ATG Inc.

HP-IP-004
Revision 1

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

OPERATION AND CALIBRATION OF THE LUDLUM MODEL 9 ION CHAMBER

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

Prepared by:
D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: HP-IP-004, OPERATION AND CALIBRATION OF THE LUDLUM MODEL 9 ION CHAMBER, has been reviewed and approved by the following:

APPROVAL SIGNATURES:

William G. Haney, Project Director — Date: 4/12/95

Thomas J. O'Dou, CHP, Project Radiation Safety Officer, HP Technical Support — Date: 4/12/95

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-IP-004

Title: OPERATION AND CALIBRATION OF THE LUDLUM MODEL 9 ION CHAMBER

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	1	0	0	0	0	0

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	0									

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	4/1/94
1	11/11/94

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	1
Date	11/11/94
Approval	

1.0 SCOPE

This procedure sets forth the specific requirements to be used for the operation and calibration of the Ludlum Model 9 Ionization Chamber Radiation Detector for use on Allied Technology Group, Inc. field projects.

2.0 PURPOSE

The purpose of this procedure is to provide instructions for theoperation and calibration of the Ludlum Model 9 Ion Chamber in accordance with the requirements specified in Reference 3.1.1.

3.0 REFERENCES

3.1 References

3.1.1 Regulatory Guide 10.8, Rev.2-1987, Guide for the Preparations of Applications for Medical Use Programs.

3.1.2 ANSI N3.1-1987, Selection, Qualifications and Training of Personnel For Nuclear Power Plants.

3.1.3 Manufacturer's instruction manual for the Ludlum Model 9 Ion Chamber.

3.1.4 ANSI N323-1978, Instrument Test and Calibration.

3.1.5 HP-OP-001, Radiation and Contamination Survey Techniques.

3.1.6 HP-OP-002, Radiological Area Posting and Access Control.

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 The ion chamber is vented to atmosphere, it is sensitive to changes in atmospheric pressure and ambient temperature.

4.1.2 When the shield is open, protect the thin face against puncture damage.

4.1.3 When using this instrument in a known, or suspected contaminated area, seal the instrument in a protective media (i.e., plastic, poly) to prevent contamination of the instrument.

4.1.4 Check the zero setting during use on the low range. Adjust as necessary. Readjustment is not required on the higher ranges.

4.2 Limitations

4.2.1 The operation of the Model 9 depends on the condition of the battery. Therefore, the battery check should be performed before each use and periodically during use to ensure proper operation.

4.2.2 Calibration shall be performed semi-annually, after maintenance is performed, if the instrument fails the performance test or if proper operation is in question.

4.2.3 A daily performance test is required when the instrument is in use.

5.0 Responsibilities and Qualifications

5.1 Responsibilities

5.1.1 ATG Radiological Field Operations Manager shall be responsible to:

5.1.1.1 Implement this procedure.

5.1.1.2 Periodically review adherence to the requirements of this procedure.

5.1.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors shall:

5.1.2.1 Perform periodic surveillance of the use and maintenance of the instrument.

5.1.2.2 Ensure instruments in use are calibrated at specified intervals.

5.1.2.3 Ensure that records pertaining to the instrument are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians shall be responsible to:

5.1.3.1 Perform the requirements in Section 6.1, 6.2, 6.3 and 6.4 of this procedure.

5.1.3.2 Document all records in this procedure.

5.1.3.3 Notify Health Physics Supervision of any unsafe or unusual conditions observed during operation of the instrument.

5.1.4 Health Physics Instrument Personnel shall be responsible to:

5.1.4.1 Perform the requirements of Sections 6.2, 6.3, and 6.4 of this procedure.

5.2 Qualifications

5.2.1 Health Physics Technicians shall be qualified in accordance with the requirements of ANSI 3.1 - 1987 to operate this instrument for any of the following: Surveys, radiation work permits and job coverage.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this instrument under supervision of a Health Physics Technician meeting the requirements of section 5.2.1.

6.0 PROCEDURE

6.1 Operation

6.1.1 Verify that the instrument has a valid Calibration Data Sticker Label # ATGL-DCK and is not out of calibration, and the daily performance test has been completed and initialled on the Performance Test Daily Check Sticker. If the performance test has not been completed, have a Health Physics Technician perform the test (Section 6.3).

6.1.2 Inspect the instrument for any obvious physical damage which could interfere with its proper operation. Include inspection for loose, damaged knobs, buttons, broken or damaged meter movements/displays, dented or corroded instrument cases, punctured/deformed probe/probe window(s). Particular attention should be given to cables and connectors, since these components frequently become damaged or worn. Any instrument or detector having a questionable physical condition shall not be used until properly corrected.

6.1.3 Perform a battery check on the instrument by turning the range selector switch on the meter face to the "BAT" position. Observe the meter needle position on the meter face. Ensure the needle position is above the "BAT TEST" area on the meter face scale. If not, replace the batteries in accordance with Reference 3.3.1. and repeat the above test.

6.1.4 Turn the range selector swich on the meter face to the X1 range setting and wait approximately 5 minutes. Re-zero the meter in a low background radiation area by turning the zero adjust knob on the meter face to obtain a reading on the meter of zero, if necessary.

6.1.5 If the instrument fails any of the above checks, remove it from service, notify Health Physics Supervision, and arrange for repair of the meter.

6.1.6 Turn the audio switch switch on the meter face to the "ON" position.

6.1.7 For gamma exposure rates proceed as follows:

6.1.7.1 Ensure the β shield is covering the mylar window.

6.1.7.2 When entering a radiation area of unknown radiation levels turn the range selector switcch on the meter face to the highest scale X100 range (1 Rem/hr to 5 Rem/hr range) and scale down until a upscale meter needle deflection is observed on the meter scale face.

6.1.7.3 If possible, place the entire chamber volume in and perpendicular to the radiation field of interest.

NOTE: If the entire detector volume is not in the radiation field, detector response will be low by the fraction of the volume exposed.

6.1.7.4 Allow sufficient time for the meter to respond. The Ludlum Model-9 instrument has a response time of approximately 3 seconds to achieve 90% of full scale.

6.1.7.5 Proceed with use of the instrument.

6.1.8 Determine the presence of β radiation as follows:

6.1.8.1 Obtain a γ exposure rate measurement in accordance with Step 6.1.7 of this procedure. β shield closed {closed window (CW)}.

6.1.8.2 Slide the β shield back exposing the mylar window.

6.1.8.3 Take an open window (OW) reading.

6.1.8.4 A higher reading with the β shield open indicates the presence of β radiation.

NOTE: In situations where very low photons are encountered, the phenolic shield may attenuate these photons. In such cases, the low energy photons may appear to be beta radiation.

6.1.9 Determine the approximate β dose rate for contact/surface exposure rates as follows:

6.1.9.1 Take a γ exposure rate reading (CW) with approximately 1/2" from the surface of interest.

6.1.9.2 Slide back the β shield and take a reading with the mylar window open (OW) at the same location.

6.1.9.3 Using the β correction (BCF), calculate the approximate β exposure rate as follows:

β exposure rate = BCF X (OW-CW)

6.1.10 For 30cm β exposure rates:

6.1.10.1 Take a γ reading (CW) approximately 30cm from the source.

6.1.10.2 Slide back the β shield and take a reading with the mylar window open (OW) at the same location.

6.1.10.3 Using a BCF of 1.5, calculate the approximate β exposure rate as follows:

β exposure rate = BCF(1.5) X (OW-CW)

6.1.11 Surveys under unusual atmospheric conditions:

6.1.11.1 These ion chambers are vented to atmospheric pressure and are sensitive to changes in pressure and temperature. The error, however, is approximately < 10% for temperatures between 40°F to 120°F and 10% for altitude changes of 2,000 feet.

6.1.11.2 If the instrument is to be used outside these ranges, refer to Reference 3.1.3 for correction factors.

6.1.12 Return of the instrument after surveys.

6.1.12.1 After completion of a survey, perform a battery check, (Section 6.1.3 of this procedure) and decontaminate as applicable, and return the instrument to its proper storage location.

6.1.12.2 If the battery check indicates an unsatisfactory condition, survey results should be evaluated by Health Physics Supervision.

6.2 Calibration

6.2.1 Calibration shall be performed by the manufacturer or a qualified vendor.

NOTE: The Health Physics Technician or Health Physics Instrument Technician shall perform steps 6.2.2 through 6.2.7 of this procedure.

6.2.2 Upon receipt from the manufacturer or qualified vendor, perform a physical inspection of the instrument. Record as satisfactory or unsatisfactory on ATGF-015.

6.2.3 Perform a battery check; replace if necessary. Record as satisfactory or unsatisfactory on ATGF-015.

6.2.4 Determine contact beta correction factor as follows:

6.2.4.1 Obtain the depleted uranium slab. Utilizing fixed geometry, perform a Closed Window Source Reading. Record results on ATGF-015.

6.2.4.2 Perform an Open Window Source Reading. Record results on ATGF-015.

6.2.4.3 Record the actual beta dose rate from the depleted uranium slab as indicated on the source assay certificate on ATGF-015.

6.2.4.4 Calculate the Beta Correction Factor (BCF) as follows:

$$BCF = \frac{\text{Actual Beta Dose Rate}}{\text{OPEN Window} - \text{CLOSED Window}}$$

NOTE: Calculated BCF is to be used for contact readings only. BCF for 30cm readings is 1.5.

6.2.4.5 Record the BCF on ATGF-015.

6.2.5 Determine performance test reference data.

6.2.5.1 Record the Cs-137 source serial number on ATGF-015.

6.2.5.2 Perform an Open Window Source Reading with the Cs-137 source in contact with the mylar window. Record results on ATGF-015.

6.2.5.3 Calculate the reference value range ± 10% of the source reading anf record results on ATGF-015.

6.2.6 Attach the manufacturer or qualified vendor's Calibration Data Sheet to ATGF-015.

6.2.7 If the above calibration steps are completed satisfactorily, attach a completed Calibration Data Sticker Label # ATGL-DCK and a Performance Test Daily Check Sticker to the instrument. Complete Section 3 of ATGF-015.

6.3 Performance Test

6.3.1 Do a performance test on the instrument and record all data on ATGF-003, Daily Instrument Performance Test Log.

6.3.2 Obtain the performance test source designated by the ATGF-015, and Label # ATGL-DCK on the instrument.

6.3.3 Record the information for each section of ATGF-003.

6.3.4 Examine the instrument for any obvious physical damage which could interfere with its proper operation.

6.3.5 Verify that the instrument has a current Calibration Data Sticker Label # ATGL-DCK, and a Performance Test Daily Check Sticker.

6.3.6 Turn the range selector switch to the "BAT" position and check that the battery is within the "BAT TEST" range on the meter scale face.

6.3.7 Turn the range selector switch to the X1 position and perform a zero check on the instrument. Adjust the "ZERO ADJUST" knob on the meter face to obtain a reading of zero if necessary.

6.3.8 Expose the detector to the designated source. If the response is within the designated range for the source, record "P" for pass on the Daily Instrument Performance Test Log. If the instrument fails, record "F" for fail and remove the

instrument from service for repair or calibration.

6.3.9 If the instrument passes the performance test, initial the Performance Test Daily Check Sticker on the instrument and initial the Daily Instrument Performance Test Log (ATGF-003).

6.4 Maintenance

6.4.1 Instruments shall be stored in areas which prevent damage by movement, accumulation of moisture or dust. Detector covers shall be used for storage when practical.

6.4.2 Electronic maintenance shall be performed by an Health Physics Instrumentation Technician or by the manufacturer or an approved vendor.

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-003, Daily Instrument Performance Test Log

7.2 ATGF-015, Instrument Service Record - Ludlum Model 9

8.0 FORMS

8.1 ATGF-003, Daily Instrument Performance Test Log

8.2 ATGF-015, Instrument Service Record - Ludlum Model 9

DAILY INSTRUMENT PERFORMANCE TEST LOG SHEET

Page _____ of _____

PROJECT:

DATE	MODEL/TYPE	S/N	PHYSICAL DAMAGE Y/N	CAL DUE DATE	SOURCE I.D.	ACTIVITY	BKRD	READING	EFF	PASS/ FAIL P/F	TECH INIT

INSTRUMENT SERVICE RECORD- LUDLUM MODEL 9

SECTION 1: INSTRUMENT DATA	
Model 9 Serial Number:	Calibration Date:
Depleted Uranium Source Serial Number:	Assay Date:

SECTION 2: CALIBRATION DATA		
Note: See Attached Calibration Data Sheet for the Dose Rate Calibration		
Physical Condition	☐ Satisfactory	☐ Unsatisfactory
Battery Test	☐ Satisfactory	☐ Unsatisfactory
Beta Correction Factor:	Actual Beta Dose Rate / OPEN Window _____ - CLOSED Window _____	= BCF

Cs-137 Source Serial Number	Source Reading	Range 10% of Source Reading

SECTION 3: REMARKS	
Checked By:	Date:
Calibration Due Date:	Date:
Reviewed By:	Date:

ATG Inc.

HP-IP-006
Revision 0

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

CONTROL AND ISSUANCE OF POCKET IONIZATION CHAMBERS (PICs)

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

Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: Control And Issuance Of Pocket Ionization Chambers (PICs) 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-IP-006

Title: Control And Issuance Of Pocket Ionization Chambers (PICs)

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0			

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.										

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	9/19/94

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	0
Date	9/19/94
Approval	9/19/94

CONTROL AND ISSUANCE OF POCKET IONIZATION CHAMBERS (PICs)

1.0 SCOPE

This procedure shall provide the guidelines for the issuance and control of pocket ionization chamber instruments used on A.T.G. field projects.

2.0 PURPOSE

This procedure ensures that proper issuance and control of Pocket Ionization Chambers (PICs) and is performed in accordance with
the provisions of documents in Section 3.1 of this procedure.

3.0 REFERENCES AND DEFINITIONS

3.1 References

3.1.1 HP-OP-004, Issue and Use of Radiation Work Permits (RWPs).

3.1.2 HP-OP-002, Radiological Area Posting and Access Control.

3.1.3 HP-IP-005, Calibration of Pocket Ionization Chambers.

3.1.4 Regulatory Guide 8.4, Direct Reading and Indirect Reading Dosimeters.

3.1.5 ANSI N322, Inspection and Test Specifications for Direct and Indirect Reading Dosimeters.

3.1.6 Manufacturer's technical manual(s).

3.2 Definitions

3.2.1 **Pocket Ionization Chamber (PIC)** - A small, portable ion chamber provided with an internal electroscope that can be read on an internal scale. These ion chambers allow the integrated gamma dose to be checked periodically by the user. A PIC may also be known as a self-reading dosimeter (SRD) or direct reading dosimeter (DRD).

4.0 PRECAUTIONS, LIMITATIONS

4.1 PICs shall receive a calibration check every six (6) months.

4.2 Any PIC lacking a current calibration sticker shall be considered OUT OF SERVICE and returned to the designated A.T.G. location.

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 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 Ensure personnel are qualified to perform the requirements of this procedure and have a working knowledge of PICs.

5.2 Health Physics Supervisors shall:

5.2.1 Perform periodic surveillance of the use and maintenance of the PICs.

5.2.2 Ensure PICs are calibrated at specified intervals.

5.2.3 Maintain an inventory of PIC locations and users.

5.3 Health Physics Technicians shall be responsible for:

5.3.1 Collection of PICs requiring calibration and notification of Health Physics Supervisor.

5.3.2 Performing release surveys on the PICs requiring calibration.

5.3.3 Ensuring all personnel issued PICs are using the PIC correctly in accordance with the provisions of the RWP.

5.4 Escorts shall:

5.4.1 Return PICs issued to any personnel in their group.

5.5 Any personnel issued a PIC shall:

5.5.1 Make sure the dosimeter issued always has a valid, dated calibration sticker.

5.5.2 Read the PIC and act upon the indication as required by the RWP and the Health Physics Technician.

6.0 PROCEDURE

6.1 Control of PICs

6.1.1 The Health Physics Supervisor shall maintain a copy of an updated inventory of all A.T.G. PICs at the job site.

6.1.2 When the PICs are due for calibration check, the Health Physics Supervisor shall determine the location of the PICs, collection of the PICs, and arrange for recalibration of the PICs.

6.2 Issuance of PICs

6.2.1 Calibrated PICs shall be stored for issue at a designated location at the A.T.G. job site.

6.2.2 A PIC charger shall be maintained at the A.T.G. job site. PICs shall be rezeroed prior to issuance and each day before work.

6.2.3 Health Physics shall issue PICs to cover 10% of a group of visitors. If visitors intend to separate at any time while in a controlled area, each group will be assigned the required 10%, with a minimum of two visitors in each group having a PIC assigned to them.

6.2.4 When issuing a PIC to a visitor, Health Physics personnel shall assign a 0-200 mr PIC, note the serial number, and complete the PIC issue log, ATGF-018, with all pertinent information.

6.2.4.1 Visitors may be required to enter a radiological area and/or an RWP required area, the PIC requirements will be decided by the Health Physics Supervisor and PICs will be issued accordingly.

6.2.5 Health Physics Supervisors shall determine the need for PIC issuance in accordance with References 3.1.1 and 3.1.2.

6.2.5.1 PICs shall not be issued to individuals for extended use. PICs shall be issued on an as needed or job duration basis.

6.2.5.2 A.T.G. staff may self issue PICs in accordance with the provisions of this procedure.

6.2.6 At the time of issue Health Physics personnel should instruct visitors being issued the PIC:

6.2.6.1 On the proper reading of the PIC and action to be taken upon off-scale indication of the PIC.

6.2.6.2 That if the PIC is dropped or mishandled, readings may not be indicative of true exposure. If this happens notify Health Physics personnel immediately.

6.2.6.3 PICs shall be worn adjacent to the TLD or film badge during work periods. In all instances, PICs shall be returned to Health Physics, or proper storage location, at the end of the day.

6.3 Return of PICs

6.3.1 PICs shall be returned to issue point upon completion of shift or after the completion of RWP requirements.

6.3.2 At the completion of the RWP work, or the end of the work day, temporarily assigned PICs shall be returned to the issuance point.

6.3.3 Lost and damaged PICs shall be handled in accordance with the provisions of Reference 3.1.1.

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-018, PIC Issue Log.

8.0 FORMS

8.1 ATGF-018, PIC Issue Log.

PIC ISSUE LOG

oject/Location:_____ (Please Print)

Name	TLD #	Company	Range	Serial Number	Date Issued	Date Returned	Initials Out	Initials In

ATG Inc.

HP-IP-007
Revision 0

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

OPERATION AND CALIBRATION OF THE MODEL LV-1 LOW VOLUME AIR SAMPLER

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

Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: HP-IP-007 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-IP-007

Title: Operation and Calibration of the Model LV-1 Low Volume Air Sampler

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0	0	0	

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.										

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	10/20/93

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	0
Date	10/20/93
Approval	12/23/93

OPERATION AND CALIBRATION OF THE MODEL LV-1 LOW VOLUME AIR SAMPLER

1.0 SCOPE

This procedure sets forth the specific requirements to be used for the operation and calibration of the F & J Specialty Products Model LV-1 low volume air samplers used on Allied Technology Group, Inc. field projects.

2.0 PURPOSE

The purpose of this procedure is to provide instructions for the operation, use, and calibration of the F & J Specialty Products Model LV-1 low volume air samplers in accordance with the requirements of Reference 3.1.

3.0 REFERENCES

3.1 References

3.1.1 Regulatory Guide 10.8, Rev. 2-1987, Guide for the Preparation of Applications for Medical Use Programs

3.1.2 ANSI N3.1-1987, Selection, Qualification and Training of Personnel for Nuclear Power Plants

3.1.3 HP-OP-010, Air Sampling and Analysis

3.1.4 Technical Manual for the F & J Specialty Products Model LV-1 Regulated Low Volume Air Sampler

3.1.5 HP-OP-005, Control of Radioactive Material

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Do not operate air samplers in an explosive environment unless the air sampler is specifically certified and designated for such use.

4.1.2 Ensure the power switch is in the "off" position prior to plugging any air sampling devices into electrical outlets.

4.1.3 Air samplers shall be considered internally contaminated and controlled in accordance with Reference 3.1.5.

4.2 Limitations

4.2.1 Calibration shall be performed annually, after maintenance is performed, or if the air sampler proper operation is in question.

4.2.2 Calibration shall be performed by the manufacturer or a qualified vendor only.

4.2.3 True flow is center of the rotometer ball reading.

4.2.4 Some rotometers are calibrated in liters per minute (LPM) vice cubic feet per minute (CFM). 1 CFM = 28.32 LP

4.2.5 Air samplers shall be operated in accordance with this procedure and Reference 3.1.3.

4.2.6 Only F & J TEDA impregnated (or equivalent) charcoal cartridges shall be used during operation of the air samplers.

4.2.7 Only F & J Model FP47 type (or equivalent) filters should be used for particulate air sampling.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

5.1.1 The ATG Radiological Field Operations Manager (Project Manager) is responsible for:

5.1.1.1 Implementation of this procedure.

5.1.1.2 Periodic reviews of adherence to the requirements of this procedure.

5.1.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors are responsible to:

5.1.2.1 Perform periodic surveillance of the use and maintenance of the air sampler.

5.1.2.2 Ensure the air samplers are calibrated at specified intervals.

5.1.2.3 Ensure that records pertaining to use and maintenance of air samplers are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians are responsible for:

5.1.3.1 Performance of the requirements of this procedure.

5.1.3.2 Documentation of all records in this procedure.

5.1.3.3 Notification to Health Physics Supervision of any unsafe or unusual conditions observed during operation of the air sampler.

5.2 Qualifications

5.2.1 Health Physics Technicians shall be qualified in accordance with the requirements of ANSI 3.1 - 1987 to operate this air sampler.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this air sampler under supervision of a Health Physics Technician meeting the requirements of Section 5.2.1.

6.0 PROCEDURE

6.1 Operation

6.1.1 Preparation

6.1.1.1 Upon receipt of the air sampler from the manufacturer or qualified vendor, complete form ATGF-028 and place a copy with the air sampler.

6.1.1.2 Verify that the instrument has a valid Calibration Data Sticker, Exhibit Label #ATGL-ASC.

6.1.1.3 Inspect the air sampler for any obvious physical damage.

6.1.1.4 Air sampling equipment should be prepared prior to entering work areas in order to minimize potential contamination of equipment.

6.1.1.5 Check for adequate power supply prior to entering the work area.

6.1.1.6 The Model LV-1 air sampler is provided with a six and one-quarter amp fuse for overload protection. Check the fuse located near the on/off power switch prior to air sampler operation. Replace if necessary.

6.2 Sample Collection

6.1.2.1 Air samples shall be collected in accordance with the provisions of Reference 3.1.3.

6.1.2.2 Load a new particulate and new charcoal cartridge (if applicable) into the sample holder. Particulate filter should be placed "fuzzy" side in (away from the flow). Charcoal cartridge should be placed in the sampler with the air flow indicator facing toward the pump.

NOTE: An inspection of the sample holder should be made prior to the placing of the filter(s) in the holder. Insure all O-rings are in place prior to use of the sample holder.

6.1.2.3 Connect the sample holder to the air sampler inlet connection via the quick disconnect coupling. Insure the sample holder "clicks" into position.

6.1.2.4 Place the air sampler in a position that is appropriate for the area to be sampled.

6.1.2.5 Turn on the air sampler and observe the flow rate. Using the Calibration Data Sticker (Label # ATGL-ASC) as a reference; adjust the flow rate by rotating the flow adjustment knob at the bottom of the air flow regulator to the desired flow rate. Clockwise movement increases flow; counter clockwise movement decreases flow.

6.1.2.6 Record the sample start date/time and flow rate on the appropriate forms in accordance with the provisions of Reference 3.1.3.

6.1.2.7 Run the sampler until a volume indicated in Reference 3.1.3 has been collected.

6.1.2.8 Upon collection of the desired volume, observe the flow rate to ensure it has not changed significantly, and turn off the air sampler.

6.1.2.9 Record the stop time and flow rate on the appropriate forms in accordance with the provisions of Reference 3.1.3.

6.1.2.10 Remove the filter and cartridge (if applicable) from the sample holder and place them in an envelope or bag taking care not to cross contaminate the filter and cartridge.

6.1.2.11 Count the filter(s) in accordance with the provisions of Reference 3.1.3.

6.2 Maintenance

6.2.1 No special storage requirements.

6.2.2 Electrical repair of this instrument shall be performed by the manufacturer or an approved vendor only.

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-028, Instrument Service Record - Low Volume Air Sampler

7.2 ATGL-ASC, Calibration Data Sticker

8.0 FORMS

8.1 ATGF-028, Instrument Service Record - Low Volume Air Sampler

8.2 ATGL-ASC, Calibration Data Sticker (Label)

EXHIBIT 8.2

AIR SAMPLER CALIBRATION DATA STICKER (LABEL)

ATGL-ASC

Air Sampler Calibration

Gauge Model No. _____

Gauge Serial No. _____

Pump Model No. _____

Pump Serial No. _____

Calibration Date:

Calibration Due Date:

Indicated Flow	Actual Flow

Calibrated By: _____

INSTRUMENT SERVICE RECORD
LOW VOLUME AIR SAMPLER

SECTION 1: INSTRUMENT DATA		
AIR SAMPLER SERIAL NO:	MAKE:	MODEL:
CALIBRATION DATE:	CALIBRATION DUE DATE:	

SECTION 2: CALIBRATION DATA		
PHYSICAL CONDITION OF INSTRUMENT:	☐ SATISFACTORY	☐ UNSATISFACTORY

SECTION 3: REMARKS

REVIEWED BY:	DATE:

ATG Inc.

HP-IP-008
Revision 0

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

OPERATION AND CALIBRATION OF THE MODEL H-9400 HIGH VOLUME AIR SAMPLER

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

Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: HP-IP-008 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-IP-008

Title: Operation and Calibration of the Model H-9400 High Volume Air Sampler

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0	0	0	

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.										

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	10/20/93

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	0
Date	10/20/93
Approval	

OPERATION AND CALIBRATION OF THE MODEL H-9400 HIGH VOLUME AIR SAMPLER

1.0 SCOPE

This procedure sets forth the specific requirements to be used for the operation and calibration of the F & J Specialty Products Model H-9400 High Volume Air Samplers used on Allied Technology Group, Inc. field projects.

2.0 PURPOSE

The purpose of this procedure is to provide instructions for the operation, use, and calibration of the F & J Specialty Products Model H-9400 High Volume Air Samplers in accordance with the requirements of Reference 3.1.

3.0 REFERENCES

3.1 References

3.1.1 Regulatory Guide 10.8, Rev. 2-1987, Guide for the Preparation of Applications for Medical Use Programs

3.1.2 ANSI N3.1-1987, Selection, Qualification and Training of Personnel for Nuclear Power Plants

3.1.3 HP-OP-010, Air Sampling and Analysis

3.1.4 Technical Manual for the F & J Specialty Products Model H-9400 High Volume Air Sampler

3.1.5 HP-OP-005, Control of Radioactive Material

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Do not operate air samplers in an explosive environment unless the air sampler is specifically certified and designated for such use.

4.1.2 Ensure the power switch is in the "off" position prior to plugging any air sampling devices into electrical outlets.

4.1.3 Air samplers shall be considered internally contaminated and controlled in accordance with Reference 3.1.5.

4.2 Limitations

4.2.1 Calibration shall be performed annually, after maintenance is performed, or if the air sampler proper operation is in question.

4.2.2 Calibration shall be performed by the manufacturer or a qualified vendor only.

4.2.3 Air samplers shall be operated in accordance with this procedure and Reference 3.1.3.

4.2.4 Some gauges are calibrated in liters per minute (LPM) vice cubic feet per minute (CFM). 1 CFM = 28.32 LPM

4.2.5 Only F & J Model FP-4.0 (4 inch) type (or equivalent) filters should be used for particulate air sampling.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

5.1.1 The ATG Radiological Field Operations Manager (Project Manager) is responsible for:

5.1.1.1 Implementation of this procedure.

5.1.1.2 Periodic reviews of adherence to the requirements of this procedure.

5.1.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors are responsible to:

5.1.2.1 Perform periodic surveillance of the use and maintenance of the air sampler.

5.1.2.2 Ensure the air samplers are calibrated at specified intervals.

5.1.2.3 Ensure that records pertaining to use and maintenance of air samplers are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians are responsible for:

5.1.3.1 Performance of the requirements of this procedure.

5.1.3.2 Documentation of all records in this procedure.

5.1.3.3 Notification to Health Physics Supervision of any unsafe or unusual conditions observed during operation of the air sampler.

5.2 Qualifications

5.2.1 Health Physics Technicians shall be qualified in accordance with the requirements of ANSI 3.1 - 1987 to operate this air sampler.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this air sampler under the direct supervision of a Health Physics Technician meeting the requirements of section 5.2.1.

PROCEDURE

6.1 Operation

6.1.1 Preparation

6.1.1.1 Upon receipt of the air sampler from the manufacturer or qualified vendor, complete Form ATGF-029 and place a copy with the air sampler.

6.1.1.2 Verify that the instrument has a valid Calibration Data Sticker, Exhibit Label # ATGL-ASC.

6.1.1.3 Inspect the air sampler for any obvious physical damage.

6.1.1.4 Air sampling equipment should be prepared prior to entering work areas in order to minimize potential contamination of equipment.

6.1.1.5 Check for adequate power supply prior to entering the work area.

6.2 Sample Collection

6.1.2.1 Air samples shall be collected in accordance with the provisions of Reference 3.1.3.

6.1.2.2 Load a new 4" particulate filter into the filter holder by unscrewing (counter-clockwise) the outer retaining ring on the filter holder.

Particulate filter should be placed "fuzzy" side in (away from the flow). After filter is centered in the filter holder, screw back on the outer retaining ring (clockwise). Hand tighten only.

NOTE: An inspection of the filter holder should be made prior placing the filter in the holder. Ensure the mesh backing screen is in place and not damaged. Ensure the flow gauge is not damaged and is securely fit into the air sampler exhaust port.

6.1.2.3 Place the air sampler in a position that is appropriate for the area to be sampled.

6.1.2.4 Turn on the air sampler and observe the flow rate on the gauge. Using the Calibration Data Sticker (Label # ATGL-ASC) as a reference; record the sample start date/time and flow rate on the appropriate forms in accordance with the provisions of Reference 3.1.3.

6.1.2.5 Run the sampler until a volume indicated in Reference 3.1.3 has been collected.

6.1.2.6 Upon collection of the desired volume, observe the flow rate to ensure it has not changed significantly, and turn off the air sampler.

6.1.2.7 Record the stop time and flow rate on the appropriate forms in accordance with the provisions of Reference 3.1.3.

6.1.2.8 Remove the filter from the filter holder and place it in an envelope or bag taking care not to cross contaminate the filter.

6.1.2.11 Count the filter in accordance with the provisions of Reference 3.1.3.

6.2 Maintenance

6.2.1 No special storage requirements.

6.2.2 Electrical repair of this instrument shall be performed by the manufacturer or an approved vendor only.

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-029, Instrument Service Record - High Volume Air Sampler

7.2 ATGL-ASC, Calibration Data Sticker Label

8.0 FORMS

8.1 ATGF-029, Instrument Service Record - High Volume Air Sampler

8.2 ATGL-ASC, Calibration Data Sticker

EXHIBIT 8.2

AIR SAMPLER CALIBRATION DATA STICKER (LABEL)

ATGL-ASC

Air Sampler Calibration

Gauge Model No. _____

Gauge Serial No. _____

Pump Model No. _____

Pump Serial No. _____

Calibration Date:

Calibration Due Date:

Indicated Flow	Actual Flow

Calibrated By: _____

INSTRUMENT SERVICE RECORD
HIGH VOLUME AIR SAMPLER

SECTION 1: INSTRUMENT DATA		
AIR SAMPLER SERIAL NO:	MAKE:	MODEL:
CALIBRATION DATE:	CALIBRATION DUE DATE:	

SECTION 2: CALIBRATION DATA		
PHYSICAL CONDITION OF INSTRUMENT:	☐ SATISFACTORY	☐ UNSATISFACTORY

SECTION 3: REMARKS

REVIEWED BY:	DATE:

ATG, INC.

HP-IP-011
Revision 0

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS
HEALTH PHYSICS OPERATING PROCEDURE

OPERATION OF THE LUDLUM MODEL 18 ANALYZER WITH THE LUDLUM MODEL 43-68 GAS PROPORTIONAL DETECTOR

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

Prepared by
D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

This procedure: HP-IP-011, OPERATION OF THE LUDLUM MODEL 18 ANALYZER WITH THE LUDLUM MODEL 43-68 GAS PROPORTIONAL DETECTOR, has been reviewed and approved by the following:

APPROVAL SIGNATURES:

William G. Haney, Project Director — 4/10/95 Date

Thomas J. O'Dou, CHP, Project Radiation Safety Officer, HP Technical Support — 4/10/95 Date

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-IP-011

Title: OPERATION OF THE LUDLUM MODEL 18 ANALYZER WITH THE LUDLUM MODEL 43-68 GAS PROPORTIONAL DETECTOR

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0			

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.										

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	2/16/95

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	2
Date	2/16/95
Approval	

OPERATION OF THE LUDLUM MODEL 18 ANALYZER WITH LUDLUM MODEL 43-68 GAS PROPORTIONAL DETECTOR

1.0 SCOPE

This procedure sets forth specific requirements to be used for the operation of the Ludlum Model 18 Analyzer with Ludlum Model 43-68 Gas Proportional Detector for use on A.T.G. field projects.

2.0 PURPOSE

The purpose of this procedure is to provide instructions for the operation of the Ludlum Model 18 Analyzer with Ludlum Model 43-68 Gas Flow Proportional Detector.

3.0 REFERENCES

3.1.1 Regulatory Guide 10.8, Rev.2-1987, Guide for the Preparations of Applications for Medical Use Programs

3.1.2 ANSI N3.1-1987, Selection, Qualification and Training of Personnel For Nuclear Power Plants

3.1.3 Manufacturer's instruction manual for the Ludlum Model 18 Analyzer.

3.1.4 Manufacturer's instruction manual for the Ludlum Model 43-68 Gas Proportional Detector

3.1.5 Manufacturer's instruction manual for the Ludlum Model 2750 Flow Control Meter

3.1.6 ANSI N323-1978, Instrument Test and Calibration

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Take care not to puncture the thin mylar window of the gas proportional detector.

4.1.2 To prevent contamination of the probe, avoid contact with the person(s) or object(s) being surveyed.

4.1.3 When using this instrument in a known or suspected contaminated area, seal the instrument case in a protective media (i.e., plastic, poly) to prevent contaminatio of the instrument case.

4.2 Limitations

4.2.1 The operation of the Model 18 depends on the condition of the battery. Therefore, the battery check should be performed before operation and periodically during use to ensure proper operation.

4.2.2 Calibration shall be performed semiannually, after maintenance is performed, if the instrument fails the performance test or if its proper operation is in question.

4.2.3 A daily performance test is required when the instrument is in use.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

5.1.1 ATG Radiological Field Operations Manager is responsible to:

5.1.1.1 Implement this procedure.

5.1.1.2 Periodically review the adherence of personnel to the requirements of this procedure.

5.1.1.3 Ensures by training and experience Health Physics Technicians are qualified to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors are responsible to:

5.1.2.1 Perform periodic surveillance of the use and maintenance of the instrument.

5.1.2.2 Ensure the instrument is calibrated at specified intervals.

5.1.2.3 Ensure that records pertaining to the instrument are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians are responsible to:

5.1.3.1 Perform the requirements in Section 6.1, and 6.3 of this procedure.

5.1.3.2 Document all records in this procedure.

5.1.3.3 Notify Health Physics Supervision of any unsafe or unusual conditions observed during operation of the instrument.

5.2 Qualifications

5.2.1 Health Physics technicians shall be qualified in accordance with the requirements of Reference 3.1.2 operate this instrument for any of the following:

Surveys, radiation work permits and job coverage.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this instrument under supervision of a Health Physics Technician meeting the qualification requirements of section 5.2.1.

6.0 PROCEDURE

6.1 Flushing the Ludlum Model 43-68 Gas Proportional Detector

6.1.1 The Ludlum Model 43-68 Gas Proportional Detector must be flushed prior to use.

6.1.2 Connect the Ludlum Model 43-68 Gas Proportional Detector to the Ludlum Model 18 Analyzer using the supplied cable with series "C" type connectors.

6.1.3 The following is a list of recommended equipment for flushing the detector:

a) P-10 Gas (90% argon, 10% methane)

b) Dual Stage Regulator (One stage to show supply pressure. Second stage to reduce supply pressure to 1-2 psi).

c) Needle valve between the second regulator stage and flowmeter for easier flow adjustment.

d) Ludlum Model 2750 Flow Control Meter 0-100 cc/min.

6.2 Flush

6.2.1 Connect the counting gas input <u>and</u> output lines to the detector.

> **CAUTION**
>
> The Model 43-68 uses double ended quick connects. Both the male and female quick connects have to be connected to allow gas flow through the detector. DO NOT flow gas into the detector unless both inlet and outlet are connected. It will rupture the detector.

6.2.2 Connect the regulator to the P-10 gas supply bottle. Ensure the gas bottle supply is off. Ensure the outlet valve of the regulator is in the closed position.

6.2.3 Connect the gas supply line to the "SUPPLY" port of the flowmeter.

6.2.4 Connect the gas line from the "TO DET" port of the flowmeter to the gas input line of the detector.

6.2.5 Connect the gas line from the output of the detector to the "FROM DET" port of the flowmeter.

6.2.6 Open the "EXHAUST" port of the flowmeter by connecting a male quick connect to the port.

6.2.7 Ensure the needle valve located at the bottom of the "IN" gauge on the flowmeter is fully closed (clockwise).

6.2.8 Turn main supply on and flush detector at 100 cc/min at 1- 2 psi gauge pressure for (1) hour.

6.2.9 The flow of gas through the detector can be increased by opening (turning counterclockwise) the needle valve at the bottom of the "IN" gauge on the flowmeter and vice versa.

NOTE

A faster flush time can be realized if the output gas line is disconnected from the output of the detector. A male quick connect must be connected to the output port of the detector to ensure gas flow through the detector. Flush time may be reduced to 20-30 minutes.

CAUTION

The main supply should be reduced to less than 50 cc/min before the output gas line is reconnected.

6.2.10 After flush is complete, set flow to 30-50 cc/min.

6.2.11 After the output line is reconnected check for detector leakage by comparing the readings on the "IN" and "OUT" gauges on the flowmeter. If a difference of more than 5 cc/min is observed tag the detector out of service and do not use until the detector has been repaired.

6.2.12 Disconnect the input quick connect on the detector.

6.2.13 Disconnect the output quick connect on the detector.

6.2.14 Turn the main gas supply off.

6.2.15 After two hours of use or when a noticeable decrease in detector efficiency is observed during use, whichever come first, the detector must be re-flushed.

6.2.16 Re-flush the detector following Steps 6.2.1 thru 6.2.14.

6.3 Operation

6.3.1 Verify that the instrument has a valid Calibration Data Sticker Label # ATGL-DCK and is not out of calibration, and the daily performance test has been completed and initialled on the Performance Test Daily Check Sticker. If the performance test has not been completed, have a Health Physics Technician perform the test (Section 6.3).

6.3.2 Inspect the instrument for any obvious physical damage which could interfere with its proper operation. It should include inspecting for loose, damaged knobs, buttons, broken or damaged meter movements/displays, dented or corroded instrument cases, punctured/deformed probe/probe window(s). Particular attention should be given to cables and connectors, since these components frequently become damaged or worn. Any instrument or detector having a questionable physical condition shall not be used until properly corrected.

6.3.3 Perform a battery check on the instrument by moving the switch to the "BAT" position. Observe the meter indication for the current battery condition.

6.3.4 If unsatisfactory results are obtained, refer to Reference 3.1.3 for the replacement of the batteries and repeat the check. The instrument shall display a satisfactory battery check prior to each use.

6.3.5 Set the audio switch to the "on" position. Set the response switch to the slow "s" position, and range selector to the lowest setting.

NOTE

The Model-18 analyzer has a 3 position high voltage adjustment switch labeled HV1, HV2, and HV3 that allows for selection of desired voltage operating points. The positions of the switch are as follows:

HV-1: Alpha	~ 1,200 volts
HV-2: Beta/Alpha	~ 1,700 volts
HV-3: Not Used (GM Detector Use Only)	~ 900 volts

6.3.6 Position the high voltage adjustment swith to the HV-1 (Alpha) position. In a low background area perform a background check on the instrument. Observe the instruments reading. Reading should be between 0 and 5 cpm. If a greater reading is noted, the detectors mylar window may be damaged, the instrument should be taken out of service and Health Physics Supervision notified immediately.

NOTE

When using the Model 43-68 detector, to do an evaluation of a surface which may contain natural radioactivity (such as concrete or plaster), determine background near contact with a non-contaminated section of the material. This will ensure that activity determination accounts for the presence of low-level natural radioactivity in the material.

6.3.7 Position the high voltage adjustment swith to the HV-2 (Beta/Alpha) position. In a low background area perform a background check on the instrument. Observe the instruments reading. Reading should be between 200 and 300 cpm. If a greater reading is noted, the detectors mylar window may be damaged, the instrument should be taken out of service and Health Physics Supervision notified immediately.

6.3.8 If a low background rate cannot be achieved check the instrument probe face for contamination. Decontaminate if necessary, taking care not to damage the probe face.

6.3.9 Proceed with operation in accordance with the desired use.

6.3.10 If performing a direct probe survey for beta/gamma surface contamination, the detector face should be within 1/2" of the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.

6.4.11 If the instrument passes the performance test, record "P" for pass on form ATGF-003, then initial the Performance Test Daily Check Sticker on the instrument and initial the Performance Test Log Sheet.

6.5 Calculation of Minimal Detectable Activity (MDA)

6.5.1 Calculation of MDA when meter is used for stationary (static) readings.

6.5.1.1 After obtaining a background count rate, the MDA can be calculated using the following formula:

$$MDA = \frac{4.65}{E * (A/100)} \times SQRT\ (B_R/2t_c)$$

where

MDA=	activity level in disintegrations/minute/100cm^2
B_R =	background count rate in counts/minute
t_c =	meter time constant in minutes
E =	detector efficiency in counts/disintegration
A =	active probe area in cm^2

6.5.2 Calculation of MDA when meter is used for scanning.

6.5.2.1 After obtaining a background level the MDA can be calculated using the following formula:

$$MDA = \frac{3 \times R_B}{E \times (A/100)}$$

where

MDA=	activity level in disintegrations/minute/100cm^2
R_B =	background rate in counts/minute
E =	detector efficiency in counts/disintegration
A =	active probe area in cm^2

NOTE

This yields an approximation of MDA based on a scan rate of approximately 2 inches per second. The MDA will increase with higher scan rates.

6.3.11 If performing a direct probe survey for alpha surface contamination, the detector face should be within 1/4" of the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.

6.3.12 If counting smears, masslinn etc. the counting time should be a minimum of 30 seconds, or when meter deflection stabilizes.

6.3.14 When performing direct scan surveys of objects, surface areas etc., static readings should be performed frequently to insure the detection of residual activity.

6.4 Performance Test

6.4.1 Conduct a performance test daily check on the instrument and record all data on form ATGF-003, Performance Test Log Sheet.

6.4.2 Obtain a 100cm^2 Tc-99 Performance Test source.

6.4.3 Record the information for each section of form ATGF-003.

6.4.4 Examine the instrument for any obvious physical damage which could interfere with its proper operation.

6.4.5 Verify that the instrument has a current Calibration Data Sticker and Performance Test Daily Check Sticker.

6.4.6 Perform a Battery Check to ensure that the battery is within the Batt OK range on the meter.

6.4.7 Place the high voltage adjustment switch in the HV-2 position. Expose the detector to the performance test source. If the response is within the designated range for the source, proceed to step 6.4.11. If the instrument fails, record "F" for fail on form ATGF-003 and remove the instrument from service for repair or calibration.

6.4.8 Obtain a 100cm^2 Th-230 Performance Test source.

6.4.9 Place the high voltage adjustment switch in the HV-2 position. Expose the detector to the performance test source. If the response is within the designated range for the source, proceed to step 6.4.11. If the instrument fails, record "F" for fail on form ATGF-003 and remove the instrument from service for repair or calibration.

6.4.10 If the instrument fails any portion of the performance test, log the instrument as failing on the Performance Test Log Sheet, remove from service and notify Health Physics Supervision.

6.6 Maintenance

6.6.1 Instruments shall be stored in areas which prevent damage by movement, accumulation of moisture or dust. Detector covers shall be used for storage when practical.

6.6.2 Electronic maintenance (except probe and cable replacements) shall be performed by an Health Physics Instrumentation Technician, by the manufacturer or by an approved vendor.

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 Form ATGF-003 Daily Instrument Performance Test Log Sheet

7.2 Calibration Data Sticker

7.3 Performance Test Daily Check Sticker

8.0 FORMS AND EXHIBITS

8.1 Forms

8.1.1 ATGF-003 - Daily Instrument Performance Test Log Sheet

8.2 Exhibits

8.2.1 Performance Test Daily Check Sticker

8.2.2 Calibration Data Sticker

DAILY INSTRUMENT PERFORMANCE TEST LOG SHEET

Page _____ of _____

PROJECT:

DATE	MODEL/TYPE	S/N	PHYSICAL DAMAGE Y/N	CAL DUE DATE	SOURCE I.D.	ACTIVITY	BKRD	READING	EFF	PASS/ FAIL P/F	TECH INIT

ATG Inc.

HP-OP-001
Revision 1

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

RADIATION AND CONTAMINATION SURVEY TECHNIQUES

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

Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

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

APPROVAL SIGNATURES:

William G. Haney, Project Director — Date: 4/12/95

Thomas J. O'Dou, CHP, Project Radiation Safety Officer, HP Technical Support — Date: 4/12/95

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-OP-001

Title: Radiation and Contamination Survey Techniques

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0	0	0	0

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	0	1	0	1	1					

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	12/23/93
1	12/08/94

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	1
Date	12/08/94
Approval	12/08/94

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 ± 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 cm^2. 100 cm^2 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 cm^2 and document in accordance with Section 6.6 of this procedure.

- Smear results >50,000 cpm may be reported in mrad/hr/100 cm^2.

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 cm^2.

6.5.8.1 The following formula should be used for converting direct probe readings in CPM to dpm/100 cm^2 :

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

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

RADIOLOGICAL SURVEY REPORT

TGS #:_____

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

#	$\beta\gamma$	α

Remarks:_____

ALLIED TECHNOLOGY GROUP, INC. FORM ATGF-001

SMEAR COUNTING ANALYSIS REPORT

ATE:	ATGS#:	ANALYSIS PERFORMED BY:

COUNTING SYSTEM DATA	
INSTRUMENT I.D.	DETECTOR I.D.
EFFICIENCIES: α_____ βγ_____	MDA: α_____ βγ_____
PERFORMED BY:	
SAMPLE COUNT TIME:	ACTIVITY REPORT IN: ☐ dpm ☐ μCi
α BACKGROUND: _____ cpm	βγ BACKGROUND: _____ cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	βγ	α	βγ	α	βγ

Remarks:

Reviewed By:	Date:

RADIATION / CONTAMINATION
SURVEY LOG

Page ____ of ____

ATG #	DATE	TIME	PROJECT	DESCRIPTION OF SURVEY	# of PAGES	TECH INITIALS

ATG Inc.

HP-OP-002
Revision 0

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

RADIOLOGICAL AREA POSTING AND ACCESS CONTROL

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

Prepared by

D. Spicuzza

Allied Technology Group, Inc.

PROCEDURE/PLAN APPROVAL PAGE

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

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-OP-002

Title: Radiological Area Posting and Access Control

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0	0	0	0

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	0	0	0	0	0	0				

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	0
Date	
Approval	

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/100cm^2 and/or fixed beta-gamma contamination exceeds 1000 dpm/100cm^2.

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} m^3]), 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/cm^2 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/cm^2 shield.

3.2.9 **Hot Spot:** Any small (< $1ft^2$) location which contains or is a source of penetrating radiation with a reading of ≥ 100 mR/hr <u>and</u> 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 <u>Radioactive Materials Area:</u> 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 <u>Airborne Radioactivity Area</u>: 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/100cm^2 for beta-gamma emitters and/or 20 dpm/100cm^2 for alpha emitters.

3.2.10.4 Highly Contaminated Area: Any area where loose surface contamination levels are:

* $\geq$ 2K dpm/100cm^2 loose α

* $\geq$ 100K dpm/100cm^2 loose $\beta\tau$

unless transuranics are present then:

* $\geq$ 200 dpm/100cm^2 loose α

* $\geq$ 50K dpm/100cm^2 loose $\beta\tau$

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

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/100cm²
UNLESS NOTED

#	$\beta\gamma$	α

Remarks:_____

ALLIED TECHNOLOGY GROUP, INC. FORM ATGF-001

ATG Inc.

HP-OP-003
Revision 0

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 — Date: 4/12/95

Thomas J. O'Dou, CHP,
Project Radiation Safety Officer
HP Technical Support — Date: 4/12/95

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-OP-003

Title: Release of Materials From Controlled Areas

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.	0	0	0	0	0	0	0	0	0	0

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	0	0								

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	11/01/93

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	0
Date	11/01/93
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 tomoderate 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 cm^2 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 cm^2 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 accessable surface means performing a 100 cm^2 disc smear on all accessible areas of the item <u>suspected</u> 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

DAILY INSTRUMENT PERFORMANCE TEST LOG SHEET

Page _____ of _____

PROJECT:

DATE	MODEL/TYPE	S/N	PHYSICAL DAMAGE Y/N	CAL DUE DATE	SOURCE I.D.	ACTIVITY	BKRD	READING	EFF	PASS/ FAIL P/F	TECH INIT

ATGS #:_____

SMEAR COUNTING ANALYSIS REPORT

Date:_____ Analysis Performed by:_____

COUNTING SYSTEM DATA

INSTRUMENT ID:_____ DETECTOR ID:_____

EFICIENCIES: α_____ βγ_____

MDA: α_____ βγ_____

PERFORMED BY: _____

Sample Count Time:_____ Activity Report In: ☐ dpm ☐ μCi

α Background:_____ cpm βγ Background:_____ cpm

SAMPLE I.D. OR DESCRIPTION	GROSS COUNTS		NET COUNTS		ACTIVITY	
	α	βγ	α	βγ	α	βγ

Remarks:_____

Reviewed by:_____ Date:_____

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

#	$\beta\gamma$	α

Remarks:_____

ALLIED TECHNOLOGY GROUP, INC. FORM ATGF-001

MATERIAL RELEASE LOG

ject/Location:

DATE	ATGS#	ITEM DESCRIPTION	TECHNICIAN Print/Sign	EVALUATOR Signature or N/A	RELEASE SIGNATURE HP Supervisor Signature

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 $\beta\gamma$	REMOVABLE
	dpm/100 cm^2 α	REMOVABLE
	dpm/100 cm^2 $\beta\gamma$	FIXED
	dpm/100 cm^2 α	FIXED

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.

HEALTH PHYSICS TECHNICIAN:	DATE/TIME:

DISPOSITION OF EQUIPMENT OR ITEMS:

VIEWED BY:	DATE:

ATG, Inc.

HP-OP-004
Revision 1

ALLIED TECHNOLOGY GROUP FIELD OPERATIONS

HEALTH PHYSICS OPERATING PROCEDURE

ISSUE AND USE OF RADIATION WORK PERMITS

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

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 — Date: 4/12/95

Thomas J. O'Dou, CHP
Project Radiation Safety Officer
HP Technical Support — Date: 4/12/95

REVISION RECORD INDICATING LATEST DOCUMENT REVISION

Procedure Number: HP-OP-004

Title: ISSUE AND USE OF RADIATION WORK PERMITS

INDEX OF PAGE REVISIONS

Page No.	i	ii	iii	iv	v					
Rev. No.										

Page No.	1	2	3	4	5	6	7	8	9	10
Rev. No.				1	1	1	1	1	1	1

Page No.	11	12	13	14	15	16	17	18	19	20
Rev. No.	1	1	1	1						

Page No.	21	22	23	24	25	26	27	28	29	30
Rev. No.										

Page No.	31	32	33	34	35	36	37	38	39	40
Rev. No.										

REVISION RECORD	
Rev. No.	Date
0	05/31/94
1	

REVISION RECORD	
Rev. No.	Date

CURRENT REVISION	
Rev. No.	1
Date	
Approval	

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 ar 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

RADIOLOGICAL SURVEY REPORT

GS #:_____

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

#	$\beta\gamma$	α

Remarks:_____

RADIATION WORK PERMIT (RWP)

WP #:_____ ☐ Regular ☐ Extended

SECTION I

Contract #	Date: / /	Time:

Location/Project:

Exposure Category: ☐ D&D ☐ Demolition ☐ Waste Processing ☐ 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	Existing General Contamination Levels:	Airborne DAC Level(s):
_____ mR/hr/γ _____ mrad/hr/corrected β _____ mrem/hr/N	_____ dpm/100cm² βγ _____ dpm/100cm² α	α _____ % P βγ _____ % P _____ % H_3
Existing Maximum Radiation Level(s): β γ N	**Existing Maximum Contamination Level(s)**	**Hot Particle?**
_____ mR/hr/γ _____ mrad/hr/corrected β _____ mrem/hr/N	_____ dpm/100cm² βγ _____ dpm/100cm² α	☐ Yes ☐ No

Remarks:_____

SECTION III

Radiological Limits:
Maximum Allowed WB Exposure Rate γN: _____ mr/hr or mrem/hr
Corrected β: _____ mrad/hr Maximum Extremity Exposure Rate: _____ mr/hr
Maximum Allowed Contamination Level βγ: _____ dpm/100cm² α: _____dpm/100cm²
Maximum Allowed Airborne Concentration Level: _____ % DAC
Remarks: _____

Industrial Hygiene/Safety Concerns: _____

RADIATION WORK PERMIT (RWP)

RWP #: _____ ☐ Regular ☐ Extended

SECTION IV

WORKER REQUIREMENTS

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

SECTION VI

Personnel Authorized to Perform Work & Acceptance of Responsibility
*My signature verifies that I have read and fully understand the RWP Requirements

Date	Name (Print)	Signature*	SSN	HPS Initials	Year Dose to Date (Rem)				
					TEDE	TODE	LDE	SDE WB	SDE EX

H	Approvals/Reviews	I	Termination
Technician Generating RWP: Date/Time:		Date: Time:	
Industrial Hygiene Approval: Date/Time:		Health Physics Rep:	
HP Supervisor Approval: Date/Time:		Reason: ☐ Job Complete ☐ RWP Revision	
RFO Manager Approval: Date/Time:		HP Supervisor Review:	

RWP SIGN HEET

NOTE:
1. All personnel signing in on this RWP Sign-in sheet must have signed Section VI of the RWP.
2. All persons entering the RWP areas must log in and out.

RWP#:	Location / Project	Date
Job Description:		

Date	Name (Print)	Signature	Social Security Number	Time		SRD Reading (mR)		Respirator Worn?		HP Comments
				In	Out	In	Out	Yes	No	

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)				

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:	Yes	No	N/A
Protective Clothing?			
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

TRAINING RECORD

TRAINING DATE:	INSTRUCTOR:
LOCATION:	TOTAL CLASS HOURS:

TRAINING COURSE TITLE:

SCOPE OF TRAINING:

NAME OF STUDENT	SOCIAL SECURITY NO.	SIGNATURE

TRAINING APPROVED BY (Project Director):

EXHIBIT I

RWP RADIATION PROTECTION RECOMMENDATIONS FOR RWP GENERATION

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

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

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.