October 17, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

| | | |
|---|---|---|
| Shelwell Services Incorporated | ) | License No. |
| Route 1, Harbor Hills | ) | 34-10445-01 |
| Hebron, Ohio 43025 | ) | EA 83-96 |

Licensee's Answer to NRC Order to Show Cause and Order Temporarily Suspending License

I. Background

On September 20, 1983, Richard C. DeYoung, Director of the Office of Inspection and Enforcement of the NRC, issued an "Order to Show Cause and Order Temporarily Suspending License" in connection with NRC byproduct material License No. 34-10445-01 held by Shelwell Services Incorporated (hereinafter referred to as "Licensee"). The Order, which was effective immediately, was prompted by an incident at Licensee's Hebron, Ohio, facility on September 13 which resulted in radioactive contamination of the facility, personnel, and off-site locations.

The Order requires Licensee to terminate use of byproduct material except as needed to comply with the Order's provisions. All byproduct material is required to be returned to Licensee's facility and stored in a restricted area in accordance with 10 C.F.R. Part 20. Licensee is required to decontaminate residences and other off-site areas contaminated as a result of the September 13 incident. The Order requires Licensee to submit

a proposed decontamination plan for the Hebron facility to to the NRC Regional Office by October 19 and obtain the Regional Administrator's approval of the plan before initiating facility decontamination. Finally, the Licensee is required to show cause why License No. 34-10445-01 should not be revoked.

This answer is submitted in response to the NRC Order. Licensee requests the withdrawal of the temporary license suspension and demonstrates that its license should not be revoked.

## II. Present State of Compliance with Order

Licensee has complied with the Order in the following respects.

- As specified in Paragraph IV.A. of the Order, Licensee is not using byproduct material, except as permitted by the Order in connection with storage and decontamination.
- As specified in Paragraph IV.B. of the Order, all byproduct material has been returned to Licensee's facility at Hebron, Ohio, and is stored in a restricted area which complies with 10 C.F.R. Part 20.
- As specified in Paragraph IV.C. of the Order, Licensee promptly initiated decontamination of residences and other off-site areas which were contaminated as a result of the incident. Oral reports on the status of decontamination have been submitted to Region III during the

course of those activities. The decontamination has now been completed and evidence thereof in the form of a final survey and verification is being submitted to the Regional Administrator on October 17, 1983.

- A draft proposed decontamination plan for the facility was discussed with Region III on October 13, 1983, and will be submitted today. The plan discusses (1) the qualifications of the persons responsible for radiation safety during the decontamination operations; (2) the levels of contamination that will be permitted to remain in the facility after decontamination; (3) a description of the methods to be used to assure protection of workers and the environment against radiation hazards during the decontamination operations; and (4) a description of the methods to be used for disposal of contaminated materials. Implementation of the proposed plan will not begin until the Regional Administrator's approval is obtained.

## III. Licensee's Activities and the Incident of September 13, 1983

Licensee is a small family-owned business engaged in furnishing essential well-logging services to the industry which is responsible for meeting much of this country's energy requirements.

Licensee has provided logging and perforating services since 1964 to oil and gas well developers in Ohio and Illinois. Two of the Company's full time employees are family members - Clyde Shelton, President and Morey Shelton, Vice-President. Licensee employed approximately 40 persons full time at the time of the incident involving release of radioactive materials. Of those, 28 were in Ohio and 12 in Illinois. The Illinois business involves logging activities in the oil fields, which activities work out of the Licensee's Hebron, Ohio headquarters.

Licensee's logging business entails taking sealed radioactive materials to well drill site locations where the materials are run down and up the bore hole to characterize the physical structure of the geologic formations which have been penetrated. Licensee's well logging activities cannot be carried out without an NRC license. The regulated aspects of well logging operations are essentially (1) the storage of byproduct materials as sealed sources in restricted areas; (2) shipment of the sealed sources in locked containers on trucks to a job site or from job site to job site over a period of time; (3) use of the sealed source with well logging tools on the job site; (4) return of the sealed source to storage in the restricted area.

License No. 34-10445-01 authorizes the use of licensed material "at the licensee's facilities at Route 1, East of Hebron on US 40, Hebron, Ohio and at temporary job sites of the Licensee anywhere in the United States where the U.S. Nuclear Regulatory

Commission maintains jurisdiction for regulating the use of licensed material." Because virtually all of Licensee's licensed operations actually are conducted in the oil fields, many miles from Company buildings where the accidental release occurred, use of Company buildings is not currently critical to resumption of the logging operations. Because the Order has required all byproduct materials to be stored at its Hebron facility and because its license has been suspended, all of the Company's oil and gas well logging operations have ceased. As will be described below, the license suspension is effectively putting Licensee out of business.

During the almost-twenty years of its existence, Licensee's record of compliance with AEC and NRC regulatory requirements has been acceptable. One civil penalty ($1,000) was imposed in 1978 for violations in connection with the loss of an americium source from a vehicle. In recent years violations have not exceeded Severity Level IV and have not involved violations of a repetitive nature. None of these violations involved any hazard to health or safety.

The contamination resulted from efforts late in the afternoon on September 13 by Licensee's personnel at the Hebron facility to remove a 2 curie cesium-137 source from a source holder which had been stored in a lead pig for approximately six (6) years. Cleanup efforts were begun on September 14 and the incident was reported to the NRC by telephone within twenty-four (24) hours of the incident. The initial report was made by

Licensee's Radiation Safety Officer who was then at a job site in Illinois and had himself received information from Hebron by telephone. Cleanup efforts by Licensee's personnel were unsuccessful and, after consultations with personnel of the NRC and the State of Ohio, the Licensee, upon the recommendation of its consulting health physicist, engaged Applied Health Physics, Inc., of Pittsburgh, Pennsylvania, to conduct the cleanup.

The incident is, in our view, an unfortunate accident which resulted in over exposure to two and possibly three employees. Licensee has been assured thus far by medical and health physics consultants that these over exposures have not resulted in damage, although final results have not yet been submitted to us. The accidental release resulted in the contamination of four buildings and one trailer at Licensee's facility, of numerous pieces of operating equipment, fourteen homes and three public buildings. Licensee has reacted quickly and efficiently to accomplish the cleanup, engaging the services of persons highly qualified and experienced in conduct of similar decontamination activities. The off-site cleanup was completed on October 6. A final survey and verification of the off-site cleanup is being filed with Region III at this time. licensee has complied promptly and fully with the Order of September 20.

## IV. Cleanup Activities

As soon as the potential magnitude of the cleanup activities became apparent, the Company's retained health physicist, James Lewis, recommended that an expert in the field of decontamination

be retained to oversee the work. He recommended Applied Health Physics, Inc. of Pittsburgh, Pennsylvania ("Applied Health") with which Mr. Lewis had worked on several decontamination projects involving other licensees. Licensee immediately retained Applied Health which agreed to perform the work only if it would conduct, as opposed to direct, the decontamination. Applied Health arrived to begin problem analysis and decontamination of off-site facilities on September 16. Applied Health's activities have been led by Robert G. Gallaghar, P.E., C.H.P., its President.

Well logging activities involving radioactive material were voluntarily stopped on September 15 immediately upon the oral request to do so by NRC Staff made to the Licensee's President. At Applied Health's recommendation, the Licensee caused the contaminated site to be posted with radiation warning signs and isolated by barriers on all sides and put under twenty-four hour continuous security. Beginning Saturday, September 17, Applied Health in continuous coordination and cooperation with NRC Staff and the Radiological Assistance Program Team made up of State of Ohio and U.S. Department of Energy personnel, carried out the contamination evaluation. Initial steps were taken to identify contaminated vehicles, equipment, persons, homes, etc., and to prohibit further spreading of contamiantion. When the evaluation was completed, cleanup of off-site facilities was conducted in accordance with NRC criteria.

All off-site contamination was cleaned up to NRC criteria and verified as such by NRC site officials by October 6, 1983. Applied Health is filing a decontamination plan for the on-site contamination with the NRC on October 17, 1983. Upon NRC approval of the plan, those decontamiantion activities will begin.

V. Revised Radiation Protection Program

In the thirty-three (33) days since the release incident, Licensee has undertaken numerous activities (in addition to providing such assistance as requested by Applied Health) to assure compliance with all NRC regulations and license conditions. Licensee fully recognizes that its future authorization to operate under an NRC license will require it to handle byproduct materials in a totally secure and appropriate manner. In order to accomplish this, Licensee has initiated the following regulatory radiation safety program:

A. Development of Radiation Safety Manuals. Licensee has written a new Operating Procedures Manual in cooperation with its retained health physicist and Applied Health. This manual, a copy of which is attached as Appendix A, allocates, defines and prescribes responsibilities, practices and procedures for managing all routine and emergency situations. Compliance with this manual will be an on-going condition of employment for all of Licensee's employees. The Manual is significantly detailed, and is constructed in compliance with the Licensee's "Policy Statement Re: Radiological Safety" which provides,

> Shelwell has a legal responsibility as well as a moral obligation to assure that all operations involving the possession and use of licensed radioactive materials are conducted in accordance with all applicable safety regulations. Therefore our company, including every employee, must make certain that we know and comply with the radiation safety procedures that are set forth in this manual as well as the terms and conditions of our NRC license. We consider our commitment to practice radiological safety so important that we hereby make it a condition of employment. Our responsibilities as an employer and your responsibilities as an employee are concisely stated in NRC Form 3 by the U.S. Nuclear Regulatory Commission. A copy of this Form 3 has been posted at our job sites, in our logging trucks and is also contained in this manual as Appendix I. We encourage you to help us to maintain all radiation exposures to as low as reasonably achievable (ALARA). Your cooperation and assistance in the implementation of this policy is essential to you, our company and to all who rely upon us to use radiation safely and profitably.

In addition to the Operating Procedures Manual, Licensee is also developing a Quality Assurance Manual to make certain that the requirements of the Operating Procedures Manual are performed. The outline for the Quality Assurance Manual is attached as Exhibit B; the Manual should be written by Applied Health and adopted by Licensee within the next thirty (30) days.

B. Training Program. Immediately following the incident, Licensee initiated action to improve the skills of its Radiation Safety Officer, Mr. Miller. Between September 19-23 he completed a 5-day training course in radiological safety offered by Applied Health. This course is specifically designed for persons responsible for implementing radiation safety programs. The course focuses on how to implement such programs effectively, including such aspects as instrumentation, monitoring and documentation

procedures, emergency and incident response, transportation, and storage and disposal of radioactive materials. It is a practical, rather than theoretical, course. A description of this course is attached as Appendix C.

The Licensee will also conduct formal training for all employees to familiarize them with the Operating Procedures Manual and prepare them to carry out their responsibilities under the Manual. This training will provide further assurance that the requirements of License No. 34-10445-01 and NRC regulations can be - and are - met in all circumstances. This training program will be conducted by the Company's Radiation Safety Officer, retained health physicist and Applied Health. The initial training sessions will begin on or before October 21, 1983. Satisfactory completion of the program will be a condition of continuing employment, as well as a condition precedent to new employees undertaking work with Licensee.

C. Additional Instrumentation. The Licensee has ordered a number of additional radiation detection instruments which will enable it to carry out required radiation surveys in normal operations and any emergency situation which may arise in the future. These instruments should be authorized for use by Shelwell of Illinois, Inc., as well as Shelwell Services, Inc. This instrumentation includes:

1 neutron survey meter Ludlum Model 15

2 Victoreen ionization chamber survey instruments for measurement of higher levels of gamma radiation

5 Solar Electronics Alert 4 end-window geiger tube instruments for measurement of lower levels of alpha-beta gamma radiation

15 low range Geiger-Mueller instruments for measurement of beta-gamma radiation

Licensee expects to receive this instrumentation on site before October 21, 1983 so that its use can be included in the training sessions discussed in B.

D. Quality Assurance Audits. The Licensee believes that it is important to confirm regularly that it is in ongoing compliance with the procedures prescribed in the manuals and training programs discussed above and that the new instrumentation is used properly. Therefore, Licensee has retained Applied Health to perform "compliance audits" to make certain that Licensee continues to meet its regulatory and permit requirements and its Policy Statement. The audits will be conducted under the supervision of a Certified Health Physicist. They will consist of regular unannounced surveys of oil field operations and annual complete reviews of all of Licensee's licensed operations. The audits will be conducted whether NRC inspections of the facility have been conducted within the same time frame.

E. Problem Awareness. The radiological release event which caused the subject Temporary License Suspension has had a profound impact upon the managers and owners of Licensee. This experience has raised the awareness level of all company personnel concerning the critical need to handle byproduct materials in full compliance with all regulatory and license requirements. Shelwell Services,

Inc. is a small family-owned and operated business, not a large operation in which numerous employees are isolated from management and its policies. Licensee believes that the traumatic impact which this incident has had on its employees, officers and business prospects is itself a significant factor in assuring that such an event is unlikely to occur again.

Licensee believes that the Revised Radiation Protection Program outlined above will prevent radiological release events from occurring in the future. It will also cause Licensee to conduct all of its operations in full compliance with applicable rules and permit terms. Because of this new program, the NRC can be assured that Licensee will conduct all of its future well logging activities without threat to the public health and safety. Licensee has shown the NRC good cause as to why Licensee's permit should not be revoked. The NRC should make the determination not to revoke NRC byproduct material License No. 34-10445-01, so inform Licensee, and withdraw its order temporarily suspending said License.

## VI. Need For Expedited Favorable Action

Licensee believes that it has shown good cause for the lifting of the NRC's Order temporarily suspending its license and a final determination by NRC that the license should not be revoked. Furthermore, the economic burden being experienced by Licensee requires that the lifting of the temporary suspension occur promptly. That is because the suspension has effectively put Licensee out of business.

During the first six months of 1983 Licensee performed 720 well logging and well perforating operations. Of these, 300 were logging of wells and 420 were perforating of wells. Perforating does not entail use of byproduct material and does not require an NRC license. At first blush it might appear that Licensee's well perforation business might stand on its own. However, that is not the case. Of total perforating jobs, 225 or 53.6% of the total, were performed on wells where Licensee had earlier also logged the wells. Thus, 73% of its business in the first half of 1983 was for wells on which Licensee performed both logging and perforation services.

That experience is consistent with 1982. Last year, 1,824 total jobs were performed with 67% (698 logging and 524 perforation)

of the jobs being performed on the same wells. Therefore, only 602 unrelated perforation jobs were performed, which accounted for only 33% of Licensee's total jobs.

The normal business practice in the Appalachian petroleum basin is for producers to purchase both logging and perforating services from the same company. Jobs are usually awarded on that basis. Licensee believes that if it had not been able to log the 300 wells it did in the first 6 months of 1983, or the 698 wells it logged in 1982, Licensee would have been able to perforate few, if any, of the wells which it also logged. Therefore, Licensee believes that common industry practice would have allowed Licensee to have perforated only those 195 wells in the first half of 1983 and those 602 wells in 1982 which it perforated without logging. That is the work which would have been left if the Company had not been licensed to use radioactive material.

Licensee believes that the surest way to evaluate the future impact of the currently enforced license suspension is to calculate its impact on past business as if the suspension had occurred during that past business. Therefore, accounting projections have been developed assuming that the logging and logging-related perforation jobs had not been performed during the respective accounting periods. Licensee is submitting, under separate cover and with an application for confidentiality, Tables A 1-3 and B 1-3, which provide total jobs, actual income and expense records and projected income and

expense records without logging-related business for the first half of 1983 and for 1982 respectively. In the projections, logging and logging-related perforation income and expenses were deleted based on their percentage contribution. Fixed costs unrelated to type of jobs performed were modified on a best estimation basis.

The bottom lines of these projections are that Licensee would have lost [$278,675.16] in the first half of 1983 and [$520,058.85] in 1982 without logging and logging-related perforations. This is a catastrophic impact, and is precisely the effect which Licensee is experiencing today because of the NRC's license suspension. Licensee believes it is losing [$10,718.28] each week, or [$1,531.18] each day this suspension continues. These estimates do not include any decontamination costs.

These losses are more than any small, family business can endure for any length of time. Since the logging business can be resumed without renewed threat to public health and safety, no regulatory or public interest mandates continued imposition of these losses. Prompt reinstatement of the NRC license is appropriate.

Licensee therefore respectfully requests that the temporary suspension of License No. 34-10445-01 be lifted promptly. Licensee conditionally requests a hearing to be conducted in the event that the NRC should deny its request for the lifting of the suspension

and/or should the NRC find that Licensee has not shown good cause as to why the license should not be revoked.

SHELWELL SERVICES, INCORPORATED

By _____
Morey D. Shelton
Vice-President

DISTRICT OF COLUMBIA, SS:

Sworn to before me and subscribed in my presence this 17th day of October, 1983.

My Commission Expires January 1, 1983

_____
Notary Public

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APPENDIX A

# RADIOLOGICAL SAFETY

# OPERATING PROCEDURES MANUAL

# GOVERNING ALL USES OF LICENSED RADIOACTIVE MATERIALS

BY

SHELWELL SERVICES, INC.

447 LAKESHORE DRIVE, WEST

HEBRON, OHIO 43025

OCTOBER 1, 1983

TABLE OF CONTENTS

# POLICY STATEMENT RE: RADIOLOGICAL SAFETY

Shelwell of Illinois, Inc. has a legal responsibility as well as a moral obligation to assure that all operations involving the possession and use of licenses radioactive materials are conducted in accordance with all applicable safety regulations. Therefore our company, including every employee, must make certain that we know and comply with the radiation safety procedures that are set forth in this manual as well as the terms and conditions of our NRC license. We consider our commitment to practice radiological safety so important that we hereby make it a condition of employment. Our responsibilities as an employer and your responsibilities as an employee are concisely stated in NRC Form 3 by the U.S. Nuclear Regulatory Commission. A copy of this Form 3 has been posted at our job sites, in our logging trucks and is also contained in this manual as Appendix I. We encourage you to help us to maintain all radiation exposures to as low as reasonably achievable (ALARA). Your cooperation and assistance in the implementation of this policy is essential to you, our company and to all who rely upon us to use radiation safely and profitably.

Vice President
Shelwell Services, Inc.

October 1983

# OBJECTIVES

This manual was prepared so that each employee has written guidelines that can enable him/her to (a) keep any radiation exposure to as low as reasonably achievable (ALARA); and (b) to implement the preceeding policy statement on radiological safety.

It is essential that this manual be read carefully, be clearly understood, and that the procedures be used for both routine and/or emergency situations involved radiation. However, whenever a potentially hazardous condition is suspected, or you do not understand clearly how or what you are to do to control a radiation risk, immediately suspend operations and call the Radiation Safety Officer (RSO), your supervisor, or, if neither person is available, call those persons listed in the Emergency Notification List (see Appendix II).

Obviously, it is impossible to produce a manual that will encompass every routine and emergency situation. However, with your help, through constructive suggestions, we will continue to revise this manual in order to provide guidance that will enable us to assure adequate safeguards and effective management of our radiological operations.

# APPLICABILITY

The radiological safety procedures set forth in this manual shall be applicable to all operations performed by or on behalf of Shelwell of Illinois, Inc. that involve eht possession, transfer, or use of licensed radioactive materials. Any questions concerning the applicability of these procedures to govern routine or emergency situations must be referred to the RSO or the Chief Executive Officer (CEO) for clarification or interpretation without delay.

(1)

# DESCRIPTION OF RADIATION PROTECTION PROGRAM

**Responsibilities of the Supervisor:**

**The supervisor is responsible for:**

(1) Protecting the health of all people under their jurisdiction.

(2) Enforcing all regulations relating to radiation safety.

(3) Making available all necessary safety equipment such as shields, protective clothing, monitoring instruments and other equipment necessary for the safe use and handling of radioactive material.

(4) Coordinating with the Radiation Safety Officer before starting any project including procurement, use, storage and/or disposal of radioactive materials or any changes in working conditions or activities which would effect the Radiation Protection Program.

(5) Coordinating with the Radiation Safety Officer for the indoctrination of employees who will be occupationally exposed to ionizing radiation.

(6) Ensuring that the proper dosimetric devices are worn correctly by all users.

Responsibilities of the Radiation Safety Officer:

The Radiation Safety Officer is responsible for assuring that all operations are conducted in compliance with applicable regulations, licenses and Corporate policies and procedures. The Radiation Safety Officer has the authority to enforce all rules and regulations. The Radiation Safety Officer (acting for the company) directs discontinuance of any operation found to be hazardous as a result of surveys and/or investigations. A report of such actions will be made immediately to the Vice President. The Radiation Safety Officer's general responsibilties are to:

(1) Ensure that personnel and area monitoring is accomplished.

(2) Supervise emergency operations in the event of fire, spills and explosions involving radioactive materials.

(3) Review plans for proposed facilities which will involve the use of radiation sources.

(4) Provide preliminary hazard evaluations for proposed uses of radiation sources.

(5) Provide training to employees in radiation protection.

(6) Ensure the receipt, shipment and transfer of radioactive materials are properly monitored and identified.

(2)

DESCRIPTION OF RADIATION PROTECTION PROGRAM

Responsibilities of Assistant Radiation Safety Officer:

(1) Will assume responsibilities of Radiation Safety Officer during his absence.

(2) Will insure that all responsibilities of Station Manager and/or Operating Engineers are being accomplished.

Responsibilites of Station Manager:

The Station Manager is responsible for assuring that all operations are conducted in compliance with applicable regulations, licenses and Corporate policies and procedures. The Station Manager has the authority to enforce all rules and regulations. The Station Manager(acting for the company) directs discontinuance of any operation found to be hazardous as a result of surveys and/or investigations. A report of such actions will be made immediately to the Radiation Safety Officer. The Station Manager's general responsibilities are to:

(1) Ensure that personnel and area monitoring is accomplished.

(2) Supervise emergency operations in the event of fire, spills and explosions involving radioactive materials.

(3) Provide training to employees in radiation protection.

(4) Ensure the receipt, shipment and transfer of radioactive materials are properly monitored and identified.

Responsibilities of Operating Engineers:

(1) The Operating Engineer is responsible for the safe handling of all radioactive material while transporting to and from, and at temporary job sites.

(2) He will insure that all surveys required are performed and entered on truck survey sheet.

Responsibilities of all persons involved in radiological operations:

All persons using radioactive materials will:

(1) Learn and practice the rules of safety as prescribed by the Radiation Safety Officer and/or the assistant Radiation Safety Officer.

(2) Wear personal dosimetric devices as assigned by their supervisors and the Radiation Safety Officer.

(3) Wear adequate protective clothing and equipment as prescribed.

(4) Strive to keep exposure to ionizing radiation as low as reasonably achievable (ALARA).

(5) Report accidents and hazardous conditions promptly.

(3)

DESCRIPTION OF RADIATION PROTECTION PROGRAM

(6) Under supervision of Radiation Safety Officer or Assistant Radiation Safety Officer, clean up spills for which they are responsible.

(7) Inform the supervisor of any changes in equipment or procedures involving radioactive material or ionizing radiation.

## GUIDELINES FOR THE CONTROL OF RADIATION EXPOSURES

The following permissible levels are not intended to mark clearly a difference between conditions that are "safe" or "unsafe". They do represent levels whereby investigations will be initiated to determine the cause and action to be taken to prevent its recurrence. All employees should make every reasonable effort to maintain radiation exposure as low as is reasonably achievable (ALARA). Any person receiving occupational exposures outside of Shelwell control must report such monthly exposures promptly to the Radiation Safety Officer. Those exposures must be included in exposure history files, and are considered as part of the 1.25 rem/13 wk permissible level.

EXTERNAL EXPOSURE:

a. Permissible occupational level for total body exposure will be 0.1 rems per week, providing that for any 13 week period the following maximum permissible radiation exposures are not exceeded:

(1) Whole Body: head and trunk, active blood forming organs, lens of eyes and gonads -- 1.25 rems. The total occupational dose to the whole body may exceed 1.25 rems during a calendar quarter provided that the total occupational dose to the whole body does not exceed 3 rems during the calendar quarter.

(2) Hands and forearms or feet and ankles -- 18.75 rems.

(3) Skin of whole body -- 7.5 rems.

b. The total accumulated dose to any individual will not exceed 5 rems per year. The allowable dose for individuals under the age of 18 is 0.5 rems per year or 1/10 of those specified in this paragraph. Paragraph 23 of this regulation outlines the policy for controlling exposures to fertile or pregnant women.

c. The Radiation Safety Officer must be notified immediately of any exposure or suspected exposure to the whole body in excess of those presented above.

d. Non-occupational exposures will be limited to 1/10 of the permissible occupational exposure limits.

SURFACE CONTAMINATION:

a. All work with radioactive material will be conducted under such conditions as to minimize any potential contamination.

b. Loose contamination will be removed as soon as possible.

c. Fixed contamination is defined as surface contamination which is not removable by ordinary smear sampling and which shows at least 900 dis/min alpha radiation per 100 $cm^2$ or area, 3000 dis/min per 100 $cm^2$ beta-gamma radiation. Areas containing fixed contaminants will be posted with the appropriate signs and strict controls initiated to prevent the occurence of a health hazard.

## NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS

The licensee shall post current copies of the following documents:

a. NRC Form 3, Notice to Employee, wherever individuals work in or frequent any part of a restricted area.

b. Instructions informing the workers that copies of the current NRC license, 10CFR19, 10CFR20, and any notice of violations or associated documents are posted or on file at operating facility.

1. Instructions to Workers. All individuals working in or frequenting areas using radioactive material and/or radiation producing apparatus will be kept informed of its use, storage and transfer.

2. They will be instructed in the following:

(a) The potential health problems related to exposure to radioactive materials and ionizing radiation.

(b) Precautions/procedures to minimize exposure and in the purpose and functions of protective devices employed in the use of radioactive materials or radiation areas.

(c) Their responsibility to report promptly to their supervisor any condition which may lead to or cause any unnecessary exposure to radiation or radioactive material.

(d) The appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material.

## GENERAL PRECAUTIONS FOR RADIATION WORKERS

All persons working with radioactive material will obey the following rules:

a. Hands will be washed thoroughly before eating, drinking, smoking or leaving work.

b. Wash rubber gloves and monitor them before removing them from your hands, if possible.

c. Use detection equipment to determine effectiveness of the decontamination.

d. Never work with radioactive material when there is the possibility of contaminating open wounds. Wear clean rubber gloves to cover breaks in the skin on hands when handling radioactive material.

e. Mouth-pipetting of radioactive liquids is not permitted. Use mechanical pipettes only.

f. Smoking, applying cosmetics, preparing or eating food in the laboratories or rooms where radioactive materials are handled is not permitted.

g. In case of an accident involving radioactive material, avoid excessive exposure, contain the contamination, perform personal decontamination. Immediately notify your supervisor and the Radiation Safety Officer.

h. Never discard any item without first checking its radioactivity.

i. Never empty radioactive materials into undesignated sinks or waste cans.

j. Do not clean equipment while wearing contaminated gloves.

k. Do not remove radiation labels and tags without proper authority.

## RADIATION MONITORING PROGRAM

a. It is the responsibility of the Radiation Safety Officer to ensure radiation monitoring is conducted.

b. Personal monitoring will include the recording of the radiation dose received by each known employee working with beta, gamma and/or neutron emitters.

(1) Monitoring will be requested by the Radiation Safety Officer. It is the responsibility of the supervisor to inform the Radiation Safety Officer of any changes of personnel or equipment.

(2) Personnel will at no time tamper with the dosimetric device.

(3) Monitoring devices should never be worn during medical exposure to ionizing radiation.

(4) Monitoring devices will be exchanged monthly by the Radiation Safety Officer. A report will be submitted by the film processor to the Radiation Safety Officer documenting the exposures of individuals.

c. The term "visitor" is used for any person for whom personal monitoring equipment is not routinely provided.

d. All visitors must register with the supervisor before entering a radiation area. The supervisor will issue a visitor's monitoring device. The visitor's name, organization, business telephone number and the dosimeter I. D. will be entered in the visitor's log. The date and time of issue and return of the dosimeter will also be entered in the visitor's log. Those areas in which the dosimeters must be worn will be designated by the Radiation Safety Officer and will be posted with the appropriate signs. Pocket ionization chambers may be issued to visitors, in which case a visitor's log will be kept containing the visitor's name, address, date and time in, time out, pocket ionization chamber number and the reading obtained from the pocket ionization chamber.

e. Periodic monitoring will be conducted with portable survey instruments by using personnel. The frequency of monitoring will be established by the Radiation Safety Officer.

f. Continuous monitoring and/or continuous monitoring devices are mandatory in those facilities, areas, or operations where there is a potential of whole body exposure in excess of 100 mrems in 1 hour.

g. Area monitoring will include the collection and analysis of environmental samples, surface swipes, and other surveys as required to ensure that radiation intensities remain below permissible levels.

## REPORTING DEFECTS AND NONCOMPLIANCE

a. Any suspected defects, hazards or noncompliance must be reported to the Radiation Safety Officer immediately upon discovery.

b. The suspected defect, hazard or noncompliance will be investigated. If the investigation reveals that a substantial violation exists, the condition will first be reported, then corrected or terminated.

c. All substantial defects, hazards or noncompliance will be reported to the Radiation Safety Officer and to the Regional Office of NRC, Glen Ellyn, Illinois 60137, according to 10CFR21.21.

d. Any worker or representative of workers who believes that a violation of USNRC, USDOT regulations and license conditions or any defect in facilities or equipment exists or has occurred in license activities with regard to radiological health and safety in which the worker is engaged should report such conditions to:

(1) The immediate supervisor or department person, and to

(2) The Radiation Safety Officer

e. Appropriate reports by workers may be submitted verbally, but should be submitted in writing for proper documentation.

f. Appropriate requests for inspection of violations or defects may also be made directly, in writing, to the U. S. Nuclear Regulatory Commission Regional Office of Inspection and Enforcement in accordance with 10 CFR 19, Sec. 19.16 (a).

g. The Radiation Safety Officer will immediately inform the Vice President of the alleged violation or safety defect or hazard.

h. The Radiation Safety Officer will conduct an investigation to determine whether or not a substantial safety defect, hazard or noncompliance exists. The investigative findings will be reported in writing to the Vice President and a copy will be filed with the appropriate USNRC license.

i. If a substantial safety defect, hazard or noncompliance does exist, notification will be provided by the Radiation Safety Officer within 2 days of the determination to the Region III, Office of Inspection and Enforcement, U. S. Nuclear Regulatory Commission, 799 Roosevelt Road, Glen Ellyn, Illinois 60137. If initial notification to the USNRC is by means other than written communication, a written report will be submitted to the same USNRC regional Office within 5 days following the determination.

j. All written reports and correspondence with the USNRC will be submitted by the Radiation Safety Officer through the Vice President. Information copies will be provided to the Vice President. Guidelines for notification to the USNRC are contained in 10 CFR 21, Sec. 21.21.

k. Copies of the references listed in this regulation and other documents pertaining to activities involving the use of radioactive materials and radiation producing devices licensed by the USNRC are maintained by the Radiation Safety Officer and are available for examination by employees.

l. Workers may request reports of their radiation exposure through the Radiation Safety Officer.

## STORAGE OF RADIOACTIVE MATERIALS

a. Radioactive materials greater than 100 microcuries will be stored in shielded, waterproof and secure areas. The storage areas will be posted with appropriate signs. This includes the room, storage cabinets and storage containers. The radiation intensity at one foot from the exterior surface of the storage area will not exceed 1 mr per hour.

b. Some shipping containers may be adequate for storage. Neutron sources will be stored in their shipping containers or such containers which have been determined to be safe for storage.

c. Radiation levels on the surface of the containers of radioactive material will not exceed 200 mrems per hour or 10 mrem/hour at a distance of three feet from the container.

d. Containers of low intensity need not be kept in radioactive material storage rooms if the intensity at one meter from the storage bin, cabinet or area does not exceed 1 mr/hr and the individual containers and storage containers are identified with appropraiate warning signs which are in plain view at all times.

e. Containers will be so located that the radiation intensity at the nearest occupied area is such that people would not unknowlingly receive exposures greater than 0.2 mrem in any one hour.

f. All storage facilities will be monitored routinely not to exceed 90 day intervals. All markings placed on the isotope containers in storage will be in such a position that there will be no radiological risk or hazard to any person who reads them.

## RADIATION AREAS

a. Radiation areas are areas that people can enter and in which there is radiation at such levels that a major part of the body could receive a dose of 5 mrems in any hour or in excess of 100 mrems in 5 consecutive days. These areas will be indentified and posted with appropriate signs: "CAUTION - RADIATION AREA"

b. High radiation areas are any areas in which people could receive a radiation dose in excess of 100 mrems in one hour. Such areas will be provided with visible or audible alarms to warn individuals entering the areas of the potential hazard. These areas will be identified and posted with the appropriate signs: "CAUTION - HIGH RADIATION AREA"

c. Temporary radiation areas are areas arising from spills, radiation beams or temporary storage of radioactive materials and the radiation dose does not exceed 5 mrems in any one hour or 100 mrems in any 5 consecutive days.

d. Temporary high radiation areas are those in which the dose will exceed 100 mrems in one hour. All temporary radiation areas or temporary high radiation areas will be roped off at the point where the radiation level is 2.5 mr per hour and adequate signs posted so as to be visible from every approach.

e. General precautions will be taken to ensure that contaminated clothing including shoes, equipment and materials are left in the radiation areas. People who are contaminated or who wear contaminated clothing will not be permitted to enter an area of lower radiation levels without previous adequate decontamination.

# GUIDELINES FOR THE CONTROL OF RADIATION EXPOSURE

## Procedure For Calibration of Portable Survey Meters

1 Equipment to be used

A. Cesium 137 NBS Traceable Source
B. Calibration Stand

2 Steps To Be Taken

A. During calibration, each area will be identified and marked where radiation intensities exceed 2.5 mr/hr
B. Each Individual involved in the calibration procedures will be required to wear a personnel monitoring dosimeter.
C. Calibrations will be conducted by or under the supervision of the Radiation Safety Officer or Assistant Radiation Safety Officer.

3 Procedure

A. Calculations will be made annualy to determine activity of Cesium 137 Source.
B. Check batteries and replace if necessary.
C. Clean all terminals if needed.
D. Use the Inverse Square Law to determine distance vs Flux (mr/hr) to obtain the following readings + 20%.

| Scale | Point #1 | Point #2 |
|---|---|---|
| X 1 | .15 mr/hr | .35 mr/hr |
| X 10 | 1.5 mr/hr | 3.5 mr/hr |
| X 100 | 15.0 mr/hr | 35.0 mr/hr |

E. Calibration date and due date will be posted on each instrument.
F. Calibration date, due date, instrument Serial Number, and initials of person performing calibration will be entered in calibration log book.

PROCEEDURES FOR HANDLING RADIOACTIVE MICROSPHERS DURING TRACER EVALUATIONS:

I CLOTHING

a. Gloves
b. Rubber Boots
c. Coveralls.

Prior to handling any tracer material, insure the use of the above clothing. In the event that the clothing becomes contaminated with the radioactive material, remove and place in a plastic bag before leaving the work site. This practice reduces the potential spread of the radioactive material to the vehicle, shop and home.

II Storage and transport.

a. All radioactive tracer material is stored inside the storage bin.

b. Prior to removing the material, perform the following:

c. Insure the use of the above clothing.
d. Inspect the container for proper containment by insuring that the lids are sealed and the container is not broken.
e. Conduct a radiation survey to determine the radiation levels. This will provide information to determine the potential exposure to personnel during the handling proceedures. Remember that every effort should be made to maintain exposures to less than 100 millirems per week, ie, if the radiation level is 100 mr/hr, one could expect to receive his 100 millirems in one hour.
f. Minimize the time spent near the container while transporting or carrying the container directly to the storage location on the vehicle.

g. Insure that the container is secured and is properly identified as "radioactive material."

III USE

a. Never transport tracer material except directly to and from the location of use, ie, never store the material on a vehicle unless there is an anticipated need. Return all unused tracer material to the storage bin upon return to the shop.

b. Tracers should be introduced into the well at the nearest available point to the hole. Every effort should be made to insure minimum distance of flow through piping outside the well. Always inject the tracer on the discharge side of any pumping system and flush the system following the injection.

c. Monitor the well site, piping, clothing and areas of potential spills or loss of the tracer.

d. In the event the tracer was spilled or leaked causing a contamination problem, the area of concern will be isolated and roped off. Notify the Radiation Safety Officer and/or your supervisor for clean up instructions and assistance. Never leave a job site unidentified if contamination has occured.

(2)

PROCEDURES FOR HANDLING RADIOACTIVE MICROSPHERS DURING TRACER EVALUATIONS

e. Insure that your clothing and shoes are not contaminated before leaving the job site. Contaminated clothing, including shoes, should be placed inside a container and returned to the shop fordisposition.

f. Return all unused tracer material to the shop storage area.

g. Perform a radiation survey of the vehicle to insure against vehicle contamination.

NOTE! I The amount of tracer material used during each procedure is usally between one and two millicuries.

NOTE!! Any contaminated items will be contained in a sealed container and held for disposal and/or decontamination. Disposal will be made to a licensed dispocal site.

## RADIATION CONTROL RECORDS

a. Records are maintained by the Radiation Safety Officer to include the following categories:

(1) Isotope inventories

(2) Personnel monitoring

(3) Area monitoring and surveys

(4) Waste disposal

(5) Special reports

(6) Training

b. Copies of any records of the previously mentioned categories conducted by an individual or supervisor will be made available to the Radiation Safety Officer.

# GUIDELINES FOR THE CONTROL OF RADIATION EXPOSURE

## Leak Testing of Sealed Sources

NOTE: Precautionary measures must be observed by any individual authorized to leak test sealed sources.

1. Certain sealed sources of radioisotopes are NOT TO BE REMOVED from shielding devices within which they are permanently mounted or stored. Radiographic exposure devices, density gauges, teletherapy units, and other such devices shall be leak tested by conducting the test on accessible surfaces of the device upon which contamination might be expected to accumulate.

2. The individual conducting the test should wear a lapel film badge, a ring badge, and pocket dosimeters or pocket chambers as may be required. With this same consideration, personnel monitoring devices should also be worn by other individuals permitted to remain in the area where leak testing is being performed.

3. The leak tester must monitor the test area and any adjacent areas with calibrated survey meters, and any required signs must be posted in accordance with Title 10-CFR-20.203 or other applicable regulations.

4. Only remote handling techniques shall be used during the manipulation of "free" sealed sources. Sources must not be allowed to come into contact with the hands or other portions of the body. Full advantage should be taken of the inverse square law and minimizing exposure time.

5. It is recommended that the leak tester wear protective clothing during the testing of certain sealed sources. Flexible protective gloves offer significant shielding from beta radiation and also prevent the possible contamination of hands.

6. When necessary, shielding devices should be used in the leak testing area. The tester may employ a barrier composed of appropriate thicknesses of lead, steel or concrete when dealing with various gamma-emitters.

7. Although most licensees are required to leak test sources at intervals not exceeding six (6) months, sealed sources should be leak tested following any incidents wherein they may be damaged. Should a source be subjected to chemical or physical stresses beyond those for which it was designed, an immediate leak test is recommended.

8. Adherence must be given to the provisions of the NRC's Title 10-CFR-20.101, "Exposure of individuals to radiation in restricted areas," and other applicable sections of NRC regulations during all leak testing procedures.

# EMERGENCY PROCEDURES AND GUIDELINES

## DOWNHOLE LOSS OF SOURCE

1. Immediate notification of Radiation Safety Officer
2. Initiate retrieving procedures
   a. Determine type of equipment need to attempt a safe successful recovery.
   b. Proceed with recovery attempt.

## SUCCESSFUL RECOVERY

Note!! Immediate moasures will be taken to prevent tool from dropping back into well.

1. Visual inspection to detect obvious physical damage.
2. Smear test source per leak test procedures.
   a. If test is negative, source will be returned to container.
   b. If test shows contamination
      1. Routine operations will be terminated.
      2. Well site will be monitored to determine extend of contamination.
      3. Area will be isolated to minimize spread of contamination.
      4. Decontamination plans developed.
      5. NRC Region III, State and local agencies notified.
      6. Decontaminate area for release to operator.

## UNSUCCESSFUL ATTEMPT

1. NRC Region III notified to determine final disposition.
2. State and Local agencies notified.
3. Well sealed and placarded in accordance with Title 10 CFR.

## EMERGENCY PROCEDURES AND GUIDELINES

### Management of Accident During Transportation of Radioactive Material

NOTE: If possible Operating Engineer will have the Assistant Engineer isolate the area, maintain security over radioactive material and keep unauthorized personnel away.

1. The Operating Engineer will notify the Highway Patrol.
2. Notify Radiation Safety Officer giving following information:

    A. What happened
    B. When
    C. Where
    D. Who was involved
    E. What has been done to control radiation
    f. Current status

# EMERGENCY PROCEDURES AND GUIDLINES

## EMERGENCY PROCEDURE FOR THE CONTROL OF ACCIDENTAL RELEASE OF RADIOACTIVE MATERIALS

Emergencies include any unusual occurrence that results in contamination of facilities and/or environment, or that may result in the exposure of people to hazardous levels of ionizing radiation. Notify the Radiation Safety Officer. or Assistant Radiation Safety Officer.

SPILLS: Emergency procedures to be followed in the event of a radioactive material spill are as follows:

a. Shut down internal ventilation system.

b. Notify all persons not involved in the spill to evacuate the area.

c. If the spill is liquid and the hands are protected, right the container.

d. Confine the spill immediately.

(1) Liquid spills. Don protective gloves. Place absorbent paper on the spills.

(2) Dry spills. Don protective gloves and respirator. Dampen the contaminated surface taking care not to spread the contamination. Generally, water may be used except where chemical reaction with water would generate an air contaminant. Oil should then be used.

e. If the spill is on the skin, flush thoroughly with water and wash with a mild detergent.

f. If the spill is on clothing, discard outer or protective clothing.

g. Evacuate the room.

h. Notify the Radiation Safety Officer as soon as possible.

i. Take immediate steps to decontaminate people involved, as necessary.

j. Begin decontamination of the area at the outer perimeter.

k. Monitor all personnel involved in the spill and clean-up operations to determine the adequacy of personnel decontamination.

l. Permit no person to resume work in the area until a survey is made and approval of the Radiation Safety Officer is obtained.

## EMERGENCY PROCEDURES AND GUIDLINES

FIRST AID. First Aid and medical attention takes priority over decontamination of people. Any injury occuring in a radiation zone, no matter how slight, should be treated as an emergency.

### CONTAMINATED WOUNDS

a. Contaminated wounds should be flushed immediately with large quantities of water within 15 seconds after the accident. Spread the edges of the wound to make the flushing more efficient. For minor wounds, bleeding should be stimulated by pressing gently around the wound followed by flushing with water. While still flushing the wound with water, rub gently with wet cotton gauze pad using liquid soap to remove dirt and grease from the wound. Monitor the wound for contamination and repeat the decontamination, if necessary. Notify the Radiation Safety Officer. Remove the person (s) to a local hospital or medical center for evaluation and further treatment.

b. For major wounds, in addition to flushing and decontamination as above, a tourniquet may be applied above the wound to restrict the venous but not the arterial flow. For wounds of the fingers, a milking action can be used on the fingers to increase bleeding and retard the venous flow of the blood. When applying the tourniquets, check the pulse to ensure that the arterial flow has not been stopped. Monitor the wound for contamination. Tourniquets may be removed if the monitoring shows no residual contamination, bleeding could then be controlled with pressure dressings. Remove person(s) to the local hospital or medical center as soon as possible.

c. Save the object causing the injury for examination to aid in the estimating the extent of contamination.

### INGESTION AND INHALATION OF RADIOACTIVE MATERIAL

a. If a person ingests a radioactive material, the individual must expectorate and be induced to vomit as quickly as possible. A quick and usually effective method is by haveing the individual tickle the back of his or her throat with a finger. The individual should be made to vomit repeatedly and should drink 2 or 4 glasses of lukewarm water between times. The Radiation Safety Officer should be notified of the incident and the patient removed to a local hospital or medical center.

b. A person who has inhaled radioactive material should be removed to an uncontaminated area immediately. Although there is no really effective first aid measure for removing inhaled material, deep breathing and coughing may help to dislodge particulate matter from the respiratory tract and will tend to dilute radioactive gases. The patient should be removed quickly to the local hospital or medical center.

## EMERGENCY PROCEDURES AND GUIDLINES

### FIRE FIGHTING

a. The Radiation Safety Officer will indoctrinate the Fire Department relating to the hazards associated with fire fighting in an area containing radioactive material. The Fire Department will be presented with a list of radioisotopes including locations of radiation areas and isotope storage areas.

b. Fire extinguishers in radiation areas should be of the dry powder or carbon dioxide type since a stream of water or other fluid may serve to spread the radioactive material. When using fire hoses, as a general rule, water fog is preferable to avoid excessive runnoff of water that may spread contamination and/or cause breakage of glass apparatus with the release of radioactive material.

c. Should a fire break out, first notify the local fire department, then the Radiation Safety Officer of its location during normal duty hours or after duty hours. If no immediate radiation hazard exists, combat the fire using the nearest fire extinguisher, sand, water etc. If there is enough time, close all windows and doors and turn off the ventilation system before leaving the area. People not in the fire area should quickly place any radioisotopes in the area into storage or transport containers and then close all windows and doors and shut off the ventilation system.

d. The Radiation Safety Officer will supply the local fire fighters with personnel dosimeters and brief the firefighters as to the location of isotopes in the laboratory building. The fire fighters must wear protective clothing and respirator equipment even though there is no evidence of immediate radiation danger. The fire fighters should not open radioisotope containers without permission from the Radiation Safety Officer. When possible, fire fighting should be conducted from the upwind side of the blaze. When the operation is completed, fire fighters will evacuate the area to be monitored and decontaminated, turn in their dosimeters and be monitored.

### DECONTAMINATION

a. Decontamination procedures will be prescribed and supervised by the Radiation Safety Officer. Preventing the spread of contamination is the primary concern.

b. Skin contamination can best be prevented by personal cleanliness, care in handling radioactive materials and use of proper protective clothing. Persons working with radioactive materials should wash their hands frequently during the day and monitor themselves before leaving their work area. Any contamination of the skin should be removed promptly while taking proper precautions not to spread the contamination. The following general skin decontamination procedures are those most widely used. Other more drastic measures may be conducted under medical supervision.

EMERGENCY PROCEDURES AND GUIDLINES

DECONTAMINATION (cont'd)

(1) Wash with pure mild soap and tepid water for 2 to 3 minutes, dry and monitor. If contamination is greater than 60 counts per minute for alpha emitters or any detectable beta-gamma emitters using a thin-window G-M tube, repeat the decontamination procedure. If, after 2 attempts at skin decontamination, more than the above levels of radiation remains, the Radiation Safety Officer will indicate additional steps to be taken. Any treatment stronger than detergents will not be used unless specifically indicated by the Medical Doctor, since they make the skin permeable and may hasten the absorption of the contamination substance. Organic solvents, acid, or highly alkaline solutions should be avoided.

(2) Should the hands be the area contaminated and washing for 2 or 3 minutes is not completely effective, then a "surgical scrub" will be used. An 8 minute scrub using a hand brush and mild soap should be employed. Dry the hands and monitor. Should the contamination remain above the maximum permissible level indicated above, the operation will be repeated. A hand lotion containing lanolin should be applied to soften the skin and help prevent chapping. Never decontaminate the skin to the extent that it becomes rough or abraded.

(3) Decontamination of the eye should be accomplished by irrigation with a copious quantity of water.

(4) After the emergency procedures are accomplished, the patient must be sent to a local hospital or medical center for examination and further treatment. Care must be taken to handle items such as soap, gauze pads, nail brushes, towels and wash water used for personal decontamination, as radioactive material.

c. In decontamination of areas and equipment, special care must be used to control the spread of contamination by:

(1) Always working toward the center of contamination.

(2) Taking care not to track contamination and to properly use protective clothing.

(3) Covering clean areas in the vicinity with kraft paper or plastic to protect them from potential contamination.

(4) Controlling, confining and properly disposing of runoff solutions and treating cleaning equipment such as mops, rags and brushes as radioactive wastes.

(5) Dismantling and decontaminating the equipment when possible.

d. More specific methods of decontamination of surfaces and equipment may be recommended by the Radiation Safety Officer.

e. Decontaminated surfaces of work areas and equipment should have residual fixed alpha contamination of less than 900 disentegrations per minute (dpm) per 100 square centimeters of area and 3000 dpm per 100 square centimeters for beta-gamma contamination. Allowable removable contamination should not exceed 100 picocuries/100 $cm^2$ alpha and/or 1000 picocuries/100 $cm^2$ beta-gamma contamination. If the equipment cannot be adequately decontaminated, it should be treated as radioactive material.

f. Methods adequate for decontamination of monitoring equipment will be formulated after consideration of the instrument type, finish, amount of contamination and isotope with which it is contaminated.

## RELEASE OF FACILITIES AND/OR EQUIPMENT FOR UNRESTRICTED USE

A. Prior to release of facilities and/or equipment for unrestricted use, any item of concern will be monitored and swipe tests will be taken to determine if any removable contamination is present. If contamination above permissable limits is found, the item will be decontaminated before release.

## TRANSFER AND/OR DISPOSAL OF RADIOACTIVE MATERIALS

a. The Radiation Safety Officer will be contacted for approval before the disposal of any radioactive material.

b. It is the responsibility of an individual producing radioactive waste to provide the Radiation Safety Officer with an inventory of the waste. Efforts will be made to limit the volume of radioactive waste.

c. The Radiation Safety Officer is responsible for furnishing information about the isotope's half-life, estimated activity, dates of estimation, radiation level at the surface of the container and instrument used in determining the level of surface radiation.

d. Short-lived waste will be separated from long-lived solid waste and records will be made as to the contents of the container.

e. The Radiation Safety Officer is responsible for maintaining radioactive waste disposal records identifying the isotope, amount and disposal method.

f. Waste containers located within working areas and having an intensity of more than 2 mr per hour at the outer surface must be identified and the area appropriately marked, controlled and/or shielded.

g. No liquid waste will be disposed of through the sanitary sewer unless it is known that levels will be within the provisions of Appendix B, Title 10, Code of Federal Regulations, Part 20, and authorization has been granted by the Radiation Safety Officer.

h. Waste containers for shipment will be required.

i. Two radiation warning labels (Radioactive Material Warning), will be attached to opposite sides of the container.

j. The container will be kept covered and monitored to determine the radiation intensity. Radiation levels should not exceed 200 mR/hr on the surface or 10 mR/hr at 3 feet. Swipe samples taken on the outside of the container to insure that it is not contaminated.

k. When the container is filled with radioactive waste, contact the Radiation Safety Officer to ensure proper monitoring and labeling before transfer of the waste. Radioactive waste will be transported according to Title 49 CFR.

l. The general requirements for a waste holding facility are:

(1) Located in an area where positive control can be maintained.
(2) Enclosed by a physical barrier such as walls or fencing provided with locked entrances.
(3) No waste material is generated during normal operations.
(4) Waste due to decay of Tracer Material will be mixed with new material and dumped into next Oil or Gas well being studied.
(5) Sealed sources found to be leaking will be transferred to manufacturer for repair or to an authorized disposal site for disposal as per 10-CFR-20.

# SAFETY OPERATING PROCEDURE (CHECK LIST)

I Before Leaving Permanent Site

1. Monitoring Equipment

   A. Film Badge
   B. Radiation Survey Meter

2. Surveys

   A. AmBe Storage Compartment
   B. Cs 137 Storage Compartment
   C. Enter Readings on Truck Survey Sheet

II Upon Arrival at Temporary Job Site

NOTE: Prior to removing any radioactive material from vehicle, all personnel not directly involved in the well logging operation will be required to remain at a minimum of twenty feet from the sealed source.

1. Survey well site and enter reading on truck survey sheet.

2. Remove source from shielded container using handling tool.

3. Place source into logging tool.

4. Pick up tool with wench. Position tool at zero point. Lower tool into well.

5. Reverse steps 2-3-4.

6. Survey well site and enter reading on truck survey sheet.

III Upon Return to Terminal

1. Surveys

   A. AmBe Storage Compartment
   B. Cs137 Storage Compartment
   C. Enter Readings on Truck Survey Sheet.

# EMERGENCY NOTIFICATION INSTRUCTIONS

These instructions are to be read and followed by all employees in the event of an emergency.

IMMEDIATE notification of an emergency is to be given by telephoning the following in numerical order:

## FIRE

Organization or Individual — Telephone No.

1. _____ Fire Dept. _____
(location)

2. _____ - RSO _____
(name) (home)

3. _____

Information given by caller

1. Give your name.
2. Your company name.
3. Company address.
4. Location of fire.
5. Entrance firemen should use
6. Caution if radioisotopes are involved.
7. Warn if airborne contamination "use masks".

1, 4, 5, 6, 7 - plus

(a) What has been done to control loss.

(b) When Fire Dept. was called.

(c) Current situation.

## INJURY

1. Dr. _____ (office) (office)
(home)

2. Dr. _____ (office) (office)
(alternate)
(home)

OR: Emergency Room _____
(hospital)

3. _____ _____
(company official)

1. Extent of injury.
2. Present condition.
3. First aid measures taken.

## ACCIDENTS

Organization or Individual — Telephone No.

1. If no injuries - no radiation,

call: _____ _____
(company official and title)

2. If radiation is involved,

call: _____ _____
(Radiation Safety Officer) (home)

3. If accident occurred off-site, (e.g. on highway, etc.) have someone maintain security over radiation source and keep personnel away, while you call 'collect' the individuals named above - PLUS - highway patrol and/or police.

Information given by caller

1. What happened.
2. When.
3. Where.
4. Who was involved.
5. What has been done to control loss.
6. Current status.

# RADIATION TRAINING FOR OPERATING ENGINEERS

1. The licensed material shall be used or directly supervised by individuals meeting the requirements of an Operating Engineer.

Requirements for classification of Operating Engineer-Training to be given under supervision of Radiation Safety Officer.

Session #1

I Basic concept of nuclear radiation.
II Definition of Terms
  a. Types and Charateristics of nuclear radiations.
  b. Units of measurements relating to radioactive material.

Session #2

III Radiation hazards and protection.

  a. Tape recorded "Radioactive material at Shelwell" - 30 Minutes
  b. Review of External and Internal exposures.

IV Monitoring procedures, records and logs.

Session #3

V 10 CFR 19, 10 CFR 20 and 10 CFR 21

  1. Employer and employee responsibilities
  2. Permissable exposure limits
  3. Reporting unusual conditions

Session #4

VI Radioactive material at Shelwell.

  a. Am Be sealed sources
  b. Co 137 sealed sources
  c. Io 131, Sc 46 and Ir 192 as Tracer Materials.

VII Shelwell procedures

  a. Storage
  b. Transportation
  c. Use

Session #5

VIII Monitoring instrumentation

  a. Survey meters
  b. Film badges and TLD's

IX Question and answers.

APPENDIX B

# Outline
# for
# Quality Assurance Manual
# for the
# SHELWELL SERVICES, INC.

1.0 Introduction
- 1.1 Quality Assurance ("QA")
- 1.2 Objectives of Quality Assurance Program for Shelwell
- 1.3 References to Applicable Regulations, Standards and Company Policy and Procedures

2.0 Organization
- 2.1 Company Organization Structure, Responsibility and Authority for Regulatory Compliance
- 2.2 Operation of Field Projects
- 2.3 Radiological Safety Program for Shelwell Services
- 2.4 Description of Radiation Training Program
  - 2.4.1 Initial (Pre-placement) Training
  - 2.4.2 On-the-job Training
  - 2.4.3 Periodic Refresher Courses
  - 2.4.4 Tests and Practical Exams

3.0 Documentation and Audit
- 3.1 Radiation Records System
- 3.2 Audit and Inspection
  - 3.2.1 Compliance and Safety Awareness of Personnel
  - 3.2.2 Review of Results of Tests and Practical Exams
  - 3.2.3 Audit of Survey Reports, Meter Calibration, Monitoring Records, Leak Tests, Transportation Logs, etc.
  - 3.2.4 Unannounced Surveys and Inspections
  - 3.2.5 Emergency Preparedness

4.0 Annual Audit of Shelwell's Safety Program
- 4.1 Summary of Results of Unannounced Inspections, Surveys
- 4.2 Review of Documentation
- 4.3 Evaluation of Adequacy of Current Safety Program
- 4.4 Recommendation for any Changes or Improvements

## About the Course

For the seventeenth consecutive year, Applied Health Physics, Inc. (AHP), is sponsoring its basic 5 day radiological safety training course for radiation safety officers. This course is tailor-made to provide individuals who are responsible for implementing a radiation safety program with the necessary background to effectively evaluate and control both ionizing and nonionizing radiation risks. The course begins with basic radiation terminology, fundamentals of radiation properties, and biological effects. Course topics will focus on how to effectively implement a radiation safety program, including cost-effective instrumentation, proper monitoring and documentation procedures, emergency and incident response, transportation, and storage and disposal of radiation. Speakers will include certified health physicists, radiation safety officers, and industrial hygienists from industry, governmental agencies, universities, private consulting firms, and hospitals.

We emphasize that this course is much more practical and comprehensive than a basic theoretical training course. Throughout the course, time will be allotted for open discussion of individual concerns and problems. This is an opportunity for participants to learn how each participating company can utilize radiation more safely, efficiently, and in a cost-effective manner.

Continuing Education Units (CEUs) will be awarded upon successful completion of the course. CEUs are a professionally accepted unit of measurement of continuing education based upon ten classroom contact hours per unit in qualified courses.

An (optional) evening session will allow interested students to (a) review a wide variety of audiovisuals for possible use in developing their own training courses; (b) participate in demonstrations of various radiation survey instruments; or (c) engage in a confidential discussion of problems (e.g. licenses, safety procedure manuals, records systems, etc.).

## Who Should Attend

This course has been developed for those individuals in industry, academia, health care facilities, and governments who are or will be administering a radiation safety program. This course is specifically designed to benefit industrial hygienists, safety personnel, health physicists, radiographers, and other occupational health professionals.

There are no specific course prerequisites for enrollment except a rudimentary comprehension of radiation and radiation terminology, mathematics, and the natural sciences.

On successful completion of the course, each participant will receive an attractive certificate specifying the Continuing Education Units (CEU's) granted and certification as a Radiation Safety Officer (RSO). This certification will satisfy most requirements of Federal and State regulatory agencies for an individual to serve as Radiation Safety Officer (RSO) for licensed radiological operations.

## Selected Instructional Topics

- Fundamentals of Radiation
- Basic Radiation Terminology
- Interaction of Radiation with Matter and Biological Effects
- Evaluation and Control of Radiation Risks
- Safety Standards and Regulatory Control of Radiation
- Detection and Measurement of Radiation
- Personnel Monitoring
- Laboratory Exercises and Demonstrations
- Transportation, Transfer, Storage and Disposal of Radioactive Materials
- Basic Laser Safety
- Microwave, Ultraviolet, and Infrared Measurement and Control of Nonionizing Radiation
- Management of Emergencies, Incidents, and Crises Involving RADIATION and/or Radioactive Materials
- Documentation and Effective Management of a Radiation Safety Program

## Registration Information

**Registration**

Since enrollment is limited, early registration is advised. To enroll, please fill out the attached Form completely. No registration will be processed without an attached check or billing instructions. Telephone registration *will not* be accepted. Deadline for registration is seven (7) days prior to each course starting date.

Confirmation will be sent to registrants along with lodging and other pertinent information on local events that may be of interest.

**Fee**

The course registration fee is $550.00. This includes all course materials, (i.e., a syllabus, sample record forms, leak test kits), refreshments, and a luncheon. Meals, lodging, and other expenses are not included in the fee. Checks should be made payable to Applied Health Physics, Inc.

**Lodging**

For your convenience, our courses are held at comfortable lodging facilities just a few minutes from Washington, D.C., and Pittsburgh, PA. Tennis, swimming, jogging areas and fine dining are readily accessible. A limited number of specially priced rooms have been reserved for course participants. However, registrants are responsible for their own reservations. When making reservations, please mention attendance at AHP's course.

**Cancellations**

Written cancellations received seven (7) business days before the scheduled course are eligible for full refund. No refunds will be made for cancellations received after this date. Substitutions for an individual previously registered may be made without notification.

Applied Health Physics, Inc., reserves the right to cancel this course for any unforseen circumstances or an insufficient enrollment. Full refunds will be granted in such an event.

**Tax Deductions for Educational Expenses**

U.S. Treasury Regulation 1.162-5 permits an income tax deduction for educational expenses accrued for registration fees, cost of travel, meals, and lodging undertaken to maintain or improve skills required in one's employment or other trade or business.

**I am interested in enrolling in your 5-day RSO Training Course.**

Course date and payment method are: (Please check one)

- ☐ **Check for $550. enclosed**
- ☐ **Bill me directly**
- ☐ **Please bill my company**

Make checks payable to ***Applied Health Physics, Inc.***

- ☐ **March 14-18, 1983 Washington, DC**
- ☐ **June 6-10, 1983 Washington, DC**
- ☐ **September 19-23, 1983 Pittsburgh, PA**
- ☐ **December 5-9, 1983 Albany, NY**

Name _____

Company _____ _____ Telephone ( ) _____
Position (Area) Number

Address _____

☐ Please call me; I'd like information on other courses and services currently offered by Applied Health Physics, Inc.

City _____ State _____ Zip _____

Application Form

Fullerton EAD

SB
LC
FILE

OCT 25 1983

Shelwell Services, Inc.
ATTN: Mr. Clyde Shelton
President
Route 1
Harbor Hills
Hebron, OH 43025

License No. 34-10445-01

Gentlemen:

We have completed our review of your proposed decontamination plan for remedial action at the Shelwell Services, Inc. (SSI) facility in Hebron, Ohio (Revision 1, dated October 17, 1983). My staff discussed this plan with your staff and Messrs. R. Gallagher, AHP and John Holberg, Esq. on October 21, 1983, via a telephone conference call. We find that the plan has adequately addressed the four elements required in Section IV.D of the September 20, 1983, Order to Show Cause and Order Temporarily Suspending License.

As discussed with your staff, two issues were clarified related to your plan. Section 4.0 of the plan indicates that an onsite NRC representative must approve release of decontaminated areas prior to unrestricted use. This is not necessary as the plan requires SSI to adhere to the approved NRC guidelines for decontamination of facilities and equipment prior to release for unrestricted use. Our role during the onsite decontamination will be one of periodic inspections. We do not plan to have an onsite NRC representative stationed at the site at all times during decontamination activities. However, we do plan to conduct periodic confirmatory and independent measurements of decontaminated areas.

The second issue clarified related to the decontamination actions necessary to cope with apparent significant contamination of an underground sewer/drain line leading from the contaminated buildings. Currently, we understand that you do not have sufficient data to determine the extent of this contamination. As agreed, this area of decontamination will be delayed until further data is obtained and your proposed actions will be discussed with us prior to any removal of sewer or drain lines.

~~8310210431~~

telephone conference

E. FLACK telephone conference 10/25/83 including changes of FLD.

| OFFICE ▶ | RIII | RIII | R III | RIII | RIII | RIII | RIII |
|---|---|---|---|---|---|---|---|
| SURNAME ▶ | Sreniawski/mf | Axelson | Loysen | Hind | Lewis | Davis | Keppler |
| DATE ▶ | 10/21/83 | 10/25/83 | 10/25/83 | 10/25/83 | 10/25/83 | 10/25 | 10/25 |

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY

Based upon the NRC staff's review of your plan and the October 21, 1983, telephone conference call and pursuant to Section IV.D of the September 20, 1983, Order, I approve your October 17, 1983, Revision 1, Decontamination Plan of Shelwell Services, Inc. Facility in Hebron, Ohio, as clarified. You may therefore enter the facility to initiate decontamination activities. Please contact Mr. Donald Sreniawski of my staff when you begin these operations.

Your cooperation with us is appreciated.

Sincerely,

James G. Keppler
Regional Administrator

cc: R. DeYoung, OIE
DMB/Document Control Desk (RIDS)
bcc: J. Lieberman, ELD
J. Hickey, NMSS
E. Flack, IE
D. Chapell, NMSS

| OFFICE ▶ | | | | | | |
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| SURNAME ▶ | | | | | | |
| DATE ▶ | | | | | | |