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Dr. Earl L. Green
Chairman, Advisory Committee for
Biology and Medicine
Division of Biology and Medicine
U. S. Atomic Energy Commission
Washington, D.C.

Dear Dr. Green:

To be attractive to industry the Commission's program of peaceful nuclear applications must be economically justifiable. It has been estimated by industry that the cost of drilling and casing a hole for an 18 inch diameter explosive in the 10 KT - 100 KT range at a depth of 10,000 feet is approximately $1,500,000, whereas the cost of drilling and casing a 12 inch device of the same yield at the same depth is estimated to be $600,000. While the present classification guide indicates that unclassified assumptions should reflect the need for use of an 18 inch device in the 10-100 KT range, the fact that we are capable of fabricating a TN device in a diameter of 11.8 inches is unclassified.

The Commission has determined that the following statement may be declassified and published without undue risk to the national defense and security and has approved revision of CG-PNE-1 accordingly:

> Nuclear explosives have not been designed specifically for underground engineering applications. When conditions warrant, such special designs could be undertaken. It is reasonable for industry to assume, for first generation designs, that yields of 100 KT could be obtained in a canister with an outside

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GROUP 1
Excluded from automatic downgrading and declassification

CLASSIFICATION CANCELLED
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BY AUTHORITY OF A.B. Dietert
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> diameter of 11 inches, suitable for emplacement in a standard 13-3/8 inch OD casing designed with at least a 12-1/8 inch clear inside diameter, or when appropriate, an open hole of the same minimum size. Unusual formation pressures and temperatures may present special problems requiring larger diameters than the above.

Furthermore, the Commission has determined that it would be desirable to release certain information to facilitate the Canal Studies Program and in addition reassure biologists that there would be no adverse health effects resulting from nuclear excavation applications. To accomplish this the Commission has declassified the following "planning information" statement which includes a table concerning the nature and quantity of radioactive debris that may be released to the atmosphere as a result of nuclear excavation applications:

> In order to plan for major excavation projects, the following factors relative to release of radioactive debris should be taken into account. The amount of radioactivity airborne in the cloud and in the fallout is minimized by scavenging during the venting process, by special emplacement techniques, by utilizing minimum fission explosives, and by employing extensive neutron shielding.
>
> Based on reasonable assumptions about these factors, the following information can be used in planning for cratering events of useful magnitude for each individual nuclear explosive detonated, the sum of fission products airborne in the radioactive cloud and in the fallout can be expected to be as low as the equivalent of 20 tons. The tritium release may be less than 20 kilocuries per kiloton of total yield. The sum of activation products airborne in the radioactive cloud and in the fallout may be expected to be as low as the amounts shown in the following table:

Representative Set of Induced Radioactivities
At Detonation Time
(Total in Cloud and Fallout)

Nuclide	Nuclide Production, Kilocurie for Yield of 100 kt	1 Mt	10 Mt
Na^{24}	200	800	2000
P^{32}	0.1	0.4	0.8
Ca^{45}	0.01	0.03	0.06
Mn^{54}	0.1	0.3	0.7
Mn^{56}	600	2000	5000
Fe^{55}	0.04	0.15	0.3
Fe^{59}	0.04	0.15	0.3
W^{185}	6	10	14
W^{187}	300	500	700
Pb^{203}	1000	7000	20000
Other	15	20	40

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Sincerely yours,

General Manager