

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

RADIATION AND CONTAMINATION SURVEY TECHNIQUES

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PROCEDURE/PLAN APPROVAL PAGE

This procedure: Radiation and Contamination Survey Techniques has been reviewed and approved by the following:

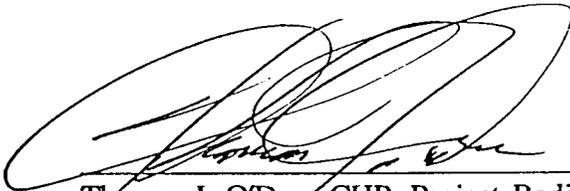
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RADIATION AND CONTAMINATION SURVEY TECHNIQUES

1.0 SCOPE

This procedure provides guidelines for the performance and documentation of Radiation and Contamination surveys on Allied Technology Group, Inc. field projects.

2.0 PURPOSE

The purpose of this procedure is to specify requirements for consistent general radiological surveys and documentation of acquired data for routine, pre-operation and post-operation surveys as well as job coverage surveys. This procedure is intended to satisfy the requirements of DOE Order 5480.11.9g (3) (b) and 5480.11.9.g (4) (a) (b) (c) and 10 CFR 20.

3.0 REFERENCES AND DEFINITIONS

3.1 References

- 3.1.1 10 CFR 20, Standards for Protection Against Radiation
- 3.1.2 DOE 5480.11, Radiation Protection for Occupational Workers
- 3.1.3 ANSI N3.1 - 1987, Selection, Qualifications and Training of Personnel For Nuclear Power Plants
- 3.1.4 NUREG/CR-5849 -1992, Manual for Conducting Radiological Surveys in Support of License Termination
- 3.1.5 HP-OP-003, Release of Materials from Radiologically Controlled Areas
- 3.1.6 HP-OP-002, Radiological Area Posting and Access Control

3.2 Definitions

- 3.2.1 Activity - The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are disintegrations per minute (dpm), Becquerel (Bq), or micro-Curies for loose contamination and disintegrations per minute or millirad/hour for fixed contamination.
- 3.2.2 Check Source - A sample of radioactive material in which the exact quantity of radioactive material is not known but the type and energy of the emission is known. These sources are used for field qualitative response checks or radiation detection instrumentation. These sources are labelled with a sticker that indicates an

approximate value of the count rate to be expected when performing a qualitative response check.

- 3.2.3 Contamination - Deposition of radioactive material in any place it is not desired, particularly where its presence may be harmful. The harm may be actual exposure to individuals or release of the material to the environment or general public. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.
- 3.2.4 Controlled Area - Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.
- 3.2.5 Fixed Contamination - Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslin.
- 3.2.6 Minimum Detectable Activity (MDA) - For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95% confidence level based upon the background count rate of the counting instrument used.
- 3.2.7 Qualitative Response Check - A check of a radiation detection instrument in which the performance of the instrument is checked against a check source for response only.
- 3.2.8 Quantitative Response Check (Performance Test) - A check of a radiation detection instrument in which performance of the instrument is checked against a reference standard with an acceptance value of $\pm 10\%$ of the reference value.
- 3.2.9 Reference Standard - A sample of radioactive material, usually with a long half-life, in which the activity and the type of emission is known and is N.I.S.T. traceable. These standards are used for calibration and quantitative source checks (Performance Test) of radiation detection instruments.
- 3.2.10 Transferrable (Loose) Contamination - Radioactive contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslin.
- 3.2.11 Radiation Work Permit (RWP) - A document generated by Health Physics to provide:
- 3.2.11.1 A description and scope of the work to be performed.
 - 3.2.11.2 The existing radiological conditions in the work area.

- 3.2.11.3 The limitations placed upon the scope of work.
- 3.2.11.4 The maximum radiological limits allowed.
- 3.2.11.5 The protective measures to be employed during the work to protect the worker(s).
- 3.2.11.6 The period of time the RWP is valid.
- 3.2.11.7 Special instructions to workers and Health Physics Technicians during the course of work.
- 3.2.11.8 The proper approvals required to start work.

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

- 4.1.1 Personnel performing surveys in known or suspected contaminated areas should avoid unnecessary contamination of survey instruments by using plastic film coverings and exercise care. Covering the mylar window may decrease the beta and alpha efficiency; avoid covering mylar windows.
- 4.1.2 Exercise care when performing contact measurements with mylar window exposed to prevent damage.
- 4.1.3 Avoid unnecessary exposure when performing surveys by practicing good ALARA practices.
- 4.1.4 The surveyor should be aware of:
 - 4.1.4.1 The operation and limitations of the survey instrument(s) used; refer to the particular instrument's operation and calibration procedure.
 - 4.1.4.2 The anticipated range of radiation and contamination levels in the area to be surveyed.
 - 4.1.4.3 Activities in the area that may have or will change radiological safety conditions.
 - 4.1.4.4 Safety considerations and requirements in effect in the area to be surveyed.

- 4.1.4.5 The nature of the work to be performed in the area the survey is to be performed if the survey is to be used for Radiation Work Permit generation.
- 4.1.5 Radiation surveys used as a basis for Radiation Work Permits or area postings shall be performed by a Health Physics Technician meeting the requirements of Reference 3.1.3 or by an individual not meeting those requirements under the direct supervision of an Health Physics Technician.
- 4.1.6 Equipment or area surveys used to determine radiation and contamination levels for informational purposes only (such as during decontamination to check progress) may be performed by individual's not meeting the requirements of Reference 3.1.3
- 4.1.7 Health Physics Technicians shall follow all applicable RWP and posting instructions when performing radiation and contamination surveys.
- 4.1.8 Health Physics shall leave an area immediately if during the survey the radiation detection instrument in use appears to be malfunctioning or radiological conditions in the area being surveyed change unexpectedly.
- 4.1.9 All material such as smears or other survey materials shall be treated as radioactive material until a survey is performed on the material in question.
- 4.1.10 Sources of radiation smaller than the open window area of an ion chamber instrument may require the use of different beta correction factors. Also, the field beta correction factor and the contact beta correction factor will differ. Refer to the appropriate ion chamber operation and calibration procedure or the calibration sticker for these values.
- 4.1.11 Contact exposure rates shall be measured at a distance of less than one inch from the source of radiation.
- 4.1.12 Thirty-centimeter (~12 inches) readings shall be used as the whole body reading for posting purposes.
- 4.1.13 Prior to entering the area or performing any survey, each radiation detection instrument shall be:
- Battery Checked.
 - Checked for obvious physical damage.
 - Quantitatively response-checked daily prior to use.
 - Checked to ensure the instrument is within current calibration.

If any of the above conditions are unsatisfactory, the instrument shall be tagged out of service and not used.

4.2 Limitations

- 4.2.1 This procedure does not apply to characterization surveys, nor is it intended to alter current or future characterization survey techniques.
- 4.2.2 For exposure rate surveys used to determine RWP requirements, job coverage, or stay times, an ion chamber instrument should be used.
- 4.2.3 The survey techniques described in this procedure do not alter or replace the requirements of Reference 3.1.5.
- 4.2.4 When using cloths (or masslin) to perform large area smears, results shall be reported in disintegrations per minute (DPM) or mrad/hr above background. Do not attempt to quantify the survey area.
- 4.2.5 Radiation and contamination surveys may be used to write RWP's if the survey has been performed within 24 hours of RWP initiation or there is reasonable assurance that conditions have not changed.

5.0 RESPONSIBILITIES

- 5.1 The ATG Radiological Field Operations Manager shall be responsible for:
 - 5.1.1 Implementation of this procedure.
 - 5.1.2 Periodic reviews of adherence to the requirements of this procedure.
 - 5.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.
- 5.2 The Health Physics Supervisors shall be responsible for:
 - 5.2.1 Reviewing and approving data generated by the use of this procedure.
 - 5.2.2 Insuring personnel using this procedure comply with all procedural requirements.
- 5.3 Health Physics Technicians shall be responsible for:
 - 5.3.1 Performing the requirements of this procedure.
 - 5.3.2 Completing all required records and submitting them for review to Health Physics Supervision.

5.4 Junior Health Physics/Decontamination Technicians shall be responsible for:

- 5.4.1 Performing the requirements of this procedure under direct supervision of an Health Physics Technician.
- 5.4.2 Completing all required records under direct supervision of an Health Physics Technician.

6.0 PROCEDURE

6.1 General

- 6.1.1 Radiation and contamination surveys shall be performed on an as-needed basis. The need for performing a survey is identified by the following conditions:
 - 6.1.1.1 An RWP is needed to perform an approved job.
 - 6.1.1.2 A procedural requirement requires a survey.
 - 6.1.1.3 A condition exists where radiological data is needed to form a decision by Health Physics supervision.
 - 6.1.1.4 An investigation is required due to abnormal conditions or indications.
 - 6.1.1.5 An on-going job requires a survey to update radiological postings and/or RWP.
- 6.1.2 Determine the type of survey to be performed and select the proper radiation detection instrument(s) for the survey.
 - 6.1.2.1 Select an instrument capable of detecting the type of radiation to be surveyed.
 - 6.1.2.2 Select an instrument capable of detecting the range of exposure rate or contamination level expected.
 - 6.1.2.3 Select an instrument calibrated to the range of expected emission energy.
 - 6.1.2.4 Select an instrument that has been calibrated for the type of radiation to be surveyed.
- 6.1.3 Review and sign in on the applicable RWP for the area to be surveyed.

- 6.1.4 When entering posted or suspected high radiation areas, or unknown areas, the ion chamber instrument range selector switch shall be selected to the highest range and moved down through the lower ranges until the meter indicates on scale.
- 6.1.5 When surveying for radiation levels using an ion chamber, gamma reading shall be taken with the beta window closed.
- 6.1.6 When surveying for beta radiation levels using an ion chamber, readings shall be taken with the beta window open (OW) and then closed (CW). The beta correction factor (CF) for contact beta readings is listed on the instrument calibration sticker. The beta correction factor for field beta readings (30cm from source) is 1.5.
- Corrected beta dose rate = (OW-CW) X CF**
- 6.1.7 Instruments used to perform radiation and contamination surveys shall be operated in accordance with their operation and calibration procedure.
- 6.2 Standard Health Physics Practices concerning performance of Radiation Surveys.
- 6.2.1 Check out necessary survey instruments and comply with operational procedures of the instrument's operation and calibration procedure.
- 6.2.2 The instrument's operation and calibration procedure may be used to assist in determining necessary survey instruments. Instrument limitations are described in these procedures.
- 6.2.3 General Area Beta/Gamma Radiation Surveys.
- 6.2.3.1 General area surveys are normally conducted to measure only gamma radiation levels. However, when suspected, general area beta radiation levels can be measured with Model-9, RO2, or RO2A (or equivalent) using the field beta correction factor of 1.5 Document all general area beta radiation levels ≥ 1 mrad/HR on the survey form.
- 6.2.3.2 For general area room surveys, hold the instrument detector at waist to chest level, utilizing the highest reading obtained for documentation of survey records and postings. Normally, general area surveys are considered as being greater than 30cm away from relevant components and equipment.
- 6.2.3.3 General area room surveys for RWP's should include accessible areas and positions or levels where personnel will be performing work.
- 6.2.3.4 Survey data should be documented in accordance with Section 6.6 of this procedure.

6.3 Contact Beta/Gamma Radiation Surveys.

6.3.1 Contact surveys should be taken at approximately one inch away from relevant components and equipment.

6.3.1.1 Conduct Beta Radiation surveys:

- (a) On open radioactive systems and exposed contaminated equipment internals.
- (b) Whenever leakage from a radioactive system is in evidence or is suspected to have occurred.

6.3.2 Contact surveys should also be taken on relevant components and equipment which personnel will be likely to contact during the performance of their work.

6.3.3 When conducting contact surveys on surfaces with high levels of exposed surface contamination, obtain an open window reading and a closed window reading to determine the beta contribution.

6.3.3.1 Denote all corrected Beta readings on the survey form.

- (a) True Beta Dose Rate is determined by open window reading minus closed window reading times the beta correction factor of 1.5 for field beta measurements or the contact beta correction factor found on the calibration stickers for contact beta measurements.

6.3.4 Document survey data in accordance with Section 6.6 of this procedure.

6.4 Standard Health Physics Practices concerning Smearable Contamination Surveys.

6.4.1 Smear Surveys

6.4.1.1 Wipe a cloth or paper disc smear over an area of 100 cm². 100 cm² is approximated by a four-inch square or an 18-inch "S".

6.4.1.2 Avoid cross-contaminating the smear samples.

6.4.1.3 Count the disc smears on the appropriate counting equipment. The following guidelines should be used when counting smears.

- (a) The Model-3/44-9 or equivalent should be used for counting smears > 1,000 dpm and smears taken in posted contaminated areas for beta-gamma.

- (b) The Model-3/43-5 or equivalent should be used to count smears obtained from contaminated areas for alpha.
 - (c) All smears taken for the purpose of determining if the item or area smeared is below the posting requirements for loose activity in accordance with Reference 3.1.6, must be counted on instruments capable of detecting 20 dpm alpha and 1,000 dpm beta-gamma (Model-2929).
 - (d) Report results in units of dpm/100 cm² and document in accordance with Section 6.6 of this procedure.
- Smear results >50,000 cpm may be reported in mrad/hr/100 cm².

6.4.2 Large Area Smear Survey (Wipe)

- 6.4.2.1 Large area smears are used to obtain a gross indication of contamination levels in large areas or on pieces of equipment suspected to have contamination present. Large area smears may also be used to check normally clean areas or equipment for presence of contamination.
- 6.4.2.2 Wipe over the surface to be surveyed.
- 6.4.2.3 Count the wipe with a count rate meter equipped with a 44-9 probe or equivalent for beta-gamma and/or a Model-3/43-5 or equivalent for alpha.
- 6.4.2.4 Use the highest reading obtained for reporting results. Results should be recorded in units of dpm/wipe above background.
 - (a) When using wipes to check a clean area, or piece of equipment for contamination; if there is any indication of activity above background on the wipe, the area must be smeared using disc smears in accordance with Step 6.4.1 of this procedure.
- 6.4.2.5 Document results in accordance with Section 6.6 of this procedure.

6.5 Standard Health Physics Practices concerning Fixed Contamination Surveys.

- 6.5.1 Fixed contamination surveys are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys.
- 6.5.2 The Model-3/44-9 or equivalent should be used for fixed contamination surveys for beta-gamma.

- 6.5.3 The Model-3/43-5 or equivalent should be used for fixed contamination surveys for alpha.
- 6.5.4 When surveying for fixed beta-gamma contamination the probe should be held within one-half inch or less from the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.
- 6.5.5 When surveying for fixed alpha contamination the probe should be held within one-quarter inch or less from the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.
- 6.5.6 When performing direct scan surveys of objects, surface areas etc., static readings should be performed frequently to insure the detection of residual activity.
- 6.5.7 When performing free release or characterization surveys 100 % of all accessible areas should be direct frisk surveyed.
- 6.5.8 Use the highest reading obtained for reporting results. Results should be reported in units of net CPM above background or dpm/100 cm².

6.5.8.1 The following formula should be used for converting direct probe readings in CPM to dpm/100 cm² :

$$\text{dpm/100 cm}^2 = \frac{\text{Gross CPM} - \text{Background CPM}}{\text{Instrument Efficiency (Eff. c/d)}} \times \frac{100}{\text{Probe Area (cm}^2\text{)}}$$

6.5.9 Document the results in accordance with Section 6.6 of this procedure.

6.6 Documentation of Surveys

- 6.6.1 All radiation and contamination surveys shall be documented on an Radiological Survey Report ATGF-001.
 - 6.6.1.1 Smears counted with portable instruments shall have the results recorded in the appropriate columns.
 - 6.6.1.2 Drawings shall be included as necessary to clearly explain survey locations.
 - 6.6.1.3 The header of the ATGF-001 shall be complete when turned in for review.
 - 6.6.1.4 All unused blank areas of ATGF-001 shall have N/A entered in the area.

- 6.6.1.5 Survey numbers are obtained from the Radiation/Contamination Survey Log ATGF-034.
- 6.6.1.6 Gamma readings are recorded in mR/hr.
- 6.6.1.7 Corrected beta readings shall be annotated as such.
- 6.6.1.8 Neutron readings shall be annotated as mrem/hr.
- 6.6.1.9 Alpha values shall be annotated with the α symbol.
- 6.6.1.10 Beta values shall be annotated with the β symbol.
- 6.6.1.11 Contact readings shall be annotated with an asterisk.
- 6.6.1.12 30 cm readings shall be annotated with the value underlined.
- 6.6.1.13 Smear locations shall be numbered with the number circled.
- 6.6.1.14 Large area smears shall be numbered with the number inside a triangle.
- 6.6.1.15 A narrative explanation of abnormal or unsafe conditions should be included on the survey.
- 6.6.2 Smears counted with fixed instrumentation such as the Ludlum Model-2929 shall be recorded on Form ATGF-006.
- 6.6.3 Isotopic analysis results shall be attached to Form ATGF-001. The survey (ATGS) number shall be recorded on each page.

7.0 RECORDS

The following records are generated by the use of this procedure. These records shall be reviewed daily by Health Physics supervision and retained in the permanent project file.

- 7.1 Smear Counting Analysis Report, ATGF-006
- 7.2 Radiological Survey Report, ATGF-001
- 7.3 Radiation/Contamination Survey Log, ATGF-034

8.0 **FORMS**

- 8.1 ATGF-006, Smear Counting Analysis Report
- 8.2 ATGF-034, Radiation/Contamination Survey Log
- 8.3 ATGF-001, Radiological Survey Report

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

RADIOLOGICAL AREA POSTING AND ACCESS CONTROL

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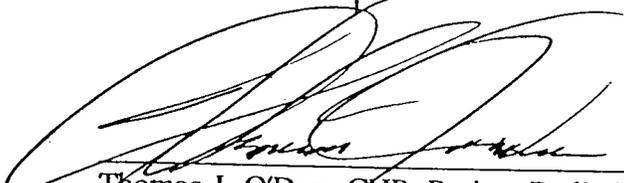
This procedure: HP-OP-002, RADIOLOGICAL AREA POSTING AND ACCESS CONTROL, has been reviewed and approved by the following:

APPROVAL SIGNATURES:



William G. Haney, Project Director

4/12/95
Date



Thomas J. O'Dou, CHP, Project Radiation Safety
Officer, HP Technical Support

4/12/95
Date

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RADIOLOGICAL AREA POSTING AND ACCESS CONTROL

1.0 SCOPE

This procedure sets forth the specific requirements for posting and access control of radiological areas on Allied Technology Group, Inc. (ATG) field projects.

2.0 PURPOSE

- 2.1 The purpose of this procedure is to identify the requirements and types of signs necessary to clearly identify radiological conditions in a specific area or location within an area.
- 2.2 This procedure specifies the requirements for access to and egress from controlled radiological areas identified in this document.

3.0 REFERENCES AND DEFINITIONS

3.1 References

- 3.1.1 DOE Order 5480.11 (12-88), Radiation Protection for Occupational Workers
- 3.1.2 10 CFR 20 (1-92), Standards for Protection Against Radiation
- 3.1.3 ANSI N3.1 - 1987, Selection, Qualification and Training of Personnel for Nuclear Power Plants
- 3.1.4 HP-OP-005, Radioactive Material and Source Control
- 3.1.5 HP-OP-004, Issue and Use of Radiation Work Permits
- 3.1.6 HP-OP-001, Radiation and Contamination Survey Techniques

3.2 Definitions

NOTE: These definitions are for informational purposes only and are to be used as posting guidelines. See Section 6.0 of this procedure for actual posting requirements.

- 3.2.1 **Alarming Dosimeter:** A device which continuously integrates the dose received and alarms at pre-set dose and exposure rate settings.
- 3.2.2 **Annual Limit of Intake (ALI):** The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide by the reference man that would result in a committed effective dose equivalent of 5 rems(0.05 Sv) or a

committed dose equivalent of 50 rems (0.5 Sv) to any individual organ or tissue. (ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table 1, Columns 1 and 2 of Appendix B of Reference 3.1.2. One ALI is equivalent to 2000 DAC-Hrs.

- 3.2.3 As Low As Reasonably Achievable (ALARA):** An approach to radiation protection for the control and management of exposure (both individual and collective) to the work force and the general public; thus ensuring a level of exposure as low as social, technical, economic, practical, and public policy considerations permit. The ALARA program is structured to increase worker awareness of exposure reduction techniques and the associated benefits of that reduction.
- 3.2.4 Barricade:** Any rope, ribbon or other barrier, yellow and magenta in color, erected to warn personnel of radiological hazards within a Controlled Area.
- 3.2.5 Controlled Area:** Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or prevent the inadvertent release of radioactive material to the uncontrolled areas.
- 3.2.5.1 Any area, building or room in which radiological area exists shall be bounded by a Controlled Area to act as a buffer zone to protect individuals from exposure to radiation and prevent the inadvertent release of radioactive material to the uncontrolled areas.
- 3.2.5.2 Any area, building or room where residual fixed alpha contamination exceeds 100 dpm/100cm² and/or fixed beta-gamma contamination exceeds 1000 dpm/100cm².
- 3.2.5.3 Any area, building or room in which an individual may receive a dose equivalent of 0.5 mR, but less than 2 mR in any one hour at 30cm from the radiation source or from any surface through which the radiation may penetrate.
- 3.2.5.4 Any area, building or room where, in the opinion of the Radiological Field Operations Manager (Project Manager), posting of the area, building or room is necessary for adequate control of existing radiological conditions.
- 3.2.6 Derived Air Concentration (DAC):** The concentration of a given radionuclide in air which, if breathed by the reference man for w working year of 2,000 hours under conditions of light work (inhalation rate of 1.2 cubic meters of air per hour [2.4 E⁺³ m³]), results in an intake of one ALI. DAC values are given in Table 1, Column 3, of Appendix B of Reference 3.1.2. One DAC-Hr is approximately 2.5 mrem total effective dose equivalent.

- 3.2.7 **Health Physics Technician:** An individual who performs radiological protection functions and meets the requirements of Reference 3.1.3.
- 3.2.8 **Hot Particle:** A hot particle is a small, discrete, highly radioactive form of contamination. Because of their small size, hot particles spread easily. Because of their high dose rates and activity, hot particles on the skin can cause high dose rates to a very small area of the skin. High energy beta hot particles such as irradiated fuel fragments, exhibit penetrating beta radiation. Approximately 50% of their high energy betas will penetrate through a 90 mg/cm² shield. Low energy beta hot particles such as cobalt which originates from the activation of stellate (high cobalt alloy), exhibits low penetrating beta radiation. Approximately 10% of their low energy betas will penetrate through a 90 mg/cm² shield.
- 3.2.9 **Hot Spot:** Any small (< 1ft²) location which contains or is a source of penetrating radiation with a reading of ≥ 100 mR/hr and at least 5 times the 30cm exposure rate.
- 3.2.10 **Radiological Area:** A generic term used to describe any posted area within a Controlled Area where specific radiological hazards exist. Radiological Areas shall be posted with signs conforming with Reference 3.1.2. The background color is to be yellow and the symbol color may be black or magenta. The wording on the sign shall be appropriate for identification and control of the radiological hazards specified.
- 3.2.10.1 Radioactive Materials Area: Any designated area where materials meeting or exceeding any of the following criteria are stored or used:
- * The amount of licensed material in the area exceeds 10 times the quantity of such material specified in Appendix C of Reference 3.1.2.
 - * Posting of an RMA is not required if the radioactive material is stored inside a posted Contaminated or Airborne Radioactivity Area.
- 3.2.10.2 Airborne Radioactivity Area: Any room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations
- (a) In excess of the derived air concentrations (DACs) specified in Table 1, Column 3, of Appendix B of Reference 3.1.2.
 - (b) To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

- 3.2.10.3 Contaminated Area: Any area where loose surface contamination levels exceed 1000 dpm/100cm² for beta-gamma emitters and/or 20 dpm/100cm² for alpha emitters.
- 3.2.10.4 Highly Contaminated Area: Any area where loose surface contamination levels are:
- * ≥ 2K dpm/100cm² loose α
 - * ≥ 100K dpm/100cm² loose β τ
- unless transuranics are present then:
- * ≥ 200 dpm/100cm² loose α
 - * ≥ 50K dpm/100cm² loose β τ
- 3.2.10.5 Radiation Area: An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem (0.05 mSv) but less than 100 mrem in 1 hour at 30cm from the radiation source or from any surface that the radiation penetrates.
- 3.2.10.6 High Radiation Area: An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 100 mrem (1 mSv) in 1 hour at 30cm from the radiation source or from any surface that the radiation penetrates.
- 3.2.10.7 Very High Radiation Area: An, area accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radioactive source or from any surface that the radiation penetrates.
- 3.2.10.8 Radiography Area: Any area where X-ray producing equipment or radioactive sources are in use to perform radiography.
- 3.2.11 Resuspension**: The probability that loose radioactive contamination on surfaces will become airborne.

4.0 PRECAUTIONS, LIMITATIONS

- 4.1 Signs identifying radiological hazards shall be posted on all sides of the barrier surrounding the identified radiological hazard area.

- 4.2 Signs identifying radiological hazards shall be firmly attached to the barrier surrounding the identified radiological hazard with materials that will withstand the effects of adverse weather and use conditions.
- 4.3 Radiation detection instruments used to identify and quantify radiological hazards shall be:
 - 4.3.1 Calibrated with sources approximating the type emissions and energies expected during surveys.
 - 4.3.2 Have a detection capability applicable to the type emission expected.
 - 4.3.3 Used by only qualified operators.
 - 4.3.4 Have a range capable of measuring the highest expected exposure rate or contamination level expected during the survey.
- 4.4 Radiation and contamination surveys used for the purpose of radiological protection shall be performed by personnel meeting the requirements of Reference 3.1.3.
- 4.5 Entry into areas identified as Very High Radiation Areas requires prior approval from the ATG Radiological Field Operations Manager (Project Manager) for each specific entry.
- 4.6 Personnel exiting Contaminated Areas shall perform a whole-body contamination survey immediately upon exit from area.
- 4.7 A TLD or film badge is required to be worn by individuals as specified by the work plan and/or RWP.
- 4.8 Highly Contaminated Areas require an assessment to determine the probability of resuspension prior to entry. Respiratory protection, decontamination or other engineering methods will be considered in Highly Contaminated Areas prior to entry.
- 4.9 All tools and equipment leaving a Contaminated Area shall be surveyed and decontaminated or packaged and labeled prior to leaving the immediate vicinity of the Contaminated Area.

5.0 RESPONSIBILITIES

5.1 Individuals are responsible for the following:

- 5.1.1 Complying with all radiation protection instructions and postings.
- 5.1.2 No smoking, eating, drinking or chewing while in a Controlled Area.
- 5.1.3 Performing a job or task in such a manner that the creation and spread of contamination are minimized.

- 5.1.4 Performing a job or task in such a manner that complies with good ALARA practices and principles.
 - 5.1.5 Presenting all tools and equipment to Health Physics personnel for surveying prior to removing the items from a Controlled Area.
 - 5.1.6 Obey "Evacuate" or "Stop Work" orders from Health Physics personnel.
 - 5.1.7 Not loitering in radiation areas.
 - 5.1.8 Keep track of your current radiation exposure and exposure limits.
 - 5.1.9 Wear dosimetry in a manner required by the Radiation Work Permit (RWP).
 - 5.1.10 Performing a personal contamination survey upon exit from a Controlled Area.
 - 5.1.11 Report the loss, damage or unexpected exposure of dosimetry to Health Physics immediately.
 - 5.1.12 Wear protective clothing and equipment specified by the RWP or area postings.
 - 5.1.13 Avoid skin or clothing contact with contaminated surfaces.
 - 5.1.14 Minimize the amount of radioactive waste generated.
 - 5.1.15 Maintain training qualifications current.
 - 5.1.16 Notify Health Physics of wounds, sores or rashes before entering any area where contamination exists and exit immediately if a wound occurs in such an area.
- 5.2 Health Physics is responsible for the following:**
- 5.2.1 Performing radiation, contamination, and airborne radiological surveys as necessary to verify the adequacy of area postings and the radiological controls within an area.
 - 5.2.2 Installation of all radiological postings and a demonstrated understanding of control requirements.
 - 5.2.3 Notifying the area occupant(s) when an area is initially posted or when area posting is changed.

6.0 AREA POSTING

6.1 When any of the criteria for a Controlled Area as defined in Section 3.2.5 of this procedure or Radiological Area are met, an area shall be properly posted using the sign specified for the identified radiological hazard.

6.2 Controlled Area

6.2.1 Controlled Areas shall be designated by clearly and conspicuously posting all accessible sides of the area with a sign bearing the following:

CONTROLLED AREA

6.2.2 To enter a Controlled Area, a person must meet all posted requirements. A Controlled Area shall surround all Radiological Areas. A TLD or film badge is required in all Controlled Areas, unless the area is specifically posted "No TLD Required for Entry".

6.3 Radiological Area

NOTE: Dose rate measurements used to determine criteria for Radiation Areas or High Radiation Areas should be made at a distance of 30cm from the radioactive source or from any surface through which the radiation penetrates.

6.3.1 An area shall be clearly and conspicuously posted as a Radiological Area by display signs on all accessible sides of the area of a yellow background with a super-imposed magenta or black trefoil.

6.3.2 Signs as defined in this procedure shall be posted as required to define specific radiological hazards/areas within a Radiological Area.

6.3.3 Access requirements for Radiological Areas shall be posted on a sign at all routine access points.

6.3.4 Radiation Area

6.3.4.1 A Radiological Area shall be posted "Radiation Area" when the following condition exists:

- (a) Any area, accessible to individuals, in which the individual could receive a dose equivalent ≥ 2 mrem but less than 100 mrem in 1

hour at 30cm from the radiation source or from any surface through which the radiation penetrates.

- 6.3.4.2 Access requirements for Radiation Areas shall be restricted to Radiation Workers wearing TLDs or film badges and signed-in on an approved RWP.
- 6.3.4.3 Radiation Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

CAUTION RADIATION AREA

- 6.3.4.4 These Radiation Areas shall also be posted "Radiation Work Permit (RWP) Required for Entry", and "TLD or Film Badge Required for Entry".
 - 6.3.5 High Radiation Area
 - 6.3.5.1 A Radiological Area shall be posted "High Radiation Area" when the following condition exists:
 - (a) Any area, accessible to individuals, in which the individual could receive a dose equivalent ≥ 100 mrem but less than 5 rem in 1 hour at 30cm from the radiation source or from any surface through which the radiation penetrates.
 - 6.3.5.2 Access to High Radiation Areas shall be restricted to Radiation Workers wearing a TLD or film badge and a self-reading dosimeter, possessing a dose-rate instrument, and signed-in on an approved RWP.
- NOTE: In lieu of a dose rate instrument, an alarming dosimeter set to alarm at the maximum dose and exposure rate allowed by the RWP is acceptable.

- 6.3.5.3 High Radiation Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

DANGER HIGH RADIATION AREA

- 6.3.5.4 The anticipated exposure rate or range of exposure rates should be written or posted with each sign identifying a High Radiation Area.
- 6.3.5.5 These High Radiation Areas shall also be posted "TLD or Film Badge Required", "Dose Rate Instrument or Alarming Dosimeter Required", "Radiation Work Permit (RWP) Required for Entry" and "HP Required for Entry".
- 6.3.5.6 Each point of entrance or access shall be equipped with one or more of the following:
- (a) A control device that limits the level of radiation to which an individual might be exposed to less than 100 mrem in 1 hour.
 - (b) A control device that energizes a conspicuous audible or visible alarm in such a manner that the entering individual is alerted the fact that entry into a High Radiation Area has occurred.
 - (c) Some form of positive control (such as key control) over each entry, posted with a means for secure lockout during periods when access is not required.

6.3.6 Very High Radiation Area

NOTE: Dose rate measurements used to determine criteria for Very High Radiation Areas should be made at a distance of 100cm from the radioactive source or from any surface through which the radiation penetrates.

- 6.3.6.1 A Radiological Area shall be posted "Very High Radiation Area" when the following condition exists:
- (a) Any area, accessible to individuals, in which the individual could receive a dose equivalent ≥ 5 rem in 1 hour at 1 meter from the radiation source or from any surface through which the radiation penetrates.

6.3.6.2 Access to Very High Radiation Areas shall be restricted to qualified Radiation Workers on an approved RWP, wearing a TLD or film badge and a self-reading dosimeter, and possessing a dose-rate instrument or device described in Steps 4.3 or 6.3.5.2. Additionally, individuals shall be escorted by a Health Physics Technician that is aware of dose margins and associated stay times. All personnel shall be aware of the maximum and average exposure rates prior to entry.

6.3.6.3 Very High Radiation Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

* For exposure rates of 5 R/hr to 50 R/hr

DANGER VERY HIGH RADIATION AREA

* For exposure rates > 50 R/hr

GRAVE DANGER VERY HIGH RADIATION AREA

6.3.6.4 The anticipated exposure rate or range of exposure shall be written on, or posted with each sign identifying a Very High Radiation Area.

6.3.6.5 These Very High Radiation Areas shall also be posted "TLD or Film Badge Required", "Dose Rate Instrument or Alarming Dosimeter Required", "Radiation Work Permit (RWP) Required for Entry" and "HP Required for Entry".

6.3.6.6 Each point of entrance or access shall be equipped with a positive locking device keyed with a unique lock. Control of the keys to this area shall be maintained by the ATG Radiological Field Operations Manager (Project Manager) or his/her designee.

6.3.7 Airborne Radioactivity Area

6.3.7.1 A Radiological Area shall be posted "Airborne Radioactivity Area" when the following condition exists:

- (a) Any room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exists

in concentrations of 10 percent of the DAC value for the specific radionuclide as listed in Table 1, Column 3, in Appendix B of Reference 3.1.2.

- 6.3.7.2 Airborne Radioactivity Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

**CAUTION AIRBORNE
RADIOACTIVITY AREA**

- 6.3.7.3 Airborne Radioactivity Areas shall also be posted "Radiation Work Permit (RWP) Required for Entry", and "Health Physics Required for Entry".

6.3.8 Radioactive Materials Area

- 6.3.8.1 A Radiological Area shall be posted "Radioactive Materials Area" when the following condition exists:

(a) Any area, or room in which licensed material is used or stored in an amount exceeding 10 times the quantity of such material specified in Appendix C of Reference 3.1.2.

- 6.3.8.2 Radioactive Materials Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

CAUTION RADIOACTIVE MATERIALS AREA

- 6.3.8.3 Radioactive Materials Areas must be posted, "TLD or Film Badge Required for Entry" and "RWP Required for Entry".

- 6.3.8.4 The exterior package surface of any radioactive material shall be labeled in accordance with Reference 3.1.4.

6.3.9 Contaminated Area

- 6.3.9.1 A Radiological Area shall be posted "Contaminated Area" when the conditions outlined in Step 3.2.10.3 of this procedure exist.
- 6.3.9.2 Contaminated Areas shall be clearly and conspicuously posted by displaying on all accessible sides of the area, signs of a yellow background with a superimposed magenta or black trefoil and the words:

CAUTION CONTAMINATED AREA

- 6.3.9.3 Contaminated Areas shall also be posted "RWP Required for Entry", and "Personnel Contamination Survey Required Upon Exiting". Each Contaminated Area that is to be entered shall have a step-off pad maintained in an uncontaminated condition located at the access/egress point.
- 6.3.9.4 Contaminated Areas which require personnel access on a daily basis should have a frisking station within 10 feet of the access/egress point, if background radiation levels permit. All personnel exiting the Contaminated Area shall perform a whole-body frisk upon exiting the area.

6.3.10 Highly Contaminated Area

- 6.3.10.1 In addition to the requirements listed in step 6.3.9 contaminated areas with loose activity meeting the requirements of Step 3.2.10.4 of this procedure exist shall be posted "DANGER", or "CAUTION", "HIGHLY CONTAMINATED AREA" (vice "CONTAMINATED AREA") and "Health Physics Required for Entry".

6.3.11 Radiography Area

- 6.3.11.1 The area shall be clearly and conspicuously posted to indicate where the equipment is used, as appropriate, by a licensed radiographer.
- 6.3.11.2 Health Physics will determine and post the integrated Radiation Area and High Radiation
- 6.3.11.2 Area boundaries in accordance with Steps 6.3.4, 6.3.5, and 6.3.6 of this procedure.

6.3.12 Underground Radioactive Materials

6.3.12.1 The entrance to any area (normally outside areas) shall be posted to indicate the presence of underground items that contain radioactive materials such as pipelines, tanks, cribs, covered ponds, covered ditches, catch basins, inactive burial grounds and sites of known, covered, unplanned spills.

6.3.12.2 The entrances to the areas shall be clearly and conspicuously posted:

**CAUTION UNDERGROUND
RADIOACTIVE MATERIALS**

6.3.12.3 Underground Radioactive Material Areas shall also be posted "Pipes and Tanks", "Excavating, digging, drilling prohibited without Site Manager approval".

7.0 RECORDS

The records generated by the use of this procedure are documented in accordance with the provisions of Reference 3.1.4, 3.1.5, and Reference 3.1.6. No new records are created.

8.0 FORMS

8.1 ATGF-001, Radiological Survey Report

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

RELEASE OF MATERIALS FROM CONTROLLED AREAS

Allied Technology Group, Inc.
47375 Fremont Blvd.
Fremont, California 94538

Prepared by

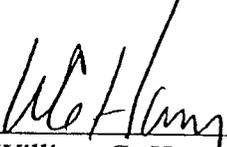
D. Spicuzza

ALLIED TECHNOLOGY GROUP, INC.

PROCEDURE/PLAN APPROVAL PAGE

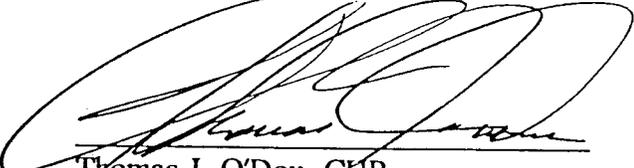
This procedure: Release of Materials From Controlled Areas has been reviewed and approved by the following:

APPROVAL SIGNATURES:



William G. Haney, Project Director

4/12/95
Date



Thomas J. O'Dou, CHP,
Project Radiation Safety Officer
HP Technical Support

4/12/95
Date

**REVISION RECORD INDICATING
LATEST DOCUMENT REVISION**

Procedure Number: HP-OP-003

Title: Release of Materials From Controlled Areas

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Approval	

RELEASE OF MATERIALS FROM CONTROLLED AREAS

1.0 SCOPE

This procedure sets forth the specific requirements for release of materials from controlled areas applicable to Allied Technology Group, Inc. (ATG) field projects.

2.0 PURPOSE

The purpose of this procedure is to specify requirements for releasing material from controlled areas and to minimize the potential for unintentionally releasing contaminated items to uncontrolled areas in accordance with the provisions of Reference 3.3.1.

3.0 REFERENCES AND DEFINITIONS

3.1 References

- 3.1.1 DOE Order 5400.5 (2-8-90), Radiation Protection of the Public and the Environment
- 3.1.2 DOE Order 5480.11 (12-21-88), Radiation Protection for Occupational Workers
- 3.1.3 10 CFR 20 (5-22-91), Standards for Protection Against Radiation
- 3.1.4 HP-OP-001, Radiation and Contamination Survey Techniques
- 3.1.5 Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors
- 3.1.6 ANSI N3.1-1987, Selection, Qualification and Training of Personnel for Nuclear Power Plants
- 3.1.7 HP-IP-003, Operation and Calibration of the Ludlum Model-2929
- 3.1.8 HP-IP-001, Operation and Calibration of the Ludlum Model-3
- 3.1.9 HP-OP-002, Radiological Area Posting and Access Control
- 3.1.10 HP-OP-005, Radioactive Material and Source Control
- 3.1.11 HP-OP-004, Issue and Use of Radiation Work Permits

3.2 Definitions

- 3.2.1 Activity - The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are disintegrations per minute (dpm), Becquerel (Bq), or micro-Curies for loose contamination and disintegrations per minute or millirad/hour for fixed contamination.

- 3.2.2 Contamination - Deposition of radioactive material in any place it is not desired, particularly where its presence may be harmful. The harm may be actual exposure to individuals or release of the material to the environment or general public. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.
- 3.2.3 Controlled Area - Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.
- 3.2.4 Fixed Contamination - Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslinn.
- 3.2.5 Minimum Detectable Activity (MDA) - For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95% confidence level based upon the background count rate of the counting instrument used.
- 3.2.6 Evaluator - An individual designated by the Radiological Field Operations Manager to evaluate materials or items in accordance with Sections 6.2, 6.3 and Step 6.5.6.
- 3.2.7 Release for Unconditional Use - A level of radioactive material that is acceptable for use of property without restrictions due to residual radioactive material without license conditions or controls. Under normal circumstances, authorized limits for residual radioactive material are set equal to, or below, the values specified in Reference 3.1.5, Table 1.
- 3.2.8 Survey Exempt Materials - The contents of sealed containers which remain unopened while in a controlled area are exempt, the outside surfaces are not exempt.

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

- 4.1.1 Instruments used to perform release surveys shall be operated in accordance with the respective operating procedure:
- 4.1.1.1 Ludlum Model-2929 - Reference 3.1.7
 - 4.1.1.2 Ludlum Model-3 - Reference 3.1.8
- 4.1.2 MDA for the Ludlum Model-2929 shall be in accordance with Reference 3.1.7.

- 4.1.3 Large area smears may be used to augment (but not replace) the 100 cm² smear survey. Large area wipes may be counted with the Ludlum Model-3 or equivalent. Large area smears are used to obtain immediate information concerning loose contamination for the purpose of radiological protection and to minimize time spent performing disc smears on an item easily identified as contaminated.
- 4.1.4 A release document package shall include the following forms:
 - 4.1.4.1 The Health Physics daily log.
 - 4.1.4.2 ATGF-005 - Material Release Log.
 - 4.1.4.3 ATGF-001 - Radiological Survey Report or ATGF-010, Unconditional Release of Equipment or Items Report and/or ATGF-006, Smear Counting Analysis Report.
 - 4.1.4.4 ATGF-003 - Daily Instrument Performance Test Log.
- 4.1.5 The release document shall include the following information:
 - 4.1.5.1 The date of the release survey.
 - 4.1.5.2 The number of the release survey.
 - 4.1.5.3 A description or identification of the item.
 - 4.1.5.4 The identity of the Health Physics Technician performing the release survey.
 - 4.1.5.5 The evaluator of the material for release.
 - 4.1.5.6 The release approval of the Health Physics Supervisor or designee.
- 4.1.6 All surveys performed for the release of material shall be documented on a Radiological Survey Report (ATGF-001) and/or on a Unconditional Release of Equipment or Items Report (ATGF-010).
- 4.1.7 Radiation and contamination surveys shall be performed in accordance with Reference 3.1.4.
- 4.1.8 Items identified as radioactive during the release survey shall be controlled in accordance with Reference 3.1.10.
- 4.1.9 Personnel performing release surveys shall be logged in on a Radiation Work Permit in accordance with Reference 3.1.11 (if applicable).
- 4.1.10 Audible response instruments must be used during direct scan surveys.

- 4.1.11 The instruments used for release surveys shall be within current calibration and shall have had a performance test check performed daily or prior to use in accordance with the instrument's operating procedure.
- 4.1.12 Release of materials from controlled areas shall be performed in accordance with the provisions and directives of References 3.1.1, 3.1.2, and 3.1.3.
- 4.1.13 Items presented for release shall be direct scanned in an area of low background.

4.2 Limitations

- 4.2.1 The maximum probe speed during direct scan surveys of surfaces shall be 3 cm/sec.
- 4.2.2 A response check shall be performed at the completion of the work day for instrument's used for direct scan surveys in accordance with the instruments operating procedure.
- 4.2.3 The probe face shall be held within 1/4 inch of the surface being surveyed for alpha, and within 1/2 inch of the surface being surveyed for beta-gamma.
- 4.2.4 If an instrument used to perform release surveys fails any operational check, it shall be removed from service. All data collected during the period of instrument failure must be evaluated by the Health Physics Supervisor.
- 4.2.5 Posting and access control of controlled areas shall be performed in accordance with the provisions of Reference 3.1.9.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

- 5.1.1 ATG Radiological Field Operations Manager
 - 5.1.1.1 Implements the requirements of this procedure.
 - 5.1.1.2 Designates qualified evaluators.
 - 5.1.1.3 Reviews the adherence of personnel to the requirements of this procedure, periodically.
 - 5.1.1.4 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.
- 5.1.2 Health Physics Supervisor
 - 5.1.2.1 Review the release documentation.
 - 5.1.2.2 Approve unconditional releases by signing the ATGF-005 form.

5.1.3 Health Physics Technicians

5.1.3.1 Perform the requirements of this procedure.

5.1.3.2 Adhere to other procedures (referenced in this procedure).

5.1.3.3 Document all releases.

5.2 Qualifications

5.2.1 Health Physics Technicians shall be qualified in accordance with the requirements of Reference 3.1.6 to perform release surveys of materials.

5.2.1.1 Documentation supporting qualifications shall be obtained and kept in the permanent project files.

5.2.2 Junior Health Physics/Decontamination Technicians may perform release surveys under the direct supervision of a Health Physics Technician meeting the requirements of Section 5.2.1.

5.2.3 Evaluators shall be designated by the ATG Radiological Field Operation Manager (Project Manager).

6.0 PROCEDURE

6.1 Release Limits For Gross Activity (Unknown Isotopes) - Regulatory

EMISSION	REMOVABLE (dpm/100 cm ²)	TOTAL (Fixed and Removable) (dpm/100 cm ²)
Alpha	20	100
Beta-Gamma	200	1000

NOTE: If all of the actual isotopic constituents of the contamination are known and documented on the release documents, the release limits of Table 1 of Reference 3.1.5 may be applied.

6.2 Inaccessible Surfaces

6.2.1 Items with inaccessible surfaces should be disassembled as completely as possible to facilitate release surveys. Items with inaccessible surfaces will not be unconditionally released unless evaluated by a designated evaluator who authorizes and documents the release.

6.2.2 The following guidance will be used when performing evaluations:

- A history of the item should be reviewed.
- The actual release survey shall be reviewed.
- Determination of the radiological conditions in the area the item has been used or stored shall be reviewed.
- Use of sensitive detectors such as NaI(Tl) or equivalent should be considered. (These detectors may indicate internal contamination that the Model-3 or equivalent may not detect due to its lower sensitivity to photon emissions).

6.3 Materials considered hazardous due to their physical or chemical nature and fragile items shall not be unconditionally released unless evaluated. For example, gases, pyrophoric materials, easily damaged electronic devices, or other easily damaged materials cannot be directly or indirectly surveyed. These materials will be evaluated on a case by case basis for release in a manner consistent with Section 6.2.2. Evaluation for release shall be performed by a designated evaluator only.

6.4 Survey Exempt Materials

6.4.1 Items such as briefcases, pens, papers, personal clothing, etc., are exempt from the Health Physics release survey requirements of this procedure.

6.4.2 Individuals shall survey the exempt items in the same manner as a whole body frisk when leaving a controlled area or have a Health Physics Technician perform the survey.

6.5 Survey Procedure

6.5.1 Upon receipt of an item presented for release, attempt to determine the history:

- Purpose of item.
- The current and past use of the item.
- The location(s) in which the item was used or stored.
- If the item was ever used for work with radio-active material or used in an area where radioactive material was used or stored.

This knowledge of the item history should provide the surveyor with information helpful in performing the release survey.

6.5.2 Using protective clothing such as gloves, perform large area smears of 100% of the accessible surfaces of the item using large area wipes (e.g. masslinn).

- 6.5.2.1 Determine if transferrable (loose) radioactive material is present by measuring the amount of activity on the surface of the cloth.
- 6.5.2.2 If the presence of radioactive material is indicated by a count rate above background, the item shall be treated as contaminated until the results of the disc smear survey are obtained and a determination is made concerning the actual 100 cm² loose contamination levels. The material shall be controlled in accordance with Reference 3.1.10.
- 6.5.3 Perform a direct scan of 100% of all accessible areas of the item, in accordance with the instrument's operating procedure, and Reference 3.1.4.
- NOTE:** Items presented for release shall be direct scanned in an area of low background. Preferably ≤ 100 CPM. The Health Physics Technician performing the release survey shall determine if the background is acceptable for direct scan of the item. Release surveys shall not be done in areas where background is ≥ 300 CPM.
- 6.5.3.1 If the scan indicates radioactive material on the surface of the item is less than the limits for release for total activity, proceed to 6.5.3.3.
- 6.5.3.2 If the scan indicates radioactive material on the surface of the item is greater than regulatory limits for total activity, the item cannot be released.
- 6.5.3.3 During the direct scan of the accessible surfaces of the item, a static measurement shall be taken:
- If an increase in the audible count rate is detected.
 - After each minute of scanning.
 - When the Health Physics Technician determines that an indication of fixed activity less than ten square centimeters may be present.
- 6.5.3.4 During the static measurement, the meter probe shall be held at the proper distance from the surface being surveyed for the proper response period to allow the meter reading to stabilize, in accordance with the instrument's operating procedure.
- 6.5.4 Perform disc smears of 100% of the effective surface area.
- 6.5.4.1 100% of the effective accessible surface means performing a 100 cm² disc smear on all accessible areas of the item suspected of being contaminated.

- 6.5.5 Count the smears in accordance with Reference 3.1.4.
 - 6.5.5.1 Record smear data on the Smear Counting Analysis Report (ATGF-006). If a Model-3 or equivalent was used, document the results on a Radiological Survey Report (ATGF-001).
 - 6.5.5.2 If the smear results indicate transferrable activity below the release limits, proceed to Step 6.5.6.
 - 6.5.5.3 If the smear results indicated transferrable activity above the release limits, the item cannot be released.
- 6.5.6 If the item has internal or inaccessible surfaces, have ATG personnel disassemble the item and repeat Steps 6.5.2 through 6.5.5 or have the item evaluated for release by a designated evaluator.
- 6.5.7 If the item meets the release limits or is evaluated as meeting the unconditional release criteria, complete forms ATGF-010, ATGF-005, and/or ATGF-001. Health Physics Supervision must review the release documents and approve the release prior to allowing the item to leave the controlled area.
- 6.5.8 Items identified as radioactive during the release survey shall be controlled in accordance with Reference 3.1.10.

7.0 RECORDS

The following records are generated by use of this procedure. These records will be maintained in the permanent project file.

- 7.1 ATGF-001 - Radiological Survey Report
- 7.2 ATGF-005 - Material Release Log
- 7.3 ATGF-006 - Smear Counting Analysis Report
- 7.4 HP Daily Log
- 7.5 ATGF-003 - Daily Instrument Performance Test Log
- 7.6 ATGF-010 - Unconditional Release of Equipment or Items Report

8.0 FORMS

- 8.1 ATGF-003 - Daily Instrument Performance Test Log
- 8.2 ATGF-006 - Smear Counting Analysis Report
- 8.3 ATGF-001 - Radiological Survey Report
- 8.4 ATGF-005 - Material Release Log
- 8.5 ATGF-010 - Unconditional Release of Equipment or Items Report

RADIOLOGICAL SURVEY REPORT

ATGS #: _____

DATE:	INSTRUMENTATION USED				
TIME:	MODEL	S/N	EFF. %	BKRD	CAL. DUE DATE
SURVEYOR:					
LOCATION:					
REVIEWED BY:					
Smear Locations Circled; Dose Rates= mR/hr					

PURPOSE OF SURVEY: _____ _____ _____	SMEAR RESULTS RESULTS = DPM/100cm ² UNLESS NOTED																																													
Remarks: _____ _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">#</th> <th style="width: 35%;">βγ</th> <th style="width: 50%;">α</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	#	βγ	α																																										
	#	βγ	α																																											

UNCONDITIONAL RELEASE OF EQUIPMENT OR ITEMS REPORT

JS #:	DATE:			
PROJECT/LOCATION:				
DESCRIPTION OF EQUIPMENT OR ITEMS:				
SURVEY EQUIPMENT:				
MODEL NO:	S/N:	BKRD:	EFF:	CAL DUE DATE:
MODEL NO:	S/N:	BKRD:	EFF:	CAL DUE DATE:
MODEL NO:	S/N:	BKRD:	EFF:	CAL DUE DATE:
CONTAMINATION LEVELS:				
		dpm/100 cm ² βγ	REMOVABLE	
		dpm/100 cm ² α	REMOVABLE	
		dpm/100 cm ² βγ	FIXED	
		dpm/100 cm ² α	FIXED	
<p>THIS IS TO CERTIFY THAT THE ABOVE DESCRIBED EQUIPMENT OR ITEMS HAS BEEN SURVEYED AND FOUND TO BE WITHIN ACCEPTABLE SURFACE CONTAMINATION LEVELS FOR UNCONDITIONAL RELEASE AS REQUIRED BY NUCLEAR REGULATORY GUIDE 1.86.</p>				
HEALTH PHYSICS TECHNICIAN:				DATE/TIME:
DISPOSITION OF EQUIPMENT OR ITEMS:				
VIEWED BY:				DATE:

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

ISSUE AND USE OF RADIATION WORK PERMITS

Allied Technology Group, Inc.
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Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: **ISSUE AND USE OF RADIATION WORK PERMITS**, has been reviewed and approved by the following:

APPROVAL SIGNATURES:



William G. Haney, Project Director

4/12/95
Date



Thomas J. O'Dou, CHP
Project Radiation Safety Officer
HP Technical Support

4/12/95
Date

REVISION RECORD INDICATING
LATEST DOCUMENT REVISION

Procedure Number: HP-OP-004

Title: ISSUE AND USE OF RADIATION WORK PERMITS

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ISSUE AND USE OF RADIATION WORK PERMITS

1.0 SCOPE

This procedure describes the circumstances when a Radiation Work Permit (RWP) is required and addresses the requirements for planning, developing, issuing, modifying, using, and terminating RWPs. This procedure applies to all radiation workers working on A.T.G. field projects.

2.0 PURPOSE

The purpose of this procedure is:

- 2.1 To provide requirements and specifications for the preparation, use, modification, and termination of Radiation Work Permits.
- 2.2 To provide guidelines to specify appropriate protective measures within the scope of the work based upon the radiological conditions in the area.
- 2.3 To provide the documentation requirements for radiological surveys used to generate RWPs based upon sound radiological judgements for all A.T.G. field project sites.
- 2.4 To provide a complete document addressing existing radiological conditions, work scope and limitations, radiological limitations, specific protective requirements, ALARA considerations and instructions to Health Physics Technicians.

3.0 REFERENCES AND DEFINITIONS

3.1 References

- 3.1.1 DOE Order 5480.11, Radiation Protection for Occupational Workers
- 3.1.2 10 CFR 20, Standards for Protection Against Radiation
- 3.1.3 ANSI N3.1-1987, Selection, Qualification and Training of Personnel for Nuclear Power Plants
- 3.1.4 Respiratory Protection Program for A.T.G.
- 3.1.5 RP-OP-001, Selection and Use of Respiratory Protection Equipment
- 3.1.6 HP-OP-010, Air Sampling and Analysis
- 3.1.7 HP-OP-002, Radiological Area Posting and Access Control
- 3.1.8 HP-OP-001, Radiation and Contamination Survey Techniques
- 3.1.9 HP-OP-011, DAC-HR Tracking

3.2 Definitions

- 3.2.1 **Multi-Badging** - The placement of more than one dosimetric device to monitor dose received in non-uniform radiation fields.
- 3.2.2 **Non-Uniform Fields** - Radiation fields that deliver significantly different doses to body areas resulting in non-uniform whole body exposures.
- 3.2.3 **Stay Time** - The time a person is allowed to remain in a radiation field based upon exposure rate and remaining allowable dose.
- 3.2.4 **Alarming Dosimeter** - A device which continuously integrates the dose received and alarms at pre-set dose and/or exposure rate settings.
- 3.2.5 **ALARA Review** - A formal document in which ALARA requirements for a specific RWP are delineated.
- 3.2.6 **Self Reading Dosimeter** - A device which measures gamma and x-ray exposure and is usually worn adjacent the TLD or film badge.
- 3.2.7 **Health Physics Supervisor** - An individual who has the authority to approve an RWP for use.
- 3.2.8 **RWP Writer** - A individual who writes and submits an RWP for approval.
- 3.2.9 **Continuous** - A term used to describe job coverage requirements that means within line of sight or direct communication to the worker. The use of cameras and communication systems may be used.
- 3.2.10 **Modification** - Minor adjustments or alterations to an existing RWP.
- 3.2.11 **Extended RWP** - A RWP that has the end of the calendar year as an expiration date and used for ongoing routine work. An extended RWP is for work in areas with low radiological hazards.

4.0 PRECAUTIONS, LIMITATIONS, DISCUSSION

4.1 Precautions

- 4.1.1 Radiological work shall be stopped and placed in a safe condition if any unsafe condition or work practice is observed in the work area. Health Physics Technicians have Stop Work authority based upon radiological and/or safety considerations.
- 4.1.2 RWP surveys shall be performed periodically during work to determine the extent (if any) of changes in radiological conditions.

- 4.1.3 During a declared emergency situation, RWP requirements may be waived to facilitate medical actions, fire fighting, etc.
- 4.1.4 Copies of work plans/instructions should be placed with the RWP, if applicable. The detailed work instructions/plans are more in depth and should be referenced periodically during work.
- 4.1.5 Issue and use of RWPs shall be performed in accordance with the requirements and articles of References 3.1.1 and 3.2.1.

4.2 Limitations

- 4.2.1 Radiological limits and protective requirements specified in the RWP shall not be altered without specific written authorization by the Health Physics Supervisor or his/her designee.
- 4.2.2 An RWP should not be used unless a radiological survey has been performed in the work area within the last 24 hours or there is reasonable assurance that conditions have not changed as determined by the Health Physics Supervisor or his/her designee.
- 4.2.3 When an RWP requirement is altered, all personnel under the RWP must be re-authorized on ATGF-023, prior to resuming work, acknowledging the changes made.

4.3 Discussion

A requirement for continuous Health Physics coverage does not mean that a technician cannot leave the jobsite for a reasonable length of time to obtain air sampling supplies, instrumentation or other necessary equipment to perform his/her work. It is a judgement made by the technician assessing the hazard and the probability of an unsafe condition developing during the time he is absent from the jobsite. It should be noted that Health Physics techniques are not rigid in their application because of large number of variables that can be encountered during the course of work. Some degree of latitude is required to allow the technician to perform his work safely, effectively, and efficiently.

For example, a minimal hazard condition in which personnel are wearing full face filter type respirators may permit the technician to leave for several minutes to obtain equipment whereas a job in which personnel performing the work evolution are wearing full face airline respirators would preclude the technician from leaving the area for any length of time. In the second case, normally a second technician would assist the first in obtaining equipment or supplies.

5.0 RESPONSIBILITIES

5.1 ATG Radiological Field Operations Manager (Project Manager) shall be responsible to:

- 5.1.1 Implement this procedure.
- 5.1.2 Periodically review the adherence of personnel to the requirements of this procedure.
- 5.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.
- 5.1.4 Periodically review RWP practices to ensure procedural compliance.
- 5.1.5 Periodically review RWPs involving significant radiological conditions.
- 5.1.6 Approve RWPs covering High Radiation Areas and Very High Radiation Areas.

5.2 Health Physics Supervisors shall be responsible to:

- 5.2.1 Terminate or extend RWPs.
- 5.2.2 Review and approve RWPs for use.
- 5.2.3 Assign Health Physics Technicians performing RWP job coverage.
- 5.2.4 Perform pre-job RWP briefings with personnel using the RWP.
- 5.2.5 Ensure RWPs are written in a timely manner prior to the start of scheduled work.

5.3 Health Physics Technicians shall be responsible to:

- 5.3.1 Perform the requirements of this procedure:
 - 5.3.1.1 RWP job coverage and associated surveys.
 - 5.3.1.2 RWP surveys for RWP generation.
 - 5.3.1.3 RWP writing.
- 5.3.2 Ensure workers are following the requirements of the RWP.
- 5.3.3 Stop work if:
 - 5.3.3.1 Radiological conditions exceed the limits specified in the RWP.
 - 5.3.3.2 Any unsafe condition exists in the work area.
 - 5.3.3.3 Non-compliance with procedural requirements occurs.

5.3.4 Ensure dosimetry, including multiple dosimetry is properly placed on individuals prior to entering the work area (when required).

5.4 Junior Health Physics/Decontamination Technicians shall:

5.4.1 Perform the requirements of this procedure under direct supervision of a Health Physics Technician.

5.5 RWP Users shall be responsible to:

5.5.1 Read, understand, sign, and comply with all of the requirements and limitations of the RWP.

5.5.2 Meet all RAD worker qualifications required by the RWP, and maintain RAD worker qualifications current.

5.5.3 Complete the RWP sign in sheet. (ATGF-023).

5.6 Industrial Hygiene (IH)/Safety Technicians shall be responsible to:

5.6.1 Review and approve the RWP for use if there are industrial hygiene/safety considerations. (If applicable).

5.7 Health Physics Planner (Usually a Health Physics Technician or Health Physics Supervisor assigned to write the RWP) shall:

5.7.1 Write the RWP in accordance with the requirements of this procedure.

6.0 RWP ISSUE AND USE

6.1 Prerequisites

6.1.1 A RWP is required when:

6.1.1.1 Entering any posted radiological area, or

6.1.1.2 When work will occur in any controlled area where general area exposure rates exceeds 0.5 mR/hr gamma or 2.5 mrad/hr corrected beta @ 30cm or

6.1.1.3 Health Physics determines that a situation warrants radiological controls in the form of an RWP.

6.2 Initiation and Issue

6.2.1 The Health Physics Supervisor shall perform, or assign a Health Physics Technician to perform a survey of the work area in accordance with Reference 3.1.8, paying particular attention to the following:

6.2.1.1 Prior to performing a work area survey, the surveyor shall be as knowledgeable as possible about the nature of the work to be performed (disassembly, grinding, decontamination, jackhammering, welding, etc.), the specific component or equipment to be worked on, the positions the workers may take to perform the work (lying under a pump, leaning against one component to work on another, etc.), and the possibility of the presence of highly radioactive debris.

* All surveys used to assess work conditions in preparation for a job shall clearly describe all the radiological hazards present in the work area. The following guidelines should be considered when performing a work area survey:

* What are the contamination, radiation and airborne radioactivity levels at the position(s) where the individual is to work?

* Where are designated radiation, high radiation, contaminated areas boundaries?

* Are there any special radiological hazards or hot spots to avoid?

* Is the area currently wet or greasy or will it become wet or greasy from the work?

* If work on a specific component is required, what are the contact and 30cm dose rates for the component?

* Is there or could there be any highly radioactive debris present?

* What additional safety hazards may be encountered at the job site?

6.2.2 Upon completion of the radiological survey, the survey shall be reviewed/approved by the Health Physics Supervisor in accordance with Reference 3.1.8. and a copy forwarded to the Health Physics Technician/Supervisor (Planner) assigned to write the RWP.

6.2.3 The Health Physics Technician assigned to write the RWP shall complete Section I of the RWP (ATGF-002).

6.2.3.1 Above Section I

* Indicate if the RWP is a regular RWP that will expire when the job is completed or an extended RWP that will cover ongoing work and expire at the end of the year.

* Enter the RWP number.

6.2.3.2 Section I

- * Complete all parts of Section I.
- * A clear description of the work activity is very important. Information regarding the exact location and scope of work is essential to adequately establish the current and anticipated radiological conditions in the area.
- * Words such as "troubleshoot" or "repair" are discouraged. The full extent of the job should be described.

- 6.2.4 The Health Physics Technician shall complete Section II of the RWP entering all existing radiological conditions, source of survey information, and the number of the RWP survey.
- 6.2.5 The Health Physics Technician or ALARA designee will complete the ALARA Considerations Form (ATGF-024), if applicable, and attach to the RWP (ATGF-002).
- 6.2.6 The Health Physics Technician will complete the radiological limits in Section III of the RWP.
- 6.2.7 An Industrial Hygiene/Safety Technician will complete the industrial hygiene/safety concerns section of Section III of the RWP if applicable.
- 6.2.8 The Health Physics Technician will complete the individual sections of Section IV based upon the recommendations in Exhibit I.
- 6.2.8.1 Protective clothing requirements.
 - 6.2.8.2 Dosimetry requirements.
 - 6.2.8.3 Special Instructions.
 - 6.2.8.4 Respiratory protection requirements.
 - 6.2.8.5 Respirator filter cartridge requirements.
 - 6.2.8.6 Applicable stay times.
- 6.2.9 The Health Physics Technician shall sign ATGF-002 and give the partially completed RWP to the Health Physics Supervisor for completion.
- 6.2.10 The Health Physics Supervisor or his/her designee shall complete Section V of the RWP.

- 6.2.10.1 Job coverage requirements.
- 6.2.10.2 Survey requirements and frequencies.
- 6.2.10.3 Air sampling frequencies.
- 6.2.10.4 ALARA Considerations (if applicable).
- 6.2.11 The Health Physics Supervisor or his/her designee shall review Sections I through V for accuracy and correctness as necessary.
 - 6.2.11.1 The Health Physics Supervisor shall notify the ATG Genoa office of any special dosimetry requirements.
 - 6.2.11.2 The Health Physics Supervisor shall notify the ATG Genoa office if any special instrumentation is required.
 - 6.2.11.3 The Health Physics Supervisor shall notify the ATG Genoa office if respiratory protection equipment is to be used.
- 6.2.12 Upon completion of Step 6.2.11, the Health Physics Supervisor or his/her designee shall sign and approve the RWP for use unless:
 - 6.2.12.1 The RWP is for a High Radiation Area or Very High Radiation Area, in which case the ATG Radiological Field Operations Manager (Project Manager) shall also review and approve the RWP.
 - 6.2.12.2 In addition to the radiological conditions, there are industrial hygiene/safety aspects which could impact upon the safe completion of the work of the RWP. In this case, the Industrial Hygiene/Safety Technician shall review the RWP; ascertain that the proposed work description is acceptably safe and is accordance with the provisions of the Industrial Hygiene Safety Pre-Job Checklist (ATGF-025) and industry standards, and shall approve the RWP for use.

NOTE: If the RFO Manager, IH/Safety Group, signatures are not required, the Health Physics Supervisor shall indicate Not-Applicable (N/A) in Section H of ATGF-002. All blanks spaces on the RWP shall be filled out with the appropriate information/data. If there is no data entered in a section of the RWP, or that section is not applicable, the Health Physics Supervisor shall indicate Not-Applicable (N/A) in the section or space of concern.
- 6.2.13 Upon approval, the Health Physics Supervisor shall notify the ATG work crew that the RWP has been issued.

6.3 Use of the RWP

- 6.3.1 Prior to the initial use of any RWP, the user(s) shall read, and sign Section VI (Personnel Authorized to Perform Work & Acceptance of Responsibility) of the RWP to indicate that he/she understands the requirements of the RWP. Any questions shall be answered by the Health Physics Supervisor.
- 6.3.2 Prior to the initial use of the RWP, the Health Physics Supervisor or his/her designee shall conduct a pre-job briefing with the work crew members.
- 6.3.2.1 Pre-job briefings shall be documented on Forms ATGF-025 (Industrial Hygiene/Safety) or ATGF-026 (Health Physics) and accompanied by a ATGF-027 Attendance Record.
- 6.3.3 The RWP user shall:
- * Sign in on the RWP sign-in sheet, ATGF-023, if applicable.
 - * Adhere to all RWP requirements.
 - * Contact Health Physics if work scope or job conditions change.
 - * Sign-out of the RWP when leaving the work area, if applicable.
 - * Wear dosimetry as prescribed by the RWP.
 - * Attend pre-job briefings and post-job briefings.
 - * Follow stop work instructions when issued.
- 6.3.4 A copy of the RWP will be kept at the work area location at all times.

6.4 RWP Modification or Extension

- 6.4.1 In the event that conditions or scope of the work changes that do not justify the generation of a new RWP, two modifications or extensions of the RWP may be made by the Health Physics Supervisor.
- 6.4.2 When modifying the RWP, all copies must be modified in the same manner.
- 6.4.3 The Health Physics Supervisor shall obtain all copies of the RWP and make the necessary changes. Each change shall be made in the following manner:
- * Each change will be made with a single line cross out of the text, or area of concern.

- * The Health Physics Supervisor shall initial and date adjacent to each change made to the RWP.
- * The Health Physics Supervisor can add any additional comments adjacent to the change, to help justify the change being made.

6.4.3.1 The modification of the RWP shall be annotated on all copies by placing "R-1" (first modification) or "R-2" (second modification) and the date in the upper right hand corner of the RWP.

6.4.3.2 A RWP may be modified or extended two times. In the event more changes are necessary, the RWP will be terminated and a new RWP generated.

6.4.4 Upon completion of the modification or extension of the RWP and prior to use, the approval/review signatories of the original RWP shall initial and note agreement with the modification by placing "R-1/initials" or "R-2/initials" and the date in the block for RWP approval by position.

6.4.5 The Health Physics Supervisor shall communicate all changes made to the RWP to the affected work crew, and work crew supervisors.

6.5 RWP Termination

6.5.1 The RWP shall be terminated by signing the "Termination" (Section I) block for any of the following reasons:

- * Job completion.
- * Significant change in work scope.
- * Significant change in radiological conditions that exceed RWP limits.
- * For cause (RWP violations).
- * RWP revision.
- * End of the calendar year.

6.5.2 Upon termination of an RWP, the original RWP will be retained in the permanent project file. All other copies will be kept at an ATG designated office.

7.0 RECORDS

The following records will be generated and retained in the permanent project file as a result of using this procedure.

- 7.1 ATGF-001 - Radiological Survey Report
- 7.2 ATGF-002 - Radiation Work Permit
- 7.3 ATGF-023 - RWP Sign-In Sheet
- 7.4 ATGF-024 - ALARA Considerations Form
- 7.5 ATGF-025 - Pre-Job Briefing Checklist (IH/Safety)
- 7.6 ATGF-026 - Pre-Job Briefing Checklist (Health Physics)
- 7.7 ATGF-027 - Training Attendance Record

FORMS AND EXHIBITS

8.1 Forms

- 8.1.1 ATGF-001 - Radiological Survey Report
- 8.1.2 ATGF-002 - Radiation Work Permit
- 8.1.3 ATGF-023 - RWP Sign-In Sheet
- 8.1.4 ATGF-024 - ALARA Considerations Form
- 8.1.5 ATGF-025 - Pre-Job Briefing Checklist (IH/Safety)
- 8.1.6 ATGF-026 - Pre-Job Briefing Checklist (Health Physics)
- 8.1.7 ATGF-027 - Training Attendance Record

8.2 Exhibits

- 8.2.1 RWP Radiation Protection Recommendations for RWP Generation

RADIATION WORK PERMIT (RWP)

WP #: _____

 Regular Extended

SECTION I

Contract #	Date: / /	Time:
Location/Project:		
Exposure Category: <input type="checkbox"/> D&D <input type="checkbox"/> Demolition <input type="checkbox"/> Waste Processing <input type="checkbox"/> CHAR		
Job Description: _____ _____		
Estimated Start Date: / /		Estimated End Date: / /

SECTION II

Existing Radiological Conditions:		
Radiation Survey No. _____ Airborne Survey No. _____ Contamination Survey No. _____		
Existing General Area Radiation Level(s): β γ N _____ mR/hr/ γ _____ mrad/hr/corrected β _____ mrem/hr/N	Existing General Contamination Levels: _____ dpm/100cm ² $\beta\gamma$ _____ dpm/100cm ² α	Airborne DAC Level(s): α _____ % P $\beta\gamma$ _____ % P _____ % H ₃
Existing Maximum Radiation Level(s): β γ N _____ mR/hr/ γ _____ mrad/hr/corrected β _____ mrem/hr/N	Existing Maximum Contamination Level(s) _____ dpm/100cm ² $\beta\gamma$ _____ dpm/100cm ² α	Hot Particle? <input type="checkbox"/> Yes <input type="checkbox"/> No

Remarks: _____

SECTION III

Radiological Limits:	
Maximum Allowed WB Exposure Rate γ N: _____ mr/hr or mrem/hr	Corrected β : _____ mrad/hr
Maximum Allowed Contamination Level $\beta\gamma$: _____ dpm/100cm ²	Maximum Extremity Exposure Rate: _____ mr/hr
Maximum Allowed Airborne Concentration Level: _____ % DAC	α : _____ dpm/100cm ²
Remarks: _____ _____	
Industrial Hygiene/Safety Concerns: _____ _____	

RADIATION WORK PERMIT (RWP)

RWP #: _____

Regular Extended

SECTION IV

WORKER REQUIREMENTS

<u>CLOTHING:</u>	<u>DOSIMETRY:</u>	<u>INSTRUCTIONS:</u>	<u>RESPIRATORY:</u>
<input type="checkbox"/> Coveralls <input type="checkbox"/> Lab Coat <input type="checkbox"/> Cloth Hood <input type="checkbox"/> Paper Coveralls <input type="checkbox"/> Plastic Suit <input type="checkbox"/> Plastic Booties <input type="checkbox"/> Rubber Shoe Covers <input type="checkbox"/> Canvas Shoe Covers <input type="checkbox"/> Cotton Gloves <input type="checkbox"/> Rubber Gloves <input type="checkbox"/> Leather Gloves <input type="checkbox"/> Beta Goggles/Face Shield <input type="checkbox"/> Extra <input type="checkbox"/> Other Clothing _____ _____ Stay Time (Heat Stress, Radiation, Exposure Limits, etc.): _____ hrs.	<input type="checkbox"/> TLD <input type="checkbox"/> Film Badge <input type="checkbox"/> SRD <input type="checkbox"/> Standard <input type="checkbox"/> Elbows <input type="checkbox"/> Gonad Pack <input type="checkbox"/> Hot Cell Entry <input type="checkbox"/> Extremity <input type="checkbox"/> Head Pack <input type="checkbox"/> Special <input type="checkbox"/> Knees <input type="checkbox"/> Varying Field <input type="checkbox"/> Upper Field <input type="checkbox"/> Ground Field <input type="checkbox"/> Alarming Dosimetry <input type="checkbox"/> None	<input type="checkbox"/> Contact HP for Line Breaks <input type="checkbox"/> Protect Cuts <input type="checkbox"/> Pre-Job Briefing <input type="checkbox"/> Post-Job Briefing <input type="checkbox"/> Contact HP Prior to Work in New Areas <input type="checkbox"/> Modesty Required <input type="checkbox"/> Site Specific Instructions <input type="checkbox"/> Equipment Monitor at Job End <input type="checkbox"/> Clean Up Work Area During and After Job <input type="checkbox"/> Eating, Drinking, Smoking, Chewing Prohibited <input type="checkbox"/> Frisk Upon Exiting Contaminated Area <input type="checkbox"/> Have Prescribed HP Coverage or Stop Work <input type="checkbox"/> Exit Area Immediately Upon Emergency or Injury. Notify HP Immediately	<input type="checkbox"/> FFNP <input type="checkbox"/> FFAL <input type="checkbox"/> SCBA <input type="checkbox"/> PAPR <input type="checkbox"/> Dusk Mask <input type="checkbox"/> Half Face <input type="checkbox"/> Bubble Hood <input type="checkbox"/> _____ <u>Cartridges:</u> <input type="checkbox"/> Particulate <input type="checkbox"/> Vapor <input type="checkbox"/> Combination <input type="checkbox"/> Other _____ _____ _____

Special Instructions: _____

SECTION V

Health Physics Requirements

1. Job Coverage: Continuous Intermittent Start End of Job
2. Air Sampling: General Area Breathing Zone Lapel AgZ
 Tritium/C-14 Particulate Charcoal LoVol HiVol
3. Exposure Rate Surveys: Start of Job Continuous Monitoring Area Monitoring
 Intermittent Monitoring End of Job
4. Contamination Surveys: Start of Job Continuous Monitoring
 Intermittent Monitoring End of Job
5. Is the ALARA Consideration Complete and Attached? Yes No Why? _____
6. Other: _____

ALARA CONSIDERATIONS

SECTION I: GENERAL INFORMATION

PROJECT:	RWP #:
JOB LOCATION:	START DATE:
PROJECT MANAGER:	END DATE:
JOB DESCRIPTION:	

SECTION II: PERSON-REM ESTIMATE (Total)

TASK No. & TITLE	ESTIMATE PERSON-HOURS	EFF. DOSE EQUIVALENT RATE (rem/hr)	ESTIMATE PERSON-REM

SECTION II - B: POST AND PRE-JOB DOSE ESTIMATES

Total Estimate (Pre-Job) Person-Rem:	Entered By:	Date:
Total Estimate (Post-Job) Person-Rem:	Entered By:	Date:

SECTION III: EXTERNAL RADIOLOGICAL CONTROLS

ALARA RECOMMENDATIONS	YES	NO	N/A	REMARKS
Decontamination				
Flushing/Filling				
Temporary Shielding				
Pre-Job Meeting				
Special Training (Mock-Up)				
Stay Time				
Post Low Dose Areas				
Other (Specify)				
CONTROLS IN LIEU OF RESPIRATORS				
Respiratory Protective Devices				
Full Face Particulate				
Supplied Air				
Self Contained Breathing Apparatus				
Other (Specify)				

ALARA CONSIDERATIONS - (continued)

SECTION IV: INTERNAL RADIOLOGICAL CONTROLS

CONTROLS IN LIEU of RESPIRATORS	YES	NO	N/A	REMARKS
Ventilation				
Decontamination				
Containments				
Relocation of Work				
Stay Time (DAC-Hours)				
Total Estimate (Pre-Job) Person-Rem:	Entered By:			Date:
Total Estimate (Post-Job) Person-Rem:	Entered By:			Date:

Prepared By: _____ Date: _____

Approved By: _____ Date: _____

Additional Approvals Required: YES NO (If YES, See below)

REQUIRED APPROVALS

RWP#:	Total Person-Rem Estimates		
Job Description:	Individual:		mrem
	Collective:		mrem
> 500 mRem INDIVIDUAL or > 5,000 mRem COLLECTIVE			
	NAME	SIGNATURE	DATE
Health Physics Supervisor			
RFO/Project Manager			
> 1,000 mRem INDIVIDUAL or > 10,000 mRem COLLECTIVE			
Health Physics Supervisor			
RFO/Project Manager			
ATG Corp. Health Physicist			

**PRE-JOB BRIEFING CHECKLIST
(Industrial Hygiene/Safety)**

Briefing is required for every job. Each of the following topics must be included in the briefing.

1. SAFETY REQUIREMENTS

All Industrial Safety Hazards discussed, such as:

	Yes	No	N/A
Confined Spaces			
Adequate Lighting			
Toxic or Explosive Gases			
IDLH			
Excessive Heat			
Housekeeping			
Hearing Protection:			
Hardhats:			
O ₂ Analyzer:			
Safety Glasses:			
Gloves: Type:			
Fire Protection			
Organic Vapor Monitor:			
Foot Protection			
Explosive/Combustible Gas Monitor:			

WORK AREA HAZARDS:

- A.
- B.
- C.
- D.
- E.
- F.

3. OTHER SAFETY REQUIREMENTS and/or SAFETY EQUIPMENT:

- A.
- B.
- C.
- D.
- E.
- F.

4. JOB SPECIFIC DISCUSSION:

- A.
- B.
- C.
- D.
- E.
- F.

Briefing Conducted By (Print / Sign)

Date / Time

**PRE-JOB BRIEFING CHECKLIST
(Health Physics)**

1. Identify Stop Work Authority:			
2. HP Coverage (Intermittent, continuous):			
3. Exposure Limitation/Goal:			
4. Conditions Expected (per RWP):			
Radiation	Contamination	Airborne	Neutron
Hot Particles	Potential Changes (debris, line-ups, opening systems, etc.)		
5. Review:			
Protective Clothing?	Yes	No	N/A
Respiratory Protection?			
Special Dosimetry?			
Air Sampling?			
Laydown Areas Set Up?			
Keys Available?			
Control Point?			
Communications Established?			
Special Instructions (per RWP)			
7. Radiological Hold Points: Identify criterion for each point:			
8. ALARA Considerations (shielding, decon, hot spots, low dose areas, etc.):			
A.			
B.			
C.			
9. Job Specific Discussion			
10. Turnover Frequency (every shift, day, etc):			
Must cover these topics:			
ALL WORKERS MUST SIGN ATTACHED TRAINING ATTENDANCE FORM ATGF-027.			
Health Physics Supervisor Review:			
Briefing Conducted By (Print / Sign)			Date / Time

EXHIBIT I

RWP RADIATION PROTECTION RECOMMENDATIONS FOR RWP GENERATION

PROTECTIVE CLOTHING AND EQUIPMENT

<p>>500 K dpm/100cm² loose βΓ and/or >50 K dpm/100cm² loose α</p>	<p>Cloth Coveralls Plastic Suit w/Hood 2 pr. Rubber Gloves 2 pr. Plastic Shoe Covers</p> <p>Cloth Hood Cotton Liners Rubber Overshoes</p> <p>Tape all openings Respiratory Protection</p>
<p>Wet conditions with loose contamination</p>	<p>Cloth Coveralls Plastic Suit w/Hood 2 pr. Rubber Gloves 2 pr. Plastic Shoe Covers</p> <p>Cloth Hood Cotton Liners Rubber Overshoes</p> <p>Tape all openings Respiratory Protection Respirators should be used based upon estimated re-suspension values</p>
<p>>50 K dpm/100cm² loose βΓ and/or >5 K dpm/100cm² loose α</p>	<p>Cloth Coveralls Paper Outer Coveralls 1 pr. Rubber Gloves 1 pr. Plastic Shoe Covers</p> <p>Cloth Hood Cotton Liners Rubber Overshoes</p> <p>Tape all openings Respiratory Protection based upon work scope</p>
<p>>1K dpm/100cm² loose βΓ and/or >20 dpm/100cm² loose α</p>	<p>Cloth or Paper Coveralls Cotton Liners 1 pr. Plastic Shoe Covers</p> <p>Cloth or Paper Hood 1 pr. Rubber Gloves Rubber Overshoes</p> <p>Tape all openings</p>

RECOMMENDED HEALTH PHYSICS RWP SURVEILLANCE FREQUENCIES

<p>0.2 mR/hr to 100 mR/hr</p>	<p>Pre-job briefing Worker review of radiological survey</p> <p>Intermittent coverage</p>
<p>100 mR/hr to 1000 mR/hr</p>	<p>Pre-job briefing Continuous coverage</p> <p>Worker review of radiological survey Alarming dosimeters</p>
<p>1000 mR/hr to 5000 mR/hr</p>	<p>Pre-job briefing Continuous coverage Staytime calculations Worker review of radiological survey</p> <p>ALARA briefing Alarming Dosimeters Reliable communication system</p>
<p>Hot Particle Controls</p>	<p>Pre-job briefing Continuous coverage w/particle surveys at specified frequencies</p> <p>Worker review of radiological survey</p>
<p>Radioactive System Breach</p>	<p>Pre-job briefing Continuous coverage during breach</p>

EXHIBIT 1 (continued)

RECOMMENDED DOSIMETRY FOR RWP USE

0.2 mR/hr to 100 mR/hr Whole Body	Whole Body TLD (or film badge) 0-200 mR PIC*
100 mR/hr to > 5000 mR/hr Whole Body	Whole Body TLD (or film badge) 0-500 mR PIC* 0-5 R PIC* Alarming dosimeter Staytime calculation (@ > 1R/hr)
Non-uniform Fields Whole Body	Multiple TLDs (or film badges) arrayed to monitor body locations Additional dosimetry as described above
> 5:1 ratio of extremity exposure rate to whole body exposure rate and at least 100 mR/hr	Extremity TLDs
> 3:1 beta eye exposure rate to gamma whole body exposure rate	Shield the eyes with safety glasses of at least 700 mg/cm ² density thickness or monitor eye exposure with a forehead TLD (or film badge)

* PIC Selection should be based on dose estimate, not dose rate.

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

DECONTAMINATION OF EQUIPMENT, MATERIALS, AND TOOLS

Allied Technology Group, Inc.
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Fremont, California 94538

Prepared by

D. Spicuzza

ALLIED TECHNOLOGY GROUP, INC.

PROCEDURE/PLAN APPROVAL PAGE

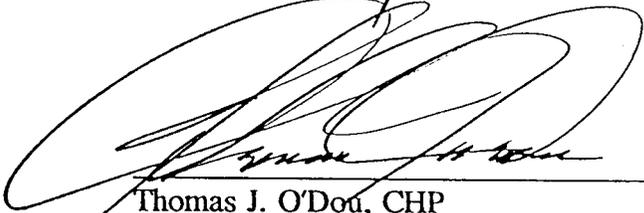
This procedure: Decontamination of Equipment, Materials and Tools has been reviewed and approved by the following:

APPROVAL SIGNATURES:



William G. Haney, Project Director

4/11/95
Date



Thomas J. O'Dou, CHP
Project Radiation Safety Officer
HP Technical Support

4/12/95
Date

**REVISION RECORD INDICATING
LATEST DOCUMENT REVISION**

Procedure Number: HP-OP-006

Title: Decontamination of Equipment, Materials and Tools

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DECONTAMINATION OF EQUIPMENT, MATERIALS, AND TOOLS

1.0 SCOPE

This procedure establishes the procedural requirements for the decontamination of equipment, material, and tools used on ATG, Inc. field projects contaminated with radioactive material.

2.0 PURPOSE

The purpose of this procedure is to provide a instruction for the decontamination of equipment, material, and tools. Each decontamination operation is unique; thus, this procedure provides general, effective decontamination techniques and guidelines to be utilized by A.T.G. field personnel. This document applies to all A.T.G. personnel involved in the decontamination process.

3.0 REFERENCES AND DEFINITIONS

3.1 References

- 3.1.1 HP-OP-001, Radiation and Contamination Survey Techniques
- 3.1.2 Regulatory Guide 1.86, Termination of Operating Licenses For Nuclear Reactors
- 3.1.3 HP-OP-002, Radiological Area Posting and Access Control
- 3.1.4 Allied Technology Group Respiratory Protection Program
- 3.1.5 HP-OP-003, Release of Material from Radiologically Controlled Areas
- 3.1.6 HP-OP-004, Issue and Use of Radiation Work Permits
- 3.1.7 HP-OP-005, Radioactive Material and Source Control

3.2 Definitions

- 3.2.1 Decontamination - The processes whereby contamination can be safely and effectively removed from equipment, tools and materials, to levels required by Reg. Guide 1.86.
- 3.2.2 Herculite - A plastic or polyethylene floor covering used for decontamination operations. HERCULITE is a brand name.

- 3.2.3 M.S.D.S. - Material Safety Data Sheet; Manufacturer directions, safety information and limitations for use of decontamination related solvents or cleaning solutions.
- 3.2.4 Radiation Work Permit (RWP) - A document generated by Health Physics to provide:
- 3.2.4.1 A description and scope of the work to be performed.
 - 3.2.4.2 The existing radiological conditions in the work area.
 - 3.2.4.3 The limitations placed upon the scope of work.
 - 3.2.4.4 The maximum radiological limits allowed.
 - 3.2.4.5 The protective measures to be employed during the work to protect the worker(s).
 - 3.2.4.6 The period of time the RWP is valid.
 - 3.2.4.7 Special instructions to workers and Health Physics Technicians during the course of work.
- 3.2.5 Shall - The word "shall" as used in this procedure is to be understood as denoting a mandatory requirement.
- 3.2.6 Should - The word "should" as used in this procedure is to be understood as denoting a recommendation that is a sound safety practice; it does not denote a mandatory requirement, however, is normally done unless job conditions require other actions.

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

- 4.1.1 All decontamination of contaminated tools or equipment shall be performed in accordance with the direction of the Health Physics Technician providing the job coverage in accordance with this Procedure, and the RWP requirements.
- 4.1.2 Decontamination activities shall be performed within a controlled area established in accordance with the provisions of Reference 3.1.3.
- 4.1.3 Controls to contain the spread of loose contamination during the decontamination activity shall be determined prior to the decontamination of equipment, material, and tools.

4.2 Limitations

- 4.2.1 Protective clothing worn by the personnel involved in decontamination activities shall be determined according to the RWP.
- 4.2.2 Decontamination cleaning solvents/solutions shall only be used in accordance with the directions and limitations listed on the manufacturer supplied MSDS. Decontamination solutions/solvents shall be approved by the Project Manager prior to use. Solvents/solutions requiring a ph adjustment shall be modified prior to use.
- 4.2.3 Respiratory protection devices required by the RWP for decontamination operations shall be selected and used in accordance with the provisions of Reference 3.1.4.
- 4.2.4 A pre-job briefing shall be held to instruct Decontamination Technicians of the conditions of the RWP. All personnel performing work in the decontamination area shall sign the RWP prior to work.
- 4.2.5 Every effort will be made by ATG personnel to avoid re-contamination of decontaminated materials. Contamination controls shall always be observed throughout a decontamination operation.
- 4.2.6 Radiation and contamination surveys shall be performed in accordance with the provisions of Reference 3.1.1.
- 4.2.7 Release of equipment, materials, and tools from the decontamination area shall be performed in accordance with the provisions of Reference 3.1.5.

5.1 Responsibilities

5.1.1 ATG Radiological Field Operations Manager

- 5.1.1.1 Implementation of this procedure.
- 5.1.1.2 Periodic reviews of the adherence of personnel to the requirements of this procedure.
- 5.1.1.3 Ensures the health Physics Technicians are qualified by knowledge, training and experience to perform the requirements of this procedure.

5.1.2 Health Physics Supervisor/Evaluator

- 5.1.2.1 The Health Physics Supervisor shall perform periodic surveillance of the decontamination operation and ensure adherence to applicable procedures.
- 5.1.2.2 The Health physics Supervisor shall write the RWP in accordance with the provisions of Reference 3.1.6.

- 5.1.2.3 The Health Physics Supervisor shall assign job coverage assignments to Health Physics Technicians.
 - 5.1.2.4 The Health Physics Supervisor shall assure that the RWP is up-to-date prior to decontamination activities.
 - 5.1.2.5 The Health Physics Supervisor or designee shall conduct the decontamination operation pre-job briefings.
 - 5.1.2.6 The Health Physics Evaluator shall provide release evaluations of decontaminated materials in accordance with the provisions of Reference 3.1.5.
- 5.1.3 Health Physics Technician
- 5.1.3.1 The Health Physics Technician shall provide constant or intermittent job coverage as required by the RWP.
 - 5.1.3.2 Prior to the start of decontamination operations, the Health Physics Technician shall assure that the area where decontamination is to be performed is properly established in accordance with Reference 3.1.3 and all engineering controls are in place and operable.
 - 5.1.3.3 The Health Physics technician performing the job coverage shall remain cognizant of changing radiological conditions which may require different levels of personal protection equipment and/or respiratory protection equipment than the levels originally assigned for a particular decontamination operation.
 - 5.1.3.4 The Health Physics Technician performing job coverage shall be responsible for enforcing the provisions of the RWP and ALARA considerations.
- 5.1.4 Junior Health Physics/Decontamination Technician
- 5.1.4.1 The Junior Health Physics/Decontamination Technician shall decontaminate ATG equipment and tools in accordance with the provisions of this procedure.
 - 5.1.4.2 The Junior Health Physics/Decontamination Technician shall adhere to the requirements of the RWP, and ALARA considerations. The Junior Health Physics/Decontamination Technician shall comply with all directions of the Health Physics Technicians.
 - 5.1.4.3 The Junior Health Physics/Decontamination Technician shall advise Health Physics supervision if the work scope or job conditions change.

6.0 PROCEDURE

6.1 Pre-Decontamination Preparation

- 6.1.1 The Project Manager shall initiate decontamination instructions.
- 6.1.2 A radiological survey shall be performed by a Health Physics Technician on any object which is to be removed from a controlled area.
- 6.1.3 If radiological survey results indicate that a RWP is required for decontamination, the Health Physics Supervisor shall write the RWP in accordance with the provisions of Reference 3.1.6.
- 6.1.4 If a survey indicates that decontamination is required, the item should be bagged, wrapped, or contained under the direction of Health Physics Supervision. The Health Physics Technician shall label the item in accordance with the provisions of Reference 3.1.7.
- 6.1.5 The Project Manager shall approve or disapprove the decontamination operation based on conditions of the RWP and the cost effectiveness of the operation versus disposal costs.

6.2 Establishment of the Decontamination Area

- 6.2.1 The Project Manager and the Health Physics Supervisor shall determine a location for set-up of the decontamination area.
- 6.2.2 Once a location has been established, the decontamination area shall be constructed by the Junior Health Physics/Decontamination Technicians under the direction of the Project Manager and Health Physics Supervisor.
- 6.2.3 The decontamination area should consist of:
 - 6.2.3.1 Herculited (or equivalent) floor surfaces. A double layer of Herculite (or equivalent) may be laid on the floor at the Health Physics Supervisor's direction.
 - 6.2.3.2 Herculited (or equivalent) wall surfaces, if applicable.
 - 6.2.3.3 Engineering controls (HEPA ventilation, vacuum cleaners, containment tent walls, glove bags, etc.), if applicable. Engineering controls shall be determined on the basis of the ALARA considerations section of the RWP. All possible engineering controls shall be utilized when feasible to minimize the usage of respiratory protection equipment.

- 6.2.3.4 Safe, sturdy work stations with contamination resistant surfaces. Tables that will support decontamination attempts on heavy pieces of equipment.
- 6.2.3.5 Adequate supply of overhead light, adequate electrical/compressed air supply for the operation of electrical/pneumatic driven decontamination equipment.
- NOTE: Use caution when decontaminating with compressed air tools to minimize spread of activity in the work area. A containment with filtered inlet and exhaust is recommended.**
- 6.2.3.6 Overhead lifting equipment, if applicable.
- 6.2.3.7 Adequate supply of ATG approved cleaning solutions and solvents; adequate supply of decontamination equipment such as:
- (a) Light duty decontamination equipment such as paper wipes, paper towels, masslinn towels, etc.
 - (b) Medium to Heavy duty decontamination equipment such as scrub pads, wire brushes, steel wool, files, sandpaper, etc.
 - (c) Fully stocked hand tool kit for disassembly of contaminated equipment.
 - (d) Power tools, such as drills, saws, needle guns, electric screwdrivers, etc.
 - (e) Radioactive material storage bags, stickers, etc.
 - (f) Buckets, barrels or drums for the storage of contaminated liquids, sludges or slurries, if applicable.
 - (g) Blotter paper or sorbent, if applicable.
 - (h) Approved absorbent material such as oil dry, etc., if applicable.
- 6.2.3.8 Storage drums/bags for the storage of contaminated protective clothing under direction of Health Physics supervision.
- 6.2.3.9 Proper surveillance instruments (air monitor/sampler, contamination monitor, friskers, dose rate meter, etc.) in accordance with the RWP.
- 6.2.3.10 Adequate supply of personal protective clothing, gloves, respiratory equipment, etc.

- 6.2.3.11 Step-Off Pad or Double Step-Off Pad in accordance with the provisions of the RWP.
- 6.2.3.12 A designated area within the decontamination area for the segregation of radwaste.
- 6.2.3.13 Fire extinguisher(s). If required.
- 6.2.4 Once the decontamination area has been established and stocked for operation, the bagged or wrapped contaminated or controlled equipment should be placed in the decontamination work area by Junior Health Physics/Decontamination Technicians under the direction of the Project Manager and the Health Physics Technician. Contaminated or controlled items should always be escorted by a Health Physics Technician to the decontamination area.

6.3 Decontamination

- 6.3.1 After radiological posting of the decontamination area, all requirements of the RWP shall be observed.
- 6.3.2 The preparation for decontamination of a particular tool, material, or piece of equipment shall be performed as follows:
 - 6.3.2.1 Position the wrapped item so that the written information on the wrapping is visible.
 - NOTE: Junior Health Physics/Decontamination Technicians may operate survey instrumentation for decontamination monitoring purposes. Health Physics Technicians shall oversee Junior Health Physics/Decontamination Technicians when survey instruments are in use. Survey instruments used in a known or suspected contaminated area should be protected (wrapped in plastic, poly, etc.) against possible contamination before use.**
 - 6.3.2.2 The Health Physics Technician shall direct the removal of the item from the wrapping in such a manner (rolling plastic wrapping inside out, etc.) to control the spread of contamination.
 - 6.3.2.3 An item that is highly contaminated with smearable contamination should be misted with an approved liquid. The water vapor will wet down the particulate contamination and help prevent the possibility of airborne contamination.
 - 6.3.2.4 Once the item has been removed from the wrapping and has been properly positioned, discard the wrapping as radwaste.
- 6.3.3 The following decontamination techniques should be considered for the decontamination of equipment, materials, and tools:

- 6.3.3.1 Any equipment with unaccessible areas shall be dismantled so that all surfaces are accessible for decontamination and for survey.
- 6.3.3.2 Decontamination shall be performed in a safe, effective manner.
- 6.3.3.3 The Health Physics Technician shall be notified IMMEDIATELY if the job conditions change (e.g. suspected asbestos found, presence of mercury in a switch or a light bulb, a fluid leak, or any other special circumstances).
- 6.3.3.4 A Junior Health Physics/Decontamination Technician shall be assigned as a firewatch if any spark creating decontamination techniques (grinding, etc.) are used. There shall be a dedicated fire extinguisher located within the decontamination area when these operations are done.
- 6.3.3.5 In order to secure a safe cleaning surface, the item should be positioned on the work table (if size and weight allow) and locked into a vise.
- 6.3.3.6 The decontamination area shall remain organized and free of debris. The Junior Health Physics/Decontamination Technicians shall "clean as they go."
- 6.3.3.7 A HEPA vacuum cleaner may be used during the decontamination operation for cleanup or for small volume ventilation (containments). Permanent facility ventilation shall not be used to vacuum debris.
- 6.3.3.8 Smearable Contamination Removal
- (a) When item is properly positioned for decontamination and the pre-survey has been completed, perform the following:
 - (b) Moisten the surface of the item with an approved liquid (e.g. pH adjusted SPRAY 9 or equivalent).
 - (c) Fold a paper or cloth wipe into sections, using one surface of the wipe, gently wipe contamination off in ONE direction AWAY from the body. This should reduce the possibility of personnel contamination.
 - (d) Re-fold the paper or cloth wipe so that a CLEAN surface is available (this should prevent cross-contamination) and continue until item is ready for survey.

- (e) For some materials, duct tape will effectively remove smearable contamination. Wrap the duct tape loosely around the gloved hand, ADHESIVE side OUT. Roll the tape over the contaminated area.
- (f) Re-survey.

6.3.3.9 Fixed Contamination Removal

CAUTION: High power removal techniques will make fixed activity loose and airborne. Controls to minimize contamination spread must be developed prior to the operation.

- (a) There are many techniques that can be used to remove fixed contamination. The techniques selected for a particular decontamination operation is at the discretion of the Project Manager and the Health Physics Technician. The techniques can be divided into the following categories:
 - Light hand decontamination
 - Abrasive hand decontamination
 - Power tool decontamination
 - Machine decontamination (use of abrasive bead blasters, grit blasters, high pressure water wash systems, etc.)

The specific implementation of these techniques is not included within the scope of this procedure.

- Cleaning solutions/solvents (use of ultrasonic cleaners, acid baths, electropolishing, etc.)

The specific implementation of these techniques is not included within the scope of this procedure.

- (b) Light hand decontamination consists of using many of the same techniques as described in Section 6.3.3.8 of this procedure.
- (c) Abrasive hand decontamination shall be performed in the following manner:

- Remove as much smearable contamination as possible as indicated in Section 6.3.3.8 of this procedure.
- Moisten the surface of the item(s) to contain contamination.
- Use an abrasive cleaning tool (e.g. sandpaper, steel wool, steel brush, hand grinder, etc.) to loosen fixed contamination. Clean in one direction ONLY and clean AWAY from the body to prevent personnel contamination.
- Continue to moisten the surface of the item(s) to contain contamination.
- Remove as much smearable contamination as possible per Section 6.3.3.8 of this procedure.
- Re-survey.

6.3.3.10 Power tool decontamination shall be performed in the following manner only under the direction of the Health Physics Technician.

NOTE: WHEN USING POWER TOOLS, ALWAYS CONSIDER THE POTENTIAL OF INJURY DUE TO THE HAZARDS INVOLVED. POWER TOOLS SHALL BE USED CAUTIOUSLY AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

- (a) Some of the electric power tools that can be used in decontamination operations are:
- drills - used to drill out contaminated areas, to disassemble contaminated components and when used with grinding wheels or disks, may be used as an abrasive tool
 - saws - used to separate contaminated pieces from clean pieces
 - grinders - used to grind fixed contamination from surfaces
 - electric screwdrivers - used in the disassembly of component parts

- (b) Some of the air-powered tools that can be used in decontamination operations are:
- Needle gun - a pneumatic tool which can remove contamination from concrete and/or steel surfaces
 - socket tools or impact hammer - used in disassembly of component parts
 - jackhammer/rotohammer - a pneumatic tool which can remove contamination from concrete and/or steel surfaces
- (c) Power tool decontamination shall be performed in the following manner:
- Remove as much smearable contamination as possible as indicated in Section 6.3.3.8 of this procedure.
 - Moisten the surface of the item lightly to contain contamination. Use a spray bottle for moistening. **DO NOT USE ELECTRIC POWER TOOLS ON A WET WORKING SURFACE. KEEP LIQUIDS AWAY FROM ELECTRIC POWER TOOLS.**
 - Whenever feasible the use of containment devices (e.g. glove box, etc.) should be used to contain the spread of contamination when using power tools for decontamination operations.
 - Use the power tool to remove fixed contamination. Clean in one direction **ONLY** and clean **AWAY** from the body to prevent personnel contamination.
 - Re-survey.

6.4 Post Decontamination

6.4.1 If the decontamination was successful, the Junior Health Physics/Decontamination Technician shall notify the Health Physics Technician who shall perform a free release survey in accordance with Reference 3.1.5.

6.4.1.1 If the item satisfies the criteria for release as in Reference 3.1.5 remove the item to a holding area for disposal and document results as in Reference 3.1.5.

- 6.4.1.2 If the item remains contaminated, attempt a second decontamination, then perform 6.4.1.1.
- 6.4.1.3 If the item remains contaminated, attempt a third decontamination ONLY by direction of the Project Manager.
- 6.4.2 If an item cannot be effectively or economically decontaminated, the Project Manager shall direct the ATG work crew to volume-reduce (reduce to component parts) the equipment, material, or tools as much as possible. The individual parts can be surveyed and released in accordance with Section 6.4.1.
- 6.4.3 If an item is volume-reduced to its component parts and decontamination is not feasible, the item parts shall be considered radwaste. Radwaste is to be segregated into similar materials for shipment purposes by the direction of the Project Manager. The Health Physics Supervisor shall direct the segregation of radwaste into the following categories:
- (a) steels, hard metals
 - (b) wood
 - (c) transite, fiber products
 - (d) paper
 - (e) rubber
 - (f) cloth (duct tape is considered a cloth)
 - (g) aluminum, soft metals (brass)
 - (h) glass
 - (i) concrete
 - (j) questionable items (e.g. light bulbs, pipe with lead solder, electronic component parts) which could be considered mixed or hazardous waste
 - (k) other categories, if applicable
- 6.4.4 After all decontamination operations have been completed a Health Physics Technician shall perform a release survey of the decontamination area and de-post the area in accordance with References 3.1.1, 3.1.2, 3.1.3, and 3.1.5.

7.0 RECORDS

The records generated by the use of this procedure are documented in accordance with the provisions of Reference 3.1.5 and Reference 3.1.6. No new records are created.

8.0 FORMS

- 8.1 ATGF-002 - Radiation Work Permit - shown in Reference 3.1.6
- 8.2 ATGF-006 - Smear Counting Analysis Report - shown in Reference 3.1.1
- 8.3 ATGF-001 - Radiological Survey Report - shown in Reference 3.1.1
- 8.4 ATGF-005 - Material Release Log - shown in Reference 3.1.5

RADIATION WORK PERMIT (RWP)

WP #: _____

Regular Extended

SECTION I

Contract #	Date: / /	Time:
Location/Project:		
Exposure Category: <input type="checkbox"/> D&D <input type="checkbox"/> Demolition <input type="checkbox"/> Waste Processing <input type="checkbox"/> CHAR		
Job Description: _____ _____		
Estimated Start Date: / / Estimated End Date: / /		

SECTION II

Existing Radiological Conditions:

Radiation Survey No. _____ Airborne Survey No. _____ Contamination Survey No. _____

Existing General Area Radiation Level(s): β γ N _____ mR/hr/ γ _____ mrad/hr/corrected β _____ mrem/hr/N	Existing General Contamination Levels: _____ dpm/100cm ² $\beta\gamma$ _____ dpm/100cm ² α	Airborne DAC Level(s): α _____ % P $\beta\gamma$ _____ % P _____ % H ₃
Existing Maximum Radiation Level(s): β γ N _____ mR/hr/ γ _____ mrad/hr/corrected β _____ mrem/hr/N	Existing Maximum Contamination Level(s) _____ dpm/100cm ² $\beta\gamma$ _____ dpm/100cm ² α	Hot Particle? <input type="checkbox"/> Yes <input type="checkbox"/> No

Remarks: _____

SECTION III

Radiological Limits:

Maximum Allowed WB Exposure Rate γ N: _____ mr/hr or mrem/hr

Corrected β : _____ mrad/hr Maximum Extremity Exposure Rate: _____ mr/hr

Maximum Allowed Contamination Level $\beta\gamma$: _____ dpm/100cm² α : _____ dpm/100cm²

Maximum Allowed Airborne Concentration Level: _____ % DAC

Remarks: _____

Industrial Hygiene/Safety Concerns: _____

RADIATION WORK PERMIT (RWP)

WP #: _____

Regular Extended

SECTION IV

WORKER REQUIREMENTS

<u>CLOTHING:</u>	<u>DOSIMETRY:</u>	<u>INSTRUCTIONS:</u>	<u>RESPIRATORY:</u>
<input type="checkbox"/> Coveralls <input type="checkbox"/> Lab Coat <input type="checkbox"/> Cloth Hood <input type="checkbox"/> Paper Coveralls <input type="checkbox"/> Plastic Suit <input type="checkbox"/> Plastic Booties <input type="checkbox"/> Rubber Shoe Covers <input type="checkbox"/> Canvas Shoe Covers <input type="checkbox"/> Cotton Gloves <input type="checkbox"/> Rubber Gloves <input type="checkbox"/> Leather Gloves <input type="checkbox"/> Beta Goggles/Face Shield <input type="checkbox"/> Extra <input type="checkbox"/> Other Clothing _____ _____ Stay Time (Heat Stress, Radiation, Exposure Limits, etc.): _____ hrs.	<input type="checkbox"/> TLD <input type="checkbox"/> Film Badge <input type="checkbox"/> SRD <input type="checkbox"/> Standard <input type="checkbox"/> Elbows <input type="checkbox"/> Gonad Pack <input type="checkbox"/> Hot Cell Entry <input type="checkbox"/> Extremity <input type="checkbox"/> Head Pack <input type="checkbox"/> Special <input type="checkbox"/> Knees <input type="checkbox"/> Varying Field <input type="checkbox"/> Upper Field <input type="checkbox"/> Ground Field <input type="checkbox"/> Alarming Dosimetry <input type="checkbox"/> None	<input type="checkbox"/> Contact HP for Line Breaks <input type="checkbox"/> Protect Cuts <input type="checkbox"/> Pre-Job Briefing <input type="checkbox"/> Post-Job Briefing <input type="checkbox"/> Contact HP Prior to Work in New Areas <input type="checkbox"/> Modesty Required <input type="checkbox"/> Site Specific Instructions <input type="checkbox"/> Equipment Monitor at Job End <input type="checkbox"/> Clean Up Work Area During and After Job <input type="checkbox"/> Eating, Drinking, Smoking, Chewing Prohibited <input type="checkbox"/> Frisk Upon Exiting Contaminated Area <input type="checkbox"/> Have Prescribed HP Coverage or Stop Work <input type="checkbox"/> Exit Area Immediately Upon Emergency or Injury. Notify HP Immediately	<input type="checkbox"/> FFNP <input type="checkbox"/> FFAL <input type="checkbox"/> SCBA <input type="checkbox"/> PAPR <input type="checkbox"/> Dusk Mask <input type="checkbox"/> Half Face <input type="checkbox"/> Bubble Hood <input type="checkbox"/> _____ <u>Cartridges:</u> <input type="checkbox"/> Particulate <input type="checkbox"/> Vapor <input type="checkbox"/> Combination <input type="checkbox"/> Other _____ _____ _____

Special Instructions: _____

SECTION V

Health Physics Requirements

1. Job Coverage: Continuous Intermittent Start End of Job
2. Air Sampling: General Area Breathing Zone Lapel AgZ
 Tritium/C-14 Particulate Charcoal LoVol HiVol
3. Exposure Rate Surveys: Start of Job Continuous Monitoring Area Monitoring
 Intermittent Monitoring End of Job
4. Contamination Surveys: Start of Job Continuous Monitoring
 Intermittent Monitoring End of Job
5. Is the ALARA Consideration Complete and Attached? Yes No Why? _____
6. Other: _____

