DRAFT

REPORT TO THE SUBCOMMITTEE ON DOSE RECONSTRUCTION

SUMMARY OF FINDINGS MATRIX
(10^{th}–13^{th} Sets: RFP/LANL Cases)

Attached is an updated issues matrix containing SC&A's responses to the NIOSH information findings from the 10^{th}–13^{th} sets of dose reconstruction audits regarding the Rocky Flats Plant (RFP)/Los Alamos National Laboratory (LANL). This updated issues matrix is being provided for discussion purposes at the meeting of the Subcommittee on Dose Reconstruction on November 27, 2012.

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Finding Number	Summary of Finding	NIOSH Response	Category	SC&A Response	SC&A Suggested Action	NIOSH: Agree/ Disagree	DRSC Action
11th set (RFP) 252.1-C.1.2	Assigned missed photon dose not consistent with protocol/DR Report.	The overall assessment was conducted for this non-comp claim using efficiency methods, so some portions were over-estimated (such as assigning both coworker and missed dose during some periods). The DRR states that missed external was assessed as a BE, but it was actually an over-estimate. In 1953, 9 months (3 quarters) of coworker dose was assigned. Based on the employment start date of [redacted]/1953, the EE was employed for 10 months during 1953. In the RFP Workbook, the "Missed Dose" Worksheet shows the calculations for number of zeros for missed dose for all years. In 1953, the number of zeros was based on a best estimate of 13 cycles for the entire year; therefore, for 1 month of missed dose (13 cycles/12 months), 1 zero should have been assigned. Instead, the "Scoreboard" Worksheet (Columns BE-BG) shows all 13 zeros were assigned, which was claimant favorable. In 1954, the best estimate of 13 zeros was assigned for the year; and, 4 quarters of coworker dose were also assigned. The "Missed Dose" Worksheet in the RFP Workbook shows the detailed calculations for number of zeros and thus, missed dose. This worksheet follows the guidance of ORAUT-TKBS-0011-6, and the then-current RFP site guidance (Basic Guidelines for	C	This problem occurred because the DRR stated the use of BE methods, but used overestimates for some doses, and then stated that 238 missed doses were used, when actually only 196 were used (which better matches those back-calculated by SC&A, as illustrated on page 16 of the audit report). The DR Report text, workbooks, and final IREP inputs should all agree with each other. Any unobvious or unclear methods should be mentioned in the DR Report to clarify the procedures actually used.	Close		

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		RFP Dose Reconstruction v1.10, Section iv "Assignment of Dosimeter Zeros for Estimation of Missed Dose 1951–1976," dated 4/5/2006). Several workbook selections and entries affect the calculations on the "Missed Dose" worksheet. First, the toggle for Column C; and in this case, modifications as indicated in comments in Cells C 17–18. Second, the hand-entered data in Columns D–F, based on comments in Cells D5 and F5. Note that some columns are hidden on the worksheet and must be un-hidden to view the calculations. The "Scoreboard" Worksheet (Columns BE–BG) shows all zeros assigned, as does the "Input Data" worksheet, in Column O (hidden). Based on the "Missed Dose" worksheet, 391 total zeros represents the maximum number of zeros which could have been assigned, based on job description and the dose records (Column D), through 1976. Based on the Column C selections, the reported zeros (Column F), and the zeros based on the LOD/2 value (Column H), the number of zeros which were "censored" from the total was 112 (Column I). This leaves a maximum number of 279 zeros through 1976 (Column J); and a best estimate of 196 zeros (Column K), which is the value assigned in this case. It does not appear the SC&A calculations considered all of the factors which affect the number of assigned					

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		zeros, as shown in the "Missed Dose" worksheet; thus, the SC&A comparison of zeros, and the associated missed dose, was not consistent with what was assigned.					
253.1–C.2.1	Incomplete accounting of recorded dose.	The DOE Response File (pp. 17 and 25) shows 0.231 rem "Skin" and 0.140 rem "Pen", and the difference between these two is 0.091 rem. The NDRP reported photon dose is 0.163 rem (DOE File_v3, pg. 1 of 12). The NDRP photon dose (0.163 rem) was used as the "Deep" dose, and the "Shallow Dose" was obtained by adding 0.091 rem, to get a total of 0.254 rem. Each "year" Worksheet in the RFP Workbook_v3 provides a detailed accounting of how the input (DOE file) doses are applied for each year. On the "1958" and "1959" Worksheets, the non-NDRP dose data is shown in Columns BH–BP, and the NDRP dose data used is shown in Columns AA–AN. The NDRP penetrating dose for the period 12/22/1958 thru 1/12/1959 (note: dose received in two different calendar years) was transferred to the "1959" Worksheet; thus, the gamma dose in question by SC&A is included in the "1959" 30–250 keV dose, and does not show up as a "1958" dose. For this claim, the file "00[redacted] RFP QC_DR.xls" was an intermediate file used to develop the final dose input file "00[redacted] RFP_DR-BE.xls." The doses in this final input file match those on the	C	When the EE's files contain a recorded dose (i.e., 1958) and some of that dose is assigned correctly for 1958 (such as the <30 keV dose), but a 30–250 keV dose is not assigned for 1958, then it is not obvious to the reviewer what NIOSH is doing (i.e., including it with 1959). Trying to figure this sort of issue out from the many spreadsheets is time consuming and not efficient. NIOSH should include any non-obvious methods or calculations in the text of the DR Report.	Close		

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		"year" worksheets in the RFP Workbook_v3, as described above.					
253.2–C.3.1	Inadequate information for derivation of organ dose.	This claim was run as a best estimate using Monte Carlo methods. At the time, the Monte Carlo calculations were done separately from the RFP Workbook, and the practice was not to include the detailed calculations with the claim files. The RFP Workbook_v3 "Irep Output" sheet was used as input for the Monte Carlo calculations. Thus, there is a "gap" in the DR files as indicated in the SC&A report, and the RFP Workbook "Irep Output" sheet does not match the final IREP sheet used for POC calculations. Again, the detailed Monte Carlo calculation workbook is not available for this claim. NIOSH agrees this file should have been included in the assessment file. Possible differences in doses calculated by SC&A could be due to the way in which NDRP photon doses are handled in the workbook. Two "comments" in the workbook should be noted. First, on the "Input Data" worksheet, a comment in Cell M19 discusses corrections made when NDRP gamma dose is greater than the DOE file reported deep dose. Second, on the "year" worksheets (see 1959 for example), a "note" in Cell CM12 indicates NDRP gamma dose is used based on the "Missed Dose Zeros Selection" on the "Missed Dose" worksheet, Column C.	F	SC&A did rework the doses using the medium DCF from OTIB-0012 (instead of IG-001) and found the derived photon doses closely match those doses assigned in the IREP Input tables using the Monte Carlo method.	Close		

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253 Observation #1	For 1958, 1961, and 1962, SC&A results matched those of NIOSH as listed in their DR files and used in assigning dose in the IREP Input tables. However, SC&A derived a smaller adjusted gamma dose for 1959 and 1960 (a total 0.160 rem less), compared to the total value used by NIOSH for these two years.	See Responses for Finding 253.2	NA	No SC&A response is necessary.	No action		
253 Observation #2	There appears to be an inconsistency in the values for the 2–20 MeV DCF_{Eff} values (as well as some of the other energy ranges) listed in the different versions of ORAUT-TKBS-0011-6, and compared to the one used in the DR Report.	The RFP Workbook_v3 shows a "comment" on the "Lookup Parameters" worksheet in Cell R8. This comment refers to a change in the ICRP 60 DCF_{Eff} value "based on a telephone conversation with [redacted]on 8/26/04." No further information could be found regarding this change, and this DCF_{Eff} value was not implemented in subsequent revisions to the TBD. As noted in the SC&A observation, the impact of using this alternate value was small.	NA	No SC&A response is necessary.	No action		
253 Observation #3	SC&A arrived at a missed 30–250 keV photon dose that was approximately 58% of what NIOSH assigned.	See Responses for Finding 253.2	NA	No SC&A response is necessary.	No action		
253 Observation #4	SC&A arrived at a missed neutron dose for 1959 of one-half of that assigned by NIOSH.	See Responses for Finding 253.2	NA	No SC&A response is necessary.	No action		
12th set (RFP) 274.1-C.2.1	Incomplete Assignment of Recorded Photon Doses	The RFP Workbook contains worksheets for each year; these sheets provide the detailed calculations for assignment of photon doses.	E	The EE had recorded photon deep doses (DDE) totaling 5.538 rem for the years 1963–1967. NIOSH did not assign any recorded deep dose for years 1963–	Close		

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		Using the "1963" worksheet as an example, the assigned 30–250 keV photon dose can be found in Cell CA6. This final assigned dose is calculated from Cell BZ2, BZ6 and CA2. The calculation is summarized as follows, based on the use of NDRP data (see Cell CK10) for missed dose determination (also see Column C of the "Missed Dose" worksheet): Cell BZ2: Total Non-Pen Dose = (Total DOE Non-Pen) – (NDRP Neutron) + (NDRP Photon – DOE Photon) Cell CA2: Total Pen Dose = Total NDRP Photon Cell BZ6: Shallow (<30keV) Photon = (Total Non-Pen Dose - Total Pen Dose)/0.65 Cell CA6: Deep (30–250 keV) Photon = Total Non-Pen Dose – Shallow Photon [if < zero, then 0 is the assigned dose) This value (Cell CA6) is the value used in Column L of the "Input Data" worksheet. From Column L of the "Input Data" worksheet, and the individual "year" sheets,		1967. SC&A understands this difference is a result of the NDRP data manipulation.			

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		a zero value for 30–250 keV photons was correctly assigned for this claim, for the years 1963–1967. It should be noted that on the "Input Data" worksheet (Cell L45), a 30–250 keV photon dose is assigned for the year 1968. This is due to the fact missed dose was based on site data, rather than NDRP data (see "Missed Dose" worksheet, Column C). Comparison of the years 1963–1967 to the year 1968 shows the calculation differences for assignment of 30–250 keV photon doses for this claim.					
274.2–C.1.1	Incorrect Assignment of Coworker Photon Doses	Based on RFP site guidance, assignment of Coworker dose is based on professional judgment relative to the site dose records, and the NDRP dose records. When NDRP data is used as the basis for assigning missed and coworker doses, it is compared to the recorded site doses to determine if all potential monitoring periods are covered. For periods not covered/monitored, coworker doses can assigned. In the RFP Workbook, assignment of missed doses is detailed on the "Missed Dose" worksheet, and assignment of coworker dose is detailed on the "Coworker Doses" worksheet. In this case, the "Missed Dose" worksheet shows that NDRP data was used to assign doses for the years 1964, 1965 and 1967. The hand-entered values in Columns D–F match the QC data file for each of these years.	F	SC&A agrees with NIOSH's reasoning in this situation and that the procedures/results were reasonable.	Close		

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		For the year 1964 in the QC data file, there is one gap which would be considered un-monitored. The NDRP dates shown in Columns AK–AL indicate the period from March 27, 1964 to July 24, 1964 was not monitored. Even though there is recorded site dose for the two quarters associated with this period, the NDRP photon doses do not match, and are less than, the site doses. Thus, based on RFP site guidance using the NDRP data, this is an unmonitored gap. Based on the number of days in this gap, a total of 4 months of coworker dose should be assigned. In this claim, 6 months of coworker dose were assigned, which over-estimates the dose. For the year 1965 in the QC data file, there is one gap which would be considered un-monitored. The NDRP dates shown in Columns AK–AL indicate the period from June 30, 1965 to September 01, 1965 was not monitored. Even though there is recorded site dose for this quarter, the NDRP photon doses do not match, and are less than, the site doses. Thus, based on RFP site guidance using the NDRP data, this is an un-monitored gap. Based on the number of days in this gap, a total of 2 months of coworker dose should be, and was correctly assigned in this claim. For the year 1967 in the QC data file, there is one gap which would be considered un-					

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		monitored. The NDRP dates shown in Columns AK–AL indicate the period from July 01, 1967 to December 31, 1967 was not monitored. Even though there are two recorded site photon/penetrating zeros for the two quarters associated with this period, there is no indication of NDRP photon monitoring. Thus, based on RFP site guidance using the NDRP data, this is an un-monitored gap. Based on the number of days in this gap, a total of 6 months of coworker dose should be, and was correctly assigned in this claim.					
274 Observation 1	SC&A found that the DR Report referred the newer version of ORAUT-TKBS-0011-3, Rev. 01, dated April 23, 2007, but used the LS dose values from Table 3.4.2.2, page 18, of the older version of ORAUT-TKBS-0011-3, Rev. 00, dated February 9, 2004. The 2004 version lists the LS dose as 0.552 rem for the PA plus LAT view, whereas the 2007 version lists the LS dose as 1.320 rem for the PA plus LAT view.	The SC&A observation is correct; the newer revision values should have been used in this claim. The values used were the values in the "Xray Data" sheet of the RFP Workbook, which had not yet been updated to reflect the newer revision.	NA	No SC&A response is necessary.	No action		
274 Observation 2	Table 3-6 in ORAUT-TKBS-0011-3 lists the time periods as pre-1970 and post-1970, but the way the titles are presently worded, they do not provide	The SC&A observation is correct. In practice, DR is performed using the "pre-1970" values for the year 1970. This is shown in the RFP Workbook, "Xray Data" worksheet, and is a claimant-favorable approach.	NA	No SC&A response is necessary.	No action		

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	information for the year 1970						
275.1-G.3	The Am-241 Environmental Intake Duration is Incorrect.	It appears this claim was based on Revision 01 (effective date of 06/29/2004) of ORAUT-TKBS-0011-4. Intakes for Am-241 match those found in Table 4-2 of ORAUT-TKBS-0011-4, Revision 01, which begins in 1965. Only Pu-239-240 intakes are provided prior to 1965 (Table 4-1) in Revision 01. In Revision 02, Americium-241 intakes are provided prior to 1965 (Table 4-2). Revision 02 should have been used for this claim, and Americium-241 intakes should have been included 1963–1964.	F	The DR was completed in May 2008 and Rev. 2 (2007) of ORAUT-TKBS-0011-4 is referenced in the DR. SC&A believes the use of an outdated TBD and the omitted Am-241intakes should have been identified during the peer review. SC&A recommends closing this finding. However, this remains a QA issue.	Close		
275.2-G.2	The DR Report Severely Underestimates the Environmental Intakes of Pu-239,240 and Am-241.	As indicated above, it appears this claim was based on Revision 01 (effective date of 06/29/2004) of ORAUT-TKBS-0011-4. Intakes for Pu-239-240 and Am-241 match those found in Table 4-2 of Revision 01. The intakes values in Revision 02 are significantly higher than those in Revision 01, and should have been used for this claim. As indicated by SC&A, the environmental intakes were underestimated. Re-run using the Rev02 values. Total dose went from 13.232 to 13.234 rem. POC went from 42.65% (original) to 41.33% (new run decreased). Files are attached. Note that in the original, environmental was < 0.001 rem, so not included; in the revised, it is slightly > 0.001 rem.	F	See response to 275.1-G.2. SC&A recommends closing this finding.	Close		
275	Instead of using the	Non-penetrating (< 30 keV photon)	NA	No SC&A response is necessary.	No action		

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Observation 1	tabulated non-penetrating doses and multiplying by the organ DCF, NIOSH subtracted the penetrating doses of Table C-5 from the non-penetrating doses and multiplied that number by the organ DCF. The doses in Table C-5 are listed as "Non-Penetrating" not "open-window" or "unshielded," and therefore should be treated as the non-penetrating dose without modification.	coworker doses are assigned in this claim only for the years 1979, and 1984–1986 (IREP Lines 098–201). The "Coworker Doses" worksheet in the RFP Workbook shows the formula used in Columns N and R; these formulas refer to values from Table C-5 as calculated in Columns AN and AO. The calculation subtracts the penetrating dose from the non-penetrating dose, as indicated by the SC&A observation. ORAUT-TKBS-0011-6, Revision 02, Section 6.6.1.2.3, equation 6-5, shows this is the correct formula for calculation of <30 keV photon dose during the time period in which it was assigned for this claim.					
300.1-D.4.1	Uncertainties not included in assigning <30 keV photon doses	The SC&A finding is correct, uncertainties for <30 keV photons were not included in the IREP Input; but, should have been. The "Macros & History" worksheet of the RFP Workbook show the "Apply Electron Uncertainty" box is not checked; thus, uncertainties were not applied. Selecting to apply uncertainties in the RFP Workbook and re-running the workbook, results in a total < 30 keV dose of 0.027 rem compared to the assigned value of 0.020 rem; a difference of 0.007 rem.	C	Attachment 1 shows an image of the "Macros & History" worksheet. There are numerous items that require the dose reconstructor to make a decision. SC&A believes the peer reviewer should verify that the proper decisions were made. SC&A recommends closing this finding. However, this remains a QA issue.	Close		
300.2-C.1.1	Incorrect Assignment of deep dose for 1964	The RFP Workbook calculations are performed on the worksheet "1964." This worksheet indicates NDRP data was used for the calculations; however, the SC&A calculated doses were not based on the NDRP data.	C	After re-analyzing the DOE and RFP workbook files, SC&A found that SC&A did not include the 1964 additional NDRP photon dose that needed to be added in. After the addition of this photon dose	Close		

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		The calculated shallow minus original neutron dose is 0.551 rem (Cell BZ2), the total deep minus original neutron dose is 0.554 rem (Cell CA2). The <30 keV photon dose is 0 rem (Cell BZ6), and the 30–250 keV photon dose is 0.551 rem (Cell CA6). These doses were determined by the formulas used by SC&A. As shown on the "Input Data" worksheet (Cell L41), the dose of 0.551 rem is based on the "1964" worksheet, as described above; and, Cell AJ41 shows the assigned shallow dose is 0 rem from the "1964" worksheet. The "Scoreboard" worksheet shows the final dose value of 0.661 rem in Cell AN40, which is the correct dose.		(Column BN, Rows 13–38), SC&A-derived doses matched those assigned by NIOSH for 1964. Therefore, NIOSH is correct in their dose assignment for 1964.			
300 Observation 1	There is an incorrect edition reference for OCAS-IG-001 listed in the DR Report (2002 edition is listed, but the 2007 edition is used). Additionally, the 2007 edition that was used does not list the plutonium DCF section in the table of contents, i.e., the table of contents does not appear to have been updated to match the recent revisions.	The SC&A finding is correct, the 2007 version of OCAS-IG-001 should have been referenced, instead of the 2002 version. The SC&A finding is correct, the Table of Contents was not updated in the 2007 version.	NA	No SC&A response is necessary.	No action		
300 Observation 2	SC&A concurred with NIOSH's number of missed	The number of neutron zeros is shown in the RFP Workbook on the "Input Data"	NA	No SC&A response is necessary.	No action		

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	neutron doses for the years 1962–1963 and 1970–1985. However, for the years 1964–1969, SC&A could not determine where NIOSH obtained a total of 10 missed doses; 1964 = 5, 1965 = 1, 1966 = 1, 1967 = 1, 1968 = 1, and 1969 = 1.	worksheet, Column Z. As indicated by the formulas, the number of zeros is the maximum of the NDRP zeros and the site reported zeros. The number of NDRP zeros are found in Column AH of the "year" sheet (e.g., "1964"), and the number of site reported zeros is found in Column BJ. For 1964, there are no NDRP zeros; thus, the number of zeros assigned is the number reported by the site, which is 5 (Column BJ). The zeros can be totaled in Columns AH and BJ of the other "year" worksheets (1965–1969) identified by SC&A in this observation. For each year, the number of zeros is correct, and is the maximum number of the two columns. In this case, for 1964–1969, all zeros are determined from Column BJ, because it is always the maximum value. The SC&A observation assumed zeros based only on the NDRP data, rather than the maximum relative to site reported data.					
300 Observation 3	SC&A found that NIOSH used the neutron LOD of 0.369 rem from page 33 of ORAUT-TKBS-0011-6, 2004 version, not the 0.226 rem from page 47 of the February 2007 version, which was the version listed in the DR Report references. This resulted in a small extra dose being assigned.	The SC&A finding is correct. Dose reconstruction was started for this claim on [redacted], 2007, based on the earliest file date. Revision 01 of the TBD was issued on February 8th. The RFP Workbook used the LOD values from Revision 0, as indicted by SC&A, which resulted in a higher assigned dose. NIOSH agrees this update should have been caught in later reviews.	NA	No SC&A response is necessary.	No action		

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301.1–G.3	Incorrect Assignment of Combined Doses	The SC&A finding is correct that missed Am dose was used instead of fitted Am dose based on the use of the wrong column for summation. This is of minimal impact, but is a QA/QC issue.	D	SC&A acknowledges NIOSH's response and recommends closing this finding. This remains a QA issue.	Close		
301 Observation 1	The DR Report states that this was a best-estimate DR. SC&A noted that NIOSH's ambient dose assignment used a DCF = 1.0, consistent with ORAUT-PROC-0060 for an over-estimate DR	The SC&A finding is correct, and the report should not have described the assigned ambient dose as a "best estimate."	NA	No SC&A response is necessary.	No action		
13th set (RFP) 327.1-C.3.1	Incorrect Assignment of Photon Energies	It is true that the photon energy distribution specified in TBD Table 6-10 was not applied. Table 6-10 refers to general photon fields, and would be used if only gamma dose rate data were available, instead of dosimetry results. Section 6.6.1.2 of the TBD provides algorithms for calculating dose based on dosimetry results, for energy-specific ranges. The algorithms of Section 6.6.1.2 were used for this claim; therefore, the application of a photon energy distribution of 100% <30 keV and 100% 30–250 keV is correct.	C	NIOSH stated on page 6 of the DR Report that 100% of the recorded photon doses were assigned as <30 keV photons and 100% as 30–250 keV photons to ensure claimant favorability. However, according to ORAUT-TKBS-0011-6, Table 6-10, page 36, the correct photon energy assignment is 25% <30 keV and 75% 30–250 keV photons for those workers that worked in the plutonium areas. Section 6.6.1.2 does provide algorithms to calculate photon doses for three time periods: pre-1960, 1960–1970, and 1970-present. However, for each of these time periods, ORAUT-TKBS-0011-6 states: *The equations above should be used with the facility radiation characteristics listed for Rocky Flats facilities in Tables 6-10 for plutonium,*	DRSC issue		

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				depleted uranium, or enriched uranium facilities to assign measured dose in the appropriate electron and photon ranges and proportions.			
327.2-C.2.1	Incomplete Assignment of Coworker Photon Dose for 1991	The SC&A finding is correct that coworker dose should have been assigned for unmonitored periods during 1991. Based on the quarterly monitoring frequency in 1990, the March 31, 1991 badge represents the 1991 first quarter badge. Thus, there is an unmonitored period from April 1 through June 9, 1991 (2.3 months). The records show monitoring from June 10 – Sept 3; then, the next badge date is Sept. 30th, which is assumed to have covered the period from Sept. 3–30th. Likewise, the badge dated October 31st is assumed to have been a monthly badge for October. Additionally, there was continuous monitoring from October 16 through January 8, 1992 by other reported badge results. Therefore, 2.3 months of coworker should have been assigned for the year 1991, rather than the 6 months of coworker based on the SC&A approach, but NIOSH agrees that this should have been added. The small amount of dose would have no impact of the overall assessment.	F	It is clear the assignment of coworker photon dose was done incorrectly and underestimated the EE's dose. SC&A is concerned other cases with coworker dose have been underestimated. However, we have not found this as a recurring problem in other RFP cases. Therefore, SC&A suggests closing this finding.	Close		
327.3-C.2.3	Incomplete Assignment of Occupational X-ray Medical Dose for 1981	As indicated in the DR Report, annual x-rays were applied prior to 1986, which is a claimant-favorable assumption. Because annual x-rays were assumed, the one actual	F	Based on the NIOSH response, the practice is to either use actual x-ray records or a frequency based on Table 3.1 of ORAUT-TKBS-0011-3,	DRSC issue		

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		pre-employment x-ray was not included. As indicated in the SC&A observation, if actual x-rays had been assigned prior to 1986, only one x-ray (pre-employment in 1981) would have been assigned, with a total dose of <0.001 rem for the bladder, and 0.003 rem for the skin. The actual dose assigned prior to 1986 was 0.001 rem for the bladder, and 0.014 rem for the skin. Thus, as indicated in the DR Report, the x-ray dose assigned was claimant-favorable. When actual x-rays are used, annual x-rays are not applied; likewise, when annual x-rays are applied, actual x-rays are not applied. Therefore, the x-ray dose was correctly assigned in this claim.		but not both. SC&A believes NIOSH should include this practice into their policy in ORAUT-TKBS-0011-3 during the next revision of the document.			
327.4-G.2	Uranium Bioassay not Addressed	The SC&A finding is correct. Neither the report nor the dose reconstruction addresses the uranium bioassay sample results on Page 80 of the DOE file. Page 79 of the DOE file indicates the results are "consistent with the normal population background for uranium in this area." It is unknown whether the DR examined these doses (since they are less than 1 mrem), but if they did, the supporting files should have been retained. The result for U-234 on Page 80 of the DOE file is greater than the MDA for that sample; therefore, internal positive uranium dose should have been assessed. A bounding (over-estimating) calculation	D	The EE had a uranium bioassay on October 3, 1996, and should have had missed dose assessed. The dose reconstructor did not evaluate the bioassay or determine if the missed dose was <0.001 rem. In fact, the DR does not even contain the word "uranium." How could this DR pass ORAUT and NIOSH reviews (as shown by the signatures on the DR) without someone recognizing the error? Although SC&A suggests closing this finding, this is another important quality concern.	Close		

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		was performed, and U-234-F was the most claimant-favorable solubility type. The total dose for each of the cancers was < 0.001 rem; therefore, it would not have been included in the POC calculations (see attached files).					
327 Observation 1	There were insufficient details in the DR files that would allow SC&A to determine the reason for the higher missed photon dose assigned by NIOSH	In the RFP Workbook, the tab "Int_Trit_Missed Dose" shows the initial dose calculations for 30–250 keV photon missed dose, beginning in worksheet row 382 through row 405. The dose (Column F) for these rows totals 1.194 rem, which includes a glovebox factor of 2.19 for the years 1982–1994. This total dose matches the SC&A calculated value. On the "Crystal Ball Setup" worksheet, doses are prepared for input into the Crystal Ball (Monte Carlo) calculation workbook; the Monte Carlo calculations were done separately at the time of this claim, and the resulting workbook is not available. However, the "Crystal Ball Setup" worksheet doses are shown in worksheet rows 528–551. These values are the dose values from the "Int_Trit_Missed Dose" tab, without the DCFs (Column N of the "Crystal Ball Setup" worksheet) applied; the total dose is 1.302 rem. The doses totaling 1.302 rem from the "Crystal Ball Setup" worksheet were input into the Monte Carlo calculation tool to get the final IREP values. As indicated in the SC&A observation, because this tool is not	NA	No SC&A response is necessary.	No action		

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		available, there is not sufficient detail to determine the differences compared to the SC&A calculations. NIOSH agrees the files should have been supplied. The current RFP workbook includes the Monte Carlo capability and provides the details for all calculations.					
327 Observation 2	Unable to determine why NIOSH's missed neutron dose for the bladder was twice that calculated by SC&A	Same as Observation 1 above	NA	No SC&A response is necessary.	No action		
11th set (LANL) 245.1–C.1.4	Inconsistence in assigning external ambient doses.	The values assigned for external ambient dose for 1947 through 1970 were based on the geometric mean value for 1989 from the table referenced in the report, adjusted to a 2500-hour work year (VALUE*2500/8760). The guidance document states that the LANL Workbook inserts claimant-favorable values prior to 1965 (the first year of available LANL measurements). The dose reconstruction did not follow the approved guidance document for the period. The LANL Guidance document (March, 2007 on page 5) supplies suggestions for an approach to determine on-site ambient doses for unmonitored workers. It states that the Workbook is the best way to come up with an estimate. The Workbook assumes the maximum value. The Guidance document goes on to say that if in best estimate territory, you need to use the provisions of ORAUT-PROC-0060, Attachment C, in the paragraph applicable to Los Alamos	C	The dose reconstructor incorrectly calculated the external ambient doses. SC&A believes errors such as this should be identified during the peer review. SC&A recommends closing this finding. However, this is also a quality concern.	Close		

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		National Laboratory. PROC-0060 which provides the following guidance: **LANL:** The best estimates should be applied as a lognormal distribution based on the Geometric Mean, adjusted for 2,500 hours, provided in Table 4-25 of the LANL TBD as Parameter 1 and the provided GSD provided in Table 4-25 as Parameter 2 (Rev. No. 01, page 24 of 26). Since the values in the LANL Workbook for the years prior to 1965 are based on the highest site wide maximum value from Table 4-25 of the TBD for the 1965–2002 period, the dose reconstructor attempted to apply a more reasonable value. The DR Draft did not adequately explain the assumptions used to determine the external ambient doses and the professional judgment applied in determining these assumptions. There was no documentation to illustrate the methodology used to determine external ambient doses prior to 1970. Subsequently, due to the acceptance of the LANL SEC, the LANL Environmental TBD (Revision 01, issued 03/26/2010) was updated to assign no environmental external doses prior to 1965.					
245.2–C.2.3	Incorrect accounting of medical x-ray doses for prostate, ear, and nose.	The actual X-ray records were requested and received from DOE. The dose reconstruction used the X-ray examinations as documented in DOE Response ADD_D165 to determine the number and type of X-ray procedures administered to the claimant. NIOSH agrees that some of the dose values applied for the X-ray examinations were incorrect. Some of the X-ray values as they appeared in the LANL	E	NIOSH's response raises concerns over the quality of the workbook tools used by the dose reconstructors. SC&A is concerned with the verification and validation process used on the workbook tools prior to release to all dose reconstructors. SC&A recommends closing this finding. However we suggest the DRSC review the verification and validation process.	DRSC should review tools verification and validation process.		

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		Workbook 2.31 used in the dose reconstruction were incorrect and this lead to the error. The DR did not verify the values produced by the Workbook before submittal of the claim. The possibility of incorrect Workbook X-ray values is pointed out in the LANL DR Guidance Document for the period (March, 2007). The X-ray data available in the LANL Calculation Workbook were updated in Revision 2.40 which was issued on November 2, 2007. When X-rays were recalculated using the TBD values, the total X-ray doses for the three diagnosed cancers decreased from those applied in the dose reconstruction; BCC (1993) from 1.535 rem to 0.965 rem, BCC (2001) from 0.054 rem to 0.053 rem, and Prostate (2007) from 0.076 rem to 0.051 rem.					
245.3–G.2	Incorrect intake value used for U-234.	NIOSH agrees with SC&A that the uranium intakes listed in the DR guideline were not multiplied by 100 as stated. There is no basis for the figure of 100 other than to ensure that environmental internal doses prior to the early 1970's were overestimated. For claims using this overestimated internal environmental approach, if the PoC exceeded 50%, completion of the claim was postponed until resolution of the pre-1971 environmental issue. Subsequently, due to the acceptance of the LANL SEC, the TBD was updated to assign no environmental	D	The U-234 intake value given in the LANL DR Guideline was 100 times too low and not consistent with Table 4-30 of ORAUT-TKBS-0010-4. DR Guidelines are unapproved and uncontrolled documents. As such, there is no assurance that the information contained in them is consistent with approved practices and procedures. SC&A suggests closing this finding. However, this is one of many quality concerns.	Close		

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		internal intakes prior to 1971.					
245.4–G.3	Ge-68 not included in dose calculations and other issues.	(1) Ge-68 was left out of the 'site defaults' radionuclide listing, and would have resulted in an additional 44 millirem for the prostate and 26 millirem for the skin cancers. As the case was reworked when additional covered conditions were certified by DOL, resulting in a change in the compensability determination, the PoC was not rerun for this comment. (2) The DR Guidance document for LANL (March, 2007) states that *as far as 'beta' ORNL environmental dose could be a pretty good fit for LANL's based on the type of operations, etc., so for I-131 and mixed fission products, the yearly intakes below were based on Oak Ridge*. The yearly intakes for iodine and MFP were based on values from Attachment 4B in the ORNL Environmental TBD. As stated above, this method of assigning environmental internal doses was a stop-gap overestimating method until the TBD was modified so that doses were not assigned during the period for which there were no environmental data available. (3) The cesium-137 doses provided the most claimant-favorable dose when compared to the strontium-90 doses for all cancers; therefore Cs-137 doses were included in the dose reconstruction. Current practice is to assign no environmental internal	D	There are three issues: 1) Ge-68 dose was omitted, 2) no technical basis for using ORNL values at LANL, and 3) the ORNL Ru-106 or Ce-144 values were assigned as Cs-137. 1) The LANL DR Guide states: *P/VAP. These are short-lived particulate and vapor activation products. All may be safely ignored except ^{68}Ge. It is not possible to calculate dose from this radionuclide using IMBA, but the 'site defaults' option in the CADW tool does calculate the dose. You will include this environmental internal dose except when it is not necessary for compensable cases. The dose from germanium is likely to be insignificant for most organs, at least in terms of overall probability of causation.* The Ge-68 dose was incorrectly omitted. 2) SC&A does not consider *ORNL environmental dose could be a pretty good fit for LANL's based on the type of operations* to be an adequate technical basis. 3) The LANL DR Guideline states: *Mixed Fission Products. These were predominantly ^{90}Sr and ^{137}Cs.*	DRSC Issue		

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		dose during this period.		*The technical basis document says that ^{90}Sr has a greater inhalation dose factor, so I'm thinking that means you can ignore everything else.* There were no calculations showing that Cs-137 was claimant favorable. SC&A suggests that NIOSH verify that the recommendations in the current documents concerning this situation are all in agreement, and are claimant favorable.			
245.5–B.4	DR Report does not address two cancers stated in the CATI.	Dose reconstructors may not consider any conditions unless listed as covered conditions by the Department of Labor. Instead, the claim is completed per the NIOSH Referral Summary and revised when the DOL has made the determination to include additional covered conditions. Subsequently for this claim, [redacted] more covered conditions were listed; the DR was reworked, resulting in a change in the compensability determination (ANRSD Return_00[redacted]_v1-12/16/2009 added [redacted] cancers).	B	SC&A acknowledges NIOSH's response and suggests closing this finding.	Close		
245 Observation #1	It was difficult from the EE's records and CATI Report to determine if the EE was potentially exposed to neutrons. NIOSH referred to ORAUT-OTIB-0023 when stating that potential missed neutron doses were not assigned for	The TIB lists a condition for the DR to use to determine that any neutron missed dose is likely to be incidental based on several factors (see reference). In this case, the fact that all neutron dosimeter results were zero, and that except one, all photon dosimeter results were either zero or less than LOD/2 and treated as missed dose, justifies this assumption. The criterion that no neutron	NA	No SC&A response is necessary.	No action		

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	the years prior to 1990 (i.e., 1959 and 1960, when the EE's records showed one zero neutron reading for each of the 2 years); however, no specific page number was noted.	dose need be assigned if *the neutron missed dose central estimate (nLOD/2) would exceed 75% of the photon dose (dosimeter dose + missed dose) that the neutron missed)* was removed from Revision 1 of OTIB-0023 in May, 2008.					
13th set (LANL) 320.1-D.1.1	Method Used for <30 keV Photon Dose is Not Apparent	NIOSH agrees with SC&A's finding. The report states that two dosimeter results recording shallow doses in 1962 were assigned as dose from photons with energies < 30 keV, assuming a DCF of 1.000. The shallow dose was incorrectly calculated using 70 as the shallow dose total for 1962, minus 20 deep for that year. This dose adjusted for the 2.19 GB Factor and the 1.3 uncertainty and the DCF of 1.00 resulted in the 0.142 rem dose applied. This calculation is overestimated and should read 0.057 rem for 1962 shallow dose.	C	This is another QA issue. SC&A recommends closing this finding.	Close		
320.2-C.2.1	Inconsistency in Assigning Unmonitored (Coworker) Doses during Different Years	NIOSH agrees with the SC&A finding. The dose reconstruction assumed that the claimant had potential for unmonitored external dose during periods with no reported dosimetry results. With some exceptions as noted in the TBD, external dose monitoring records are expected to be complete for LANL workers. The LANL External TBD Section 6.4.4 (Revision No. 01) states that "Essentially all LANL radiological work areas with significant neutron radiation dose also had significant photon radiation." Section A.6 Unmonitored Neutron Dose, states there	F	The 2010 modifications to the LANL DR Guidelines should help improve the consistent assignment of unmonitored (coworker) doses. SC&A recommends closing this finding.	Close		

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		should not, typically, be significant neutron exposure of unmonitored workers." During the claimant's employment at LANL, only 1962 showed any measured photon dose. Missed and measured neutron doses based on neutron-to-photon ratio, in addition to maximum on-site ambient doses were applied for this year. Assignment of co-worker dose for the unmonitored years, 1958, 1960, 1966, 1968 and 1969, is an overestimating assumption. A 'best' estimate of external dose would likely include only on-site ambient photon dose for this worker's unmonitored periods, versus the overestimating assumption of coworker photon and neutron dose. On-site ambient doses would be pro-rated and applied for those periods with no dosimetry information available. The DR guidance available during the time this dose reconstruction was performed concerning the application of unmonitored doses was minimal. Subsequent Dose Reconstruction Guidelines for LANL (2010) provide more direction as to the appropriate application of unmonitored (coworker) doses. The current guidance states: *When necessary, the values in this table (Table A-2) may be used to assign external doses when personnel may have received unmonitored exposure; however, this should occur only infrequently. External dosimetry was normally assigned to individuals in*					

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		areas where there were external dose fields; the overwhelming preponderance of zero dosimeter results indicates that LANL policies for assigning external dosimetry were conservative. The provision is available to use when a person makes an allegation of unmonitored dose (or claim specific information clearly implies it) and either there is no reason to argue it, or it is credible to the dose reconstructor that there was an unmonitored exposure. Based on this guidance, no unmonitored doses would be applied in this dose reconstruction and on-site ambient doses would be applied as appropriate for the years that it is available, 1965 and later.					
320.3-C.2.2	Number of Missed Doses for 1962 and 1967 is Incorrect	NIOSH agrees that for 1962, the DR neglected the second badge for November, which should have been included based on LANL guidance to determine the missed dose. For 1967, the reported August zero dosimeter result was not included. By including the result additional zeroes for 1962 and 1967, the missed dose for 1962 increased by 0.054 rem, and the missed dose for 1967 increased by 0.024 rem. This change caused the total dose to go from 28.580 rem to 28.659 rem. This change resulted in an increase in PoC of 0.03%, which remained below the compensability criterion.	C	SC&A understands the 0.024 rem increase is trivial in this case. However, this error should have been prevented. SC&A recommends closing this finding. However, this is an example of another quality error.	Close		
320.4-G.4	NIOSH Used the MDA Value Instead of One-Half the MDA Value	NIOSH agrees that the DR used the MDA for plutonium versus one-half the MDA for the period to determine the plutonium	E	Although this was an overestimate case and the dose was claimant favorable, the DR Report specifically stated:	Close		

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		missed dose intake. This effectively doubled the intake and resulted in an overestimate of missed plutonium dose.		*The chronic intake rate based on the urinalysis data was determined using half the minimum detection activity (MDA) for that radionuclide.* This error should have been identified and corrected during the peer review. SC&A suggests closing this finding.			
320.5-G.3	NIOSH did not Consider Potential Uranium Intake	Uranium bioassay was typically conducted when individuals worked with un-encapsulated uranium. This individual did not have uranium bioassay, and his work with uranium seems to have been with encapsulated material or in dry boxes according to information documented in the telephone interview. The claimant's work with uranium based on information in the telephone interview seemed to be limited to the controlled conditions of the [redacted] and took place in dry boxes. As a [redacted], the claimant was called to provide support during shots because "hot debris around the shot caught fire." The firemen were on location to extinguish these fires. The telephone interview specifically noted that the claimant was not involved in any accident involving radiation exposure or contamination.	B	SC&A acknowledges NIOSH's response and suggests closing this finding.	Close		
320 Observation 1	Table 3B-4, page 21, of ORAUT-TKBS-0010-3 lists the bladder dose for the LAT view for 1985–1994 as 4.77E-06 rem, The dose value for time periods on	NIOSH agrees with the SC&A observation. The value for the LAT chest view X-ray examination for 1985–1994 for the urinary bladder as it appears in the LANL Medical TBD was incorrect. Other doses during that period in Table 3B-4 for organs in similar	NA	No SC&A response is necessary.	No action		

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	both sides of this dose value are an order of magnitude higher.	locations to the bladder (surrogate organ for the prostate) show 4.77E-05 rem as the dose (ovary, uterus). Revision 1 of the LANL Medical TBD issued September 14, 2010 (Table 3-5) shows 8.40E-05 rem for the LAT View for 1985–1994. However, annual doses would still round to <0.001 in the IREP input spreadsheet. This would have a minimal impact on total X-ray dose applied.					
321.1-C.2.1	Incorrectly Assigned Shallow Dose as Deep Dose for 1996	NIOSH agrees with the SC&A finding. NIOSH incorrectly applied the 0.011 rem of shallow dose to the deep dose for August of 1996. This slightly increased the assigned total photon dose.	C	SC&A acknowledges NIOSH's response and recognizes this as a QA concern. SC&A suggests closing this finding.	Close		
321.2-C.2.2	Correct Number of Missed Doses was 66 instead of 68	NIOSH agrees with the SC&A finding. For November and December, 1995, two extra photon and neutron zeroes were applied to determine missed photon and neutron doses. The zeroes for these months were not included in the EE's dosimetry record. As noted above, the zero for August, 1996 was entered incorrectly as a positive photon value. These items slightly increased the overall assignment of photon and neutron doses. The DR Report should more correctly describe the missed photon and neutron doses calculated with the applied Monte Carlo methodology as a "best estimate" of missed photon and neutron doses.	F	SC&A acknowledges NIOSH's response and recognizes this as a QA concern. SC&A suggests closing this finding.	Close		
321.3-G.3	Larger Intake Values were Used than Indicated	NIOSH agrees with SC&A findings that a value of 93.80 pCi/d was applied to calculate the dose from Pu-238 for the first intake	E	SC&A acknowledges NIOSH's response and recognizes this as a QA concern. SC&A suggests closing this	Close		

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		period versus the correct value of 20.02 pCi/d. This resulted in an overestimate of approximately 6 rem in the internal dose calculated to the $LN_{TH.}$ The DR made an error in entering the Pu-238 intake/dose for the first period when calculating the dose in the Super S tool. The error produced an increase in the internal dose applied. The Pu-238 IMBA run that was submitted with the claim was correct; the Pu-238 dose applied in the OTIB-0049 workbook was incorrect.		finding.			
321.4-G.2	NIOSH did not Address Urinalysis Bioassay Results	Although the urine bioassay results were not specifically mentioned in the DR Draft, it is stated in the DR Draft that: *All measurement results for plutonium and americium during this time showed an activity less than the minimum detectable activity (MDA)[8] for the given radionuclides and bioassay method.* All urine bioassay and chest count results for Pu and Am were less than the MDA for the period and analytical method. NIOSH did project the chest count results applied in the dose reconstruction to the claimant's urine bioassays and found them to be compatible with the urine bioassays. This file was not included in the submission, but is included in the supporting documentation for this response (321_Pu S miss CC projected to urine.ix).	D	SC&A acknowledges NIOSH's response and suggests closing this finding.	Close		
321.5-B.2	NIOSH did not Consider Non-returned Badge for 2002	NIOSH applied the information reported in the LANL Occupational Exposure Record for the claimant to determine the external dose in 2002.	F	The EE supplied 458 pages of documents, including a photograph of the EE's TLD from 2002. Apparently, the EE took this TLD badge home after	Close		

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		According to the Termination Check-out Sheet dated [redacted], 2002 (Page 59 of 204 of the DOL Initial Case file for the claimant) in Section 8, the Health and Safety Section, the item, TLD badge returned, is checked as YES. This document is also signed on [redacted], 2002, by the claimant, affirming that …*all government property assigned or loaned to me has been properly reassigned or returned in accordance with established policies/procedures*. The claimant-supplied information was received in 2008 after the assessment was initially completed in 2007. General Correspondence_0[redacted]_ [redacted]_ [redacted]_2008 does clearly state that the additional information supplied by the claimant was reviewed and would have no impact - "I talked with [redacted] and the analysis is valid. The new data was reviewed, and Mr. XXX's dose is essentially all internal and over estimated." As stated by SCA in the review, adding a single week exposure based on the conflicting info supplied by the claimant would have little impact on the assessment.		cleaning out the EE's locker. Therefore, the EE contends the TLD could not have been read and recorded as the DOE file (DOE Response_0[redacted]_D165_v1.pdf, page 4) indicates. Although the EE had nearly all zeros recorded for external dose during the EE's work history at LANL, SC&A believes NIOSH should have acknowledged this issue in the DR and perhaps assigned a 1-week external coworker dose during this period. SC&A recommends closing this finding.			
321 Observation 1	An exposure pathway that has not been completely addressed in the LANL TBDs or the Special Exposure Cohort (SEC) resolution process is the	The Technical Basis Document for LANL – Occupational Environmental Dose, Section 4.3.2.2, Los Alamos Neutron Science Center (LANSCE, TA-53) reports the results of an analysis estimating air concentrations resulting from the LANSCE stack,	NA	No SC&A response is necessary.	No action		

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	potential for intakes of radionuclides (especially tritium) by workers located near the area of the TA-53 evaporation lagoons.	considering three work locations: TA-53, TA-21, and TA-72. TA-53 was the location where the accelerator operated. The ambient radiation for these areas was also analyzed. Estimates of external dose based on area badge data for TA-53 and other technical areas (Table 4-25), as well as the estimated annual average intakes for americium-241, tritium, iodine-131, plutonium, uranium and for P/VAP (Table 4-21) at TA-53 are listed. This information is available for use in dose reconstruction if specific information for the TA-53 area is required.					

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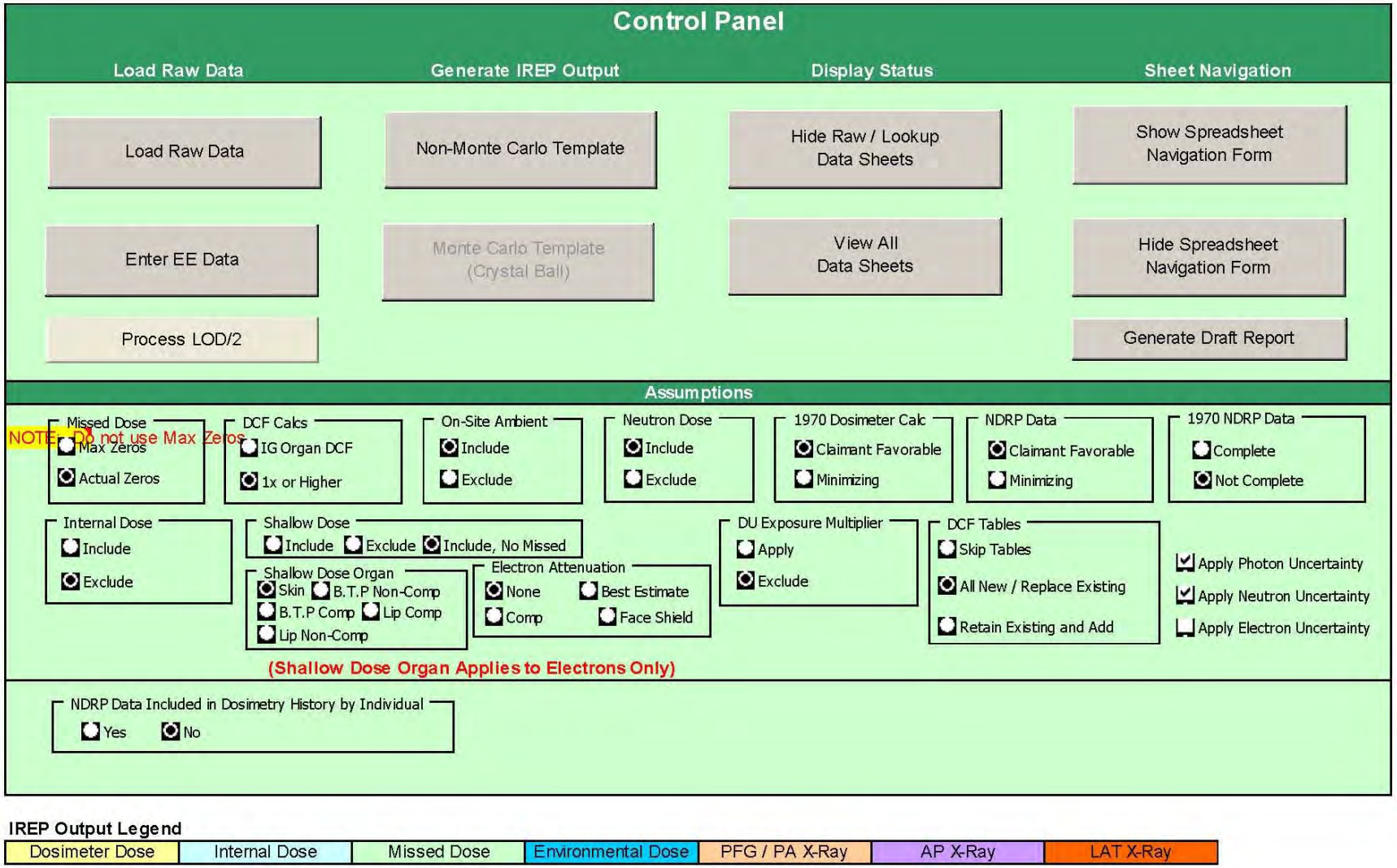
Attachment 1 (RFP Finding 300.1) – Macros & History Image



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