Discovering a New Path:

A History of Experimental Dairy Farm to Experimental Field Station

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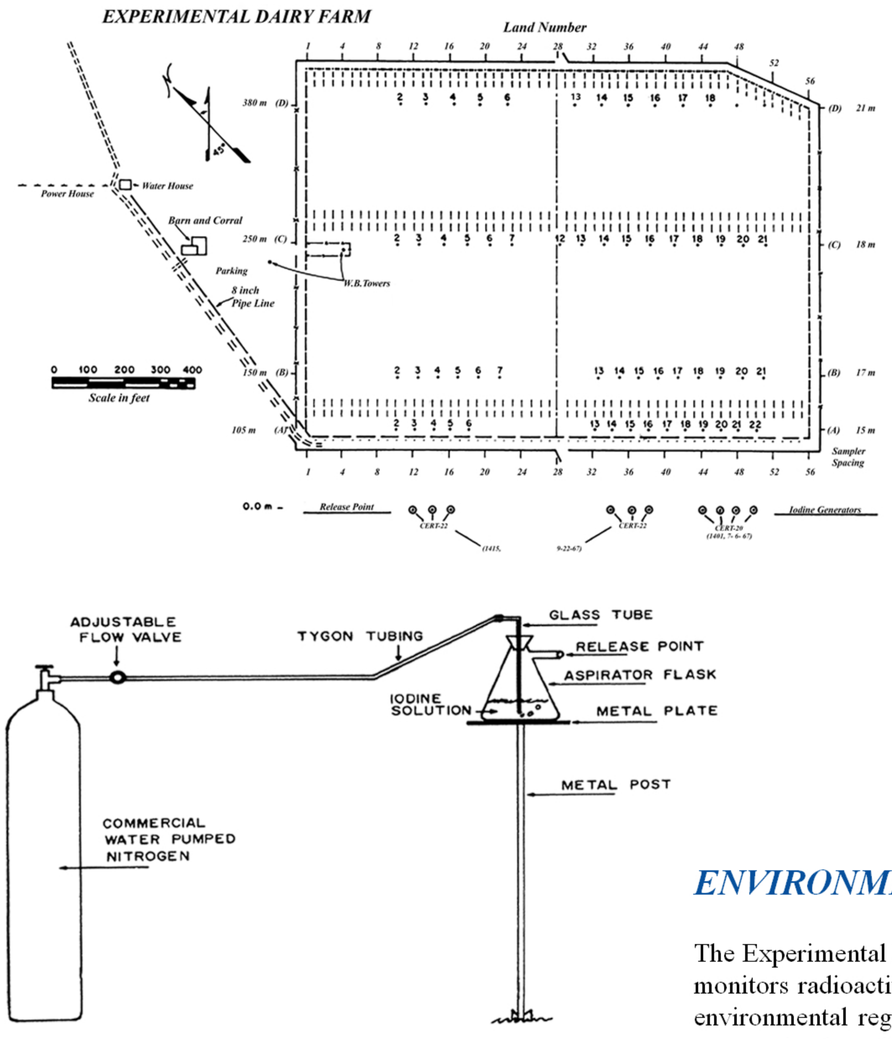
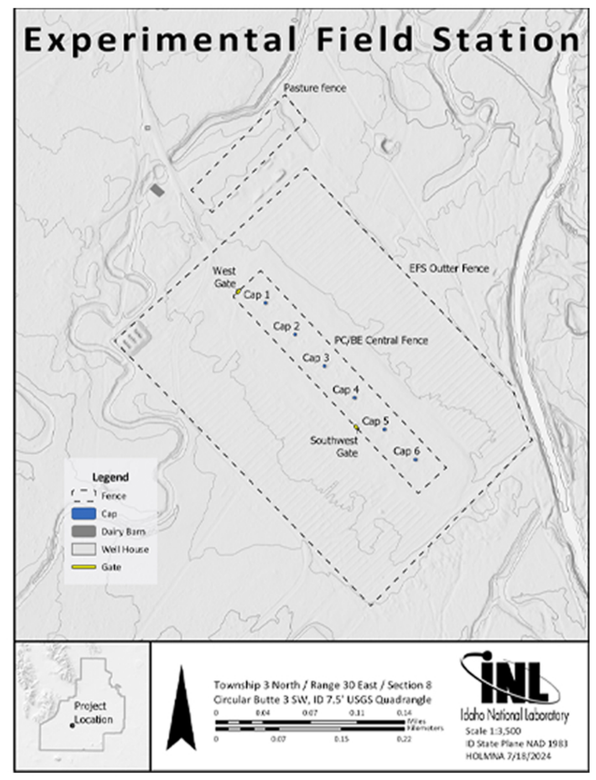
INTRODUCTION

This project explores the development of the Experimental Dairy Farm (EDF) in 1963, which emerged in response to concerns over radioiodine-131 releases following nuclear testing and the Windscale fire disaster. The EDF's Controlled Environmental Radioiodine Tests (CERT) rigorously investigated the transport mechanisms of radioiodine through the air-vegetation-cow-milk-human pathway, employing various environmental conditions and variables. This project utilizes a diverse range of sources—including environmental reports, GIS mapping, oral histories, research articles and INL archives. This research highlights the EDF's pivotal role in advancing INL's environmental research agenda. Furthermore, it situates the Experimental Field Station (EFS) as a critical component in monitoring and compliance efforts, underscoring the laboratory's commitment to public health and safety through comprehensive environmental surveillance and research initiatives aimed at understanding radioactive exposure and promoting sustainable practices.





METHODS FOR RELEASING RADIOIODINE

Radioiodine is released into the atmosphere as $^{131}I_2$ using a sparging technique. Sodium iodide-131 was diluted with sulfuric acid and combined with a sodium iodide carrier. Before release, iodide was oxidized to I_2. The $^{131}I_2$ was sparged with nitrogen, and subsequent measurements recorded wind speed, air temperature, and precipitation to evaluate changes in iodine-131 activity on grass over time.

METEOROLOGICAL DATA

The primary objective of the CERT test series was to study the meteorological variables, such as turbulence and wind speed, which control radioiodine kinetics in the air-vegetation link of the food chain. The turbulent structure, temperature, and moisture content of the atmosphere are critical meteorological factors influencing the transfer of fine particles and gases from the air to the ground and their retention on the surface. To investigate these dynamics during field releases, profiles of wind and temperature were obtained alongside direct turbulence measurements using bivanes and anemometers. Additionally, relative humidity was recorded to provide a comprehensive understanding of atmospheric conditions.

GRASS COLLECTION AND ANALYSIS

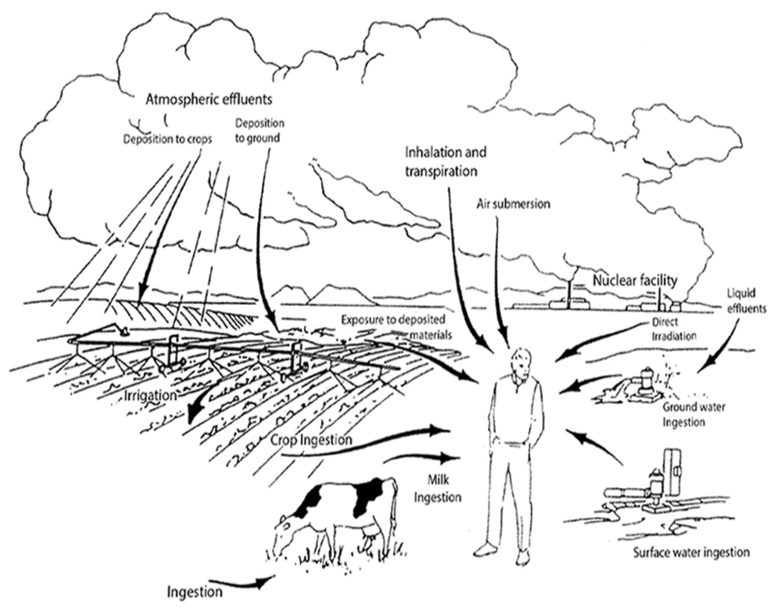
To gauge activity levels after radioiodine was released, grass samples were gathered every day from specific grazing strips the day before grazing started. The Experimental Dairy Farm utilized specialized equipment for efficient forage processing, including a forage harvester for uniformity, a weighing apparatus for accurate feed allocation, and feed boxes for consistent distribution. Grass samples were systematically collected and analyzed for radioiodine activity and moisture content using calibrated gamma counting methods.

MILK & URINE TEST

Cows were milked twice daily, and 900-ml samples were collected in plastic-lined containers for radioiodine analysis. These samples were analyzed using a calibrated thallium-doped sodium iodide crystal scintillation counter for gamma counting. Daily urine was collected through stimulation and tested for radioiodine activity. The CERT project sought to establish the relationship between iodine concentrations in grass and milk, measured by the peak activity ratio during grazing.

ENVIRONMENTAL PATHWAYS

The Experimental Field Station (EFS) at Idaho National Laboratory (INL) monitors radioactive exposure pathways, ensuring DOE compliance with environmental regulations. Surveillance at INL evaluates air, water, soil, game animals and food samples to assess radionuclide impacts on workers and the public. Projects like the Protective Cap/Biobarrier Experiment (PC/BE) were used to test soil-plant cover systems to prevent water infiltration into hazardous waste at INL and similar climates. At EFS, Lockheed Martin Idaho Technologies Company conducted comprehensive monitoring, including air quality and particulate radioactivity, until September 1996.



CONCLUSION

In conclusion, the Experimental Dairy farm, which was established in 1963, addressed radioiodine-131 concerns through Controlled Environmental Radioiodine Tests (CERT), exploring the air-vegetation-cow-milk-human pathway. Utilizing diverse sources, this project underscores EDF's crucial role in advancing INL's environmental research. The EFS further enhanced monitoring and compliance efforts emphasizing INL's commitment to public health and safety through rigorous environmental monitoring and sustainable practices.

Sources

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