Facility: Hanford Tank Farm/Hanford and Argonne

Best Practice Title: Regulatory Summary 10 CFR 835, Occupational Radiation Protection

Point of Contact:
Barry Thom
509-376-1814
Charles_thom@rl.gov

and

Robin Colglazier
630-252-6312
Rcolglazier@anl.gov

Brief Description of Best Practice: The Price Anderson Amendment Act (PAAA) involves several Code of Federal Regulations (CFRs) (e.g., 10 CFR 830, 10 CFR 835, 10 CFR 851, etc.). PAAA Enforcement Coordinators are expected to understand the PAAA regulations and determine whether issues identified within their contract are a PAAA noncompliance. The Regulatory Summary for 10 CFR 835 provides a resource for PAAA Enforcement Coordinators to use by providing examples of noncompliances associated with each citation.

Why the best practice was used: Every year there is a new group of PAAA Enforcement Coordinators that often have little to no experience regarding the PAAA CFRs. The subject Regulatory Summary can be used to supplement the inexperience of the new PAAA Enforcement Coordinators and serve as a refresher for more experienced PAAA Enforcement Coordinators.

What are the benefits of the best practice: New PAAA Enforcement Coordinators will have a better understanding of the associated CFR.

What problems/issues were associated with the best practice: There were no problems associated with the deployment of the best practice.

How the success of the Best Practice was measured: Positive feedback from existing PAAA Enforcement Coordinators.

Description of process experience using the Best Practice: The known operating experience to date includes 3 sites. The best practice supports a better understanding of the subject nuclear safety regulation.

Regulatory Summary
10 CFR 835, Occupational Radiation Protection

Introduction:

This document is intended to provide general support information based on the experience of contractors in the Energy Facility Contractors Group's (EFCOG) Regulatory & Enforcement Subgroup. It is not intended in any way to constitute binding interpretations of any regulation or U. S. Department of Energy (DOE) requirement.

The information and examples contained in this EFCOG Support Document for 10 CFR 835 do not expand or restrict application of any 10 CFR 835 regulation and are not all inclusive. The intent is that these examples are only potential data points that may be used by a contractor when analyzing the applicability of 10 CFR 835. EFCOG recognizes that all potential noncompliances are very fact dependent. This document should not substitute for an individual contractor's interpretation of 10 CFR 835 regulations based on the facts and circumstances of any specific event or set of issues. Additionally, how each site describes and implements its Radiation Protection Program (RPP) may affect how the regulations in 10 CFR 835 are implemented and interpreted.

Common Deficiencies in Contractor Screening Processes (Noncompliance Identification Process)

When screening issues for noncompliances, it is important to be aware of the following information from the DOE Enforcement Coordinator Handbook (page 25).

- *"Failure to consider all appropriate sources for screening (e.g., assessment reports, employee concerns, subcontractor events or deficiencies)*
- *Screening out issues because they were corrected promptly*
- *Screening out issues that are noncompliant with requirements, but are judged to be of low significance*
- *Establishing criteria that are not stipulated in the safety and security regulations, with the effect of limiting the applicability of the regulations;*
    - *for example, treating as noncompliances only matters covered specifically in the safety basis,*
    - *or only violations of work controls for work involving direct handling of nuclear material, or only violations of procedures specifically listed in Rule-required program plans."*

How to Use this Document

- The Row #s are for easy reference only.
- The yellow and green colors are provided to make the groupings clear (i.e., examples, go with the key words, go with the 835 citation).
- The key words are provided to help facilitate a search for a specific subject/noncompliance.
- The blue text is used to emphasize the 835 citation.

Note 1: In all Code of Federal Regulations (CFRs), there are often citations that essentially say the same thing; therefore, citing the "perfect" CFR is not as important as explaining how the issue/event did not comply with the CFR being cited. When the explanation is provided, even though the contractor cites CFR X and the Office of Enforcement (OE) cites CFR Y, it's appropriate because OE will recognize and give contractor credit for identifying the same noncompliance. A good example is a contractor cites 830.122(e)(1) as the noncompliance for not following a radiation protection procedure and OE cites 835.104. They both require procedures to be followed.

Note 2: If a user of this document has an example that the user believes is interesting or would help other Enforcement Coordinators, please submit these examples to the Chair of the EFCOG Regulatory & Enforcement Technical Subgroup.

Note 3: Acronyms used within this document are defined in Attachment 2.

Row #	Noncompliance Examples
1	**Subpart A—General Provisions** **835.3 General rule**
2	**Example 1:** A worker was told by a Radiological Control Technician (RCT) that he was violating the Radiation Work Permit (RWP). The worker ignored the RCT and continued working. **Example 2:** A worker deliberately refused to survey out of a contamination area (CA). The worker insisted, although posted as a CA, that there was no contamination. **Example 3:** An RCT was determined to have been falsifying survey records. _____ **Key Words:** Willful; Intentional; Deliberate _____ **PAAA Noncompliance(s):** **835.3(a):** *"(a) No person or DOE personnel shall take or cause to be taken any action inconsistent with the requirements of:* *(1) This part; or* *(2) Any program, plan, schedule, or other process established by this part."*
3	**Example 1:** The internal audit required for one element of the Radiation Protection Program was extended beyond the allowed 30 days. **Example 2:** The required continuing radiation safety training for a worker was extended beyond the allowed 30 days. **Example 3:** The required inventory for accountable sealed radioactive sources was extended beyond the allowed 30 days. **Example 4:** The required testing for a sealed radioactive source could not be performed within the six months plus 30 days due to the fact the source could not be located. _____ **Key Words:** Extension of: Audits; Radioactive Source Inventory; Radioactive Source Leak Testing; and Radiation Safety Training _____ **PAAA Noncompliance(s):** **835.3(e):** *"(e) For those activities that are required by §§835.102, 835.901(e), 835.1202 (a), and 835.1202(b), the time interval to conduct these activities may be extended by a period not to exceed 30 days to accommodate scheduling needs."* **Referenced in 835.3(e) above. Provided here for convenience.** **835.102:** *Internal audits for all functional elements of Radiation Protection Program minimum at least every 36 months* **835.901(e):** *Radiation safety training at least every 24 months* **835.1202(a):** *Accountable sealed radioactive sources shall be inventoried at least every six months*

Row #	Noncompliance Examples
	835.1202(b): *Accountable sealed radioactive sources shall be leaked tested at least every six months*.
4	**Subpart B—Management and Administrative Requirements** **835.101 Radiation protection programs**
5	**Example 1:** The Radiological Control (RadCon) Manual (implements the DOE approved radiation protection program) includes a requirement that is not flowed down into an implementing procedure, and that requirement was not followed. **Note:** If a requirement from the RadCon Manual is flowed into an implementing procedure, then if the implementing procedure is not complied with, use citation 835.104. **Example 2:** A contractor was operating to an unapproved radiation protection program. _____ **Key Words:** RadCon Manual Compliance; Radiation Protection Program _____ **PAAA Noncompliance(s):** **835.101(a):** *"A DOE activity shall be conducted in compliance with a documented radiation protection program (RPP) as approved by the DOE."* **Note:** The citations below are related to 835.101(a) and associated example above. Provided here for convenience. **835.101(d):** *The RPP shall specify the existing and/or anticipated operational tasks that are intended to be within the scope of the RPP. Except as provided in §835.101(h), any task outside the scope of a RPP shall not be initiated until an update of the RPP is approved by DOE.* **835.104:** *Written procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to these hazards.*
6	**Subpart B—Management and Administrative Requirements** **835.102 Internal audits**
7	**Example 1:** One element of the radiation protection program was not audited within the required 36 months' timeframe, and no extension was requested/documented. **Example 2:** All audits of the radiation protection program focused on content only. There was no auditing on the adequacy of implementation. _____ **Key Words:** Internal Audit; Assessment; Performance Based Audit; Functional Element _____ **PAAA Noncompliance(s):**

Row #	Noncompliance Examples
	835.102: *"Internal audits of the radiation protection program, including examination of program content and implementation, shall be conducted through a process that ensures that all functional elements are reviewed no less frequently than every 36 months."*
8	**Subpart B—Management and Administrative Requirements** **835.103 Education, training and skills**
9	**Example 1:** RCT did not have the necessary training/qualification card. **Example 2:** Health Physicist purchased degree on line from an illegitimate school. **Example 3:** Subcontractor utilized unqualified workers to calibrate instruments and equipment used for radiation monitoring. _____ **Key Words:** Training; Skills; Education _____ **PAAA Noncompliance(s):** **835.103:** *"Individuals responsible for developing and implementing measures necessary for ensuring compliance with the requirements of this part shall have the appropriate education, training, and skills to discharge these responsibilities."*
10	**Subpart B—Management and Administrative Requirements** **830.104 Written procedures**
11	**Example 1:** A procedure that implements a site's Radiation Protection Program meets one or more of the following conditions: • The procedure has a mistake. • The procedure cannot be followed as written. • The procedure is unclear. • The procedure is missing required information. • The procedure is missing requirements. • A procedure does not exist and is needed. • The procedure provides conflicting direction with another procedure. **Example 2:** A RadCon procedure was not followed. _____ **Key Words:** Procedure Quality; Inadequate Procedure; Missing Procedure; Conduct of Operations (ConOps); Procedure Noncompliance _____ **PAAA Noncompliance(s):** **835.104:** *"Written procedures shall be **developed** and **implemented** as necessary to ensure compliance with this part, commensurate with..."* **Note 1:** 835.104 could be paired with many of the other 10 CFR 835 noncompliances since 835 is flowed down into implementing procedures and when those implementing procedures are not complied with then that is a 835.104 noncompliance.

Row #	Noncompliance Examples
	Note 2: Based on review of existing Notices of Violation (NOV), OE often cites and in some cases groups 835.104 with 835.1001(b) and 830.122(e)(1). See NOVs listed for 835.1001 (Row 52)
12	**Subpart C—Standards for Internal and External Exposure** To be Determined. No examples at this time.
13	**Subpart D—[Reserved]**
14	**Subpart E—Monitoring of Individuals and Areas** **835.401 General requirements**
15	**Example 1**: Access was granted to room 2F (area not routinely surveyed) without the requisite RCT coverage. **Example 2:** A reusable contaminated equipment storage area has not been surveyed for seven years. **Example 3:** A worker exited a Radiological Buffer Area (RBA) without doing the required hand and foot survey. **Example 4:** While escorting an assessor, the radiological worker escort inadvertently exited a posted RBA without performing the required survey. **Example 5:** The weekly routine LE-100 was not performed for week of June 8-14. **Example 6:** Intermittent RCT coverage was not provided as required by the RWP in support of the exhauster activities. **Example 7:** A worker received an uptake resulting in personnel exposure exceeding the 100 millirem committed effective dose equivalent. (The source of the radioactive material was not controlled.) **Example 8:** Worker monitoring was insufficient to avoid personnel intakes of radioactive material. Because of inadequate hazard identification, personnel monitoring was focused almost exclusively on external radiation dose without adequate focus on surface and airborne contamination. _____ **Key Words:** RadCon Monitoring; Surveys; Radiological Conditions _____ **PAAA Noncompliance(s):** **835.401(a):** *"(a) Monitoring of individuals and areas shall be performed to:* *(1) Demonstrate compliance with the regulations in this part;* *(2) Document radiological conditions;* *(3) Detect changes in radiological conditions;* *(4) Detect the gradual buildup of radioactive material;* *(5) Verify the effectiveness of engineered and administrative controls in containing radioactive material and reducing radiation exposure; and* *(6) Identify and control potential sources of individual exposure to radiation and/or radioactive material."* **Note:** If 835.401(a)(1) was not complied with then it is very likely that neither were the following citations: **835.104:** *Written procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to these hazards.*

Row #	Noncompliance Examples
	835.501(d): *"Written authorizations shall be required to control entry into and perform work within radiological areas. These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards."*
16	**Example 1:** The radiological survey lists alpha contamination but fails to list/identify use of an instrument capable of taking alpha measurements. **Example 2:** The Geiger–Mueller (GM) portable survey instrument is being used to quantify levels of contamination beyond its capabilities. This instrument cannot be used to verify, by direct survey at a 67% Confidence Level, that removable contamination levels are below 1000 disintegrations per minute per 100 centimeters squared (dpm/100cm^2) if the background is > 50 counts per minute (cpm). **Example 3:** RadCon had been using the referenced REM Ball neutron survey meters to survey the neutron sources used by Operations. Both neutron sources have contact dose rates above the REM Ball instrument's limitations. **Example 4:** The alarm settings on the instrument were set such that all of the alarms were disabled. **Example 5:** The dosimeter was returned to the checkout station with incorrect settings. **Example 6:** A dosimeter was issued to a worker without the proper setup. **Example 7:** An area radiation monitor was found to be out of calibration on multiple occasions. **Example 8:** It was discovered that an RCT performed a survey with an instrument that had not been source checked within the last 24 hours. _____ **Key Words:** Calibration; Limitations of Instrument; Incorrect Instrument listed on Survey. _____ **PAAA Noncompliance(s):** **835.401(b)(1):** *"(b) Instruments and equipment used for monitoring shall be:* *(1) Periodically maintained and calibrated on an established frequency;* *(2) Appropriate for the type(s), levels, and energies of the radiation(s) encountered;* *(3) Appropriate for existing environmental conditions; and* *(4) Routinely tested for operability."*
17	**Subpart E—Monitoring of Individuals and Areas** **835.402 Individual monitoring**
18	**Example 1:** Workers were wearing electronic pocket dosimeters that were never assigned to the respective workers. **Example 2:** Two Industrial Hygiene Technicians did not have dosimeters required by the RWP (See citation for 835.402(a)(1)(i)) "provided and used") **Example 3:** The worker spent three minutes in the radioactive material area before realizing he should not be in the area without the required dosimetry and immediately exited. **Example 4:** A radioactive waste transport truck driver was allowed by his qualified radiological worker escort to sign the RWP and enter a posted radioactive material area without the required dosimetry. _____ **Key Words:** Dosimetry; Dosimeters

Row #	Noncompliance Examples
	_____ **PAAA Noncompliance(s):** **835.402(a)(1)(i):** *"(a) For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided and used by:* *(1)Radiological Workers who under typical conditions are likely to receive one or more of the following:* *(i)An effective dose of 0.1rem or more in a year."* **Note:** Since this example involves not following the RWP then 835.501(d) could also be cited.
19	**Subpart E—Monitoring of Individuals and Areas** **835.403 Air monitoring**
20	**Example 1:** Some workers' lapel air samplers were not properly placed to ensure collection of a sample representative of the breathing zone, as is needed for proper evaluation of results. A number of workers' samplers were placed under loose-fitting hoods that could obstruct sampler effectiveness or in locations away from the breathing zone. **Note:** If lapel air samplers are required, then they must be properly used to satisfy this requirement. **Example 2:** Upon completion of the work activity, the riser flange was reinstalled, but prior to the completion of all the post work activities (housekeeping) inside the posted Airborne Radioactivity Area (ARA) the grab air sampler was turned off prematurely so that the air sample could be counted. **Example 3:** An air sample was not taken prior to worker entry into a potential airborne contamination area. **Example 4:** Electricity was disconnected from the Continuous Air Monitor (CAM), affecting the alarm function and thus disabling the real-time monitoring. **Example 5:** RCTs observed that custodians were only changing out some, not all, of the fixed air sample filters in one of the laboratories, therefore compromising the air monitoring program. **Example 6:** The alarm of the only CAM located in the shredder area of the building to alert workers to changes in radiological conditions was never turned on, therefore, could not alert workers to the airborne release of radioactive material. _____ **Key Words:** Airborne RadCon Monitoring; Alarm; Air Samplers _____ **PAAA Noncompliance(s):** **835.403(a) and (b):** *"(a) Monitoring of airborne radioactivity shall be performed:* *(1) Where an individual is likely to receive an exposure of 40 or more DAC-hours in a year; or* *(2) As necessary to characterize the airborne radioactivity hazard where respiratory protective devices for protection against airborne radionuclides have been prescribed.* *(b) Real-time air monitoring shall be performed as necessary to detect and provide warning of airborne radioactivity concentrations that warrant immediate action to terminate inhalation of airborne radioactive material."*

Row #	Noncompliance Examples
21	**Subpart F— Entry Control Program** **835.501 Radiological areas**
22	**Example 1:** The vehicle gates (all two-panel gate systems) did not have a mechanism in the middle of the gates to hold the gates in place when they were closed. This allows the gates to move in and out thereby not establishing a positive boundary for the radiological areas being contained inside the gated and fenced area **Example 2:** Entry approach to a radiation/contamination area was not posted and did not have a barricade. **Example 3:** The boundaries for a CA were not clearly defined. Ropes were only in place on two of the four sides. **Example 4:** Required radiological postings were not on all of the rope barriers that defined the CA boundary. **Example 5:** Entry to the linear electron accelerator room of the Radiation Therapy Facility was not controlled to the degree commensurate with existing radiological hazards within the area in that one of two micro-switches acting as a redundant interlock for the door to the linear electron accelerator room failed and the failed interlock was bypassed by taping the micro-switch closed. _____ **Key Words:** Entry Control (Radiological Area); Posting; Access Control; Entrances _____ **PAAA Noncompliance(s):** **835.501:** *"(a) Personnel entry control shall be maintained for each radiological area.* *(b) The degree of control shall be commensurate with existing and potential radiological hazards within the area.* *(c) One or more of the following methods shall be used to ensure control:* *(1) Signs and barricades;* *(2) Control devices on entrances;* *(3) Conspicuous visual and/or audible alarms;* *(4) Locked entrance ways; or* *(5) Administrative controls."*
23	**Example 1:** Contrary to the RWP, work was performed in hood 1 of room 1GA prior to obtaining the required radiological surveys by an RCT. **Example 2:** Contrary to the RWP, a worker entered a CA without proper Personal Protective Equipment (PPE). **Example 3:** Contrary to the RWP, a worker entered into a Radioactive Material Area without the required personal dosimeter. **Example 4:** Worker entered a CA without signing the RWP and was not wearing the required PPE. **Example 5:** Worker did not stop work when the void limit on the RWP was exceeded. **Example 6**: The RWP did not specify radiation protection measures commensurate with the existing and potential hazards associated with the activity. Based on the radiation levels measured during most of the activity, the workers and the RCTs thought they were working within the bounds of the RWP. The worst case readings at both areas were significantly higher than the RWP limits and warranted more aggressive controls.

Row #	Noncompliance Examples
	Example 7: The RCT prescribed extremity dosimetry, but the RWP did not despite the potential for significant dose when handling this source. Worker 1 wore his wrist dosimeter (though incorrectly), and in accordance with the RWP, Worker 2 and Worker 3 did not wear any extremity dosimetry. _____ **Key Words:** RWP Violation _____ **PAAA Noncompliance(s):** **835.501(d):** *"Written authorizations shall be required to control entry into and perform work within radiological areas. These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards."* **Note 1:** If a worker does not comply with the RWP, then the worker does not have written authorization to be in the subject area. **Note 2:** RWP violations often are paired with other noncompliances, such as citations that relate to monitoring, dosimetry, PPE etc. **Note 3:** Radiological area means any area within a controlled area defined in this section as a "radiation area," "high radiation area," "very high radiation area," "contamination area," "high contamination area," or "airborne radioactivity area."
24	**Example 1:** Room 100 is posted as a Radiation Area (RA) and CA. Room 100 has a locked door to obtain entry and a crash bar for exit. The crash bar has malfunctioned several times preventing workers from exiting the room. A work request was submitted six months ago, but still no action has been taken to fix the door. **Example 2:** The door used to exit a room that is posted as an RA was inadvertently locked from the outside of the room by a security guard, thus preventing the workers on the inside of the room from being able to exit. **Example 3:** Worker was inadvertently locked/trapped in lower head end ventilation blower room that is posted as an RA. **Example 4:** Two electricians were inadvertently locked in a material storage area that was locked for physical security reasons, not for radiological access control. However, a radiological area did exist in the storage area and the locked door was found to prevent rapid evacuation of personnel under emergency conditions. **Note:** Being locked inside a room is also going to be a NFPA Life Safety code noncompliance. _____ **Key Words:** Entry Control (Egress); Locked Doors; Escape; _____ **PAAA Noncompliance(s):** **835.501(e):** **"***No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions."*

Row #	Noncompliance Examples
	Note: High and Very High Radiological Areas have the same requirement see Row 29
25	**Subpart F— Entry Control Program** **835.502 High and very high radiation areas**
26	**Example 1:** The RCT unlocked the entry to the High Radiation Area (HRA) and then realized his instrument was not working. He told the workers to go enter the room and start their field walk down without the RCT coverage because it would not take long to get a new instrument. As a result, the workers had no idea where the high doses were located in the room. It took the RCT an hour to return. **Example 2:** A worker entered an HRA without the required electronic dosimetry. **Example 3:** A worker entered an HRA with an electronic dosimeter that had a dead battery. _____ **Key Words:** RadCon Monitoring (HRA); Personnel Monitoring _____ **PAAA Noncompliance(s):** **835.502(a):** *"(a) The following measures shall be implemented for each entry into a high radiation area:* *(1) The area shall be monitored as necessary during access to determine the exposure rates to which the individuals are exposed; and* *(2) Each individual shall be monitored by a supplemental dosimetry device or other means capable of providing an immediate estimate of the individual's integrated equivalent dose to the whole body during the entry."* "
27	**Example 1:** The key for entry into a HRA was removed from the Shift Office without proper approval and completion of the key checkout log. **Example 2:** While conducting the weekly verification of an HRA control devices, the RCT discovered that the lock that prevents access to cell XC-2 was missing. **Example 3:** An individual, without an access control key, entered an enclosure with two other individuals, who had appropriate access control keys. **Example 4:** The alarms that signal impending operation of radiation sources were found to not be functioning. _____ **Key Words:** Entry Control (HRA); Physical Controls; Control Device _____ **PAAA Noncompliance(s):** **835.502(b):** *"b) Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 sievert) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:* *"(1) A control device that prevents entry to the area when high radiation levels exist or upon entry causes the radiation level to be reduced below that level defining a high radiation area;*

Row #	Noncompliance Examples
	(2) A device that functions automatically to prevent use or operation of the radiation source or field while individuals are in the area; *(3) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry;* *(4) Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;* *(5) Continuous direct or electronic surveillance that is capable of preventing unauthorized entry;* *(6) A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source."*
28	**Example 1:** A discrepancy existed in implementing two levels of engineered controls for Very High Radiation Areas; visible lights and audible alarms were in place along with a series of defense-in-depth control measures, but a second engineered control was not in place. **Example 2:** The operator had been distracted during his exit and inaccurately recalled having applied the lock, resulting in the door being unlocked over the weekend. _____ **Key Words:** Entry Control (Very High Radiation Area); Physical Controls; Control Device _____ **PAAA Noncompliance(s):** **835.502(c):** *"Very high radiation areas. In addition to the above requirements* (Row 26 & 27)*, additional measures shall be implemented to ensure individuals are not able to gain unauthorized or inadvertent access to very high radiation areas."*
29	**Example 1:** See examples for 835.501(e) (Row 24). _____ **Key Words:** Entry Control (Egress); Locked Doors; Escape; _____ **PAAA Noncompliance(s):** **835.502(d):** *"No control(s) shall be established in a high or very high radiation area that would prevent rapid evacuation of personnel."* Note: Radiological Areas have the same requirement see Row 24
30	**Subpart G—Posting and Labeling**

Row #	Noncompliance Examples
	835.601 General requirements
31	**Example 1:** Due to radiological postings/signs being in the sunlight for extended period, the postings/signs were no longer compliant (e.g., the colors were seriously faded, the yellow background was almost white) with the standard postings described in 10 CFR 835. **Example 2:** During a routine surveillance, several postings were discovered that used nonstandard posting/sign for CAs. Based on preliminary interviews with the RCT that hung the nonstandard posting/sign, it appears the RCT ran out of standard posting/signs, then improvised by using some discarded OSHA Yellow Caution signs with the pen markings "Contamination Area." When the RCT was interviewed, he stated he did not want to leave the CA ropes without postings/signs; therefore, he improvised with the intent of going back later and replacing the nonstandard posting/signs with approved signs. However, it was at the end of his shift and he failed to return. _____ **Key Words:** General RadCon Posting and Labeling _____ **PAAA Noncompliance(s):** **835.601(a);** ***"Except as otherwise provided in this subpart, postings and labels required by this subpart shall include the standard radiation warning trefoil in black or magenta imposed upon a yellow background."***
32	**Example 1:** A CA posting was on the front of the door that was hidden when the door was left open. **Example 2:** A CA postings that was hung from the rope boundaries were lying face down on the ground. **Example 3:** Any radiological area posting is missing. **Example 4:** Any radiological postings markings are no longer legible. **Note:** 835.601(b) could be cited for every required posting that is missing. In addition, the specific type of posting that is missing such as the postings that are required by 835.603 should also be cited. _____ **Key Words:** General RadCon Posting and Labeling; Missing Posting; _____ **PAAA Noncompliance(s):** **835.601(b);** ***"(b) Signs required by this subpart shall be clearly and conspicuously posted and may include radiological protection instructions."***
33	**Subpart G—Posting and Labeling** **835.602 Controlled areas**
34	**Example 1:** A controlled area posting is missing. **Example 2:** A controlled area was posted incorrectly. The original calculation had a mistake. The new total effective dose was calculated to be greater than 0.1 rem/yr and should have been posted as a radiation area. **Example 3:** While performing a safety walk down, the recently moved radioactive source storage file cabinet in Room D-178 was found to be securely locked and conspicuously posted "Radioactive Source Storage." Room D-178 was posted as a Radioactive Material Area (RMA), however, as the building is not within a Radiologically Controlled Area (RCA), the room should also have also been posted as an RCA.

Row #	Noncompliance Examples
	Example 4: An RCT discovered that the controlled area sign at the main gate was missing. (Note, the sign existed on the old construction gate) _____ **Key Words:** Controlled Area Posting; Radiological Area; Radioactive Material Area _____ **PAAA Noncompliance(s):** **835.602(a):** *"Each access point to a controlled area (as defined at 835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area. Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001 sievert) in a year."*
35	**Subpart G—Posting and Labeling** **835.603 Radiological areas and radioactive material areas**
36	**Example 1:** Two areas of elevated contamination were identified in the immediate work area on subsequent surveys. Although only limited access is provided to this facility, adequate warnings and controls were not in place during this time to inform personnel of the hazard. **Example 2:** Discovery of a contaminated respirator breathing tubes and associated respiratory equipment in an area that was not posted as a radiological area. **Example 3:** Multiple failures of personnel to adhere to the work control process resulted in two breaches of a physical barrier to the adjacent area, a posted Airborne Radioactivity Area (ARA). **Example 4:** While radioactive material areas were established as a control for applicable samples and materials, a sample was stored outside of a posted Radioactive RMA. Storing this sample in an RMA and labeling it as radioactive material were established controls that were not implemented. **Example 5:** A known Radiation Area was determined to not be posted properly. _____ **Key Words:** Access Point; RadCon Postings _____ **PAAA Noncompliance(s):** **835.603:** *"Each access point to radiological areas and radioactive material areas (as defined at §835.2) shall be posted with conspicuous signs bearing the wording provided in this section.* *(a) Radiation area. The words "Caution, Radiation Area" shall be posted at each radiation area.* *(b) High radiation area. The words "Caution, High Radiation Area" or "Danger, High Radiation Area" shall be posted at each high radiation area.* *(c) Very high radiation area. The words "Grave Danger, Very High Radiation Area" shall be posted at each very high radiation area.* *(d) Airborne radioactivity area. The words "Caution, Airborne Radioactivity Area" or "Danger, Airborne Radioactivity Area" shall be posted at each airborne radioactivity area.*

Row #	Noncompliance Examples
	(e) Contamination area. The words "Caution, Contamination Area" shall be posted at each contamination area. *(f) High contamination area. The words "Caution, High Contamination Area" or "Danger, High Contamination Area" shall be posted at each high contamination area.* *(g) Radioactive material area. The words "Caution, Radioactive Material(s)" shall be posted at each radioactive material area."* **Note:** Exceptions to these posting requirements are allowed as described in 835.604.
37	**Subpart G—Posting and Labeling** **835.605 Labeling items and containers**
38	**Example 1:** While moving drum 15904-C, the RCT performed a survey and found that the dose rate on the drum exceeded the level indicated on the radioactive material label. (This noncompliance is being cited because the "sufficient information" must be accurate.) **Example 2:** Box #12-1390 was discovered with a radiation protection tag on it indicating that the box had a high dose rate of 1500 mR/hr. The box did not have any special postings indicating any additional requirements for working in or around dose rates of this magnitude. **Example 3:** The radioactive material tag associated with the sample when transported to another area did not provide sufficient information to permit individuals handling the sample to take precautions to avoid or control exposures. While the material tag did indicate the sample was contaminated, it provided a dose rate significantly below readings obtained _____ **Key Words:** Radioactive Material Labeling; Item Labeling; Container Labeling _____ **PAAA Noncompliance(s):** **835.605:** *" Except as provided at 835.606, each item or container of radioactive material shall bear a durable, clearly visible label bearing the standard radiation warning trefoil and the words "Caution, Radioactive Material" or "Danger, Radioactive Material." The label shall also provide sufficient information to permit individuals handling, using, or working in the vicinity of the items or containers to take precautions to avoid or control exposures."* **Note:** Exceptions to labeling are described in 835.606.
39	**Subpart H—Records** **835.701 General provisions**
40	**Example 1:** During the review of routine surveys, it was discovered that documentation of three weekly surveys could not be located. **Example 2:** There is no evidence of a standard laboratory-wide program for radiological recordkeeping. Also, there is apparently no centralized document storage area for applied health physics records. Retrieval of historical radiological records is difficult. _____

Row #	Noncompliance Examples
	Key Words: Records _____ **PAAA Noncompliance(s):** **835.701:** *"(a) Records shall be maintained to document compliance with this part and with radiation protection programs required by 835.101. (b) Unless otherwise specified in this subpart, records shall be retained until final disposition is authorized by DOE."*
41	**Subpart H—Records** **835.702 Individual monitoring records**
42	**Example 1:** On Tuesday, August 1, 2000, 15 unanalyzed urine bioassay samples collected from employees between April 4, 1995, and May 21, 1995, were discovered inside locked refrigerators. **Example 2:** The failure to review 50 anomalous bioassays for 24 individuals from September 2009 to May 2012 may result in more internal dose reporting. **Example 3:** The contractor failed to conduct several routine whole body counts during the calendar year 1998. _____ **Key Words:** Records; External Dose; Internal Dose; Exposure Monitoring _____ **PAAA Noncompliance(s):** **835.702:** *"(a) Except as authorized by §835.702(b), records shall be maintained to document doses received by all individuals for whom monitoring was conducted and to document doses received during planned special exposures, unplanned doses exceeding the monitoring thresholds of §835.402, and authorized emergency exposures.* *(b) Recording of the non-uniform equivalent dose to the skin is not required if the dose is less than 2 percent of the limit specified for the skin at §835.202(a)(4). Recording of internal dose (committed effective dose or committed equivalent dose) is not required for any monitoring result estimated to correspond to an individual receiving less than 0.01 rem (0.1 mSv) committed effective dose. The bioassay or air monitoring result used to make the estimate shall be maintained in accordance with §835.703(b) and the unrecorded internal dose estimated for any individual in a year shall not exceed the applicable monitoring threshold at §835.402(c).* (c) The records required by this section shall: (1) Be sufficient to evaluate compliance with subpart C of this part; (2) Be sufficient to provide dose information necessary to complete reports required by subpart I of this part; (3) Include the results of monitoring used to assess the following quantities for external dose received during the year: (i) The effective dose from external sources of radiation (equivalent dose to the whole body may be used as effective dose for external exposure);

Row #	Noncompliance Examples
	(ii) The equivalent dose to the lens of the eye; (iii) The equivalent dose to the skin; and (iv) The equivalent dose to the extremities. (4) Include the following information for internal dose resulting from intakes received during the year: (i) Committed effective dose; (ii) Committed equivalent dose to any organ or tissue of concern; and (iii) Identity of radionuclides. (5) Include the following quantities for the summation of the external and internal dose: (i) Total effective dose in a year; (ii) For any organ or tissue assigned an internal dose during the year, the sum of the equivalent dose to the whole body from external exposures and the committed equivalent dose to that organ or tissue; and (iii) Cumulative total effective dose. (6) Include the equivalent dose to the embryo/fetus of a declared pregnant worker. (d) Documentation of all occupational doses received during the current year, except for doses resulting from planned special exposures conducted in compliance with §835.204 and emergency exposures authorized in accordance with §835.1302(d), shall be obtained to demonstrate compliance with §835.202(a). If complete records documenting previous occupational dose during the year cannot be obtained, a written estimate signed by the individual may be accepted to demonstrate compliance. (e) For radiological workers whose occupational dose is monitored in accordance with §835.402, reasonable efforts shall be made to obtain complete records of prior years occupational internal and external doses. (f) The records specified in this section that are identified with a specific individual shall be readily available to that individual. (g) Data necessary to allow future verification or reassessment of the recorded doses shall be recorded. (h) All records required by this section shall be transferred to the DOE upon cessation of activities at the site that could cause exposure to individuals.”
43	**Subpart H—Records** **835.703 Other monitoring records**
44	**Example 1:** A worker discovered that the technician assigned to exchange CAM filters did not record flow rate and count rate on the daily CAM check sheet for Thursday March 16, 2006. **Example 2:** Air sampling analysis reports often lacked flow rates, sampling times, counting times, filter type, or filter efficiency factor. **Example 3:** It was discovered that two RCTs had not maintained their Equipment Performance Logs as required by procedure. **Example 4:** Dummy fuel elements were removed from Room 100, a radiological area, to the maintenance shop, a non-radiological area, without maintaining release surveys records. _____

Row #	Noncompliance Examples
	Key Words: Exposure Monitoring; Contamination Control; Records; Maintenance and Calibration _____ **PAAA Noncompliance(s):** **835.703:** *"The following information shall be documented and maintained:* *(a) Results of monitoring for radiation and radioactive material as required by subparts E and L of this part, except for monitoring required by §835.1102(d);* *(b) Results of monitoring used to determine individual occupational dose from external and internal sources;* *(c) Results of monitoring for the release and control of material and equipment as required by §835.1101; and* *(d) Results of maintenance and calibration performed on instruments and equipment as required by §835.401(b)."*
45	**Subpart H—Records** **835.704 Administrative records**
46	**Example 1:** Completion of visitor orientation is not documented and retained as required. **Example 2:** Training on the installation of drip catch containers was given, but no objective evidence of completion was submitted as a record. **Example 3:** Records Inventory and Disposition Schedule retention times and disposition requirements have not been established for all of the As Low As Reasonably Achievable (ALARA) generated records. _____ **Key Words:** Records; Training; Pregnancy; ALARA _____ **PAAA Noncompliance(s):** **835.704:** *"(a) Training records shall be maintained, as necessary, to demonstrate compliance with §§835.901.* *(b) Actions taken to maintain occupational exposures as low as reasonably achievable, including the actions required for this purpose by §835.101, as well as facility design and control actions required by §§835.1001, 835.1002, and 835.1003, shall be documented.* *(c) Records shall be maintained to document the results of internal audits and other reviews of program content and implementation.* *(d) Written declarations of pregnancy, including the estimated date of conception, and revocations of declarations of pregnancy shall be maintained.* *(e) Changes in equipment, techniques, and procedures used for monitoring shall be documented.*

Row #	Noncompliance Examples
	(f) Records shall be maintained as necessary to demonstrate compliance with the requirements of §§835.1201 and 835.1202 for sealed radioactive source control, inventory, and source leak tests."
47	**Subpart I—Reports to Individuals** **835.801 Reports to Individuals**
48	**Example 1:** It was discovered that 94 personnel exposure reports were issued containing erroneous computation of radiation exposure data results. **Example 2:** The Cumulative Total Effective Dose Equivalent received by each individual as recorded and reported by the Laboratory does not include doses received at other locations as required by the amended (1998) 10 CFR 835 rule. **Example 3:** During the period January 1996 through March 1998, the Laboratory was periodically not in full compliance with the 90-day requirement to provide exposure records to individuals terminating employment. _____ **Key Words:** Records; Exposure; Termination; Dose Report _____ **PAAA Noncompliance(s):** **835.801:** *"(a) Radiation exposure data for individuals monitored in accordance with Sec. 835.402 shall be reported as specified in this section.* *(b) Upon the request from an individual terminating employment, records of exposure shall be provided to that individual as soon as the data are available, but not later than 90 days after termination.* *(c) Each DOE- or DOE-contractor-operated site or facility shall, on an annual basis, provide a radiation dose report to each individual monitored during the year at that site or facility in accordance with Sec. 835.402.* *(d) Detailed information concerning an individual's exposure shall be made available to the individual upon request of that individual, consistent with the provisions of the Privacy Act (5 U.S.C. 552a).* *(e) When a DOE contractor is required to report to the Department, pursuant to Department requirements for occurrence reporting and processing, any exposure of an individual to radiation and/or radioactive material, or planned special exposure in accordance with §835.204(e), the contractor shall also provide that individual with a report of his or her exposure data included therein. Such report shall be transmitted at a time not later than the transmittal to the Department."*
49	**Subpart J – Radiation Safety Training** **835.901 Radiation Safety Training**
50	**Example 1:** The Principal Investigator had neglected to add the rotation student to the Radiation Work Authorization for work with radioactive materials in his laboratory and had neglected to assure that she completed the radiation safety training required for independent work with radioisotopes. **Example 2:** The training for 613 personnel who signed the various RWPs was evaluated, and 13 were determined to not have documentation to evidence completion of appropriate access training required by procedures for entry to the radiological conditions identified on the RWPs.

Row #	Noncompliance Examples
	Example 3: An assessment found that four workers who had performed radiological work at the facility without completing the current site-specific radiological training. An extent of condition review of all workers at the facility found that over a two year period, 13 workers entered radiological areas at at the facility without completing the current radiological training. _____ **Key Words:** Training; Radiation Safety; Radiological Worker; Unescorted Access _____ **PAAA Noncompliance(s):** **835.901:** *"(a) Each individual shall complete radiation safety training on the topics established at Sec. 835.901(c) commensurate with the hazards in the area and the required controls:* *(1) Before being permitted unescorted access to controlled areas; and.* *(2) Before receiving occupational dose during access to controlled areas at a DOE site or facility.* *(b) Each individual shall demonstrate knowledge of the radiation safety training topics established at Sec. 835.901(c), commensurate with the hazards in the area and required controls, by successful completion of an examination and performance demonstrations:* *(1) Before being permitted unescorted access to radiological areas; and* *(2) Before performing unescorted assignments as a radiological worker.* *(c) Records shall be maintained to document the results of internal audits and other reviews of program content and implementation.* *(d) Written declarations of pregnancy, including the estimated date of conception, and revocations of declarations of pregnancy shall be maintained.* *(e) Changes in equipment, techniques, and procedures used for monitoring shall be documented.* *(f) Records shall be maintained as necessary to demonstrate compliance with the requirements of §§835.1201 and 835.1202 for sealed radioactive source control, inventory, and source leak tests."*
51	**Subpart K—Design and Control** **835.1001 Design and control**
52	**Example 1:** Adequate administrative controls and procedural requirements to maintain personnel radiation exposures ALARA were not implemented. Specifically, high-energy radiation was known to be a radiological hazard associated with thermocouple removal; however, adequate radiological controls for this hazard were either not included in the work package or its accompanying work documents, such as the RWP and the Process Control Package, or were not followed. **Example 2:** Twenty-three workers occupying the T321 trailer during the period of December 1999 to August 2000 inhaled airborne radioactivity. As a result, the individuals received unplanned exposures ranging from approximately 30 to 330 millirem. There were no design features or administrative controls instituted to limit radiation exposure. **Example 3:** For additional examples see, the NOVs referenced below. _____

Row #	Noncompliance Examples
	Key Words: Design Controls; Administrative Controls; ALARA _____ **PAAA Noncompliance(s):** **835.1001:** *"(a) Measures shall be taken to maintain radiation exposure in controlled areas ALARA through engineered and administrative controls. The primary methods used shall be physical design features (e.g., confinement, ventilation, remote handling, and shielding). Administrative controls shall be employed only as supplemental methods to control radiation exposure.* *(b) For specific activities where use of engineered controls is demonstrated to be impractical, administrative controls shall be used to maintain radiation exposures ALARA."* **Note 1:** It is difficult to make a distinction between 835.1001, 835.1002, and 835.1003 because 835.1001 appears to apply to both engineered (primary method) and administrative controls (supplemental method) to **any controlled area to maintain radiation exposure as ALARA** whether the area is a new design, modification to an existing design or just part of routine operations. Whereas, 835.1002 appears to apply only engineered controls to maintain radiation exposure as ALARA for both new facilities and modification of existing facility. Then, 835.1003 applies both again, yet just for routine operations. Therefore, a user of this Regulatory Summary may just want to cite 835.1001 when design features or administration controls or both fail to control radiation exposure. As can be seen by the NOV examples In Note 2 below 835.1001 has been a citation of choice by the Office of Enforcement. **Note 2:** Based on review of existing NOVs, Office of Enforcement often cites and in some cases groups 835.104 with 835.1001(b) and 830.122(e)(1). The Nuclear Safety NOVs can be found here https://www.energy.gov/ea/listings/nuclear-safety-enforcement-documents Rather than list the noncompliances for each NOV, the noncompliances are grouped into the following Sets: **Set 1=** [835.1001(b)] **Set 2**= [835.104; 830.122(e)(1)] **Set 3**= [835.1001(a); 835.104; 830.122(e)(1)] **Set 4**= [835.101(a); 835.1001(a)] Note that 835.101(a) and 835.104 are both not following procedures, RWPs etc. **Set 5**= [830.122(e)(1)] **Set 6**= [835.1001; 835.104] **Set 7**= [835.104] **Set 8**= [835.1001(a)] Reference the following Nuclear Safety NOVs: • EA 96-02 (7-16-1996): **Set 1** • EA 96-03 (8-14-1996): **Set 1**

Row #	Noncompliance Examples
	• EA 96-04 (10-7-1996): **Set 1** • EA-96-05 (10-7-1996): **Set 1** • EA-97-01 (2-27-1997): **Set 1** • EA 97-03 (6-6-1997): **Set 1** • EA 97-04 (6-6-1997): **Set 1** • EA 97-07 (8-14-1997): **Set 1** • EA 97-08 (9-19-1997): **Set 1** • EA 97-10 (10-21-1997): **Set 1** • EA 97-12 (12-5-1997): **Set 1** • EA 97-13 (12-18-1997): **Set 1** • EA 98-01 (3-9-1998): **Set 1** • EA 98-05 (6-4-1998): **Set 1** • EA 98-07 (9-21-1998): **Set 1** • EA 98-08 (9-21-1998): **Set 1** • EA 98-10 (9-21-1998): **Set 1** • EA 98-12 (11-16-1998): **Set 1** • EA 99-01 (2-26-1999): **Set 1** • EA 99-02 (4-15-1999): **Set 1** • EA 99-03 (5-21-1999): **Set 1** • EA 99-08 (9-3-1999): **Set 1** • EA 99-10 (12-14-1999): **Set 1** • EA 2000-06 (5-19-2000): **Set 1** • EA 2000-08 (7-18-2000): **Set 1** • EA 2001-03 (7-11-2001]: **Set 3** • EA 2001-04 (7-17-2001): **Set 1** • EA 2001-05 (8-14-2001): **Set 1** • EA 2001-06 (1-4-2002): **Set 8** • EA 2002-01 (3-19-2002): **Set 1** • EA 2003-02 (4-10-2003): **Set 3** • EA 2004-02 (2-3-2003): **Set 3** • EA 2004-03 (4-6-2003): **Set 3** • EA 2004-05 (6-21-2004): **Set 3** • EA 2004-07 (8-9-2004): **Set 6** • EA 2005-01 (3-10-2005): **Set 2** • EA 2005-04 (8-4-2005): **Set 2** • EA 2005-05 (8-25-2005): **Set 7** • EA 2006-02 (3-7-2006): **Set 2** • EA 2006-05 (2-16-2006): **Set 3** • EA 2006-06 (11-16-2006): **Set 1** • NEA 2008-01 (6-13-2008): **Set 2** • NEA 2011-01 (4-15-2011): **Set 4** • NEA 2011-02 (7-22-2011): **Set 2** • NEA 2011-04 (9-1-2011): **Set 2**

Row #	Noncompliance Examples
	• NEA 2012-01 (10-4-2012): **Set 5**; Because some of the procedures listed in the NOV are related to Radiation Protection. Office of Enforcement probably should have also included 835.104 or 835.101(a). • NEA 2015-01 (1-29-15): **Set 2**
53	**Subpart K—Design and Control** **835.1002 Facility Design and Modifications**
54	**Example 1:** The design had minimal consideration for controlling radiation exposure to ALARA. **Note:** Applies to the "design" for a new facility design or a modification to an existing facility design. **Example 2:** The design did not consider incorporating a concrete wall for shielding around a 500-gallon tank that was expected to have a very high dose rate. **Example 3:** The facility design did not consider how the reactor coolant pump could be removed and replaced when the pump failed. _____ **Key Words:** ALARA Design (New and Modification) Considerations for Operations, Maintenance, Decontamination, and Decommissioning _____ **PAAA Noncompliance(s):** **835.1002:** *"During the design of new facilities or modification of existing facilities, the following objectives shall be adopted:* *(a) Optimization methods shall be used to assure that occupational exposure is maintained ALARA in developing and justifying facility design and physical controls.* *(b) The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of 0.5 millirem (5 μSv) per hour and as far below this average as is reasonably achievable. The design objectives for exposure rates for potential exposure to a radiological worker where occupancy differs from the above shall be ALARA and shall not exceed 20 percent of the applicable standards in §835.202.* *(c) Regarding the control of airborne radioactive material, the design objective shall be, under normal conditions, to avoid releases to the workplace atmosphere and in any situation, to control the inhalation of such material by workers to levels that are ALARA; confinement and ventilation shall normally be used.* *(d) The design or modification of a facility and the selection of materials shall include features that facilitate operations, maintenance, decontamination, and decommissioning.*" **Note 1:** It is difficult to make a distinction between 835.1001, 835.1002, and 835.1003 because 835.1001 appears to apply to both engineered (primary method) and administrative controls (supplemental method) to **any controlled area to maintain radiation exposure as ALARA** whether the area is a new design, modification to an existing design or just part of routine operations.

Row #	Noncompliance Examples
	Whereas, 835.1002 appears to apply only engineered controls to maintain radiation exposure as ALARA for both new facilities and modification of existing facility. Then, 835.1003 applies both again, yet just for routine operations. Therefore, a user of this Regulatory Summary may just want to cite 835.1001 when design features or administration controls or both fail to control radiation exposure; however, some examples above are provided that may be more appropriate depending on the details of the issue/event.
55	**Subpart K—Design and Control** **835.1003 Work Place Controls**
56	**Example 1:** The plant manager did not want to wait for lead blankets to be installed to reduce the worker exposure because it would delay the work package completion by one day, and it was the end of the dosimetry quarter and the assigned workers had no dose on their dosimetry for the quarter. **Example 2:** A Field Work Supervisor (FWS) sent three Pipe Fitters into a High Radiation Area to complete a work package when only two were required because the FWS had nothing else to give the third Pipe Fitter to do that day. **Note:** It is difficult to make a distinction between 835.1001, 835.1002, and 835.1003 because 835.1001 appears to apply to both engineered (primary method) and administrative controls (supplemental method) to **any controlled area to maintain radiation exposure as ALARA** whether the area is a new design, modification to an existing design or just part of routine operations. Whereas, 835.1002 appears to apply only engineered controls to maintain radiation exposure as ALARA for both new facilities and modification of existing facility. Then, 835.1003 applies both again, yet just for routine operations. Therefore, a user of this Regulatory Summary may just want to cite 835.1001 when design features or administration controls or both fail to control radiation exposure; however, some examples above are provided that may be more appropriate depending on the details of the issue/event. _____ **Key Words:** Post-job; ALARA Improvements; _____ **PAAA Noncompliance(s):** **835.:1003:** *"During routine operations, the combination of engineered and administrative controls shall provide that:* *(a) The anticipated occupational dose to general employees shall not exceed the limits established at §835.202; and)* *(b) The ALARA process is utilized for personnel exposures to ionizing radiation."*
57	**Subpart L—Radioactive Contamination Control**

Row #	Noncompliance Examples
	835.1101 Control of material and equipment
58	**Example 1:** Stainless steel coupon was determined to be contaminated and the appropriate controls, posting, PPE and monitoring were not implemented immediately. **Example 2:** Material and equipment were removed from a designated CA without any surveys to detect contamination levels. **Example 3:** Material was removed from a CA using equipment that was not appropriate for the type, level and energies of the radiations encountered. _____ **Key Words:** Movement of Equipment; Equipment Surveys; Conditional Release _____ **PAAA Noncompliance(s):** **835.:1101:** *"(a) Except as provided in paragraphs (b) and (c) of this section, material and equipment in contamination areas, high contamination areas, and airborne radioactivity areas shall not be released to a controlled area if:* *(1) Removable surface contamination levels on accessible surfaces exceed the removable surface contamination values specified in appendix D of this part; or* *(2) Prior use suggests that the removable surface contamination levels on inaccessible surfaces are likely to exceed the removable surface contamination values specified in appendix D of this part.* *(b) Material and equipment exceeding the removable surface contamination values specified in appendix D of this part may be conditionally released for movement on-site from one radiological area for immediate placement in another radiological area only if appropriate monitoring is performed and appropriate controls for the movement are established and exercised.* *(c) Material and equipment with fixed contamination levels that exceed the total contamination values specified in appendix D of this part may be released for use in controlled areas outside of radiological areas only under the following conditions:* *(1) Removable surface contamination levels are below the removable surface contamination values specified in appendix D of this part; and* *(2) The material or equipment is routinely monitored and clearly marked or labeled to alert personnel of the contaminated status."*
59	**Subpart L—Radioactive Contamination Control** **835.1102 Control of areas**
60	**Example 1:** Contamination was found outside a CA or a RBA used for contamination control. **Example 2:** The radioactive material stored outside has degraded packaging, with visible oil leaks and is covered in large amounts of animal droppings. **Example 3:** The installed catch container does not sufficiently prevent the spread of contamination by taking deliberate actions to control contamination at the source and reduce Airborne Radioactivity, Contamination and High Contamination Areas. **Example 4:** Lined detention basins have holes in the covers. The holes have allowed birds to get into contaminated water. The birds spread contamination via nests, egg shells, feathers and droppings.

Row #	Noncompliance Examples
	Because these basins are associated with an operating facility, the spread of contamination related to the birds is considered to be inadequate contamination control associated with normal operating conditions. **Example 5:** A personal clothing contamination occurred while removing a Robotic Crawler from a tank's annulus riser. A worker's pants, shirt, and shoe showed contamination levels of 4000-5000 dpm/100cm^2 beta-gamma and no alpha. The workers were not wearing PPE since historically there had been no contamination from a leaking tank. **Note:** If the contamination spread is related to tumbleweeds, any other wild life other than birds, the contamination may be considered legacy contamination and 835.1102(b) will be cited based on the Office of Enforcement May 4, 2000, Memorandum from Keith Christopher contained within Attachment 1 of this Regulatory Summary. _____ **Key Words:** Degraded Radioactive Material Packaging; Catch Containers; Contamination Spread; _____ **PAAA Noncompliance(s):** **835.1102(a):** *"Appropriate controls shall be maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions."*
61	**Example 1:** Legacy Contamination. Tumbleweeds, animal droppings, and anthills with contamination levels that exceeded 10 CFR 835 Appendix D levels located outside a CA. Note: The concept of legacy or pre-existing contamination is neither defined nor discussed in 10 CFR 835. No exclusions for pre-existing conditions (including legacy contamination) are contained in 10 CFR 835. Consequently, the identification of any radioactive surface contamination (legacy or otherwise) above the applicable levels contained in 10 CFR 835, Appendix D, in an unposted and uncontrolled area typically represents a noncompliance with 10 CFR 835 requirements. The specific citations against 10 CFR 835 vary based on the circumstances of the discovery; however, the following specific sections of 10 CFR 835 would generally be applicable: 835.603(e): Requires that Contamination Areas be posted 835.1102(b): Requires that areas where contamination levels exceed Appendix D values be appropriately controlled. 835.1102(c): Establishes control requirements for areas where fixed-only contamination levels exceed Appendix D values. For additional guidance related to legacy contamination see the Office of Enforcement May 4, 2000 Memorandum from Keith Christopher contained within Attachment 1 of this Regulatory Summary. **Example 2:** Contaminated lead gloves with contamination levels that exceed Appendix D found outside a contamination area. **Note:** Could also cite 835.1102(a); however, there may be an advantage (i.e., trending) for a site to use 835.1102(a) for all instances of contamination found outside a contamination area that is not legacy. The

Row #	Noncompliance Examples
	exception would be when writing an NTS (Noncompliance Tracking System) report a site may want to list both non-compliances if applicable. _____ **Key Words:** Legacy Contamination; _____ **PAAA Noncompliance(s):** **835.1102(b):** *"Any area in which contamination levels exceed the values specified in appendix D of this part shall be controlled in a manner commensurate with the physical and chemical characteristics of the contaminant, the radionuclides present, and the fixed and removable surface contamination levels."*
62	**Example 1:** Contaminated component was being stored outdoors without appropriate posting and labeling. **Example 2:** Contaminated material discovered during excavation in an uncontrolled area. **Example 3:** An RCT identified fixed contamination (2,400 dpm/100cm^2 alpha and 2,000 dpm/100cm^2) beta gamma on a Portable Alpha Meter (PAM) probe that had been sent in for calibration. The PAM was not labeled to indicate fixed contamination. **Example 4:** A Fixed Contamination Area (FCA) sign is not legible; therefore, does not meet the posting requirement. **Example 5:** Not all FCAs are routinely monitored to ensure removable surface contamination level remains below 10 CFR 835 Appendix D. _____ **Key Words:** Inadequate Radiological Control; Monitoring; Surface Contamination; Posting; Labeling _____ **PAAA Noncompliance(s):** **835.1102(c):** *"Areas accessible to individuals where the measured total surface contamination levels exceed, but the removable surface contamination levels are less than, corresponding surface contamination values specified in appendix D of this part, shall be controlled as follows when located outside of radiological areas:* *(1) The area shall be routinely monitored to ensure the removable surface contamination level remains below the removable surface contamination values specified in appendix D of this part; and* *(2) The area shall be conspicuously marked to warn individuals of the contaminated status."*
63	**Example 1:** Researcher did not conduct a self-survey upon removing hands and arms from high contamination area (hood). **Example 2:** Determined that contaminated individual performed a hand and shoe survey when a whole body survey should have been performed. **Example 3:** Health Physics support staff were not contacted to monitor personnel entry/exit or removal of material from the CA during work. _____

Row #	Noncompliance Examples
	Key Words: Inadequate Radiological Control; Survey; Monitoring _____ **PAAA Noncompliance(s):** **835.1102(d):** *"Individuals exiting contamination, high contamination, or airborne radioactivity areas shall be monitored, as appropriate, for the presence of surface contamination."*
64	**Example 1:** Current supply of anti-contamination (anti-C) clothing does not adequately cover workers that have long arm lengths. **Note:** In order to be "protective clothing," the anti-Cs need to be adequate for the various sizes of workers. **Example 2:** Current supply of anti-C gloves have been noted by workers to tear during dress out and in the field. **Note:** In order to be "protective clothing," the gloves need to be durable for their intended use. **Example 3:** A worker was allowed to enter a CA without protective clothing. _____ **Key Words:** PPE; Whites; Hoods; Anti-Cs _____ **PAAA Noncompliance(s):** **835.1102(e):** *"Protective clothing shall be required for entry to areas in which removable contamination exists at levels exceeding the removable surface contamination values specified in appendix D of this part."*
65	**Subpart M—Sealed Radioactive Source Control** **835.1201 Sealed radioactive source control.**
66	**Example 1:** Exempt quantity (non-accountable) radioactive sealed sources were left unattended and uncontrolled in the 01-14 building. **Example 2:** Radioactive Sr-90 source found outside shielded assembly/jig. **Example 3:** Legacy radioactive source discovered during facility decommissioning. _____ **Key Words:** Material Accountability; Safeguards and Security; Inadequate Radiological Control _____ **PAAA Noncompliance(s):** **835.1201:** *"Sealed radioactive sources shall be used, handled, and stored in a manner commensurate with the hazards associated with operations involving the sources."*
67	**Subpart M—Sealed Radioactive Source Control** **835.1202 Accountable sealed radioactive sources**
68	**Example 1:** Legacy accountable radioactive source discovered during facility decommissioning. **Example 2:** Multiple accountable radioactive sources had not been inventoried and/or leak tested in over one year.

Row #	Noncompliance Examples
	Example 3: Failure to maintain accountable radioactive source control documentation. **Example 4:** The source custodian conducted an inventory after two accountable sources were moved but failed to establish their location, assuming without verifying that the sources were still in their normal location. **Example 5:** A self-assessment found that two accountable radioactive sealed sources had not been inventoried since being shipped between two facilities (over five years), despite required six-month frequency. _____ **Key Words:** Material Accountability; Safeguards and Security; Inadequate Radiological Control; Sealed Sources _____ **PAAA Noncompliance(s):** **835.1202(a):** *"Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. This inventory shall:* *(1) Establish the physical location of each accountable sealed radioactive source;* *(2) Verify the presence and adequacy of associated postings and labels; and* *(3) Establish the adequacy of storage locations, containers, and devices."*
69	**Example 1:** Multiple sources, contained within gas chromatographs, not entered in database and not inventoried or leak tested. **Example 2:** Legacy sources discovered in a storage area, and had not been included in database and not inventoried or leak tested. **Example 3:** Changes occurred in source database, resulting in sources not being flagged for leak tests for at least two cycles. **Example 4:** A self-assessment found that three Radioactive Sealed Sources had not been inventoried or leak tested in over one year. _____ **Key Words:** Material Accountability; Safeguards and Security; Inadequate Radiological Control; Sealed Sources; Leak Tests _____ **PAAA Noncompliance(s):** **835.1202(b):** *"Except for sealed radioactive sources consisting solely of gaseous radioactive material or tritium, each accountable sealed radioactive source shall be subject to a source leak test upon receipt, when damage is suspected, and at intervals not to exceed six months. Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 µCi."*
70	**Example 1:** An accountable sealed source, which had been removed from service, was found stored in an uncontrolled area. **Example 2:** An accountable sealed source, which was in storage, had not been inventoried in the past 12 months.

Row #	Noncompliance Examples
	Example 3: An accountable sealed source, which had been in storage for the past 24 months, was returned to service prior to having a leak test performed. _____ **Key Words:** Material Accountability; Safeguards and Security; Inadequate Radiological Control; Sealed Sources; Source Storage; Leak Tests _____ **PAAA Noncompliance(s):** **835.1202(c):** *"Notwithstanding the requirements of paragraph (b) of this section, an accountable sealed radioactive source is not subject to periodic source leak testing if that source has been removed from service. Such sources shall be stored in a controlled location, subject to periodic inventory as required by paragraph (a) of this section, and subject to source leak testing prior to being returned to service."*
71	**Example 1:** A sealed source, found to be leaking based on most recent leak test, was not removed from service or controlled to prevent spread of contamination. _____ **Key Words:** Material Accountability; Safeguards and Security; Inadequate Radiological Control, Sealed Sources, Leaking _____ **PAAA Noncompliance(s):** **835.1202(e):** *"An accountable sealed radioactive source found to be leaking radioactive material shall be controlled in a manner that minimizes the spread of radioactive contamination."*

Department of Energy

Washington, DC 20585

May 4, 2000

MEMORANDUM FOR DOE PAAA COORDINATORS
CONTRACTOR PAAA COORDINATORS

FROM: R. KEITH CHRISTOPHER
DIRECTOR
OFFICE OF ENFORCEMENT AND INVESTIGATION

SUBJECT: Enforcement Guidance Supplement 00-01:
Enforcement Position Relative to the Discovery/Control of Legacy Contamination

Section 1.3 of the *Operational Procedures for Enforcement*, published in June 1998, provides the opportunity for the Office of Enforcement and Investigation (EH-Enforcement) to periodically issue clarifying guidance regarding the processes used in its enforcement activities.

On November 24, 1999, I issued a memorandum providing interim clarification on the EH-Enforcement position on legacy radioactive contamination. That memorandum was issued in response to questions I had received regarding 10 CFR 835 (Occupational Radiation Protection) applicability and potential enforcement related to the discovery of legacy contamination in unposted and/or uncontrolled areas.

This Enforcement Guidance Supplement (EGS) provides more detail related to specific 10 CFR 835 requirements and applicability of those requirements. This EGS also discusses EH-Enforcement's planned level of enforcement discretion associated with legacy contamination incidents, as well as the limitations to the application of that discretion.

BACKGROUND

For the purposes of this EGS, legacy radioactive contamination is generally defined as radioactive contamination resulting from historical operations that is unrelated to current activities. Over the past year, I have received questions from various contractors related to the applicability of 10 CFR 835 to legacy contamination, particularly to its discovery in uncontrolled areas. Specifically, contractors have questioned whether such a discovery represents a noncompliance with 10 CFR 835 that could lead to a potential enforcement action. The general view advanced by contractors with whom I have communicated is that since the contamination is "legacy" and was spread during a previous contractor's activities, the discovery falls outside the scope of 10 CFR 835 and does not represent a noncompliance or a potential enforcement situation.

I have also noted a mistaken perception among several contractors that as long as legacy contamination remains undiscovered, it creates a defense to enforcement action. This perception is of particular concern, since it acts as a disincentive to implementing proactive and effective survey programs. As discussed below, enforcement discretion will only be applied in those instances where effective survey programs are in place.

10 CFR 835 APPLICABILITY

The concept of legacy or pre-existing contamination is neither defined nor discussed in 10 CFR 835 (both original and amended versions). No exclusions for pre-existing conditions (including legacy contamination) are contained in 10 CFR 835, Subpart A.

Consequently, the identification of *any* radioactive surface contamination (legacy or otherwise) above the applicable levels contained in 10 CFR 835, Appendix D, in an unposted and uncontrolled area typically represents a noncompliance with 10 CFR 835 requirements. The specific citations against 10 CFR 835 requirements would vary based on the circumstances of the discovery; however, the following specific sections of the amended 10 CFR 835 would generally be applicable:

- 835.603(e) - Requires that Contamination Areas (see 835.2 definition) be posted.
- 835.1102(b) - Requires that areas where contamination levels exceed Appendix D values be appropriately controlled.
- 835.1102(c) - Establishes control requirements for areas where fixed-only contamination levels exceed Appendix D values.

Such discoveries may also represent a noncompliance with 10 CFR 830.120 (Quality Assurance Requirements), depending upon circumstances and specific procedural requirements.

It should be recognized during evaluations of legacy contamination conditions that the 10 CFR 835 Appendix D values which trigger the above requirements are applicable to surface contamination conditions only. They do not apply to situations where an item or area is contaminated only in volume or by matrix (see Note 1 to Appendix D, also see 10 CFR 835 preamble comment on volumetric contamination at 58 FR 65475).

Consequently, the discovery of items incorporating legacy contamination by volume but not representing a surface contamination condition or hazard (such as contaminated flora, fauna, or some soils[1]) would not typically represent a 10 CFR 835 noncompliance. Despite this 10 CFR 835 non-applicability, such environmental contamination conditions must be appropriately controlled; it should also be noted that the presence of

[1] For the case of volume-contaminated soils, the applicability of the 10 CFR 835, Appendix D levels is based on the potential to disperse contamination from the area in excess of the Appendix D levels. If such a potential is likely, the area containing the soils should be posted and controlled as a Contamination Area. DOE relevant guidance is contained in Implementation Guide DOE G 441.1-9, Radioactive Contamination Control Guide (6/99) and Article 238.3 of the DOE Radiological Control Standard (7/99).

environmental contamination may present other radiological hazards (such as direct radiation) that do require appropriate posting and control under 10 CFR 835.

ENFORCEMENT DISCRETION

In recognition of the specific circumstances surrounding legacy contamination discovery events, EH-Enforcement does not typically plan to pursue enforcement for noncompliances identified in association with such. The application of this enforcement discretion, however, would be subject to all of the following conditions:

- An effective radiological survey program is in place and functioning.
- Appropriate and timely corrective actions (such as posting, effective area control, decontamination, etc.) are taken upon identification of the contamination.
- It is unreasonable to expect the contamination to have been identified earlier, either through implementation of the radiological survey program, the review of readily available historical information, or the prudent response to previous contamination incidents.

NTS REPORTABILITY

Contamination events (legacy or otherwise) should be screened and tracked in accordance with existing site PAAA Program procedures. Typically, simple discovery-type events would not meet NTS reporting thresholds and should be entered and tracked on contractor local PAAA tracking systems. For those contamination-related noncompliances meeting the thresholds of Table 3-1 or 3-2 of the EH-Enforcement *Operational Procedures* (June 1998), a report should be made to the NTS regardless of whether the contractor chooses to apply the term "legacy."

Enforcement Guidance Supplements will be incorporated into later revisions of the DOE Enforcement Handbook and will be made available on the Office of Enforcement and Investigation web page . If you have any questions regarding this guidance, do not hesitate to contact me or Tony Weadock of my staff at 301-903-0100.

Acronym List	
ALARA	As Low As Reasonably Achievable
Anti-C	anti-contamination
ARA	Airborne Radioactivity Area
CA	Contamination Area
CAM	Continuous Air Monitor
CFR	Code of Federal Regulation
CPM	Counts Per Minute
DOE	Department of Energy
EFCOG	Energy Facility Contractors Group
FCA	Fixed Contamination Area
FWS	Field Work Supervisor
GM	Geiger–Mueller
HRA	High Radiation Area
NOV	Notice of Violation
NTS	Non Compliance Tracking System
OE	Office of Enforcement
PAM	Portable Alpha Meter
PPE	Personal Protective Equipment
RA	Radiation Area
RadCon	Radiological Control
RBA	Radiation Buffer Area
RCA	Radiologically Controlled Area
RCT	Radiological Control Technician
RMA	Radioactive Material Area
RPP	Radiation Protection Program
RWP	Radiation Work Permit