UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION RELATED CORRESPONDENCE

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
COMMONWEALTH EDISON COMPANY) Docket Nos. 50-454 OL
) 50-455 OL
Byron Nuclear Power Station,)
Units 1 & 2)

Docketed USNRC MAR 07 1983 Office of the Sec. Docketing & Ser. Branch

SUMMARY OF TESTIMONY OF DAVID D. ED

David D. Ed is the Office Manager for the Office of Technical Support of the Illinois Department of Nuclear Safety (IDNS). His testimony addresses DAARE/SAFE Contention 3 and the League's Contentions 19 and 108 insofar as they raise matters related to the role of the IDNS in emergency planning for the Byron Station.

Mr. Ed outlines the responsibilities of the IDNS in regard to emergency planning for the Byron Station. Specifically, he explains the role of the IDNS in the development of the Illinois plan for radiological accidents (IPRA) and the site specific Byron annex to IPRA. Mr. Ed also addresses specific concerns raised by the Intervenors in their contentions or in the course of discovery.

Mr. Ed concludes that prior to the commencement of operation of Byron Station the Bryon emergency plan will be adequate to effectively respond to a nuclear emergency.

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Date: 3/1/83

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In The Matter of	)	
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COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454 OL
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(Byron Nuclear Power Station,	)	
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TESTIMONY OF DAVID D. ED

Q1: State your name and present occupation.

A1: My name is David D. Ed. I am employed by the Illinois Department of Nuclear Safety. My personnel code title is Nuclear Safety Executive and my position within the department is that of Office Manager, Office of Technical Support.

Q2: Please describe your educational and professional background.

A2: My formal education background is as follows:

1967-71	University of Illinois, Urbana, Illinois Bachelor of Science in Chemistry Minors in Biology, Psychology
1971	University of Illinois, Medical Center, Chicago, Illinois Partial Course Work in Pharmaceutical Chemistry
1971	University of Chicago Argonne National Laboratory, Argonne, Illinois Environmental Source Term Modeling
1977	United States Nuclear Regular Commission Radiological Emergency Operations, Las Vegas, Nevada

1977 Georgia Institute of Technology, Atlanta, Georgia
Radiological Environmental Monitoring

1980 USNRC/FEMA, Chicago, Illinois
Dose Projection, Accident Assessment, and Protective Action Decision Making For Radiological Emergency Response

1982 Harvard University, School of Public Health, Boston, Massachusetts
Biological Effects of Ionizing Radiation

My professional employment background is as follows:

1980-Present
Illinois Department of Nuclear Safety
Office of Technical Support
Office Manager

1975-80 Illinois Department of Public Health
Division of Nuclear Safety
Manager, Environmental Surveillance Program

1973-75 Illinois Department of Public Health
Division of Laboratories
Chief, Nuclear Chemistry Section

1972-73 City of Springfield
Utilities Department
Chemical Engineer, Dallman Generating Station

1971-72 Illinois Environmental Protection Agency
Division of Laboratories
Analytical Chemist

My relevant professional activities and associations are as follows:

Member Health Physics Society
Sub-Committee on Reporting of Environmental Radiation Data

Alternate to Health Physics Society Steering Committee on Upgrading the Quality and Usability of Environmental Radiation Data

Alternate to Radioactivity Sub-Committee International Joint Commission, Great Lakes Water Quality, Ontario, Canada

Appointed United States Participant, International Symposium on the Behavior of Tritium in the Environment, International Atomic Energy Agency, San Francisco, California

Co-author "Illinois Plan for Radiological Accidents", technical volumes with Standard Operating Procedures

Member, Steering Committee for the Investigation of Tritium Migration at the Sheffield Low-Level Nuclear Waste Disposal Site

Co-designer, Illinois Remote Radiological Monitoring System

Q3: What are your duties with respect to emergency planning at Commonwealth Edison Company's Byron Nuclear Power Station?

A3: As Manager, Office of Technical Support, my duties involve, among other things, managerial and professional administration of three divisions: (1) Division of Laboratories, (2) Division of Electronic Data Processing (computers), and (3) Division of Emergency Planning. In managing the Division of Emergency Planning, I have become involved with emergency planning at Commonwealth Edison's Byron Nuclear Power Station.

Q4: To which contention is this testimony addressed?

A4: Those portions of DAARE/SAFE Contention 3 and the Rockford League of Women Voters Contentions 19 and 108 which raise matters related to the role of the Illinois Department of Nuclear Safety in emergency planning for the Byron Station.

Q5: Please describe generally the role of the Illinois Department of Nuclear Safety with respect to emergency planning at the Byron Station.

A5: The Department of Nuclear Safety (DNS) is statutorily mandated (Ill. Rev. Stat., Ch. 127, § 63b17, December 3, 1980) to "have primary responsibility to formulate a comprehensive emergency preparedness and response plan for any nuclear accident", and to "develop such a plan in cooperation with the Illinois Emergency Services and Disaster Agency" (ESDA).

In fulfilling this mandate, DNS and ESDA have cooperatively developed and implemented a plan known as "Illinois Plan for Radiological Accidents" (IPRA). This plan is comprised of two major components: (1) Technical (nuclear/radiological) functions, and (2) Operational (non-nuclear) functions. The former logically being the responsibility of DNS and the latter is executed by ESDA.

At present, the DNS staff (excluding myself) dedicated to maintaining the technical functions of IPRA are as follows:

1 - Health Physicist V
1 - Health Physicist IV
3 - Health Physicist III
1 - Health Physicist II
2 - Nuclear Safety Specialist I
1 - Electronics Technician II

This staff currently maintains the DNS planning effort at four operating nuclear generating stations (Dresden, Quad Cities, Zion, LaSalle). These efforts are being expanded to include three (3) additional nuclear generating stations under construction (Byron, Braidwood, Clinton). Activities include developing and continuously upgrading the technical

(nuclear/radiological) portion of IPRA. This involves defining, implementing, testing and revising, from a technical perspective, those actions that would be undertaken by state, local, federal and private entities in an effort to assess and subsequently reduce/alleviate any adverse health/environmental consequences of a nuclear accident. Additionally, this staff trains and retrains between 5,000 to 7,000 emergency workers annually throughout the state in the principles of nuclear radiation and how one protects oneself from such when assisting in response to nuclear accidents.

Q6: What are the planning criteria and bases for those portions of IPRA for which the Department of Nuclear Safety is responsible?

A6: The department utilizes a variety of technical and regulatory documentation, tempered with insight from our own professional staff, in establishing the planning criteria for those portions of IPRA which fall under the purview of DNS. The primary regulatory guidance is derived from NUREG 0654/FEMA-REP, Rev. 1.

Q7: Has IPRA been tested and reviewed in conjunction with planning drills conducted at other nuclear power plant sites in the State of Illinois?

A7: Yes. IPRA has been successfully exercised nine times at four sites (Dresden (3), Quad Cities (2), Zion (2), LaSalle (2)) over the past few years. At each exercise, activities of state and local governments in Illinois have been judged to be capable of protecting the

EPZ populations living near nuclear power stations.

Q8: What is the status of site specific planning being conducted by the Department of Nuclear Safety with respect to the Byron Station?

A8: DNS initiated site specific planning for the Byron Station February 8, 1983. This planning involves several steps. First, a review of the preliminary plan has been completed, appropriate changes reflecting DNS operations noted and submitted to ESDA for incorporation into the first revision. Second, DNS is in the process of contacting local officials and groups identified as emergency workers to explain the DNS responsibilities to determine requirements for dosimetry equipment and training. Third, DNS will make arrangements to distribute dosimetry equipment and schedule emergency workers' training.

Q9: To your knowledge, is the Byron site specific IPRA going to be reviewed and tested in the context of an emergency exercise?

A9: Yes. Federal regulation requires that IPRA be successfully exercised annually at each operating nuclear station in Illinois. IPRA and its site specific volume for Byron will be tested during an exercise, presently scheduled for late summer, 1983.

Q10: What are the sizes of the plume and ingestion EPZ's selected for the Byron IPRA?

A10: The plume exposure EPZ is an area encompassed by a circle having approximately a 10-mile radius extending

from the Byron plant. The food ingestion pathway EPZ is an area encompassed by a circle having approximately a 50-mile radius extending from the plant.

Q11: How was the size of the EPZ's selected?

A11: As indicated earlier, the development of IPRA is a cooperative effort on the part of DNS and ESDA with input from a multitude of other federal, state, local and private entities. The DNS considers the sizing of EPZ's based upon projected radiological hazards under a variety of accident scenarios. ESDA and other agencies consider logistical or other interests in sizing the EPZ. The final geographical extent of the EPZ is determined only after taking all of these various factors under consideration.

Q12: Are you aware of any special circumstances or considerations which would require selecting EPZ's of a size greater than that recommended by NUREG 0654?

A12: No. Byron is not located in a geographic or demographic area which necessitates expanding the size of the EPZs.

Q13: Will the IPRA for Byron require that potassium iodide pills be distributed to all persons who reside within the plume exposure emergency planning zone?

A13: No.

Q14: In your opinion, is it necessary to distribute potassium iodide pills to these residents in order to have an effective emergency plan for Byron?

A14: Potassium iodide (KI) will be distributed to only certain identifiable groups within the EPZ population. The state's position regarding the utilization of KI as a protective action is best described in a document entitled "Comparison of Protective Actions that may be Employed Through Implementation of Illinois Plan for Radiological Accidents" (Attachment 1).

Q15: Please describe the radiation monitoring devices which are or will be installed around the Byron site by the Department of Nuclear Safety.

A15: The department essentially has three modes of monitoring the operations of and discharges from nuclear power stations: (1) routine sample collection and analysis, (2) continuous remote radiological monitoring, and (3) emergency operations of radiological assessment field teams. The first program involves standard, classical environmental monitoring techniques. At Byron, a total of 17 water samples (both ground and surface) are collected approximately every 90 days from 14 different locations. These locations are indicated on the attached Map #1. Additionally, samples of milk, fish, vegetation and sediment are collected regularly or when in season. These samples are screened in our laboratory for the presence of alpha, beta and gamma emitting isotopes. If this screening process identifies any radioactivity above normal background levels, tests are run to identify the specific isotopes causing the activity (e.g., ^{3}H, Sr89, 90, Cs-137, Co-60, I-131, etc.). Air samples are

collected continuously and analyzed weekly in the same manner.

In addition to this sampling of environmental media, some 28 continuously integrating thermoluminescent dosimeters (TLD's) are deployed in the environment around Byron Station. These radiation measuring devices are analyzed quarterly to establish a baseline of background radiation and to detect any changes attributable to plant operations. The attached Map #2 shows the location of these sampling points.

The second monitoring program involves deployment of 16 continuous reading pressurized ion chambers in the environment around Byron Station. The locations of these ion chambers are identified on the attached Map #3. These devices electronically relay radiation measurements on a continuous basis to our operations center in Springfield. Any abrupt change in radiation levels initiates computerized alarm systems bringing such a change to the attention of DNS staff.

In addition, to these off-site radiation monitors, signals from on-site station instrumentation are relayed to our operations center in Springfield. Included are parameters such as containment radiation levels, gaseous and liquid discharge monitors, meteorological parameters such as wind speed, direction, etc., as well as certain reactor status indicators.

All of this information is fed into sophisticated computer models resulting in a continuously updated picture of plant discharges and projections of the resultant off-site radiation exposure, if any.

The third and final monitoring mode is that of our off-site Radiological Assessment Field Teams during an accident. A typical deployment scheme is shown in Figure 1. During an accident, teams continuously transverse the plume collecting samples and taking radiation readings. The resultant sample analyses and radiation levels are compared with those projected through computer modeling.

In an accident situation, a thorough review of data from any or all of the above referenced sources precedes recommendations to initiate, continue or curtail specific protective actions.

Q16: ..ith respect to the continuous reading monitors which are linked to your agency's headquarters in Springfield, do these monitors also automatically notify radio and television stations of possible radioactive releases?

A16: No, not directly. You will recall that I mentioned sophisticated computer programs continuously analyzing the data that is remoted to Springfield. These programs are designed to identify events or combinations of events that may indicate problems with plant operations. Upon such identification, alarms bring the situation to the attention of our staff. If after analyzing the problem, we determine that public notification is warranted, such notification will be made in accordance with IPRA (e.g., notification of EBS stations, siren system activation, mobilization of public address units, etc.).

Additionally, there is in place at each nuclear station a part of the statewide "Nuclear Accident Reporting System" (NARS). This complicated, dedicated phone network allows DNS, ESDA and/or CECo immediate voice communications with each other, as well as with key local governmental entities. These decision makers can then jointly discuss the situation and if necessary immediately recommend the implementation of protective actions, including public notification.

Q17: Please describe the plans for decontamination of individuals who may be contaminated as a result of a release from Byron.

A17: During the development of the Byron volume of IPRA, certain facilities outside the direct exposure EPZ will be identified as being appropriate decontamination/relocation centers. At Byron, approximately 20 such facilities are anticipated to be identified (e.g., schools, armories, etc.). Decontamination procedures will be outlined in Section P-4 of the site specific plan (IPRA Vol. 6) and in 4-SOP-8, 4-SOP-9 and 4-SOP-10 of the generic plan (IPRA Vol. 1). A copy of referenced documentation is attached. (Attachments 2-5.)

Q18: Please describe the training which the Department of Nuclear Safety provides for individuals in the Byron area.

A18: DNS will be involved in two types of training. First, emergency worker training. During this train-

ing, DNS will present concepts of radiation protection, as well as use and operation of dosimetry equipment. Second will be Dosimetry Control Officer training. Dosimetry Control Officers are individuals who are responsible for providing radiation protection assistance to emergency workers as well as those segments of the population who may be difficult or impossible to evacuate (such as hospital patients, nursing home residents, prison inmates, etc.). During this training, DNS will present procedures for distribution and collection of dosimetry equipment, administration of potassium iodide, appropriate recordkeeping and radiation exposure limits.

Q19: Do you have any reason to believe that the Byron emergency plan will not be adequate to effectively respond to nuclear emergencies prior to the commencement of operation of the facility?

A19: To the contrary, based on our past experience at four other locations throughout the state, we foresee no major difficulties in writing, adopting and implementing the site specific plan at Byron. From the DNS perspective, progress toward completion of the Byron volume of IPRA is on schedule.

COMPARISON OF PROTECTIVE ACTIONS THAT MAY BE EMPLOYED THROUGH IMPLEMENTATION OF

ILLINOIS PLAN FOR RADIOLOGICAL ACCIDENTS

The ultimate purpose of the Illinois Plan for Radiological Accidents (IPRA) is to totally eliminate, or at least maximally reduce the dose (equivalent) commitment accumulated by the general population during an accident involving radiation or radioactive materials.

In attaining this goal, IPRA allows for the application, singly or in combination, of several protective actions. A protective action defined as that activity suggested by appropriate public officials to be executed by the general population in an effort to entirely eleviate, or at least minimize the dose commitment, resulting from a radiation accident. The protective actions detailed by IPRA include:

1. Evacuation
2. Sheltering
3. Administration of Potassium Iodide (KI)
4. Contamination Control

The application of each protective action is explained below:

Evacuation

In most instances, evacuation is the most effective protective action for the reduction of dose commitment. The reason for this is quite obvious -- if one is far removed from the source of radiation, no exposure will occur, subsequently, no dose commitment will be incurred. If the evacuation is timely, health consequences, directly attributable to radiation exposure, can be reduced to zero. Since this is the ultimate goal of IPRA, timely evacuation becomes the most desirable option in the administering of protective actions.

Sheltering

Sheltering reduces exposure to radiation and radioactive materials in varying degrees through providing structural shielding of direct radiation, as well as some mechanical reduction of inhalable radioisotopes. The relative effectiveness of sheltering in reducing total dose commitment is dependent on a variety of factors and therefore is not easily defined in a generic sense. However, IPRA specifies that sheltering will be utilized only when it is estimated to be more effective in dose reduction than evacuation (i.e., timely evacuation is inpracticable or impossible). This is consistant with the purpose of IPRA; maximum reduction of dose commitment.

Administration of Potassium Iodide (KI)

The relative effectiveness of prophylactic administration of Potassium Iodide (KI) in reducing overall dose commitment is again dependent on a variety of specific factors. However, some degree of effectiveness can be discussed in a general sense. First, KI is only effective in reducing dose commitment to the thyroid gland due to the ingestion or inhalation of radioactive iodine. It does nothing to reduce the dose due to ingestion or inhalation of other radioisotopes, nor does it in any way reduce dose due to external exposure regardless of isotopic origin. In the great majority of realistic accident scenarios, dose attributable to direct external exposure is the overriding factor in selection of immediate protective actions rendering KI ineffective in significant reduction of dose commitment. These generic intricacies, when combined with other negative factors such as adverse side effects and short shelf life, renders the wholesale distribution of KI to the general population technically undesirable, logistically unfeasible, and ethically inappropriate (the prescription of drugs properly falls within the realm of the medical profession, not state government).

This is not to infer that the use of KI, to significantly reduce dose commitment in specific instances, is unwarranted. On the contrary, under certain circumstances, IPRA explicitly calls for the use of the drug. Certain groups within the general population are easily identified as being difficult, if not impossible, to evacuate and/or shelter (hospital patients and workers, prison inmates and guards, nursing home occupants, emergency workers such as police, fire and rescue squads, etc.). It is to these identifiable entities that IPRA may recommend the administration of KI, but even then only if the accident circumstances indicate a possibility that some dose commitment may be attributable to radioiodine and then only if such administration is ordered by appropriate public health officials licensed to practice medicine.

Individuals who feel that administration of KI may be personally appropriate are encouraged to discuss the matter with their physician.

Contamination Control

Included in this class of protective actions are access/egress control to and from contaminated areas, quarantine/destruction of contaminated foodstuffs, decontamination of personnel, livestock,

equipment, real estate, etc. The relative effectiveness of these protective actions in reduction of dose commitment s, being time dependent, again highly variable. In the event that contamination is projected or detected before exposure occurs, control is highly effective in dose reduction. Contamination control after exposure obviously reduces dose commitment to a lesser degree, depending upon duration of exposure. The principle here is the same as evacuation, separation of the population from the radiation.

In reality, most accidents involving radiation or radioactive materials are of a relatively small scale, contamination control being the only protective action warranted. Larger, more infrequent accidents that may require additional protective actions almost always require contamination control.

PROPOSED GENERAL DESCRIPTION OF DECONTAMINATION FOR BYRON VOLUME OF IPRA

P-4

DECONTAMINATION

In the event of an accident at BNPS, there is the possibility of radioactive contaminates being released to the environment. Radioactive contaminates may present an internal (inhalation or ingestion) or external (deposit on skin) contamination situation. If there is a known or suspected release of contaminates from BNPS, IDNS will perform radiological monitoring and decontamination procedures for emergency workers and evacuees at established relocation centers. If indicated, and upon request to the RAFT Commander, additional decontamination locations may be established. If personnel cannot be decontaminated to acceptable levels due to the inhalation or ingestion of radioactive material, they will be directed to the nearest medical facility capable of providing further decontamination treatment.

Contamination of materials and equipment also may occur. Site specific plans designate individuals and organizations at county and municipality levels who are responsible for this type of decontamination. IDNS will provide technical assistance to these designees when required appropriate with the priority of tasks associated with the particular incident.

IDNS will continuously monitor any contaminated areas and determine when the area is safe to reenter. Teams will remain in the area and provide technical assistance in the clean-up of any remaining minor contamination.

SMD/dmm

ILLINOIS PLAN FOR RADIOLOGICAL ACCIDENTS

Department of Nuclear Safety

Standard Operating Procedure

Monitoring of Evacuees for Contamination and Thyroid Uptake

4-SOP-8

9/22/80

ATTACHMENT 3

MONITORING OF EVACUEES FOR CONTAMINATION AND THYROID UPTAKE

A. Purpose

This procedure provides instructions for the:

1) Radiological monitoring of evacuees to determine if surface contamination is present to an extent requiring decontamination;

2) Monitoring of evacuees' thyroids to determine if more detailed investigation is warranted.

B. Responsibility

RAFT Contamination/Ingestion Control Officer is responsible for the completion of this procedure.

C. References

1) "Guidance on Offsite Radiation Measurement Systems," Federal Interagency Task Force on Offiste Emergency Instrumentation on Nuclear Incidents.

2) 4-SOP-4, Administering Potassium Iodide (KI).

3) 4-SOP-9, Radiological Decontamination of Personnel.

D. Prerequisites

1) This procedure shall be completed by properly trained and authorized personnel only.

E. Precautions

1) Note the background count. Substract this background count from all readings when surveying personnel. Do not survey individuals in high background areas greater than 1000 cpm.

2) Under all circumstances, unnecessary exposure to radiation should be avoided. Under emergency conditions, the risk of exposure (usually slight) to the rescuer should be balanced against contribution (usually great) being made toward the health and safety of the evacuee.

3) To prevent contamination of the detector probe, care should be taken when surveying contaminated surfaces. Hold probe as close to the surface as possible without touching surface.

4) Thyroid examination should be performed only after it has been established that no external contamination is present or surface contamination has been removed.

5) When an individual has been seriously injured, first aid will be provided by appropriate medical personnel prior to extensive monitoring.

NOTE

A minor injury contaminated by radioactivity is considered a serious injury. Decontamination of an injury will be performed by appropriate medical personnel (refer to 4-SOP-9, Radiological Decontamination of Personnel).

E. Procedure

1) Have the person to be monitored ("frisked") stand with arms outstretched and legs spread.

2) Hold the HP-260 probe almost in contact with the body(½ to 1 inch) and slowly scan over the entire area of the body; taking special care at the feet (including bottom of shoes), hands, and other areas which may have a high likelihood of being contaminated.

NOTE

Scanning should be slow enough that it requires approxmately 90 seconds to monitor one person.

3) If any measurable count rate (greater than 100 cpm) above background is noticed, the evacuee should be considered contaminated. Attachment A, Evacuee Monitoring Record shall be completed and the person deconned in accordance with 4-SOP-9.

4) Take particular care in monitoring the front part of the neck. If a high count rate occurs a determination should be made as to whether this is caused by surface contaminiation or an uptake of radioactive iodine by the thyroid gland. This can be accomplished either by counting a neck "smear" or by decontamination (e.g., showering), followed by re-scanning of the neck.

5) If a thyroid uptake is suspected based on initial contamination survey or the evacuee was brought in from an area of known or suspected radioiodine exposure a (2x2)NaI (SPA-3) probe will be used to survey the neck.

   Survey the neck as follows:

   a) Position the probe next to the neck. Monitor both sides of the throat.
   b) Record the count rate and possible uptake on Attachment A.
   c) Determine the thyroid dose to the individual using the following approximation:

      4900 CPM = uCi uptake = 1.7 Rads to Adult Thyroid
   d) If it is determined that radioactive iodine uptake by the thyroid has probably occurred, administer potassium iodide (KI) according to 4-SOP-4 and send the evacuee to a medical facility for further examination and treatment.

6) If it is suspected that an individual has been exposed to radioiodine, resulting in a thyroid dose exceeding 5 rem, administer potassium iodide (KI) in accordance with 4-SOP-4.
7) All information and observations should be recorded on Attachment A.
8) If no surface contamination or iodine uptake is indicated, evacuee should be released for further relocation (evacuation).

Attachment A

Evacuee Monitoring Record

Last Name	First Name	Initial
Home Address	Social Security No.	

City	State	Zip	Telephone No.

Date	Time	Inst.	Radiation Levels (cpm)			Initials
			Background	Surface	Thyroid	

Was evacuee injured? YES_____ NO_____
Was clothing contaminated? YES_____ NO_____
Was evacuee decontaminated? YES_____ NO_____
Was KI amdinistered? YES_____ NO_____ Date_____

THYROID dose estimated ________________

WHOLE BODY dose estimate ________________

COMMENTS:

143A/2460C

ILLINOIS PLAN FOR RADIOLOGICAL ACCIDENTS

Department of Nuclear Safety

Standard Operating Procedure

Radiological Decontamination of Personnel

4-SOP-9

11/1/80

ATTACHMENT 4

RADIOLOGICAL DECONTAMINATION OF PERSONNEL

A. Purpose

This procedure provides instructions for handling and decontaminating personnel.

B. Responsibility

The RAFT Ingestion/Contamination Control Officer is responsible for the completion of this procedure.

C. References

1) "Los Alamos Handbook of Radiation Monitoring", Healy, J. W., Los Alamos, M.N., 1970
2) "A Handbook of Radiation Shielding Data", ANS/SII - 76/14, J. C. Courtney, editor, 1976.
3) 4-SOP-8, Monitoring of Evacuees for Contamination and Thyroid Uptake.

D. Prerequisites

1) Initial contamination monitoring (4-SOP-8) has revealed the presence of surface contamination.
2) This procedure shall be completed by properly trained and authorized personnel only.

E. Precautions

1) Wear personal dosimetry equipment when handling contaminated personnel, i.e., pocket dosimeters or TLD and film badge.
2) Wear protective clothing to prevent self contamination.

3) Under all circumstances, unnecessary exposure to radiation should be avoided. Under emergency conditions, the risk of exposure (usually slight) to the worker should be balanced against contribution (usually great) being made toward the health and safety of the evacuee.

4) Medical first aid always takes priority over decontamination activities.

5) Do not decontaminate a wound; this will be done by qualified medical personnel.

6) Be aware that soap, brushes, and other articles used for decontamination may become contaminated after use and should be handled accordingly.

F. Procedure

1) Remove and place contaminated clothing in plastic bags for later decontamination or disposal. (Disposal will be conducted by the Department of Nuclear Safety in accordance with USNRC regulations).

2) Conduct personnel decontamination using procedures and materials delineated in Table 1, PERSONNEL DECONTAMINATION GUIDE.

3) Repeat Step 2 until decontamination is completed or no significant improvement is observed. An acceptable level of decontamination using an HP-260 probe would be less than 100 cpm above background.

4) Record all necessary information and observations on Attachment A of 4-SOP-8, including final monitoring results.

5) Transportation to a medical facility (Table 2) is warranted if:

   a. Acceptable levels of contamination cannot be obtained following this procedure.

   b. Detectable radiation above background exists near and/or in a wound.

   c. Inhalation or ingestion of radioactive material in excess of PAGs has occurred.

6) Arrange for referral to a medical facility through the Emergency Medical Services Coordinator of the Illinois Department of Public Health.

7) During transportation to a medical facility, the victim should be wrapped in a blanket or sheet to protect the attendants, the stretcher and the ambulance from possible contamination.

8) Ensure in some manner (e.g., labeling) that the hospital will be aware of a patient's radiation and/or contamination status upon arrival.

9) When decontamination has been completed to within acceptable levels, evacuee may then be released for further relocation (evacuation).

10) Maintain all records for further evaluation.

TABLE 1

PERSONNEL DECONTAMINATION GUIDE

Contaminated Areas	Method*	Technique	Comments**
Skin, Hands and Body	(1) Soap & Water	Wash 2-3 minutes and check activity levels. Repeat washing 2 times.	Wash Hands, arms and face in sink, use showers for rest of body.
	(2) Lava soap, soft brush, and water	Use light pressure with heavy lather. Wash for 2 minutes, 3 times. Rinse and monitor. Use care not to erode the skin.	Apply lanolin or hand cream to prevent chapping.
	(3) Tide or similar detergent	Make into a paste. Use with additional water and a mild scrubbing action. Use care not to erode the skin.	Apply lanolin or hand cream to prevent chapping.
Eyes, Ears, Nose and Mouth	(1) Flushing	Eyes; Roll back eyelids and gently flush with water.	
		Ears: Clean the opening of the ear canal with cotton swabs.	Be cautious not to damage ear drum.
		Mouth: Rinse with water--do not swallow.	
Hair	(1) Lava soap and water	Use light pressure with heavy lather. Wash for 2 minutes, 3 times, rinse, and monitor.	
	(2) Tide or similar detergent	Make into a paste. Use additional water and a mild scrubbing action. Do not erode the skin.	
	(3) Haircut/ shave Head	Remove the hair to decontaminate scalp. Use skin decontamination methods.	Use only after other methods fail.

* - Begin with the first listed method and then proceed step-by-step to the more severe method as necessary.

** - Do not decontaminate a wound; this will be done by a doctor or experienced medical personnel

TABLE 2

HOSPITALS PREPARED TO HANDLE CONTAMINATED PATIENTS

Area	Location - Facility
Cook County	Chicago-Northwestern* Memorial Superior Street & Fairbanks Court Chicago, IL
Kane County	Aurora-Copley Lincoln & Weston Avenue Aurora, IL
	Elgin-St. Joseph 77 North Airlite Elgin, IL
Kankakee County	Kankakee-St. Mary's 500 West Court Street Kankakee, IL
Livingston County	Pontiac-St. James 610 East Water Street Pontiac, IL
LaSalle County	Streator, St. Mary's * 111 E. Spring Street Streator, IL
DeKalb County	DeKalb-Kishwaukee Community Box 707 - Bethany Road DeKalb, IL
Will County	Joliet-St. Joseph * 333 North Madison Street Joliet, IL
	Joliet-Silver Cross 1200 Maple Road Joliet, IL
Clinton, Iowa	Jane Lamb Memorial Hospital* 638 South Bluff Clinton, Iowa
Lake County	Victory Memorial Hospital* 1324 North Sheridan Road Waukegan, IL

* These facilities have been designated by utilities as regional decontamination hospitals and are therefore trained and equipped to specifically respond to a nuclear power plant accident.

ILLINOIS PLAN FOR RADIOLOGICAL ACCIDENTS

Department of Nuclear Safety

Standard Operating Procedure

<u>Monitoring and Decontamination of Miscellaneous Items</u>

<u>4-SOP-10</u>

9-22-80

ATTACHMENT 5

MONITORING AND DECONTAMINATION OF MISCELLANEOUS ITEMS

A. Purpose

This procedure provides instructions for monitoring and decontaminating vehicles, tools, equipment, livestock, structures, crops, soil, and any other items that are contaminated with radioactive material.

B. Repsonsibility

The RAFT Ingestion/Contamination Control Officer is responsible for completion of this procedure.

C. References

1) Shapiro, J., "Radiation Protection," Harvard University Press, ISBN-0-674-74581-7, 82-5 (1976).

2) Eichholz, G. G., "Environmental Aspects of Nuclear Power," Ann Arbor Science Publishers, Inc. (1976).

3) 4-SOP-12, Collection of Environmental Samples

4) 4-SOP-13, Analysis of Environmental Samples

D. Prerequisites

This procedure shall be completed by properly trained and authorized personnel only.

E. Precautions

1) Be aware that soap, brushes, and other articles (equipment) used for decontamination may become contaminated after use and should be handled accordingly.

2) Under all circumstances, unnecessary exposure to radiation should be avoided.

3) Wear protective clothing when surveying and deconning equipment.

4) Care must be exercised to prevent contamination from spreading to other areas.

5) Do not use decontamination methods which will spread localized material or increase surface penetration.

6) All surveys should be performed in an area of low background (less than 1,000 cpm with HP-260).

7) Disposal of contaminated materials must be performed in accordance with USNRC regulations. (Such disposal will be conducted by the Department of Nuclear Safety.)

E. Procedure

1) General

a. Monitoring for contamination is done by slowly moving the detector over the suspected surfaces. Measurements of beta-gamma contamination with a G-M counter are taken with and without interposing a shield that stops beta particles. The difference between the readings gives the contribution from beta radiation.

b. Proceed from the outermost edges of the contaminated area inwards, reducing systematically the area that is contaminated.

c. A survey must be made after deconning to verify that the radioactive material has been removed. Use values contained in Table 1 as appropriate.

d. Care must be taken regarding the method used, as the creation of a worse radioactive hazard (e.g., contaminated water) may be created.

e. If a particular surface or area is suspected of being contaminated with radioactive material, it should be marked (roped) off accordingly. Do not allow anyone to leave the contaminated area without being monitored.

f. Monitoring and decontamination of items not included in this procedure will be handled on a case by case basis under the direction of the Department of Nuclear Safety.

2. Vehicles

a. Vehicles used by evacuees and emergency response personnel may be contaminated with radioactive materials. All such vehicles will be monitored and decontaminated if necessary.

b. Monitoring will consist of performing a general gross beta-gamma survey of the vehicle; paying particular attention to the tires and the top of the vehicle.

c. If step b indicates contamination, wipe test all tires and the hood and/or top of the vehicle for removable surface contamination.

d. If wipes reveal removable beta-gamma surface contamination greater than approximately 100-cpm/100 cm^2 above background, perform additional wipes and surveys to determine entire contaminated area of the vehicle and start decontamination procedures.

e. Decontamination will be accomplished by washing the vehicle with soap and water. This may be carried out in commercial car wash establishments, if appropriate. Fire-hosing may also be used to decontaminate vehicles under certain circumstances.

3. Tools and Equipment

a. Tools and equipment that have become contaminated should be labeled, wrapped, and stored in such a manner as to constitute no hazard to personnel and to control spread of contamination.

b. Decontamination, if required, can be accomplished using one of several methods, e.g., wiping with a dry cloth, "Radclean" cleaning solvent, soap and water, etc.

4. Livestock

a. Livestock in the affected area should be monitored for contamination.

b. Such decontamination should be conducted under the supervision of the Department of Agriculture. Owners of the livestock, after suitable training, may perform the decontamination themselves.

c. Washing with soap and water should eliminate contamination.

5. Structures

a. Before re-entry into the evacuated area is allowed, structures will be monitored and, if necessary, decontaminated by washing with soap and water.

b. Decontamination may be effected by the owner of the structure after proper training and instructions in decontamination procedures.

6. <u>Crops and Soil</u>

a. Crops and soil that may have become contaminated with radioactive materials will be monitored (sampled) and analyzed for contamination in accordance with 4-SOP-12 and 4-SOP-13.

b. For small areas, decontamination can be accomplished by digging up the affected area and disposal at a site to be determined by the Illinois Department of Nuclear Safety.

c. For large areas, decontamination can in certain instances be accomplished by plowing-under contaminated crops and soil.

TABLE 1
ACCEPTABLE SURFACE CONTAMINATION LEVELS[a]

NUCLIDE[b]	AVERAGE[c,d]	MAXIMUM[c,e]	REMOVABLE(c,f)
U-nat, U-235, U-238, and associated decay products	5,000dpm/100cm^2	15,000dpm/100cm^2	1,000 dpm/100cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100dpm/100cm^2	300 dpm/100cm^2	20 dpm/100^2
Th-nat, Th-232 Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100cm^2	3,000 dpm/100cm^2	200 dpm/100cm^2
Beta-gamma emitters (nuclides with decay modes other than aplha emmission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm/100cm^2	15,000 dpm/100cm^2	1,000 dpm/100cm^2

(a) Acceptable to be released for unrestricted use.
(b) Where surface contamination by both alpha- and beta-gamma-emitting exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.
(c) As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
(d) Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

TABLE 1 (continued)

(e) The maximum contamination level applies to an area of not more than $100cm^2$.

(f) The amount of removable radioactive material per $100cm^2$ of surface area should be determined by "wiping" that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the "wipe" with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be "wiped."

FIGURE 1

TYPICAL DEPLOYMENT OF IDNS VEHICLES

DURING A NUCLEAR ACCIDENT

83-74

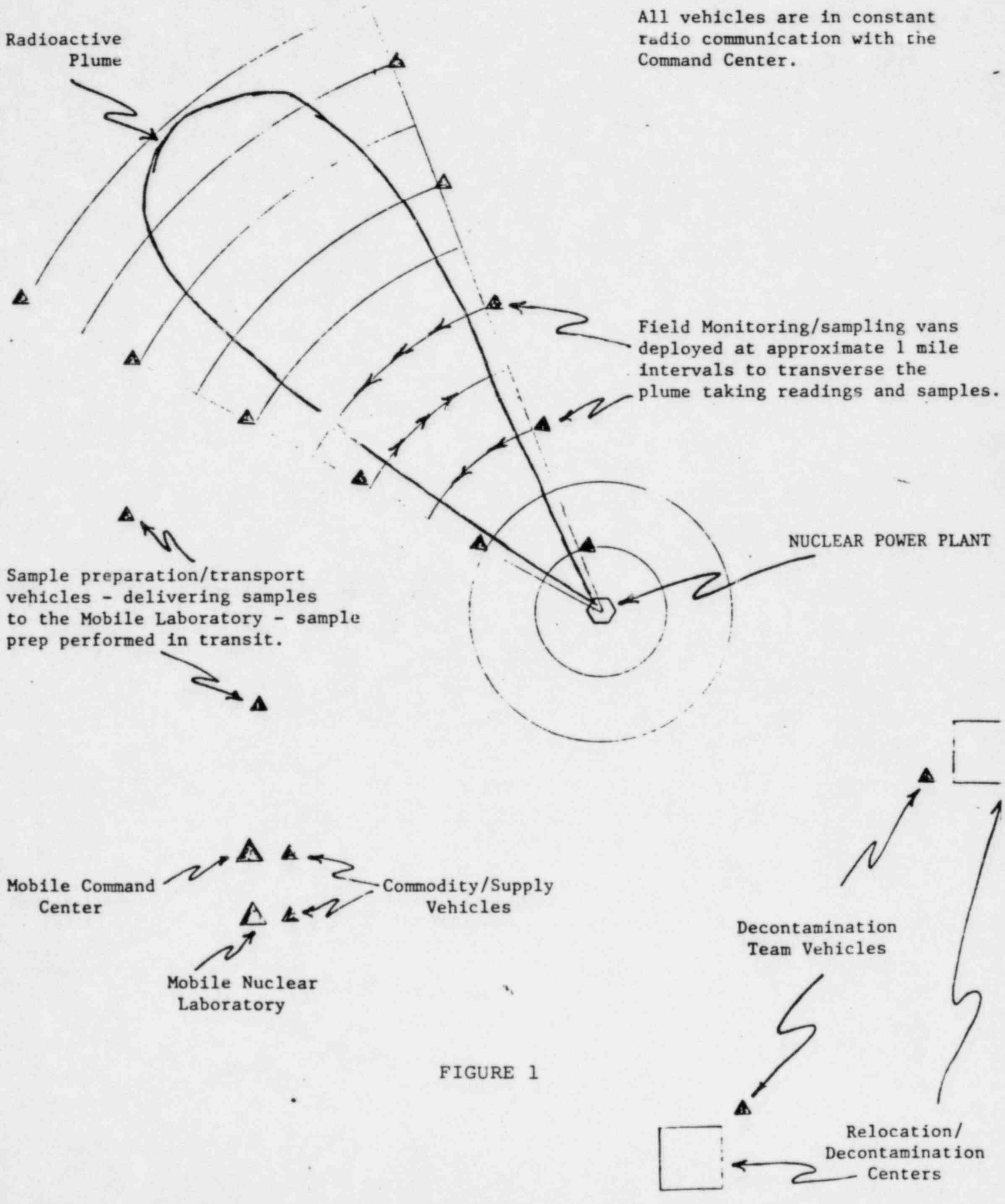
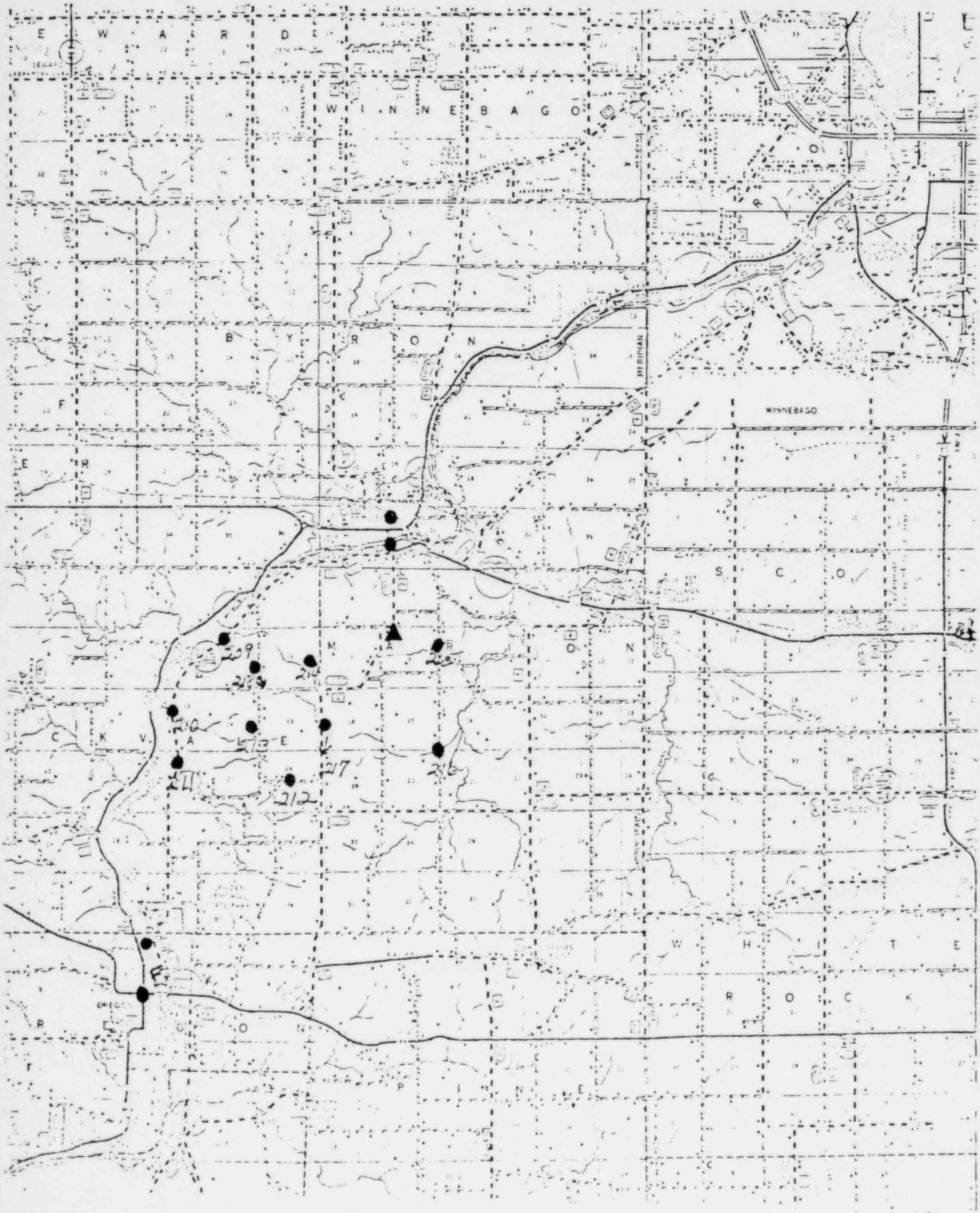


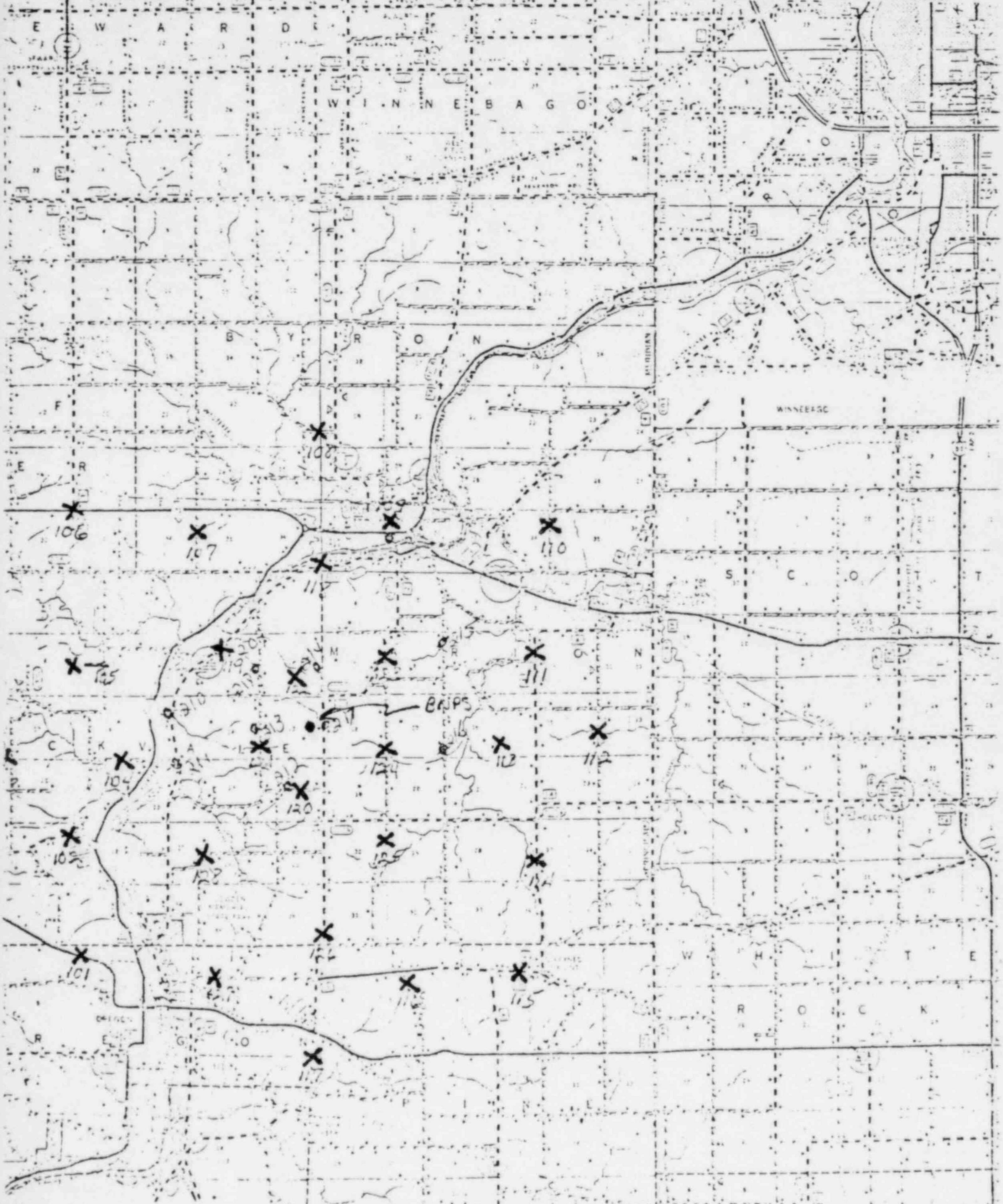
FIGURE 1

WATER & AIR SAMPLING LOCATIONS NEAR BYRON NUCLEAR GENERATING STATION



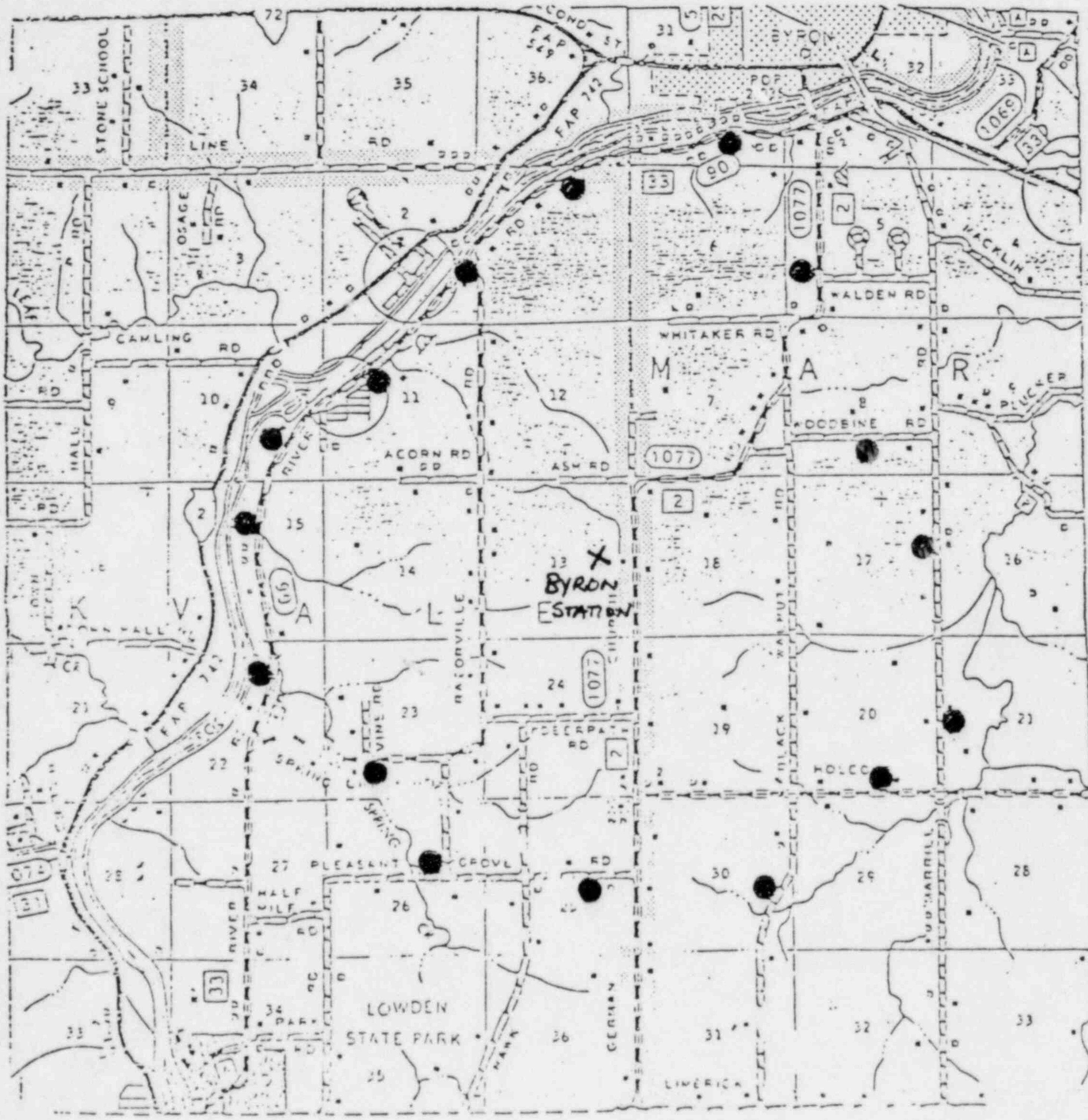
Map #1

LOCATION OF THERMOLUMINESCENT DOSIMETERS (TLD's) NEAR BYRON NUCLEAR GENERATING STATION



Map #2

LOCATIONS OF PRESSURIZED ION CHAMBERS NEAR BYRON NUCLEAR GENERATING STATION



Map #3