Working Draft

Review of the Special Exposure Cohort Petition Evaluation Report for Rocky Flats Plant

Data Reliability: Safety Concerns

January 19, 2007

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DRAFT
SC&A Response to NIOSH Safety Concern Comments

Background

During the course of interviews with Rocky Flats Plant Special Exposure Cohort (SEC) petitioners and others, individuals stated that former supervisors had gone back and modified dose records by replacing positive doses with zeros. When asked by S. Cohen and Associates, Inc. (SC&A) if they had corroborating documentation, the interviewees indicated they had filed formal safety concerns at the time. SC&A was provided with and reviewed a hard copy list of safety concerns provided by the petitioners. This index, covering 1970-1992, gave only brief descriptions of each Safety Concern topic. It was inclusive of concerns related to industrial, chemical and radiological safety. Given the brevity of the interview visit, the petitioners shared several examples of the safety concerns with SC&A. The files ranged from a single sheet where the issue was resolved on a one-page form, to several sheets where the issue was elevated to the Joint Company/Union Safety Committee (JCUSC). The safety concern list provided by the petitioners was reviewed by SC&A with the objective to corroborate the particular concerns cited by the interviewees, as one means to establish whether data reliability may be an SEC-related concern.

In the May 2006 working group meeting on the Rocky Flats Special Exposure Cohort, a petitioner indicated that there was a database of safety concerns formally maintained by Rocky Flats Environmental Technology Site (RFETS), the former operating contractor that may include safety concerns prior to 1970. NIOSH was asked by the Advisory Board working group to determine if such a database existed, and whether it contained early safety concerns relevant to the petition evaluation. A database containing 4,946 safety concerns from 1970 to 2004 was subsequently located in the RFP archived records. NIOSH evaluated this official list of safety concerns and identified thirty-three safety concerns that had potential relevance to the SEC. One file was actually a subset of another safety concern. SC&A also evaluated the database of safety concerns and identified an additional seventeen safety concerns. A majority of the actual documentation pertaining to specific safety concerns (that would have relevance to specific SEC data reliability issues) were not available and were requested from Legacy Resource Management at RFP. The safety concern files provided by DOE include the original safety concern filed by the employees, a supervisory response, and documentation relating to resolution of the safety concern.

NIOSH completed a review of the forty-seven safety concern files. The evaluation for Safety Concerns 90-169 and 91-048 are ongoing. One safety concern was identical to another but was renumbered by JCUSC. The NIOSH evaluation concludes that the safety concerns with complete reviews do not have a bearing on the data integrity issues included in the petition, and they do not affect the ability to conduct dose reconstruction. NIOSH has indicated that there are techniques that can be used to assign the missing dose. For example, bioassay data before and after a data gap can be used to assign internal dose during the period of time when bioassays were not collected.

Safety concerns identified included a wide range of subject matter with some issues closely related to concerns raised in the SEC petition. The time period of the safety concerns range from 1970- 2000, with a majority from the 1990s. A few concerns pose questions regarding the accuracy of the personnel monitoring program (internal and external). Other concerns relate to the adequacy of the bioassay program in effectively monitoring personnel routinely and for incidents. There were several safety concerns related to RFP external dosimetry policies and practices including badge exchanges, dosimeter storage, contaminated dosimeters, and unauthorized practices. Several of the documents discuss general health physics issues such as lack of Radiation Protection Technician (RPT) coverage, or noncompliance with procedures.

Analysis

SC&A has reviewed the safety concerns and the NIOSH position related to each safety concerns. Table 1 gives a list of the safety concerns evaluated including a description of the concern, the NIOSH position related to the safety concern, and the SC&A response. The review involved evaluation of the safety concern file as well as the response documented by NIOSH in *NIOSH Evaluation of Specific Safety Concerns* (NIOSH 2006a) and *NIOSH Evaluation of Specific Safety Concerns Set 2* (NIOSH 2006b) provided to the working group and SC&A on August 28, 2006 and October 31, 2006, respectively. Safety concerns were considered inconclusive when key information was not available in the file. One example is where individuals expressed concerns about high radiation exposures, but their monitoring status remains unknown. In two cases, NIOSH did not specifically evaluate the issues presented in the safety concern. In these cases, an evaluation of the relevance of the issue with respect to falsification of records, dosimetry investigations, and inadequate or incomplete dosimetry data and records was prepared by SC&A and is included in this review.

SC&A, in its evaluation, has divided the Safety Concerns into three categories in relation to the SEC petition. First, there are those Safety Concerns that are not relevant to or bear on NIOSH's ability to adequately conduct dose reconstruction; these include concerns such as those related to non-radiological safety issues, hostile work environment, instances when individuals were monitored based on the particular event, lack of communication, and lack of training. Second, there are issues associated with the processing of dosimeters when the dosimeter or dosimeter components were lost, damaged, overexposed, or exhibited other problems. Finally, there are Safety Concerns that, in SC&A's view, reinforce claims and statements made in affidavits or public comments. There are two safety concerns that continue to be under investigation by NIOSH. These files concern lost or invalid bioassay results (#90-169) and the inadequacy of the internal and external dosimetry programs (#92-048).

Inconclusive Safety Concerns

Three safety concerns (#89-259, #94-245, #95-061) and a portion of two additional safety concern (91-395, #91-496) were considered inconclusive because key information to make a determination was not included in the file provided by Rocky Flats.

Safety Concern #89-259 expresses a concern related to the accuracy and trends in cumulative dose. The issue was not clearly defined, making it difficult to ascertain whether the issue was

directly related to dosimetry, or whether it was one associated with the health physics goal of monitoring radiation exposures "As-Low-As-Reasonably-Achievable" (ALARA). Safety Concern #91-395 states that radiation exposures to employees in Building 664 were too high and unnecessary because grams of plutonium, americium, and uranium were being stored in drums at this location (Ausmus 1991). It is unclear whether personnel in the building were required to wear dosimetry prior to the establishment of an RCA, or whether the RCA was created prior to the drums arriving. NIOSH has assumed that this is not an SEC issue; however, without the information discussed above, it is unclear how they were able to come to this conclusion.

Safety Concern #91-496 specifically expressed concern regarding the lack of background studies conducted prior to the locating the badge storage rack in the tunnel north of Portal 1. There was an underlying concern that the radiation and environmental conditions at this location were not appropriate. For periods of time when location specific backgrounds were used in background subtraction, the safety concern is inconclusive. There is no indication how the background radiation level changed, and if adjustments were applied to retrospective data. For those years where environmental dose levels were used for background subtraction, the location of the dosimeter storage areas would not affect the dosimeter results.

Safety Concern #94-245 involves the confiscation of the TLDs of two workers as a result of safety violations. NIOSH indicates that performing work without appropriate dosimetry in a Radiological Control Area (RCA) may or may not affect the ability to do dose reconstruction. They further indicate that the employees with confiscated TLDs did not work in an RCA during the period of time without a TLD. There seems to be some disagreement regarding this fact. The employees indicated they did perform radiological work during this time period while the JCUSC indicated the employees were not required to perform work in a radiological area without a TLD during this time period. No details of the JCUSC investigation were provided in the Safety Concern file. In addition, this Safety Concern raises the question of how frequently TLDs were taken away from workers and why. Were these workers prevented from entering radiological areas during this time period? Certainly, if employees were entering radiological areas without TLDs this would put their external exposure in question, and therefore impact dose reconstruction. NIOSH assumes the worker did not enter a radiological area. In SC&A's view, not enough information is provided in the Safety Concern field to make this determination.

Safety Concern #95-061 discusses a situation where the Building manager pulled TLDs from workers in Building 776 as a result of a Radiation Work Permit (RWP) violation. There is no indication whether individuals having their dosimeters pulled were accordingly banned from entry into the RCAs. The larger concern is whether a simultaneous restriction from radiation areas was enforced. The safety concern did not indicate what restriction was imposed on personnel. Without complete information on the above issues, no determination can be clearly made with regard to whether they represent data integrity problems.

Safety Concerns Not Affecting the Dose Reconstruction Process

Several of the files reviewed were concerned with Field Radiological Control conditions, and not directly related to dosimetry results. Safety Concern #70-2 related to general area radiation levels, adequacy of shielding, storage of plutonium, dry box damage, and inadequacies in

criticality drains. As NIOSH indicated, these are important to the health and safety of workers; however, individuals in these areas would have been monitored for internal and external exposure. This safety concern is simply noting that several individuals exceeded this level. This would not affect dose reconstruction since these individuals were monitored. This safety concern indicates that high dose rates were expected for some groups, and that established administrative exposure levels were exceeded. Table 2 provided the number of individuals who exceeded an annual dose of 5 Rem. This data was compiled by the site for the years 1951-1986.

Table 2: Exposures in Excess of 5 Rem from 1951-1984 (RI 1987).

Dose Range (Rem)	Number of Individuals Exposed at this Level
5-6	184
6-7	59
7-8	34
8-9	14
9-10	6
10-11	4
11-12	2

General area doses rates will be further discussed in the Data Integrity Example Analysis response.

Safety Concern #71-7 concerned the inaccuracy of the stack air sampling results because appropriate procedures were not followed. This addresses environmental monitoring issues, which have implications for environmental dose. Environmental dose will be discussed in the extended review of the RFP site profile review.

Job coverage, inadequate notification of Health Physics, violation of procedures, and inadequate field monitoring were raised in Safety Concerns #85-137, #86-186, part of #91-496, #93-124, and #94-080. Although important to a functional Radiological Control program, these concerns were not directly related to personnel monitoring and dose reconstruction. Other concerns addressed logbook entries of contents in a tanker truck, hostile work environments, lack of showering facilities and emergency response kits, and inappropriate labeling of confidential information (#89-214, #94-072, #94-079, #94-081, #97-163, #99-023, and #00-075). Safety Concern #95-077 dealt with the appropriate procedure for shipping urine samples through the mail. Safety Concern #89-148 relates to the lack of procedures available for documenting infractions in Radiation Monitoring reports. These concerns were not directly related to personnel monitoring or dosimetry documentation.

The lack of timely turnaround time with respect to external dosimetry supervisor reports was brought up in Safety Concerns #87-206 and #92-036. The lapse of dosimeter exchange on the part of External Dosimetry was raised in #86-13, and the timeliness of processing was raised in #96-182. Although a less frequent exchange frequency may cause additional uncertainty in the evaluation of the badge (e.g., fading considerations, appropriate background subtraction), it does not constitute an unmonitored situation. The lack of proper distribution of dosimeter results to

the field (e.g., supervisor reports) was primarily related to the As Low As Reasonably Achievable (ALARA) program for minimizing worker radiation exposures below external dose limits. The JCUSC raised the issue of manpower shortage in the dosimetry department in Safety Concern #86-013 indicating dosimetry delayed usual dosimeter pick-up schedules and thus processing for lower risk groups (e.g., third quarter 1985). This delay in processing of badges may make comparisons being conducted in other areas of this review difficult. Also, the timely processing of dosimeters is of some concern because backlogs may lead to practices such as not reading dosimeters from perceived low exposure groups. This was the case with respect to some workers assigned to the "cold area" where radioactive material was, in fact, handled. This directly relates to the establishment of co-worker dose. Safety Concern #75-34 related to the adjustment of dosimeter results after administration of a medical isotope. Assuming an investigation was conducted to determine the appropriate dose, this is a reasonable practice. Safety Concern #90-202 relates to questions posed to dosimetry about potential exposure from the Cf-252 calibration source. It was determined that the individuals of concern were monitored for both beta/gamma and neutron exposure. This data can be used in dose reconstruction.

With regard to dosimeter background concerns, the radiation background at the Dosimeter Exchange Board is monitored by a TLD placed in the rack along with those worn by personnel. The methodology used for background subtraction has varied over time. Lagerquist (1975) indicated, effective January 1986, that the total background subtracted from dosimeters would be environmental background (0.34 mRem/day) with instrument background. TLD operating procedures in 1983 also indicated that the total background subtracted was determined from environment and instrument background (RFETS 1983). The *Background Subtraction Methodology Study* was conducted the second quarter of 1999 at locations across the site. This study indicated that using a location specific background may create potential problems because the dosimeters were not always stored at the assigned location. Furthermore, the study indicated subtracting backgrounds by location will generally reduce the reported dose (Klueber and Savitz 1999). A TLD background subtraction based on whether the location of the storage area was in a hard walled or non-hard walled building was implemented (Baker 1999). In 2001, the actual TLD element residual signal together with a time dependent and location dependent background, results in a TLD specific background, which is subtracted from the personal dosimeter (RFETS 2001). Methods for background subtraction prior to 1976 were not located. The concern here is whether the location specific background level is appropriate for background subtraction. Based on documentation reviewed, the location specific background was not used until 1999. In 1999, studies were conducted and a revised methodology was implemented. The study included background level data by location. These data could be used to adjust dosimeter results as appropriate. Background subtraction is more appropriately addressed as a site profile issue.

Safety Concern #91-262 questions the practice of wearing dosimetry only when entering Radiological Control Areas. Of particular concern was the potential for worker involvement in a criticality. There are other means of determining doses in cases where dosimeters are not worn during a nuclear criticality. This was demonstrated with the Y-12 Criticality Accident in 1958. The JCUSC agreed with the employee that dosimeters should be worn at all times when in the Perimeter Security Zone (PSZ). Concerns were expressed by the operations groups that this was not consistent with the health and safety procedures. HSP 18.07, *External Radiation Dosimetry*, updated June 15, 1991, shortly after the Safety Concern

was issued, continued to require that dosimetry be worn in Radiation Controlled Areas or when posting required it, and that dosimeters be stored on badge racks. The relative exposure in uncontrolled areas of the building was not discussed in the safety concern. Available area dosimetry systems could be used to assign a dose for those not entering Radiological Controls assuming the exposure to the badge and personnel are equivalent.

Processing of Lost, Damaged, Overexposed, or Otherwise Compromised Dosimeters

Safety Concern #85-161 #87-005, #87-038, and #91-490 relate to methods utilized to conduct external dosimetry investigations, as well as providing another example of individuals questioning the accuracy of the dosimetry system. Extended External Dosimetry Investigations are documented in personal dosimetry files back to the mid-1980s; however, availability in Radiation Dose files was not routine until the late-1990s.

Safety Concern #85-161 speaks to the conduct of external dosimetry investigations for questioned doses. There is not enough information to determine whether this was a site wide policy; however, the Safety Concern provides an example of where a dosimetry investigation was conducted. It is difficult to determine from a secondary source whether an adequate investigation was conducted and whether the response was appropriate to the employees concerns.

In Safety Concern #87-005, a memorandum from R.N. Chanda and G.A. Overholt to P.A. Madsen indicates that a review of the dosimetry records was conducted, and it was determined that the zeros were the result of wrist dosimeters turn-in without corresponding body dosimeters. This individual was assigned to the Non-destructive Assay group in Building 371 where there was a potential for exposure. It is difficult to determine from a secondary source whether an adequate investigation was conducted and whether the response was appropriate to the employees concerns. Direct data should be evaluated in this case, and the individual's dose should be compared to that of his coworkers performing the same tasks.

Safety Concern #87-038 relates to methods utilized to conduct external dosimetry investigations, as well as providing another example of individuals questioning the accuracy of the dosimetry system. The dosimeter value was modified due to quality control issues with the dosimetry results. There does not appear to be any kind of follow-up investigation of the individual's potential exposure. This is directly related to the issue of how dose was assigned when dosimeters were lost, damaged, contaminated, or had quality control problems. The individual was on a biweekly exchange period indicating the potential for higher exposure. The adjustment to his dose does not reflect this, and adequate justification for this dose is not provided. Questionable data of this type should not be used in dose reconstruction.

Safety Concern #91-496 discusses the responsibility on the part of the employee to protect their dosimeter from contamination, tampering, misuse, and other compromising situations. With respect to positive control, there is really no system available to prevent individuals from tampering with dosimeters. RFP External Dosimetry indicated they evaluate the raw results from each element as an indication of inappropriate dose results. There is no discussion included

in the safety concern regarding the specific process External Dosimetry followed to identify and investigate inappropriate dose results.

Safety Concerns Consistent with Statements in Affidavits or Public Comments

SC&A has determined that Safety Concern #71-4 does not provided conclusive evidence of a site-wide issue. It does, however, provide an example of a situation where the worker believed dosimeter badges were not adequately capturing the file readings. The safety concern, itself, stated:

> *My film badge results for Dec. 1970 did not show the high level of neutron exposure which according to instrument readings and film badge results of other monitor on the same special job, should have been expected (JCUSC 1971a).*

This safety concern mirrors the concerns cited in former RFP worker affidavits that their dosimeters did not reflect actual exposure conditions. The supervisor's response indicated there was an inherent inaccuracy with neutron film dosimetry, and that neutron TLDs were scheduled to replace neutron film. There was no explanation of why the worker's film badge did not reflect his co-workers' dose, or instrument readings. The petition includes affidavits from employees documenting similar concerns.

Safety Concern #74-61 indicated there was a need for quantitative assessment of radioactive material within the body. Further discussion with RFP RadCon staff having knowledge of this safety concern indicated that the concern was particularly directed at the *in vivo* counting system. NIOSH has indicated that *in vivo* counting results are not used in their analysis of claimant dose. If this is the case, and individuals were adequately monitored via urinalysis, NIOSH could use bioassay data for dose reconstructions. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated. The concern clearly shows that some workers, even within the Radiological Control organization, questioned the results they were receiving from dosimetry. Whether dosimetry data was inadequate or not cannot be determined from the information in the safety concern. This lack of faith in dosimetry results has been raised several times throughout the petition. The safety concern provides a historical reference to these concerns.

Safety Concern #89-037 involves the lack of internal and external monitoring for an employee who worked in the uranium area. It provides an example situation where missed dose is possible. NIOSH has generic methods for assigning dose where there are data gaps; however, the exact method for addressing data gaps is still under consideration. Their method for identifying data gaps and assigning dose for multiple year data gaps is particularly of concern. Although lack of monitoring is not, per se, a data integrity issue, it does have a significant impact on dose reconstruction. In addition, gaps in the data of individuals exposed, but not adequately monitored, cast doubt on the integrity of the data made available for dose reconstruction.

Apprehension related to abnormally high or positive *in vivo* bioassay results were discussed in Safety Concern #84-19 and #86-161. Safety Concerns #84-19, #86-169, #89-167, #93-061, #93-193, and #99-013 raised problems regarding the timeliness of bioassay collection or communication of results. Inconsistencies in instrument results (e.g., wound counting) or malfunctions in equipment (e.g., *in vivo* counter) were questioned in Safety Concerns #85-109, #89-203, and #92-003. Although delaying communication of bioassay results and subsequent dose assessments is a poor practice, it does not preclude dose reconstruction. Untimely bioassay turnaround times delay the collection of follow-up samples and complicate the determination of intake conditions. Furthermore, this is not conducive to a good ALARA program. Delaying bioassay, whether urine or fecal, or *in vivo* counting, for a few days does not prevent the detection of long-lived insoluble radionuclides taken into the body. For soluble material such as tritium, delay in bioassay may affect the ability to detect an incidental intake depending on the length of the delay. Assuming the employee was adequately monitored via urinalysis, and *in vivo* counting was not used in dose reconstruction, these issues would not present an issue with dose reconstruction. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.

Safety Concern #97-176 demonstrates the lack of proper quality control within the dosimetry processing laboratory. An employee was given a TLD badge that did not contain TL elements. The TLD had been processed and the elements were not replaced at the time the supervisor came in and retrieved the dosimeter. The Radiological Control Technician entered radiological areas with inadequate dosimetry (Baker 1997). This is one of many quality control problems encountered by External Dosimetry throughout RFP operational history.

Safety Concern 98-073 relates to multiple employees working in Building 374 questioning the accuracy of the monitoring program. The site provided an evaluation of dosimetry results for the particular department; however, there is no information provided for specific individuals allowing a comparison to previous exposures. The external dosimetry department looked at the dosimetry results of Process Specialists and Radiological Control Technicians for the fourth quarter of 1997 and the first quarter of 1998. Dosimetry indicated that dose for 12 process specialists went down, dose for 7 process specialists went up, and dose for 3 individuals stayed the same. For the same time the RCT doses decreased. The average dose for process specialists averaged 9.8 mrem in Quarter 4 1997 and 6.1 mrem in Quarter 1 1998. It is difficult to ascertain whether there is evidence of inaccuracies in individual files based on a population evaluation that appears to be inconclusive. NIOSH has provided a general hypothesis that inaccuracies did not exist without substantiating them by looking at individual cases. Some basis for this hypothesis should be documented.

NIOSH, in other cases, also provides such hypotheses in response to specific concerns without what SC&A views as an adequate basis or substantiation. In several instances, a broader conclusion regarding site-wide data integrity is made on this basis.

For example, in relation to Safety Concern #89 -037 NIOSH states:

> *In any event, this appears to be an example of an isolated failure to follow established policies. Corrective actions were taken, and there is no indication that this event constitutes a sitewide data integrity issue, and does not have SEC implications.*

During review of logbooks the following entry was found. This incident involved four Radiological Control Technicians (RCTs).

> *….do not have dosimetry badges on the board this morning.…told to report to class then go to external dosimetry to get badge. Problem is movement of RCT's between buildings, but no paper work sent to change badge board locations.*

This indicates that RFP site dosimetry was not always aware of facility changes made by workers, and may not have adjusted the personal monitoring in a timely manner. Although the logbook entry in, and of itself, does not provide conclusive evidence of a site-wide issue, it certainly indicates the NIOSH hypothesis that Safety Concern #89-037 is an isolated failure may not be correct.

There is no information included in the Safety Concerns reviewed that taken together would conclusively demonstrate a site-wide issue with data integrity. However, there are numerous specific examples raised in these concerns that bring into question the accuracy aspects of the internal and external monitoring program. Some of these concerns were documented well before the enactment of the EEOICPA underscoring that a number of these concerns were not new.

Safety Concerns Needing Further Basis or Investigation

NIOSH has indicated that Safety Concerns #90-169 and #92-048 require further investigation to determine their relevance to the SEC Petition. In Safety Concern #90-169, the worker submitted multiple urine samples including samples sent off site. He was told that the first sample was negative. Additional samples were collected. Some samples were lost and another was invalid due to poor chemical recovery. This safety concern appears to provide an example of quality control issues in the bioassay laboratory. This may or may not affect multiple individuals depending on the extent of the bioassay laboratory problems. Safety Concern #92-048 expresses concern with the adequacy of the internal and external dosimetry programs at RFP and their compliance with federal requirements. It further expresses concern over the lack of communication between dosimetry and the workforce.

Summary

The safety concerns evaluated provide multiple examples where Extended External Dosimetry investigations would have been presumably conducted by Radiological Control. However, it is difficult to determine from a secondary source whether an adequate investigation was conducted and whether the investigation was responsive to the employees concerns. From a review of former worker's Health Physic files, there is evidence that Extended External Dosimetry Investigations were documented back to the mid-1980s; however, the documentation did not

routinely show up in the worker's file until the late-1990s. This raises an unresolved concern as to whether external dosimetry investigations were conducted routinely prior to the late-1990s, and if so, why documentation is apparently absent from the Health Physics file.

A number of safety concerns (#74-61, #85-109, #86-13, #86-161, #86-169, #89-037, #89-203, #90-169, #91-496, #92-003, #92-048, and #97-176) relate to the lack of quality control in the internal and external monitoring programs. These collectively reinforce issues raised in the petition regarding data quality. For example, the Neutron Dose Reconstruction Project (NDRP) is provided in the petition as illustrative of petitioner concerns over data quality issues. The NDRP was initiated as a result of questionable accuracy and completeness in neutron dosimetry from 1952 through 1971 (Baker 2002). Other examples of quality control issues in the dosimetry program included computer algorithm and transfer errors (RI 1976, Baker 1998), not adjusting monitoring requirements for employees transferred to other areas of the site, lost of bioassay samples, double background subtraction for dosimeters (Savitz 1996), and failure at blind audits (Klueber 1997). **A generalized evaluation related to the completeness and accuracy of dosimetry results as well as dosimetry investigation procedures will be provided by SC&A in its ongoing data integrity evaluation.**

Safety Concerns #90-169 and #92-048 should be further investigated to ascertain their applicability to the SEC petition. This lack of trust in the internal and external monitoring programs and dosimetry systems are the fundamental concerns raised by the petitioners.

In conclusion, SC&A concurs with NIOSH's assessment of many of the forty-nine safety concerns and parts of other safety concerns. While these safety concerns do not directly address falsification of records, a number of them express a lack of confidence in the monitoring at RFP. Although not providing definitive evidence of a systemic problem with RFP radiation dose data that would necessarily preclude dose reconstruction, some of them do highlight historic instances of poor quality control practices.

ATTACHMENT 4: SAFETY CONCERNS SUMMARY TABLE

Rocky Flats Safety Concern Review for Data Integrity Issues

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
70-2	Senior Radiation Monitors raised five safety issues related to general work area radiation levels, adequacy of shielding, storage of plutonium, dry box window damage, and inadequate criticality drains. There was an agreement to reduce storage in the building. A review of the dosimetry results for Manufacturing personnel indicated that there were four individuals receiving over 4 Rem in 1969, and no individuals over 5 Rem. Criticality drains were recognized as an ongoing problem (JCUSC1970).	While these safety concerns detail valid safety issues and it was important for these issues to be corrected, the concerns do not adversely impact NIOSH's ability to conduct dose reconstruction of sufficient. NIOSH therefore concludes that these issues do not have SEC implications.	Although plutonium storage, adequacy of shielding, dry box window damage, and inadequacy of criticality drains are important safety issues, this type of information is not used in dose reconstruction. Manufacturing personnel set an internal administrative exposure level at 4 Rem. (Note: There were more than four individuals in the external data file with greater than 4 Rem for 1969.) This safety concern is simply noting that several individual exceeded this level. This would not affect dose reconstruction as the individuals were monitored. *Concurrence with NIOSH assessment.*
71-4	The employee was concerned that the film badge results for December 1970 did not reflect the high level of neutron exposure measured by field instruments and film badge results of a coworker on the same special job (JCUSC 1971a).	As discussed on previous occasions, it is not reasonable to expect that all workers frequently perform different duties that put them in different proximity to the source. The Safety Concern in and of itself does not in and of itself demonstrate a problem with the integrity of RFP dosimetry data.	This safety concern aligns with issues raised in the petition about dosimeter results not reflecting field conditions. The effectiveness of the dosimeters has been raised numerous times during the course of the petition review. An explanation of why the dosimeter did not respond to alleged high dose fields warrants further investigation.
71-7	Inadequate notification of Health Physics regarding maintenance work on booster fans potential caused inaccurate stack air sampling results. Other safety issues included such infractions as no dry box overhead alarm, taping a plastic bag and the end of the air duct to contain high level contamination, and an unsafe drill press (JCUSC 1971b, JCUSC 1971c, JCUSC 1971d, JSUSC 1971e, JSUSC 1971f).	While these are important safety issues and it was important for these issues to be corrected, the concerns do not adversely impact NIOSH's ability to conduct dose reconstruction of sufficient. NIOSH therefore concludes that these Safety Concerns do not have SEC implications.	Inaccurate stack air sampling results has an implication for environmental doses; however, the doses from environmental exposure are small in comparison to occupational dose. This concern should be addressed in the context of the RFP site profile resolution process. *Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
74-61	The employee has indicated that there is a need for a quantitative method to evaluate radioactive materials taken into the body to prevent unsafe exposures (JCUSC 1974).	The data were adequate and of sufficient quality to accurately assess the amount of Pu in the body. There is nothing in this Safety Concern that would adversely impact NIOSH's ability to conduct dose reconstructions with sufficient accuracy; therefore, this issue does not have SEC implications.	Further discussions with Rocky Flats RadCon staff having knowledge of this safety concern provided additional insight. In 1974, when the safety concern was issued, the site had three *in vivo* counting systems of which two were used on a routine basis. The third counter, according to workers, resulted in more positive chest counts than those used on a routine basis. Workers questioned the accuracy of the counters used for routine *in vivo* counts. Dosimetry staff met with the worker filing the concern and discussed the principles of the *in vivo* counting systems. NIOSH has indicated that *in vivo* counting results are not used in their analysis of claimant dose. If this is the case, and individuals were adequately monitored via urinalysis, NIOSH could use bioassay data to conduct dose reconstructions. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
75-34	Employee concerned about downward adjustment of his TLD readings to account for his receipt of a medical procedure involving the administration of a radionuclide (JCUSC 1975).	The appropriate consideration of nuclear medicine techniques and the adjustment of the occupational dose record are important for accurate dose reconstruction. If an employee failed to notify the medical/dosimetry staff of such a procedure, dosimetry results may be biased high and it could result in a false positive result in a subsequent whole-body count. The procedure implemented addresses this concern.	*Concurrence with NIOSH assessment.*
84-19	"A very high percentage of the personnel working in Room's 264-266 in 881 are getting abnormally high radiation from the body counter. These areas until recently were closed due to contamination." (JCUSC 1984)	There may be a valid concern that the work areas in question may still contain contamination, and it can be inferred that this may be what motivated the filing of this Safety Concern. It appears that the possibility of intake was evaluated using whole body counts and bioassay. In such situations, NIOSH can use these data to conduct dose reconstructions of sufficient accuracy; therefore this Safety Concern does not appear to have SEC implications.	The bioassay results from this situation can be used for dose reconstruction. *Concurrence with NIOSH assessment.*
85-109	Workers were involved in decontamination of machine parts in their personal clothing. They questioned this practice but were told to continue. Employees were concerned that radiation monitoring in Bldg. 881 and the Medical Department came up with different results than the personnel involved (JCUSC 1985a).	While observance of proper contamination control requirements and use of appropriate personal protective devices has important safety implications, there is nothing in this Safety Concern that would prevent NIOSH from conducting dose reconstructions with sufficient accuracy. Uptakes resulting from work in contamination areas, if any, would be reflected in bioassay results, which NIOSH would not likely include in reconstructing internal dose.	Assuming the employee was adequately monitored via urinalysis, and the questionable data was not used in dose reconstruction, this would not present an issue with dose reconstruction. If, however, NIOSH decides to use the data, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
85-137	Employees were involved in a bag change and bag out procedures without the support of a Radiation Monitor. Respiratory protection was not worn while holding packages and the packages were not in secondary containment (JCUSC 1985b).	There is nothing in this Safety Concern that would prevent NIOSH from conducting dose reconstruction with sufficient accuracy. Uptakes resulting from work without proper coverage from Radiation Monitoring personnel, if any, would be reflected in the bioassay results, which NIOSH would use in reconstructing internal dose.	*Concurrence with NIOSH assessment.*
85-161	There is survey and decontamination of dosimeters prior to shipping them to External Dosimetry for processing. The site is allowing dosimeters which have to be surveyed to go to dosimetry to be taken home by employees after work (JCUSC 1985c).	The subject of this concern does not adversely impact NIOSH's ability to conduct dose reconstruction of sufficient accuracy.	This safety concern questions the decontamination of dosimeters prior to the time they are shipped to dosimetry for processing. Although this is a standard practice to protect the dosimetry lab, it raises the questions about when and how the dosimeter became contaminated, and what the relative effect on external dosimetry results. It also raises questions regarding the potential for internal exposure from inadequate contamination control.
86-13	The frequency of an employees badge exchange was twice rather than four times per year (JCUSC 1986a).	This issue does not cast doubt on the integrity of Rocky Flats dosimetry data, does not prevent NIOSH from conducting dose reconstruction with sufficient accuracy, and therefore does not have SEC implementation.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
86-161	Several inspectors received body counts. Four out of the five had high counts for uranium. The employee was concerned about this because there was a sudden focus on counting individuals from Building 460 where he worked. Later it was determined that there was a problem with the counters on the day of his count (JCUSC 1986b).	NIOSH relies primarily on bioassay data for reconstruction of internal doses at Rocky Flats. It appears that whatever the problem with these particular lung counts was, the problem was addressed and the individuals were recounted. Therefore, NIOSH concludes that there in nothing in the Safety Concern which would prevent dose reconstruction of sufficient accuracy.	Assuming the employee was adequately monitored via urinalysis, and *in vivo* counting was not used in dose reconstruction, this would not present an issue with dose reconstruction. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.
86-169	There is an inadequacy in the scheduling of personnel for body counts and a lack of coverage at the body counter during mid-shift. The Safety Concern indicated equipment problems created a temporary backlog. The individual filing the concern eventually did receive a body count (Leigh and James 1986, JCUSC 1986c).	It must also be noted that NIOSH dose reconstructions at Rocky Flats rely primarily on bioassay (urinalysis). For these reasons, NIOSH concludes that this Safety Concern does not raise issues that adversely impact our ability to conduct dose reconstructions of sufficient accuracy, and therefore does not have SEC implications.	Assuming the employee was adequately monitored via urinalysis, and *in vivo* counting was not used in dose reconstruction, this would not present an issue with dose reconstruction. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.
86-186	An electrode and base were left in the line after the completion of a job for an extended period of time. The bag was cut resulting in external contamination to the surface of the bag at >1,000,000 c/m smear. Workers involved in the job indicated the incident investigation was not adequate. (JCUSC 1986d).	While this is an important safety issue, this Safety Concern does not raise issues that adversely impact our ability to conduct dose reconstructions of sufficient accuracy, and therefore does not have SEC implications.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
87-005	In this concern the worker questions why he received very low or no exposure on his badge for 2 years. A review of his dosimetry files indicated that the zeros in the individual's records were the result of wrist badges being turned in without a corresponding body badge (JCUSC 1987a, Chanda and Overholt 1987).	This is an example of an employee who is suspicious of his dosimetry results. The basis for this suspicion is not described in the Safety Concern. However the employee's records were reviewed by the JCUSC, who determined that (1) all dosimetry results were included in the employee's radiation file, (2) his results had been consistent for the time period in question; and (3) his results were in line with those of similar employees. Therefore this Safety Concern does not have SEC implications.	This safety concern relates to methods utilized to conduct external dosimetry investigations, as well as providing another example of individuals questioning the accuracy of the dosimetry system. The memorandum from R.N. Chanda and G.A. Overholt to P.A. Madsen indicates that a review of the dosimetry records were conducted and it was determined that the zeros were the result of wrist dosimeters turn in without corresponding body dosimeters. This individual was assigned to the NDA department in Building 371 where there was a potential for exposure. It is difficult to determine from a secondary source whether an adequate investigation was conducted and whether the response was appropriate to the employees concerns. Direct data should be evaluated in this case, and the individual's dose should be compared to that of his coworkers performing the same tasks.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
87-038	The worker questioned the zero result he received on his dosimeter. The dose was initially 15 g and 246 n it fell outside the average ratio expected for Building 771. The dosimeter result was to be recounted and a 3-1 ratio applied (JCUSC 1987b).	The Safety Concern, dated 1/30/87, states the print out (presumably the Supervisor's High-to-Low Dose Report, distributed after a TLD exchange) dated 1/22/87 shows zeros, and that the initial readings were 15 g and 246 n. It is assumed the 15 g stood for gamma and the 246 n stood for neutron dose, in mrem, although this is not stated in the Safety Concern. The Safety Concern also doesn't state for which dosimeter exchange period this reassessment was completed. (Further information can be obtained from NIOSH 2006.)	The dosimeter value was modified due to quality control issues with the dosimetry results. There does not appear to be any kind of follow-up investigation on the individual's potential exposure. This relates to the issue regarding how dose was assigned when dosimeters were lost, damaged, contaminated, or had quality control problems. This individual was on a biweekly exchange period indicating the potential for higher exposure. The adjustment to his dose does not reflect this, and adequate justification for this dose is not provided. This questionable dose would be used during the dose reconstruction process.
87-206	Employees were not receiving updated reports on their current dosimetry badge readings in accordance to RFP procedures (JCUSC 1987c).	This issue does not prevent NIOSH from conducting dose reconstruction with sufficient accuracy, and therefore does not have SEC implementation.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
89-037	Employee worked in an area with uranium; however, only a single sample was collected over a three and a half year period. The same individual was not assigned a dosimeter for a year (JCUSC 1989a).	NIOSH has established methods for calculating dose in the case of data gaps. There is no indication that this event constitutes a sitewide data integrity issue, and does not have SEC implementation.	NIOSH states this is an isolated example. NIOSH has not provided a basis for their statement that there is no indication of a Site wide data integrity issue on the basis of this one safety concern. NIOSH has generic methods for assigning dose where there are data gaps; however, the exact method for addressing data gaps is still under consideration. Their method for identifying data gaps and assigning dose for multiple year data gaps is particularly of concern. Although lack of monitoring is not per se a data integrity issue, it does have a significant impact on dose reconstruction. In addition, gaps in the data of individuals exposed, but not adequately monitored, cast doubt on the integrity of the data made available for dose reconstruction.
89-148	The concern expressed was related to lack of procedures for documenting infractions in the Radiation Monitoring reports when individuals enter respirator required areas without a respirator, gloves with removable contamination that have not been changed, or procedural violations which endanger the safety of individuals (JCUSC 1989b).	While the particular types of issues mentioned have obvious safety implications, a form for reporting such situations was implemented across the plant. These types of issues do not prevent NIOSH from conducting dose reconstructions of sufficient accuracy; and therefore do not have SEC implications.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
89-167	The concern requested that a survey of Building 334 be conducted to verify there was no radiation present. One individual required a wound count and another had a positive bioassay result. A survey was conducted with negative results (JCUSC 1989c).	Bioassay was employed for the individual involved, and this is the information NIOSH would use to conduct dose reconstructions. There is nothing in this Safety Concern which would prevent NIOSH from conducting dose reconstruction of sufficient accuracy, and therefore it does not have SEC implications.	Assuming the employee was adequately monitored via urinalysis, this would not present an issue with dose reconstruction. If, however, NIOSH determines the bioassay monitoring at RFP was inadequate, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.
89-214	Procedures for "Personal and Confidential" records were not being followed with quarterly dosimetry records (JCUSC 1989d).	At some DOE sites, including Rocky Flats, periodic dosimetry results were posted publicly on a master list. This practice would have privacy implications, and this concern appears to be related to this practice. This issue does not appear to have data integrity or other SEC implications.	*Concurrence with NIOSH assessment.*
89-203	An individual working a breathing air job received a possible inhalation. The individual received an *in vivo* count however, during the *in vivo* count the equipment malfunctioned. He was sent home without an adequate count. All personnel were contacted and scheduled for a follow-up *in vivo* count as soon as the equipment was repaired. Corrective actions were taken regarding the detector problems. (JCUSC 1989e)	In this situation, NIOSH can use these data to conduct dose reconstructions of sufficient accuracy; therefore this Safety Concern does not appear to have SEC implications.	Assuming the employee was adequately monitored via urinalysis, and *in vivo* counting was not used in dose reconstruction, this would not present an issue with dose reconstruction. If, however, NIOSH decides to use lung count data to "bound" intakes, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction. Furthermore, if this data is used in the coworker model, the reliability of this data is in question and must be further evaluated.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
89-259	Inaccurate cumulative radiation dose equivalent history from Dosimetry and a lack of earlier exposure information once a high cumulative radiation dose equivalent has been set (JCUSC1989f).	The meaning of the concern in not entirely certain, but the response seems to indicate that the worker was concerned that he/she was not notified when the trends in cumulative dose would eventually put the worker over target dose limits. If the interpretation is correct, the issue does not constitute a data integrity issue or have SEC implications.	The safety concern is not clearly defined making it difficult to ascertain whether this is a dosimetry or ALARA issue. *Inconclusive.*
90-169	The worker submitted multiple urine samples including samples sent off site. He was told that the first sample was negative. One special sample and 4 or 5 samples were collected. Some samples were lost and another was invalid due to poor chemical recovery (JCUSC 1990a).	Evaluation of this Safety Concern in ongoing.	There appears to be an issue with the quality control in the bioassay laboratory which may affect multiple individuals. *Concurrence with the NIOSH assessment that further investigation is needed.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
90-202	The submittal did not include a specific concern but rather questions related to the potential exposure of Dosimetry Technicians from Cf-252 source in Building 126. J.M. Hoffman from the External Dosimetry group, issued a memorandum discussing the use of the source, how it is handled by the dosimetry technician, and the dose rates associated the shielded and unshielded source. Calculations of expected annual dose from duties associated the source were determined to be 52.1 mrem/person using conservative assumption. A survey of the area was conducted showing minimal exposure rates. Upon issuance of the safely concern, Dosimetry Technician personnel dosimeters were processed. The dosimetry results, representing six months of exposure indicated a total dose of less than the detection limit including neutron dose (Hoffman 1990a; Lesses 1990a). A review by Radiological Engineering indicated a lock to prevent inadvertent access should be installed and the Beacon light required repair (Lesses 1990b). No health hazard was believed to exist (JCUSC 1990b).	The employee was satisfied with the results and the proposed actions were completed. There is nothing in this safety concern that would prevent NIOSH from conducting dose reconstructions with sufficient accuracy.	The safety concern indicated that the employees were monitored for both beta/gamma and neutron dose. This data could be used in dose reconstruction. *Concurrence with the NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
91-262	The safety concern questioned the practice of wearing dosimetry only when entering a Radiological Control Area. If there were a criticality accident, and the employee was exposed, there would be no record of their exposure (JCUSC 1991a).	The concern expressed is not relevant to NIOSH's ability to reconstruct doses with sufficient accuracy at Rocky Flats, as there is no evidence that an unplanned criticality ever occurred at Rocky Flats. However, it is true that in such an event, it is frequently possible to reconstruct doses from neutron-activated elements in biological materials such as hair and blood, and in nonbiological materials, as well as from area TLDs and TLDs worn by coworkers, depending on the specifics of the situation. Therefore, this issue does not have SEC implications.	The JCUSC agreed with the employee that dosimeters should be worn at all times when in the Perimeter Security Zone (PSZ). Concerns were expressed by the operations groups that this was not consistent with the health and safety procedures. HSP 18.07, *External Radiation Dosimetry*, updated June 15, 1991, shortly after the Safety Concern was issued, continued to require that dosimetry be worn in Radiation Controlled Areas or when posting required it, and that it be stored on badge racks. There are other means of determining doses in cases where dosimeters are not worn. This was demonstrated with the Y-12 Criticality Accident in 1958. *Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
91-395	Safety Concern 91-395 states that radiation exposures to employees in Building 664 were too high and unnecessary because grams of plutonium, americium, and uranium were being stored in drums at this location (JCUSC 1991b). Anderson (1991a) conducted a radiation survey of the aisles of waste drums and calculated the maximum potential Dose Equivalent for an individual exposed 30 minutes per week in this area. An estimated external gamma dose for this scenario was 631 mRad per year. No elevated levels neutron exposure readings were detected. The estimated dose was below the Administrative Dose Guidelines and deemed to result in no significant health related problems. A Radiological Control Area was established for Building 664 a few months prior to the safety concern. The changes in RCA requirements, including use of a dosimeter, were incorporated into the Building 664 Site Specific Health and Safety Plan (Anderson 1991b). In late 1992, the drums were shipped from Building 664 to Building 569 (Lewis 1992). Further concerns were raised during the JCUSC evaluation about the location of the dosimeter exchange board and elevated background. Radiological Engineering reviewed survey and background dosimeter data from 1991 for the facility. The location of the dosimetry board was preferred and no relocation was necessary (Anderson 1991a).	While unnecessary radiation exposure to employees could have important safety implications, there is no indication that doses were unmonitored. NIOSH therefore concludes that this issue does not have SEC implications.	With respect to the storage of radioactive materials in the aisle of Building 664, it is unclear whether personnel in the building were required to wear dosimetry prior to the establishment of an RCA, or whether the RCA was created prior to the drums arriving. NIOSH has assumed that this is not an SEC issue; however, without the information discussed above, it is unclear how they were able to come to this conclusion. *Inconclusive*. In relation to the radiation background at the Dosimeter Exchange Board, it is common practice for the dosimetry group to place TLDs in the rack along with those worn by personnel. The methodology used for background subtraction has varied over time. Lagerquist (1975) indicated, effective January 1986, the total background subtracted from dosimeters would environmental background (0.34 mRem/day) and instrument background. TLD operating procedures in 1983 also indicated that the total background subtracted was determined from environment and instrument background (RFETS 1983). The *Background Subtraction Methodology Study* was conducted the second quarter of 1999 at locations across the site. This study indicated that using a location specific background may create potential problems because the dosimeters are not always stored at the assigned location. Furthermore, the study indicated subtracting backgrounds by location will generally reduce the reported dose (Klueber and Savitz 1999). A TLD
Safety Concern No.	**Description of Concern**	**NIOSH Response**	**SC&A Response**
91-395			background subtraction based on whether the

(Continued)			location of the storage area was in a hard walled or non-hard walled building was implemented (Baker1999). In 2001, the actual TLD element residual signal together with a time dependent and location dependent background, results in a TLD specific background which is subtracted from the personal dosimeter (RFETS 2001). Methods for background subtraction prior to 1976 were not located. The concern here is whether the location specific background level is appropriate for background subtraction. Based on documentation reviewed, the location specific background was not used until 1999. In 1999, studies were conducted a revised methodology was implemented. The study included background level data by location. These data could be used to adjust dosimeter results as appropriate. Background subtraction is more appropriately addressed in as a site profile issue. *Concurrence with NIOSH assessment that background concerns are not an SEC issue.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
91-490	Safety Concern 1991-490 expressed apprehension over the lack of positive control to prevent tampering, misuse, and other compromising situations with the current dosimeter storage system and location. External Dosimetry indicated that there were procedures in place to monitor for inappropriate dose results (JCUSC 1991c). The second issue raised concerned the affect of temperature and humidity variations on the dosimeter badge. Several reports relevant to the conditions of exposure for environmental dosimeters were made discussed. Based on tests conducted on the TLDs, External Dosimetry dosimeters were found adequate to handle environmental conditions encountered including temperature and humidity. A third issue indicated that a background control study was not conducted prior to the implementation of the new storage areas for dosimeters. A study began simultaneously with the placement of badges at the new locations. External Dosimetry noted ambient external radiation was monitored during surveys. In addition, as long as the individual stores the badge in the correct location, background levels are not an issue.	Throughout the operating history of Rocky Flats, suspect dosimetry badge readings were investigated, and in later years formal investigation reports were placed in individual radiation files. There is nothing in this Safety Concern that would prevent NIOSH from conducting dose reconstructions with sufficient accuracy.	With respect to positive control, there is really no system available to prevent individuals from tampering with dosimeters. This is why External Dosimetry evaluates the raw results from each element as an indication of inappropriate dose results. NIOSH has not specifically responded to the second, third, and fourth issues raised in this concern. *Inconclusive due to lack of response.* The environmental dosimetry program indicates that dosimeters can withstand temperature and humidity changes for the monitoring period of a year. Studies conducted by Bollinger (1990) on CaSO4:Dy dosimeters indicated dosimeters could be submerged in water yet give consistent results with controls. Ong (1985) demonstrated that TLD elements do not respond to sunlight when enclosed in a holder. Background subtraction and studies are discussed under Safety Concern 91-395. This does not constitute an SEC issue. Dosimeter storage locations were areas of maximum accessibility to the employees. There was a potential that a badge could be tampered with; however, a procedure was in place to evaluate inappropriate or suspicious dosimeter results. Employees were asked to protect the dosimeter from becoming contaminated or physically damaged; however, this did occur from time to time.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
91-490 (Continued)	A concern arose regarding violation of HSP 18.07, *External Radiation Dosimeter*. This procedure states that all employees shall protect their dosimeter from contamination, physical damage, moisture, and heat (HSP 1991). External Dosimetry issued a revision to this procedure providing clarification on the employee's responsibility regarding their dosimeter (HSP, 1992).		Contaminated badges were decontaminated wherever possible; however, with the TLD chips contained in the holder, they were generally safe from contamination. Physical damage to a dosimeter, if it affected the TLD chips, resulted in a Dosimetry Investigation according to former staff. Extended External Dosimetry Investigations are documented in personal dosimetry files back to the mid-1980s; however, availability in Radiation Dose files was not routine until the late-1990s. External Dosimetry investigations are considered in previous Safety Concerns.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
91-496	Safety Concern 91-496 questions the storage of film badges in the tunnel north of Portal 1. External Radiation Dosimeter requires that background studies be conducted prior to the implementation of badge racks (JCUSC 1991d). Similar concerns were raised in 91-490 so JCUSC addressed them together. A separate safety concern indicating there were violations of HSP 18.07 (HSP 1992), was issued on March 2, 1992 is included in the Safety Concern 91-496 file. Documentation indicated that a Radiation Protection Technician was without dosimeter protection, which resulted in an entire building being without RPT support (JCUSC 1991e).	However there is nothing in this Safety Concern that would prevent NIOSH from conducting dose reconstructions with sufficient accuracy. Uptakes resulting form work without proper coverage from Radiation Protection personnel, if any, would be reflected in bioassay results, which NIOSH would use in reconstructing internal doses.	NIOSH has not specifically responded to the issue of storage of film badges in the tunnel. Independent external dosimetry assessments as well as employees raised concerns regarding the environmental conditions of the tunnel. Although no deficiency was cited, Radiation Protection agreed to relocate the dosimeter storage board to a more environmentally suitable location, including consideration of background radiation (Shinn 1991). For periods of time when location of specific backgrounds were used in background subtraction, the safety concern is *inconclusive*. There is no indication how the background radiation level changed, and if adjustments were applied to retrospective data. For those years where environmental dose levels were used for background subtraction, the location of the dosimeter storage areas would not affect the dosimeter results. With respect to RPT coverage, this does not impact the ability to reconstruct dose as long as all individuals supporting radiological operations within the building were appropriately monitored. *Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
92-003	The Safety Concern was filed by an employee who sustained a minor injury while working in Building 707. The employee reported to Medical for a wound count. He expressed concern over the inconsistency of the wound counter, procedures related to wound counting and training. The corrective actions included training for individuals operating wound counters, verification of background levels, filter changes in Room C, Bldg 112, and thorough cleaning of this room (JCUSC 1992a, Baker and McCoy 1992).	NIOSH relies primarily on bioassay data for reconstruction of internal doses at Rocky Flats. NIOSH concludes that this issue does not in and of itself compromise the integrity of Rocky Flats data, does not prevent NIOSH from conducting dose reconstructions of sufficient accuracy and therefore does not have SEC implications.	Assuming the employee was adequately monitored via urinalysis, and wound counting was not used in dose reconstruction, this would not present an issue with dose reconstruction. If, however, NIOSH decides to use the wound count data, or it is determined that bioassay monitoring was incomplete, this would impact internal dose reconstruction.
92-036	External dosimetry reports used by the field to monitor the amount of exposure an employee has received to date for a particular year were not provided for a year (JCUSC 1992b).	This appears to be an issue of lack of timely reporting of dosimetry results to employees. There is no indication that employees were in fact unmonitored, but rather than the results of such monitoring were not reported promptly to the employees. As such, the safety concern does not have data integrity or other SEC implications.	*Concurrence with NIOSH assessment.*
92-048	The internal and external dosimetry programs at RFP are inadequate and not in compliance with requirements. There is a lack of communication between dosimetry and the workforce (JCUSC 1992c).	Evaluation of this safety concern is ongoing.	SC&A agrees that this safety concern deserves further investigation. This lack of trust in the internal and external monitoring programs and dosimetry systems are the fundamental concerns raised by the petitioners.
93-061	Safety Concern 93-061 indicates there is untimely turn around time for samples submitted by workers (JCUSC 1993a).	Three employees submitted this concern and all of them signed the form stating that they were satisfied with the results. Untimely bioassay results do not compromise the integrity of Rocky Flats bioassay data, does not prevent NIOSH from conducting dose reconstructions of sufficient accuracy and therefore does not have SEC implications.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
93-109	This Safety Concern form is identical to that of Safety Concern 1991-395 and has the same date. It appears that this safety concern was renumbered and additional response was provided. The additional response indicates that the resolutions described in Safety Concern 91-395 were not completed.	While unnecessary radiation exposure to employees could have important safety implications, there is no indication that doses were unmonitored. NIOSH concludes that this issue does not compromise the integrity of Rocky Flats dosimetry data, does not prevent NIOSH from conducting dose reconstructions of sufficient accuracy and therefore does not have SEC implications.	Refer to response for Safety Concern #91-395.
93-124	The implementation of Personal Contamination Monitors resulted in discontinuation of monitoring by RPTs. RPT monitoring was still available upon request (JCUSC 1993b).	The employee indicated his satisfaction with the response on the JCUSC Concern form. While contamination monitoring practices at the exit from a radiological contamination area could have safety ramifications, the failure to perform such monitoring would not affect NIOSH's ability to conduct dose reconstruction with sufficient accuracy. Personnel entering such areas were required to participate in bioassay programs, and this is the data NIOSH relies upon for dose reconstruction. Therefore, the Safety Concern does not have SEC implications.	*Concurrence with NIOSH assessment.*
93-193	The employee issued a Safety Concern because he was involved in an incident, and was notified 1.5 days after the incident that he required an *in vivo* count, bioassay sampling, and was restricted from the Material Access Area (MAA). There was acknowledgement that the bioassay sampling should have begun within 24 hours of the incident. Additional training was scheduled for Radiological Engineering regarding their responsibilities related to potential intakes and subsequent measurements (JCUSC 1993c).	This is an issue with safety implications. Corrective actions were taken, i.e. training was held. There is nothing in this concern that would compromise NIOSH's ability to reconstruct internal doses with sufficient accuracy; therefore NIOSH concludes that this is not an SEC issue.	A delay of 1.5 days for bioassay, whether urine, in vivo count, or fecal sampling will not prevent detection of an intake. *Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
94 -072	Logbook entries made regarding the contents of a tanker truck do not reflect what was actually in the tanker truck (JCUSC 1994a).	The subject of the safety concern does not involve the data NIOSH used to conduct dose reconstructions at Rocky Flats (personal external and internal dosimetry). There is nothing in this Safety Concern which would adversely impact NIOSH's ability to conduct dose reconstructions with sufficient accuracy, therefore this issue does not have SEC implications.	*Concurrence with NIOSH assessment.*
94-079	No decontamination and showering facilities are available for Radiological Control Technicians at the Federal Records Center.	This issue appears to relate to emergency facilities at the Denver Federal Records Center, where records were being sent from Rocky Flats. As such, this issue is not germane to NIOSH's ability to conduct dose reconstruction of sufficient accuracy.	*Concurrence with NIOSH assessment.*
94-080	This safety concern indicates that there was no pre-evolution evaluation conducted for work being performed at the Federal Records Center. There was not a PRE or RWP generated and available at the worksite. There were also no emergency instructions for casualties issued. The response indicated that an evaluation of the need for a Radiation Work Permit was conducted, and any new or additional members will receive a briefing. It was further indicated that an RWP was not required for this job (JCUSC1994b).	This issue appears to relate to emergency facilities at the Denver Federal Records Center, where records were being sent from Rocky Flats. As such, this issue is not germane to NIOSH's ability to conduct dose reconstruction of sufficient accuracy.	*Concurrence with NIOSH assessment.*
94-081	This concern indicated that there were no emergency response kits and appropriate forms available at the Federal Records Center. Management indicated that they would transport necessary emergency response equipment to and from the Federal Records Center (JCUSC 1994c).	This issue appears to relate to emergency facilities at the Denver Federal Records Center, where records were being sent from Rocky Flats. As such, this issue is not germane to NIOSH's ability to conduct dose reconstruction of sufficient accuracy.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
94-245	Two people had their TLD confiscated as a result of an occurrence. TLDs were not returned immediately. The office personnel in Bldg. 776 were required to have TLDs but these workers were not (JCUSC1994d).	While performing work in a RCA without appropriate external dosimetry may or may not affect NIOSH's ability to perform dose reconstructions with sufficient accuracy, it appears that this did not occur in this particular instance. Therefore the Safety Concern does not have SEC implications.	NIOSH indicates that performing work without appropriate dosimetry in an RCA may or may not affect the ability to do dose reconstruction. They further indicate that the employees with confiscated TLDs did not work in an RCA during the period of time without a TLD. There seems to be some disagreement regarding this fact. The employees indicated they did perform radiological work during this time period while the JCUSC indicated the employees were not required to perform work in a radiological area without a TLD during this time period. No details of the JCUSC investigation were provided in the Safety Concern File. In addition, this Safety Concern raises the question of how frequently TLDs were taken away from workers and why. Were these workers prevented from entering radiological areas during this time period? Certainly if employees were entering radiological areas without TLDs this would put their external exposure in question, and therefore impact dose reconstruction. NIOSH assumes the worker did not enter a radiological area, while SC&A believes the Safety Concern does not provide enough information to make this assumption. *Inconclusive.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
95-061	TLD badges were pulled by the Building Manager of 776 as a result of Radiation Work Permit (RWP) violations. This was due to lack of communication by management to employees using the RWP on a daily basis and without a critique to find a root cause for the violations. Inconsistencies exist within management when pulling TLDs. The supervisor response indicated the company policy was to pull TLDs in any case where radiological procedures are violated. (JCUSC 1995a).	This safety concern appears to be a disagreement between management and the employee. The employee states that there are inconsistencies by management when pulling TLDs. Building management conducted tool box and conduct of operations meetings to reinforce the RWPs. There is nothing in this safety concern that would prevent NIOSH from conducting dose reconstructions with sufficient accuracy.	There is no indication whether individuals having their dosimeters pulled were simultaneously banned from RCAs. The larger concern is whether a simultaneous restriction from radiation areas was enforced. The safety concern did not indicate what restriction was imposed on personnel. *Inconclusive.*
95-077	Retired workers are asked to provide a urine sample and return it via the U.S. mail. Some of these samples are contaminated (JCUSC1995b).	The protocol for shipping bioassay samples from retired employees was determined to fall within the applicable laws and regulations. This issue does not relate to NIOSH's ability to conduct dose reconstructions with sufficient accuracy, and therefore does not have SEC implications.	*Concurrence with NIOSH assessment.*
96-182	An employee was involuntarily terminated. His dosimeter was not read within the month following (Local 8031, 1996).	The badge in question was read, though not within the timeframe called for in the site procedures. This is an issue of timeliness in reading the badge, rather than a date integrity issue, and the implication is that this was an oversight. Therefore, this Safety Concern does not have SEC implications.	*Concurrence with NIOSH assessment.*
97-163	There was a concern raised over animosity between Mission Support Specialist and Decontamination workers assigned to perform the same work creating a hostile work environment (Local 8031 1997).	The preliminary description of the Safety Concern mentioned a "hostile work environment". However, this issue does not appear to have SEC implications, as it does not deal with data integrity, or with NIOSH's ability to conduct dose reconstructions.	*Concurrence with NIOSH assessment.*

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
97-176	An employee was given a TLD badge which did not contain TL elements. The TLD had been processed and the elements were not replaced at the time the supervisor came in and retrieved the dosimeter. The RCT entered radiological areas with inadequate dosimetry (Baker 1997).	The JSUSC Safety Concern Worksheet indicated that no action was required and that this issue was resolved. The employee also indicated satisfaction with the resolution. A bulletin was sent out on July 10, 1997 describing the issue, as well as the steps to prevent reoccurrence. According to information obtained in HIS_20, a dose reconstruction was performed by dosimetry personnel for the affected individual to address this situation and the individual was assigned positive dose.	With respect to the individual's situation, a dosimetry investigation was conducted to determine the dose received while wearing this inadequate dosimeter. This provides some positive affirmation the Extended External Dosimetry reviews were conducted at least during this time period. *Concurrence with NIOSH assessment the particular situation does not preclude dose reconstruction.*
98-073	External dosimetry reports received by employees in Building 374 indicated the many employees received zero doses for first quarter 1998. The employees questioned these results based on the exposures they had received in past reports. Employees felt that based on previous reports, the results were in error. Dosimetry explained to workers that dosimeter results less than 10 mrem were recorded as zero. A population dosimetry investigation was conducted by external dosimetry (JCUSC 1998a, McCoy and Chestnut 1998).	This Safety Concern provides an example that workers concerns on this subject were investigated. While the accuracy of external dosimetry results is certainly an issue with SEC implications, this Safety Concern does not provide any evidence of inaccuracies in Rocky Flats external dosimetry.	The External Dosimetry department looked at the dosimetry results of process specialists and Radiological Control Technicians for the fourth quarter of 1997 and the first quarter of 1998. Dosimetry indicated that dose for 12 process specialists went down, dose for 7 process specialists went up, and dose for 3 individuals stayed the same. For the same time the RCT doses decreased. The average dose for process specialists averaged 9.8 mrem in Q4 1997 and 6.1 mrem in Q1 1998. It is difficult to ascertain whether there is evidence of inaccuracies in individual files from the information provide. NIOSH has provided a hypothesis that inaccuracies did not exist without looking at individual cases. Some basis for this hypothesis is warranted.

Safety Concern No.	Description of Concern	NIOSH Response	SC&A Response
99-013	The employee was concerned that he was not notified of a positive bioassay sample and the subsequent dose assessment in a timely manner. The process of notification of the employee of positive bioassay samples was modified such that the employee would be notified in a timely manner (JCUSC 1999a).	This concern was recognized and addressed. Untimely reporting of bioassay results has potential safety and regulatory compliance implications, but NIOSH concludes that this issue does not compromise the integrity of Rocky Flats bioassay data and does not prevent NIOSH from conducting dose reconstructions of sufficient accuracy.	Although delaying communication of bioassay results and subsequent dose assessment is a poor practice, it does not prevent dose reconstruction. *Concurrence with NIOSH assessment.*
99-023	Employees believe foremen created a hostile work environment with outbursts of anger, name-calling, and arguments with employees, and potential sexual harassment (JCUSC 1999b).	The Safety Concern details inappropriate behavior by an individual toward his coworkers. While it was important for this situation to be rectified, the subject of this concern does not adversely impact NIOSH's ability to conduct dose reconstructions of sufficient accuracy. NIOSH therefore concludes that this Safety Concern does not have SEC implications.	*Concurrence with NIOSH assessment.*
00-075	A chemist who supervised work in the head space area created a hostile work environment. He threw stainless steel canisters at a cabinet in a contamination area in the vicinity of others (Anonymous 2000).	The Safety Concern details inappropriate behavior by an individual toward his coworkers. While it was important for this situation to be rectified, the subject of this concern does not adversely impact NIOSH's ability to conduct dose reconstructions of sufficient accuracy. NIOSH therefore concludes that this Safety Concern does not have SEC implications.	*Concurrence with NIOSH assessment.*