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Subject: Reach LA-1 Update

Update of Reach LA-1 Sediment Investigations

S. Reneau, 1/20/98

Analytical results from our 2nd sediment sampling event in reach LA-1 have been received, along with results from some new LA-2 West samples that were collected at the same time. LA-1 has several sub-reaches that were defined in order to evaluate a series of potential contaminant sources. As referred to in this summary, LA-1 Far West is located upstream from Hillside 140 (the westernmost of the known TA-1 contaminant sources) and downstream from the bridge; it could potentially include contaminants from several upstream PRSs, in addition to contaminants from non-point sources such as road runoff. LA-1 West+ is between Bailey Canyon and Hillside 137, and could have received additional contaminants from either Hillside 140 or Bailey Canyon. LA-1 West proper is downstream from Hillside 137 and upstream of TA-41, including the Hillside 138 outfall channel, and likely received Pu and other contaminants derived from the old TA-1 plutonium facility (D Building, at the site of the LA Inn). LA-1 Central is in TA-2 immediately downstream of the Omega West reactor. LA-1 East is in TA-21 downstream from the outfall channel for the old TA-21 laundry facility, another potential source of Pu. Finally, LA-2 West is immediately upstream from DP Canyon, and is being used to evaluate dilution of contaminants from the LA-1 reaches plus potential new additions of contaminants from various TA-21 outfalls.

Pu-239,240

Pu-239,240 was used as an indicator contaminant in this sampling round (as well as the first LA-1 sampling round) because of its pervasive occurrence in sediment samples collected previously as part of OU 1098 (TA-2 and TA-41) characterization activities, as well as our own samples, and we obtained Pu analyses on 55 new sediment samples. These analyses generally support inferences from our 1st LA-1 sampling event, and better define the primary source of Pu in upper Los Alamos Canyon.

The highest average concentrations of Pu and the largest estimated inventory are in LA-1 West downstream from Hillside 137, indicating that this TA-1 site (below an outfall from the old "D Building") is the most important source of Pu upstream from DP Canyon. In addition, because maximum concentrations, average concentrations, and estimated inventory are

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less in LA-2 downstream from DP Canyon, this suggests that Hillside 137 may be the most important source upstream from Pueblo Canyon (contrary to LANL reports dating back to the 1970s that flagged TA-21 and DP Canyon as the only significant Pu source). An apparent increase in Pu concentrations and inventory in LA-1 East, in relation to LA-1 Central, suggests the addition of Pu derived from the old TA-21 laundry facility. In LA-1 Far West, upstream from Hillside 140, Pu is within background, and in LA-1 West+, upstream from Hillside 137, Pu-239,240 is present above background concentrations, but an order of magnitude below concentrations downstream. These data suggest minor contributions of Pu from either Hillside 140 or from Bailey Canyon, but no sources farther upstream.

Maximum Pu-239,240 concentrations obtained in the sub-reaches are 0.03 pCi/g in LA-1 Far West, 0.6 in LA-1 West+, 19.1 in LA-1 West, 8.8 in LA-1 Central, 19.3 in LA-1 East, and 10.6 pCi/g in LA-2 West. In comparison, the highest value we have obtained in LA-2 East is 6.4 pCi/g. Estimated Pu inventories in the sub-reaches are about 1 mCi/km in LA-1 West+, 25 in LA-1 West, 7 in LA-1 Central, 16 in LA-1 East, 6 in LA-2 West, and 11 in LA-2 East. All of these estimated inventories are below that in any Pueblo Canyon reach downstream from Acid Canyon.

Metals

We had previously obtained 11 analyses for the Target Analyte List metals in reach LA-1, and in this 2nd sampling round we obtained an additional 16 analyses for metals in LA-1, plus two analyses in LA-2 West. Lead was reported above our background screening value of 19.7 ppm in 19 of the 27 samples, including samples from each sub-reach, with a max of 46.9 ppm in LA-2 West. Mercury was reported above our present background screening value of 0.1 ppm in 4 samples, and at 0.1 ppm in 2 additional samples. The maximum Hg was 0.31 ppm from the LA-2 West sample with the highest Pb. This same sample also had the only Zn above background, at 81.7 ppm (vs. 60.2 for background), and also had the highest Pu-239,240 in LA-2 West. Copper was also found slightly above our present background screening value of 11.2 ppm in 10 samples, including in LA-1 Far West, with a max of 23.8 ppm in LA-1 East.

PCBs and Pesticides

We had previously obtained 9 analyses for PCBs in reach LA-1, and in this 2nd sampling round we obtained an additional 16 analyses for both PCBs and pesticides in LA-1, plus two analyses in LA-2 West. We had PCBs reported above detection limits in three of the 1st round samples, and in 12 of the 2nd round samples from LA-1 and in both of the new LA-2 West samples, all of which are in the relatively fine-grained overbank sediment deposits.

PCBs are apparently widely distributed in this part of Los Alamos Canyon, being detected in each of the sub-reaches, including in "LA-1 Far West", upstream of the known TA-1 contaminant sources. The highest values are 1.5 ppm in LA-1 West+, 1.3 ppm in LA-1 West, and 1.0 ppm in LA-1 East.

Pesticides were reported above detection limits in 11 of the new LA-1 samples and in both of the LA-2 West samples, again only in relatively fine-grained overbank sediments. DDT was reported at 0.0055-0.048 ppm in 12 samples, including in LA-1 Far West, with the highest value in reach LA-1 Central. DDE was reported at 0.0055-0.0085 ppm in 4 samples, again including LA-1 Far West, with the highest values in LA-1 Central and LA-1 East. Alpha and gamma chlordane were reported in 1 sample in LA-1 West, at concentrations of 0.0072 and 0.0068 ppm, respectively.

We are not certain of the sources for the PCBs and the pesticides, although the fact that both are found upstream of the TA-1 hillsides indicates at least a partial source farther upstream. We are also not certain as to the controls on their distribution, as they are not collocated with Pu or with each other, suggesting variable sources and/or variable release histories.

Uranium

We had previously obtained 4 analyses for isotopic uranium in reach LA-1, and in this 2nd sampling round we obtained isotopic uranium analyses on 16 additional samples from LA-1 and 2 samples from LA-2 West. U-234 was reported at or slightly above our background screening value of 2.59 pCi/g in 1 sample in LA-2 West, at 2.6 pCi/g. U-238 was reported at or slightly above our background screening value of 2.29 pCi/g in 2 samples in LA-1 East and LA-2 West, at 2.31 and 2.51 pCi/g. These data suggest that there is little anthropogenic uranium in the sediments in this part of Los Alamos Canyon.

Sr-90

We had earlier obtained some relatively high Sr-90 analyses from LA-2 West, 2-3 pCi/g, that were inconsistent with all other Sr-90 analyses from young sediments upstream from DP Canyon (all of which were below background screening values of about 1 pCi/g). Our chemist indicated that the high values may have resulted from use of a less-than-optimum analytical method. In this sampling event we recollected 2 layers in LA-2 West that had previously yielded 2.4 and 3.3 pCi/g, submitted them to the analytical lab that had been recommended by our chemist for quality and reliability of Sr-90 data, and obtained values of 0.28 and 0.45 pCi/g. These data thus indicate that we do not have Sr-90 in young sediments upstream from DP Canyon at above background levels, and that DP Canyon is the only

significant source in the Los Alamos Canyon watershed (note that this conclusion only applies to the young sediments, and that a leach field at TA-2 likely contributes Sr-90 to the alluvial groundwater).

Cs-137

We obtained 11 analyses for Cs-137 in LA-1 this sampling round. Two of new samples, both from LA-1 East, yielded Cs-137 values above background, 1.1 and 2.9 pCi/g. In addition, a previous value of 1.6 pCi/g from LA-2 West and two OU 1098 sediment analyses of 0.94 and 0.96 pCi/g in our reach LA-1 Central also suggests a source for at least small amounts of Cs upstream from DP Canyon, perhaps including TA-2.

Am-241

We obtained 11 analyses for Am-241 in LA-1 and two in LA-2 West this sampling round using alpha spectrometry. Three analyses obtained in LA-1 Far West were within background ranges, supporting the absence of a source of Am-241 farther upstream. All 8 samples from LA-1 West, LA-1 Central, and LA-1 East yielded Am-241 above background (0.041-0.571 pCi/g), with the highest value in LA-1 West from the sample layer there that had the highest Pu-239,240. The two samples from LA-2 West were within the range of background, suggesting significant downstream dilution.

Please feel free to contact me if you have any questions or if you would like more information.

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