



RECEIVED  
REGION 1

2002 MAY -6 AM 9:16

*MSG*

*P-5*

United States Nuclear Regulatory Commission  
Region 1  
King of Prussia, Pennsylvania 19406  
Attention: Marie Miller

*37-00030-02*

April 25, 2002

Docket No. 03005980  
Control No. 130955

Dear Mrs. Miller:

Enclosed with this letter, please find the answers to the questions of your concern.

In our telecon with the NRC and DEP-BRP, we discussed waste permits. The only two sites in the work plan that requires waste permits are Barnwell and Hanford. The applications for the permits have been requested and should be to Solutient within two weeks. Although Safety Light Corporation will apply for the permits; Solutient will fill out the required spaces relating to the type of waste and volume that we will be sending to the various waste sites. Safety Light Corporation will fill out the rest and apply for the permits. It should be noted that Barnwell wants to know the volume and kind of waste that is going to be sent them as a condition of applying for the permit; therefore, the waste will have to be segregated first. Safety Light Corporation intends to use Solutient to broker the waste for us. It is Solutient and Safety Light Corporation's intent to have this waste shipped to the various waste sites before Solutient leaves the site if that is possible. What we plan to do is apply for the permits at the earliest we can determine (A) that there is legitimate waste that can be shipped to that particular waste site and (B) that we can determine a fairly close estimate of the volume

Its premature at this time to have a contingency plan for storing waste which might for whatever reason not be able to be shipped offsite. The volume of waste which could not be shipped offsite, if any, and the amount of radiation emanating from the containers will play a major role in where on the site the waste can be stored without affecting the operations currently being done on the Safety Light Corporation property or the employees doing those particular operations. It is noted that both the NRC and the DEP-BRP are going to have

*130955*



increased inspection activities go on throughout the segregation and repackaging of the waste. As we approach various areas of concern throughout the operation it should be very easy to come to some consensus as to any plans that may be necessary to provide the best possible solution for onsite storage if the need arises.

If you have any further questions, please do not hesitate to contact me.

Very Truly Yours,

Larry Harmon,  
Plan

## **NRC REQUEST FOR ADDITIONAL INFORMATION ON THE SAFETY LIGHT CORPORATION "WORK PLAN"**

### **Work Plan – Introduction Section**

- 1. This section states that Solutient Technologies (ST) will perform all on-site work in accordance with the approved Health and Safety Plan and the Quality Assurance (QA) Plan. Please submit these two documents NRC.**

A copy of Solutient Technologies Radiation Health and Safety Plan and Quality Assurance Plan are enclosed with this response.

- 2. This section states that specific tasks or a description of the work will be provided in the ST Radioactive Work Permits, and that a project set will be provided upon approval of the Work Plan. Please provide a copy of the governing procedure for developing Radioactive Work Permits. Likewise, any project RWP's referenced in Section 4, when they are completed to control on-site work activities, should be available for review during pre-job inspection by NRC.**

A copy of Solutient Technology's license procedure for the development of RWP's is enclosed with this response. As a matter of practice, ST posts all active RWP's at the appropriate job location. Any RWP that is in development will be available for inspection but will not be posted until it is approved.

### **Section 2.0 Organizational Structure**

- 3. This section identifies ST managers and staff that will be performing the on-site activities. During our telephone discussion, ST stated that experienced health physics technicians analysts and supervisors with several years of experience and technical knowledge will be involved with this project. Please confirm the experience level for ST personnel who will be sorting, sampling, analyzing and supervising work activities onsite.**

**Also confirm the expected role of the oversight contractor with respect to approximate time spent in oversight activities onsite. In addition, describe how concerns or issues identified by the oversight contractor or by your organization will be addressed.**

Solutient Technology's individual resumes are enclosed with this response. The role of Auxier & Associates as the oversight contractor is to track the progress of the waste segregation, repackaging, and preparation for disposal to determine whether the contracted Scope of Work is being completed by Solutient Technologies. Auxier & Associates will be present onsite during one week (perhaps two weeks) at the beginning of waste segregation operations, subsequently will track progress through contact by telephone and facsimile, and will be present onsite again during two of the weeks toward the end of onsite operations. It may be necessary to allow flexibility in this plan to accommodate changing circumstances as the work progresses. The projected Solutient Technologies schedule includes approximately nine weeks of onsite operations.

Issues, concerns, or suggestions identified by Auxier & Associates will be brought to the attention of Solutient Technologies and Safety Light Corporation and discussed with both parties to result in a reasonable and appropriate solution that is consistent with completion of the Scope of Work and ensuring protection of the health and safety of workers and the public.

## **Section 5.0 Comprehensive Work Plan**

- 4. Section 5.5 describes the processing of the containers. Please indicate where containers will be stored after processing and in particular, describe where high activity containers will be stored to ensure exposures will be maintained As Low As Reasonably Achievable (ALARA).**

It is anticipated that the processed and packaged waste will be stored in the same general location that the material is now stored in. In the current storage state, only incidental shielding is provided. The major contributor to exposure is the radium waste. After the waste is packaged, the maximum activity will be 300 mCi of radium in a container. This will be stored with several inches of concrete shielding in addition to the steel drum. This is much more shielding than is currently present and should significantly reduce the external dose rates and make storage a much simpler operation. The higher exposure containers will be stored in the center to allow the use of lower dose containers as additional shielding. There isn't anywhere else on this site to store the containers without causing exposure to the people working here on the site. If the external dose rates are low enough with the extra shielding to permit the storage of the drums that are currently stored in the lower storage area to be combined with the drums in the upper storage area until shipment, we will do that. Keep in mind that with the activity of each container conceivably being a lot lower than it may be now, that there will likely be an increase in drum count at the finish of the project.

- 5. Section 5.6 refers to representative samples, pre-samples and composite samples. During our telephone discussion, ST also stated that samples will be taken from each container. Please describe in more detail how these sample results will be collectively used to profile each of the waste streams and how the individual container sample results will demonstrate the waste will be accepted at each of the waste disposal facilities.**

### **2 Part question**

#### **1<sup>st</sup> Part**

**How these sample results are collectively used to profile each of the waste streams?**

#### **Type of samples**

##### **Pre-sample:**

These samples will be collected from some of the very first containers processed, plus any containers, which may have some material of concern. The samples will be sent out for Radiological and RCRA analytical to help Solutient determine how to segregate these materials for future processing. This will also allow the initial selection of a disposal facility.

### **Representative samples:**

Solutient believes that a minimum of one sample per drum will be sufficient to ensure a representative sample of that drum. If Solutient feels that it does not represent a representative sample, more samples or a more thorough mixture will be taken to assure a representative sample.

### **Composite Samples:**

For a select number of soil drums, three samples will be taken as the drum is filled they will be blended and one composite sample will be analyzed by the MCA. This information will be used as a measure of the consistency of material within a drum.

### **2<sup>nd</sup> Question**

**How the individual container sample results will demonstrate the waste will be accepted at each of the waste disposal facilities?**

The criteria for each site are well defined. With the exception of WCS, all sites have a list of acceptable labs for analysis. Acceptance of a waste stream is based on providing the data that will be submitted as part of the profile to the site for approval. This data verifies the isotopes are acceptable to the site, the packaging is correct and there are no unacceptable other materials present. Meeting these requirements normally results in approval of the waste for disposal.

- 6. Section 5.7 describes the five different waste streams expected during the project. Please clarify how other waste (i.e. liquids) will be processed or stored. Also please identify the exempt levels of materials that can be shipped to the Waste Control Specialists facility in Texas.**

Incidental liquids are potentially available from two sources. There may be water in the drums associated with the recovery of the material from the bottom of the silo. The ideal use for this water would be to make the concrete necessary to cap the drums prior to disposal. The activity of this waste and the absence of any RCRA materials above the limits will be confirmed prior to use. Any excess water would be absorbed using a material approved by the disposal site. The activity levels would determine the disposal site. The second source could be material in containers such as bottles or vials. This could range from a sealed bottle from the vendor with complete labels to a container with no marking at all. While not specifically questioned, unknown solids have the same issues. Once identified, any liquid can be solidified. The primary question is does the unknown have any RCRA or compatibility issues. Items that can be identified will be stored in small compatible groups with appropriate spill protection pending radiological analysis. Items found to have levels of radioactive material below the default DCGL for unconditional release will be treated as hazardous waste. Materials with elevated activity will be profiled to determine the required processing.

- 7. Section 5.9 describes final packaging and staging of containers and states that '2R container' waste will be presented to the QA contractor for review and approval prior to capping and the final layer of concrete. Please describe the criteria that the QA contractor will use to give final approval.**

The QA contractor in this case will be Auxier & Associates. The following is Auxier & Associates criteria for approval of 2R containers:

- For each 2R container, perform and document a QC check calculation of package activity and radionuclide identities using measurement data collected by Solutient Technologies.
- For each 2R container, inspect the container and determine whether its construction complies with the requirements of 49 CFR 178.360 "Specification 2R; inside containment vessel."

**8. Section 6.0 addresses spill prevention of solid materials during processing. Some liquids will probably be encountered in the drums. Please indicate how these liquids will be handled to minimize personnel and areas contamination should there be a spill.**

Liquids will be removed to the extent possible at the initial inspection station before the containers are sorted. Both containers will be placed in a spill containment system and the liquid pumped from the container to be sorted into a holding container. The actual sort area will have a small containment built into the floor for incidental spills. Recovered liquids will be stored in small 5-gallon pails with lids. These will then be placed into a 55-gallon drum or similar item to provide secondary containment.

### **Section 8.0 Radiation Safety Plan**

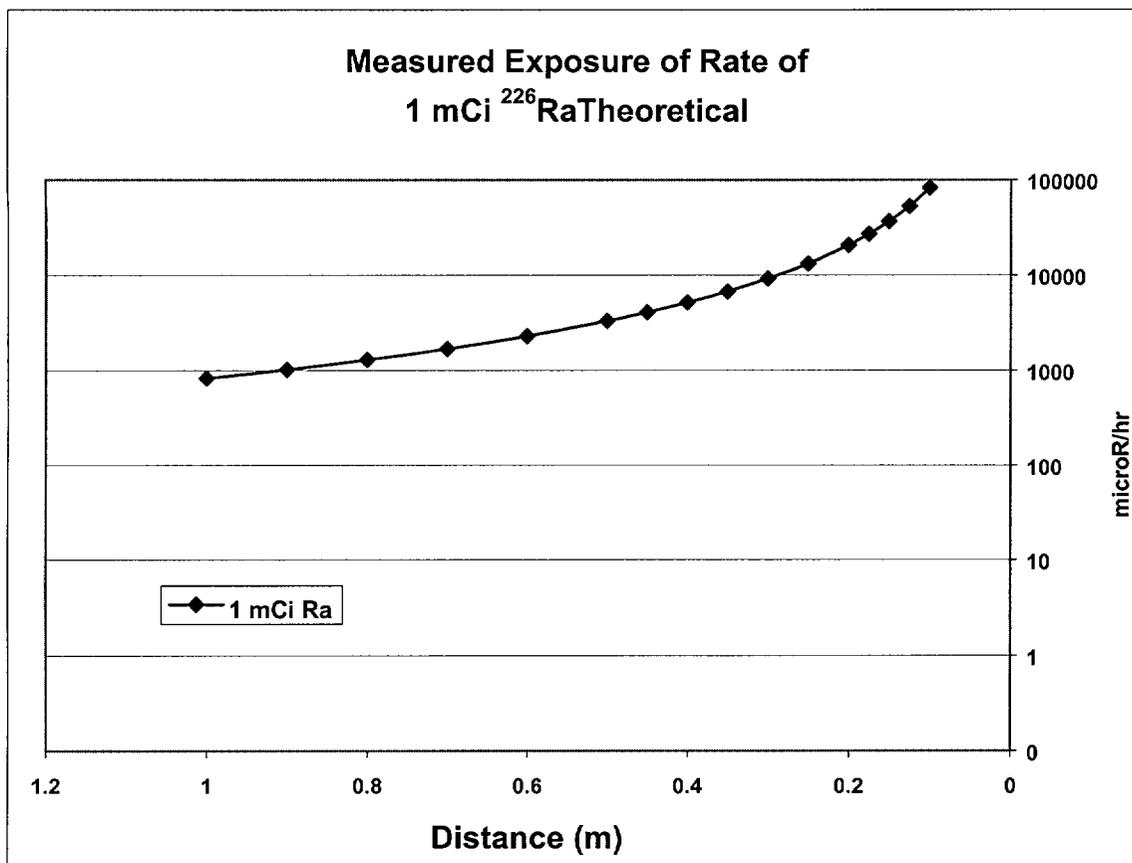
**9. Section 8.3 states that representative monitoring will be performed with personal breathing zone (BZ) samplers. Please clarify under what conditions BZ samplers will be used. For example, will all personnel involved in (specify activities) wear a BZ or will only one crew members wear a BZ during (specify activities), and any doses will be assigned to all those working in this area.**

It is the intention to initially monitor at least one person each day for each task with a BZ sampler. The major tasks are waste transport, initial evaluation and sorting. The BZ data for that task will be used to assign doses for all people doing that task. The sampling frequency will be increased if more than one worker is involved in a task that has documented exposures greater than 25% of the DAC and may be decreased for tasks with documented exposures less than 10% of the DAC.

### **Section 11.0 Waste Material Screening/Survey and Sampling**

**10. Section 11.1 states that a dose vs distance conversion will be used to determine activity. Please provide this information or indicate where this information is located in the Work Plan.**

To quantify the activity, the exposure rate of an item with a near point geometry will be measured at several distances and compared to the theoretical exposure rates from a one (1) milliCurie point source of radium, as shown on the following graph. Items with a very low activity may be grouped to reduce measurement error. Data obtained during the project will be plotted and the resulting lines compared to determine the shape of the measured data.



**11. Section 11.4 describes air sampling of the stack discharges. We understand from previous sampling records that radioactive effluents are not expected to exceed 10 percent of NRC limits. However, please indicate its expected surveillance sampling that will be done at this location to ensure effluents are adequately evaluated.**

ST plans to sample at least one discharge stack on a daily basis when work is underway. Sampling will be done with a single point, isokinetic probe. Based on continued results below 10% of the DAC, this interval may be increased.

**Section 12.0 Quality Control**

**12. Verify that measurements using the onsite multi channel analyzer system will be used for screening only and therefore not subject to an independent Quality Control program.**

Any measurements done that will become part of the official record will be performed on equipment using a NIST calibration standard. The field screening measurements with the NaI MCA will not be part of this package.

**SOLUTIENT TECHNOLOGIES, LLC  
RADIATION PROTECTION HEALTH & SAFETY MANUAL**

**TABLE OF CONTENTS**

1.0	Purpose and scope	1
2.0	Program Assessment	1
3.0	Radiation Protection Administration	1
4.0	Personnel Monitoring Program	2
4.1	Compliance with requirements for summation of external and internal doses	2
4.2	Conditions requiring Individual Monitoring of External and Internal Occupational Dose	2
4.3	Occupational dose Limits for Adults	3
4.4	Occupational Dose Limits to Minors	3
4.5	Occupational Dose Limits to an Embryo/Fetus	3
4.6	Dose Limits for Individual Members of the Public	3
4.7	Administrative Limits for Occupationally Exposed Adults	3
4.8	Determination of Prior Occupational Exposure	4
4.9	Determination of Internal Dose	4
4.10	Determination of External Dose from Airborne Radioactive Material	4
4.11	Summation of Internal and External Doses	4
4.12	Personnel Monitoring for External Radiation	4
4.13	Personnel Monitoring for Internal Radiation	5
4.14	Planned Special Exposure	5
4.15	Visitors	5
5.0	General Survey and Monitoring Requirements	5
5.1	Surveys	5
5.2	Monitoring	6
5.3	Contamination Control	6
5.4	Contamination Control Limits	7
6.0	Radiological Areas, Labels, and Posting	7
6.1	Radiological Areas	7
6.2	Containers	8
6.3	Posting Notices and Instructions to Workers	8
7.0	Radioactive Material Control Program	8
7.1	Receipt of Radioactive Materials	8
7.2	Storage of Radioactive Materials	9
7.3	Labeling	9

7.4	Movement of Radioactive Materials	9
7.5	Shipment of Radioactive Material	9
7.6	Radioactive Source Control	9
8.0	Radiation Work Permit Program	10
8.1	Responsibilities	10
8.2	Radiation Work Permits	10
9.0	Respiratory Protection Program	11
9.1	Respiratory Protection Policy Statement	11
9.2	Use of Respiratory Protection	11
9.3	Selection of Respiratory Protection Devices	11
9.4	Medical Assessment	12
9.5	Respirator Fit Testing	12
9.6	Respirator Maintenance	12
10.0	Instrumentation Program	12
10.1	Inventory	12
10.2	Calibration	13
10.3	Quality Assurance Program	13
11.0	Environmental Monitoring	13
11.1	Environmental Effluent Levels in Unrestricted Areas	13
11.2	Environmental Effluent Levels in Restricted Areas	13
11.3	Reports of Overexposure and Excessive Levels and Concentrations	14
11.4	Methods of Environmental Monitoring	14
12.0	Records, Reports, and Notices	14
12.1	General Provisions	14
12.2	Posting of Notices	15
12.3	Notifications	15
12.4	Reports	15
12.5	Records	16
13.0	Training	16
14.0	Procedures	17
15.0	Emergency Response	17

## **RADIATION PROTECTION HEALTH & SAFETY MANUAL**

In accordance with the Tennessee Standards For Protection Against Radiation, Solutient Technologies, LLC (ST) has developed and will comply with the Radiation Program as described in the ST Radiation Protection Health & Safety Manual. The basis for this program is to follow the ALARA philosophy in all aspects of Environmental Health and Safety.

### **1.0 PURPOSE AND SCOPE**

The Radiation Safety Program described in this manual has been designed specifically for ST's mobile de-con and re-remediation services at sites around the country. The use of this license is designed solely for this operation and is not intended to be used as a fixed facility license.

### **2.0 PROGRAM ASSESSMENT**

In accordance with SRPAR 1200-2-5.40, this program will be reviewed, as a minimum, on an annual basis. The procedures used to implement this program will be used as working documents, for training, and operational guides and will, therefore, be continually reviewed. Since these procedures are working documents, revisions may be made during the year. Any change that would affect the provisions of the SRPAR (State Regulation for Protection Against Radiation) will be submitted for approval prior to implementation. Changes that do not affect provisions of the SRPAR will be submitted as notification only and will be done yearly.

### **3.0 RADIATION PROTECTION PROGRAM ADMINISTRATION**

#### **A. Management Responsibilities:**

ST management is responsible for the programmatic oversight of this facility and license. They will ensure the items such as personnel; funding, equipment etc are provided to the work force. They will commit to the State of Tennessee.

#### **B. Radiation Safety Officer**

The Radiation Safety Officer is responsible for the implementation and compliance of the license. He provides the technical assistance and direction for conducting the program.

#### **C. Project Manager (On-site Radiation Safety Officer)**

For the purposes of this license, the project manager is responsible for conducting the day-to-day aspects of the radiation safety program. He will ensure that qualified staff carries out the daily tasks.

#### **4.0 PERSONNEL MONITORING PROGRAM**

The regulations require monitoring of an individual's external occupational dose if it is likely to exceed 10% of any dose limit that is appropriate for the individual. Monitoring for the intake of radioactive material is also required if it is likely to exceed 10% of the Annual limit of intake (ALI) for an occupationally exposed individual, which includes the embryo of a declared pregnant woman.

##### **4.1 Compliance with requirements for summation of external and internal doses**

The regulations require summation of internal and external doses only when monitoring of both is required. Monitoring of internal exposure is required for the following:

- a. Adults are likely to receive, in one year, an intake in excess of 10 percent of the applicable ALI(s) or about 200DAC hours
- b. Minors and declared pregnant women likely to receive, in one year, a committed effective dose equivalent in excess of 50 mrem or about 20 DAC hours.

Although it is unlikely that workers will exceed 10 percent of the internal dose limits, the ST bioassay and internal dose assessment programs have been established. Internal dose will be added to a worker's records at 90 percent of the levels at which summation is required.

The Tennessee SRPAR 1200-2-5.50 establishes a Total Effective dose equivalent (TEDE) limit and a Total organ dose equivalent (TODE) limit for those occupationally exposed individuals.

##### **4.2 Conditions Requiring Individual Monitoring of External and Internal Occupational Dose**

ST will monitor exposures to radiation and radioactive materials to demonstrate compliance with the dose limits required by SRPAR (see personnel monitoring section). Individual monitoring devices will be used under the following conditions:

1. Adults likely to receive, in one year, from sources external to the body, a dose in excess of 10 percent of the limits listed under Occupational Dose Limits for Adults
2. Minors and declared pregnant women likely to receive in one year from sources external to the body, a dose in excess of 10 percent of any of the applicable limits under The Occupational dose for minors and embryo/fetus.
3. Individuals entering a high or very high radiation area.

ST will monitor the occupational intake of radioactive materials and assess the committed effective dose equivalent when:

1. Adults likely to receive in one year, an intake in excess of 10 percent of the ALI(s) listed in SRPAR, Schedule RHS 8-30
2. Minors and declared pregnant women likely to receive, in one year, a committed effective dose equivalent in excess of 10 percent of limits specified in the occupational dose for minors and embryo/fetus.

##### **4.3 Occupational Dose Limits For Adults**

The following dose limits apply to all employees, contractors, and visitors who will receive an occupational dose at an ST job site. This dose limit is defined as the radiation dose received while in a restricted area or any other work related dose received. It does not apply to dose from background radiation, medical applications, or that received while a member of the public.

- a. Whole Body - The more limiting of the total effective dose equivalent (TEDE) equal to 5 rem or the sum of the deep dose equivalent to any individual organ or tissue other than the lens of the eye, equal to 50 rem.
- b. Skin - A shallow dose equivalent equal to 50 rem.
- c. Lens of the Eye - An eye dose equivalent equal to 15 rem.
- d. Extremities - A shallow dose equivalent equal to 50 rem.

#### **4.4 Occupational Dose Limits to Minors**

1. The annual occupational dose limits for minors (less than 18 years old) shall be 10 percent of the annual dose limits specified for adults. Minors may be allowed as visitors, but will not be allowed to work in radiologically controlled areas.

#### **4.5 Occupational Dose Limits to an embryo / fetus**

1. The dose limits to an embryo / fetus during the entire pregnancy of a declared pregnant woman shall not exceed 0.5 rem. A uniform exposure rate needs to be set to avoid substantial variations.
2. The dose to the embryo / fetus shall be taken as:
  - a. The deep dose equivalent to the declared pregnant woman
  - b. The dose to the embryo / fetus from radio-nuclides in the embryo fetus and radio-nuclides in the declared pregnant woman. If a woman declares her pregnancy to the licensee and the dose to the embryo / fetus is found to be greater than .45 rem, then the embryo / fetus is allowed an additional .05 rem for the remainder of the pregnancy.

#### **4.6 Dose Limits for Individual Members of the Public**

The total effective dose equivalent received by a member of the public shall not exceed 100 mrem in a year.

The dose in any unrestricted area from external sources shall not exceed 2 mrem in any one hour.

#### **4.7 Administrative Limits For Occupationally Exposed Adults**

1. ST will utilize administrative limits concerning dose to ensure that regulatory limits are not exceeded and to maintain an ALARA philosophy. These limits will be outlined in ST's internal procedures and not part of the license.

#### **4.8 Determination of prior occupational exposure (Accumulated Dose)**

For any individual entering the restricted area who is likely to receive, in a year, an occupational dose requiring monitoring as outlined in 1200-2-5-.71, the licensee shall make a determination of prior dose history and it shall be documented on Form RHS 8-1H. The record shall show each period in which the individual received occupational dose and shall be signed by the individual who received the exposure.

#### **4.9 Determination of internal dose**

ST will take measurements of the following when gathering data to determine internal exposure:

- a. Concentrations of radioactive materials in air
- b. Quantities of radio-nuclides in the body
- c. Quantities of radio-nuclides excreted from the body.
- d. Combinations of these measurements

ST will assume the concentrations of airborne radioactive material inhaled by an individual is equal to the concentration in the ambient air unless Respiratory protection is used and / or the assessment of intake is based on bioassays.

#### **4.10 Determination of external dose from Airborne Radioactive material**

The determination of external dose will be based upon measurements from individual monitoring devices.

#### **4.11 Summation of internal and external doses**

ST does not anticipate that any individual will receive an intake of radioactive material in excess of 10 percent of the internal dose limits ALI(s) as specified in Schedule RHS 8-30. However, if an unplanned exposure took place, the requirements of 1200-2-5-.51 would be followed.

#### **4.12 Personnel monitoring for external radiation**

The regulations require individual monitoring devices be used when any adult is likely to receive in a year, a dose in excess of 10 percent of the occupational limits in 1200-2-5-.50 and a minor or declared pregnant woman are likely to receive in a year, a dose in excess of the limits in 1200-2-5-.55 and 1200-2-5-.56 respectively.

All individuals entering the restricted area will be required to wear a personnel monitoring device (film badge, TLD, or pocket dosimeter), unless an assessment has been made and it is determined that persons are not likely to receive a dose in one year in excess of 10 percent of the limits.

Extremity Monitoring - Extremity monitoring shall be required whenever an individual is likely to receive an extremity dose that exceeds 10 percent of the limit in one year.

Skin Monitoring - Skin dose will be monitored by the primary dosimeter. The proper protective clothing should minimize this dose. To ensure accurate dose readings, the dosimeter should be placed in a plastic bag to prevent contamination and the bag will also prevent low energy beta radiation from reaching the detector as the clothes prevent the same radiation from reaching the

skin.

#### **4.13 Personnel monitoring for internal radiation**

In-vivo and/or in-vitro monitoring shall perform internal monitoring for radiation exposure. In-vitro (urinalysis) monitoring can be used to monitor Uranium and transuranic radio-nuclides and their elimination rates from the body. In-vivo monitoring can be used for radio-nuclides that emit gamma or X- rays.

Baseline in-vitro monitoring will be performed on all ST employees, prior to initial work in the de-com facility. In-vivo monitoring will be performed, subject to the anticipated exposure of employees working in the facility.

The following situations will result in bioassay sampling:

1. Termination from the facility
2. Following a known uptake
3. Air sampling data that indicates > 10 DAC hours has occurred in a 7 day workweek.

#### **4.14 Planned special exposure**

In special situations only, the regulations allow for a planned special exposure. This is a situation where alternatives that might avoid higher exposures are unavailable or impractical. ATI does not expect this situation to arise in the operation of this facility. ST does not intend to exercise the provisions of this regulation.

#### **4.15 Visitors**

Visitors do not fall under the requirements for monitoring, record keeping, and reporting. However, when entering the restricted area, they will be issued a dosimeter (PCD) for verification purposes. If a group is visiting, they may be issued a single dosimeter to represent the group.

### **5.0 GENERAL SURVEY AND MONITORING REQUIREMENTS**

#### **5.1 Surveys**

This section provides an overview of the ST radiation survey program. As described in SRPAR 1200-2-5-.70, surveys shall be performed for the purpose of evaluating:

- a. The extent of radiation levels
- b. Concentrations or quantities of radioactive material
- c. The potential radiological hazards that could be present

Surveys shall be conducted at a frequency to ensure representative assessments of the area are made. The type and frequency of the survey will be dictated by the number of personnel occupying the area as well the type of radiological hazard present.

The types of surveys to be used by ST include:

- a. Loose contamination surveys - These surveys will be performed using smears and swipes. This

type of survey will aid in contamination control.

b. Fixed contamination surveys - These surveys will be performed using the appropriate beta/gamma detectors to identify potential sources of exposure.

c. Contact dose rate surveys - These surveys shall be used to identify the maximum radiation levels to which an individual could be exposed.

d. Airborne radioactivity surveys - These surveys shall be taken to determine the conditions that could result in potential internal exposure to personnel. The types of airborne surveys are:

- General area
- Personal (Breathing Zone)
- Grab
- Continuous (CAM)

## 5.2 Monitoring

Personnel and Equipment / Materials shall be monitored when entering or exiting the restricted areas. This requires the establishment of access control points. Personnel exiting a contaminated area shall A Frisk using a portable detector or PCM. Whenever materials are being taken out of a contaminated area, they shall also be surveyed to assure they are free of radiological contamination. Typically a "Pancake" probe is used to perform these surveys. If there is a specific Radio-nuclide being used (ie: an alpha emitter) then the appropriate monitoring device will be used. (See section 10 of the license application).

## 5.3 Contamination Control

The primary concern regarding contamination is to prevent the inhalation, ingestion, or absorption of radioactive materials into the body. The secondary concern is to prevent the spread of contamination throughout the facility by personnel tracking, movement of equipment, materials, etc. Contamination can present external exposure problems if the radiation levels are high enough and an internal exposure problem if the radio-nuclide is an alpha emitter, such as uranium.

The contamination control measures to be utilized at the ST job site are:

1. Designation of controlled areas, restricted areas and buffer zones
2. Control of traffic and movement of materials and equipment into and out of the controlled and restricted areas.
3. Use of personnel access points and de-contamination areas.
4. Use of protective clothing and respiratory protection
5. Prohibition of eating, drinking, smoking, and chewing in the controlled and restricted areas.
6. Proper housekeeping

## 5.4 Contamination Control Limits

ST(s) policy on contamination is to maintain ALARA levels. Regulatory Guide 1.86 will be the



the annual limit on intake or 12 DAC hours.

This area shall be posted with a sign that bears the words, "CAUTION AIRBORNE RADIOACTIVITY AREA".

## **6.2 Containers**

Each container that holds radioactive material shall bear a clearly visible label identifying the radioactive contents. It shall also provide any information, which will permit the individuals handling or using the containers to take precautions to avoid or minimize exposures. The container shall bear the radiation symbol and the words "CAUTION RADIOACTIVE MATERIAL".

## **6.3 Posting Notices and Instructions to Workers**

Each licensee shall post current copies of the following documents or state where they may be examined:

1. State Regulations for the Protection Against Radiation
2. Radioactive Materials License amendments
3. Operating and Emergency Procedures
4. Any written notice of license violations
5. Form RHS 8-3 (Notice to Employees); copies of this form may be obtained by writing the Division of Radiological Health.

## **7.0 RADIOACTIVE MATERIAL CONTROL PROGRAM**

The following radioactive material controls are established to maintain positive control of the material and to prevent any inadvertent release to any restricted or unrestricted areas. These controls are also in place to aid in the minimization of radioactive waste.

### **7.1 Receipt of Radioactive Materials**

Packages of radioactive material must be received when offered for delivery by the carrier, and must be done expeditiously. When applicable, notification, prior to arrival, should occur.

Packages of radioactive material shall be monitored upon receipt, per SRPAR 1200-2-5-.16(2)(a-

c). If a package is received and has contamination in excess of the limits specified in 1200-2-2-

.16(d), ST shall immediately notify the final carrier and the Division of Radiological Health. ST has developed a procedure for the safe opening of packages that contain radioactive material, including materials that may have loose contamination, received for further de-contamination.

### **7.2 Storage of Radioactive Material**

All radioactive material shall be stored in a restricted area that is constantly under the control of the licensee. These storage areas shall be properly posted and controlled using appropriate barriers.

### 7.3 Labeling

Each container of radioactive material must bear a clearly visible label showing the radiation symbol and the words "CAUTION RADIOACTIVE MATERIAL" unless exempted by SRPAR 1200-2-5-.113.

### 7.4 Movement of Radioactive Materials

Radioactive materials shall be properly containerized and/or secured prior to movement. They must be in a strong tight container to prevent the spread of contamination. If material is going to be moved within the facility, it should be covered in plastic and taped if there is any loose contamination on the surface.

### 7.5 Shipments of Radioactive Materials

Radioactive Material Shipments shall comply with the Department of Transportation and the State of Tennessee regulations. All packaging and labeling requirements will be in accordance with the regulatory requirements. When required, advance notification of shipments shall occur.

### 7.6 Radioactive Source Control

The Radiation Safety Officer shall approve all requisitions for radioactive sources, and shall be notified upon their receipt. Sealed sources will be maintained and controlled through the use of implementing procedures. The RSO or Project Manager shall perform source inventory checks monthly. Leak tests will occur upon receipt and at intervals not to exceed 6 months. The Division of Radiological Health will maintain records of the test for inspection.

Sources shall be used in accordance with the assigned Radiation Work Permit and the users shall be trained in the proper handling techniques, inventory etc.

The RSO or Project Manager shall designate where the storage of the sources will be. The approved location(s) will be locked and posted as a "Radioactive Material Storage Area" and access control will be maintained.

## 8.0 RADIATION WORK PERMIT PROGRAM

### 8.1 Responsibilities

The control of work involving radioactive materials is the responsibility of all personnel involved. The radiation protection personnel and the front line supervisors have the primary responsibility for monitoring the work and ensuring the regulations are followed. Operating procedures and training are provided to guide the employees. Radiation Work Permits (RWP) is used to identify the detailed requirements for specific jobs being performed under the Radioactive Materials License.

### 8.2 Radiation Work Permits

An RWP is a document that ST will use to implement specific jobs under the license. Any operation that is not detailed in an operating procedure will be performed under an RWP. The supervisor shall submit, in writing, a request for an RWP, prior to performing the work. The request shall contain enough detail to describe the work to be performed and the radiological hazards anticipated. The health physics personnel will fill out the RWP with the following types of information:

1. Description of the work to be performed
2. Location of the work to be performed
3. Desired dates for the work
4. Radiological conditions in the area
5. Other non-radiation hazards
6. Personal protective equipment required
7. Respiratory protection required (if applicable)
8. Additional dosimetry requirements
9. Engineering controls
10. Air monitoring requirements
11. Job briefing requirements (yes or no)
12. Approval by authorized individual

Once an RWP is approved, the requestor will be notified and the job can be performed after all the requirements/conditions are met. The supervisor must have a meeting with the personnel involved and cover the requirements. The RWP must be posted at the access point to the area or facility, prior to beginning work.

Once an RWP job is completed, the supervisor shall notify the health physics office, and return the RWP for the hp to sign, date and terminate. A copy of the Radiation Work Permit is covered in procedure # 3001.

## **9.0 RESPIRATORY PROTECTION PROGRAM**

The Respiratory protection program is designed to protect personnel from a variety of airborne contaminants, including particulate material, gases, and vapors. The types of hazards may be radiological or non-radiological. Respiratory equipment is also used to protect against oxygen deficient atmospheres. The Respiratory Protection Program is established per the SRPAR requirements 1200-2-5- .90 - .93. Other guidance documents are Occupational Safety and Health Act 29 CFR 1910.134 and Nu-Reg. 0041 "Manual of Respiratory Protection Against Airborne Radioactive Material".

### **9.1 Respiratory Protection Policy Statement**

The ST Respiratory Protection Policy Statement is to maintain personnel exposure to airborne hazards (radiological and non-radiological) as low as reasonably achievable (ALARA). These exposures shall be limited, primarily, by process and engineering controls. Administrative actions will also be taken to limit personnel exposures. There are situations where engineering and administrative controls will not provide the maximum protection required and in these

situations, the use of respiratory protective devices will be used. The use of the respiratory equipment must be used in a way that does not increase personnel risk from a safety stand point and must be consistent with maintaining the total effective dose equivalent ALARA.

## **9.2 Use Of Respiratory Protection**

The health physics department shall evaluate the radiological conditions of specific processes and make a determination as to the respiratory protection requirements. The usage will fall into 3 categories:

1. Routine - This is a situation where the use of respirators will be the primary mode of protection based on the assessment of the health physics department.
2. Non-Routine - This is a situation where respirators will be used as a secondary mode of protection. Typically, engineering or administrative controls would be used, but circumstances may arise that prevent their use (ex: ventilation filter change).
3. Emergency - This is a situation that is unplanned and airborne concentrations of hazardous materials are unknown.

## **9.3 Selection Of Respiratory Protection Devices**

The proper selection of respiratory protection devices shall be made by trained and qualified individuals only. Only NIOSH / MSHA approved respirators shall be used. The following activities must take place prior to respirator selection:

1. Assessment of the physical, chemical and toxicological properties of the substances.
2. External radiation hazards must be identified.
3. Assessment of the ambient air concentrations of the hazard
4. The duties of the individual wearer as related to work time, movement, and external stresses, such as heat.
5. The peak levels of contaminants expected.

Respirators have different protection factors and the selection will be based on the anticipated peak air concentrations of the contaminants. The protection factors will be assigned in accordance with the regulations as specified in 1200-2-5- Schedule RHS 8-32.

Facial hair can affect the proper fit of a respirator and to eliminate any judgement concerning the issuance of a respirator to a worker with facial hair, the policy of ST is " Employees required to wear respirators shall not have full facial hair".

## **9.4 Medical Assessment**

All employees who may be required to wear a respirator during the course of their work shall be given a medical evaluation. This evaluation must be given by a physician prior to respirator wearing and must be performed every 12 months thereafter as specified in SRPAR 1200-2-5-.92(1)(c)(5).

## **9.5 Respirator Fit Testing**

Respirator fit testing must be performed on all individuals:

1. Prior to the start of work in hazardous environments.
2. At least every 12 months unless other wise noted by specific regulations

The health physics department will perform the fit test and also train the individual to perform a daily positive or negative pressure "field " fit test. This test must be performed every time the respirator is donned.

### **9.6 Respirator Maintenance**

Respirators shall be cleaned and dis-infected after each use. (If a specific respirator is assigned to an individual, this requirement can be performed at the end of each workday, provided the respirator is wiped down when taking breaks or lunch). Respirators shall be inspected each day and maintenance performed. The individual performing the maintenance must document all maintenance of respirators. The respirators should be stored in a clean, dry and sanitary location, away from all chemical or physical agents.

## **10.0 INSTRUMENTATION PROGRAM**

There are many different types of radiation instrumentation used by ST in support of the on-going projects. The instrumentation program describes the inventory control, calibration, response testing, maintenance, and quality assurance of the program.

### **10.1 Inventory**

ST tracks all of their instrumentation by the use of serial numbers. A logbook is maintained identifying the location of the instrumentation, the next calibration date, and issuance date.

### **10.2 Calibration**

The calibration of radiation monitoring equipment and air sampling equipment will be calibrated per the manufacturers specifications and will be sent out for calibration to an approved vendor.

The instruments must be returned with a calibration certificate. The instruments will be calibrated prior to the first use and following any repair that could affect the calibration, and at least every six months for portable equipment and annually for semi-portable and fixed instrumentation.

Daily response checks will be performed using a NIST traceable source. This testing should be documented daily or prior to each use. The response check should be performed on each scale that the instrument will be used. Records of maintenance and calibrations shall be kept at ST's corporate office in Ohio with copies in the Oak Ridge office.

### **10.3 Quality Assurance Program**

A quality assurance program for counting instrumentation has been established in conformance with ANSI N323-1978 "Radiation Protection Instrumentation Test and Calibration". It includes the following:

1. Daily background response checks
2. Chi square test during calibrations to determine statistical variations
3. Maintenance records are kept

## **11.0 ENVIRONMENTAL MONITORING**

An environmental monitoring program will be established in accordance with SRPAR 1200-2-5 to document compliance with all applicable exposure limits. The monitoring will be performed by taking measurements on air, water, soil, sanitary sewerage, and ambient radiation. The results of these measurements will be utilized to calculate potential dose to ST personnel, contractors and the public. The analysis for environmental samples will be sent to a qualified outside lab.

### **11.1 Environmental Effluent Levels in Unrestricted Areas**

The environmental effluent levels shall not exceed those levels as outlined in Tennessee schedule RHS 8-30, Table 2. ST has set action levels at 50 percent and will initiate investigations and response if the action levels are exceeded. The following actions will take place should an effluent level be exceeded:

1. Analysis of the probable cause
2. Evaluate the need for additional sampling
3. Verify the analysis with the lab
4. Evaluate the need for additional sampling

### **11.2 Environmental Effluent Levels in Restricted Areas**

The environmental levels in restricted areas shall not exceed those limits as specified in Tennessee schedule RHS 8-30, Table 1. ST has set action limits at 50 percent and will initiate investigations and response if the action levels are exceeded.

### **11.3 Reports of Overexposure and Excessive Levels and Concentrations**

ST will notify the Department, in writing, within 30 days of the over exposure or excessive level as outlined in SRPAR 1200-2-5-.143. The report will contain the following information:

1. The individual exposed, social security number, date of birth, and the estimated exposure.
2. The extent of individual exposure, levels and concentrations of radioactive materials, how it occurred, the quantities and form.
3. The planned corrective actions

### **11.4 Methods of Environmental Monitoring**

Boundary Monitoring - ST will utilize Thermo -Luminescent Dosimeters (TLD's) to monitor dose rates at the boundaries of the ATI property and unrestricted areas. These dosimeters will be collected and replaced with new ones monthly and sent off to a qualified lab for analysis. ST will comply with the limits outlined in 1200-2-5- .60 "Dose Limits For Individual Members Of the Public" and with 1200-2-5-.61"Compliance With Dose Limits For Individual Members of The Public".

Restricted Area Monitoring - ST will utilize continuous air monitors (CAM) and RAS-1 "type" air samplers to monitor the air in the restricted areas. These monitors are capable of collecting up to 20 liters of air per minute and can run for the duration of the work shift or continuously. The samples will be collected daily and analyzed by an approved lab or using on-site laboratory equipment, such as a Multi-channel analyzer.

Personal environmental monitoring will also be performed by using "breathing zone samplers"

that are worn by the individual. These samplers typically collect 2 liters per minute and operate for an 8-hour period. These samples will be collected daily and analyzed by an approved lab or using on-site laboratory equipment, such as a Multi-channel analyzer.

Soil Monitoring - ST will utilize standard protocol for collection of soil samples in determining radiation activity levels. Per NRC guidance document 5469? This type of environmental sampling will take place on an as needed basis, specifically for verification that contamination has not spread.

Water Monitoring - ST will monitor any effluents of water that may be impacted by the de-con facility. Samples will be taken and analyzed for the appropriate radio-nuclides by an approve lab.

## **12.0 RECORDS, REPORTS, AND NOTICES**

### **12.1 General Provisions**

ST will generate and maintain all records required by SRPAR 1200-2-5, for review and inspection by the Department. These records will be kept for three years or until the license is terminated, as specified by the regulations.

ST will use the proper units for documentation as specified by 1200-2-5-.130. The records will be legible and reproducible. Records will be kept in a manner that allows for efficient inspections and audits by the Department.

### **12.2 Posting of Notices**

ST will make available to all employees who enter the restricted area, the following required notices:

1. Notice to Pregnant Workers
2. State of Tennessee "Policy of Non- Discrimination"
3. Notice to Employees

In lieu of posting the license, regulations, and company procedures, ST will post a notice describing the documents and informing the employees where they can review the documents.

### **12.3 Notification**

Reports of Theft or Loss of Radioactive Material - ST will immediately notify the department by telephone, at its office in Nashville, concerning any theft or loss of radioactive material in excess of any quantity as outlined in 1200-2-5-.140. If there is any theft or loss of material not outlined in 1200-2-5-.140, it shall be reported immediately upon discovery.

Notification of Incidents - There are two types of notifications required by SRPAR 1200-2-5-.141; Immediate and 24 hour notice. ST will highlight these notifications in the emergency response procedure.

Notification of License Termination - Per the regulations, ST will notify the Department 30 days in advance if they intend to terminate the license.

## 12.4 Reports

### Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Limits.

ST will issue a written report within 30 days of any of the following occurrences:

1. Exceeding the occupational dose limit for an adult
2. Exceeding the occupational dose limit for a minor
3. Exceeding the dose limit for an embryo/fetus of a declared pregnant women
4. Exceeding the limits for an individual member of the public
5. Exceeding any applicable limit in the license

The written report shall comply with 1200-2-5-.25

Reports to Individuals of Exposures to Radiation - ST will furnish radiation exposure data to past and present employees as specified in 1200-2-5- .25.

## 12.5 Records

One of the most important responsibilities of a radioactive material license holder is proper record keeping and the subsequent retention of those records. ST's policy is to maintain the records to demonstrate regulatory compliance and also to demonstrate that good ALARA practices are maintained. Records will be maintained to show proper implementation of the radiation protection program. The following records will be kept on file and in accordance with SRPAR 1200-2-5:

1. Records of the Radiation Protection Program
2. Records of surveys
3. Records of an individuals occupational dose
4. Records of individual monitoring results
5. Records of dose to individual members of the public
6. Records of waste disposal
7. Records of training
8. Transportation records
9. Records of free release surveys

## 13.0 TRAINING

ST will perform all required training for their employees prior to them performing any work in a restricted area. Specific training will be required prior to each project and is listed below:

- Basic radiation protection concepts
- Radiation exposure risks
- License requirements
- Emergency procedures

The detailed training requirements are covered in ST procedure # 0002. Specific training will be required prior to the start of each project. The on-site RSO will be responsible for providing the training.

ST has included Radiation Safety Procedures in the Radioactive Materials License. These documents describe, in detail, the implementation and adherence to the requirements of SRPAR. These procedures will be reviewed on an annual basis, as part of the radiation safety program annual review. Any change to a procedure that could affect the requirements of the regulations will be submitted to the State for review and approval. Any administrative changes to these procedures that do not affect the regulations will be reported annually as a notification of change.

#### **14.0 PROCEDURES**

ST has included Radiation Safety Procedures in the Tennessee Radioactive Materials License. These are documents that describe, in detail, the implementation and adherence to the requirements of the SRPAR. The following guidelines delineate the types of procedures and the intended use of the procedures:

- A. Any work, which requires the handling of radioactive materials or access to restricted areas, will be controlled by approved procedures.
- B. Standard operating procedures are instructions relating to the operation of facilities or equipment.
- C. Radiation Safety Procedures are instructions for the radiation safety activities of the facility. Radiological control activities are considered special and will be directed under the Radiation Work Permit program.

These procedures will be reviewed on an annual basis, as part of the radiation safety program annual review. Any change to a procedure that could affect the requirements of the regulations will be submitted to the state for review and approval. These changes will include the following conditions:

- 1. Any change that could affect radiation safety
- 2. Any change that would affect radiation limits
- 3. Any change that would affect survey frequencies
- 4. Any change that might affect environmental releases
- 5. For any change that does not have clear delineation, ST will notify the department and determine if an amendment is required.

Any administrative changes to these procedures that do not affect the regulations will be submitted annually as a notification of change.

#### **15.0 EMERGENCY REPOSE**

ST has a standard emergency response procedure for field activities. Prior to the start of every project, notifications to the local emergency response personnel will be made, appropriate phone numbers will be posted, and training performed. If a facility has an emergency response plan in place, ST will implement their procedure into the existing one.

# Quality Assurance Plan Solutient Technologies, LLC

Index

Definitions

Policy

Objectives

## **I MANAGEMENT SYSTEM**

### **1.0 Programmatic**

- 1.1 Organizational Structure
- 1.2 Interface Requirements
- 1.3 Resource Control Systems

### **2.0 Training and Qualification**

- 2.1 Training Requirements
- 2.2 Qualification Requirements
- 2.3 Continual Improvement

### **3.0 Quality Improvement**

- 3.1 Defect Identification
- 3.2 Cause Identification and Correction
- 3.3 Identify Process Improvement Needs

### **4.0 Documents and Records**

- 4.1 Establish Design Review and Process Requirements
- 4.2 Control Record Distribution

## **II PERFORMANCE SYSTEM**

### **5.0 Work Processes**

- 5.1 Identify Controlled Items
- 5.2 Maintain and Calibrate Equipment
- 5.3 Develop Procedures and Instructions

### **6.0 Specify Design Interfaces**

- 6.1 Specify Design Interfaces
- 6.2 Validate Design Independently
- 6.3 Design Based on Science and Engineering

**Quality Assurance Plan  
Solutient Technologies, LLC  
(Continued)**

**7.0 Procurement**

**8.0 Inspection and Acceptance**

**III ASSESSMENT**

**9.0 Management Assessment**

**10.0 Independent Assessment**

10.1 Periodic Independent Assessment

10.2 Sufficient Authority and Freedom

10.3 Knowledgeable and Qualified Assessors

## **Definitions**

- a. Assessment/Verification The act of reviewing, inspecting, testing, checking conducting surveillance, auditing or otherwise deterring and documenting whether items, processes, or services meet the specified requirements. The terms assessment and verification as used within this procedure are synonymous: their use is determined by who is performing the work. Assessments are performed by or for senior management. The operating unit performs verifications.
- b. Item An all inclusive term use in place of any of the following: facility, sample, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, unit, documented concept or data.
- c. Process, A series of actions that achieves an end result.
- d. Quality, The degree to which an item or process meets or exceeds user's requirements or needs.
- e. Quality Assurance, Actions that provide confidence that quality is achieved.
- f. Quality Assurance Program. The overall program established by an organization to implement the requirements of this Plan. The Program assigns responsibility and authorities, defines policies and requirements and provides for the performance and assessment of work.
- g. Service, The performance of work, such as design, fabrication, inspection, nondestructive examination, repair or installation.
- h. Senior Management, The manager responsible for objective accomplishment and overall operations.
- i. Work, Process of performing a defined task or activity; for example, research and development, operations, maintenance, administration, inspection, data collection and analysis.

## **Policy**

It is the policy of Solutient Technologies, LLC to establish quality assurance requirements to ensure that risks and environmental impacts are minimized and that safety, reliability, and performance are maximized through the application of effective management systems commensurate with the risks posed by the facility and its work. The Solutient Quality Plan implements this policy to ensure that quality assurance requirements are clearly specified for the broad spectrum of work performed by Solutient and its subcontractors. The Solutient Quality Assurance Plan is intended to meet all requirements of the Nuclear Quality Assurance Manual (NQA1), Quality Assurance Program Requirements for Nuclear Facilities.

## **Objectives**

- a. That senior management provides planning, organization, direction, control and support to achieve the organization's objectives;
- b. That the line organization achieves quality; and
- c. That overall performance is reviewed and evaluated using a rigorous assessment process.

## **I. Management System**

### **1.0 Programmatic**

Solutient will use various controls and procedures to assure that all work being performed meets or exceeds all federal, state and local regulations. Solutient will use Total Quality Management (TQM) philosophies and techniques to manage projects and operations. Statistical Process Control (SPC) methodology will be utilized where applicable.

Both internal and external subcontractors will potentially have major roles in various systems. Any subcontractor will agree to be bound by all quality control requirements that are part of the Solutient program. Failure to do so will be cause for removal from the team.

#### **1.1 Organizational Structure**

#### **1.2 Interface Requirements**

Interface requirements will be formally communicated to all affected parties. Formal acceptance of interface requirements will be obtained. A written change log will be maintained for each interface by the managing entity.

#### **1.3 Resource Control Systems**

Resource control is critical to the success of any effort. Critical resources include labor, equipment, facilities, time and materials. Systems will be developed to track actual vs. expected usage of each resource. Significant variances will be escalated for management review and correction as required. Tracking systems will rely on written records such as time cards, purchase orders and usage records. Appropriate software will be used for these requirements.

### **2.0 Training and Qualifications**

#### **2.1 Training Requirements**

Minimum standards are developed for each critical job function. Employees performing these functions will have documentation demonstrating their skills. Training will be provided for any new function and to maintain skill levels for current functions.

#### **2.2 Qualification Requirements**

Qualification requirements will be taken from recognized sources if possible. If this is not possible, typical industry practice will be used as a starting point.

#### **2.3 Continual Improvement**

Continual improvement will be considered an essential element of the quality program. Improved methods will be evaluated and included as appropriate. Training will be used to improve skills.

### **3.0 Quality Improvement**

#### **3.1 Defect Identification**

An identified defect provides a rare opportunity to improve system performance. A formal system will be used to collect all information about a defect. This information will be forwarded to senior management for investigation and corrective action.

#### **3.2 Cause Identification and Correction**

Any defect will be investigated to determine its root cause. Root cause is considered the fundamental reason the system did not perform as expected, not the initial item discovered or implementing event. The results of any investigation may be used to coach or retrain employees. They will not be used for punitive measures.

#### **3.3 Identify Process Improvement Needs**

The investigation is expected to reveal some part of the process that can be improved to prevent a reoccurrence. Process improvement will have a formal plan to govern its implementation. A future assessment of the effectiveness of the process improvement will make and documented.

### **4.0 Documents and Records**

#### **4.1 Establish Design Review and Process Requirements**

During the course of administering the quality program, a number of records will be generated to document our status. These records include those, which transmit key parameters such as specifications, approvals, interfaces and independent design reviews and program assessments. Each program will specify its own critical records in addition to those listed above. These critical records will be stored in a secure location. Distribution will be made to all required parties.

#### **4.2 Control Record Distribution**

For each process having critical review requirements, the manager will maintain those records. The manager of any defect evaluation and any independent assessment will also maintain records.

## **II Performance System**

### **5.0 Work Processes**

#### **5.1 Identify Controlled Items**

For any process there is a large number of potentially critical parameters. Each process will be evaluated and key process parameters identified.

### **5.2 Maintain and Calibrate Equipment**

Any system or instruments used to measure key parameters will be properly calibrated and maintained. Operators will be trained in the use and maintenance of the equipment. Care will be taken to prevent the loss, damage or deterioration of equipment.

### **5.3 Develop Procedures and Instructions**

Work will be performed using approved instructions, procedures or other appropriate control documents. Operators shall be trained in the approved means of performing their tasks.

## **6.0 Design**

### **6.1 Specify Design Interfaces**

Processes and projects can be very complex. To insure that individual elements can be integrated successfully, design interface control will be established. This interface will be subject to change control. This interface will incorporate appropriate requirements and design data.

### **6.2 Validate Design Independently**

The adequacy of design products shall be verified or validated by individuals or groups other than those who performed the work. A formal record shall be maintained of the verification or validation. This shall be completed prior to approval and implementation of the design.

### **6.3 Design Based on Science and Engineering**

Designs shall be based on sound engineering and scientific principals. Appropriate codes, standards and industry practices shall be referenced and adhered to as required. OSHA and environmental requirements shall be included as a design requirement.

## **7.0 Procurement**

Prospective suppliers will be evaluated and selected based on specified criteria. These criteria will incorporate appropriate design and specification elements. Suppliers will be subject to periodic reviews to ensure they can continue to provide acceptable items and services.

## **8.0 Inspection**

Inspection and testing shall be performed on all critical items. These inspections will be designed to demonstrate compliance with design criteria and standards. Procedures may be used as specified in the specifications or acceptance criteria. Any equipment used shall be calibrated and maintained.

### **III. Assessment**

#### **9.0 Management Assessment**

Management will periodically assess the quality program and its performance. Organizational issues that could prevent optimal quality will be identified and corrective action taken.

#### **10.0 Independent Assessment**

##### **10.1 Periodic Independent Assessment**

Planned periodic assessments will be made to evaluate the quality and effectiveness of the quality program. The assessment results will be used to improve the quality function.

##### **10.2 Sufficient Authority and Freedom**

The assessing organization will have sufficient authority and freedom from the assessed organization to complete their tasks without organizational constraints. Persons carrying out the assessment shall be technically qualified and knowledgeable in appropriate areas.

**RADIATION WORK PERMIT**

**Approvals:**

**Operations Manager:**

\_\_\_\_\_  
**DATE**

**Health & Safety:**

\_\_\_\_\_  
**DATE**

**Radiation Safety:**

\_\_\_\_\_  
**DATE**

**President, ST:**

\_\_\_\_\_  
**DATE**

**Other (as required):**

\_\_\_\_\_  
**DATE**

**1.0 APPLICABILITY**

This procedure applies to Solutient Technologies, LLC personnel and contractors.

**2.0 PURPOSE:**

The safety of all personnel shall be maintained during all routine or unusual activities. This procedure describes the minimum requirements for any activities which are conducted without the approved Operating Procedure.

**3.0 DEFINITION OF AUTHORITY:**

- 3.1 Any activity in the controlled areas which has the potential to expose employees, contractors or the public to any radioactive materials shall be approved by the Radiation Safety Officer (RSO) or his designee.
- 3.2 Activities involving radioactive materials may be covered by a site wide RWP (See Attachment 1). Site wide RWP, shall be kept in the health physics office.
- 3.3 Any activity which will result in heating of materials, deactivate safety devices, reduce containment of hazardous materials, assign personnel to be inside any vessel, or require personnel to be assigned to non-routine activities which process hazardous materials shall be reviewed and approved by the RSO or his designee (See Attachment 2).

**4.0 ISSUANCE OF RWP'S**

- 4.1 The supervision, manager or director of any area can request an RWP. The health physics department may also decide when an RWP is required.
- 4.2 The request shall supply as much of the indicated information as possible. As a minimum, the sections for job description, equipment or systems involved, work beginning, and building must be indicated.

- 4.3 The RSO or his designate shall review all RWP's and approve prior to training and implementation.
- 4.4 Training shall be performed on each RWP prior to initiation. Each person working under the RWP shall sign the training form.

**5.0 WORK AREA:**

- 5.1 A copy of the RWP shall be posted at the work area in plain view of all personnel entering the area.
- 5.2 The responsible supervision shall insure that all the specified protective equipment is in place before the task begins.
- 5.3 All personnel involved with radioactive materials at the work area shall follow the RWP requirements.
- 5.4 The work area shall be cleared of any debris or hazardous materials at the end of this task.

**6.0 WORK COMPLETION:**

- 6.1 The RSO or his designate shall be contacted to review the work area at completion.
- 6.2 The inspection may include high volume air sample, smears, personnel contamination checks or other tests to insure the area is safe and released for routine use.
- 6.3 The completed request form shall be maintained by the health physics office.

## DR. STEPHEN V. PREWETT

An environmental manager and professional nuclear engineer with major public agencies and private enterprises regarding environmental management issues and the application of new technologies and products, as well as the disposal of nuclear and other hazardous waste and by-products.

### PROFESSIONAL EXPERIENCE

#### 1996 – Present

**Soluent Technologies, LLC. North Canton, OH** - Technical Director/RSO responsible for (a) radiation protection, decontamination, and decommissioning at NRC and state licensed facilities; (b) environmental management, waste stabilization, information system development and design; (c) preparing remediation work plans and statements of work; and (d) principal radiation safety officer; and (e) risk evaluation.

#### 1994-1996

**Orbit Technologies, San Diego, CA** – A technology transfer company offering new products which significantly enhance safety and environmental factors in manufacturing and waste disposal operations.

**Vice President, Technology** responsible for accurate assessment of the commercial usefulness and regulatory impact of new technologies and products; performs detailed safety and environmental tests and studies on the production and application of new technologies; formulates business plans for the commercial application of new technologies using environmental and safety issues as market entry points; acts as a consultant to major enterprises and public entities, including service as the principal investigator for nuclear waste encapsulation for the U.S. Department of Energy.

#### 1982-1994

**GenCorp, Fairlawn, OH** – A \$2 billion multi-national manufacturing company with major interests in defense, automotive and polymer products.

**Manager, Environmental Affairs (1988-1994)** – Responsible for environmental compliance, audits, regulatory impact analysis and environmental business development; developed an innovative method which completed a 2 year remediation project in 2 months expediting the sale of a \$20 million asset; conducted over 40 internal facility compliance audits in which all non-compliance issues were addressed and resolved; served as lead or support environmental engineer for 12 domestic and foreign due diligence efforts for transfer of facilities or real estate to new ownership; prepared documentation for the Controller and Board of Directors detailing environmental liabilities facilitating fund reserving decisions.

**Director, Facility Environmental Health & Safety (1982-1988)** – Responsible for compliance, licensing and remediation practices at the Jonesborough, TN facility; addressed technical issues and prepared expert witnesses for a favorable NLRB landmark decision regarding a strike based on alleged abnormally dangerous workplace conditions; implemented a safety program which reduced accident rates from a factor of two above the industry average to the current record 1,250,000 work hours without a lost-time accident, receiving two awards from the National Safety Council; managed the decommissioning of a California facility, regulated by 17 agencies, which was completed in 65% of the estimated time and cost and the final 1,100 page report approved in six weeks; managed a multi-year project to close a radioactive waste pond which was completed on schedule; established a volunteer facility emergency response team which involved 20% of the work force, resulting in 50% savings in insurance premiums.

Trained in risk identification assessment program. Participated in the multi-year study to identify potentially higher catastrophic consequence accidents with low probability of occurrence. After identification of accidents implemented risk reduction procedures such as reinsurance or process changes to reduce risk to acceptable levels.

1976-1982

**U.S. Department of Energy, Oak Ridge, TN**

**Senior Nuclear Engineer** responsible for evaluating new technologies and determining the probability of successful commercial applications; held a Q clearance with endorsements for weapons and advanced isotope technologies; involved extensively with a variety of classified uranium enrichment and weapons technology programs; served as a member of DOE's nuclear incident response team.

1973-1976

**Institute for Resource Management** (concurrent with graduate school) – an organization which supplies health physics personnel to nuclear power plants when they shut down for routine maintenance.

**Site Manager** – Responsible for the performance of up to 42 professional employees, ensuring compliance with regulations issued by the Nuclear Regulatory Commission so that no facility was cited; progressed to this position from Senior Health Physics Technician.

**PROFESSIONAL PUBLICATIONS & COPYRIGHTS**

Over 45 articles and studies published regarding risk management and communications project management, development of standards, and nuclear interactions and codes, as well as numerous presentations on these and related topics at various conferences and seminars. Most significant are:

- Mixed Waste Salt Encapsulation Using Polysiloxane, Accepted, WM98 (joint with G.G.Loomis and C.M. Miller)
- Remedial Action Guides for Depleted Uranium and Thorium in Soil (joint with D.E. Bernhardt, L.W. Cole, and Rogers)
- Risks of Transporting Incinerated Depleted Uranium Waste (joint with D.E. Bernhardt and Hoynacki)
- Decommissioning Standards for Depleted Uranium Manufacturing Facility (joint with D.E. Bernhardt and Pittman)
- Measurement of Uranium in Soil Using the USRADS Survey System (joint with Flynn and L.W. Cole)
- Transportation Risk for Depleted Uranium Oxide (joint with D.E. Bernhardt)
- Health Physics Experience During a Uranium & Thorium Pond Closure
- Design & Construction of a Low Level Waste Storage Site in East Tennessee (joint with Mishu)
- Health Risk Assessment for Field Use of Depleted Uranium Munitions (joint with D.E. Bernhardt and L.W. Cole)
- Closure for a Depleted Uranium & Thorium Waste Pond (joint D.E. Bernhardt and R.D. Douglas)
- Effects of U-236 on the Fuel Cycle
- Estimating Possible Kidney Toxicity from Exposure to Uranium Compounds (joint with L.W.Cole)
- Uranium Incineration (re: Incineration of Low Level Radioactive Waste) (joint with L.W. Cole, Hoynacki and Pittman)
- Excavation & Disposal of Depleted Uranium and Thorium Contaminated Soils (joint with D.E.Bernhardt)

One Copyright.

**EDUCATION**

Ph.D. Nuclear Science Engineering, Virginia Polytechnic Institute (1979)  
M.S. Nuclear Science & Engineering, Virginia Polytechnic Institute (1973)  
B.S. Applied Physics, East Carolina University, (1972)

# SOLUTIENT TECHNOLOGIES

**Dan Rosenhagen**  
**Operations Lead**

## SUMMARY OF QUALIFICATIONS

**EXPERIENCE:** Comprehensive experience and expertise in the following areas of responsibility:

Rad waste packaging	High Rad segregation, storage,
Solidification	retrieval for shipment
Cavity decontamination	High Rad filter transportation
Radiation controls set up	and storage
Transfer canal	Evaporator system high rad
Decontamination	resin transfer
Support rooms	Instrument set up and
Decontamination	implementation
Remediation technique specialist	

## EMPLOYMENT HISTORY

### Solutient Technologies - BP Cleveland Remediation Project – Senior HP Lead

- Operation of water treatment system.
- Set up and implementation of various survey instruments.
  - 43-68 gas proportional
  - 43-37 floor monitor
  - 44-110 tritium detector
  - Multi channel analyzer
- Lead compliance technician for several areas
- Lead MARSSIM specialist for several areas
- Grid layout and Microsoft Excel mapping
- MARSSIM QA contractor interface
- Supervised several decon workers and contractors
- Hands-on removal of concrete floors, impacted drain lines, ad various surfaces
- Hands-on dismantling of impacted labs and support systems
- Constructed several special containments for radiological control
- Team member during QA of final closure report

### **Sciencetech-NES - Quehanna Decommissioning Project – Operations Lead**

- Decontamination and dismantling of several highly contaminated hot cells
- Responsible for the direction of several operators and laborers
- Built special containment for vertical entry into problem cell #4, with Strontium-90 levels in excess of 40,000 rad
- Involved in various other construction activities and rigging
- Assisted in radiological controls and implementation
- Assisted in the removal of manipulator arms
- Lead decontamination via mailing techniques

### **Westinghouse-RS – DC Cook Nuclear Power Plant – Training Instructor Rad Waste Supervisor**

- Responsible for the development and implementation of O.J.T – O.J.Q training and documentation in preparation of I.N.P.O. & NRC audits.
- Supervised house crew in rad waste transportation, segregation and packaging
- Participated in high rad transportation, segregation storage and shipment
- Participated in decontamination of Reactor cavity, Transfer canal, and support rooms.

### **ACHIEVEMENTS**

- I.N.P.O. Accredited (O.J.T. & O.J.Q) Instructor Certification
- Over 40,000 hours (Nuclear and Environmental) as Field Supervisor

# Solutient Technologies

Dr. RAYMOND E. HOLMES. C.PHYS., F.INST.P., F.INST.NUC.E., FSRP, CHP

## QUALIFICATIONS & RELEVANT EXPERIENCE

Raymond E. Holmes is a hands-on engineer and scientist with more than thirty years of international experience in the determination of health risks and the environmental impact of chemical and nuclear pollution, and in the practice of optimal remediation. The first twenty years, based in Europe, encompassed a comprehensive range of academic, industrial and government applications. Residency in the USA in 1980 facilitated senior technical management positions and consultant appointments to a wide range of national and international environmental corporations.

## EDUCATION

B.Sc. (Zoology Honors Course) UCSW, UK  
MSRP - (Health Physics) SRP, London  
Post Graduate Diploma of Health and Radiation Safety (MS equivalence) - NELP London  
Ph.D. - Health Physics - Dublin, Eire.  
C.Phys. - Chartered Physicist - IOP London  
F.Inst.P. - Fellow of the Institute of Physics - London  
F.Inst.Nuc.Eng. - Fellow of the Institute of Nuclear Engineers - London  
FSRP - Fellow of Society of Radiological Protection - London  
CHP - Certificate of Applied Health Physics - SRP London  
CHP - Certificate to Practice Health Physics- Institute of Physics and Engineering in Medicine and Biology - London

## HOME ADDRESS

[REDACTED] Telephone: [REDACTED]  
Fax: [REDACTED] E-mail: [REDACTED]

## EMPLOYMENT CHRONOLOGY

### SOLUTIENT TECHNOLOGIES – SEPTEMBER 2000 TO PRESENT

Chief Scientist – Directs and monitors project status advises on technical issues.

### BHE ENVIRONMENTAL, INC. - MARCH 1997 TO SEPTEMBER 1999

In 1997, Ray Holmes joined BHE as Technical Director. In this capacity, he is responsible for managing BHE's Radiological Services Group, developing strategic alliances, and for regulatory and client interfacing.

Introduced BHE to the FUSRAP Program through an on-going contract with a major Pension Group – the First Management Group - where he carries responsibility for the management of radiological risk in all their properties. This includes a major site in St. Louis, Missouri, which is regulated under the FUSRAP program. At this site, acted as Program Manager for major maintenance and development of an operating tenant factory, which is regulated under CERCLA/SARA. Included in this work was the design and construction of radioactive storage structures for the containment of more than 6000 cubic yards of LLRW. The site is contaminated with high levels of Th-230. Directed health physics personnel, and was responsible for the calculation and approval of dose detriment for each of the site workers, and for preparation of the dose detriment and remedial activity reports. Acted as the client's liaison with regulatory agencies, and was responsible for negotiations with, and obtaining approval from DOE and MDNR for the remedial work plan prior to implementation. Oversight responsibilities for this site through an active program of remediation is on going.

Appointed as radiological advisor to the USACE for the River Valley School Site in Marion, Ohio, in their investigation of the potential link between Ra-226 and an alleged leukemia cluster among students.

**PERSONAL INFORMATION WAS REMOVED  
BY NRC. NO COPY OF THIS INFORMATION  
WAS RETAINED BY THE NRC.**

# Solutient Technologies

Provided major technical support to the BHE Marketing Group in the development of their status as a credible small business in the Federal Business Sector. This has included participation in Washington as a technical expert on FUSRAP for discussions between the USACE and its stakeholders.

## **ALLIED TECHNOLOGY GROUP – August 1995 to March 1997**

Senior Corporate Vice President responsible to the CEO for management and development of the Waste Management Division, the Radiological Remediation Division, and the Radiological Operation Division. The services managed included waste compaction, vitrification, decontamination, and field remediation.

## **NUCLEAR ENERGY SERVICES (NES) – September 1994 to July 1995**

National Director of Nuclear and Mixed Waste Services and Director of Midwest Regional Services. Achievements included the establishment of a Regional Facility with a major industrial client base, including the personal Program Management of environmental assessment and remediation services to CSX Transportation and a Basic Ordering Agreement to the Bechtel Corporation for Remediation Services at the Savannah River Facility.

## **KEMRON ENVIRONMENTAL SERVICES – August 1993 to August 1994**

National Director of Nuclear and Mixed Waste Services, Director of Midwest Region Consulting Services. Progressed a Midwest Regional business comprising three facilities from loss to profit. Services managed included Cultural Resources, NEPA services, Site Investigation and Characterization, Remedial Design, Remedial Contracting, and Chemical Analytical Laboratories.

## **HALEY & ALDRICH – August 1992 to September 1993**

Vice President for Hazardous Materials and Remediation Services. Responsible for the expansion of an established geotechnical corporation into hazardous waste consulting services. Introduced quantitative risk evaluation into nuclear and mixed waste projects.

## **KAI TECHNOLOGIES GROUP – July 1991 to August 1992**

Senior Vice President for R.F. technology development and application. Introduced R.F. technology into mixed waste remediation. Awarded a U.S. patent for the application of this technology to drummed mixed waste.

## **ENSR CORPORATION - 1983 -1991**

Appointed initially as Vice President to ERT with responsibility to develop ERT from a primarily Air Quality Services Corporation to a Hazardous Wastes Consulting Service Corporation. ERT progressed until approximately 70% of business was hazardous materials based. At this juncture, ERT achieved Public Corporation status, and Ray. Holmes was appointed Senior Vice President and Chief Engineer with responsibility for Remediation Services. In addition to building a national network of approximately 2000 employees. The work required Program Manager for major clients involving expert witness and litigation services, and acted as Technical Editor for the production of the ENSR CERCLA/SARA and RCRA Handbooks. Major programs personally managed included:

- Metallurg Corporation - Management of environmental risk in the production of specialist alloys.
- Goodyear Corporation - Management of RCRA Program from Tire Manufacturing facilities.
- Lonestar Industries - Management of liability and assets from a business combining cement production and landfill.
- Olin Corporation - Program Management of environmental impacts in international property and business acquisitions and sales.
- Environmental Services to the Office of Governor of Puerto Rico - Design and leadership of measurements and evaluations to determine mass psychogenic disturbance causing extensive hospitalization of workers at the Industrial Estate at Mayaguez and elsewhere.

# Solutient Technologies

## ERCO CORPORATION - 1980 - 1983

Vice President with responsibility of transferring appropriate European Environmental Technology to the USA to build ERCO from an environmental engineering group to a Remediation Service Group. Introduced quantitative risk methodology from UK experience into evaluation of the risks of heavier-than-air volatile organics with Cabot Corporation, and nuclear risks through projects at Gulf Atomic.

## PPC CONSULTING SERVICES / PPC INTERNATIONAL 1971 - 1983

Managing Director of a corporation providing technical and management services to the Waste Treatment and Disposal Companies in Europe and the USA. Personal appointments were held as Technical Director with NEI PLC and as Technical Director to Leigh Industries PLC.

Major Programs managed during this period included:

- The Harwell Hazardous Waste Advisory Service for the UKAEA.
- Development for Leigh Industries of industrial waste treatment and alternate disposal facilities to their deep mine disposal system, which initially comprised more than 50% of their business. Of commercial significance were the development of Sealosafe (which was marketed commercially as "Stablex"), chemical detoxification for cyanide wastes, waste oil chemical/thermal recovery units, automobile tire pyrolysis, and liquid/sludge waste incineration.
- Retention by Wimpey Waste Management (WWM) to audit the acquisition of waste disposal corporations and to advise on the restructuring.
- Retained by the PEEL Group to design, build, and provide on-site technical control of their industrial and commercial waste landfill business.
- Retained by PEEL and BIFFA to design, develop, install, and commission landfill systems with associated hardware, to optimize recovery of landfill gas for electrical production for sale to the National Grid.
- Training Program for the National Association of Waste Disposal Contractors.
- Decommissioning of the Nuclear Submarine Dockyard at Chatham, Kent, UK, for Rolls Royce.
- Audit of the BNFL Radioactive Waste Landfill at Drigg.
- Audit and risk management of radiological and chemical risks at the Re-Chem International UK Incinerators that included medical wastes.
- Retained as a consultant by the UK CEBG as advisor on U.S. technology in low level radwaste treatment, transport and storage.
- Retained by NIREX for technical evaluation of shallow landfill of low level radwastes.
- Development of the FLAIR Program for the real time determination of risk from the discharge of fluorides in overheating accidents in Aluminum Production.
- Development of the IFAL Program for the quantification of risk in accidents within petroleum refineries for Lloyds Technical Bureau, London.
- Radiological risk evaluation for the conceptual design of a Generic Low Level Radioactive Waste Storage Facility for NIREX.
- Assessment of radiological and chemical risk for designs of submarine radioactive waste storage depositories for Sir Robert McAlpine Group.
- Chief Researcher for the EEC on a Study of the Comparability of Chemical and Nuclear Risks Commission of European Communities EUR6417 1980.
- Expert witness services for hazardous and radioactive pollution litigation.

# Solutient Technologies

## ASSOCIATED NUCLEAR SERVICES (ANS): ATOMIC POWER CONSTRUCTIONS (APC): UNITED POWER COMPANY (UPC): UK ATOMIC ENERGY AUTHORITY (UKAEA) – prior to 1971

- As a partner of Associated Nuclear Services Project, managed nuclear installations in Australia, Bucharest, and Chile. Prior to this, responsible as Chief Health Physicist to the APC/UPC Board for operator, public and environmental safety for Nuclear Power Plants including Trawsfynydd, Wales, and Tokai Mura, Japan. Introduced quantitative risk methodology into operational control in non-accident conditions. Member of the Working Parties developing standardized methods for radiation shielding. Initial post-graduate research was with the UKAEA Atomic Weapons Research Establishment. Research included health effects with enriched uranium, plutonium, and tritium, with lung retention modeling and the field evaluation of thyroid iodine accumulation in the presence of other fission products. UK Technical Secretary for the Tripartite Agreement between USA, UK, and Canada on the exchange of Nuclear Data.
- Design and construction of nuclear research and manufacturing facilities:

Polonium/Beryllium Initiator Manufacturing Building Nominated as the Health Physicist to the Engineering Design and Construction Oversight Team that constructed the facilities defined below. Responsibilities included the design and testing of ventilation and containment systems, liquid and air effluent treatment facilities, the selection and testing of finishes for contamination control, personnel distribution systems, change room and equipment monitoring and decontamination systems, radwaste control systems and, where appropriate, criticality and external dose rate control design features. Facilities included:

  - Depleted Uranium Tamper Casting and Machining Plants
  - Enriched Uranium Component Manufacturing Plant
  - Plutonium Component Manufacturing Facility
  - Tritium Component Manufacturing Facility
- Nuclear Weapon Component Transport:
  - Development of Emergency Response Systems for Transport Accidents involving Weapon Components
  - Supervision of International Transport of Weapons Components
- Nuclear Weapons and Related Experience:

Acted as Field Health Physicist in Weapon and Weapon component tests in Maralinga, Australia, and Christmas Island in the Pacific with tests involving conventional explosive dispersion, in addition to fission dispersion. Measurement programs included neutron and gamma dose, radioactive iodine determinations, equipment and personnel decontamination, and Phase 1 decommissioning of test facilities.

## PROFESSIONAL AFFILIATIONS

- UK Institute of Nuclear Engineers
- UK Institute of Physics
- European Physical Society
- UK Society of Radiological Protection
- International Radiological Protection Association

## ACADEMIC APPOINTMENTS

- Associate Lecturer - Imperial College of Science and Technology, University of London (BS/MS Engineering and Physics)

# Solutient Technologies

- Reader - Faculty of Mathematics and Science, Brunel University London (MS Environmental Pollution Science)

# SOLUTIENT TECHNOLOGIES

**Scott Rose**  
**Laboratory Manager**

## SUMMARY OF QUALIFICATIONS

**EXPERIENCE:** Mr. Rose has over seventeen years experience working as a Health Physics Technician and Site Remediation Safety Officer. His thorough understanding of selected federal regulations, including NRC, EPA, and DOT, has enabled him to provide assistance in characterization of soil samples used for isotopic analysis, heat stress monitoring, support for decontamination/decommissioning of radioactively contaminated sites, and environmental restoration projects. He has supervised shipments of radioactive waste to conform to DOT and NRC guidelines. Mr. Rose is also a proficient operator of heavy equipment, including backhoes, bulldozers, front-end loaders and forklifts.

Waste Management  
DOE Experience  
Project Management

Health Physics Support  
MARSSIM Compliance  
Decommissioning Closures

## EMPLOYMENT HISTORY

### Solutient Technologies, LLC, North Canton, Ohio – Senior HP Lead

Supervisor of HP Technicians that were assigned to Ir-192 source recovery project. Implemented Health Physics controls and guidelines for personnel entering and exiting the location of the source incident. Performed MARSSIM compliance surveys, Radioactive waste shipments, manifests and waste profiles. Waste stream documentation and adhered to DOE compliance and regulations. Waste management for the removal of impacted equipment and material for free release. Management of characterization and pre-remediation project. Establishes protocols and performs calibration for lab instruments including ProTeau low activity Alpha/Beta counter, Canberra MCA and hand held instrumentation.

### Perma-Grain – Lead Senior Health Physics Technician

Implementation of radioactive controls and procedures for hot cells enormously contaminated with various chemical forms of Sr-90.

### Nuclear Energy Services – Technical Support

Assistance in the development of the D&D Technology database 2.0 that will assist with the selection of proper tools and equipment for remediation practices.

**Breitling – Site Supervisor**

Supervisor for radiological characterization and decontamination of a tritium contaminated watch facility.

**Cabot Performance Materials – Senior Health Physics Technician**

Implementation of radiological controls for facility with contaminated ore. Radioactive shipment of 17.5 million pounds of impacted material.

**MEC Breckenridge – Senior Health Physics Technician**

Characterization for core sampling of possible impacted facility.

**CERTIFICATIONS**

40-Hour HAZWOPER Certified  
ANSI 3.1 Senior Health Physics Technician  
Radiation Worker Training  
Radwaste technician Training  
8-Hour refresher Course  
Confined Space Training & Certification

LESLIE W. COLE, CHP

---

*Professional Qualifications*

Mr. Cole has over 37 years of experience in applied health physics field and environmental health physics with specific emphasis in environmental sampling, analysis and data evaluation, health physics and safety program evaluations, radiological and mixed waste management, site characterization and remediation, NORM evaluation and assessment and uranium health physics.

He is a past Director of Environmental Health and Safety at a uranium metal fabrication facility and is also a member of the NCRP Task Group developing national recommendations for handling uranium. He served as a Radiation Safety Officer for a major decontamination facility that processes material from nuclear power plants. He has also served as a Health Physics Team Leader in an Environmental Radiological Assessment Program.

*Education*

M.S., Chemistry (Nuclear Effects Engineering), U. S. Naval Post-Graduate School; 1968.

B.S., Chemistry, East Tennessee State University; 1958.

MBA, post-graduate courses, George Washington University; 1969-1970.

Advanced post-graduate courses in Environmental Chemistry, University of Tennessee; 1981-1983.

Advanced post-graduate courses towards Ph.D. (Biochemistry) program at East Tennessee State University; 1986-1988.

*Registrations/Certifications*

Comprehensive Certification by the American Board of Health Physics, 1982.

Member Task Group 15, "Uranium in Man", Scientific Committee 57, National Council on Radiation Protection and Measurements

*Experience and Background*

Present      ***Solutient Technologies, LLC, Technical Advisor***

Direct and advises on a verity of health physics and environmental issues. The range of projects include laboratory measurements, licensing and permitting for a major tranuranic and mixed waste processing facility, licensing for a uranium hexafluoride conversion facility, risk analysis for the unrestricted release of facilities and properties utilizing MARSSIM criteria.

1996 -      ***Senior Associate, Auxier and Associates, Knoxville, Tennessee.***

- 1998 Work involves environmental monitoring and surveying, radiological remediation, radiation risk assessment, environmental radioactivity dispersion and measurement, internal and external dosimetry and general health physics. Served as technical director for major decontamination and decommissioning of a firing range where uranium metal munitions had been tested (project total over \$2.2 million). Advised on NORM site characterization at a large military installation. Served as Safety Manager for four NORM characterization efforts related to oil fields. Served as Radiation Safety Officer for major waste processing facility start-up and for mixed waste processing facility.
- 1994 - *Vice President, Regulatory Affairs, SEG, Oak Ridge, Tennessee.*  
1996 Direct activities related to SEG's six radioactive material licenses, RCRA permit, nine air permits, POTW permit and EPA treatability studies permit. Deal directly with state regulatory offices on these matters. Also direct activities related to inventory management of three million cubic feet radiological waste processing annually. Direct health and safety and laboratory activities.
- 1992 - *Senior Associate, Auxier and Associates, Knoxville, Tennessee.*  
1994
- 1988 - *Director, Environmental Health and Safety for Aerojet Ordnance Tennessee, Inc., in Jonesborough, Tennessee.*  
1992 Direct all safety and environmental functions. Interact with other departments, directors, and managers on integrating safety and environmental concerns into production matters. Coordinate all regulatory matters with state regulatory authorities in Radiological Health, Air Quality, Water Quality and Solid Waste. Act as Aerojet General expert on Radiological matters at other sites. Project manager for a major D&D project. Manage budget of 2.5 million dollars.
- 1983 - *Radiation Safety Officer for Aerojet Ordnance Tennessee, Inc., in Jonesborough, Tennessee.*  
1988 Manage all radiological protection activities involving fabrication of uranium metal products. Supervise the technical aspects of large-scale environmental improvement program and for a major decontamination and decommissioning of a manufacturing facility. Assist the industrial safety officer in evaluating respiratory protective requirements. Plan and supervise Health Physics analytical processes. Interact with plant engineering on radiation protection requirements, including ALARA considerations, for process improvements. Inspect industrial x-ray equipment to maintain regulatory compliance. Responsible for assuring regulatory compliance on all radioactive shipments including waste. Technical advisor for legal team involved with long-term labor dispute concerning health and safety issues. Supervise seven technical personnel.
- 1982 - *Health and Safety Officer for Quadrex Fixed Base Decontamination Facility in*  
1983 *Oak Ridge, Tennessee.*

Supervise all radiological protection and safety activities involving handling multicurie decontamination processes; recordkeeping to certify releasability of cleaned materials, personnel dosimetry, maintain environmental effluents to acceptable levels, radioactive shipments (incoming and outgoing), radiation safety, ALARA and industrial safety. Developed mechanical techniques for surveying cleaned material to minimize labor efforts and improve quality control. Develop analytical procedures for laboratory and quality control. Supervise 15 professional and technical personnel.

1980 - ***Senior Health Physics Team Leader in the Radiological Site Assessment Program with Oak Ridge Associated Universities in Oak Ridge, Tennessee.***

Responsible for planning, conducting, and preparing reports on radiological assessments at various industrial and past-government facilities where radionuclides are, or have been, in use. Projects included radiopharmaceutical manufacturing facilities, mill tailings sites, and thorium manufacturing facilities. Assisted with developing laboratory analytical procedures. Supervise six to twelve health physics professionals.

1979 - ***Staff Officer, HQI Corps Group, South Korea.***

1980 Responsible for nuclear, chemical and biological training and preparedness. Had staff responsibility for nuclear accident/incident control for approximately one-third of South Korea.

1974 - ***Senior Instructor at mid-level U.S. Army Staff College.***

1978 Primary course is year long, leading to Master's Degree. Planned and directed instruction on radiation safety, radiological defense and radiation measurements and dosimetry. Supervised eight to twelve other instructors. Reviewed all Army literature in development for topics related to nuclear weapons effects, radiation safety and measurements. Served as Nuclear Accident/Incident Control Officer (NAICO) for North Central United States area. Supervised the NAIC teams to maintain readiness in measurement and monitoring techniques for uranium and plutonium.

1971 - ***Administrative Officer for Military Science Department at East Tennessee State University.***

1973

1968 - ***Nuclear Efforts Officer at Continental Army Command Headquarters in Fort Monroe, Virginia.***

1970

Responsible for planning of radiation safety matters for all Army installations in the continental United States. Coordinated the evaluation of new radiation detection

devices for military use. Instrumental in the adoption of the "Fiddler" instrument for use in detection of plutonium. Held an Atomic Energy Commission license for small radiation sources and was the certifying authority for other similar licenses. Coordinate the nuclear accident/incident control procedures for all Army posts in the United States. Developed procedures for monitoring and measuring uranium and plutonium contamination. Supervised the installation of a "hands-on" decontamination facility using short-lived radionuclides for training specialized nuclear decontamination teams.

1966 - *Student at U.S. Naval Post-Graduate School, Monterey, California.*  
1968

1963 - *Staff Officer, HQ U.S. Army, Europe.*  
1968 Responsible for training and readiness preparation in nuclear chemical and biological officers for all U.S. Army personnel in Europe. Assistant Nuclear Accident/Incident Control Officer. Was directly involved in a large-scale nuclear accident in Spain. Clean-up from this accident involved several hundred people and several weeks of work. Primary concern was monitoring personnel and equipment for plutonium contamination.

#### *Awards*

R.B. Young Award (recognition for technological innovation within Aerojet General Corporation).

#### *Professional Affiliations*

Health Physics Society  
American Chemical Society  
Member NCRP Scientific Committee 57-15

#### *Publications*

Mr. Cole has prepared or contributed to numerous reports and publications on radiological surveys and assessments and applied health physics.

#### *List of Publications*

Cole, L. W., J. D. Berger, P. R. Cotton, R. C. Gosslee, T. J. Sowell, and C. F. Wever, "Radiological Assessment of Ballod & Associates Property (Stephen Chemical Company), Maywood, New Jersey," July 1981.

- Cole, L. W., J. D. Berger, W. O. Helton, B. M. Putnam, T. J. Sowell, and C. F. Wever, "Radiological Evaluation of Decontamination Debris Located at the Futura Coatings Company Facility, 9200 Latty Avenue, Hazelwood, Missouri", September 1981.
- Cole, L. W., J. D. Berger, G. W. Foltz, P. W. Frame, B. P. Rocco, and C. F. Wever, "Preliminary Survey of Igloo 9050, Former L00W Site, Lewiston, New York," September 1981.
- Cole, L. W., J. D. Berger, R. D. Condra, W. O. Helton, B. M. Putnam, T. J. Sowell, and C. F. Wever, "Preliminary Radiological Survey of Proposed Street Right-of-Way at Futura Coatings, Inc., 9200 Latty Avenue, Hazelwood, MO," December 1981.
- Cole, L. W., J. D. Berger, R. D. Condra, P. W. Frame, W. O. Helton, C. W. Kuechle, S. E. Trench, and C. F. Wever, "Environmental Survey of the Manufacturing Facility, Medi-Physics, Inc., Arlington Heights, IL," January 1982.
- Cole, L. W., J. D. Berger, P. W. Frame, G. W. Foltz, R. C. Gosslee, and C. F. Wever, "Environmental Survey of the Mallinckrodt Diagnostics Facility, Maryland Hights, MO," March 1982.
- Cole, L. W., J. D. Berger, R. D. Condra, G. W. Foltz, P. W. Frame, B. M. Putnam, B. P. Rocco, T. J. Sowell, and C. F. Wever, "Radiological Assessment of the Breckenridge Disposal Site, Velsicol Chemical Corporation, St. Louis, MO," July 1982.
- Berger, J. D., L. W. Cole, R. D. Condra, G. R. Foltz, C. W. Kuechle, J. C. Mann, and C. F. Wever, "Environmental Survey of the Engineered Products Department, Monsanto Research Corporation, Dayton, OH," December 1981.
- Rocco, B. P., J. D. Berger, L. W. Cole, R. D. Condra, R. C. Gosslee, C. F. Riemke, T. J. Sowell, Wever, and L. A. Young, "Environmental Survey of the Medi-Physics Facility, South Planfield, NJ," January 1982.
- Rocco, B. P., J. D. Berger, L. W. Cole, R. D. Condra, R. C. Gosslee, C. F. Riemke, T. J. Sowell, C. F. Wever, and L. A. Young, "Environmental Survey of the E.R. Squibb & Sons Facility, New Brunswick, NJ," March 1982.
- Berger, J. D., L. W. Cole, R. D. Condra, P. R. Cotton, W. O. Helton, T. J. Sowell, and C. F. Wever, "Environmental Survey of the Static Control Systems Department, Minnesota Mining & Manufacturing Company, New Brighton, MN," March 1982.
- Frame, P. W., J. D. Berger, L. W. Cole, R. D. Condra, P. R. Cotton, W. O. Helton, A. J. Liu, C. M. Plott, and C. F. Wever, "Confirmatory & Post-Stabilization Radiological Survey of the AMAX Site, Parkersburg, West Virginia," March 1984.

*Contributing Author*

- U.S. Army Field Manual 3 - 15 "Nuclear Accident/Incident Control Procedures" - 1970.
- U.S. Army Field Manual 101-31 "Nuclear Weapon Employment" - 1975.,
- U.S. Army Field Manual 101-5 "Staff Officer's Guide" - 1976.
- U.S. Army Field Manual 100-5 "Maneuver Control" - 1976.
- U.S. Army Field Manual 71-100 "Corps Operations" - 1976.
- U.S. Army Field Manual 71-101 "Division Operation" - 1977.
- U.S. Army Field Manual FM101-31-1 "Nuclear Weapons Employment - Data and Procedures" - 1977.
- U.S. Army Command & General Staff College Reference Book 3-1 "NBC Operations" - 1977.
- U.S. Army Command & General Staff College Reference Book 3-1 "NBC Operations" - 1978.

*Technical Papers Presented*

- "Consideration of Potential Kidney Injury" - Tennessee Section, American Toxicological Society, Johnson City, Tennessee, June 1984.
- "Uranium Incineration" - Conference on Incineration of Low Level Waste, Tucson, Arizona, March 21-23, 1985.
- "Remedial Action Guides for Depleted Uranium and Thorium in Soil" - Waste Management '85, March 25-28, 1985.
- "Health Physics Experience During a Uranium and Thorium Pond Closure" - Health Physics Mid-Year Symposium, March 1-3, 1986.
- "Analysis of Uranium and Thorium in Soil" - Health Physics Mid-Year Symposium, March 1-3, 1986.
- "Particle Size Characterization of Airborne Uranium Compounds" - American Industrial Hygiene Association Annual Meeting, May 15-18, 1986.
- "Health Risk Assessment of Field Use of DU Munitions" - Health Physics Society Annual Meeting, June 29-July 3, 1986.
- "As Case Study of a Worker with an Embedded Piece of Uranium in His Chest" - Health Physics Society Annual Meeting, July 5-10, 1987.

"Rapid Air Quality Measurements" - Health Physics Society Annual Meeting, December 1988.

"Measurements of Surface Deposited DU After CE Warhead Firing" - Health Physics Society, December 1988.

"Challenges in Decontamination of DU Manufacturing Facility" - Waste Management Symposium, February 1989.

"Unrestricted Release of a Depleted Uranium Manufacturing Facility" - Waste Management Symposium, February 1989.

"Depleted Uranium Waste Disposal" - Environmental Compliance in Armaments Facilities and Demilitarization Symposium, October 1991.

# Solutient Technologies

## Dell V. Reuss

### Operations Manager

---

#### **Experience**

1997 – Present

#### **Solutient Technologies**

Operations Manager

Responsible for the preparation of technical specifications and engineering cost estimates for decontamination and decommissioning projects. Verifies that cleanup projects comply with standards and requirements of the client, and federal, state and local agencies. Provides oversight to the characterization, handling, transportation and subsequent disposal of radioactive waste materials.

92 – 97

#### **Aerojet**

Operations Manager, Environmental Services

Responsible for the preparation of technical specifications and engineering cost estimates for decontamination and decommissioning projects. Verifies that cleanup projects comply with standards and requirements of the client, and federal, state and local agencies. Provides oversight to the characterization, handling, transportation and subsequent disposal of radioactive waste materials. Design equipment for specific decon applications, manager over waste shipments, packaged and transported and back up for waste water treatment and industrial water treatment.

90 – 92

#### **Aerojet**

Supervisor Water and Waste Water Treatment

Grade II waste water operator certification, set up waste reduction facilities for radioactive waste/began operation, worked layout for large scale decontamination which was planned to begin by the end of 1992.

87 – 90

#### **Aerojet**

Foreman

Prepared radioactive waste packaging and documentation for waste shipments according to State and Federal regulations. Maintained and operated nitric acid pickling system, and all hazardous waste records and gave training for T.S.D. facility personnel. Was foreman over water and waste water treatment, prepared storm water for sampling and licensing under NPDES permit, grade I waste water operator certification.

86 – 86

**Aerojet Heavy Metals Company**

Shipping and Receiving Clerk

80 – 86

**Aerojet Heavy Metals Company**

Manager, RSO

Waste packaging in the Waste Management Department, packaged and prepared radioactive waste for shipment according to State and Federal regulations, recycling or disposal. Operated water processing system, maintained ventilation system, handled janitorial services for facility. Served four (4) years as waste disposal coordinator and lead person for Waste Management. Served six (6) months as production control forklift operator.

76 – 80

**United States Army**

Ammunition Clerk for Second Armored Division

Responsible for ammunition ordering, accountability, and delivery to the ranges. Accountability was maintained from time of pickup until the ammunition was expended or returned to the supply point.

**EDUCATION:**

Advanced Hazardous Waste Management

Advanced Supervisory Training

49CFR172.700 Sub Part H Training

**CERTIFICATION:**

Over 17 years of experience with depleted uranium

- Waste packing
- Solidification
- Incineration
- Water treatment
- Decontamination
- Waste shipping

# Solutient Technologies

## Brad Squibb

Environmental Health & Safety Officer  
Radiation Safety Officer

---

### Experience

97 – Present

#### **Solutient Technologies**

Duties include Radioactive / Hazardous waste management activities, to include characterization, manifesting & transportation. Established an environmental Health and Safety software package for major client. Responsible for writing a State of Tennessee license application for mobile decontamination projects. Perform marketing functions and bids. Utilized as a project manager on off-site remediation projects. Primary interface with state regulators for two of Solutient's Radioactive Material Licenses. Project Manager for \$5M radiological and chemical remediation in the State of California utilizing MARSSIM.

97 – 98

#### **Gutierrez-Palmenberg, Inc.**

Project Manager

Directed marketing functions for East coast operations. Developed new business ventures, preparation of bids, and, proposals, and managed environmental re-remediation projects. Responsible for obtaining a Radiological Material license for a Tennessee firm and was named the Radiation Safety Officer for the project.

95 – 97

#### **Scientific Ecology Group**

Manager, Waste disposition

Directed activities for the Special Waste Operations Group and the disposition of all the waste generated at the SEG facility, also negotiated disposal contracts with sites around the U.S. Responsible for the Decontamination department and it's marketing and pricing of the projects.

80 – 95

#### **Aerojet**

Technical Director, Environmental Services

Developed new business in the re-remediation business, preparing bids, performing job-site evaluation and performing project management on remedial jobs. Directed the departments of Health and Safety, Health Physics, Facility Waste, Water Treatment, Emergency Response and decontamination Facility. Was Senior EH&S Manager, Radiation Safety Officer, Industrial Safety Manager and Health and Safety Specialist.

# Solutient Technologies

## **Education**

B.S. Environmental Science

## **Achievements**

Established Aerojet Environmental Group with over 2.5 M in sales the first year. Developed the respiratory protection program for Aerojet. Successfully negotiated the first mixed waste contract with Envirocare of Utah, served as team leader on the company Total Quality Management Team, opened and finalized 9 waste profiles with Envirocare and shipped over 4M lbs. of waste in a 5 month period. Was safety Manager at Aerojet when the company reached 1M hours without a lost time accident, and, completed management, oversight and risk tree (MORT) analysis program.

**EXPERIENCE**

**HEALTH & SAFETY MANAGER**

**Solutient Technologies**

1999 – Present

Responsible for the direction and oversight of the STS H&S Program. Duties include Training and orientation, Emergency Response, Hazardous Waste Management, Hazard Communication, Respiratory Protection, Industrial Safety and Project Management. Performed as the H&S Director for URS Corporation and STS during a major radiological and demolition project in Los Angeles, CA.

**WASTE PROCESS MANAGER**

1997 – 1999

**Aerojet Ordnance (TN)**

Responsible for overseeing all Budgetary, Regulatory and Reporting requirements. Supervise daily operations of Radioactive and Hazardous Waste Processing Operations. Manage Wastewater Treatment Facility. Maintain NPDES permit and SPCC plan; Interact with regulatory agencies; Coordinate Stormwater program; Spill Response Coordinator; Fire Response Captain; Coordinate Radioactive Decontamination program.

**ACHIEVEMENTS**

- Reduced radioactive and hazardous waste volumes to lowest levels in a decade.
- Developed plant wide waste minimization program.
- Managed decontamination project of 30,000 square foot facility. Project completed on time and within budgetary constraints.

**HEALTH AND SAFETY SPECIALIST III**

1995 - 1997

**Aerojet Ordnance (TN)**

Job duties included various Environmental, Industrial Safety, and Industrial Hygiene tasks, while being directly responsible for the following programs:

- Hazardous Waste
- Emergency Response Team
- Training and Orientation
- RCRA
- Hazard Communication
- Stormwater Sampling

**ACHIEVEMENTS**

- Participated in remediation of Aerojet facility located in Chino, California.

**ENVIRONMENTAL COORDINATOR**

1993 – 1995

**Snap-On Tools Inc.**

Solely responsible for all Environmental Programs, Reporting Requirements and Operations. Maintained NPDES permit; Developed SPCC, Stormwater and Chemical Process Safety Plans; Interacted with regulatory agencies; Developed and Maintained Hazardous Waste Program, RCRA and Hazardous Waste Reports. Responsible for conducting Monthly Safety Meetings.

**ACHIEVEMENTS**

- Initiated plant-wide noise abatement program.
- Developed a process to reduce the volume of filter press cake (F006), reduced hazardous waste volume by 40%.

**HEALTH AND SAFETY SPECIALIST**

1988 – 1993

**Aerojet Ordnance (TN)**

Job duties included various Environmental, Industrial Safety and Industrial Hygiene tasks, while being directly responsible for the following programs:

- Well Sampling
- Industrial Hygiene Sampling
- Emergency Response Training
- Monthly Safety Meetings
- Air Sampling
- Hazard Communication Program

**ACHIEVEMENTS**

- Assisted in bringing soft media decontamination process to the facility.

**PERSONAL INFORMATION WAS REMOVED  
BY NRC. NO COPY OF THIS INFORMATION  
WAS RETAINED BY THE NRC.**

**MILITARY EXPERIENCE**

Eight years of experience in both Active Duty, National Guard and Reserve capacity, while holding the following positions:

- Platoon Leader
- Detachment Commander
- Environmental Officer

**ACHIEVEMENTS**

- Military Order of World Wars Award
- United States Army Certificate of Merit for Safety
- Tennessee Army National Guard Commendation Award
- Graduated Top 10% in Officer Basic Course
- Successful completion of U.S. Army Airborne School

**EDUCATION**

BS, Public Health

East Tennessee State University

Johnson City, Tennessee

**CERTIFICATIONS**

Certified Hazardous Materials Manager

**SECURITY CLEARANCE**

Secret

**PROFESSIONAL MEMBERSHIPS**

Academy of Certified Hazardous Materials Managers

American Society of Safety Engineers

International Society for Respiratory Protection

**COMMUNITY ACTIVITIES**

Technician; Johnson City/Washington Co. Hazardous Materials Team

American Heart Association

Johnson City/Washington County United Way

**CONTINUING EDUCATION**

- DOT/NRC Transport Regulations
- Supervisory/Leadership Development
- Lean Manufacturing Workshop
- Workplace Organization and Visual Controls
- Chemistry of Hazardous Materials
- Windows NT, Level I
- Excel 97, Level I
- Access/Database, Level I
- Workers Compensation Update
- Occupational Safety and Ergonomics
- Industrial Wastewater Pretreatment
- Comprehensive Study of Occupational Safety and Health technology
- Hazardous Materials On Scene Incident Commander
- OSHA Voluntary Compliance Course
- First On The Scene Response Course
- In-Plant Industrial Chemical Spill Response
- Health Physics Technician; Level II Advanced
- TOSHA Seminar – OSHA Compliance
- Team Development/Process Improvement
- Industrial Structural Firefighting
- TOSHA Seminar – Construction Safety

**MASTER'S LEVEL COMPETENCY**

- Environmental Health Practices
- Water Pollution Principles
- Biostatistics