Environmental Resources Management

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DeWitt, New York 13214
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5 December 2011

Michael J. Hinton, P.E.
Division of Environmental Remediation – Region 9
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

RE: Addendum to Remedial Investigation Work Plans
BCP Main Parcel and Northern Extension
Former Mill No. 2 Site – Niagara Falls, New York
NYSDEC BCP Site Number C932150

Dear Mr. Hinton:

ERM Consulting and Engineering, Inc. (ERM) is providing environmental services to Greenpac Mill, LLC (Greenpac) on the above-referenced project. ERM is overseeing activities and tasks associated with the investigation and remediation of soil within the parcel identified as Brownfield Cleanup Program (BCP) Site Number C932150 located at 4001 Packard Road in the City of Niagara Falls, Niagara County, New York (the Site). The location of the Site is presented in Figure 1 (Attachment A). General Site layout and the location of selected Site features are presented in Figure 2 (Attachment A).

The New York State Department of Environmental Conservation (NYSDEC) was consulted due to the discovery of radioactive materials at the Site. The investigation and remediation of radioactive materials at the Site will be performed on behalf of Greenpac by Los Alamos Technical Associates, Inc. of Westerville, Ohio (LATA) and Greater Radiological Dimensions, Inc. of Lewiston, New York (GRD) under the oversight of NYSDEC and New York State Department of Health (NYSDOH) specialists in radioactive materials remediation, in consultation with NYSDEC's BCP Project Manager and ERM.

The purpose of this Addendum is to describe investigative methodologies being used at the Site by GRD for the evaluation of radioactive materials. Professional profiles outlining the experience and qualifications of key GRD personnel are presented in Attachment B. The investigation of radioactive materials will be incorporated into the overall BCP for the Site through the submission of this Addendum. At the request of the

NYSDEC, ERM has prepared this document as an Addendum to the approved Remedial Investigation (RI) Work Plans for the Site. The Final RI work plans for the BCP Main Parcel and the Northern Extension were dated August 2010 and June 2011, respectively.

The remediation of radioactive materials at the Site is being performed under the direction of LATA. At the request of the NYSDEC, a separate Addendum to the Soil Excavation Interim Remedial Measure (IRM) Work Plan is being prepared that is specific to the remedial approach for radioactive materials. Professional profiles for key LATA personnel were previously provided in LATA's Site Operations Plan dated 16 September 2011, which will also be included as an attachment to the Addendum to the Soil Excavation IRM Work Plan.

INTRODUCTION

The Site is located in an industrial urban area in Niagara Falls, New York. Buildings, facilities, and operations at the Site are associated with the Former Mill No. 2 which historically housed paper manufacturing, finishing, and packaging operations of finished goods. The facility was originally constructed in the 1920s and was expanded several times. Former Mill No. 2 structures have been demolished to allow construction of a new, state-of-the-art fiberboard recycling facility. Excavation of soil is being performed to install foundations for the new facility and to address areas of chemical-affected soil that contains compounds of potential concern at concentrations above applicable NYSDEC Part 375 Soil Cleanup Objectives. Additionally, RI is ongoing at the Site as described in the Final RI Work Plans for the BCP Main Parcel and the Northern Extension dated August 2010 and June 2011, respectively. Data and information obtained from RI activities completed to date were reviewed and incorporated as appropriate into a Soil Excavation Interim Remedial Measure (IRM) Work Plan dated June 2011. This work plan was conditionally approved by the NYSDEC on 3 June 2011.

Radioactive slag material was subsequently discovered in historic fill materials excavated at the Site when three trucks tripped the radiation portal at Allied Landfill. Soil from these three trucks was screened in the field using a radiation meter and samples were collected for laboratory analysis. Initial evaluation of resulting data suggests that the source of the radiation is technically-enhanced naturally-occurring radioactive material (TENORM) associated with historic production of phosphorus slag in

western New York.

HEALTH AND SAFETY

Radiological Site investigation work will be performed by GRD in conformance with LATA's Site-Specific Radiological Safety Plan (Attachment C). Attachment C was previously approved by the NYSDEC and the NYSDOH in e-mail correspondence dated 7 September and 8 September 2011.

INVESTIGATION APPROACH

The purpose of the radiological investigation is to delineate radiological conditions in areas within the BCP Site Boundary that exceed the NYSDEC-approved general guidance value of 10,000 counts-per-minute (cpm) as quantified using a Ludlum Model 2221 meter with a 44-10 probe (sodium iodide). Radiological screening activities will include:

- visual identification of slag material;
- scanning of material surfaces by GRD radiological technicians using field instruments;
- comparison of screening data against background measurements to evaluate whether the materials have elevated radioactivity; and
- evaluation of survey results provided by site instruments.

The investigation of elevated TENORM at the Site will be performed during the following activities.

Field Screening During RI Activities

GRD radiological technicians will accompany ERM personnel during the installation of soil borings and monitoring wells at the Site and will screen soil cores and cuttings for elevated radioactivity using visual assessment and a Ludlum Model 2221 meter with a 44-10 probe (sodium iodide). Elevated radioactivity readings, if any, will be noted on ERM soil boring logs.

Field Screening During Excavation Activities

Excavation activities will be directed by LATA and observed by a LATA Radiation Safety Officer. Excavated soil will be screened by GRD

technicians using visual assessment and a Ludlum Model 2221 meter with a 44-10 probe (sodium iodide). Continued screening will be performed as each new layer is exposed. Field screening will be used to characterize and segregate excavated material for disposition. Pre-excavation and post-excavation readings will be collected to document radioactivity levels in excavated areas.

Gamma Walkover Survey

GRD will perform a gamma walkover survey of all areas within the BCP Site Boundary that are not subject to RI investigation activities and/or building construction excavation activities to evaluate these remaining areas for elevated radiation. A Ludlum Model 2221 meter with a 44-10 probe (sodium iodide) will be coupled to a Global Positioning System (GPS) unit and radioactivity readings will be measured and their locations recorded. Site gamma walkover survey data will be mapped by GRD to facilitate identification of areas of elevated radiation.

Laboratory Analysis of Samples

Selected samples may be submitted to a laboratory qualified for the radiological analysis of environmental samples on an as-needed basis as determined by NYSDEC and/or NYSDOH specialists in radiation and GRD's radiological technicians. Laboratory analysis will be performed at a laboratory specializing in environmental radiation analytical services and holding accreditation through the National Environmental Laboratory Approval Program and its home state accreditation body.

Based on input from the NYSDEC, samples submitted for laboratory analysis will be analyzed by gamma spectroscopy with reporting limited to isotopic uranium, thorium, and radium.

QUALITY ASSURANCE/QUALITY CONTROL

As approved by the NYSDEC and NYSDOH, the focus of the radiological investigation effort will be based on field instrumentation techniques using a Ludlum Model 2221 meter with a 44-10 probe (sodium iodide) and the professional judgment of GRD's radiological technicians and NYSDEC and NYSDOH specialists in radioactive materials remediation. If deemed necessary by the NYSDEC and/or NYSDOH, laboratory analyses may be performed on bulk samples for soil and/or wipe samples for surfaces at

an approved environmental laboratory specializing in radiation analytical services. The laboratory selected will be accredited through the National Environmental Laboratory Approval Program, including accreditation by the laboratory's home state accreditation body.

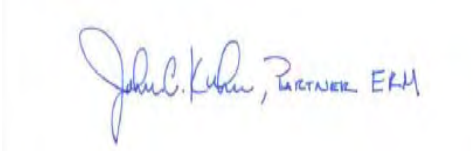
REPORTING

The results of TENORM investigation activities will be summarized by ERM in the Addendum to the Soil Excavation IRM Work Plan. The Addendum to the Soil Excavation IRM Work Plan will discuss the extent of elevated TENORM at the Site based on information available to date. The results will be evaluated against established background levels at the Site and/or approved cleanup criteria to evaluate an appropriate scope of remedial action. The Addendum to the Soil Excavation IRM Work Plan will propose excavation and off-Site disposal at a permitted disposal facility located out-of-state to remediate areas of elevated TENORM within the BCP Site Boundary as required by the NYSDEC.

Thank you and please contact the undersigned if you have any questions or comments.

Sincerely,

Jon S. Fox, P.G.
Senior Consultant

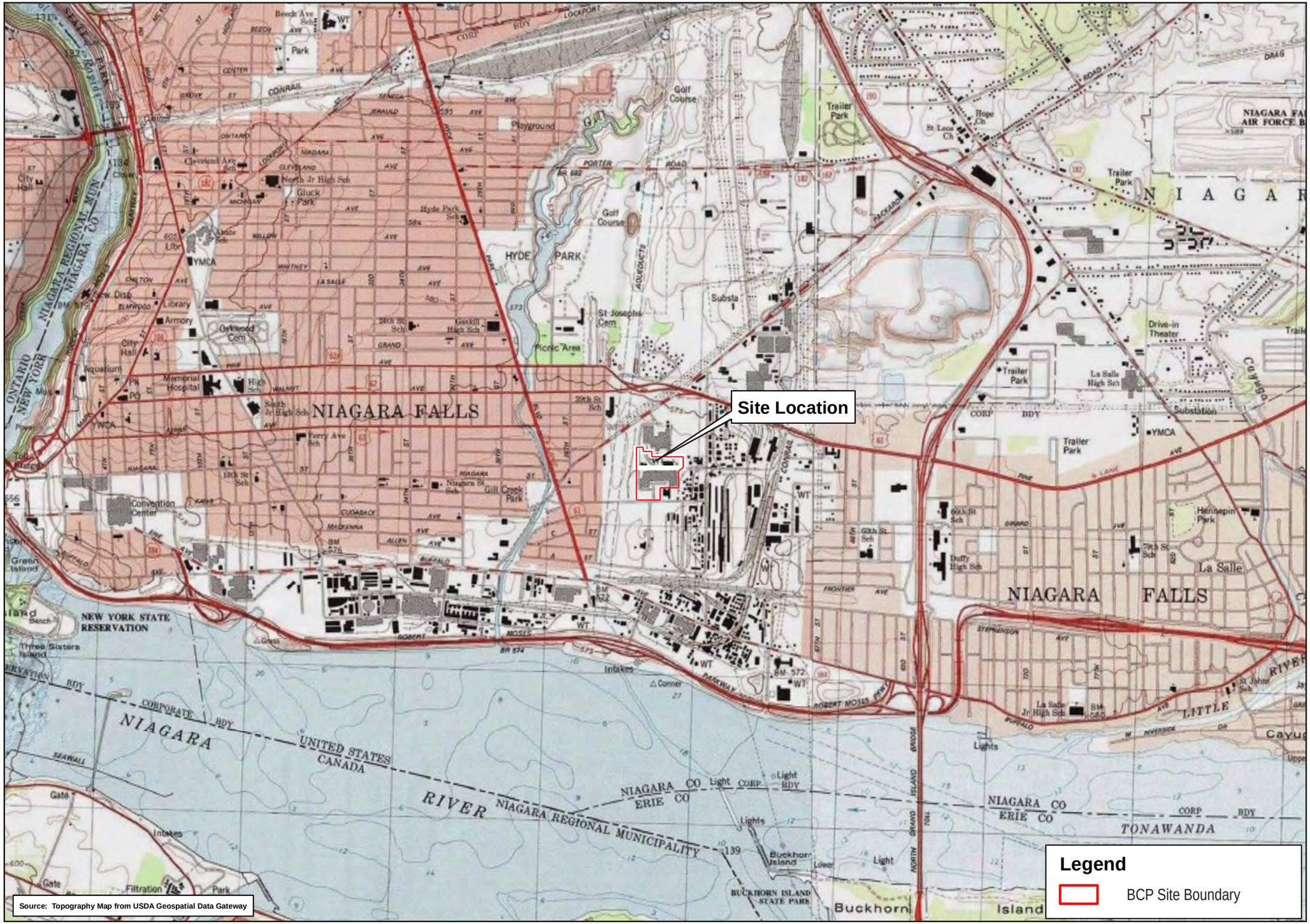


John Kuhn
Partner-in-Charge

Attachment A – Figures
Attachment B – GRD Professional Profiles
Attachment C – LATA Site-Specific Radiological Safety Plan

Cc: Luc Nadeau (Greenpac Mill, LLC)
Lucie-Claude Lalonde (Greenpac Mill, LLC)
Yves Levesque (Cascades)
Francois Mayrand (Cascades)
Kamala Rajan (MiniMill Technologies)
Ken Carter (MiniMill Construction)
Elgie Harrison (MiniMill Technologies)
Srini Balaji (MiniMill Technologies)
Laurie Colson (MiniMill Technologies)
Randy Bartels (MiniMill Construction)
Craig Slater, Esq. (Harter, Secrest, & Emery)
Gregory Sutton, P.E. (NYSDEC)
James Charles, Esq. (NYSDEC)
Tom Papura (NYSDEC)
Cynthia Costello (NYSDOH)
Matt Forcucci (NYSDOH)
Steven Bates (NYSDOH)
John Kuhn (ERM)
John Mohlin, P.E. (ERM)
Dave Myers, C.G. (ERM)
John Trendowski, P.E. (C&S Engineers)
Jason Brydges, P.E. (LATA)
Ron Voorheis (LATA)
Stuart Pryce (GRD)

Attachment A
Figures

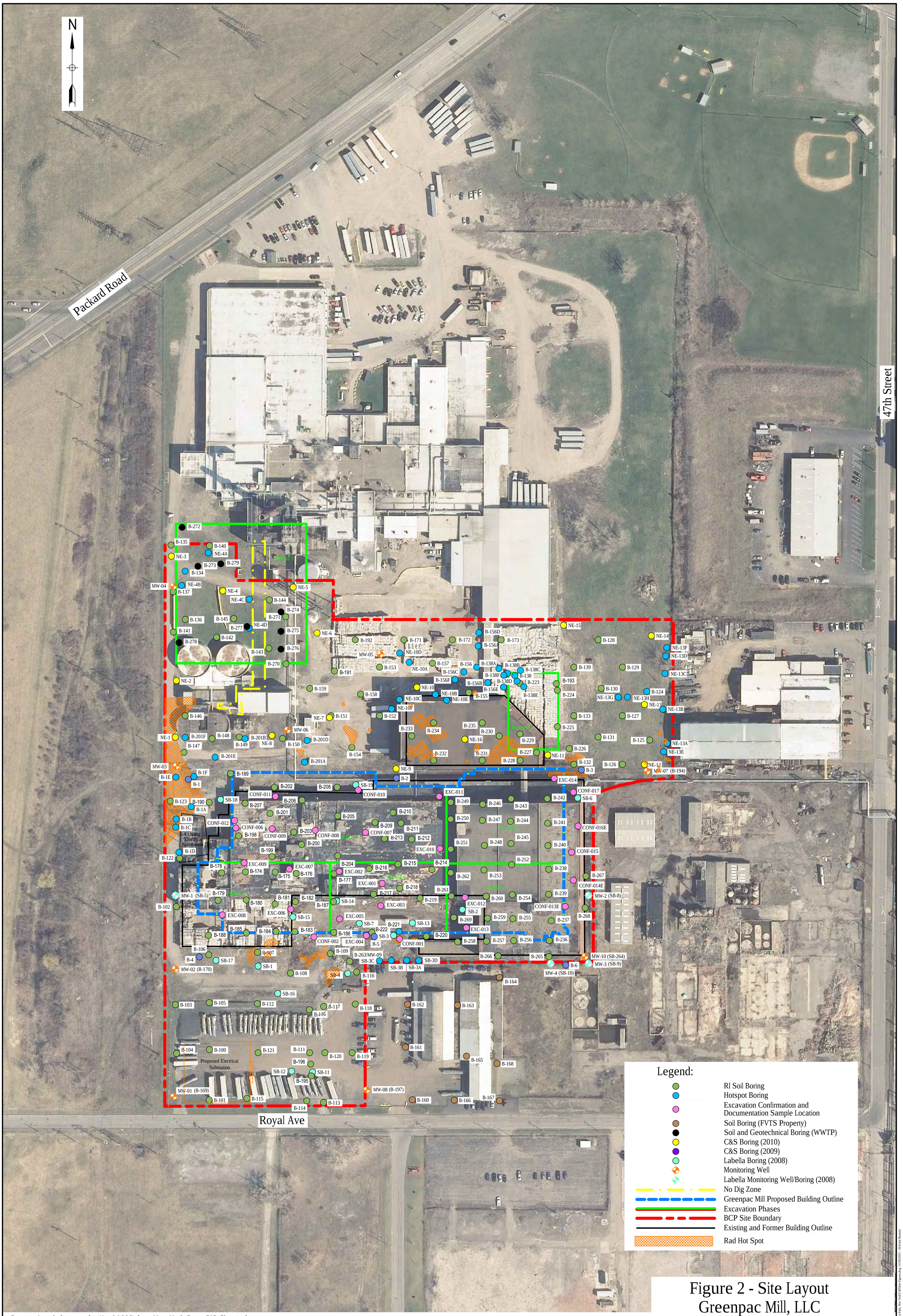


N

0 2,000 Feet

Figure 1 - Site Location Map
Greenpac Mill, LLC
Niagara Falls, New York
NYSDEC BCP Site #C932150

ERM



Source: Aerial photography (April 2008) from New York State GIS Clearinghouse.
Data for all property lines, perimeters and building outlines were obtained from the MiniMill Technologies provided CAD files.

Figure 2 - Site Layout
Greenpac Mill, LLC
NYSDEC BCP Site No. C932150
Niagara Falls, New York

G:\Graphics\Clients\Greenpac Mill\Niagara Falls, New York\CAD\Site Figures.dwg (11/03/2011 - 10:41am Boston)

Attachment B
GRD Professional Profiles

STUART PRYCE

890 Onondaga Street – Lewiston, NY 14092 | stuart.grd@gmail.com | (716)957-0209

Senior Radiological Technician with over 15 years experience as a Radiological Control Technician and has a broad range of experience with the most recent techniques and equipment.

EDUCATION & TRAINING

State University of New York at Buffalo – Buffalo, NY
BA History – 1991

- CPR First Responder
- OSHA 40 Hour Certificate
- Hazwopper – 40 Hour and 8 Hour refresher
- NYS Construction – 10 Hour
- Competent Person Excavation
- Confined Workspace
- GPS
- Environmental Air Particulate Monitoring
- Gamma Spec Operator
- RAD Worker I
- RAD Worker II
- Shipping & Receiving Hazardous Materials

EXPERIENCE

Senior Health Physics Technician

2010 - Present

Greater Radiological Dimensions Inc. – Lewiston, NY
Niagara Falls Storage Site Building 401 Demolition,In conjunction with US Army Corp of Engineers and Energy Solutions Inc.
Lead Technician performed the following:

- Survey
- Instrumentation
- Sampling
- Shipping & Packaging
- Radiation Technician
- Demolition Support
- Air Particulate Monitoring Program
- Lab Analysis
- Job Coverage

1999-2010

CWM Chemical Services – Model City, NY
Linde FUSRAP Site – Tonawanda, NY

Health, safety and technical support during excavation activities

- On-site radiation monitoring
- Collection of samples
- Radiological and GPS surveys
- Instrumentation and calibration
- Well Drilling geo-probe support
- Gamma walkover of FAC Pond 8
- Developed work plans to comply with DEC standards
- Successfully characterized, sampled, packaged and shipped all radioactive material for disposal

Junior Radiation Technician

1997 - 1999

Safety and Ecology Corp. – Knoxville, TN

Assisted the US Army Corps of Engineers in original gamma walkover of the Seaway Landfill Performed Radiological Surveys

GEORGE WEISSENBURGER

855 Porterville Road – East Aurora, NY 14139 | Georgew.grd@gmail.com | (937)260-3533

Senior Radiological Technician with over 25 years of ANSI 3.1 Power Plant, DOE and D&D Control Technician experience. Commercial Power Plants, DOE Facilities and the Army Corp of Engineers.

EDUCATION & TRAINING

Niagara County Community College – Sanborn, NY
Associates in Applied Science – 1988

RCT Core Radiological Training – 2011
Hazardous Material Refresher Course – 2010
OSHA Hazardous Material Training – 1995
State Certification in Asbestos Removal – MD – 1985
Certification – Power Plant Health Physics Course – MD – 1985

EXPERIENCE

Senior Health Physics Technician

2010 - Present

Niagara Falls Storage Site – Perform surveys to support the demo of building 401 – Niagara Falls, NY
SPRU / Knolls Laboratories – Daily meter check / coverage of hot cells – Albany, NY

2003-2010

Bartlett Nuclear – Survey, repackaging, and treating drums for shipment – Los Alamos, NM
Fernald Facility – Material release surveys of heavy equipment – Ross, OH
DOE Mound Facility – Completed final status surveys – Miamisburg, OH
Saxton Soil – FSS soil surveys – Saxton, PA
BWXT – Independently survey drums for release – Lynchburg, VA
Maine Nuclear Plant – Spent fuel pool rack removal – ME
Big Rock Nuclear Plant – Radiation waste resin tank removal – Big Rock, MI
Energy Solutions – Release surveys of heavy equipment to vendors – Memphis, TN
RASI Services – FEMA recovery of waste drums – Barnwell, SC

1988-2003

Various Facilities
Radiation decontamination, airborne surveys and equipment coverage
Issued, inspected and repaired respirator equipment

Junior Radiation Technician

1986 – 1988

Various Facilities
Interfaced with various government agencies – DEC, NRC, and Army Corp of Engineers
Performed radiation contamination, neutron and airborne surveys
Provided health physics coverage
Issue and assign self dosimeters and thermoluminescence detectors
Radiological occurrence and exposure evaluation reports
Characterization, pre/post decon, soil and Uranium remediation final release surveys

LOUIS A ROSOCHA

Applied Physics Consulting - 536 Central, #4 – Los Alamos, NM 87544
505-662-7123/plasmamon@msn.com

Louis Rosocha received the B.S. degree in physics from the University of Arkansas (Fayetteville) in 1972 and the M.S. and Ph.D. degrees in physics, with a minor in chemistry, from the University of Wisconsin (Madison) in 1975 and 1979, respectively. From 1978-1981, he was with the National Research Group of Madison, Wisconsin, where he assisted in the development of lasers, pulsed-power equipment and ozone generators for water cleanup. From October 1981 – January 2008, he was a technical staff member and manager at the Los Alamos National Laboratory.
Most recently, he served as the Team Leader for Plasma Processing in the Plasma Physics Group leading several projects on the application of electrical discharge plasmas to plasma-assisted combustion, fuel conversion, toxic chemical and radionuclide cleanup and the environment. He has been the principal author on five book chapters on the subjects of electron-beam excited KrF lasers, hazardous chemical/mixed radiochemical waste destruction with non-thermal plasmas, and plasma-assisted combustion. Over the course of his career, he has worked on plasma chemistry, relativistic electron beam sources, pulsed power, non-thermal plasma processing, and the development of new technologies for environmental cleanup and environmental restoration (some targeted at the DOE's Rocky Flats Plant in CO).

Dr. Rosocha has presented many invited talks and served as a session chair, organizer, and committee member for several major international conferences and workshops, including organizing the 1st International Workshop on Plasma-Assisted Combustion in 2003, and co-organizing the 2nd event in 2006. He has served as a referee for several journals and was Associate Editor for Non-Thermal Plasmas for the Journal of Advanced Oxidation Technologies and has been a Guest Editor for three special issues of the IEEE Transactions on Plasma Science on Plasma-Assisted Combustion. He has also received two Distinguished Performance Awards at LANL during his career.

Dr. Rosocha is presently a member of the American Physical Society and the IEEE. He has previously been a member of the International Ozone Association, Sigma Pi Sigma, and Phi Beta Kappa. After an early retirement from LANL, Dr. Rosocha now operates his own business and his current R&D interests are focused on some of the most important problems of our time: CO2 sequestration/global warming, national energy security (improving combustion, the efficiency of engines/fuels, and the conversion of trash into 'green' energy), and environmental cleanup.

Selected Publications

1. L.A. Rosocha, "Non-Equilibrium Plasma Combustion Technology Applied to Fuel Efficiency and the Environment," Chapter 3 in *Plasma Physics Applied*, C. Grabbe, Ed., Transworld Research Network, Kerala, India (2007).
2. L.A. Rosocha, Y. Kim, G.K. Anderson, J.-O. Lee, and S. Abbate, "Decompositiuon of Ethane in Atmospheric-Pressure Dielectric-Barrier Discharges: Experiments," *IEEE Trans. Plasma Sci*. **34**, pp. 2526-2531 (Dec. 2006).
3. Y. Kim, V.W. Ferreri , L.A. Rosocha, G.K. Anderson, S. Abbate and K.T. Kim, "Effect of Plasma Chemistry on Activated Propane/Air Flames," *IEEE Trans. Plasma Sci*. **34**, pp. 2532-2536 (Dec. 2006).
4. L.A. Rosocha, "Non-Thermal Plasma Applications to the Environment: Gaseous Electronics and Power Conditioning," *IEEE Trans. Plasma Sci*. **33**, pp. 129-137 (Feb. 2005).
5. S. Stange, Y. Kim, V. Ferreri, L.A. Rosocha, and D.M. Coates, "Flame Images Indicating Combustion Enhancement by Dielectric Barrier Discharges," *IEEE Trans. Plasma Sci.* Fourth Triennial Special Issue on Images in Plasma Science **33**, pp. 316-317 (2005).
6. Y. Kim, S.M. Stange, L.A. Rosocha, and V. Fererri, "Enhancement of Propane Flame Stability by Dielectric Barrier Discharges," *J. Adv. Oxid. Technol*. **8**, pp. 188-192 (2005).
7. Y. Kim, H.L. Teslow, J. Park, L.A. Rosocha, and H.W. Herrmann, "CF4/O2/He Reaction Chemistry in an Atmospheric Pressure Plasma Jet," *J. Adv. Oxid. Technol*. 8, pp. 182- 187 (2005).
8. Y. Kim, J. Park, L.A. Rosocha, H.L. Teslow, and H.W. Herrmann, "Measurements of Dioxygen Fluoride (O2F) in an Atmospheric Pressure Plasma Jet," *Appl. Phys. Lett.* **87**, pp. 1-3 (2005).
9. L.A. Rosocha, D. Platts, D.M. Coates, and S. Stange, "Plasma-Enhanced Combustion of Propane Using a Silent Discharge," invited paper, *Physics of Plasmas*, **11**, pp. 2950-2956 (May 2004).
10. L.A. Rosocha and R. A. Korzekwa, "Removal of Volatile Organic Compounds (VOCs) by Atmospheric-Pressure Dielectric-Barrier and Pulsed-Corona Electrical Discharges," Chapter 10 in *Electrical Discharges for Environmental Purposes - Fundamentals and Applications*, E.M. Van Veldhuizen, editor, pp. 245-278, Nova Science Publishers, Inc., Huntington, NY (2000)

Attachment C
LATA Site-Specific Radiological Safety Plan

SITE SPECIFIC RADIOLOGICAL SAFETY PLAN
for the
Radiologically Impacted Materials Removal for Greenpac Mill, LLC at 4400 Royal Avenue, Niagara Falls, NY

Prepared for
Greenpac Mill, LLC
4400 Royal Avenue
Niagara Falls, New York 14303

Prepared by:

Los Alamos Technical Associates, Inc.
756 Park Meadow Road
Westerville, OH 43081

Prepared By: Joseph P. Shuman, CFPS CSP CHMM	**Signature:**	**Date:** 9/2/11	**Title:** LATA Sr. Environmental Engineer
Approved By: Ron Voorheis	**Signature:**	**Date:** 9/2/11	**Title:** LATA Project Manager
Approved By: Jason Brydges, PE	**Signature:**	**Date:** 9/2/11	**Title:** LATA Program Manager

Los Alamos Technical Associates, Inc.
Site Specific Radiological Safety Plan for the
Radiological Remediation for Greenpac Mill, LLC
At 4400 Royal Avenue, Niagara Falls, NY

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1.0 PURPOSE AND SCOPE

This Site-Specific Radiological Safety Plan (RSP) provides detail on the work practices necessary to fully implement Los Alamos Technical Associates (LATA) Radiological Safety practices at the Greenpac Mill, LLC (Greenpac) property located at 4400 Royal Avenue, Niagara Falls, New York (Site) to achieve:

- Sound radiological practices implemented during activities at the Site where the potential for exposure to ionizing radiation exists;,
- Radiological exposure to the public, site personnel, and the environment that are maintained As Low as Reasonably Achievable (ALARA), and
- Performance of activities at the Site in a manner consistent with applicable local, state, and federal regulations.

2.0 APPLICABILITY

The work practices specified in this site specific RSP apply to work conducted by site personnel that have a potential to result in the exposure of employees to ionizing radiation. All Site visitors and employees working in a radiation area or a radioactive materials area are responsible for following this RSP. The Project Manager (PM) and the Site Radiation Safety Officer (RSO) are responsible for ensuring that the Site Specific RSP is implemented at the Greenpac Site.

3.0 GENERAL

3.1 REFERENCES

- DOT 49 CFR 171-177, Transportation – Hazardous Materials Regulations.
- 6 NYCRR 380 Prevention and Control of Environmental Pollution by Radioactive Materials
- 10 NYCRR 16 Ionizing Radiation
- 10 NYCRR Part 16, Standards for Protection Against Radiation
- OSHA 29 CFR 1910.1096, Ionizing Radiation
- OSHA 29 CFR 1926.53, Ionizing Radiation
- NRC Regulatory Guide 8.25, Air Sampling in the Workplace
- LATA Corporate Respiratory Protection Program
- Federal Guidance Report No. 12, entitled External Exposure To Radionuclides In Air, Water, And Soil (EPA-402-R-93-081

3.2 DEFINITIONS

Airborne Radioactivity Area – Area where the measured concentration of airborne radioactivity above natural background exceeds a peak concentration of 1 derived air concentration (DAC) or 12 DAC-hours during the hours a worker is present during one week.
As Low As Reasonably Achievable (ALARA) – An approach to radiological control or a process to manage and control exposures to the work force and to the general public at levels as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations.
Bioassay – Measurement of radioactive material deposited within or excreted from the body. This process may include whole body and organ counting as well as collection of urine and fecal samples.
Contaminated Area – An area in which radioactive contamination is present that exceeds removable levels presented in Table 3.

Controlled Area – An area to which access is controlled in order to protect personnel from exposure to radiation and radioactive materials. An area in which the existing or potential radiation and radioactivity levels are above normal background but are less than that designating a radiological area or a restricted area.

Derived Air Concentration (DAC) – The concentration of a radionuclide in air that, if breathed over the period of a work year (2000 hours), would result in the annual limit on intake being reached.

Disintegration per Minute (dpm) – The rate of emission by radioactive material as determined by correcting the counts per minute observed by a detector for background, efficiency, and counting geometry associated with the instrument.

Dose – A generic term for the amount of energy deposited in body tissue due to radiation exposure. Technical definitions for dose terms necessary for various exposure calculations and recordkeeping purposes include the following:

Absorbed Dose (D) – Energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest in that material. The units of absorbed dose are the rad and the gray (Gy).

Dose Equivalent (H_T) – The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and Sievert (Sv).

Effective Dose Equivalent (H_E) – The sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (W_T) applicable to each of the body organs or tissues that are irradiated (H_E= SWTxHT).

Committed Dose Equivalent ($H_{T,50}$) – The dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by a person during the 50-year period following the intake.

Committed Effective Dose Equivalent ($H_{E,50}$) – The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues ($H_{E,50}=\Sigma w_T x H_{T,50}$).

Total Effective Dose Equivalent (TEDE) – The sum of the deep dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Total Organ Dose Equivalent (TODE) – The sum of the deep dose equivalent (for external exposures) and the committed dose equivalent to an individual organ or tissue (for internal exposures).

Fixed Contamination – Radioactive material that cannot readily be removed from surfaces by nondestructive means such as causal contact, wiping, brushing, or washing.

Frisking – Process of monitoring personnel for contamination.

Hazardous Work Permit (HWP) – Permit that identifies Hazardous conditions and health and safety hazards, establishes worker protection and monitoring requirements, and also contains specific approvals for radiological work activities. The HWP serves as an administrative process for planning and controlling radiological work where a Hazardous and informing the worker of the radiological, health, and safety issues.

Health Physics – The practice of radiological protection or radiation safety.

High Radiation Area – An area, accessible to personnel, in which radiation levels could result in a person receiving a dose equivalent to or in excess of 100 mrem in 1 hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

Internal Dose – The portion of the dose equivalent received from radioactive material taken into the body.

Occupational Dose – The dose received by a person during employment in which the person's assigned duties involve exposure to radiation and to radioactive material. Occupational dose does not include dose received from background radiation, as a patient from medical practices, from voluntary participation in medical research plans, or as a member of the public.

Optically Stimulated Luminescence Dosimeter (OSL) – Radiation detection and measuring device used to record the radiological exposure of personnel or area to certain types of radiation.
Personnel Dosimetry – Devices designed to be worn by a single person for the assessment of dose equivalent such as film badges, optically stimulated luminescence dosimeters, thermoluminescent dosimeters, and pocket ionization chambers.
Personnel Monitoring – Systematic and periodic estimate of radiation dose received by personnel during work hours.
Radiological Work Permit (RWP) – Permit that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approvals for radiological work activities. The RWP serves as an administrative process for planning and controlling radiological work and informing the worker of the radiological, health and safety issues.
Radioactive Material Area – A controlled area or structure where radioactive material is used, handled, or stored.
Radiation – Ionizing radiation that includes alpha particulate, beta particulate, X-rays, gamma rays, neutrons, and other particulates capable of producing ions.
Radiation Area – An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent or in excess of 5 mrem in 1 hour at 30 cm from the source of radiation or from any surface that the radiation penetrates.
Radiological Controlled Areas (RCA)- Includes Radioactive Materials Areas, Radiation Areas, Contamination Areas, or Airborne Radioactivity Areas.
Radiological Worker – Worker whose job assignment requires work on, with, or in the proximity of radiation-producing machines or radioactive materials. A radiological worker has the potential of being exposed to more than 100 mrem per year, which is the sum of the dose equivalent from external irradiation and the committed effective dose equivalent from internal irradiation.
Removable Contamination – Radioactive material that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing.
Survey – An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other source of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and measurements or calculations of levels of radiation, or concentrations or quantities of radioactive material present.
Unrestricted Area – An area designated by the Nuclear Regulatory Commission (NRC) or Agreement State as being an area to which access is neither limited nor controlled by an NRC or Agreement State licensee.

3.3 RESPONSIBILITIES

3.3.1 LATA Project Manager

The LATA Project Manager (PM) will be responsible for:

- Overall radiological safety of the public and occupational workers.
- Reviewing each scope of work to identify potential radiation risks and hazards.
- Designating a Site Radiation Safety Officer (RSO) and arranging for employees on the project to receive appropriate radiation safety training.
- Ensuring that employees working on the project are monitored for radiation exposures as is required by applicable regulation(s).
- Assessing and controlling risks to employee and public health and safety from site activities.
- Maintaining routine housekeeping at the site to ensure safe and efficient working conditions and environment.

The PM will ensure that all employees are knowledgeable of applicable radiological safety requirements for their work area and compliance with these requirements. PMs emphasize the need for high standards for radiological control through direct communication, support of radiation control goals and a presence in the workplace.

3.3.2 Site Radiation Safety Officer/Health Physicist

The Site Radiation Safety Officer/Health Physicist (RSO) will be responsible for:

- Coordinating implementation of the Radiological Safety Plan (RSP).
- Developing and administering the RSP incorporated into the Interim Remedial Measures (IRM) HASP and associated standard operating procedures.
- Conducting appropriate radiation safety training for employees.
- Evaluating potential site/employee radiation exposure.
- Recommending necessary workplace and administrative controls.
- Issuing Radiation Work Permits, as necessary(see Section 6.2).
- Administrating the personnel monitoring program.
- Arranging for each individual's monitoring results to be sent to the individual and employers as appropriate.

3.3.3 Radiation Technicians

Radiation Technicians provided by Greater Radiological Dimensions, Inc. GRD will be responsible for assisting the RSO in the implementation of radiological controls on each site. Specific responsibilities will include:

- Performing radiological surveys.
- Collecting samples and smears.
- In conjunction with the RSO, assessing radiological hazards during work evolutions and making adjustments to ensure that worker radiological exposures and potential releases to the environment are maintained ALARA.

Qualifications of Radiation Technicians will be reviewed by the RSO to ensure that the level of expertise is commensurate with the assigned duties.

3.3.4 Employees

Employees will be responsible for understanding radiological protection requirements for their work areas and for complying with these requirements.

4.0 ALARA

4.1 POLICY STATEMENT

All work with ionizing radiation will be conducted in accordance with established good practices in radiation protection, and in all cases, incorporate radiological criteria to ensure safety and maintain radiation exposures ALARA. The primary method to maintain exposure ALARA will focus on the use of established work practices and engineering controls following the use of administrative and procedural requirements.

4.2 ADMINISTRATIVE IMPLEMENTATION PROCEDURES AND ENGINEERING CONTROLS

The following minimum steps will be implemented for maintaining radiation exposures ALARA.

- Estimate radiation exposure and use the estimate to set project ALARA dose goals.
- Review actual radiation exposures and compare with projected dose values.
- If necessary, make adjustments to the administrative and engineering control in place.

- Implement engineering controls to minimize the spread of activity.
- Radiological training and monitoring requirements.

5.0 EXPOSURE LIMITS

5.1 ADMINISTRATIVE GOALS

Administrative goals for radiological protection performance will be established. These limits are more conservative than regulatory limits, commensurate with the work plan and level of hazard, and in accordance with the ALARA principle. The annual radiological goals include (not to exceed):

- Maximum individual total effective dose equivalent – 100 mrem;
- Maximum embryo/fetus total organ dose equivalent for a declared pregnancy – 100 mrem; and
- Maximum total effective dose equivalent to a member of the public, or visitor (excluding background radon and thoron) – 50 mrem.

5.2 OCCUPATIONAL EXPOSURE LIMITS

The occupational exposure to employees performing the duties of radiological workers will be controlled so that the limits in Table 1 are not exceeded in one year for this project. Measures will be taken to maintain doses as far below these limits as reasonable achievable through use of administrative goals, engineering controls, and application of the ALARA process. Radiation exposure from normal background, therapeutic and diagnostic medical radiation, and voluntary participation in medical research plans will not be included in the determination of occupational exposure. Planned special exposures will not be required.

Table 1. Occupational Dose Limits

Category	Greenpac Administrative Limit		10 NYCRR Part 16 Limit	
	mrem/yr	mSv/yr	mrem/yr	mSv/yr
Total Effective Dose Equivalent	100	1	5,000	50
Total Organ Dose Equivalent	1,000	10	50,000	500
Lens of Eye Dose Equivalent	300	3	15,000	150
Shallow Dose Equivalent	1,000	10	50,000	500
Embryo/Fetus	100/gestation	1/gestation	500/gestation	5/gestation
Minor	Not Allowed	Not Allowed	500	5
General Public (See comment above)	100	1	100	1

5.3 EMBRYO/FETUS EXPOSURE LIMITS

The occupational dose equivalent limits applicable to the embryo/fetus are detailed in Table 1, and apply to a "declared pregnancy." In such a case, a woman may elect to voluntarily declare the pregnancy and limit the dose received by the embryo/fetus as provided in regulatory requirements. In this case, the dose equivalent goal for the embryo/fetus, from the period of conception to birth from occupational exposure, will be no more than 100 mrem, an administrative limit significantly lower than the regulatory limits. The expected duration of the project and relatively low anticipated doses indicate that there will not be a

significant potential dose to a pregnant worker exceeding regulatory limits. If the dose equivalent has exceeded 500 mrem at the time the pregnancy is declared, based on doses from other projects, steps shall be taken to ensure that additional occupational exposure does not occur. The Voluntary Declaration of Pregnancy shall be documented. Occupational exposure to an individual who has declared pregnancy will not be allowed until the RSO documents an embryo/fetus dose of record upon declaration, based on the individual's declaration of the date the pregnancy began. If the dose from prior exposure exceeds the administrative limit, the individual will be restricted from performing work involving exposure to radiation and radioactive materials. Any declared pregnancy may be voluntarily undeclared, in writing, to withdraw a pregnancy declaration.

5.4 MINOR EXPOSURE LIMITS

Individuals under 18 years of age will NOT be allowed to work on site where there is the potential for occupational exposure to radiation. There are no exceptions to this requirement.

5.5 MEMBERS OF THE PUBLIC EXPOSURE LIMITS

The annual exposure limit for any member of the public shall be limited to 100 mrem total effective dose equivalent, regardless of whether the individual is inside or outside of a controlled area. The dose equivalent in any unrestricted area from external sources (other than natural background) will not exceed 2 mrem in any one hour or 50 mrem per year, regardless of occupancy by a member of the public.

5.6 AIR AND LIQUID EFFLUENTS

The release of radioactivity in air or liquid effluents to unrestricted areas will be monitored and controlled in accordance with the requirements of 10 NYCRR Part 16. The Greenpac project will limit air emissions by controlling fugitive dust (see detailed discussion below in section 6.4, *Action Levels*). Liquids from decontamination will be contained to prevent release to off-site waters. Records of air monitoring, radioactive effluent monitoring, and/or modeling will be generated and maintained to demonstrate compliance with effluent limitation requirements.

6.0 CONDUCT OF RADIOLOGICAL WORK

6.1 PLANNING

Engineering controls will be implemented at the Site to minimize the spread of contamination and limit the potential uptake by, and direct exposure to workers. This will principally involve mitigation of dust generation, as discussed in Section 5.6. Contamination reduction and establishment of controlled access zones will also be used to limit radiological exposures.

6.2 RADIOLOGICAL AND HAZARDOUS WORK PERMITS

Radiological Work Permits (RWPs) will be used to inform workers of area radiological conditions and entry requirements, and to provide a mechanism to relate worker exposure to specific work activities. Radiological requirements may be combined with other, non- radiological requirements, into a single Hazardous Work Permit (HWP). Implementation of a work permit plan will have the following requirements:

- RWPs/HWPs will be written based on radiological survey data that characterize the expected work conditions.
- RWPs/HWPs will detail the work area and activity that are within their scope and will specify required conditions for protective measures, including dosimetry, air sampling, PPE, respiratory protection, work area preparation, and health physics oversight.
- RWPs/HWPs will be reviewed and approved by the RSO. Modifications to existing RWPs/HWPs will require the concurrence of the RSO or designee.

- RWPs/HWPs will be posted in a conspicuous area (if possible, they will be posted at the access point to the applicable radiological work area).
- Workers will acknowledge by signature that they have read, understand, and will comply with the RWPs/HWPs prior to initial entry to the area and after any revisions to the RWPs/HWPs.
- RWPs/HWPs will be updated if radiological conditions change to the extent that protective requirements need modification.

6.3 CONTROL ZONES

6.3.1 Access/Egress Procedures

Only appropriately trained, authorized, and qualified personnel will be permitted access to radiological controlled areas. The degree of control will be commensurate with the existing and potential radiological hazards within the area and may include, for example, signs and barricades, entrance ways locked against ingress, control devices or alarms, or administrative controls. The establishment of High or Very High Radiation Areas is not anticipated for this project, however additional access control measures for High and Very High Radiation Areas will be established in accordance with 10 NYCRR Part 16, as appropriate. The controls will be established so that rapid egress from the controlled area in an emergency is not hindered. Control measures and established procedures will incorporate a RWP/HWP system to ensure appropriate planning, control, hazard communication, and documentation of work activities in Radiological Controlled Areas (RCA) that include Radioactive Material Areas, Radiation Areas, Contamination Areas, or Airborne Radioactivity Areas. Task-specific RWP/HWP's will be used for short-term work in these RCAs with the potential for changing radiological conditions. General RWP/HWP s may be used for longer term activities in RCAs with known, stable radiological conditions.

Personnel frisking and/or monitoring will be conducted before exiting radiologically contaminated areas and other areas where contamination is suspect. If the instruments, usually a pancake-type Geiger-Mueller probe and ratemeter with a nominal efficiency of ten percent, indicate greater than 100 cpm above background for beta-gamma radiation emissions, a Radiation Technician will be contacted for evaluation and/or decontamination of personnel.

6.3.2 Posting and Labeling

The standard radiation symbol (ANSI N2.1/12.1) in magenta or black on a yellow background (or alternate as provided by regulations) will be used to warn individuals of the presence of radiation and/or radioactive material. Each access point to a controlled or restricted area will be posted with the appropriate identification and instructions. For controlled or restricted areas, each area will be posted as detailed in Table 2. For the Greenpac Site, only the postings for a Contaminated Area or a Radioactive Material Area are expected to be required.

Table 2. Posting Requirements

Posting Sign	Definition
Caution Radiation Area	5 mrem in 1 hour at 30 cm
Caution or Danger High Radiation Area	100 mrem in 1 hr at 30 cm
Grave Danger Very High Radiation Area	500 rads in 1 hr at 1 m
Caution Contaminated Area	Removable radioactive contamination (Ref. Table 3)
Caution or Danger Airborne Radioactivity Area	>1 DAC or 12 DAC-hours/week

Posting Sign	Definition
Caution or Danger Radioactive Material	Radioactive material handled, used or stored
NY Form DOH-2482, Notice to Employees	Posted in a location visible to all employees

6.4 DOSE ASSESSMENT

The radionuclides of concern and their concentrations at the Site, identified through soil analysis from Analytical Report ARSI-11-01761, are presented in Table 3.

Table 3. Soil Sample Results

Isotope	Concentration (pCi/g)			
	Sample ID			Average
	001	002	003	
K-40	5.644	8.246	5.988	6.626
Tl-208	0.116	0.157	0.102	0.125
Pb-210	2.405	2.752	4.377	3.178
Bi-212	0.336	0.609	0.225	0.390`
Bi-214	2.733	3.959	6.092	4.261
Pb-214	3.396	3.583	6.916	4.632
Ra-226	6.219	6.69	12.574	8.494
Ra-228	0.322	0.587	0.324	0.411
Th-228	0.382	0.44	0.385	0.402
U-235	<MDC (0.179)	0.269	0.427	0.292

For the Site, two methods of exposure have been evaluated. First is the direct exposure from the contaminated soil. The second pathway evaluated is the potential for exposure due to excavation activities creating fugitive soil dust in the work area.

Direct exposure from contaminated soil, using the radionuclide concentration averages in Table 3, has been estimated using the Dose Coefficients for contaminated soil contained in Federal Guidance Report No. 12, entitled EXTERNAL EXPOSURE TO RADIONUCLIDES IN AIR, WATER, AND SOIL (EPA-402-R-93-081, commonly called FGR-12). The coefficients used are for a nominal soil density, taken from FGR-12, of 1.6E3 Kg/m^3 and a conservative assumption was made that the depth of contamination was “infinite” (Table III.7). The infinite depth table is preceded by a table with the depth assumption of contamination to be 15 cm which, based on available site history, was not considered to reflect potential contaminant conditions at the site.

The soil contaminants, conservatively ignoring the fact that, as the remediation proceeds, the available mass of radionuclides contributing to exposure will decrease, will contribute approximately 11 mrem of occupational exposure over the course of a 2080-hour work year. This level will decrease as material is removed, segregated, and controlled for disposal.

Exposure resulting from contaminated soil as fugitive dust in the air was evaluated at a limit of 5 mg/m^3 of dust loading in the breathing zone. The estimate used Dose Coefficients for air immersion contained in FGR-12. A continuous work zone fugitive dust load of 5 mg/m3 will contribute approximately 57 mrem of occupational exposure over the course of a 2080-hour work year.

The total occupational worker exposure estimate over a work year is about 68 mrem which is well below the administrative limit of 100 mrem for this project.

7.0 MONITORING

7.1 PERSONNEL MONITORING

7.1.1 Internal Dosimetry

Personnel are not anticipated to have the potential for significant uptakes of radioactive materials (greater than the personnel monitoring threshold of a committed effective dose equivalent in excess of 500 mrem). Therefore, a radiological bioassay program will not be implemented for this project. Prior to allowing a radiological worker to start work in a controlled area, a 24 hour urine sample will be taken and stored. This will be a baseline sample, if needed. After the project is complete, or at the discretion of the RSO, an additional 24 hour urine sample will be taken. If air sampling results indicate the airborne activity in the work area is or was elevated during the project the urine sample will be analyzed for the appropriate radionuclide(s).

7.1.2 External Dosimetry

Monitoring applies to any individual likely to receive an annual external whole body exposure in excess of ten percent of the occupational limit (500 mrem). Though individual doses are not expected to reach levels of 500 mrem on this project (and the administrative goal is less than 100 mrem), whole body dosimetry will be implemented as a good practice. All personnel dosimetry used will be processed and evaluated by a processor holding a current accreditation under the National Voluntary Laboratory Accreditation Plan (NVLAP) of the National Institute of Standards and Technology (NIST).

7.1.3 Summation of Internal and External Exposures

Internal committed effective dose equivalents and external effective dose equivalents during the year will be combined to determine the annual total effective dose equivalent in accordance with the requirements of federal and state regulations. Generally, summation will be required when intakes exceed ten percent of the annual limit on intake, may result in a total effective dose equivalent of 50 mrem for visitors, or a dose equivalent of 50 mrem to the embryo/fetus for declared pregnant women. The deep dose equivalent to the whole body may be used as the effective dose equivalent for external exposures.

7.1.4 Medical Surveillance

Other than baseline and possible follow up urine sampling as discussed in Section 7.1.1 and medical qualification for respirator use discussed in Section 8.2, no specific medical surveillance requirements exist for exposure to radiation levels at occupational levels. General medical surveillance requirements for all hazardous waste sites are contained in the project HASP.

7.15 Overexposure

All cases of overexposure and suspected ingestion or inhalation of radioactive materials must be reported to the RSO immediately. The LATA Sr. Environmental Engineer, in consultation with the Occupational

Medicine Specialist, will advise the RSO on the type(s) of test(s) required to accurately assess exposure effects if necessary.

7.2 WORKPLACE MONITORING

7.2.1 Surveys

Radiological monitoring and surveys of radiation exposure levels, contamination, and airborne radioactivity will be conducted to:

- Characterize workplace conditions and detect changes in those conditions;
- Verify the effectiveness of physical design features, engineering and process controls, and administrative control procedures;
- Demonstrate regulatory compliance;
- Detect the gradual buildup of radioactive material;
- Identify and control potential sources of personnel exposure; and
- Identify areas requiring postings.

Monitoring will be performed only by trained and qualified personnel and will be conducted as specified by the project RSO.

Minimally, radiological surveys will be conducted:

- Once per shift at entrance or exit points, between contamination areas and clean areas;
- Daily in RCAs;
- Weekly in radiation and/or contamination areas; and
- Weekly in clean areas.

7.2.2 Air Sampling

General area and personal air sampling will be conducted in accordance with the guidance in NRC Regulatory Guide 8.25. Air sampling will be employed when necessary to determine whether confinement or suppression of radioactive material is effective, to determine required workplace administrative controls, to estimate worker intakes, and to determine what personal protective equipment (PPE) is appropriate.

General area and/or perimeter air sampling for airborne radioactivity will be conducted with low-volume air samplers F and J Model LV-1 or equivalent (0-100 lpm). The low-volume samplers will use 47mm filters and will be counted on a Ludlum model 2929 sample counter or equivalent, for alpha and beta immediately to determine any excessive levels. The filters will be changed daily. Following a 5 day hold time for radon decay, where the potential for airborne radioactivity is above background levels, the sample will be counted again to determine the actual activity without radon progeny contribution.

High-volume air samplers are those with sufficient flow rate to achieve a minimum detectable activity (MDA) of 10% of the applicable DAC in an 8-hour shift. Air sample filters will be analyzed on site for gross alpha and gross beta in accordance with written procedures. In work zones with a potential for short-term airborne excursions, representative breathing zone samples will be collected in the immediate vicinity of work being performed to determine whether the area is an airborne radioactivity area requiring additional work controls or to assess the worker's intake of airborne radioactive materials.

When required to estimate worker intakes, representative personal air sampling from a member of each field team working in radiologically contaminated areas will be conducted for airborne radioactivity in the breathing zone. The data will be compared with the DACs that are the most conservative for the

contaminant(s) expected to be present to gauge employee exposure potential. DACs for radioactive contaminants in Appendix C to 10 NYCRR 16 will be used to assess exposure potentials, as appropriate.

7.3 RELEASE OF MATERIALS FROM CONTAMINATION AREAS

Radiological contamination survey, documentation, and labeling requirements will be established for all property/material released from an RCA. All equipment, materials, and property used in an RCA established for contamination control will be considered as potentially contaminated and will not be released to an uncontrolled or unrestricted area until they have been surveyed and meet the unconditional release limits listed in Table 4 below.

Table 4. Surface Radioactivity Release Limits/ Acceptable Surface Contamination Levels				
Application	***Alpha (dpm/cm^2)***		***Beta/Gamma[1]***	
	Total	***Removable***	***Total (mR/hr)***	***Removable (dpm/cm^2)***
Controlled Area				
Basic guide	25,000 Max. 5,000 Av.	500	1.0	5,000
Clean area	1,000	100	0.5	1,000
Non-controlled Area				
Skin, personal clothing	500	ND[2]	0.1	ND[2]
Release of material or facilities	2,500 Max. 500 Av.	100	0.2	1,000

[1]Measured at 1 cm from the surface
[2]ND – Non-Detectable

Source: 10 NYCRR 16, Appendix 16-A, Table 7

7.4 INSTRUMENT CALIBRATION

Radiation detection instrumentation will be provided as appropriate for performing necessary surveys and monitoring. The instrumentation will be selected based upon the type of radiation detected, MDA measurement capability, and range in accordance with the radiological hazards present or anticipated for the project.

Calibration of radiological instruments and equipment will be performed by the manufacturer or a calibration service in accordance with ANSI N323 - 1997 using standards traceable to the NIST primary standards. The calibration certificate will be available at the site and maintained by the RSO.

Field calibration of counting/analysis instrumentation in accordance with approved written procedures is authorized if it meets the above requirements and the source calibration certificate and documented detection efficiency determination are maintained in the site-specific project file. Each instrument or piece of equipment will have a calibration sticker with an expiration date affixed.

At a minimum, performance tests of radiological instruments will be conducted daily before use, and at the end of the day. Satisfactory performance test results will be within ± 10% of the expected response. Instruments that do not meet performance test criteria, are found to be out of calibration, or are defective, will be removed from service until repaired and/or calibrated. The results of these checks will be recorded in a daily source check log by the performer and will be maintained in the project file. All performance tests will be conducted in accordance with approved written procedures.

8.0 PERSONNEL PROTECTIVE EQUIPMENT

8.1 USE AND SELECTION OF PROTECTIVE CLOTHING

PPE will be selected based on the contamination levels in the work area and the anticipated work activity, ALARA and safety considerations, and consideration of non-radiological hazardous materials that may be present. Surfaces are considered radiologically contaminated if above Table 4 levels. PPE provided will be in good condition and free of chemical or radioactive contamination and may include the following items at the discretion of the RSO:

- Full Set Coveralls (Tyvek ® or cotton)
- Cotton glove liners
- Rubber or chemical resistant gloves
- Shoe covers
- Protective overshoes
- Hood (Tyvek ® or cotton)

Protective clothing and equipment selected for project tasks will be described in the HASP, together with procedures for donning and removing PPE without spreading contamination or contaminating the worker. The necessary PPE for a task will be specified by the RWP.

8.2 USE AND SELECTION OF RESPIRATORY PROTECTION DEVICES

LATA's documented respiratory protection program details specific procedures for respiratory usage, fit, cleaning, and so forth.

Engineering control measures will be provided to limit the concentrations of radioactivity in air to levels below those that constitute an airborne radioactivity area to the extent feasible. When this level is not feasible, other methods such as administrative controls and respiratory protection will be employed to limit the potential for intake of radioactive material.

Only respiratory protection equipment that is tested and certified by the National Institute for Occupational Safety and Health (NIOSH) will be used. Protection factors listed in 10 NYCRR Part 16 will be used in the assessment of potential radioactive material intake. Selection of appropriate respiratory protection devices will be designated within either the HASP or the RWP. At a minimum, respiratory protection devices will be selected so that a protection factor greater than the multiple by which peak concentrations or airborne radioactivity exceed the values specified in 10 NYCRR Part 16 is not exceeded.

Only respiratory protection equipment that has been specifically certified for emergency use by NIOSH/Mine Safety and Health Administration (MSHA) will be used as emergency devices.

Whenever respiratory protection will be used at a site, the following additional minimum requirements will be met:

- Air sampling will be performed to identify the potential hazard, permit proper equipment selection, and estimate exposures.
- Surveys and bioassays, as appropriate, will be performed to evaluate actual intakes.
- Respirators will be tested for operability immediately prior to each use.

- Written procedures will be available regarding selection, fitting, issuance, maintenance, medical testing and testing of respirators (including testing for operability prior to each use), supervision and training of personnel, monitoring (including air sampling and bioassays), and recordkeeping.

9.0 RADIOACTIVE MATERIAL ACCOUNTABILITY AND CONTROL

All procurement, receipt, and storage of radioactive material (instrument check sources, analytical calibration standards, etc.) will be coordinated with the individual or organization responsible for radiation protection at the project site. A source custodian and documented inventory record will be established and maintained for radioactive sources. All sources brought on site by external organizations will not be allowed into areas under company control without prior notification and approval by the RSO or organization responsible for radiation protection. Radioactive materials licenses will be required for sources that exceed exempt quantities.

Transportation of radioactive material (specific activity greater than the nuclide-specific values in 49 CFR 173.436) in commerce, generally off site, will be in accordance with Department of Transportation (DOT) requirements in 49 CFR 170 through 180, and other federal, state and local regulations, as applicable.

10.0 DECONTAMINATION

10.1 PERSONNEL

The guideline for determining the presence of skin contamination on personnel is any detectable radiological contamination above background.

If necessary, decontamination of personnel will be performed only under the direct supervision of the RSO. Generally, dry, nonabrasive methods will be attempted first and, if necessary, may be followed by washing with mild soap and warm water. Material generated during decontamination, including wipes, tape, and water, will be collected and disposed as radioactive waste. Specific decontamination procedures and documentation requirements shall be under the direction of the RSO.

10.2 EQUIPMENT

Surface contamination levels presented in Table 4 will be used to determine if a piece of equipment is contaminated with radioactive materials. When decontamination is necessary, decontamination will be performed using techniques that are appropriate based on site-specific conditions. Generally, dry decontamination methods such as high-efficiency particulate air (HEPA) vacuuming or wipe-downs are preferred when facilities for the collection of radiological contaminated wastewater are not in place. If adequate facilities exist for the collection of such fluids, it may be appropriate to use a wet decontamination technique. Additional decontamination methods in extreme conditions include sand or other abrasive blasting. Specific decontamination procedures and decontamination requirements shall be under the direction of the RSO.

11.0 WASTE MANAGEMENT

TENORM is the waste material expected to be generated during this project. Materials suspected of being mixed waste (RCRA/TSCA/etc. hazardous substances combined with radioactive materials) will be identified and segregated as soon as practical to avoid combining mixed waste with other waste forms. While the scope of this waste minimization will be commensurate with the level of radioactive materials present and activities conducted at each site, at a minimum, the following guidelines will be used:

- Removal of excess/unnecessary packaging material prior to bringing materials into radiological controlled areas;
- Restriction of materials entering radiological areas to those materials necessary for performance of work;
- Restriction of the quantities of hazardous materials, such as paints, solvents, chemicals, cleaners, and fuels, entering radiological areas;
- Substitution of reusable items in place of disposable ones, when practical;
- Selection of consumable materials such as PPE that is compatible with waste processing systems, volume reduction, and waste acceptance criteria;
- Survey of potentially contaminated material leaving controlled areas to separate uncontaminated materials from contaminated materials; and
- Emphasis on waste reduction methodologies in training.

Additional waste minimization procedures and/or requirements may be identified in each site specific work plan and will be commensurate with the levels of radioactive materials present and activities being performed. A separate waste management plan shall be prepared for the Site.

12.0 EMERGENCY PROCEDURES

Details on the site-specific emergency procedures are provided in the HASP. All site personnel will be instructed in their emergency responsibilities and the emergency procedures. An emergency hospital is identified in the HASP and maps to this facility are readily available.

13.0 TRAINING

Training will be provided to general employees, radiation workers, and radiological control staff at the project Site. Annual retraining for Radiological Worker qualification is required specific to operations at this Site. All formal training under the RSP will verify individual knowledge by an appropriate examination. Documentation of training will be generated containing the individual's name, date of training, topic(s) covered, pass or fail, and the name of the certifying official. An employee will not be permitted to independently perform tasks inside of a radiological controlled area until the appropriate training and qualification requirements are met.

Additional training requirements will be determined on a site-specific basis and will be commensurate with the radiological hazards present on each site. These additional requirements will be determined and documented by the RSO.

13.1 RADIOLOGICAL WORKER TRAINING

At a minimum, all personnel entering an area where radioactive material or radiation generating devices are used, and where there is a potential for an individual to receive a Total Effective Dose Equivalent (TEDE) of 100 mrem or more in one year, will receive the following training:

- **Radiological Fundamentals** – Atomic Structure, Definitions and Units of Measure, the Four Basic Types of Ionizing Radiation, Units of Measure for Radiation.
- **Biological Effects** – Sources of Radiation, Effects of Radiation on Cells, Acute and Chronic Radiation Dose, Prenatal Radiation Exposure, Risks in Perspective.
- **Radiation Dose Limits** – Basis for and Purpose of Radiation Dose Limits and Administrative Control Levels, Dose Limits and Administrative Control Levels.
- **ALARA Program** – ALARA Program, Responsibilities for the ALARA Program, External and Internal Dose Reduction, Radioactive Waste Minimization.

- **Personnel Monitoring Programs** – External Dosimetry, Internal Monitoring, Methods for Obtaining Radiation Dose Records.
- **Radiological Access Controls and Postings** –Radiological Work Permits, Radiological Postings, Requirements for entering, working and exiting Radiological Control Areas.
- **Radioactive Contamination** – Types & sources of contamination, Contamination control methods, Contamination monitoring equipment, Decontamination.
- **Radiological Emergencies** – Emergency Alarms and Responses, Radiological Emergency Situations, Considerations in Rescue and Recovery Operations.
- **Practical Factors for Radiological Workers** – Review an Appropriate Radiological Work Permit (RWP); Record the Appropriate Information on the RWP; Select and Don, Wear and Remove Required PPE and Dosimeter(s); Enter Simulated Area and Demonstrate ALARA Techniques; Monitor for Contamination; Respond to Emergency Situations or Abnormal Radiological Situations; and Personal Frisking on Exit from Controlled Area.

Evidence of similar training completed within the past year will be accepted in lieu of new training. Site specific training will be provided.

13.2 General Awareness Training

General employees who are not radiological workers but may be involved in an occasional or indirect manner with radioactive material or activities supporting decontamination and decommissioning (D&D) efforts will receive training specific to the Site activities. This training may be similar in content to the Radiological Worker training but will not require a practical exercise.

13.3 Visitors

Visitors to the site will be provided with a handout that summarizes the necessary radiation training and this will be documented by the RSO or designee. Visitors will not be allowed unescorted access to radiation areas.

14.0 AUDITS

Because of the short duration of this project, the normal requirement for an internal audit of the field implementation of this RSP to be conducted at least once per year by the RSO will not be required. Should conditions at the site change significantly this requirement may be reconsidered by the Site RSO or LATA corporate RSO. Evidence of the annual audit conducted in support of the LATA NRC radioactive materials license is available to the RSO and project personnel. Audit findings are reported in writing to appropriate personnel and agencies.

15.0 RECORDS MANAGEMENT

RSP records will be maintained to document compliance with regulatory requirements and the exercise of due diligence in the control of radiological hazards for the protection of employees, members of the public, and the environment. These records will be transferred to the project file at the conclusion of the project.

At the completion of Site activities, copies of exposure monitoring records will be sent to the individuals monitored and their employers where appropriate. LATA employees will have copies also sent to the LATA Corporate Health Officer for inclusion into each respective employee's medical file. Exposure monitoring records for subcontract personnel will be transferred to each respective subcontract organization. Monitored individuals will be provided with a copy of their radiation monitoring results, consistent with the requirements of to 10 NYCRR 16.13(e). Upon completion of work at a site, exposure

data pursuant to the 10 NYCRR 16.13(e) requirements will be provided for LATA employees only. Subcontract personnel will be required to make requests for exposure records directly to their respective employer.

Exposure records that are maintained by LATA will be maintained in a manner consistent with applicable Privacy Act requirements. The records will be available for retrieval until termination of the LATA license. All quantities used in the records will be in special units of curie, rad, or rem, including multiples and subdivisions of these units.

Records identified with an individual's name or identifying number will be available upon request from that individual.

Records to be maintained include the following (as available):

- Doses received by individuals, for whom monitoring was required, during previous employment;
- Doses received by individuals for whom monitoring was required;
- Dose assessments for individuals for whom bioassay was performed;
- Doses to the embryo/fetus of a declared pregnant employee;
- Written declarations of pregnancy;
- Written withdrawal of declaration of pregnancy;
- Results of surveys for radiation and radioactive material in the workplace and outside of controlled or unrestricted areas as required by regulatory requirements or the radiation protection program;
- Results of surveys for the release of material or equipment to uncontrolled or unrestricted areas;
- Records of effluents and radioactive waste disposal under control;
- Results of calibrations performed on radiological instruments and quality control;
- Checks for radiological instrumentation and personal monitoring devices;
- Records of ALARA evaluations and control actions;
- Records of radiological training completed, including general employee radiological
- training;
- Records of internal reviews and audits with corrective actions closeout; and
- Records of regulatory agency inspections and audits with corrective actions closeout.

Interim storage of the above radiological records will be the responsibility of the RSO and will be maintained in a readily retrievable, controlled manner. Upon completion of each site project, and upon request, copies of all radiation exposure records will be made available to appropriate parties.

Records associated with radiation surveys and measurements performed to support activities associated with D&D of a site and equipment are:

- Name of the person making the evaluation and recording the results;
- Date of the survey;
- Instrument serial number used for surveys and measurements;
- Results obtained; and
- Applicable review.

LATA will record contamination levels observed and procedures followed for incidents involving contamination of individuals. The record should include name of individuals involved, description of work activities, calculated dose, probable causes (including root causes), steps taken to reduce future incidents of contamination, times and dates, and the surveyor’s signature.