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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

January 11, 1999

Mr. Theodore Taylor, Project Manager
Los Alamos Area Office-Department of Energy
528 35th Street MS A316
Los Alamos, New Mexico 87544

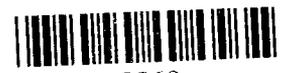
Dr. John Browne, Director
Los Alamos National Laboratory
P.O. Box 1663, MS A100
Los Alamos, NM 87545

RE: Request for Supplemental Information concerning the Work Plan for Mortandad Canyon, Los Alamos National Laboratory, NM 0890010515

Dear Mr. Taylor and Dr. Browne:

The RCRA Permits Management Program (RPMP) of the New Mexico Environment Department (NMED) has reviewed the Work Plan for Mortandad Canyon (referenced by LA-UR-97-3291) dated September 25, 1997 (EM/ER:97-388) and is requesting supplemental information. Most of RPMP's comments request clarifications or reflect relatively minor issues. Although RPMP is requesting supplemental information, RPMP recognizes and appreciates the time and effort that was required to compile the existing data and reinterpret the geology beneath Mortandad Canyon. The quality of the Work Plan is exceptional and RPMP is pleased with the product and progress that has been made regarding the development of the canyons work plans.

Some primary concerns that have arisen with the review of the Work Plan include: 1) a more timely and thorough investigation of the intermediate and regional aquifers will not be accomplished due to budget restrictions that have reduced the number of characterization/monitoring wells in Mortandad Canyon and associated tributaries, 2) the investigation of "Pratt Canyon" should be concurrent with the implementation of this work plan 3) most of the boreholes/wells located in the Mortandad Canyon watershed are not RCRA constructed or are limited in usefulness and should be reconditioned or plugged and abandoned following RCRA guidance.



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Request for Supplemental Information Regarding the Work Plan for Mortandad Canyon
LA-UR-97-3291, EM/ER: 97-388
January 11, 1999
Page 2 of 13

Los Alamos National Laboratory (LANL) must respond to the request for supplemental information (Attachment A) within thirty (30) calendar days of receipt of this letter. Should you have any questions, please feel free to contact Mr. John Kieling, RPMP's LANL Facility Manager at (505) 827-1558, extension 1012.

Sincerely,



Robert S. (Stu) Dinwiddie, Ph. D.
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau

RSD:jry

attachments

cc:

J. Canepa, LANL EM/ER, MS M992
J. Davis, NMED SWQB
B. Garcia, NMED HRMB
M. Johansen, DOE LAAO, MS A316
J. Kieling, NMED HRMB
M. Kirsch, EM/ER, MS M992
M. Leavitt, NMED GWQB
H. LeDoux, DOE LAAO, MS A316
D. McInroy, LANL EM/ER, MS M992
D. Neleigh, EPA 6PD-N
J. Parker, NMED DOE OB
J. Vozella, DOE LAAO, MS A316
S. Yanicak, NMED DOE OB, MS J993

File: Reading and HSWA LANL 4/1049/M 99
Track: LANL, doc date, n/a, DOE/LANL, RPMP/Dinwiddie, RE, file

Los Alamos National Laboratory
NM 0890010515

Attachment A: Request For Supplemental Information regarding the Work Plan for Mortandad Canyon

General Comments:

1. RPMP has concerns that the number and location of the proposed wells may be inadequate to discern the lateral and vertical extent of saturation in the alluvial, intermediate, and regional aquifers. For example, based on discussions with staff from LANL and the DOE-Oversight Bureau, RPMP recommends installation of an additional alluvial well and consider the placement of a well to the Cerro Toledo, in Tensight Canyon, to address potential impacts to the subsurface from historic TA-35 releases. In addition, the current and proposed gaging stations may not be adequately located to determine water balance and other recharge issues.
2. LANL should identify the specific wells to be sampled, provide sampling protocols, and provide the rationale for the approach and strategy to sampling. For example, see § 7.1 *Introduction, page 7-3, Table 7.1-2, Initial Estimates of Sample Collection and Analyses*. LANL should note that many of the wells installed in the Mortandad Canyon Watershed and used for environmental surveillance were *not* installed and completed according to RCRA guidance. The wells not installed and constructed following RCRA guidance should be evaluated and replaced/reconditioned to meet RCRA guidance criteria.
3. RPMP will require that LANL sampling acquire a "snap shot" of the surface water, alluvial, intermediate and regional aquifer groundwater zones. Sporadic sampling of the surface water and ground water wells is inappropriate for understanding the hydrogeologic system. Sample collection should be designed to acquire water samples from a canyon within a short period of time. LANL should also time sampling with storm-water, spring snow-melt, etc. to address effects on water quality and aquifer hydraulic response in Effluent, Tensight, and Mortandad Canyons.
4. LANL should discuss or reference protocols for sealing discrete zones of ground water (contaminated or not) if encountered while drilling the boreholes in Mortandad Canyon.
5. Before LANL limits analytical suites, sample numbers, the scope of work, etc. , LANL must provide rationale to RPMP and acquire prior approval before limiting the suite of analytes, sample number, etc..
6. LANL should include a section concerning investigation derived waste (IDW) characterization and disposal.
7. LANL should review effluent discharge and precipitation amounts (1951-current) and compare to groundwater levels, sediment, soil, surface and groundwater concentrations to better understand the hydrogeologic system response to effluent releases, precipitation, etc..

8. Risk assessments need to consider future impacts to receptors (e.g., contaminant migration to municipal production wells, land transfers to the county or pueblo, etc.) as well as present-day scenarios.
9. LANL should replace all terminology of "Background Screening Value" with "Background Value" as this is the RPMP-LANL accepted terminology. For example, see § 3.4.4.2.1, Table 3.4.4-5, pages 3-49 and 3-50.
10. In light of the recent findings (HE detections) at R-25 (suggesting an interconnection between surface water or alluvial groundwater with the regional aquifer) LANL and DOE should reconsider exposure pathways and data quality objectives/requirements to ensure that data needs are met for this work plan.
11. LANL should clarify that lithologies, staining, moisture, etc. will be targeted for sampling when drilling, where possible, instead of discrete intervals.

Specific Comments:

12. § 2.4.6 Technical Area 50, Table 2.4.6-1, page 2-20

Please indicate the reasons for unknown gross alpha/beta, cesium-137 and strontium-89/90 values in the table. These constituents were part of the routine reporting prior to the unknown values and were undoubtedly released during the unknown time frames and should be included in the table.

13. § 3.3.4 Data Requirements, page 3-15

In order to resolve uncertainties in the conceptual model, the distribution of contaminants (extent) within the Mortandad hydrogeologic system is required. The work plan should address the nature, rate and extent of any contamination present. LANL should include "distribution of contamination" as a data requirement.

14. § 3.4.4.2.1 Active Channels, Figure 3.4.4-3, page 3-22

Please include in Figure 3.4.4-3 the physical measurements (e.g., 0.5-1 mm, 1-2 mm, etc.) for the size-fraction of Granules, V. Coarse, Coarse, etc..

15. **§ 3.4.4.2.1 Active Channels, Published Does Estimates for Exposure to Sediments, page 3-34**

"Because water in the canyon is not used for drinking, irrigation, cattle grazing, or gardens, the drinking water, meat ingestion, and fruit and vegetable ingestion pathways are not considered"

The water in the canyon may not directly be used for drinking, irrigation, cattle grazing, or gardens; however, Native Americans harvest plants, wildlife, material for pottery, etc., therefore ground water and surface water should be considered as exposure pathways. In addition, the current land-use scenario may not include irrigation, cattle grazing or gardening but future scenarios (e.g., land transfers) can not preclude these uses for the water found in Mortadad Canyon.

16. **§ 3.5.3.3 Borehole MCC-8.2, page 3-66**

"Activities of ²⁴¹Am greater than 0.001 pCi/g are observed from the surface to a depth of about 165 ft (50.3 m) within the Otowi Member, but activities are very low and are within background fallout values."

Please clarify if fallout values of ²⁴¹Am would be expected at a depth of 165 feet or if the text should read "below detection limits" instead of "within background fallout values."

17. **§ 3.7.2.3 Recent Alluvial Groundwater Level Observations, page 3-96**

"Historically, groundwater has not been found in the alluvium east of the MCO-8.2 area."

The second paragraph of this section indicates that historically no ground water has been observed east of MC0-8.2. According to Appendix D, Table D-5 (page D-33), indicates water was recorded in MCO-13 by DOE-OB staff in 1996 and 1997. Please clarify the discrepancy

18. **§ 3.7.4 Regional Aquifer, page 3-118, third paragraph**

"The routine sampling and analyses of TW-8 in 1994..."

This paragraph indicates that an "anomalous" activity of 0.188 pCi/l ^{239, 240}Pu obtained 1994 from TW-8 was not consistent with the previous years sampling. Please indicate if sampling of TW-8 occurred at a similar time during both years, whether amounts of precipitation, runoff, effluent discharge, purge time/volumes were similar, pump location relative to the top of the regional aquifer, etc. were consistent. Although, the "anomalous" Pu activity measured in TW-8 may not represent the conditions at the regional aquifer, evidence presented does not preclude pulses of contamination migrating through the groundwater system following high precipitation events, large volumes of discharge, runoff, etc.. Also, if leakage around the annulus of TW-8 was the source for the tritium in the regional aquifer, it seems the detection of tritium and other radiological contaminants would be more consistent from year-to-year as the effluent discharge from TA-50 is somewhat consistent.

19. **§ 3.8 Geochemistry of Surface Water and Groundwater in Mortandad Canyon, page 3-120, third paragraph in section**

"(GS-2 was operated for brief periods only, and gaging stations installed in 1995 and 1996 in lower Mortandad Canyon have not recorded flows as of May 1997, see section 3.6)"

During a site visit, the gaging station E202 (mis-labeled as E222 on Plate) appears to be routinely bypassed by surface water flow, as evidenced by significant head cutting into the northern side of the channel, within 10 meters of the gaging station and therefore is not likely to have recorded any flow since installation. RPMP will require that LANL inspect all current gaging stations in order to determine effectiveness and to assess the need for relocating the current gaging stations.

20. **§ 3.8.7 Data Requirements for Understanding the Geochemistry of Surface Water and Groundwater, page 3-139 and 3-140**

Bullets 1, 2 and 3 should state "will" instead of "should" or "is needed" when discussing the data requirements for sample collection, sorption experiments, and geochemical modeling. This is a work plan, not a proposal. In addition, LANL should add determination of hydraulic properties of weathered tuff (page 3-110, last paragraph) as well as other activities that are required to adequately understand the hydrogeologic system.

21. **§ 4.1.1 Purpose, Page 4-1, 4th paragraph**

"The conceptual model description helps define the investigations (including field measurement activities) and the interpretation and analysis of both new and existing data that are needed to refine risk assessments".

Because HRMB/NMED is unaware of any risk assessment being completed for the canyon setting, LANL should consider revising this statement to read: "The conceptual model description helps define the investigations (including field measurement activities) as well as the interpretation and analysis of both new and existing data that are needed to perform risk assessments".

22. **§ 4.1.1 Relationship of the Conceptual Model to Impact Assessment, Page 4-2, 1st paragraph**

"The exposure pathways are part of the human health risk assessment model and ecological risk assessment model described in Chapter 6 of the core document (LANL 1997, 55622)".

The cited document does not contain any methodology to evaluate ecological risks. Thus, LANL should revise the work plan to include either the correct reference or the proposed approach to evaluate ecological risks.

23. **§ 4.1.1 Relationship of the Conceptual Model to Impact Assessment, Page 4-2, 3rd paragraph**

This paragraph identifies the potential human exposure scenarios for the Mortandad Canyon. The exposure scenarios listed here differ from those presented in Chapter 6 of the core document. Please provide the rationale for these differences.

24. **§ 4.1.1 Relationship of the Conceptual Model to Impact Assessment, Page 4-2, 3rd paragraph, 5th and 6th bullets**

"The potential human exposure scenarios for the Mortandad Canyon system include the following: ...habitation by the local biological community, which considers whether complete exposure pathways exist; and use of the Rio Grande, including integrity of the biological community."

These two bullets do not appear to be directly attributed to human exposure scenarios but they are relevant to ecological receptor exposure. LANL should review and revise these two bullets for their relevancy to human exposure scenarios.

25. **§ 4.1.3 Development of the Mortandad Canyon Conceptual Model, Page 4-3, Figure 4.1.3-1**

Figure 4.1.3-1 shows the elements of the Mortandad Canyon system conceptual model. This model identifies, people, animals, and plants as receptors potentially affected by contaminated media but it does not predict exposure pathways to those receptors. For clarity and to better understand any relationship between contaminated media and potential exposure of those receptors, it would be helpful to construct an additional (complementary) model diagram or diagrams presenting contaminated media, contaminant release and transport mechanisms, and exposure scenarios/pathways to both human *and* ecological receptors.

LANL should develop the Mortandad Canyon conceptual model and its diagram(s) to include the relationships between contaminated media, contaminant release and transport mechanisms, and exposure scenarios and pathways to both human and ecological receptors. Also, LANL should provide the rationale for addressing or not addressing those components of the model during the Mortandad Canyon investigations.

26. **§ 4.1.3 Development of the Mortandad Canyon Conceptual Model, Page 4-3, Figure 4.1.3-1**

Figure 4.1.3-1 illustrates airborne resuspension as a mechanism of contaminant transport from sources such as "worldwide fallout, stack emission and deposition, and "active channel sediments". However, other and potentially **critical** contaminant sources such as contaminated soils on mesa tops and the canyon slopes have been left out of the canyon investigation and are not considered to affect airborne resuspension.

LANL should review and revise the current Mortandad Canyon conceptual model and its diagram to include contaminated soils on mesa tops and the canyon slopes as critical sources for the airborne resuspension transport mechanism.

27. **§ 4.2 Contaminant Transport Conceptual Model, Page 4-4, second paragraph**

This paragraph implies that the major elements of the conceptual model are: surface water and sediment transport, ground water transport, biological/food chain transport, and atmospheric transport. Although soil transport has not been listed here, Table 4.2-1 (pages 4-5 through 4-11) discusses the erosion and transport of soil and sediments as a part of surface water and sediment transport. It is recommended that LANL should consider soil erosion and transport from mesa tops and down the canyon slopes as one of the major contaminant transport mechanism or pathways for the canyon system. LANL should revise the conceptual model to include soil transport from mesa tops and the canyon slopes as the mechanism for contaminants transport in the Mortandad Canyon.

28. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-4, 4th paragraph**

"Sequential precipitation runoff and other surface flow events have transported a small portion of these contaminants off-site (see Section 3.4)."

This statement is rather a speculation than defensible technical documentation. LANL should provide numerical values (and their ranges, if applicable) in support of statements such as "a small portion" (or e.g., "low levels" on page 4-10, element G7) to allow readers for their own interpretation and, therefore, reducing or eliminating subjectivity of the evidence.

29. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-5, Table 4.2-1**

Table 4.2-1 identifies and discusses elements of the conceptual model for Mortandad Canyon. Element B in this table, erosion and transport of soils and sediments, discusses sediment traps as the transport medium for contaminants downstream in Mortandad Canyon. However, there is no mention about the sediment traps acting as a secondary source term, promoting percolation and infiltration of contaminants into the underlying ground water system in the canyon.

This work plan should include the approach to evaluate performance of sediment traps in the canyon system, intended to reduce the rate of contaminant transport downstream and off-site, as well as their impact on quality of the underlying ground water.

30. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-10, element I1, Table 4.2-1**

Element I1 states that an animal can ingest contaminants by consuming water from the active channel or from water ponded for limited periods at locations such as the sediment traps. Other

sources or points of animal exposure to contaminants, which are not mentioned here, are contaminated springs and seeps. LANL should include springs and seeps, if they are present in the canyon system, as the potential sources/points of exposure.

31. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-11, element I7, Table 4.2-1**

"Behavior can decrease the degree of exposure to environmental contaminants because food or water might not be obtained from a single site or behavior might cause wildlife to be exposed to multiple, antagonistic contaminants."

The concept of multiple contaminants interactions is incomplete as discussed here. Antagonism is only one of many types of possible interactions between contaminants in which people and other animals are exposed. Therefore, other types of interactions such as synergistic, additive, or potentiation must also be acknowledged. LANL should review and revise this statement to read: "Behavior can decrease the degree of exposure to environmental contaminants because food or water might not be obtained from a single site or behavior might cause wildlife to be exposed to multiple contaminants and these exposures might result in antagonistic, synergistic, additive or other interactions between contaminants." Also, please provide a few examples.

32. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-11, element K2, Table 4.2-1**

"Disturbance of the soil surface by vertebrates also affects the rates of erosion processes."

Vertebrates have the ability to disturb both surface and subsurface soils. Also trees' and shrubs' root systems have the ability to penetrate into the deep subsurface disturbing the integrity of consolidated material and this action may bring contaminant to the surface. LANL should revise this concept/hypothesis to include the ability of vertebrates to disturb integrity of subsurface soils that might promote erosion.

33. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-11, element L4, Table 4.2-1**

"Therefore, even if all such radioactive contaminants were attributable to Mortandad Canyon deposits, from a regulatory standpoint there is no significant risk on the mesa tops."

The technical basis or evidence in support of the statement that "from a regulatory standpoint there is no significant risk on the mesa tops" is unclear. Without this evidence, the statement appears to be premature and potentially misleading. LANL should delete the statement.

34. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-11, element M1, Table 4.2-1**

"Gaseous contaminants are not believed to occur in Mortandad Canyon at any significant levels."

This statement appears to be speculative and arbitrary and unsupported by any technically based evidence. As such, the sentence should be deleted unless the evidence in its support is provided.

35. **§ 4.2.1 Surface Water and Sediment Transport and Resultant Exposures, Page 4-12, 2nd paragraph**

This paragraph lists several human exposure pathways potentially associated with contaminated sediment. The list is, however, incomplete and it should include all relevant human exposure pathways considered by American Indian land use scenarios in the core document. Among those additional sediment-associated human exposure pathways should be inhalation of contaminated smoke particles from the burning of contaminated wood for heating, cooking, ceremonial uses as well as inhalation of volatile organic compounds and tritium, and dermal exposure to high energy beta-emitting radionuclides in sediments. Therefore, LANL should review and revise Section 4.2.1 to include all relevant human exposure scenarios and pathways consistent with those accepted by the core document.

36. **§ 4.2.2 Ground Water Transport and Resultant Exposures, Page 4-13, 3rd paragraph**

"Currently the alluvial ground water is not consumed by humans, but soil moisture does support vegetation that is used as forage by animals and for fuel and ritual or medicinal purposes by American Indians from San Ildefonso Pueblo."

If springs or seeps originating from the alluvial ground water are present or discovered in the canyon system and their water is occasionally consumed by people, the statement that "currently the alluvial ground water is not consumed by humans" may potentially be misleading. LANL should revise this sentence to read: "No springs nor seeps are known to be fed by the alluvial ground water and no humans use this water for drinking, but soil moisture does support vegetation that is used as forage by animals and for fuel and ritual or medicinal purposes by American Indians from San Ildefonso Pueblo."

37. **§ 4.2.2 Ground Water Transport and Resultant Exposures, Page 4-16, 5th paragraph**

"This mechanism requires further investigation to determine how far the vapor-aqueous-phase transport of tritiated water may extend or to determine at which point it no longer needs to be considered a significant risk potential."

Risks can only be evaluated after the nature, rate, and extent of contamination have been determined. It is, therefore, inappropriate to state that either the extent of contamination or the significance of risk should be determined. LANL should revise the sentence to read: "This

mechanism requires further investigation to determine how far the vapor-/aqueous-phase transport of tritiated water may extend.”

38. **§ 4.2.3 Biological Transport and Resultant Exposures, Page 4-17, 2nd paragraph**

“The dropping of leaves and other dead or dying plant tissues also returns contaminants to the ground where they are subject to erosion or dissolution.”

Contaminated plants or their parts may act as a secondary source of contamination. Possible contaminant release mechanisms would include erosion of accumulated plant material and dispersion rather than dissolution. LANL should revise the sentence to read: “The dropping of leaves and other dead or dying plant tissues also returns contaminants to the ground where they are subject to erosion or dispersion.”

39. **§ 4.3 Refinement of the Conceptual Model, Page 4-18, 3rd paragraph, 4th bullet**

“Actual data to document possible exposure of canyon occupant by resuspension.”

If contaminated sediment resuspension is of concern, please say so, otherwise remove this bullet.

40. **§ 7.1.5 Overview of Information to be Collected, page 7-5, Bullets**

“Identification of contaminant concentrations and distributions in (1) sediments, (2) surface water, (3) groundwater, and (4) the biological environment in the Mortandad Canyon system within and outside the Laboratory Boundaries”

Bullet 1: Please include in the text **“(1) sediments and other soils”**.

“Identification of contaminant transport pathways and improvement in understanding transport mechanisms and the ability to predict the potential for movement of present day contaminants to off-site areas”

Bullet 3: Please indicate the activities identified in this work plan and other work plans that will be used to determine transport mechanisms.

41. **§ 7.2.2.1 Geomorphic and Radiological Survey Data Quality Objectives, page 7-7, last paragraph**

“Radiation screening results and laboratory analyses will be examined to determine whether the original geomorphic units are appropriate to define the contaminant inventories and risks using average values for these units”

First, RPMP does not allow screening data to be directly used in the assessment of risk. Secondly, LANL should remove “...and risks using average values for these units” from this statement as it is not known if this approach is appropriate prior to data analysis.

42. § 7.2.2.1 Geomorphic and Radiological Survey Data Quality Objectives, page 7-8

"Limited sampling of older sediments may be conducted to test the validity of criteria for distinguishing post-1942 sediment and to gauge the importance of the other potential contaminant pathways"

Please identify the criteria used to determine the "limited sampling" and confidence level that the "limited sampling" will achieve in order to test the validity of the post-1942 sediment identification.

43. § 7.2.3 Technical Approach for Sediment Investigation, page 7-11, first paragraph

"Supplemental measurements such as field radiological data and the sizes of sediment deposits, may be made in intervening areas to improve confidence in extrapolation between reaches"

RPMP believes that supplemental measurements of the intervening areas are needed to improve confidence and reduce uncertainty in transport models and any risk assessments conducted for Mortandad Canyon.

44. § 7.2.6.3.2 Inorganic Chemicals and Radionuclides, page 7-38

"Radionuclides with half-lives less than 365 days are not considered to be COPCs."

LANL should provide the rationale for this statement. The radionuclides with short half-lives (less than 365 days) should be considered as COPCs. The daughter products may have longer half-lives and if these radionuclides are currently being discharged in the TA-50 effluent they are present and will add to any calculated present risk scenario.

45. § 7.2.7 Characterization of Potential Release Sites in Mortandad Canyon, pages 7-40 and 7-41

This section should include characterization of "Pratt Canyon", historic TA-35 discharges, possibly TA-48 issues, etc.

46. § 7.3.2.1 Surface Water and Alluvial Groundwater Data Quality Objectives, page 7-52

A thorough water balance study should be conducted on the Mortandad Canyon watershed so that a reasonable model may be developed.

47. § 7.3.2.1 Surface Water and Alluvial Groundwater Data Quality Objectives, page 7-53

"Sampling of the upgradient alluvial well will be conducted semiannually"

RPMP will require quarterly sampling of the upgradient well for at least two (2) years so that seasonal variations can be more adequately understood.

48. **§ 7.3.2.2 Bandelier Tuff and Regional Aquifer Groundwater Data Quality Objectives, page 7-55**

"Continuous groundwater levels will be recorded for two years in wells containing pressure transducers."

Please indicate which wells will be equipped with pressure transducers.

49. **§ 7.3.2.2 Bandelier Tuff and Regional Aquifer Groundwater Data Quality Objectives, page 7-55**

"Data needed to evaluate potential impacts from contaminant transport within or outside the Laboratory boundary must provide adequate validation of models of aquifer distribution and transport properties to evaluate trends over time relative to present-day risks"

Please discuss the approach to model "validation" and define "adequate validation".

50. **§ 7.3.3 Technical Approach of for Surface Water and Groundwater Investigation, Table 7.3.3-1, page 7-59**

Clarify if the designation of the replacement well for MCO-3 is MCO-3a or MCO-3 as indicated in the table.