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PRODUCT

PROGRESS REPORT FOR MONTH OF SEPTEMBER 1944

CONTRACT # W-7405-eng-48A

J. G. Hamilton

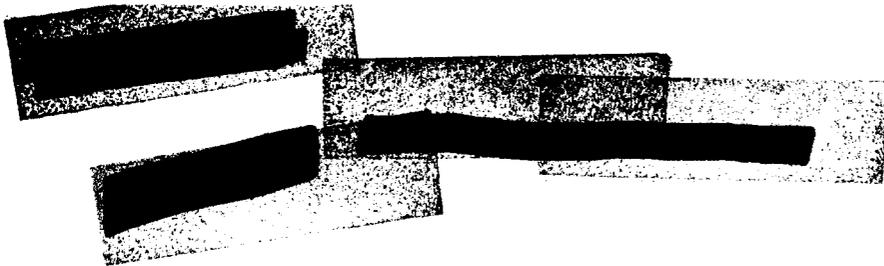
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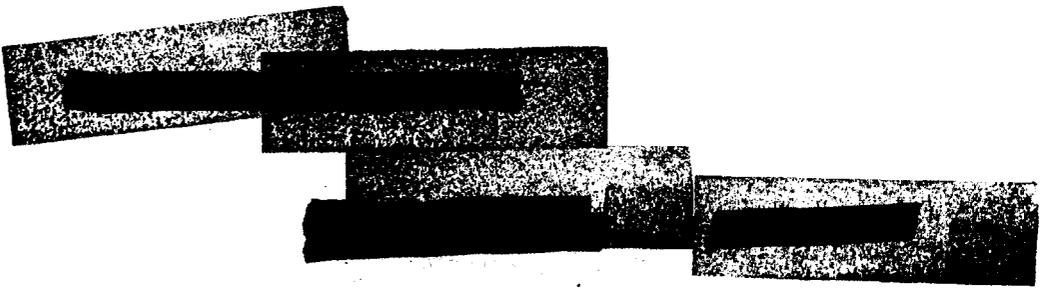
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SUMMARY

Studies with PuO₂ smoke show a slow and prolonged release of product from the lungs following inhalation. Apparently 80% of the material estimated to have been originally deposited in the alveolar tissue was excreted by way of the trachea during the 64 day interval following inhalation of the PuO₂ smoke. Less than 1% of the product inhaled was absorbed through the lungs and deposited elsewhere in the body. Studies have been initiated with PuO₂ smokes produced by burning metal in a carbon arc.



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II. TECHNICAL PROGRESS REPORT ON THE METABOLIC STUDIES OF PRODUCT

1. Radio-Autographic Studies

Lung Radio-Autographs from animals inhaling PuO_2 smoke produced by the volatilization of PuCl_4 and $\text{Pu}(\text{NO}_3)_4$ with the aid of an electric arc have been completed for various intervals ranging from 0 to 16 days. Distribution immediately after inhalation of the PuO_2 smoke revealed considerable deposition in both the bronchial tree and alveolar air sacs. Radio-Autographs taken 96 hours after exposure showed almost complete removal of product from the bronchial tree. No significant alteration in the very uniformly diffuse patterns of distribution in the alveolar tissue was noted in lungs from animals sacrificed at the various time intervals between 0 and 16 days after exposure. The interpretation of the results described above is that initially relatively uniform distribution of the PuO_2 smoke took place throughout the entire extent of air passages of the lungs. The PuO_2 deposited in the bronchial passageways was rapidly removed by ciliary action but very little, if any, movement of the material in the alveolar tissue took place within the 16 day interval. Lung Radio-Autographs from animals sacrificed 64 days after exposure are now in preparation.

A large number of lung Radio-Autographs from animals exposed to PuO_2 smoke produced by burning the metal in an electric arc are being prepared. A few have been completed for the shorter time intervals following exposure and they appear to resemble quite closely the lung radio-autographs from animals exposed to PuO_2 smokes produced from PuCl_4 and $\text{Pu}(\text{NO}_3)_4$.

Bone Radio-Autographs are being prepared since the sliding microtome was recently received.

2. Tracer Studies

The tracer studies with PuO_2 smokes produced from PuCl_4 have now been extended to 64 days and it appears from data not yet fully completed that the PuO_2 held in the alveolar tissue was slowly removed by bronchial excretion. Apparently over 80% of the material originally deposited in the alveolar tissue was eliminated from the lungs during this interval. The PuO_2 initially in the bronchial tree was, as has been shown by lung Radio-autographs, very rapidly removed. Several additional long term studies with PuO_2 smokes are now in progress and the accumulations of more data will fix more precisely the actual quantitative rates of release of PuO_2 deposited in the lung following its inhalation. Less than 1% of the estimated amount initially inhaled was found to have been deposited in other tissues of the body; e.g. skeleton, liver, kidney, etc.

A total of 30 animals have been exposed already to PuO_2 smoke produced by burning Pu metal in a carbon arc. The metal, in the form of small pellets, was imbedded in the center of carbon rods approximately 1 mm. in diameter. The preparation of the metal and the loading of the carbon rods was done through the cooperation of Dr. Seaborg and his group. Preliminary assays of the tissues of animals sacrificed at 0, 1, and 4 days after exposure to the PuO_2 smoke from the metal indicated that the behavior of product smoke from this type of source was very similar to the results observed using smoke produced from PuCl_4 and $\text{Pu}(\text{NO}_3)_4$, which were reported last month.

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3. Decontaminator Studies

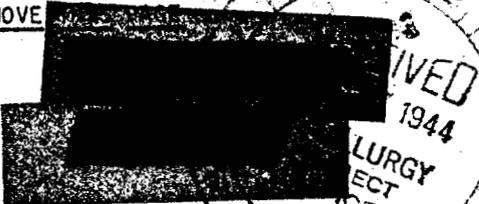
The animals injected last month with product have now approached a sufficiently stable level of excretion to permit the initiation of different experimental regimens aimed at increasing the rates of elimination.

4. Projected Studies for the Next Two Months

The Radio-Autographic, tracer, smoke, and decontamination experiments are to be continued.

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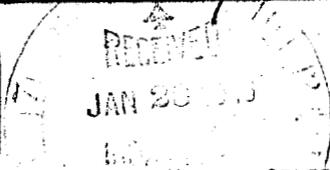
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