Chapter 2

Comment [h2]	The current NRC web page FACT SHEET on background radiation dose quotes a value of 620 mrem (http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html). Which is more authoritative/accepted?	**NO – but assume if this was left in, it is the more authoritative reference.**
Comment[h6]/Comment [xxx7]	This should be explained as this is non-intuitive to the general reader. My previous comment still applies. A single sentence noting the decay periods of fuel prior to transport ensures the decay behavior is stable under transport such that no significant change in the decay daughter products will occur and the source can be assumed to be fixed.	**YES**
Comment [h11]	This is for those not traveling the route but are stationary on the route. For those traveling on the route with the transport, matching speeds provides the maximum potential dose.	**YES**
Comment [h12]	Per the NRC web page (NRC FACT sheet on background radiation (http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html),…" the radiation sources that contribute to the average annual U.S. radiation dose of 620 mrem. One minute of average background would be 620/525600 =.0012 mrem (1.2x10^-2 mrem)	**NO-But assume that if this was left in, that the statement was reviewed and accuracy verified.**

Comment [h12]	Results not intuitive and need to be reviewed or explained. Why does the Lead shielding cask produces greater potential dose? This can be due to the geometry of the cask (i.e., larger thickness for steel than lead), but as this is a public document, any non-intuitive results reported should be provided with explanation to ensure the results aren't openly questioned. This can be explained by reference to Table 2-1. However since the dose rates and distances and populations don't change the resulting doses should follow the same ratio between lead and steel as indicated in Table 2-1. This ratio is 0.735 whereas here the ratio is 0.754.Additionally, the higher doses from the truck shipment make sense considering that although the average speed is higher (67mph vs. 27 mph –Table2-3), the minimum distance to the dosed individual is dramatically reduced (30 meters versus 200 meters-table 2-10). This distance may be defined by requirement or assumption, but it is not intuitive. It is typically easy to get very close to railroad tracks during the passage of a train. As a result, justification of this assumption may be warranted.	**NO-But comment left the option for providing additional explanation if it appeared warranted. Still not intuitive to me as a reviewer.**
Comment [h15]	Typo. 10meters is approximately 30 feet, not the other way around.	**YES**

Comment [h17]	Some of this data should be explained further in Footnotes, not just referenced. The principle reason, again, for this is not a believe these values are necessarily wrong, but as this is a public document meant to provide a level of confidence in the public, the listing of counter and non-intuitive assumptions with no explanation is not furthering the cause. I realize that it is difficult to provide detailed explanations for all assumptions. However there are really only 2 tables in this chapter that reference assumptions (2-3 and 2-10). In this table (2-3), the average speeds seem reasonable and understandable, as do the average vehicles per hour. The identical values between highway and rail population densities I don't suspect is accurate, but appears to be conservative (i.e., higher densities around highways are adopted conservatively for rail lines). The shielding by buildings needs explanation. As does the NA for nonresident/resident ratio's for Rural and Suburban traffic on highway and rail. Finally the high "number of occupants of other vehicles" for urban segments of rail lines is not obvious. I think this is explained and could be referenced based upon Footnote 12	**NO- this comment was directed toward clarification for public understanding and did not identify inaccuracies or errors. As a result, it is assumed that additional clarification for the benefit of the public reader is left to the disgression of the authors/sponsors. They chose not to footnote/clarify which is their prerogative. It does not provide a very compelling table for the lay reader though.**
Table 2-4	No comment, but Table completely changed from Kewaunee NP to ORNL to Kewaunee to Skull Valley	
Table 2-5	Various comments	**YES -Population data adjusted. Did not check to see if consistency appears better, but it is obvious they addressed the inconsistencies in the apparent data. Also, they added a disclaimer about the "Bounding" vs. "representative" dose cases which does not solve the problem, but does address the comment.**
Paragraph under Table 2-5	Various comments	**NO- the comments did not necessarily identify known errors, but no attempt to revise based upon the comments appears to have been attempted.**

Comment[h40]	I assume this is per shipment but I didn't see this specified. Also, although you mention that the doses depend on the population and break down of the route (i.e., length of urban, suburban and rural sections), you never specify what the source is. I assume that it is the maximum allowed by the license for the particular cask such that a bounding dose per shipment is determined; however, I never see this stated. I think this should be included to give confidence to the reader that the estimates provide an upper bound to the potential doses. Also, Since the only difference between rail-lead and rail-steel is the TI for the cask (i.e., similar routes, population densities, travel times, etc). the relative ranking between the different routes for rail-lead and rail-steel should remain consistent. In the spreadsheet I compared the relative rankings between the different cask and the rankings were different. This suggests errors in some of the calculations (see spreadsheet for identification of inconsistent rankings)	**YES – I didn't check all the values against my previous comments based on spreadsheet estimates, but the values changed in this table which I assume was associated with addressing the inconsistencies I had found before.**
Comment [h44]	Reference for rush hour truck speed and vehicle density	**Yes-No reference provided, but comment addressed lack of existing data. It should, however, additionally justify the use of this ad hoc value of ½ speed and 2x density.**
Comment[h56]	I compared the results between the rail-lead and rail-steel routes. The relative rankings should stay the same. The urban values for the Indian Point-Deaf Smith route don't appear consistent with expected rankings. See spreadsheet.	**Yes- I didn't check all the values against my previous comments based on spreadsheet estimates, but the values changed in this table which I assume was associated with addressing the inconsistencies I had found before.**

Comment [58]	Since the values here are based solely upon vehicles sharing the road and these are assumed to be fixed for the various routes based solely on an average value assumed for "rural", "suburban", and for "urban". The relative dose ranks here should track directly with the routes that include the greatest number of these individual segments. The only segments that can be checked are the urban segments as these are the only ones uniquely defined in Table 2-5. For these, most rankings don't correlate with the rankings for maximum dose here. This suggests something is in error (see Results_Check spreadsheet)	**Yes- I didn't check all the values against my previous comments based on spreadsheet estimates, but the values changed in this table which I assume was associated with addressing the inconsistencies I had found before.**
Comment [h70]	Shouldn't these ratio with the 1.4 and 1.0 dose rate values associated with the rail (lead and steel casks) in Table 2-1?	**No change, but I assume that this means the values I noted were checked and found to be correct.**
Comment[h71]	Which distance is assumed, or is it an average of these two distances?	**No change or explanation provided. This was a clarification request so its incorporation would be optional.**
Comment[h75]	As a quick check, the doses should vary by route with the different hours, but shouldn't the relative ratios of the doses between lead and steel cask be the same and in ratio with the 1 meter dose rates presented in Table 2-1? Beyond this difference in 1 meter dose rate, all other aspects of the calculations should be identical between the different casks. The ratio in table 2-1 is 1.03/1.4 =0.735. The values here range from 0.73 up to 0.78. Is this due to rounding or is there something fundamentally different? (see Results_Check spreadsheet)	**Yes- I didn't check all the values against my previous comments based on spreadsheet estimates, but the values changed in this table which I assume was associated with addressing the inconsistencies I had found before.**
Comment[h76]	This is probably true, but it is not bounding or guaranteed. Since the number of stops here is sometimes on the order of only about 1, a single stop in an Urban area, with high population density would impact these values.	**No but this was more comment than identified revision need. It is assumed that the comment was reviewed and it was determined not necessary for document revision.**
Comment [80]	Also truck stop workers.	**YES**

Comment[h84]	Why are the doses the same for the rail-lead and rail-steel casks when the 1 meter doses are different? I assume the lack of data for inspector and truck stop worker for DU urban results from the assumption that there are no inspections or stops for urban environments. This is reasonable but not bounding. Also, why is it assumed that there would be no rail classification in urban rail yards? There are plenty of large rail yards that exist in urban areas.	**Yes- I didn't check all the values against my previous comments based on spreadsheet estimates, but the values changed in this table which I assume was associated with addressing the inconsistencies I had found before.**

Chapter 5

Comment[h1]	You also include loss of neutron shielding in Section 5.4.2. Should it be referenced here as well?	**YES**
Comment[h3]	I think this is a typo, the value should be 6.8e-7 based on the values listed here	**YES-It appears entire table modified to address Comment[xxx2]**
Comment[h5]	Where do these probabilities come from – Reference? Is this supposed to be from Table V-2 in Appendix V?	**YES-Table footnoted to explain source of probabilities.**
Comment[h6]	It is highly suspect to report probabilities of this order. The uncertainties in the assumptions necessary to derive these values are such that reporting probabilities of this magnitude are meaningless and misleading. This comment applies anywhere in this chapter where conditional probabilities on the order of 10^-10 to 10^-19 are referenced. I suggest quoting some deminimus threshold within the uncertainty of the analysis and quoting probabilities as below this threshold of credibility.	**NO- This was mostly philosophical. Probabilities estimated on the order of 10^-14 are meaningless and cast doubt on the understanding of the limits of PRA. But you can still multiply these numbers together and get estimates of these low probabilities.**

Comment[h7]	How do these numbers compare to the results reported in Table 2-11. In that table, the resident collective doses for Segments of various routes are determined based upon urban, suburban, and rural routes. In that table, the average stop time is listed at 4 hours (for example) in the ME routes (using this route as an example to make a comparison between the tables). Assuming that there was just one stop for both of these tables, the numbers ought to relate as in each case there is no release or shielding loss. Since the distance to the public would be assumed to be identical in each case, the total dose would be expected to vary with the stop time. The assumed stop time here is 10 hours compared to the 4 hours in Table 2-11. That would lead one to assume the total dose represented here would be greater by a factor of roughly 10/4 (ratio of the stop times). That is not what is seen here. The RURAL doses here are LESS than the RURAL doses reported in Table 2-11. This seems inconsistent.	**No- I can only assume that they looked at my estimates and determined that there results were accurate and my apparent inconsistencies were not errors.**
Comment[h8]	You would like to compare these values with those listed in Table 2-12 as they involve similar assumptions (like what was suggested in the comment for Table 5-4 above). However, a comparison is not as straightforward because no listing for stop times in Table 2-12 is presented. Rather a total number of stops is given. Presuming here that the stop time is again 10 hours for the accident, if we know the stop time (in hours) assumed in Table 2-12, these results can be compared for consistency.	**YES- The values in the table are different. I assume this indicates that they reviewed the data in the table and revised as necessary upon review.**
Comment[h9]	Reference population tables (i.e., I assume the average collective background doses would simply be the US background dose for ten hours multiplied by the average RURAL, SUBURBAN and URBAN populations for the 16 routes analyzed.	**YES-They included references for how the values were obtained and revised the estimates.**

Comment[h9]	And rural as well	**YES- They generalized the statement.**
Comment[h12]	Results for "**average accidents for the Total route**" don't seem to compare when using the route distances in Table 2-5. Shouldn't the results here be the total km for the rail route in Table 2-5 multiplied by column 3 in this table? See results in spreadsheet "Results Check"	**MAYBE-They removed the column that was titled "Average Accidents per KM". This led one to believe that the total average accidents for the route should be the first and second columns from the previous table multiplied together. I assume their numbers are correct after looking at my comment and checking and they removed the "misleading" column.**
Comment[h13]	Are these for rail-lead casks alone. You don't say that here, but you mention above (well separated from this table) that the steel casks are unaffected. I know it seems like a trivial point to mention it again specifically, but it is very easy for the reader to get lost and lose track of all of this in the middle of all these tables.Where do these results come from? Does this use the results from Figures 5-2 and 5-3?	**YES – they added clarification**
Comment[h14]	Where do these results come from? Reference the source or the calculation in the Appendix as to how these values are derived. The text doesn't explain, and the numbers just show up in tables. It is difficult to check results like this.	**No- This was not a needed correction, but rather a request for referencing so the reader/reviewer can understand where the results came from.**
Comment[h17]	Reference? This is explained well in Appendix V. Reference that discussion here for details.	**YES– Reference provided**
Comment[h18]&[h19]	Tables of data like this shouldn't just be produced without citing reference or example in appendix. Reference?	**YES – Reference provided**

Comment[h20]	Ground concentrations would be expected to be somewhere downwind as it takes some distance for particulates to settle to the ground. 21 meters seems reasonable. However for Gaussian dispersion releases, maximum air concentrations decrease monotonically downwind.	**NO- But this was an observation not a necessary error or correction. It is still puzzling why air concentrations would concentrate downwind. They should decrease monotonically downwind. This is even noted in a paragraph below (ie., ..."The figure shows the exponential decrease of airborne concentrations as the downwind distance increases")**
Comment[h21]	Reference? Provide and cite example calculation in Appendix.	**YES-Reference provided**
Comment[h22]	How do these results compare against Table 5-4? It appears that these are quoting identical scenarios (i.e., 10 hour stop, no release, no loss of shielding for rail-lead cask. I summed the routed dose risks for suburban, urban, and rural routes in Table 5-4 and multiplied by the conditional probability of the no-release, no-loss of shielding accidents and compared with the results of this table. The numbers don't match. In these cases it would be useful to have an example calculation for each of the tables in which the results could be checked and methodology followed.	**YES- The values in the table have changed which I assume resulted from checking the previous results based upon my comment.**
Comment[h23]	Reference? Where is this calculated?	**Yes-Reference provided**
Comment[h26]	This comes out of nowhere. Where was this reported in the text? What table and where is this discussed. It appears to be a significant result and yet it was never discussed. There should be more	**No- Right at the end the statement is made that loss of shielding scenarios result in doses that exceed 10 CFR 71.51 and are significant by neither acute nor lethal. Yet there is no explanation of this. This is not the last statement you want to make in a document for public consumption.**