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ER ID NO. 57587 ***Date Received:*** 5/1/98 ***Processor:*** YCA ***Page Count:*** 11

Privileged: (Y/N) N ***Record Category:*** P ***Record Package No:*** 0

FileFolder: N/A

Correction: (Y/N) N ***Corrected No.*** 0 ***Corrected By Number:*** 0

Administrative Record: (Y/N) Y

Refilmed: (Y/N) N ***Old ER ID Number:*** 0 ***New ER ID Number:*** 0

Miscellaneous Comments:

REFERENCE CITED

THIS FORM IS SUBJECT TO CHANGE. CONTACT THE RPF FOR LATEST VERSION. (JUNE 1997)

4010

(11) CR ID# 57557

MDA Focus Area, TA-49
RFI Sampling, BMP Activities, and Asphalt Pad Removal
Material Disposal Area AB- Areas 2, 2A, and 2B

WASTE CHARACTERIZATION STRATEGY FORM

OU Number/Focus Area	PRS/SWMU Number	Title
OU1144 / MDA	PRS 49-001(b, c, and d)	RFI Sampling, BMP activities, and Asphalt Pad Removal at MDA AB - Area 2, 2A, and 2B
All Waste Types or Waste streams: Asphalt, decon fluids, PVC pipes, and PPE.		

Completed By: Bennie Martinez	Date: March 6, 1998
FPL: Allyn Pratt	WMC: Bennie Martinez
Type of Activity (site investigation, EC, etc.): Interim Action (Performance Measure)	

Description of the Activity:

In preparation for the planned remedial action at TA-49- Areas 2, 2A, and 2B, as described in the RCRA Field Investigation (RFI) Sample and Analysis Plan (SAP), the following activities will be conducted

1. A RFI-driven SAP including land, radiological, and geophysical surveys will be performed at Areas 2, 2A, and 2B at MDA AB in order to determine the positions of subsurface experimental shafts, determine if there is any surface contamination, and to locate near-surface potentially contaminated debris. The presence, location, and elevation of the cement plugs on top of each shaft will be confirmed using an electric rotary hammer drill and/or hand auger to penetrate the subsurface. Subsurface media will be sampled every 12 inches to the top of the cement plug. Samples will be field screened for gross radiation levels and sent to the ESH-1 lab to analyze for tritium. Asphalt samples will also be taken and sent off site for waste characterization analyses. Additional samples, both on and off the asphalt pad, will be collected in the northeast corner of Area 2 where historical sampling has shown elevated radionuclide levels.

2. Core Hole 2 (inside Area 2, approximately 501 ft deep), the two 150 ft boreholes in Area 2, and all the moisture monitoring wells located in MDA AB Areas 2, 2A, and 2B will be plugged and abandoned. This work will entail removing the steel (or PVC) casing, and backfilling the hole with grout. In the case of Core Hole 2, a video log will be taken of the hole before it is backfilled. Decontamination fluids produced from the decontamination of the geophysical instrument used for the logging will be sampled and sent out for off-site waste characterization analysis. The ODEX steel casing that is removed from the two 150 ft boreholes and the PVC casing from the moisture monitoring wells will be screened using hand-held organic and radiological instruments, swiped on the outside to determine any radiological contamination, and then it will be sent to TA-50 for decontamination. The metal casing will then be sent to the ER drilling yard for reuse and the PVC casing will be disposed of at the county landfill.

3. The Area 2 asphalt will be removed and disposed of according to waste characterization sampling data collected from the RFI sampling (as detailed later on this form and in the SAP). Based on sufficient process knowledge and on the history of this site, a common sense approach which can reasonably be defended will be used for characterization of the asphalt. During the excavation, any of the asphalt that is above radiological screening limits (i.e., 50 cpm for alpha and 200 cpm for beta [ESH1-2-0.2 Rev.1]) will be sampled and sent in for waste characterization analysis. Contingent upon the New Mexico Environmental Department's approval of the Interim Action Plan and allowing the three SWMUs at Area 2 (i.e., 2, 2A, and 2B) be considered one large SWMU; the underlying nonhazardous fill will then be mixed with clean fill that will be brought in from off-site to dry the material down to an acceptable level (10% moisture by weight), and then spread over the three SWMU area as a base for the engineered cover to be put into place in FY99. As detailed later on this form, if the EM/SWO group allows the asphalt and underlying fill at Area 2 to be disposed of at their facility at TA-54 the scope of work would change dramatically in that only Area 2 would be covered with an engineered cover.

Received by ER-RPF
MAY 01 1998

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Acceptable Knowledge

Site Description, Site History, and Historical Waste Generating Processes or Activities. (Include dates for site history):

Material Disposal Area (MDA) AB was the location of nuclear-related experiments performed from late 1959 to mid-1961. The MDA consists of six separate experimental Areas (1, 2, 2A, 2B, 3, and 4). Kilogram levels of both characteristic hazardous and transuranic waste was left in place after the subsurface nuclear experiments were completed. There is 90,000 kg of lead, a toxicity characteristic metal, and approximately 80% of Los Alamos National Laboratory's transuranic waste is located at MDA AB. Besides lead, the other contaminants of concern and their amounts include: enriched and depleted uranium (93 and 82 kg, respectively), plutonium (40 kg), and beryllium (13 kg). The majority of the contamination at MDA AB is subsurface at depths which range from 31 to 142 ft. Little other use has been made of MDA AB since the early sixties.

SWMU 49-001(b): Experimental Shafts Area

SWMU 49-001(b) is Area 2 of MDA AB. It is covered by a 125 ft x 150 ft asphalt pad approximately 8 inches thick. During the 1960s nuclear experimentation some Area 2 experiments used a downhole neutron source that expended a total of a few curies of tritium, now decayed through almost three half-lives. In November 1960, unexpected contamination occured during the drilling of Shaft 2-M (located in the north central portion of Area 2). In this incident Shaft 2-M was contaminated by Shaft 2-L (which had been shot with plutonium in April 1960) when the 2-M shaft drift was inadvertently oriented in the wrong direction, causing radioactive-contaminated material to be brought up to the surface contaminating the surface soil at Area 2. In December 1960, alpha contamination in excess of 100,000 cpm was noted in the as-yet empty shaft 2-M. Monitoring indicated that surface contamination was as high as 800,000 cpm. Lower levels of contamination were found on clothing, tools, and vehicles. An investigation of the incident indicated that no personnel were contaminated. To prevent further spread of contamination, the whole Area was capped with about 6 ft of crushed tuff and soil fill material followed by sealing it at the surface with 4 to 6 inches of asphalt. In March 1975, a 6 ft X 3 ft wide hole was discovered where the asphalt pad had collapsed over backfilled Shaft 2-M. At that time a significant amount of snowmelt infiltrated the subsurface. Unfiltered samples of the water bailed from Core Hole 2 in October 1977 and August 1978 contained 1.7 to 3.1 pCi/g of Pu-239. Elevated radioactivity (Am-241: 38 pCi/g, Pu-238: 24 pCi/g; Pu-239: 43 pCi/g) was also detected in a soil sample collected from pocket gopher diggings in the northeast corner of the asphalt pad in 1987. The gopher diggings were sampled again in April 1991 with similar results (1200 pCi/g gross alpha activity). In FY94 subsurface sampling was completed when four 10 ft and two 150 ft boreholes where drilled through the pad. Core samples from these holes indicated no lateral migration of contaminants, however, elevated moisture readings (10 to 40% moisture by weight) indicated that moisture had accumulated beneath the pad. The only isolated hit detected during the FY94 drilling activities was at the 3 ft level of the northeast 10 ft borehole where 291 pCi/g of Pu-239 and 59 pCi/g of Am-241 were detected. About 212 fifty-five gallon drums of liquid and solid waste were generated from the FY94 drilling activities. Of these, only 39 drums of solid waste (characterized as low level rad) were sent to TA-54 at Area G for disposal.

SWMU 49-001 (c and d): Experimental Shafts Area

SWMU 49-001(c and d), are Areas 2A and 2B, respectively. Area 2A lies just west of Area 2 and includes six shafts. Area 2B is directly south of Area 2 and includes six shafts although an additional 19 holes were either proposed or were just backfilled and not shot. The only activities which have occured in these locations, besides the moisture monitoring well measurements completed by environmental surveillance personnel, has been surface soil sampling which was conducted in FY93. No surface soil contamination was detected at Areas 2A and 2B; however, about 14 pCi/g of Pu-239 (below the screeening action level) was detected in the culvert drainage just northeast of Area 2.

Previous Investigation Analytical Results (Report the analytical methods and results above background levels.)

Isotopic plutonium analysis was completed by alpha spectroscopy and Am-241 results were obtained by

gamma spectroscopy. Total uranium analysis was done by kinetic phosphorescence analysis (KPA), which provided poor results. Isotopic uranium by alpha spectroscopy is currently being analyzed on archived core samples from Area 2. Analytical methods CLP ILM02.1 and ILM03.0 Metals were used to do RCRA metals analysis. See above under Site Description, etc. for the results.

Waste Description

Description of Waste Type, Potential Contaminants, Volume Estimate, and Waste Packaging

Based on acceptable knowledge (AK) criteria, there are no listed hazardous wastes that will be generated for all the waste types described below.

Asphalt: The entire 125 ft x 150 ft asphalt pad at Area 2 will be removed as a first step in correcting the elevated moisture in the underlying fill material. Once all of the asphalt is removed the moist fill will be mixed with clean, noncontaminated fill which will be brought in off-site to reduce the moisture content. After a 10% moisture content is achieved from the mixing of the two materials, the fill mixture will be spread over Areas 2, 2A, and 2B. This mix will act as the lower layer of an engineered cover that will be completed in FY99. Approximately 602 cubic yards of asphalt waste (based on a 30% expansion factor) will be generated. Potential contaminants of concern include beryllium, lead, 238 and 239-Pu, 241-Am, 235 and 238-U, and tritium; however, based on previous soil sampling results no RCRA metal nor radioactive contamination is expected. It is highly likely that the explosives used in the nuclear experiments at Areas 2, 2A, and 2B (except for the barium component) were consumed with high efficiency in the detonations, and therefore are of no concern for asphalt waste characterization purposes. Other chemicals used in very limited quantities at TA-49 (including VOCs and SVOCs) were used primarily for radiochemistry and photographic purposes mainly at Areas 5 and 11, and are therefore also of no concern at Area 2. However, due to asphalt material concerns at TA-54 along with DOE and Los Alamos County issues, a few asphalt samples will be collected and analyzed for volatile and semi-volatile constituents. It is anticipated that all or most of the asphalt material will not be contaminated, however, due to past sampling results indicating localized radioactive contamination, a Radiological Control Area (RCA) controlled for volume contamination will be maintained near the excavation site. A roll-off bin will be staged at the site to containerize any asphalt determined through field screening or off-site analytical results to be radiologically contaminated. All rad contaminated asphalt (believed to be no more that 20 cubic yards in volume) will be taken to TA-54, Area G for disposal after it has been properly crushed and characterized. It is anticipated that the majority of the asphalt material will be loaded and hauled off in dump trucks to an asphalt recycling plant in Santa Fe, NM after it has been characterized as clean, nonradioactive/nonhazardous material to be recycled. Another option for the clean, nonradioactive/nonhazardous asphalt material is to use it as road base at TA-16 or dispose of it at the county landfill if for some reason the plan to get the asphalt recycled doesn't work out.

Soil: No soil waste will be generated unless approval is given by EM/SWO to dispose of the entire fill material that is beneath the asphalt pad in Area 2 at TA-54, Area G. If this approval is given, the volume of soil material that will need to be removed is estimated to be between 3000 and 5000 cubic yards. This also means that no clean, noncontaminated fill will need to be brought into Area 2 since the wet fill can be disposed of elsewhere. The original plan of removing the fill underneath Area 2 and installing the engineered cover only over Area 2 could then be implemented.

As explained above, during the SAP activity, samples will be taken every foot and radiologically field-screened for gross alpha and beta. If screening levels are not above action levels as described in the SSHASP, they will be placed back into the hole. If the readings are above SSHASP levels, the soil will be containerized in a 30-gallon drum, a sample will be taken and sent out for off-site analysis to determine actual levels of contamination and for waste characterization purposes.

Decontamination fluids: During the Best Management Practices borehole plug and abandonment activity decontamination fluids will be generated. It is anticipated that about 10 gallons of decon fluids will be generated from decontamination of the geophysical instrument used for the borehole logging of Core Hole 2. Although there is a possibility that the fluid could be low level rad contaminated, it is believed that the waste classification will be nonhazardous/nonradioactive. This fluid will be containerized in a 30 gallon drum and placed in a < 90 day hazardous waste storage area until waste characterization sampling results from one sample are obtained and the waste classification is determined. Off-site lab analysis for RCRA metals, VOCs, SVOCs, TSS, TOC and Nitrate/Nitrogen will be completed and a sample will be taken and

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sent to the TA-21 laboratory for alpha and beta analysis (which is all that is required for acceptance into the TA-50 liquid waste facility). In addition, there may be a minor amount (about 20 gallons) of decontamination fluids from borehole casing decontamination at TA-50. A representative subsection of casing (i.e., the most likely depth to be contaminated), will be sent to TA-50 to be decontaminated. The decon fluids generated from decontamination of the subsection of casing will be containerized in a 30 gallon drum, sampled, and analyzed for RCRA metals. If the results indicate no RCRA metal contamination, the liquid will be disposed of at the TA-50 liquid waste facility and the decontaminated casing will be sent to the EM/ER drilling yard to reuse. These latter results will determine if the remaining casing decon liquid waste can be disposed of at TA-50 or if it will have to be sent off-site as a hazardous waste. If the liquid waste is classified as hazardous or mixed waste, arrangements will be made with the EM-SWO group to ship it off-site.

PPE: Launderable PPE coveralls will be used for all the activities described on this form as much as possible. However, during some of the activities, such as the asphalt removal where alot of mud will be encountered, disposable tyvex coveralls will be worn. It is anticipated that approximately four 55-gallon drums of PPE waste will be generated and will be classified according to the asphalt waste characterization. Based on past sampling data at Area 2 it is believed that all the PPEs will be nonhazardous, nonradioactive waste that can go to the county landfill for disposal.

Metal, Wood, Concrete, and PVC: All the metal borehole casing removed from the site will be reused by the ER drilling crew after the casing has been swiped for radiological contamination, released from the site, and taken to TA-50 for decontamination. As excavation of the asphalt proceeds, chain-link fencing and metal fence poles will need to be removed. The plans are to reuse the fence materials at the site as much as possible. Any minor amount of radiologically-contaminated fencing or concrete on fence posts will be buried within the Area 2, 2A, and 2B SWMU boundary under the 10% fill mixture mentioned earlier on this form.

It is anticipated that several wooden electric line poles will need to be taken down during the asphalt excavation. Every effort will be made to reuse the poles at the site, or if that is not possible, they will be swiped for radiological constituents to get released from the site, and returned to JCI for reuse elsewhere at LANL.

The 2 and 4 inch PVC borehole casing at the site will be swiped for radiological constituents to get released from the site. The pipes will then be decontaminated at TA-50 and sent to the county landfill for disposal.

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Characterization Strategy

Description of Strategy / Waste Sampling*

A radiological survey over MDA AB, Areas 2, 2A, and 2B using a Field Instrument for the Detection of Low Energy Radiation (FIDLER) will be performed and documented to determine any surface contamination. It is anticipated that there will be no surface contamination detected, however, if contamination is found, the contaminated area will be roped off and posted as a surface-soil radiological contaminated area. A geophysical survey and land survey will also be completed to locate potentially contaminated near surface debris that may present a potential hazard during excavation, and to locate the subsurface shafts. After the shafts and debris have been located, an electric rotary hammer drill and/or hand auger will be used to penetrate the subsurface and determine the presence, location, and elevation of the cement shaft plug. About 30 of these boreholes will be drilled. Along with the H&S subsurface media sampling, approximately 30 samples will be taken of the asphalt. Since composite sampling is encouraged (see ER-SOP-1.11) and analytical costs can be reduced substantially, the 30 asphalt samples will be composited into 5 composite samples and sent out for off-site analysis. Samples will be taken from the top and bottom portions of the asphalt to check for contamination on either side. Based on process knowledge and site history which strongly suggests that contamination will not be found in the asphalt, it seems more than reasonable to believe that 5 composite samples will be adequate to defend a decision that the asphalt is clean, recognizing that these composites will reflect information from about 30 locations**. If any of the composite samples indicate that there is contamination present, then a second phase of sampling will be performed in order to segregate the contaminated portion of the asphalt. These waste characterization samples will be analyzed for RCRA metals (plus beryllium), isotopic plutonium, isotopic americium, and isotopic uranium. In addition to these analyses, two asphalt samples collected prior to compositing will be analyzed for PCBs, volatile constituents, and semi-volatile constituents. Also, since tritium cannot accurately be determined from asphalt media at an off-site lab, wet swipes from the bottom of the asphalt samples at each of the approximately 30 boreholes (i.e., a total of 30 wet swipe samples) will be taken and analyzed at the TA-21 laboratory for tritium content.

Contingent upon what is found during the asphalt excavation, if the waste characterization analysis indicates the asphalt is clean and nonhazardous, arrangements will be made to ship the material to a certified asphalt recyling plant in Santa Fe, NM (i.e., Associated Asphalt and Material Company). If for some reason the asphalt cannot be recycled, the clean, nonradioactive/nonhazardous asphalt material will be sent to TA-16 to be used as road base or to the county landfill for disposal. During the excavation of the asphalt, if there are any hot spots detected during rad field screening the asphalt will be sampled ***(as explained below) and sent out for off-site analysis. Any asphalt material that has been found to be radiologically contaminated during excavation screening will be loaded into a roll-off bin located in an on site radiological control area until waste characerization results have been obtained. If no hot spots are detected on the excavated asphalt, the waste will be loaded into a dump truck and hauled off-site to the asphalt recyling plant.

Decontamination fluids generated during borehole plug and abandonment activities will be handled as described in the **Waste Description** section above.

Also, as explained above, the PPE waste will be stored and handled according to the asphalt waste characterization classification.

* A sample of homogeneous or heterogeneous waste collected for VOC analysis should consist of a grab sample rather than a composite sample.

** A memorandum from the statisticians to the waste management coordinator for this project is attached to this form for reference to why this asphalt waste characterization approach was taken.

*** The small amount of radiologically contaminated asphalt that is anticipated to be at Area 2 will be crushed on site, containerized in a roll-off bin from which a composite sample will be taken for waste characterization. The low level rad asphalt will then be sent to TA-54, Area G for disposal.

Analytical Strategy

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Analyte Category	Analytical Method	May be Present (yes, no, unknown)	Direct Sampling of Containerized Waste	Acceptable Knowledge Existing Information	Acceptable Knowledge - Data from Proposed Site Characterization
Volatile Organic Constituents	SW-846 8240B	unknown	X		
Semivolatile Organic Constituents	SW-846 8270B	unknown	X		
Organic Herbicides		no		X	
Pesticides and PCBs	SW-846 8080A	unknown	X		
Total Metals (RCRA + Beryllium)	SW-846 6010	yes	X		
Total Cyanide		no		X	
Other Inorganic/Organic Constituents (specify) TSS, TOC, and Nitrate/Nitrogen	EPA 600 - TSS 160.2 TOC 415.1 NO3-N 353.2	unknown (only for decon fluids)	X		
High Explosive Constituents		no		X	
Asbestos		no		X	
TPH		no		X	
TCLP Metals		no		X	
TCLP Organics		no		X	
TCLP Pesticides and Herbicides		no		X	
Gross Alpha	Ludlum Model 12 Survey Meter & TA-21 Lab	yes	X		
Gross Beta	Ludlum Model 12 Survey Meter & TA-21 Lab	yes	X		
Gross Gamma		no		X	

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Tritium	Liquid Scintillation	unknown	X		
Gamma Spectroscopy		no		X	
Isotopic Plutonium	Alpha Spectroscopy	yes	X		
Total Plutonium		no		X	
Isotopic Uranium	Alpha Spectroscopy	yes	X		
Total Uranium		no		X	
Strontium-90		no		X	
Isotopic Americium	Alpha Spectroscopy	X	X		

Preliminary RCRA Determination

Based on past surface and subsurface soil sampling results, the entire waste should be non-RCRA, and no hazardous waste is anticipated.

Preliminary RCRA Status

__X_ Non-RCRA: (No 90-Day Storage Requirement)
Describe how waste will be stored/handled See above for details

____ RCRA: (90-Day Storage Requirement)
Waste will be stored/handled in accordance with 20 NMAC Generator Requirements

Preliminary Determination for Radioactivity

Based on past surface and subsurface soil sampling results, there may be some radiologically-contaminated waste, although the majority will probably be non-rad.

There may also be some low-level tritium contaminated waste

Preliminary Radioactivity Status

__X__ Material is not radioactive (except for minor amounts)

_____ Material is radioactive

Waste Material Storage/Handling:

If there is any RCRA hazardous asphalt waste encountered, it will be stored in a roll-off bin in a < 90 day hazardous waste storage area on-site until arrangements can be made to ship it off-site. Decontamination fluids will also be stored in closed 30 or 55-gallon drums on site in a < 90 day hazardous waste storage area as a hazardous waste pending analysis, until analytical results are received and appropriate disposal can be arranged. Any asphalt that is characterized as clean, nonhazardous, nonradioactive waste will be hauled off site in dump trucks to a certified recycling plant in Santa Fe, NM. Any asphalt waste that is only radiologically contaminated will be crushed on site and placed in an on-site radiological control area in a roll-off bin until it is characterized and arrangements can be

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made to send it to TA-54, Area G for disposal PPEs will be stored in 55 gallon drums in the radiological control area on site pending analysis of the asphalt

Signatures:

Field Team Leader _____

Field Team Waste Management Coordinator _____

Waste Management Representative _____

NEPTUNE AND COMPANY, INC.
1505 15th Street, Suite B
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Phone: 505-662-2121 Fax: 505-662-0500

To: Bennie Martinez, LANL

From: Paul Black, Lance Voss

Date: 5 March 1998

Subject: Statistical basis for Waste Characterization

MEMORANDUM

Due to the time frame remaining to complete a Waste Characterization Strategy Form, we've put together this memorandum for you to explain quickly the difficulties associated with generating a statistically based design for waste characterization at the TA49 asphalt pad.

Over the course of the last month we have shared information with the goal of providing a statistical basis for the waste characterization of the asphalt at Area 2 (TA49). We have several documents that have helped put some pieces together, but, unfortunately there is still insufficient information to provide a statistical basis.

Documents that we have considered include:

"Waste Analysis Requirements" (from a recent RCRA training course - information that you forwarded to us - provides the statistical methodology for number of samples required to justify waste characterization decisions)

Waste Management Plan - which provides some limits for radionuclides that appear to distinguish between LLW and HLW, as opposed to providing information to distinguish between LLW and clean product.

Waste Profile Form - which provides TCLP limits for inorganics and organics, but does not provide specific WACs for radionuclides (simply radioactive vs. non-radioactive).

LANL-ER-SOP-1.10 - Waste Characterization - which describes LANL ER's procedures for waste characterization, which again provides no information on WACs for radionuclides (it does, however, provide justification for composite sampling which can be used to substantially decrease analytical costs).

LANL-ER-SOP-1.11 - Radioactive Waste Management for ER Project Field Operations - this document references various guidance documents including DOE Order 5400.5, 10 CFR 20, but again does not lead to WACs for radionuclides.

At this time insufficient information has been found (or is available) to be able to provide a statistically based sample design for a waste characterization decision for the asphalt at this site.

The statistical process laid out in the RCRA training (which happens to not be consistent with the DQO process), requires several inputs including an expected mean concentration, and an expected variance, both of which can be judged reasonably from process knowledge and available data; a level of statistical confidence that is desired (which really relates to out threshold for making the wrong decision, and hence should be provided by "project" management with help from the statistician to interpret the input - but could otherwise be set at a default value (not a good move, but usually inevitable)), and a regulatory threshold (i.e., WAC).

At the very least we do not have WACs available, hence the statistical design cannot be performed. We have also talked to Diana Hollis about the absence of WACs, and she confirmed that this has been an item that has been overlooked for some time, and that it needs to be addressed by WM.

For this site we do not believe that all is lost. We believe that there is sufficient process knowledge that a common sense approach can be reasonably defended. This is because we do not expect to find contamination in the asphalt. Based on the history of the site, there is no known mechanism to cause contamination of the asphalt. Our opinion is that, if optimal sample size calculations could be performed, that, given our understanding of the site (contamination is not expected at all), that the optimal sample size would be extremely small.

We also note that as this is a waste characterization problem that composite sampling is allowed, and even encouraged (see ER-SOP-1.11). We also note that the SAP requires drilling of approximately 30 boreholes for other purpose. Our belief is that based on the available information at this site, it is more than reasonable to composite the asphalt component of these boreholes into 5 composite samples, and to conduct analyses for radionuclides, inorganics and PCBs for these composites.

If any of the composites show results that were not expected, then a further round of sampling can be performed later (confirmed with Jim Santo that this is not unreasonable).

There is another statistical approach that can be taken that is based on presence or absence (e.g., detection or non-detection) that would probably

work well at this site, especially for inorganics and organics. However, this approach also requires input from the project team that we do not have at this time. Our guess is that we so strongly expect not to detect any inorganics or organics (other than those that comprise asphalt) that the optimal sample size would be zero. In which case, taking a few samples to verify our conceptual understanding of the site seems reasonable.

In summary, insufficient information is available to provide statistical justification for a sample design, but given process knowledge (which strongly suggests that contamination will not be found in the asphalt) it seems more than reasonable to believe that 5 composite samples will be adequate to defend a decision that the asphalt is clean (it should be recognized that these composites will reflect information from about 30 locations). If a composite sample shows otherwise then a second phase of sampling can be performed. This is what we will put in the SAP at this time.

(Please note that one additional asphalt sample might be collected from the subsurface around shaft 2-M because of the collapse that occurred in the past).