NIOSH RESPONSES T0 SC&A KANSAS CITY SPECIAL EXPOSURE COHORT PETITION SEC-00210 ISSUES MATRIX (MARCH 2014)

No.	SEC Issue	Lines of inquiry	Post-data capture	NIOSH response
1	**Data Completeness, Legibility, and Accuracy –** SC&A has not found that the completeness and accuracy of the recorded bioassay and external exposure records, as well as the electronic database, has been verified for the KCP. This is especially important because of the lack of general periodic or routine monitoring for KCP workers, and also because of the lack of legibility of some of the records. This issue applies to both bioassays and external dose records.	What proportion of the individual bioassay and external records are illegible, and how does the unavailability of this data impair or undercut dose reconstruction and the coworker approach being proposed in the ER? Can the internal and external data be verified and validated (V&V), and what is the result?	*a) Prior to the KCP visit, during an analysis of some of the claimant recorded dose files, SC&A found that approximately 50% of the images on NOCTS had questionable readability. Therefore, SC&A evaluated the situation during the KCP visit and found that the original files exist, appear to be legible, and are available for DR if needed. If the dose reconstructor has any problems reading the external or bioassay records, the dose reconstructor can contact the KCP and obtain a legible copy. b) During the KCP visit, Brent Nasca agreed to provide NIOSH with a summary of the QA/QC methodology used to audit the transfer of the written external and bioassay records to the electronic database. NIOSH has agreed to provide a copy of that summary to SC&A when it becomes available. SC&A will then evaluate the process.*	The KCP health physicist (HP) was interviewed and questioned by SC&A, Board members and NIOSH regarding this issue at the May 2014 KCP site visit. Photocopied images were shown to interviewers on the HP's computer monitor and it was demonstrated that legible, accurate records are available. Efforts to acquire additional urinalysis records are ongoing. NIOSH has reviewed several documents that indicate urinalysis was performed beginning in 1951, and that those samples were analyzed by LANL. NIOSH has received an example urinalysis from an employee's medical file, and the Team is getting access to the LAHDRA holdings to search for additional records. There are also some other classified urinalyses listings that NIOSH is attempting to capture.

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2	**Worker Location, Job Category, and Coworker Model –** Because of the varied historic operations at the KCP coupled with the lack of specific worker locations and job categories, the application of coworker or generalized technical basis document derived doses could result in incorrect dose assignments. This could involve a relatively large number of workers because in many cases there is a lack of (or illegible) bioassay and/or external dose records. Therefore, the adequacy and completeness of the available data used for the coworker model needs to be addressed, along with it applicability to different categories of workers.	How definitive were the KCP organization codes in terms of distinguishing what occupational groups were exposed to uranium and were given bioassays? Is there an adequate means to distinguish "machine operators" from "general laborers," "clerical workers," "supervisors," and other classes of workers, for purposes of assigning TBD-6000 based scaling factors of 50% and 10%, respectively? Is there sufficient basis for delimiting natural uranium fabrication to Depts. 3A and 49X? What proportion of the individual bioassay and external records are illegible, and how does the unavailability of this data impair or undercut the coworker approach being proposed in the ER (i.e., job categories and work locations)?	*Based on 5/5-8/14 KCP interviews, there were conflicting accounts of how freely workers "on the plant floor" were able to move from one department to another. One interviewee recollected moving from job to job, while another disagreed, noting that the union restricted such movement. Based on past interviews, the organizational codes did not necessarily match the assigned jobs, which could change over time; however, the distinction between operators, supervisors, and administrative staff was seen as clear. There appears to be a clear delineation and access restriction afforded the operating area containing the natural and depleted uranium work (Depts 20 and 26). While some scanned records on the SRDB are not legible, the original records are readable. Further review warranted to ascertain whether worker location and job category are sufficiently distinguishable for coworker modelling.*	This is primarily a TBD issue and NIOSH is planning a revision to the TBD. The adequacy and completeness of the available data is being addressed in issue 1 above. Interviewees during the May 2014 visit indicated that historic radiological operations were not that varied (e.g. five separate operations), and that personnel movement throughout the radiological facility was limited. A better understanding of these classified operations is desirable; however, NIOSH has not received any new information that thus far appears to conflict with the bounding assumptions documented in the SEC00210 Evaluation Report (ER).

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3	**Chronic vs. Acute –** Default chronic pattern of intake used in the uranium coworker model, apparently being applied to most KCP workers, may not be applicable to a large number of them. SC&A's review of actual claims reveals that workers that have legible bioassay records show patterns of excretion rates that indicate that the coworker model may not be necessarily claimant favorable for all workers.	For a given worker the uranium in urine bioassays show significant variations in ugm/l results from year to year, as well as month to month; additionally, for a given month, results varied noticeably among workers. Bioassay results for 1960 and 1961 show significantly greater uranium readings than for the other years. These bioassay patterns indicate a non-negligible potential for acute intakes.	*The operational information obtained during the KCP visit indicates that there was the potential for acute intakes, i.e., not all operations were continuous steady-state production processes. Therefore, this issue remains open as an internal dose reconstruction issue that NIOSH should address. Additionally, the cause of the generally higher bioassay reading for 1960-1961 warrants further investigation.*	This is primarily a TBD issue and NIOSH is planning a revision to the TBD. The ER does not make use of the TBD's coworker model. The TBD 6000 Working Group has also generically addressed these chronic vs. acute coworker model issues.

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4	**Super S Uranium –** Type S, high-fired uranium oxide (UO_2) may have been handled at KCP and needs to be addressed in terms of : 1) source term and exposure potential; and 2) how solubility factors will be addressed. [Note: confirmation of Type S uranium would not confound dose estimation – requires explicit acknowledgement in site profile).	Are there any other records (besides SRDB #14693) to verify incoming UO_2 powder or other material as having been high-fired?	*While it was likely that some of the uranium handled at KCP was "high fired," there is no clear evidence of insolubility that would preclude dose reconstruction with sufficient accuracy. Previously addressed by Board for Y-12 and INL; no dose reconstruction concerns concluded. Recommend closure by the work group.*	NIOSH does not need to address a high-fired uranium oxide source-term and exposure potential separately from other KCP uranium work because, SC&A has previously agreed with NIOSH that high-fired uranium oxide is adequately bounded by the Type S solubility class (see, *White Paper – SC&A Review of LBNL Issue #3, dated 9/5/12*).

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5	**Recycled Uranium -** SC&A is aware of the potential for even DU to include recycled uranium once Hanford established its recycling program in the early 1950s. A cursory search of available documents did not reveal explicit mention of KCP as a recipient, but the potential for trace contaminants may exist. Therefore, the potential for exposure to radionuclides from recycled uranium at the KCP needs to be addressed. [Note: confirmation of recycled uranium by itself would not confound dose estimation – issue is explicit acknowledgement as source term).	Are there any records of recycled uranium or depleted uranium being received at KCP? Any analysis of U or DU showing elevated Pu or other trace radionuclides (e.g., Np-237 and Tc-99)?	*It is the standing position of NIOSH to assume the presence of recycled uranium beginning in the mid-1950s and to account for it in dose reconstruction. TBD 6000, for example, addresses recycled uranium in its model calculations. NIOSH will assume recycled uranium was present at KCP and dose reconstruct, accordingly. Recommend closure by the work group.*	TBD-6000 Section 2.3 identifies 1952 as the start of RU availability. The bounding methodology used during uranium work after 1952 includes the exposure contribution from RU nuclides. This was implied by reference in the ER to TBD 6000.

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6	**DU After 1971 and During and After 1997 -** The nature and extent of work with depleted uranium after 1971 and again during and after 1997, as well as any intakes that may have resulted, remains to be adequately established.	A search of classified records is waranted: What were nature and radiological hazard (exposure potential) and controls related to DU work? Where was work performed and who was potentially exposed? How were workers monitored and what was the exposure history? What was incident history and how were they handled, and by whom? What was contamination control experience? What was difference in above, for 1958-1972, vs. after 1997?	*An interview conducted during 5/5-8/14 KCP visit, indicates that uranium machining equipment remained in place and was not D&D'd until 1975. Depleted uranium "ballast" parts were used in the KCP telemetry program in the 1980s (and possibly beyond) and show up in KCP waste inventory; not clear if they were fabricated onsite. Further review of "ballast" source term activity warranted.*	NIOSH requests that SC&A be more specific as to the DU work information missing from the ER after 1971 to the end of the evaluated period (12/31/93). NIOSH is not aware of any DU work that is not bounded by the methods documented in the ER. The period after 1993 did not qualify for evaluation.

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7	**Radioactive Waste -** Further evaluation is warranted in regard to the processes and isotopes contributing to liquid radioactive waste shipments from the Kansas City Plant, the time period during which these activities and shipments occurred, and the potential for unmonitored internal exposures from spills, leaks, cleanup, and routine handling/storage of contaminated drums.	Any incidents involving radwaste spills, leaks, or contamination? How were radwaste handled, controlled, and shipped to and from KCP? Who handled radwaste and how were they monitored; what was the exposure history at KCP? What was the composition of the waste handled and what was the exposure potential to workers? How much radwaste was handled and on what frequency?	*Several KCP interviews on 5/5-8/14 indicated that DU and MgTh turnings were collected in small barrels with oil, and staged in a "dump room" for disposition. Interviewees did not recall instances of leakage or contamination from these drums or from the waste disposal process, itself. However, LANL documentation indicates instances of leakage upon receipt. Further review is warranted, with a particular focus on whether leakage was limited to uranium.*	NIOSH has reviewed liquid radioactive waste shipment records (e.g. SRDB 123835). More records [Solid Waste Information Management System (SWIMS)] have also been requested (SWIMS example SRDB 123881). NIOSH is not aware of any processes or unmonitored internal exposures from spills, leaks, cleanup and routine handling/storage of contaminated drums that are inadequately bounded with the methodologies described in the ER utilizing models developed with approved TIBs and TBD 6000.

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8	**Metal Tritides –** It needs to be established the degree to which metal tritides were present and how doses would be reconstructed to account for this potential source of exposure, with particular attention to any incidents that may have occurred (i.e., only one isolated incident?).	What metal tritides were handled at KCP? How were they handled, where were they handled, and what was the exposure potential for workers?	*KCP interview of 5/5-8/14 indicates that several types of metal tritides were likely handled at KCP in sealed components. Historically, there appears to be only one instance where a component leaked, resulting in tritium contamination involving erbium tritide in 1987, but with no evidence of intake. Further review is warranted of incident records to confirm no evidence of contamination involving tritium and tritide containing components.*	Interviews conducted during the May 2014 site visit confirmed that the presence of metal tritides at KCP were solely related to contaminated parts being returned without adequate decontamination. A second occurrence of metal tritide contamination at KCP was described by an interviewee, and records of that occurrence will be reviewed by NIOSH.NIOSH has been made aware of "Weekly Activity" documents obtained during the May 2014 visit that indicate KCP performed an operation where tritium water was transferred from one-gallon polyethylene bottles to 4-ounce bottles. These documents indicate that KCP obtained procedures from Sandia to perform urinalysis and that KCP was "set-up" to handle tritium water (equipment operating satisfactorily and calibrated) before they received the first (8) gallon shipment in August 1964. This water was received from Sandia and certified at 226 µCi/l. There are also indications within these reports that KCP ordered (7) additional gallons of of tritium water in December of 1964. NIOSH also recently reviewed a document (SRDB 128438 pdf 3) that seems to indicate KCP handled or prepared a tritiated phosphor within an exhaust hood, utilizing safe handling precautions. This document indicates this work occurred prior to October 1968. NIOSH will continue to request and review documents that address KCP's tritium operations.

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9	**External Coworker Dose –** Legibility, accuracy, and completeness of the databases (original and electronic) for use in developing a coworker external dose model has not been verified. Preliminary review indicates the lack of legibility and raises questions concerning the completeness of the external dose records	a) The dose/intake tables in the KCP TBD were derived using the data from the KCP plant electronic database, which was sent to NIOSH on a flash drive with the PII [redacted] (SRBD #14707). b) The external dose records for 1969 are all zero, which is unusual since the adjacent years show positive readings. However, SRBD #14707 shows that there [fewer than 9] bioassayed in 1969, with results being very low; this may indicate that there was very low exposure potential during 1969.	*a) See Issue #1 above concerning QA/QC of transferred data.* *b) To date, neither NIOSH nor SC&A has found the reason for all the recorded external doses for 1969 being zero. During the KCP visit, Brent Nasca agreed to try to determine the cause of the records for 1969 being all zero. Brent will contact SC&A if he finds anything.*	The legibility of monitoring records was verified during the May 2014 site visit and NIOSH is satisfied that there are methods available to obtain reliable monitoring results.

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10	**Non-penetrating Dose -** It appears that there are periods (especially 1950-1963) where the details of non-penetrating exposure, dose, and records are lacking, making it difficult to evaluate non-penetrating doses to workers and for developing a coworker model.	The proper dosimetry calibration, measurement, and recording of non-penetrating dose, as well as how it will be used during DR, are especially important for skin cancer evaluation (which constitutes a significant fraction of the claimants' cancers analyzed during DR).	*SC&A's research of KCP claims files indicate that before 1964, there was a column labeled "RADS" that may have been used for recording of the beta dose. However, this has not been addressed in the ER or site profile documents. The relationship between recorded RADS, ROENTGENS, REM, and BETA RAD, as recorded at the KCP, needs to be defined, and how these quantities will be applied during DR (i.e., how will the non-penetrating dose be calculated from the recorded data) to determine if appropriate data was recorded for DR purposes.*	The ER provides a method to place an upper bound on non-penetrating doses with sufficient accuracy. NIOSH is aware of the dosimetry used from 1950 to 1963, and that KCP records show 5000 entries for non-penetrating doses during this time. NIOSH is satisfied that the maximally exposed work group and work scenario are represented with the available data, and can bound doses to others in the evaluated class with their data.

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11	**N/P issues –** The KCP neutron-to-Photon (n/p) ratios as recommended by NIOSH are not technically correct and require additional investigation in order to develop a technically-sound approach for dose reconstruction.	A few recorded positive neutron doses with accompanying zero photon doses were used by NIOSH to derive an n/p value of 1.0. However, the value of n/p in this case would be *n/0.000 = undefined*. A zero photon dose with a small positive neutron dose indicates that the dosimetry system did not register the photon dose, because every neutron field is accompanied by a photon field from neutron-gamma capture reactions in the surrounding materials. Although the recommended n/p value of 1.0 may be claimant favorable, it is not based on a scientifically valid dataset.	*NIOSH's proposed method is not technically correct. This is still an issue that NIOSH needs to address.*	Based on OTIB-024 the n/p ratio for alpha reaction in uranium and thorium would result in n/p ratios less than one, therefore the ratio stated in the ER is bounding. The KCP Site Profile advises the use of an n/p ratio approach rather than the use of NTA film with a correction factor for neutron dose assignment. The data used to recommend the n/p ratio of one are from the post-NTA film era as noted in Section 6.4.3 of the Site Profile. The occurrence of positive neutron dose during the post-NTA era is very rare indicating a low potential for neutron exposure. It is also noted (from Table 4 in the Site Profile) that the same neutron sources were operational during the NTA and post-NTA dosimetry eras; therefore, using the modern data set to recommend an n/p ratio for the earlier era should be valid.

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12	**Fading of NTA -** The fading of the NTA film as a function of time, temperature, and humidity has not been addressed, nor were there any correction factors provided. Lower-energy moderated neutrons could have gone undetected, and if detected, would show even more fading as compared to the higher-energy neutrons, such as those used for calibrating the NTA film. Quarterly exchange of NTA film, such as was used at KCP, can result in complete loss of countable track and yield zero dose recordings for low-level and/or low-energy neutron exposures. These factors could be indicative of why there were very few recorded neutron doses, and insufficient data to derive a technically-sound n/p value.	Lower-energy moderated neutrons could have gone undetected, and if detected, would show even more fading as compared to the higher-energy neutrons, such as those used for calibrating the NTA film. Quarterly exchange of NTA film, such as was used at KCP, can result in complete loss of countable tracks and yield zero dose recordings for low-level and/or low-energy neutron exposures. These factors could be indicative of why there were very few recorded neutron doses, and insufficient data to derive a technically-sound n/p value.	*During the KCP visit, records of outside vendor neutron dosimetry were located. Most of the results were recorded as minimum detectable level (M). However, with quarterly exchanges, the fading of NTA film tracks could significantly contribute to positive doses not being recorded. NTA film fading and its impact on DR is still an issue that NIOSH needs to address.*	The NTA film fading is a common issue and has been discussed at multiple sites. A correction factor could be developed for KCP; however, it would take significant research and may not be justifiable since essentially all the neutron doses during the NTA era are "zero." NIOSH will perform dose reconstructions using data from the post-NTA era and will not use the NTA data.

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13	**Mg-Th Alloy operations –** In the ER NIOSH identified the Mg-Th operations period as May 1, 1957 through April 30, 1979, as well as a residual period after operations ceased and before D&D. For the operational period, NIOSH proposes to use engineered air concentration limits coupled with ORAUT-OTIB-0070 to bound internal doses. The operations, timeframe, data adequacy/completeness, dose estimation approach, as well as the representativeness of 1970 BZ sampling for null exposure, need to be validated. For the residual period, NIOSH proposes to assume 3E-11 uCi/ml lower air limit and deposition, re-suspension, and depletion models to assign intakes. Thoron dose assumed to be 5.1 WLM/yr coupled with TBD-6000 modeled air concentrations. These assumptions and models need to be evaluated.	What was the operational experience with Mg-Th alloy operations and what airborne resuspension of particulates was experienced? What was the basis for the engineered air concentration limits? What exposure potential for thorium existed during operations?	*May 5-8, 2014 interview indicates that Mg-Th alloy work commenced as early as 1954. No additional air sampling data was identified. Further review of operational experience (with attention to incident reporting of fires) and dose reconstruction method is warranted.*	NIOSH has reviewed the ER and remains satisfied that the bounding method is feasible. NIOSH is also requesting additional recently located urinalysis records to determine if modification of the bounding method is required.

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14	**Post-1993 monitoring –** Need to validate 1993 cutoff date for ER based on NIOSH finding of "*no apparent, or potentially, inadequately-monitored exposures,*" which was based on a review of claims after 10 CFR 835 was implemented.	What was exposure monitoring experience post-1993, and how was 10 CFR 835 implemented and when was it in full effect? 4/17/2014 - NIOSH responded to this issue by stating that a qualitative assessment of claimants' records showed it was possible to assign any unmonitored works to one of 3 categories (TBD, p.26) for external dose, and one of 4 categories (TBD, p.22) for internal dose.	*SC&A analyzed NIOSH's 4/17/2014 response to this issue and sampled several case files in view of it. To date, SC&A has not located definitive information that dose cannot be reconstructed beyond 1993; however, SC&A recommends that this issue be left open until the other SEC issues are resolved.*	During the petition qualification phase ORAUT performed, a qualitative assessment that considered job titles and work information contained in the CATI. Claim information was reviewed for indications that a specific EE's work duties were not represented by the four worker "exposure categories" presented in the site profile for assignment of dose to unmonitored workers. As stated in petition qualification documentation, dose reconstruction methods and assumptions would be evaluated through 1993, and if subsequent NIOSH evaluation into areas such as decontamination following operations indicated potential inadequately monitored exposures post 1993, NIOSH would extend the evaluation period into the 10 CFR pt. 835-era, as appropriate. Since it was determined by NIOSH that all doses could be estimated with sufficiency accuracy through 1993, the evaluation period remained unaltered in the final report. NIOSH is aware that DOE performed a "Radiological Protection Appraisal" of KCP in April 1993, and determined that KCP complied with most of the requirements of the DOE RadCon Manual. The few parts they were not in complete compliance with were not significant in terms of employee monitoring (SRDB 108258). NIOSH is also aware that KCP was actively complying with Article 511 of the Manual and appropriately removing personnel from the monitoring program (SRDB 108258). To illustrate, KCP monitored 59 personnel in 1994 using DOELAP accredited dosimetry, with only two personnel receiving measureable exposures. The two exposures were < 100 mrem TEDE (SRDB 11987).

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15	**Thorium oxide operations –** Need to validate that KCP laboratory operations involving ThO_2 were bench scale in nature, and therefore, had negligible exposure potential.	What operations involved thorium oxide at KCP? What was inventory of ThO_2 at any given time (NMMSS?). Was there a radiological control or monitoring program?	*DOE inventory review indicates a standing inventory of "non-alloyed" (i.e., non-MgTh) thorium at KCP in the 1970s-1980s. No associated KCP program has yet been identified, or attendant bioassay program and related bioassays. One interviewee from 5/5-8/14 visit recalled a "room devoted to thorium;" that it was in "powder form." However, other interviewees to date do not acknowledge any programmatic activity involving thorium other than MgTh (and formulation of laboratory-scale standards; one interviewee noted that thorium oxide powder was retained for use as an ICAAP standard). Further review is warranted.*	Interviewees were asked about operations involving ThO_2 at the May 2014 site visit and no large-scale operations were identified. The Industrial Hygienist provided additional documents during the May 2014 site visit that NIOSH will review after they are ADC reviewed.

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16	**Application of TBD-6000 –** Need to validate proposed application of TBD-6000 methodology to determine if recommended concentrations bound internal doses for workers that had less exposure potential, or were unmonitored, for internal exposures to natural uranium (NU), thorium, and thoron.	The major items of concern are: a) 1950-1955 - Application of TBD-6000 during NU processing. b) Use of the TBD-6000 methodology for unmonitored workers less exposed than operators for: 1955-1958 - Residual period of post NU processing. 1979-1984 - Residual period for post uranium operations. c) Use of the TBD-6000 methodology for unmonitored workers less exposed than operators for: 1957-1979 – Mg-Th operational period. 1979-1984 – Thorium and thoron during residual period of post Mg-Th operations.	*a) SC&A's review of the application of TBD-6000 for the exposure to NU during the period of 1950-1955 at KCP found that the approach adopted in the SEC to be scientifically sound and claimant favorable, as long as there were no other radiological operations taking place in the Main Manufacturing Building during this time period. b) SC&A's review of the use TBD-6000 methodology for unmonitored workers uranium intakes for the 1955-1984 time period found that the approach adopted in the SEC PER to be scientifically sound and claimant favorable, as long as there were no other radiological operations taking place in the Main Manufacturing Building during this time period.* *SC&A finds that NIOSH's use of TBD-6000 addresses the concerns for uranium exposures. c) However, the Mg-Th operational and residual periods warrant further review of dose reconstruction methods for thorium and thoron, as outlined in Issue #13.*	Interviewees were asked about access controls and freedom of movement throughout KCP during the May 2014 site visit. NIOSH remains satisfied that the methodology documented in the ER is bounding. The TBD 6000 Working Group has also generically addressed the use of the surrogate modeling used in the ER.

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17	**D&D activities –** Need to validate scope and monitoring status of D&D activities; ER assumes D&D confined to 1984-1986 period and applies assumed air concentration parameter for general employee exposure.	Was D&D confined only to 1984-1986 and involved only Rockwell workers? What operational or facility changes occurred at KCP that would have involved D&D? Is there adequate monitoring data for Rockwell D&D workers? Was there a potential for exposure of KCP workers during D&D?	*Interviews have not identified any significant D&D other than that in 1984-1986. Other D&D related activities involved contaminated equipment, e.g., DU machining. No evidence has been found of exposure potential for plant workers during D&D. Further review of weekly activity reports and other sources of operational information is warranted.*	Interviewees were asked about the possibility of other D&D activities by Rockwell International or other contractors during the May 2014 site visit. NIOSH remains satisfied that the ER's description of D&D activities is bounding.

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18	**Accidents, Incidents, and Fires in Worker's Record -** The status of the recording of accidents, incidents, and fires in the worker's records needs to be determined. Specifically, NIOSH needs to establish whether internal intakes and external doses from accidents, incidents, and uranium fires were included in the records NIOSH has available for dose reconstruction or whether they need to be obtained and accounted for separately from the standard recorded intakes and doses. This would include the 1987 erbium tritide and the 1989 Pm-147 incidents, as well as intakes from uranium fires.	How complete is the ER compilation of radiological incidents at KCP? Are there any dose estimation implications (e.g., "missed dose") for history of radiological releases or contaminations from such incidents? What is frequency and significance of uranium fires during operations? How was post-incident monitoring addressed and by whom (Rockwell?).	*Routine recording of workplace incidents was not identified until "weekly activity reports" were found in microfilm format during 5/5-8/14 KCP visit – a search for all such available reports has been requested. A limited sampling of such weeklies for the mid-1960s found routine reporting of workplace fires, spills, and accidents.*	The KCP HP was asked about the inclusion of dose investigations with monitoring records during the May 2014 site visit. A dose investigation that includes a statement about it being added to an employee's records (SRDB 128233) was shown to the HP and he stated that this was a KCP standard practice. Interviewees were also asked about their recollection of accidents, incidents and fires. NIOSH remains satisfied that the ER's description of D&D activities is bounding. The personnel information in documents pertaining to the 1987 erbium tritide (SRDB 108267) and the 1989 Pm-147 (SRDB 6216) incidents has been reviewed against NOCTS claimant identifiers, and linked to NOCTS claims data as appropriate. The TBD 6000 Working Group has also generically addressed the inclusion of fires and other incidents into exposure models.

NIOSH RESPONSES T0 SC&A KANSAS CITY SPECIAL EXPOSURE COHORT PETITION SEC-00210 ISSUES MATRIX (MARCH 2014)

No.	SEC Issue	Lines of inquiry	Post-data capture	NIOSH response
19	**Potentially Unmonitored Exposures –** The ER mentions the concerns of a petitioner about potentially unmonitored exposures in Section 7.4.4. However, the response in the ER was that NIOSH has determined it has sufficient information to document potential exposures and bound associated doses. Since these are specific items, it would be appropriate to address the monitoring requirements, impacted workers, and available records associated with each exposure potential to determine dose reconstructability for these potential exposures.	Review indicated unmonitored exposures involving (selected): *plutonium, tritium, weapons grade uranium-235, uranium-233, electron beam welders, accelerators, cesium irradiator, and Electro Curtain.* Determine source term existed and exposure potential addressed (or unaddressed) in ER.	*Inventory review and interviews indicate no plutonium and weapons grade uranium-235 and uranium-233 were present at KCP, except in gram quantities in sealed sources, or as isolated fugitive contamination in returns. External radiation sources, e.g., electron beam welders, accelerators, cesium irradiator, and Electro Curtain, would have been monitored through film and TLD badges. Potential tritium exposure will be addressed in as a separate issue. Further review of operational records and incident reports are warranted.*	The concerns of a petitioner about potentially unmonitored exposures were listed in the ER as follows: "Many surface and airborne uranium isotopes, plutonium, tritium, weapons grade uranium-235, uranium-233, neutrons and other ionizing radiation from industrial X-ray gauging devices, electron beam welders, neutron generators, neutron plutonium-beryllium sources, accelerators, cesium irradiator, medical X-ray, and Electro Curtain". NIOSH addressed exposures to the evaluated class from many of the listed sources throughout the ER. Those items not addressed in the ER such as weapons grade uranium-235 were omitted because there is no indication that they were on site. NIOSH has questioned former employees and searched SRDB documents for information regarding all of the petitioner's concerns; however, only verified exposures are addressed in the ER.

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20	***NEW ISSUE:*** **TRITIUM**	Onsite review of weekly activity reports indicates that KCP handled bulk quantities of tritium beginning in 1964, which were obtained from LANL and involved the filling of hundreds of small bottles for a yet undetermined purpose. No operational or monitoring records have been found for this period.	*Recommend that the WG open a new issue and further review continue.*	