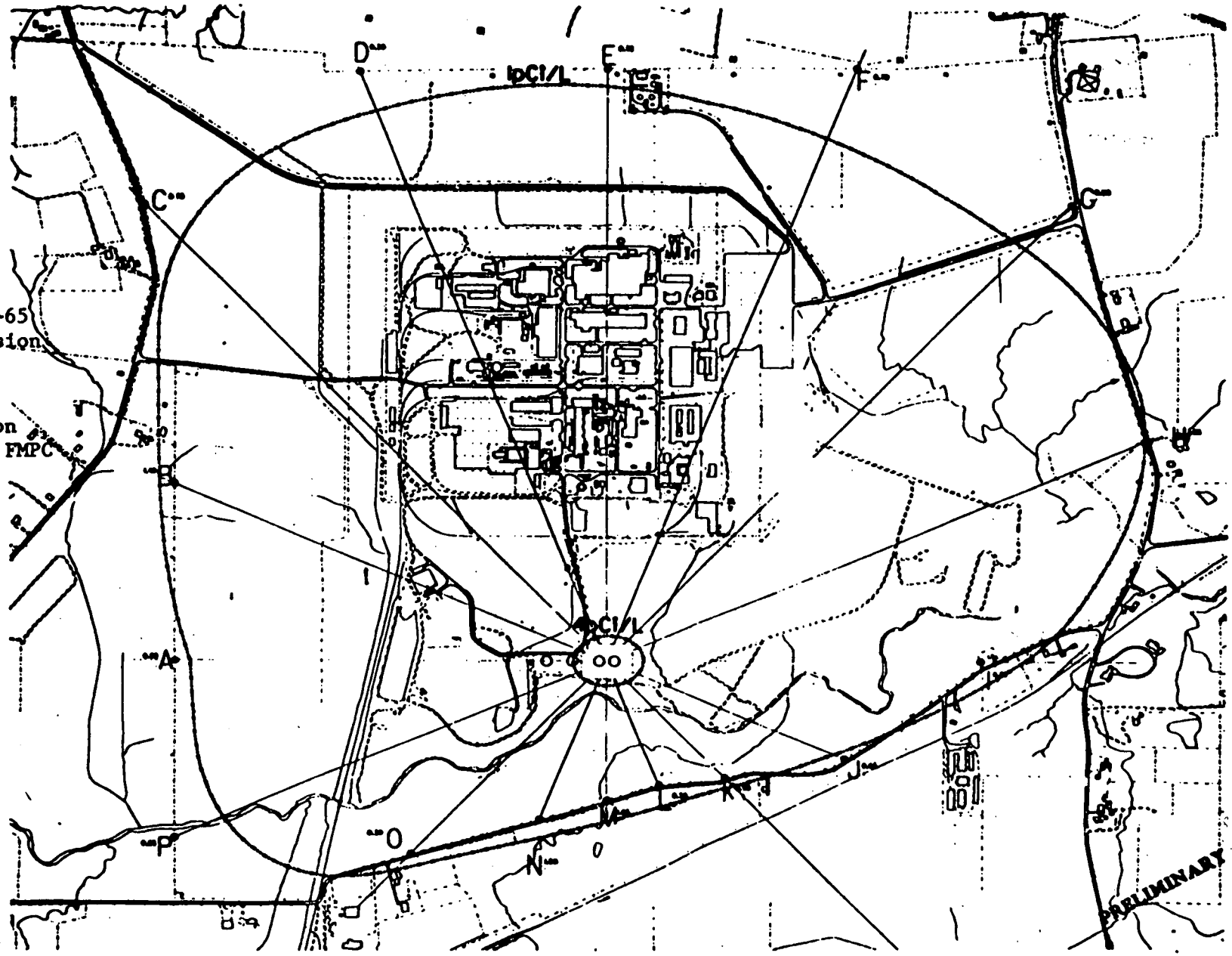
Note:

4pCi/1 = Avg. Radon Conc. at K-65 Silo Exclusion Fence

0.8 pCi/1 = Avg. Radon Conc. at FMPC Boundary (Stations A - P)



NOTE:

1. BACKGROUND RADON CONCENTRATIONS HAVE NOT BEEN SUBTRACTED.
2. K-65 SILO ISOLINE IS AVERAGE OF SILO AREA FENCE READINGS.

1988 RADON MONITORING

PRELIMINARY

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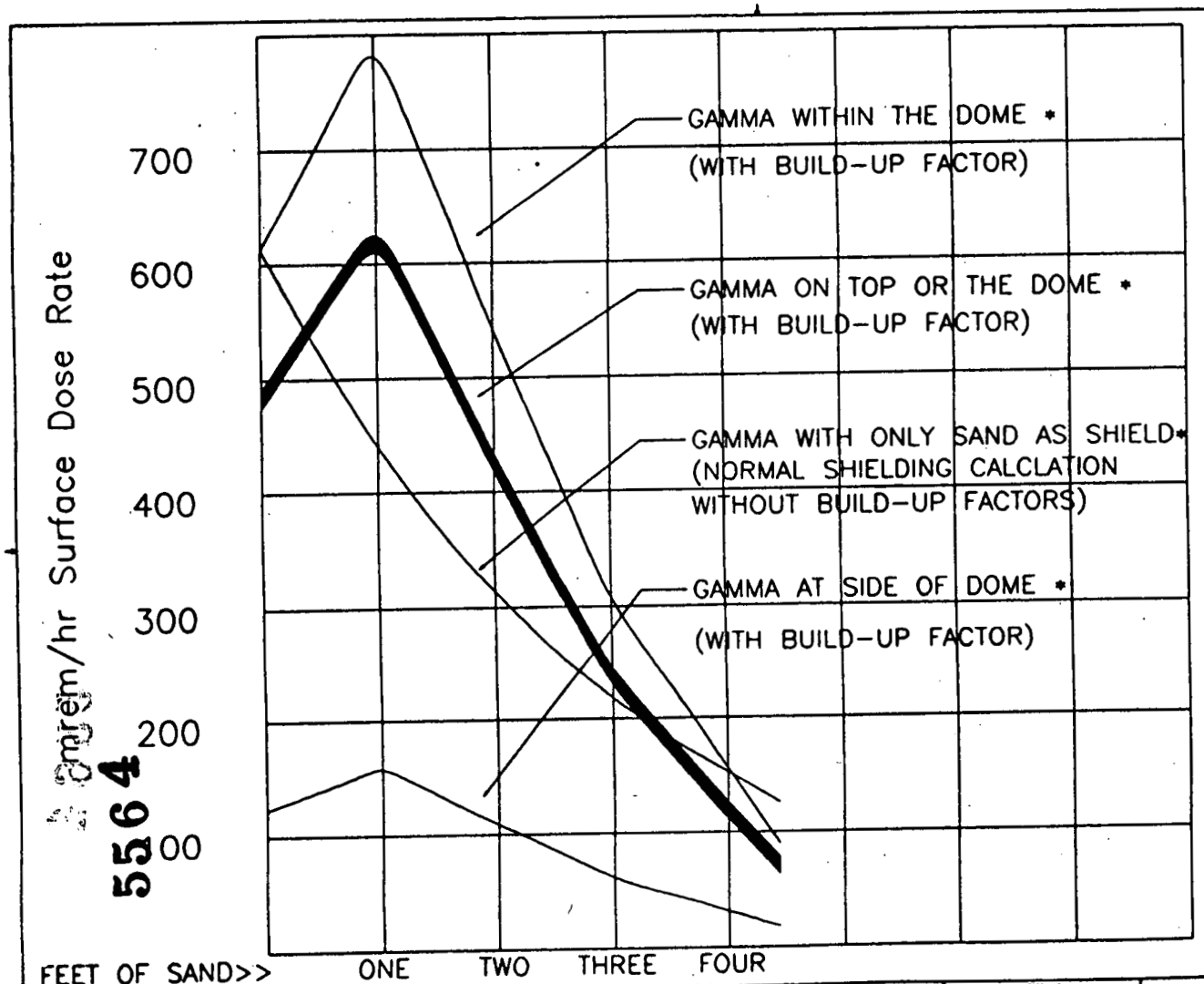
Attachment 3
Gamma Reduction



NOTES

THE (*) REFERS TO THE FOLLOWING: CONSERVATIVE ITEMS USED IN THE CALCULATIONS.

1- MATERIALS HAVE REACHED STATIC EQUILIBRIUM (VERY CONSERVATIVE FACTOR)

2- DOMES ARE COMPLETELY SEALED CAUSING A WORSE CASE SCENARIO.

3- STANDARD TEMPERATURE AND PRESSURE ARE ASSUMED.

4- DIFFUSION WAS CALCULATED THROUGH THE USE OF 1" DISCREET INCREMENTS.

5- THE SHIELDING & BUILD-UP CODES HAVE A FACTOR OF APPROXIMATELY 50% CONSERVATIVNESS.

6- THE RESULTS ARE BASED ON MODEL RESULTS AND AS SUCH ARE VERY CONSERVATIVE.

CALCULATIONS OF SANDING OF K-65 DOME; BUILD-UP, SHIELDING AND DOSE AT VARIOUS LOCATIONS

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