ATTACHMENT A

D&D Procedure Cover Page

CHARACTERIZATION/LICENSE TERMINATION PROCEDURE

CONTAMINATION VERIFICATION SURVEYS PRIOR TO DEMOLITION

Procedure No. ZS-LT-400-001-002

Revision No. 0

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Secondary Reviewer: (Print name / sign): Ron Shippee Ronald Shippee Date: 3/17/2016
Ron Shippee

Regulatory Required Reviews (per AD-11, "Regulatory Reviews")		
Part 72 ISFSI Impact License: 10 CFR 72.48	☐ YES	☒ NO
Part 50 License: 10 CFR 50.59 and 50.90	☐ YES	☒ NO
Fire Protection: 10 CFR 50.48(f)	☐ YES	☒ NO
Conditions of License: E-Plan: 10 CFR 50.54(q)	☐ YES	☒ NO

Technical Review Required? ☐ YES ☒ NO

Secondary Reviewer: CG Fuller / CG Fuller DATE: 3/21/16
Print Name / Signature

Approval Section

DEPARTMENT MANAGER: Robert F Yetter DATE: 3/21/16

DECOMMISSIONING PLANT MANAGER: J. H. Ashburner / J. H. Ashburner DATE: 3/21/16
Print Name / Signature

Effective Date: March 21, 2016

Summary of Changes in this Revision:

- Rev. 0 – Initial issue.

1. PURPOSE AND SCOPE

1.1. Purpose

This procedure provides the guidance used to design, perform, control, evaluate and document Contamination Verification Surveys (CVS) performed to verify that pre-demolition contamination levels of radiological impacted systems, structures and components (SSCs) of the site Radiologically Controlled Area (RCA) and non-RCA are below the established limits for open air demolition.

1.2. Scope

This procedure is applicable to all radiologically impacted SSCs that are scheduled for demolition and removal from site as radioactive waste. Performance of CVS will ensure airborne radioactivity levels remain within regulatory limits and off-site dose consequences remain As Low as Reasonably Achievable (ALARA).

2. RESPONSIBILITIES

2.1. Characterization/License Termination (C/LT) Manager is responsible for:

- Providing overall guidance and support for the development and implementation of CVS plans and survey packages.
- Reviewing and approving all CVS sample plans.
- Reviewing survey results and providing permission, through signature, that SSCs within a RCA are suitable for open-air demolition.

2.2. Vice President (VP) D&D/Construction is responsible for:

- Ensuring, through signature, that all necessary decommissioning or remediation activities in the area are completed and safety concerns are addressed.

2.3. Project Construction Managers are responsible for:

- Ensuring housekeeping is performed, any tools or equipment not required to support survey activities are removed, and additional measures necessary to limit the spread of contamination are implemented.
- Notifying the C/LT Group when SSCs are ready for turnover.
- Assisting in providing support and access to areas to be surveyed, as required.

2.4. Characterization/License Termination (C/LT) Engineers/C/LT Supervisors are responsible for:

- Preparing CVS plans.
- Ensuring only approved instrumentation is used to perform CVS surveys and the instrumentation is capable of meeting the required Minimum Detectable Concentrations (MDCs).

- Ensuring CVS surveys are conducted in accordance with written CVS plans, based on approved procedures and work instructions.
- Control and implementation of CVS plan instructions during field activities.
- Ensuring SSC preparation prior to initiating CVS.
- Providing daily supervision and guidance to field survey technicians and performing quality checks of field activities.
- Ensuring CVS are performed, results, evaluated, and documented correctly.
- Establishing and maintaining isolation and control of structures, systems, and components to prevent inadvertent contamination.
- Reviewing and approving any work activities to be performed following completion of CVS in a specific area.
- Maintaining, and controlling survey packages and completed survey documentation.

2.5. Data Base/LTP Support Engineer is responsible for:

- Maintaining CVS plan index and filing locations.
- Ensuring CVS packages and plans are properly labeled, stored, and controlled per RM-ZN-101, "Records Management Program" and ZS-LT-01, "Quality Assurance Project Plan (for Characterization and FRS)."
- Maintaining a list of LTP personnel authorized to access the files.
- Tracking the status of the CVS Survey Plans and support documents.

2.6. Characterization/License Termination (C/LT) Technicians – are responsible for:

- Performing CVS as directed by the C/LT Supervisor(s) using approved sample plans, procedures and other documentation as appropriate.
- Establishing and maintaining isolation access control measures prior to and during CVS activities.

2.7. Project Personnel – are responsible for:

- Reading and adhering to CVS postings and ensuring the integrity of CVS access controls is not compromised.

2.8. Technical Lead/RE – is responsible for:

Reviewing all survey packages prior to implementation and providing technical oversight during survey implementation and data review.

3. DEFINITIONS/ACRONYMS

3.1. **Measurement** - Radioactivity measurement obtained by placing a radiation detector near the surface or media being surveyed. An indication of the resulting radioactivity level is read out directly.

3.2. **Mean** - The average value obtained when the sum of individual values is divided by the total number of values.

3.3. **Minimal Detectable Count Rate** - The *a priori* minimum count rate that a specific instrument or technique can be expected to detect 95% of the time.

3.4. **Survey** - A systematic evaluation and documentation of radiological measurements with correctly calibrated instrument or instruments that meet the sensitivity required by the objective of the evaluation.

3.5. **CVS Area** - CVS areas are established based on logical physical boundaries and site landmarks for the purpose of documenting and conveying radiological information, and to facilitate the scheduling, management and performance of Open Air Demolition. The survey area may encompass one or more survey units.

3.6. **CVS Plans** - A collection of files and information in a standardized format for controlling and documenting field measurements collected for CVS. CVS plans contain at a minimum, survey instructions, the number and location of survey measurements and samples, survey maps, instrumentation requirements, and safety requirement as necessary. The CVS plan will contain all the QA records and other documentation relevant to the CVS of a survey unit.

3.7. **Survey Unit** - A contiguous unit within a survey area of similar use history and the same classification of contamination potential.

3.8. **ACRONYMNS**

ALARA	As Low As Reasonably Achievable
CVS	Contamination Verification Survey
C/LT	Characterization/License Termination
MDCR	Minimum Detectable Count Rate
QA	Quality Assurance
QAAP	Quality Assurance Project Plan
QC	Quality Control
RCA	Radiological Controlled Area
RE	Radiological Engineer
SSC	Structures, Systems, Components
TSD	Technical Support Document
QA	Quality Assurance

QAPP	Quality Assurance Project Plan
ZSRP	Zion Station Restoration Project

4. PRECAUTIONS, LIMITATIONS, AND PREREREQUISITES

4.1. Precautions

4.1.1 Documents and databases containing CVS data and survey records are QA records when complete. Positive control of the records shall be maintained until such time that they are forwarded to Records Management.

4.1.2 When documenting survey information, all personnel shall ensure that QA records are in good quality and legible. Legibility is determined to be readable and reproducible.

4.1.3 The pre-survey walk down will identify potential industrial safety hazards within a specific unit.

4.1.4 Beware of physical changes to SSC resulting from decommissioning activities previously performed.

4.2. Limitations

4.2.1 Survey instrumentation and analytical laboratory equipment and procedures should be selected based on detection, sensitivity capabilities, and temperature limitations for the expected contaminants and their quantities.

4.2.2 Radiation detection and measurement instrumentation will be selected based on the type and quantity of radiation to be measured.

4.2.3 Only qualified C/LT Technicians will perform CVSs.

4.3. Prerequisites

4.3.1 CVS shall be performed prior to open air demolition of radiologically impacted SSCs.

4.3.2 Decommissioning activities having the potential to contaminate areas to levels that exceed the open air demolition criteria shall be verified completed prior to implementing the CVS in that area.

4.3.3 Decommissioning activities having the potential to alter the final survey unit/SSC configuration shall be completed prior to implementing the CVS in that area.

4.3.4 Housekeeping activities that may interfere with the performance of the survey, such as clean-up of debris and/or removal of tools or equipment, shall be completed, as required by the C/LT Group, prior to initiating the CVS in that area.

4.3.5 All survey or counting instrumentation used to produce CVS data must be able to achieve adequate sensitivity to demonstrate contamination verification criteria.

4.3.6 The CVS Plan shall be approved by the C/LT Manager prior to implementation.

4.3.7 Release of the surveyed area for Open Air Demolition shall be approved by the C/LT Manager.

4.3.8 All personnel involved with the physical survey of a specific area shall receive a CVS plan brief prior to working in that area.

4.3.9 The use of computer-generated forms in lieu of procedural attachments is permitted provided the information required by the procedure is included on the forms.

5. MAIN BODY

5.1. Turnover of CVS area to the C/LT Group

5.1.1 The Project Construction Manager shall ensure, in coordination with the C/LT group, that the SSC is suitable for turnover to the C/LT Group by performing the following:

1.) Complete any necessary pre-demolition engineering/construction activities in the survey unit/SSC.

2.) Verify performance of housekeeping to ensure any tools or equipment not required to support survey activities have been removed.

3.) Ensure any additional measures have been implemented, if required, to limit the spread of contamination from adjacent areas (i.e., plug vent louvers, cover floor gratings, etc.).

4.) Ensure all safety issues have been addressed (i.e., cover holes in floor, etc.).

5.) Sign the *Demolition & Decommissioning Group Request for Survey* section of Attachment 1 to signify area is acceptable for turnover.

6.) Forward Attachment 1 to the VP D&D/Construction for signature.

5.1.2 The VP D&D/Construction shall ensure any necessary decommissioning or remediation activities in the survey unit/SSC are completed by signing the appropriate section of Attachment 1 and forwarding the attachment to the C/LT Group.

5.1.3 The C/LT Supervisor or C/LT RE shall verify the SSC is in a condition suitable for survey by signing the Demolition & Decommissioning Group Request for Survey section of Attachment 1.

5.2. Access Control Measures

NOTE

While it is highly desirable to control access to specific areas as soon as possible following completion of pre-demolition activities, it is absolutely essential that access be positively controlled at the time of and following the CVS.

5.2.1 The C/LT Technicians shall post the area and establish controls by performing the following:

1.) Place postings such as illustrated in Attachment 2 at the entrances to survey areas.

2.) Use additional controls such as ropes, barricades, tamper proof seals, locks and contamination monitoring instrumentation for personnel and equipment prior to entering the area, as necessary.

5.2.2 The C/LT Supervisor shall verify postings have been established, sign Attachment 3, and forward to the C/LT RE.

5.2.3 The C/LT RE shall verify postings have been established, sign Attachment 3 and forward to C/LT Manager for review.

1.) File Attachment 3 with the survey plan for the survey unit/SSC.

5.2.4 Project personnel shall obtain authorization from the C/LT Supervisor prior to entering these areas.

5.3. Survey Design

5.3.1 The C/LT RE shall prepare a survey plan as directed by the C/LT Manager:

1.) Ensure the survey plan contains, as a minimum, detailed survey instructions, a hazards / safety walk down and safety requirements, survey map(s), field data collection results, and smear sample result reports.

2.) Divide large buildings (i.e., Auxiliary Building, Fuel Handling Building) into smaller survey units to optimize the performance of the CVS, if necessary.

A. Develop a CVS plan for one or multiple survey units.

B. Maintain a listing of all survey units and related CVS plans.

C. File the original Attachment 1 signed by the responsible D&D Project Construction Manager and VP D&D/Construction in each survey plan.

5.3.2 The C/LT RE shall prepare survey instructions for each survey unit as directed by the C/LT Manager.

1.) Complete Attachment 4, *Radiological Survey Instructions for CVS*, to document the survey instructions.

A. Enter the Package ID and Survey Unit/SSC using guidance from Table 1 of ZS-LT-04, *Characterization of Structural Survey Units That Will Not Be Subjected to Final Status Survey*.

B. Complete the *Historical Use* section.

i. Review previous operational radiological surveys, the Historical Site Assessment and radiological surveys performed in support of decommissioning, as appropriate.

ii. If necessary, interview site personnel knowledgeable of past uses and radiological conditions in the area.

iii. Provide past and/or present radiological data that would assist in determining CVS survey requirements (loose of fixed contamination levels, radiation levels, and airborne contamination levels, etc.).

NOTE

The intensity of the CVS will vary dependent on the historical use of the area, as well as the potential for the area to contain residual radioactivity in excess of the open air demolition limits shown in Table 2.

C. Complete the *General Instructions/Comments* section.

i. Prescribe the *minimum* gamma dose rate scan area coverage (percentage) using the guidance provided in Table 1, Recommended Area Coverage for Contamination Verification Surveys, and professional judgment.

ii. Prescribe the number of static measurements required. A minimum of thirty (30) static measurements is required in each survey unit/SSC.

iii. Prescribe the minimum number and general locations of loose surface contamination samples (100 cm^2 smears) required. A minimum of one (1) smear is required at each static measurement location.

iv. Prescribe any actions to be taken if an area of elevated activity is identified (1.5 mR/hr or 75% of the limit) or if any loose surface contamination is identified in excess of the limits.

Table 1, Recommended Area Coverage for Contamination Verification Surveys

Surface	*Minimum* Scan Coverage	Static Measurements	Smear Surveys
Floors	10%	Static measurements will be collected at a minimum of 30 biased locations and at any are of elevated activity identified during the scan survey.	Smear samples will be collected at the location of each static measurement and in each penetration. Smears shall be analyzed for β/γ and α contamination.
Walls < 2m	10%		
Walls > 2m	5%		
Ceilings	5%		
Exterior Walls < 2m	10%		
Exterior Walls > 2m	5%		
Roof	10%		

2.) Identify the instruments to be used for the CVS as follows:

A. Select instrumentation to provide both reliable operation and adequate sensitivity to demonstrate attainment of the established limits.

B. Ensure instrumentation is setup, operated and maintained in accordance with the appropriate procedures.

5.3.3 The C/LT RE shall perform a *Job Hazard Assessment* (JHA) in accordance with ZS-SA-01, HASP and document the JHA on Attachment 3 and forward CVS Plan to the Technical Lead/RE for review.

5.3.4 The Technical Lead/RE shall review the survey plan to ensure the plan is appropriate for the SSC to be surveyed and sign when complete.

5.3.5 The Technical Lead/RE shall forward the survey plan to the C/LT Manager for review and approval.

5.4. Survey Performance

5.4.1 Prior to implementing the CVS Plan, the C/LT Supervisor shall perform a Pre-Job Briefing in accordance with HU-ZN-1211.

5.4.2 The C/LT Technician(s) shall obtain and review the survey instructions from the survey plan to ensure an understanding of survey requirements for that specific survey unit/SSC**.**

5.4.3 The C/LT Technician(s) shall obtain the instruments necessary to perform the survey as indicated in the survey instructions.

1.) The C/LT Technician(s) shall use survey techniques in accordance with ZS-RP-105-001-001, "Radiological Surveys," applicable instrumentation procedures and instructions specified in the survey plan.

2.) Perform a scan survey of the area using an energy compensated GM tube or Ion Chamber and check for areas of elevated activity in accordance with the survey instructions.

A. Record the readings on the appropriate survey map.

B. Document the verification survey using standard survey forms (examples are provided in Attachments 5 and 6).

3.) Perform removable contamination surveys as follows:

A. Obtain an additional smear at each area of elevated activity identified during the scan survey.

B. Analyze all smears for β/γ and α activity.

C. Determine the boundary of the elevated activity and physically mark the area in the field.

D. Annotate the location and record on the survey map.

5.4.4 The C/LT Technician(s) shall forward completed surveys to the C/LT Supervisor for review.

5.5. Turnover Areas for Demolition

5.5.1 Upon completion of survey activities, the C/LT Supervisor shall perform the following:

1.) Verify all required measurements were collected and the survey results are below the criteria for turnover to the demolition contractor (see Table 2 below).

Table 2, Recommended Open Air Demolition Limits

Total Surface Contamination	Loose Surface Contamination	
β / γ	**β / γ**	**α**
2 mR/hr contact Greater than 2 mR/hr contact other material other than concrete as authorized by RP	1000 dpm/100cm^2 Max 300 dpm/100cm^2 Avg.	20 dpm/100cm^2 Max

A. Calculate the mean and maximum values for all direct measurements and loose surface contamination measurements obtained.

B. Sign and date Attachment 1 under C/LT Group Review/Approvals.

C. Forward completed survey package to the responsible C/LT RE for review.

5.5.2 The C/LT RE shall sign/date Attachment 1 after review and forward package to C/LT Manager for final review and closeout.

5.5.3 The C/LT RE shall forward a completed copy of Attachment 1 to the VP of D&D/Construction and notify the Director of Radiation Protection in writing that the CVS of the specific survey unit has been completed.

5.5.4 The C/LT RE shall forward all original attachments with the completed survey package to the Database and LTP Support Engineer.

6. REFERENCES

6.1. ZSRP License Termination Plan

6.2. NRC HPPOS-071, Control of Radioactively Contaminated Material

6.3. NRC-HPPOS-073, Surveys of Waste from Nuclear Reactor Facilities before Disposal.

6.4. NRC Information Notice No. 85-92, Control of Radioactively Contaminated Materials, May 1981.

6.5. TSD-10-002, Technical Basis for Radiological Limits for Structure/Building Open Air Demolition.

6.6. ISO 7503-1, "Evaluation of surface contamination – Part 1: Beta emitters (maximum beta energy greater than 0.15 MeV) and alpha emitters", 1988.

6.7. AD-20, Records Management Program

6.8. ZS-LT-01, Quality Assurance Project Plan (QAPP) for Characterization and FRS

6.9. ZS-LT-02, Characterization Survey Plan

6.10. ZS-RP-103-003-001, Radiological Postings and Labeling Requirements

6.11. ZS-RP-105-001-001, Radiological Surveys

6.12. ZS-RP-108-000-000, Radiological Instrumentation Program

6.13. Instrument Operation Manuals

6.14. ZS-LT-04, Characterization of Structural Survey Units That Will Not Be Subjected To Final Status Survey

6.15. ZS-SA-01, Zion*Solutions* Health and Safety Plan

6.16. HU-ZN-1211, Pre Job Briefings

7. RECORDS

7.1. Attachment 1 - CVS Area Release for Demolition

7.2. Attachment 3 – CVS Area Turnover, Acceptance and Access Control

7.3. Attachment 4 – Radiological Survey Instructions for Contamination Verification Survey

7.4. Attachment 5 – Direct Measurement and Loose Surface Contamination Survey Data

7.5. Attachment 6 – Survey Map (Example)

8. ATTACHMENTS

8.1. Attachment 1 - CVS Area Release for Demolition

8.2. Attachment 2 – Example Posting for Pre-Demolition Surveys

8.3. Attachment 3 – CVS Area Turnover, Acceptance and Access Control

8.4. Attachment 4 – Radiological Survey Instructions for Contamination Verification Survey

8.5. Attachment 5 – Direct Measurement and Loose Surface Contamination Survey Data

8.6. Attachment 6 – Survey Map (Example)

9. FORMS

None

Demolition & Decommissioning Group Request for Survey

Area to be Demolished:_____ Scheduled Demolition Date:_____

Waste Disposition: _____

Decommissioning activities having the potential to contaminate the survey unit at level that exceed the open air demolition limits have been completed and safety concerns have been addressed, as appropriate.

☐ Condition suitable for Turnover to C/LT Group and for performance of CVS.

_____ _____
Project Construction Manager or designee Date

_____ _____
VP President D&D Construction or designee Date

_____ _____
C/LT Supervisor or RE Date

C/LT Group Review/Approvals

Area(s) CVS completion date: _____

Data reviewed by C/LT Supervisor for Pre-Demolition Survey Completion:

_____(sign/date)

Data reviewed by C/LT RE for Pre-Demolition

_____(sign/date)

Indicate the appropriate response below

Review and Close Out

The final radiological control condition for this area is:

☐ The area(s) listed above meet the criteria to be released for open air demolition.

☐ The area(s) listed above do not meet the criteria to be released for demolition because:

☐ The area(s) listed above are released for demolition with the following restrictions:
☐ RP job coverage required
☐ RWP required
☐ Further surveys required during intermediate steps of demolition (attach requirements to this form)
☐ No radioactive materials are to be stored in this area.
☐ Special waste disposal or segregation methods required (attach requirements to this form)
☐ Other:

_____ _____
C/LT Manager or designee Date

NOTICE

A PRE-DEMOLITION SURVEY IS IN PROGRESS OR HAS BEEN COMPLETED IN THIS AREA

NO DECOMMISSIONING/DEMOLITION ACTIVITES ARE TO BE PERFORMED IN THIS AREA

THE USE, MOVEMENT OR STORAGE OF RADIOACTIVE MATERIAL IS PROHIBITED IN THIS AREA

ENTRY OF PERSONNEL IN THIS AREA IS PROHIBITED WITHOUT THE AUTHORIZATION OF C/LT SUPERVISION

CONTACT: _____

EXTENSION: _____

Turnover / Acceptance of Area

Hazardous Awareness Pre walk down of Survey Unit

☐ - Cold work environment	☐ - Hazardous Atmospheres	☐ - Exposed electrical circuitry
☐ - Stinging Insects	☐ - Load bearing stresses	☐ - Sharp Objects or surfaces
☐ - Hazardous plants and/ or animals	☐ - Lack of structural integrity	☐ - Falling Objects
☐ - Tripping Hazards	☐ - Released of stored energy sources (hydraulic, steam, etc...)	☐ - Other*
☐ - Standing Water > 1 ft deep	☐ - Buried utilities	☐ - Other*
☐ - Fall hazards	☐ - Overhead power lines	
☐ - Work @ height > 6ft	☐ - Kinetic energy sources (moving equipment)	
☐ - Open excavations	☐ - Vehicle traffic	

*Comments:_____
_____
_____

☐ Area meets the criteria for turnover	☐ Access Controls are instituted and completed.	☐ Area is acceptable for CVS

_____ _____
C/LT Supervisor Date

_____ _____
C/LT RE Date

The area meets the criteria for turnover to the C/LT Group. Access Controls have been established. Area is acceptable for CVS.

_____ _____
C/LT Manager Date

Comments:

PACKAGE ID:	**SURVEY UNIT/SSC:**
Description of Area:	
Historical Use	
General Instructions	

Package ID:	**CVS Survey Unit/SSC:**

Instrumentation

Measurement Type	Instrument Model	Detector Model	Scan Speed	Mode	Count Time

Individuals performing survey have read and understood this plan and are aware of the hazards identified on Attachment 3.

Performed by: Date:

Performed by: Date

Performed by: Date:

Performed by: Date:

Performed by: Date:

Instructions Prepared by:

_____ _____
C/LT RE Date

Instructions Reviewed by:

_____ _____
Technical Lead/RE Date

Instructions Approved by:

_____ _____
C/LT Manager Date

SURVEY RESULTS				
Number	Location	β/γ Contact (mR/hr)	α Smear (dpm/100 cm^2)	β/γ Smear (dpm/100 cm^2)
SURVEY SUMMARY				
Total		β/γ Contact (mR/hr)	β/γ Smear (dpm/100 cm^2)	α Smear (dpm/100 cm^2)
Mean Value				
Maximum Value				

Reviewed By: _____ _____
C/LT Supervisor Date

Reviewed By: _____ _____
C/LT RE Date

SURVEY#:-----DATE:__/__/__TIME:-_____ -----Page---of-----

Survey-UNIT:--_____---BLDG:-_____---ELEV:-_____

Description:--_____

Name	Sign:

ZION SOLUTIONS LLC An EnergySolutions Company

Purpose of Survey:

☐ Class-1: ☒ Class-2: ☐ Class-3: ☐ NA

Disposition Option:

INST MODEL	SERIAL#	Pre-✓	Post-✓
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Beta-gamma Contact Doserate Survey

☐ All Doserates are <2mRlhr

Smear Survey:

☐ Results attached for smear results.

Materials and Equipment Description

Item-#	Description
N/A	See Map
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

NOTE: Doserates are in mR/hr unless otherwise noted

Peer Check--- _____ -DATE: __/__/____ RPS Approval (Signature) _____ --DATE:_____/_____/_____