Comments and Responses for the Draft Report Titled "An Aerial Radiological Survey of the Western New York Nuclear Service Center"

	Page, Section, Paragraph	By	Comment Description	Response
1	general	NRC	As discussed at the June 9, 2015 teleconference call among New York State Energy and Research Development Authority's (NYSERDA), NRC, the Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (NYSDEC) and DOE-WVDP, the NRC anticipates that NYSERDA will perform a dose assessment and explain the results in terms of public dose compliance, for example, 100 mrem/yr TEDE all pathways (10 CFR 20.1301(a) & 20.1302), 10 mrem/yr (10 CFR 20.1101 (d) and 10 CFR 20.1301(e)) requiring compliance with the provisions of the U.S. Environmental Protection Agency's generally applicable environmental radiation standards in 40 CFR part 190). Without prohibitions on land use in the area in question (Flood Plain 3), receptor scenarios consistent with the environmental conditions and topography should be considered. In addition, NYSERDA should perform a site-specific dose assessment to demonstrate that it is in compliance with standards for offsite releases. The NRC anticipates that NYSERDA will either provide its assessment to NRC or have it available for inspection, ideally before the final aerial radiation survey report is published or its results are discussed publicly. The NRC suggests that the aerial radiation survey results should be put into context with respect to public health and safety and discussed either in the Aerial Radiation Survey Report or through another means at the same time the Aerial Radiation Survey Report is made public. In addition, NRC suggests that the discussion of the aerial radiation survey results should also address: 1) how the estimated concentrations (if estimates are used for the dose assessment), actual soil concentrations (if collected and analyzed), or both compare to the current Derived Concentration Guideline Levels (DCGLs) in the Phase I Decommissioning Plan; 2) whether the scenarios used to determine the DCGLs in the Phase I Decommissioning Plan are still appropriate; and 3) any planned follow-on actions and the objectives of the proposed actions. Two examples to consider are: 1) soil and sediment samples will be taken offsite to confirm that the concentrations of Cs-137 are below levels that will ensure the regulatory public dose limit is being met and 2) soil samples will be taken in known areas of Cs-137 contamination at the WVDP premises for quality assurance to verify that the Cs-137 results derived from the aerial radiation survey are reliable.	NYSERDA agrees to conduct the follow-up soil sampling in the offsite areas and to prepare the dose assessment requested by the NRC. If radionuclide levels in the soil are found to be elevated, a dose assessment will be conducted to confirm that there is no health and safety concern. Because the areas sampled are off-site and are unrestricted, the dose assessment results will be compared to the dose limits included in 10 CFR 20.1402 - Radiological Criteria for Unrestricted Use. DOE agrees to provide additional ground-level, dose rate data from the WVDP to augment the aerial survey in order to assist the public to understand that actual dose rates to workers and the public are within regulatory and DOE limits. RSL was tasked with only the aerial radiation survey data collection effort. Because RSL's scope of work did not include identifying the source or likely source of any contamination that might be identified, NYSERDA will prepare a report regarding environmental releases from the facility. NYSERDA's "Companion Report" will include a discussion of historical discharges from NFS operations, the soil sampling results, and the dose assessment. DOE will provide a summary of the environmental release data from the Annual Site Environmental Reports from 1982 through 2014 to be included within the report. The aerial survey results will be presented at the November WVDP Quarterly Public Meeting. NYSERDA is presently collecting the follow-up soil samples. Assuming the field sampling activities can be completed by about the end of November, or before the onset of winter (whichever comes first) NYSERDA expects to present the results of the soil sampling and dose assessment work at the February 24 Quarterly Public Meeting.

2	general	EPA	Provide date of draft report	Date of last draft was May 13, 2015 (it was in the filename but not the document). Date will be added to the footer in the next draft.
3	general	NRC	The U.S. Nuclear Regulatory Commission (the NRC) concludes that the 2014 aerial radiation survey appears to be complete with respect to the discussion of the technology and the methodology used to collect the data and process the information. NRC believes that the comparison in the aerial survey report between the previous mappings of the Cs-prong to the current study is sufficient basis to conclude that the current study was not significantly biased; there appears to be relatively good agreement of the spatial distribution and magnitude of the radiation levels associated with the Cs-prong. The procedures to account for background (to include Cs-137 fall-out), elevation effects, the orientation of canyon walls, and other features are well-described and appear to be technically sound.	DOE and NYSERDA agree with this comment.
4	general	NRC	We suggest that the report better identify in the text and in a figure the location of where the area of elevated Cs-137 concentrations in Flood Plain 3.	The “Flood Plain 3 Anomaly” is not meant to be a precisely defined location, rather a general area extending a mile or so along Cattaraugus Creek. The elevated Cs-137 signatures are indicated in Figure 21 by the colored contours (30-60 cps) just north of the “Flood Plain 3 Anomaly” label on the map. The general coordinates of this area are given in Paragraph 4 of Section 5.3 in the report. The additional maps we have produced for NYSERDA to inform follow-up measurements should also help define this area.
5	general	NRC	We suggest that an examination of the area in question in Flood Plain 3 be performed to determine the current land use and the results be reflected in the report.	The current land use will be identified as part of the soil sampling and dose assessment activities and will be provided in the separate assessment report.
6	general	EPA	A quick calculation shows that a 1 uR/h increase due to Cs-137 would require about 5 pCi/g Cs-137. This is about a factor of 5 to 10 higher than what I’ve seen in most soils and sediments that were collected and analyzed looking for contamination as opposed to simply background.	We do not attempt to estimate any variation in exposure rate due solely to Cs-137, nor do we attempt to relate elevations in anthropogenic or Cs-137 extractions to ground (surface or volume) concentrations. Inferred soil concentrations from exposure rate measurements are very strongly dependent on the assumed distribution of contaminants through the soil column, and we have no basis for choosing one distribution over another in any given area of concern.

7	general	DEC	A summary of the history of discharges into the Buttermilk/Cattaraugus drainage system should be included to put the current levels of sediment contamination into perspective. The department recommends that it include the radioactive content discharged by the former reprocessing operations and by the more recent DOE operations at the site, as well as discuss the relative timeframes during which those releases occurred. It should also briefly discuss the implications for the current sediment contamination in the stream beds from the current and ongoing releases compared to those of decades older releases. A comparison to historic contamination levels in sediments in the drainage system would provide some perspective for the average reader. The contamination levels also need to be put into perspective for the public in regard to the relative level of risk to public health and the environment.	RSL was tasked with the aerial radiation survey data collection effort. RSL was not tasked with identifying the source or likely source of any contamination that might be identified. NYSERDA will conduct soil sampling and dose assessments as follow-up activities to the aerial survey. When the results of these follow-up activities are reported, the report will also contain a tabular summary of liquid effluent releases from (1) NFS operations from 1966 through 1980 and (2) WVDP operations from1982 through 2014.
8	general	DEC	The levels of contamination indicated by the aerial survey needs to be verified by a ground survey effort. Ideally, arrangements for that effort should be in place before finalizing the report for public release.	As described above, NYSERDA will conduct the field measurements and soil sampling activities needed to provide the information needed to demonstrate the continued protection of public health and safety. The aerial survey results will be presented at the November WVDP Quarterly Public Meeting. NYSERDA is presently collecting the follow-up soil samples. Assuming the field sampling activities can be completed by about the end of November, or before the onset of winter (whichever comes first) NYSERDA expects to present the results of the soil sampling and dose assessment work at the February 24 Quarterly Public Meeting.
9	general	DEC	The color gradations in the figures do not correlate well with those in their scales and are not easily decipherable in many cases. NYSERDA note: the transparency used to show underlying topography, features, etc. creates a mismatch between mapped data and data legend.	This color mismatch due to transparency is apparently a known issue with ESRI's ArcMap software. We have identified a workaround that should make the legend more consistent with the contour colors. We will revise the maps in all customer deliverables.
10	Figure 6	EPA	Provide additional information on Field Of View concept. Provide information on whether any collimators were used. If collimators were not used, then provide explanation of the difference between signal corresponding to the gammas emitted within Field Of View cone depicted in Figure 6 vs signal corresponding to the gammas emitted from outside the Field Of View cone. Provide explanation on how gammas arriving from outside the Field Of View are accounted for. Basis: It's not clear how the gammas emitted from outside the Field Of View cone were accounted for if collimators were not used.	Detectors were not collimated. The "field of view cone" is not an indicator of which gamma rays did/did not enter the detectors or were/were not accounted for in the analysis. The field of view concept is a useful rule of thumb for choosing line spacing when planning a survey to balance ground area coverage with time and cost of flight operations. See e.g. Proctor (1997). We will add this reference to the report.

11	Page 7 Para 3. Figure 9 and Page 12.	EPA	Clarify whether the working assumption is that the gammas from airborne radon and its daughters are present above the water or not present. If present, are these gammas produce the same signals as gammas from airborne radon and its daughters over land. Explain whether upper plot in Figure 9 includes contributions from airborne radon and its daughters and cosmic rays or not. Basis: Paragraph 3 Sentence 2 states that "…the water effectively shields all contributions to the gamma ray count rate in the detectors from terrestrial sources, but does not shield radiation from any *airborne radon or radon daughters, or background from cosmic rays*…". Figure 9 caption states that " … The water line count rate data were used to remove *radon and cosmic ray* contributions to the overall count rate.." That implies that the count rate in upper plot in Figure 9 is caused by radon and cosmic rays. The range of count rates in Figure 9 is about 800 – 2200 cps, that using formula on Page 11, would correspond approximately to 0.3 – 0.8 microR/hr that does not seem to include 4.2 microR/hr caused by cosmic rays (page 12).	The upper plot in Figure 9 includes gamma counts in the usual ~20-3000 keV energy range, but most of the cosmic ray contribution to exposure comes from higher-energy photons. This contribution is estimated from the data using counts in the overflow channel (> ~3000 keV), based on separate work by AMS (the referenced McCullough/Hoteling work) and on spectra from a large number of past surveys. We will add a note to the Fig. 9 caption and add text to section 4.1 to indicate this.
12	Page 9 Section 4.2.	EPA	Provide information whether the calculated lambda accounts for differences in gamma spectrae produced by anthropogenic sources vs natural only sources, as explained in Section 4.2. Provide information on whether the lambda was calculated using signals from only natural sources.	The altitude spiral was flown over an area initially presumed (and subsequently confirmed) not to be contaminated, although it is not strictly necessary that the area under the altitude spiral contain only natural sources. As long as the radiological signature beneath the altitude spiral is relatively uniform and representative of the survey area, and the terrain is flat, very low levels of contamination are permissible when empirically determining the gamma attenuation factor.
13	Page 12. First Para. 1.	EPA	Provide information to what measurement height above ground the referenced in the paragraph exposure rate (0.4 – 0.8 microR/hr) corresponds to and how it was determined. Provide information on mentioned variations of cosmic exposure rate due to local changes in elevation. Provide information whether these local variations were accounted for in exposure rate calculations and whether these variations were propagated to determine variability and uncertainty of the overall exposure rates that are presented in the maps.	The radon contribution is quoted at 1m above ground and is based on a calculation similar to the one described in comment 13 here. The cosmic exposure rate is attenuated by atmospheric depth and consequently varies with elevation above mean sea level. These local and temporal variations were not taken into account in the subsequent exposure rate calculations. Propagation of these uncertainties was performed; these 0.1-0.2 uR/h uncertainties are small contributors to the ~0.5 uR/h total variance.
14	Page 13.	EPA	Provide location, total area and description of the reference area used to calculate K_A.	The area is approximately circular with radius ~3500', and is located about 3 miles southeast of the plant, near the southeastern most corner of the survey area. We will add text to the report to identify this.

15	Section 4.3.	EPA	Provide critical limit for net peak area in cps for Cesium extraction. Include this information in Cesium extraction maps' legends. Provide information whether the count rates reported in Cesium extraction maps are above or below the critical limit.	As we understand the term, a critical limit applies when there is some established threshold for decision or action, which is not the case for this survey. We chose not to report our measurements in terms of critical limits or action levels, but to report in terms of deviation from background. The first non-background contour corresponds to 2 standard deviations above background, etc.
16	Pages 16-17 Figures 11, 12, 14, 15 and Section 5.2. 1	EPA	1) Provide LLD for the reported Exposure Rates in all bands. 2) Provide detailed quantitative justification of ~1 microR/hr precision in reported bands. 3) Provide uncertainties and variabilities at 95% confidence level for all reported bands of values. Basis: Reported bands of one microR/hr appear not to be justified given provided information. For example, the rough conservative estimate of uncertainty, given provided in the Draft information and assuming normal distribution for counts in each measurement, might go as follows: the reported terrestrial BG rate is 2 – 5 microR/hr (Page 20), i.e., SD ~ 1.5. The SD in gross count rates based on the data in Figure 9 and accounting for uncertainties in conversion factor F, is about 1 microR/hr. Therefore the SD for net count rate is about 1.8 or ~ 2 microR/hr. If results are to be reported with 95% confidence, that would correspond approximately to reporting Exposure Rate +/- 2*SD or about Exposure Rate +/- 4 microR/hr. The exposure rates in all of the Exposure Rate figures are reported with 1 microR/hr precision. 4) Improve color scheme and shades in all Exposure Rate figures. Basis: In the comparison below, it appears that at least 6 shades are present in the vicinity of Zoar Valley including 1-2 microR/hr shade band. This is inconsistent with the statement in Section 5.2 that the terrestrial BG range is 2 – 5 microR/hr. The color shades on the map on the left does not seem to correspond to all of the shades presented in the legend on the right. The purplish shades on the left are not present in the legend. NYSERDA note: the transparency used to show underlying topography, features, etc. creates a mismatch between mapped data and data legend.	It's not clear to what points 1 and 3 refer. There are no LLDs or uncertainties within the bands. The only relevant quantity is the uncertainty on the measurand, which is point 2. The actual variance of our measurement is about 0.5 uR/h. There is a statistical component of about 0.3 uR/h, and other sources of uncertainty bring up the total pointwise variance to 0.5. This was studied with the test-line data here, as well as in other AMS studies. There is an additional normalization uncertainty of about 8% when converting to exposure rate (which is globally correlated across the maps). Adding these together conservatively, we came up with 1 uR/h bands. Note that the variance mentioned in the comment here, 2-5 uR/h, reflects the variance of the underlying geology, and not the sensitivity of the AMS measurements. We will revise the maps to improve the agreement between contour and legend colors (see response to #9).

17	page 17 section 5.1.1	DEC	Please add information on where the test line was located in relation to Thiel Langford Road. This issue relates to the potential gamma contribution from NORM in the road grade material. There was a reported gamma contribution from road bed material on similar ground measurements made during aerial survey efforts following the Fukushima disaster. The Department notes that it is not uncommon for road bed materials in western NY to contain either NORM, or in some cases TENORM, at levels ranging from slightly too significantly above local soil gamma rate background values. This could affect readings made in proximity to such roads.	The aerial test line measurements were taken 150' directly above the road surface along Thiel Langford Road. The PIC ground measurements were taken at varying distances offset from Thiel Langford Road. Although we do compare exposure rate measurements made by the PIC to the aerial measurements, this was not the purpose of the test line measurements. The primary use of the aerial test line measurements is to ensure the consistency of count rate measurements from day to day (in concert with water line measurements). If we had observed disagreement between exposure rate inferred from aerial measurements and the exposure rate measured along the test line, we agree that NORM/TENORM elevations from the road bed would have been a natural possible cause to investigate.
18	Pages 16-18, Table 1 and Figure 11.	EPA	Provide table reporting all PIC measurement values with their corresponding locations. Explain why values on test line, as presented in Figure 11, appear to be from different dose rate bins, contrasting in color with surrounding areas. Basis: Table 1 reports AMS and PIC values overlapping each other for the test line, while color circles presented in Figures 11 appear to contrast with the surrounding area, i.e. differ from AMS values at least by 1 microR/hr.	PIC measurement data and locations were provided to NYSERDA in a separate spreadsheet. The coloration in Figure 11 is an artifact of the transparency. Semi-transparent blue circles are being drawn on top of a semi-transparent blue layer on top of the base map; the result is that the circles appear to be a different color than the contour map. There is no perfect solution to this problem, which is precisely why we also report this correspondence in Figure 13 and Table 1. (Also note: test line PIC measurements are not included in Figure 11. The line of PIC measurements ~2 miles north of the WVDP correspond to the altitude spiral.)
19	page 18, section 5.1.2, second paragraph	DEC	Given the wide spread low-concentration Cs-137 contamination within the cesium prong, and the relatively low exposure rate values detected by both the aerial and PIC measurements, please include a discussion of what the implications are for the chances of the aerial survey missing small elevated areas or deeper deposits of Cs-137 in stream sediments along Buttermilk and Cattaraugus Creek. Include the implications for the level of ground truthing needed in impacted sediment deposits within the stream floodplains.	An aerial survey only detects radiation from radionuclides present at or near the ground surface. As such, it is not possible to draw conclusions about the potential for the presence of more deeply buried radionuclides based on the results of this study. Similarly, the detail of scale achievable from an aerial survey is restricted by the altitude at which it is flown, so it is not possible to draw conclusions about features on a scale significantly smaller than the effective field of view of the detector system (in this case, a 300' radius). An exception would be if a strong (on the order of millicuries), isolated and unshielded point-like source were present at the ground surface – such a source would be visible to this detection system.

20	Page 18 Table 1.	EPA	1) Include information on the Site Interior in similar manner as for the Test Line, Altitude Spiral and Site Exterior. 2) Clarify whether all uncertainties have been propagated and included in the +/- SD presented in the Table, such as those from all explanatory variables in formulae on Pages 9 and 10.	1) The average values for the AMS and PIC measurements from the site interior are, respectively, 44.7 ± 46.0 and 105.4 ± 232.9 μR/h. Because of the decidedly non-normal distribution of values, it does not make sense to average them. The relevant conclusion to draw from these data is rather that the values inferred from the aerial data don't match the ground measurements in this area, a consequence of the vastly different fields of view for the two measurement systems and potentially large gradients in the exposure rate field. We believe this information is conveyed in the text and in the third plot in Figure 13. 2) The uncertainties listed in Table 1 come from the standard deviation of each set of measurements, as stated in the first paragraph of Section 5.1.1.
21	Page 18 Last Para.	EPA	Provide information on the (i) level of global nuclear testing fallout in the area and (ii) observed variability of that level.	The intent of the statement in the second paragraph of Section 5.1.2 (third sentence) was to qualitatively compare the Cs-137 peak intensity in the in situ and AMS measurements collected in this area (Cs prong) with spectra collected elsewhere in the survey area. The statement in the report implies a quantitative comparison. We will rephrase the statement to reflect this.
22	page 19, section 5.3	DEC	Please explain where the second of the two PIC readings in the floodplain was performed and what the results indicated. Please also explain what, if anything, this limited PIC data set for the large floodplain area of the survey means for the data review and conclusions.	We will add text to the report summarizing the second PIC measurement referenced here. The fact that only two PIC measurements were taken specifically in the flood plain areas has no consequence on the conclusions of the report. The PIC measurements are used as a check on the validity of the method to determine exposure rate from the aerial data in areas where the method's assumptions are applicable. In this survey we collected many other points that fit that criterion and we observed good agreement.

23	Page 19 Figure 13.	EPA	Include regression analysis line in the plot. Include 95% regression analysis confidence band.	The intent of this plot was to illustrate the presence or absence of systematic error in exposure rate inferred from aerial measurements vs. direct ground measurements, which should be distributed narrowly and symmetrically about the y = x line if there is no systematic error. We feel that although a regression fit with confidence bands may be interesting, given the narrow range of values among the test line, altitude spiral, flood plain, and site exterior data, the slope would not be very meaningful. Additionally, specifically the site interior measurements are strongly dominated by systematic effects unique to each measurement, so the slope of the regression line would also not be very meaningful.
24	Page 20 Section 5.2.	EPA	Provide information on why on most exposure rate maps, 5 color shades can be easily discerned in all non-impacted areas while it is stated in Sections 5.2 and 5.5 that the natural terrestrial background falls within 2-5 microR/hr, i.e., 3 color shades.	Sections 5.2 and 5.5 claim that non-impacted areas “typically” have backgrounds within 2-5 uR/h. 92% of the non-impacted survey area falls within this range.
25	Page 23 Para 2.	EPA	Provide information whether elevated AMS dose rate levels observed in Zoar Valley manifest themselves in the same manner in a similar terrain elsewhere but not downstream the anthropogenic source term. Provide locations with topography similar to Zoar Valley. Basis: The gamma scattering topographic explanation is not visible in maps along the creeks upstream the source or further away downstream.	Looking at a topographic map of the survey area (http://viewer.nationalmap.gov/viewer/), we don’t see any areas that are comparable topographically to the same degree as Zoar Valley; i.e., elevation changes of 300-500 ft. over a horizontal distance of ~500 ft from the creek bed on both sides of the creek. There are a couple of bends in the creek upstream of Zoar Valley that have somewhat strong (but not as strong as Zoar Valley) asymmetric elevation gradients (just to the SW and NE of approximate lat/lon 42° 27.6’ N, 78° 46’ W) that also show slight elevations in the exposure rate and anthropogenic extraction maps. Likewise, there is a somewhat strong terrain elevation gradient on either side of the approximate lat/lon 42° 30.3’ N, 78° 59.1’ W (south of Versailles) that shows a slight elevation in the exposure rate map and possibly also in the anthropogenic map, though not very strong in either.

26	Page 27 Para 2.	EPA	Provide assumptions used in detailed analysis for buried Cs-137. Basis: It's not clear how potentially buried Cs-137 was ruled out. Could Cs-137 have migrated deeper in soil in these areas, so the anthropogenic algorithm reveals its presence because most of scattered gammas stay in the low energy portion of the spectrum and still get counted but the cesium extraction algorithm that focuses only on the narrow peak area of the spectrum – did not.	We can make no direct claims based on aerial data alone that cesium is buried vs. on the surface. We are only able to note that certain spectral shapes may be consistent with cesium that is below the surface (less pronounced photopeak) vs. on the surface (stronger photopeak). "Detailed analysis" is misleading phrasing. An experienced and trained spectroscopist examined the aerial spectra to confirm the presence or absence of signatures from contaminant isotopes. We will replace the phrase "detailed analysis of spectra" with "careful, detailed inspection of spectra" in paragraphs 1 and 2 of Section 5.4.1.
27	page 27, section 5.4	DEC	The discussion about Cs-137 along Cattaraugus Creek is consistent with the Department's understanding of distribution patterns from past site discharges. Lack of Cs-137 in Zoar Valley would be consistent with the higher erosion/scouring expected within this more confined valley. Given the acknowledgements that some of the aerial data is consistent with cesium being present deeper in the soil column, and the known history of cesium sediment contamination in the Buttermilk/Cattaraugus drainage system, the discussion of the "Flood Plain 3 Anomaly" should go beyond the very carefully worded statement that it is not possible to specifically determine if its source is past atmospheric fallout or sediment transport from the WNYNSC discharges. It should discuss what the likely source of this contamination is.	NYSERDA will prepare a report regarding environmental releases from the facility. NYSERDA's "Companion Report" will include a discussion of historical discharges from NFS operations, the soil sampling results, and the dose assessment. DOE will provide a summary of the environmental release data from the Annual Site Environmental Reports from 1982 through 2014 to be included in the report. Since the aerial survey report is intended to be a report on the data collection effort and was not intended to identify sources of the contamination, the statement regarding a possible fallout origin for the Floodplain 3 anomaly will be removed from the report.
28	Page 27	NRC	The draft report states that "from the data set, it is not possible to determine the source of the observed cesium signature in the Flood Plain 3 Anomaly; more specifically, it cannot be determined whether the anomaly is due to migration of contamination downstream from the WNYNSC, is from global fallout from past nuclear testing, or originates from some other source." We suggest that the report focus on the most likely source of contamination in question rather than trying to precisely determine the source of contamination which may not be possible. We believe that such a discussion in the report is important, especially regarding the contamination in Flood Plain 3 that was not identified in previous aerial radiation surveys.	NYSERDA will prepare a report regarding environmental releases from the facility. NYSERDA's "Companion Report" will include a discussion of historical discharges from site operations, the soil sampling results, and the dose assessment. DOE will provide a summary of the data from the Annual Site Environmental Report data from 1982 through 2014 to be included in the report. Since the aerial survey report is intended to be a report on the data collection effort and was not intended to identify sources of the contamination, the statement regarding a possible fallout origin for the Floodplain 3 anomaly will be removed from the report.

29	Page 33 Table 2.	EPA	Provide information on whether cosmic and radon and radon products gammas are accounted for in the values presented in the Table.	Yes, cosmic-ray, radon and radon product contributions to exposure rate are included in the numbers reported in Table 2. We will update the Table 2 caption and the text in paragraph 1 of Section 5.5.1 to reflect this.
30	Page 34 Para 1.	EPA	Provide discussion on why the terrestrial background level shifted down and whether it corresponds to the decay of the fallout material.	The systematic difference in background level exposure rates between the 1984 study and this one is not due to decay of global fallout. The previous survey was conducted over 30 years ago with different hardware, different analysis software, and a different body of prior work to draw from in determining conversion factors. Although the basic methodology has not changed, systematic differences in results from one survey to the next may occur due to these factors. We will add text to the report to address this.
31	Page 35 Figure 24.	EPA	Provide levels of variability and uncertainty for each bin of the presented data.	We are not sure what is requested regarding "each bin." The relevant parameters are the uncertainty on a given measurand and the overall variability of the data. The breakpoints for the anthropogenic and cesium extraction maps were chosen to facilitate direct comparison by using standard deviations above background as a common metric. See response to comment #18.
32	Figure 24	NRC	Figure 24 in the report shows concentrations of radionuclides in the sediments of the stream system (e.g. at the confluence of the relevant streams) have been reduced more than can be explained by radiological decay; that contamination must end up somewhere else in the system. Although the observation of offsite contamination may be a "new" result from the current survey, there has been offsite contamination for quite some time as documented in various studies and reports. Therefore, we suggest that the report not imply that the current observations of offsite contamination are surprising. We suggest that the report contain a brief discussion of historical activities and the likelihood of their influence on the results of the aerial radiation survey to provide an explanation of the most likely source of the contamination in question. For example, consideration of the following topics maybe helpful in this regard: • Former Operations of the Reprocessing Plant: The streambed sediments, suspended sediments, water and biota of the creek system downstream of the Western New York Nuclear Service Center (WNYNSC) have been sampled on numerous occasions starting as early as the late 1960's. This should be discussed in relation to the aerial radiation survey results. Much of the	Particle bound contaminants that are released from site operations will be subject to a complex set of natural processes that may include some combination of transport by air or water, deposition and erosion. As such, it is not surprising that the data may reflect the influence of processes in addition to radioactive decay. The report will be reviewed to ensure that it does not provide a sense that the current observations of contamination in downstream areas is surprising. NYSERDA will conduct soil sampling and dose assessments as follow-up activities to the aerial survey. When the results of these follow-up activities are reported, the report will also contain a tabular summary of liquid effluent releases from (1) NFS operations from 1966 through 1980 and (2) WVDP operations from1982 through 2014.

			sampling was completed by various State or governmental agencies. The results show increases in concentrations of a number of radionuclides attributed to operation of the former reprocessing plant activities. Peak concentrations were generally around 1969 and were mainly the result of planned releases from the wastewater lagoons. Though concentrations were elevated above background they were not in violation of Atomic Energy Agency limits and standards at the time. In addition, there is a series of reports by Onishi et al., completed from 1977 to 1982 (NUREG/CR-1387 and NUREG/CR-2425), that documents extensive characterization of the stream system in order to collect data to validate a sediment and radionuclide transport model. In those reports, samples were collected for Cs-137, for example, and some off-site sediment samples exceeded 100 pCi/g Cs-137. Some samples taken at the mouth of Cattaraugus Creek where it enters into Lake Erie exceeded a concentration of 100 pCi/g Cs-137. • Other Nuclear Licensed Facilities in Cattaraugus County: There are a number of licensed nuclear facilities in vicinity. A discussion of how these facilities could or could not have potentially impacted environmental radiation levels reported in the aerial radiation survey and why (or why not) should be discussed. • The West Valley Demonstration Project Act Site Activities: The discharge history of planned and unplanned radiological releases as a result of U.S. Department of Energy- West Valley Demonstration Project Act (DOE-WVDP Act) activities as compared to that of the reprocessing plant when it was operational and as compared to those of the State Disposal Area (SDA) and the potential relationships to the aerial radiation survey results should be discussed. The overall order of magnitude of the amount of material and their levels of radioactivity in discharges among the reprocessing plant, the SDA, and the DOE-WVDP Act activities should be compared against those resulting from reprocessing operations. • Erosion Physics: The nature of erosion physics with regard to fall-out concentrations of Cs-137 in stream beds versus flood plains should be considered and insights should be discussed with respect to the aerial radiation survey results in Flood Plain 3. The	

			Flood Plain 3 anomaly is identified as being 2-4 standard deviations above background; there is only a 0.01% to 5% chance that the anomaly is explained by variation in fall-out concentrations.	