



October 24, 2012

Dr. Peter Lee
United States Nuclear Regulatory Commission
Division of Nuclear Materials Safety
U.S. NRC Region III
2443 Warrenville Road, Suite 210
Lisle, Illinois 60532-4352

SUBJECT: Release of west lagoon and surrounding area – Supplemental information for initial request (ML 120650756, as amended).

Dear Dr. Lee:

I am writing to request the ABC Laboratories former lagoon (now closed) and the surrounding area be released without restriction. We have completed the engineering work, as well as soil and water sampling with a summary of the results attached. If this request is successful, the ABC Laboratories licensed activities will then be confined to the current buildings in which licensed activities are conducted; hence, none of the grounds associated with license will then be restricted. I am requesting this be done as an amendment to the ABC Laboratories license – 24-13365-01. Following the approval of that amendment, our 10.CFR.30.36 records will reflect that the areas containing and surrounding the lagoon as well as the lysimeter field are unrestricted.

The basis of this request is that the total dose from the sediment placement in the maximum year will be less than 25 mrem to the most impacted person (10.CFR.20.1402), and that the representative soil concentration for remainder of the site is less than the screening value of 12 pCi/g (NUREG 1757). The dose estimate for the lagoon itself was submitted along with the closure plan (ML120650756). In addition, we show that there is no opportunity to significantly impact any aquifer and that localized groundwater is substantially below the Maximum Contaminant Level (MCL) of 4 mrem/y (2,000 pCi/L).

AREAS REQUESTED FOR RELEASE

West Lagoon

The west lagoon, which was operated as a sanitary lagoon until 2004 (Attachment 1), was characterized (Attachment 2 and Appendices 1a – 1f) prior to the dewatering and placement as described in ML 120650756. Figure 2 shows the locations of the sediment samples taken directly from the lagoon with results in Appendix 2f, and sampling is described in Attachment 8.

Drain Field, Application Area and Downslope Area - proximate areas

The areas surrounding the lagoon – the drain field, application area, downslope, creek and sewer line have also been characterized. Soil results were collected in a biased manner to sample the most potentially impacted areas, with drain field and application area samples taken near the distribution piping, and downslope samples from the surfaces that would have had the most exposure to any lagoon effluent. Creek sediment and sewer line samples were taken to measure any radiocarbon in the area, though there were no expectations these were at a measurable level. Figure 1 shows an aerial photograph, annotated to show the location of the lagoon placement,

soil sample locations and monitoring well locations. These are shown and discussed in Attachment 3, with analyses in Appendices 2a – 2f). The distribution piping was expected and found to be less than 5,000 DPM per 100 cm², and was disposed (Attachment 4).

Monitoring Wells

Numerous monitoring wells have been installed to exceed the “triangle” pattern normally regarded as sufficient. We have taken into account the direction of water flow and the use of the site, placing wells proximally to lagoon site and in both layers of soil. Nine monitoring wells have been installed and tested. The results are tabulated in Attachment 5 and certificates of analysis are shown in Appendix 3. Sampling includes wells screened in either clay or shale, as well as some screened simultaneously in both matrices. Wells were placed in the maximally contaminated areas as well as outside the contaminated area and medial to the contaminated area; hence I am confident that we have sampled the groundwater of highest concentration. These data show clearly that the areas of highest concentration are well below the MCL of 2,000 pCi/L. Moreover, there is no potential for impactful migration to any aquifer, since the concentration is already so low, clay and the underlying shale are effective barriers to downward movement and any aquifer is several hundred feet below the surface. Water from the immediate site will not be available for human consumption.

Lysimeter Field

Although not related to the function of the lagoon, the area known as the lysimeter field was investigated and found to be uncontaminated (Attachment 6 and Appendix 4). I am including these data because this area had been discussed over the years and suspected of containing contaminated areas, however characterization shows that the area is free of contamination.

RESULTS

Placement Status

As is detailed in ML 120650756, the final placement of the sediment, along with the sidewalls of the lagoon resulted in a contaminated volume of 1,782 cubic yards at a conservatively estimated concentration of 32.7 pCi/g. The placement of sediment and soil is consistent with Missouri requirements for lagoon closure, with any sediment now located at least three feet from any surface soil. The radiological dose was estimated using RESRAD and the maximal dose is estimated to be 0.2 millirem in the worst year (mrem/y).

Soil Results for the Area Surrounding the West Lagoon

Soil results are shown in Attachment 3. The highest soil concentration was 26.3 pCi/g and was located immediately beneath the distribution piping. A representative concentration of 6 pCi/g is obtained, well beneath the screening value of 12 pCi/g. Since the area is small and the concentration is well beneath the screening value, even with biased sampling, no dose estimate has been calculated for this area. Even at these low levels, the concentrations decline rapidly with distance, indicating both the sampling employed was successful in finding the areas of highest contamination and that all measurable levels are contained within the top few feet of the clay layer, with little penetration.

Monitoring wells results

Results from the various monitoring wells are compared to the Maximum Contaminant Level (MCL) for carbon-14 of 2,000 pCi/L. The highest result obtained – 532 pCi/L – was from the most shallow well in the most exposed region – consistent with the operation of the lagoon. The representative concentration was 126 pCi/g – 6% of the MCL. The northern vector is bounded by the operational berm as is demonstrated by the absence of radioactivity in Well 7. The flow of water, from east to west, provides a boundary to the east as demonstrated by the absence of radioactivity in wells 3a and 3b. The western boundary is defined by the small creek which terminated any water flow across the site. While we do not demonstrate absence at the southern boundary, the level at the southernmost monitored point is well beneath the MCL and diminishing, therefore it is established that the maximum concentration occurs in the area of Well 6a and concentrations diminish to the south. The well data also indicate that water sampled within shale, even in the most contaminated region of the site (6b), is beneath the method reporting levels of 50 pCi/L. Hence, all measurable levels result from collection of water samples screened in the clay soil, and none from soil screened in shale. All data are consistent with retention of any radiocontamination in the clay layer of soil, with little or no downward migration. Any migrations of contamination is effectively limited by the impermeability of clay, the low concentration and topographically driven lateral water movement.

Lysimeter Field Results

Of 24 soil samples, 23 were beneath the reporting limit and one returned a result of 3.41 pCi/g. These data show clearly that the area has not been contaminated. With this amendment, I will reflect this area as non-contaminated in the site 10.CFR.30.36 records.

Certificates of Analysis (C's of A)

Results used in this determination were obtained by General Engineering Laboratories, Charleston, South Carolina using validated methods. These results are provided in the appendices as referenced for each set of analyses.

CONCLUSIONS

Contaminant is now contained in the lagoon placement as referred to in ML 120650756 (amended), and is estimated to have a maximal dose rate of 0.2 mrem/y. The representative concentrations for the remainder of the site are well beneath the screening value for soil of 12 pCi/g. The local water sampled by the monitoring wells is not available as a source for drinking, is severely limited with respect to any migration and is far below the MCL.

The site remainder is characterized by a very low level of radioactive carbon in the clay soil, which has been effectively immobilized near the distribution piping or soil surface, and may be expected to continue to diminish in concentration slowly over the upcoming years, principally thorough the topographically driven lateral flow of water. No measurable levels in either soil or water are found beneath the clay layer.

These data demonstrate that any doses in future years will be well less than 25 mrem/y – 0.2 mrem/y or less - and that the local water as represented by the monitoring wells is



Dr. Peter Lee

Page 4 of 4

October 24, 2012

unavailable for human consumption, well below the MCL and unable to migrate downward. On these bases, I request that the areas of the site containing the closed lagoon and the lysimeter field be released without restriction.

Please let me know if you have any questions.

Best Regards,

Bradly D. Keck, PhD, CHP
Radiation Safety Officer
Analytical Bio-Chemistry Laboratories, Inc.

cc: Troy DeVault, ABC Labs



Release of West Lagoon and Surrounding Area

Supplemental Information for Initial Request (ML11270525, as Amended)

Bradly D. Keck, PhD, CHP
10/24/2012

Table of Contents

Title Page.....	1
Table of Contents	2
Attachment 1 Operation of West Lagoon	3
Attachment 2 History and Status of West Lagoon	6
Attachment 3 Drain Field, Application Area, Downslope and other Soil Sampling	10
Attachment 4 Distribution Piping.....	12
Attachment 5 Monitoring Wells.....	15
Attachment 6 Lysimeter Results	17
Attachment 7 Summary of Chemical Investigations	19
Attachment 8 Sediment Sampling.....	21
Figure 1 Facility Sampling Map	23
Figure 2 Lagoon Sediment Map	25
Appendix 1a ¹⁴ C in Clay Bottom, 0-3" Depth.....	27
Appendix 1b ¹⁴ C in Clay Bottom, 0-6" Depth.....	39
Appendix 1c ¹⁴ C in Clay Bottom, 6-12" Depth.....	44
Appendix 1d ¹⁴ C in Clay Bottom, 12-18" Depth.....	49
Appendix 1e ¹⁴ C in Clay Sidewall, 6-12" Depth	54
Appendix 1f ¹⁴ C in Clay Sidewall, 12-18" Depth	60
Appendix 2a Drain Field Certificates of Analysis.....	66
Appendix 2b Application Area Certificates of Analysis	75
Appendix 2c Downslope Certificates of Analysis	82
Appendix 2d Creek Sediment Certificates of Analysis.....	89
Appendix 2e Sewer Line Soil Samples Certificates of Analysis.....	93
Appendix 2f Sediment Certificates of Analysis.....	97
Appendix 3 Monitor Wells Certificates of Analysis	116
Appendix 4 Lysimeter Certificates of Analysis	140

Attachment 1 Operation of West Lagoon

Attachment 1 Operation of West Lagoon

The sanitary lagoon at ABC Laboratories was operated from 1986 to 2004, at which time the site was connected to the local Publicly Owned Treatment Works (POTW). In the operating years, it served as the sole source of sewer for all the elements of the 7200 E ABC Lane site, including the primary purpose of sanitation, but also for rinsates from the lab, which involved some radiolabeled compounds.

Effluent from the sanitary lagoon was discharged to the site through two systems of pipes overlaying gravel beds as shown in [Figure 1](#). One system of approximately 600 linear feet discharged around the perimeter of the lagoon and to the north – this is described as the drain field. This system is terminated by a berm at the northern end of the field, so that any discharge would be turned back toward the west and south, and would not exit the site at the northern boundary. A second system of piping – about 300 linear feet, extended east of the lagoon into the surrounding field and is described as the application area. In the normal course of operations, the lagoon received sanitary and other discharge from the site. The solids settled to the bottom of the lagoon, becoming sediment, and the effluent was discharged to the two systems noted above. Once discharged, water would be distributed through the piping to the site. Consequently, the areas of greatest exposure were expected to be directly underneath the piping and, secondarily, on the surface in downgrade areas where water could work its way to the surface from the distribution piping, driven by the decreasing elevation in the east to west direction and the poor permeability of clay. Since the clay surrounding the lagoon in all directions is resistant to water flow and the elevation drops as the site goes from east to west – this is the direction of natural water flow, and is noted with an arrow on [Figure 1](#).

Monitor wells have been installed over time to provide radiochemical sampling capability on the site. Monitor wells 1 and 2 date to 2007; wells 3a, 3b, 4, 5, 6a, 6b and 7 were installed in 2010 and 2011. These wells were placed in locations that represent: wells outside the expected flow of the lagoon (3a/b and 7), the center of flow, hence maximum overall contamination (2, 6a), areas of decreasing flow, hence lower levels of contamination (wells 1, 4 and 5). Throughout this area the soil consists of clay on the top layer, a layer of shale in most cases underlying the clay, unless the limestone bedrock is directly underneath the clay. The wells most important to the maximum concentration observed are wells 2 (screened in both shale and clay) and well 6a (screened in clay). Wells 6b and 3b are the only wells that were designed to sample from the shale layer. (Shale collections were intended for well locations 4 and 5 as well, but these locations encountered rock and it was not possible to place the well into shale.)

This area is not an aquifer for human consumption for several reasons: 1) the yield of water from clay is simply too little to be of utility – even under wet conditions; 2) local ordinances do not allow drilling a new shallow well in this area, but connection to the municipal source is required for any new development; and 3) the local practice for a well of potable water here, if allowed, would be to drill to a much greater depth – the nearest well to these being approximately 1,000 feet deep and approximately 600 feet is considered to be minimal by the local engineering community. So, while these monitor wells are useful for monitoring very local conditions, they do not represent a useful source of drinking water. In evaluating the site for chemical contaminant with the Missouri Department of Natural Resources, the exposure pathway for water was regarded as incomplete, since there was no reasonable path for local groundwater, similar to the water from the monitoring wells, to become consumable water for humans. The results from these wells are compared to the US EPA Maximum Contaminant Level, - that

Attachment 1 Operation of West Lagoon

concentration which for carbon-14 results in 4 mrem per year exposure to a reference man drinking two liters per day – this is taken to be 2,000 pCi/L (confirmed by calculation (Keck)).

The site is now represented by two areas: 1) the lagoon placement for which a dose model was previously submitted (ML120650756); and 2) the remainder of the site which has been characterized in a conservative, biased manner, evaluating preferentially the areas most likely to contain contamination. This area, consisting of the drain field, application area, downslope area and creek, is here shown to be less than 12 pCi/g. These areas are indicated in [Figure 1](#).

Attachment 2 History and Status of West Lagoon

Attachment 2 History and Status of West Lagoon

Beginning operation in 1986, the lagoon was operated until 2004. It has been the object of non-approved decommissioning plans, NRC information requests and abandoned alternate disposal requests. This lagoon, as is normal, for most of this time contained several feet of water, which complicates the characterization and management of the lagoon and provides a potential issue in leakage. Key events in the progress of releasing this lagoon include:

- A. History of Termination requests.
- B. Characterization of the lagoon components (2010, with analyses in [Appendix 2](#))
- C. Dewatering of the lagoon and localization of the sediment to allow inspection of the bottom (2011).
- D. Placement of the lagoon sediment (2012).
- E. Request for release under 10.CFR.20.1402 (2011 – ML 11270525 as amended (2012) and this document).

No decommissioning plan has ever been approved for the west lagoon, but both decommissioning and alternate disposal requests have been sought by ABC Laboratories between 2009 and 2011. For a variety of reasons, these were all unsuccessful - being either withdrawn or not approved. The current request is for unrestricted release under 10.CFR.20.1402.

History of previously submitted plans

Decommissioning Plan Withdrawn and Replaced with Current Application

A decommissioning plan was submitted on October 19, 2009 by ABC Laboratories (ML 100120325). This plan was not approved, and was withdrawn in favor of this application. As part of that former plan, however, a number of analyses were submitted that might appear to be in conflict with the data submitted here. These data are in [Attachment 2](#) of that former plan and one type of data of the three submitted has been found to be inadequate. There are data in that attachment from three different methods of analysis: Water analyses done by Eberline labs (all in one table where it is the only type of data), soil analyses done by General Engineering Laboratories (in columns labeled as "QC") and soil analyses performed internally at ABC Labs in 2009 by the former RSO, Ms. Hecht. These data include tables: "Background Samples," "Historical Sanitary Ponds," "Historical Ponds Discharge," "Sanitary Lagoon," "Sanitary Lagoon – Top of Berm," "Application Field," and "Sewer Feed Samples."

Upon review of all these data, both the water samples performed by Eberline and the "QC" samples performed by GEL were found to be valid and also to agree well with the valid data obtained in this submission. However, as to the soil samples performed internally, I found several problems that led to me to find them invalid. There was not a description of the method so it is impossible to recreate with certainty what was done. No separation of sediment from clay was performed. There are no appropriate quality controls employed. There are no commonly used figures of merit, for example a minimum detectable activity or lower limit of quantitation. There was no record of a suitable quench curve existing (this would be very likely if one had existed at the time). There were also no indications that suitable techniques to control chemiluminescence or phosphorescence were used. The method that should have been used was a soil combustion method, but the technicians qualified to run this

combustion uniformly recall that they did not do these particular sets of samples and no records exist to show that they were run (logs of these instruments are again highly likely to exist if they ever existed). While I cannot say with certainty what was actually done, the likelihood is that soil mixture samples were simply added to liquid scintillation cocktail and counted – a process severely lacking for the stated purpose of quantitation. For these reasons, the results reported in all these tables, with the exceptions noted for water and “QC” samples, are simply neither quantitative nor reliable. These faulty data should not, in my view, be used as the basis of any decision to release or not release the placement of the lagoon as it currently exists, and the appropriate approach is to consider the data in the current application only which is technically sound, based on thorough, systematic sampling.

After a full investigation by ABC Management, the RSO of that time, her superior and the consultants who were instrumental in that decommissioning plan and were discharged from ABC labs in 2010 – in part due to this poor technical effort. New management and a new RSO were put in place. The Radiation Safety Program has seen much improvement since the change and continues to advance.

Alternate Disposal Consideration

There was also a plan to remove the sediment under an alternate disposal request, then release the remainder of the site by dose assessment; however, this did not prove to be feasible since it would have required the use of Missouri landfills; this approach was also abandoned following the State of Missouri’s refusal of that request. (This approach was not formally considered by NRC staff.)

Current Request

Hence, the engineering has now been completed for this current request for release of the lagoon and surrounding area under 10.CFR.20.1402. The characterization of the site, the site management and engineering are shown below.

Characterization of Lagoon Components

The operating lagoon (as it existed prior to dewatering in 2011) consisted of water, a distribution system for effluent, sediment and the clay bottom and sidewalls. The design and operational principles would strongly suggest that any radioactivity remaining should be insoluble, confined largely to the sediment and effectively blocked by the clay bottom and sidewalls from migrating into the surrounding soil or groundwater. Further, the normal discharge of effluent through the distribution system to the drain field and application area was expected to result in very low levels of radioactivity within these areas (Characterization data are shown in [Attachment 2](#)).

Characterization of the sediment, bottom¹ and sidewalls showed that this is indeed correct. The concentration of radioactivity in the sediment was found to be an average of 476 pCi/g (ML, data also

¹ At various times the compacted clay forming the bottom of the lagoon has been referred to as a “liner.” However, this is not correct - a liner is clay that is transported to form an impermeable layer over more porous soil types. In this case, there is not a liner, even though the native, compacted clay does serve a similar purpose. However, here the underlying soil is also native clay and is also quite impermeable, even in the native, non-compacted form.

shown in [Appendix 2f](#)). This diminishes quickly with distance as the 0 to 3 inch sample of clay was shown to a mean value of 19.6 pCi/g ([Appendix 1a](#)) and the 0 to 6 inch clay sample showed a mean value of 8.4 pCi/g ([Appendix 1b](#)). The clay between 6 and 12 inches averaged 11.3 pCi/g ([Appendix 1c](#)) and the 12 to 18 inch sample showed a value of 6.7 pCi/g ([Appendix 1d](#)). Since sediment and clay are intermingled at the surface, it is impossible to quantify how much in the clay layer results from the physical presence of sediment and how much from the penetration of any soluble material into the clay. In any case, even the first six inches shows a decline to less than 12 pCi/g by a depth of six inches, indicating clearly that the clay was effective as a barrier.

The sidewall analyses also indicate that everything deeper than 6 inches is less than 12 pCi/g. The 0 to 6-inch layer of the sidewall is impossible to interpret due the complex intermingling of sediment and clay which cannot be clearly separated; hence this level was not collected. Samples collected at 6 to 12 and 12 to 18 inches depth, however, were evaluated and these layers are below 12 pCi/g giving results of 9.5 and 5.3 pCi/g, respectively ([Appendices 1e](#) and [1f](#)). These data confirm that the principal contaminant is in the sediment and that the clay composing the lagoon bottom and sidewalls was an effective barrier to migration.

Dewatering

In the course of characterization, it was observed that some pitting on the bottom of the lagoon had occurred. Since this potentially could have compromised the integrity of the containment, it was necessary to remove the water, collect the sediment; then inspect and repair the bottom of the lagoon. An engineered sump was installed and the water pumped to the POTW via 10.CFR.20.2003. Sediment was moved from the bottom to the sidewalls of the lagoon in order to examine the bottom. There was some erosion of the bottom, however, the integrity of containment was intact as no leakage through the pit in the bottom could be observed. The pit was repaired with bentonite to bring the eroded area back to grade level with the rest of the bottom.

Placement

As part of the lagoon closure process, the sediment, and sidewalls along with fill dirt were placed into the cavity of the lagoon such that the contaminated zone is now in the former cavity of the lagoon and clean fill is used to provide a minimum three foot buffer, per agreement with the Missouri Department of Natural Resources. This is further described in previously submitted and reviewed documents (ML 120650756).

Request for Release

Currently, the placement contains 1,782 cubic yards of soil at a mean value of 32.7 pCi/g (amendment to ML 112770525, October 27, 2011). The remainder of the site is either not contaminated at all or is at a conservatively calculated representative concentration of 6 pCi/g. RESRAD models indicate that the dose to the most affected person would be only about 0.2 mrem in the worst year. Based on these facts, I am requesting that the lagoon and surrounding area be released without restriction.

**Attachment 3 Drain Field, Application Area, Downslope and other Soil
Sampling**

Attachment 3. Drain Field, Application Area, Downslope and Other Soil Sampling

Soil samples outside the placement area were taken to evaluate the maximum possible carbon-14 concentrations in soil. This is a biased sampling to include the highest areas of contamination near the distribution piping. Where the drain field or application area piping was present, samples were taken immediately beneath the gravel bed (0-6 inches), six to 12 inches beneath the gravel bed and 36 – 48 inches below the gravel bed. In addition, samples were taken from the surface of the sloping ground, the creek sediment and areas adjacent to the incoming sewer line. All of the data have been used to evaluate the average concentrations observed. This is a very conservative approach as a random grid would have missed most or all of the areas of higher concentration.

These locations are indicated on [Figure 1](#), tabulations with C's of A are shown in [Appendices 2a – 2e](#) and the results are shown in the table below with calculations of the mean and 95% confidence interval of all analyses that lie outside the placement – the mean is also referred to as the representative concentration.

Sample	Depth ^	Result (pCi/g)
DF4a-1103	0-6	19.2
DF4b-1103	6-12	1.45
DF5a-1103	0-6	26.3
DF5b-1103	6-12	2.85
DF5c-1103	36-48	1.26*
DF6a-1103	0-6	4.8
DF6b-1103	6-12	2.51*
AA1a-1103	0-6	16.3
AA1b-1103	6-12	11.2
AA2a-1103	0-6	7.09
AA2b-1103	6-12	1.94*
AA2c-1103	36-48	0.61*
DS1a-1103	0-6 bgs	7.02
DS1b-1103	6-12 bgs	2.8
DS2a-1103	0-6 bgs	12
DS2b-1103	6-12 bgs	1.04*
DS2c-1103	36-48 bgs	0.332*
SL1a-1103	0-6 bgs	-0.0337*
SL1b-1103	6-12 bgs	-0.411*
CS1a-1103	0-1 inches sed	-0.578*
CS3a-1103	0-1 inches sed	-0.577*
Mean (pCi/g)		6
n		21
t⁺		1.725
STD (pCi/g)		7
Upper Bound (pCi/g)[#]		8

*Analytical result was less than MDC, empirical result used to calculate mean.

^depth is beneath pipe level, unless indicated as below ground surface (bgs) or at surface

+T value from NUREG 5849, table B-1

#NUREG 5849, Eq. 8-13

Attachment 4 Distribution Piping

Attachment 4 Distribution Piping

The piping associated with the distribution of lagoon effluent was evaluated by calculation and confirmed by measurement to be less than a maximum value of 15,000 DPM/cm² and a mean value of 5,000 DPM/ 100 cm² as follows.

The expectation value for surface piping based on the representative concentration from the drain field soil was expected to be very low based on: the concentration in surrounding soil, the low concentration of any ¹⁴C in the water of the lagoon, the relative affinity favoring clay versus plastic pipe and many informal surveys of the inside and outside of the pipe while in the field – all of which were negative.

As a final confirmation, numerous informal checks for radioactivity using a field instrument (Ludlum 2241 with 44-2 probe) while the piping was being removed were found to be indistinguishable from background. In addition after the removal of the pipe, and before discarding, a series of one minute counts was preformed, recorded and evaluated. The mean of all data was found to be less than 5,000 DPM/100 cm² (this translates to 30 CPM), and the pipe having the greatest difference was also less than 5,000 DPM/100 cm². Due to normal background fluctuations, these were not statistically significant, thus the findings were that no areas were distinguishable from background, but even the ordinal differences were less than the count rate of 30 CPM, corresponding to 5,000 DPM/100cm².

An observation record is attached.

ABC Laboratories, Inc.

OBSERVATIONS AND/OR REMARKS FORM	
Test Material: Pipes from lagoon	Project/Study #: Lagoon Closure
Survey of pipes to be removed from site:	
Iron incoming pipes - Background reading CPM 38 Reading 1 68 Reading 2 63 Reading 3 62	<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> 1142 Probe has 4% efficiency and 15cm² of active area, so Res beside 1.86 for 14C (5,000 DPM/100cm²) translates to 30 CPM. 2MAY12 BOK </div>
average reading is 64 ± 3	
Plastic pipes from lateral Background reading CPM 56 Reading 1 74 Reading 2 90 Reading 3 90	<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> of all analyses: pipes are 69 ± 13 and BQ's are 58 ± 20. BOK 2MAY12 </div>
avg. reading is 84 ± 9	
Plastic pipes form Application area Background Readign CPM; 79 Reading 1 38.0 58 Reading 2 61 Reading 3 56	
avg reading is 58 ± 3	
average background is 58 ± 20	
Meter Used: Ludlum 2241-3, S/N 233277	
Conclusion: <u>All differences between pipe readings and backgrounds are less than 30 CPM, and may be disposed as not radiactive. - BOK 2MAY12</u>	
① (R) JPS 21 MAY 2012	

Note: Individual entries must be cated and initialed.	
Performed by/Date: BOK and PER	2MAY12
Reviewed by/Date: JPS	21 MAY 2012

Attachment 5 Monitoring Wells

Attachment 5 Monitoring Wells

A total of nine monitoring wells have been installed at the laboratory site. Wells 6a (thought to be at the highest concentration), 2 and 1, respectively, were thought to represent the areas of greatest exposure, hence highest potential concentrations. Wells 3a, 3b and 7 were either up-gradient of or outside the effluent exposure. All Locations are shown in [Figure 1](#).

In the table below, results from analyses in 2011 or 2012 and screening depths and matrices are shown.

Well	pCi/L 2011-March	pCi/L 2011-August	pCi/L 2012-January	pCi/L 2012-July	Screen Depth (ft bgs) [matrix]
1	95.3	191	175	ns	20-40 [Clay & Shale]
2	426	400	367	341	15-40 [Clay & Shale]
3a	-5.7*	-6.27*	-15.9*	ns	10.5 - 20.5 [Clay]
3b	-2.4*	-9.66*	-9.2*	ns	27-37 [Shale]
4a	71.1	122	29	ns	8-13 [Clay]
5a	200	38	69	ns	8-13 [Clay]
6a	np	np	532	Dry	5 – 15 [Clay]
6b	np	np	ns	37.5*	19 – 29 [Shale]
7	np	np	-7.3*, -17.8*	ns	8-23 [Clay & Shale]
RC^ (pCi/L) 131					
n 23					
t # 1.717					
Upper bound* 191					

*Analytical result was less than MDC of 50 pCi/L, empirical result used to calculate representative concentration

^Representative Concentration, NUREG 5849, Eq. 8-11

* Upper bound calculated from NUREG 5849, Eq. 8-13

#t value from NUREG 5849, Table B-1

np = well not yet placed

ns = not sampled

Dry = attempted to sample but no water present

The highest observed concentration is in well 6a, and the second highest is in well 2. Both the maximum value observed and the representative concentrations are well beneath the MCL of 2,000 pCi/L.

It should be noted that in the normal soil status (without a monitor well present), water is present only as a component of the clay soil and is not free flowing. Only the construction of a well permits the separation of the water from the clay into a collectible sample. This is important in two ways: 1) the clay prevents any rapid movement of water, hence any migration of contamination; and, 2) water is generally unavailable as a free liquid, save for the artificial construction of a monitoring well. The ability to measure radiocarbon where the well is screened in clay, and the inability to measure radiocarbon where the well is screened exclusively in shale indicate that little migration has occurred, or can occur in the downward direction.

It should also be noted that wells 3a and 3b, even though proximal to the lagoon, show no contamination – this is consistent with the directional gradient of water flow (i.e, in a westward, downhill direction).

Attachment 6 Lysimeter Results

Attachment 6 Lysimeter Results

Background. Lysimeters are used to study agrichemicals for soil retention. Soil is placed into a lysimeter (a closed end pipe that is placed into the ground) and radiolabeled compound is added to the encased soil which is allowed to distribute and metabolize over the course of a few days to a few weeks.

If the lysimeter functions properly, then all the contaminated soil would be removed at the end of the study. However, there was a suspicion that this may not have been the case. The area was gridded and 24 surface samples (corresponding to the most likely place for any residual contamination) were taken for analysis. Results are shown below. Of 24 samples, 23 were beneath the reporting limit and one was reported at 3.41 pCi/g. Based on these results (Upper bound of 0.872 pCi/g), the lysimeters functioned as designed and the area is not contaminated. All results were less than the screening value of 12 pCi/g. Certificates of Analysis are shown in [Appendix 4](#).

Results of 24 Lysimeter Samples

Sample I.D.	Result	Empirical
LYS-A1-	ND	0.176*
LYS-A2-	ND	0.518*
LYS-A3-	ND	0.541*
LYS-A4-	ND	-0.166*
LYS-A5-	ND	0.256*
LYS-A6-	ND	0.514*
LYS-B1-	ND	0.973*
LYS-B2-	ND	1.71*
LYS-B3-	ND	0.164*
LYS-B4-	ND	0.359*
LYS-B5-	ND	0.302*
LYS-B6-	ND	0.0143*
LYS-C1-	ND	0.821*
LYS-C2-	ND	0.938*
LYS-C3-	3.41	3.41
LYS-C4-	ND	1.58*
LYS-C5-	ND	1.05*
LYS-C6-	ND	0.0742*
LYS-D1-	ND	0.671*
LYS-D2-	ND	0.131*
LYS-D3-	ND	0.255*
LYS-D4-	ND	-0.183*
LYS-D5-	ND	0.378*
LYS-D6-	ND	-0.0941*
	RC	0.600
	STD	0.779
	t	1.71
	Bound	0.872

*Less than the reporting Limit of 2 pCi/g.

Attachment 7 Summary of Chemical Investigations

Attachment 7 Summary of Chemical Investigations

The lagoon site was thoroughly investigated for the presence of any chemical residues. This includes sampling of the lagoon sediment, surrounding area and monitoring wells. The scope of the sampling was developed by Foth Infrastructure and Environment in close consultation with the Missouri Department of Natural Resources. The final report is being submitted to MDNR concurrently with this application. We expect, based on numerous conversations and existing precedents, that the area will not be restricted on the basis of any chemicals found.

As part of this investigation sediment, soil and groundwater were sampled and analyzed for:

- VOCs by USEPA SW-846 Method 8260B;
- SVOCs by USEPA SW-846 Method 8270;
- Pesticides and herbicides by USEPA SW-846 Methods 8081, 8141, 8151 and/or the multi-residue pesticide scan by USEPA SW-846 Methods 8081B, 8141B, 8270D, and 8321B;
- TPH-gasoline range organics (TPH-GRO) by USEPA SW-846 Method 8260, TPH-diesel range organics (TPH-DRO) and TPH - oil range organics (TPH-ORO) by USEPA SW-846 Method 8270; and
- Priority pollutant metals by USEPA SW-846 Method 6010 and 7470(1). The priority pollutant metals analytical list includes antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, and zinc. To reduce laboratory reporting limits, arsenic, beryllium, lead, and thallium were analyzed by USEPA SW-846 Method 6020 (ICP-MS).

In addition, based upon laboratory use, 13 additional analytes were measured; these are:

- | | |
|---|---|
| <input type="checkbox"/> Acetonitrile | <input type="checkbox"/> Pendimethalin |
| <input type="checkbox"/> Acetone | <input type="checkbox"/> Trifluralin |
| <input type="checkbox"/> Methanol | <input type="checkbox"/> Terbufos |
| <input type="checkbox"/> Aldrin | <input type="checkbox"/> Dimethoate |
| <input type="checkbox"/> Malathion | <input type="checkbox"/> Disulfoton |
| <input type="checkbox"/> 2-methyl-4-chlorophenoxyacetic acid (MCPA) | |
| <input type="checkbox"/> 2,4-DB | <input type="checkbox"/> Methylene chloride |

With the exceptions of methylene chloride and MCPA found in sediment and the lagoon floor, all analytes were either absent, below the acceptable concentration or attributable to local background (metals). No attributable chemicals were found in groundwater. The measurable presence of methylene chloride and MCPA were taken into account for the final grading plan, and the grading plan executed was adequate to prevent any unacceptable exposure pathway based on Missouri Risk Based Corrective Actions (MRBCA). No further analyses are anticipated.

Attachment 8 Sediment Sampling

Attachment 8 Sediment Sampling

Sediment samples were collected in two separate events one conducted by ABC Staff in October 2010 and one conducted in concert with environmental consultants in November 2010. These resulted in 10 samples from the first (LGNOCT2010xx in [Appendix 2f](#)) and seven samples from the second (LBSxx in [Appendix 2f](#)).

Key parameters of these samplings, in contrast to 2009 data, are: 1) sediment is carefully collected and segregated from any clay or rock; 2) a validated, quality controlled analysis of each sample was performed (GEL Labs C01 method); and, 3) a conservatively constructed grid of the sediment was collected in each event to ensure a conservative mean resulted from the analyses. In both cases, sampling was designed around a grid of the lagoon bottom, with addition of a sample in each grid to include the immediate area where the effluent pipe emptied, as this is the area most likely to contain any high concentrations. This ensured that the mean value conservatively represents the lagoon sediment concentration, as the area of highest concern is oversampled in each set from a volumetric perspective. Sample locations are shown in [Figure 2](#).

Samples were taken either by extraction using a pipe or by direct sampling inside a caisson device. Either a 2 inch diameter core or approximately one liter of sediment was taken and homogenized; then aliquots of these were analyzed by GEL laboratories. This ensures representative sampling at each sample location.

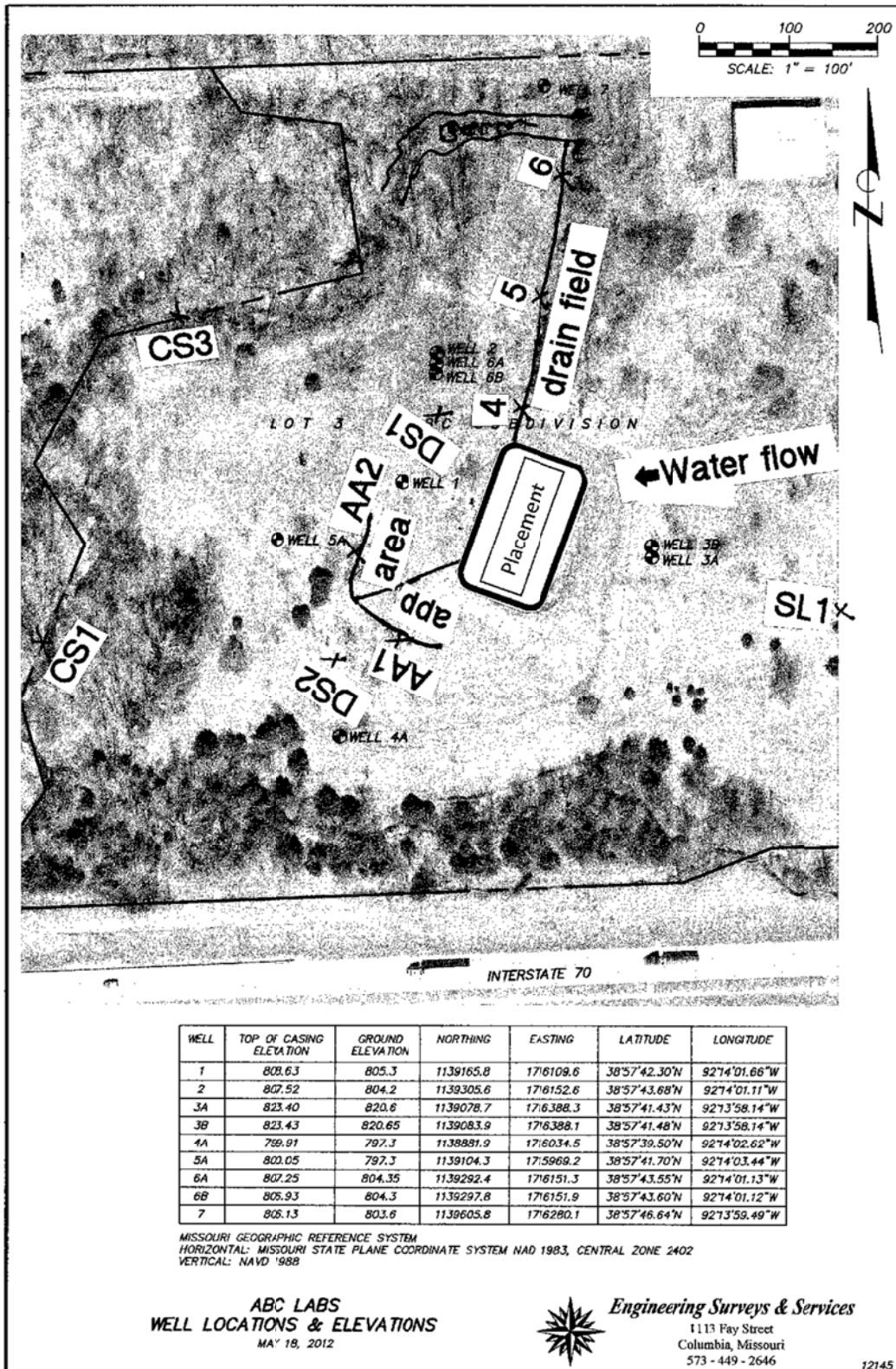
In both cases, only sediment was analyzed, since any clay would have effectively diluted the concentration – this again provides a conservative estimate by excluding any clay. Visual separation of these two phases was straightforward, as sediment and clay have distinct appearances each from the other.

All results are shown in [Appendix 2f](#). Given that the means of the two samplings are similar, the highest sample was from the area suspected, and that the overall heterogeneity is unremarkable, it is very unlikely that additional samples would have resulted in a significantly different mean.

Figure 1 Facility Sampling Map

Figure 1 Facility Sampling Map

Figure 1. Site Map with sample locations

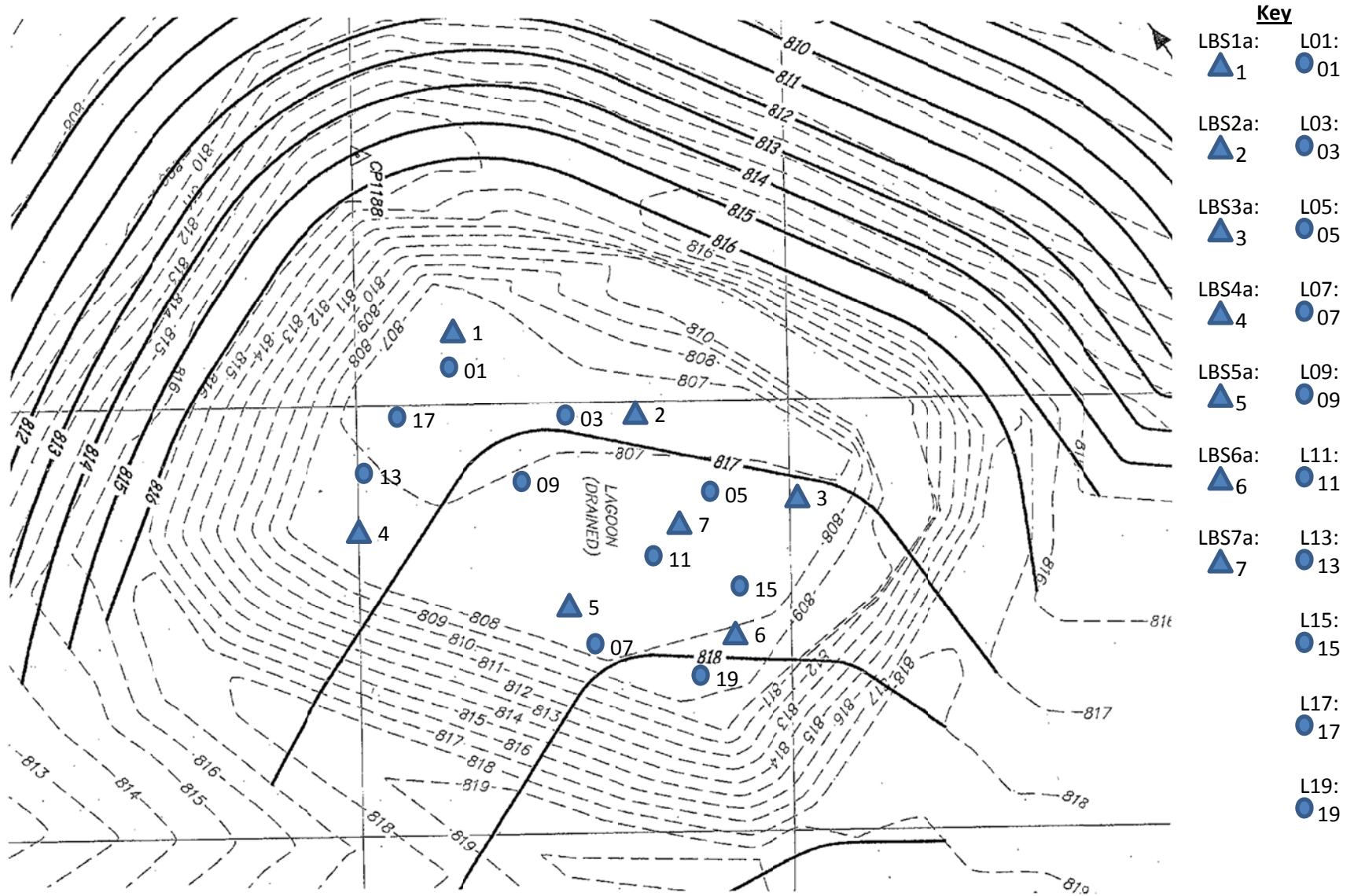


* sample sites added 4JUN12 - bdk, placement 1154W12 - bdk, SL1 - 303412

Figure 2 Lagoon Sediment Map

Figure 2 Lagoon Sediment Map

Locations of sediment samples from lagoon. All samples were composites of sediment, with no clay included.



Appendix 1a ^{14}C in Clay Bottom, 0-3" Depth

Appendix 1a Concentrations of ¹⁴C in Soil, 0-3" in Clay Bottom

Concentrations of carbon-14 in pCi/g in clay samples from 0 to 3" depth from the lagoon bottom or sidewall.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LGNOCT2010_0006	15.9
LGNOCT2010_0016	8.62
LGNOCT2010_0018	83.1
LBS1b-101102	9.44
LBS2b-101102	15.0
LBS3b-101102	21.0
LBS4b-101102	10.6
LB5ba-101102	10.6
LBS6b-101102	14.2
LBS1a-101102	8.33
Mean +/- STDEV	19.6 +/- 22.6

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Company : ABC Laboratories, Inc. Report Date: November 3, 2010
 Address : 7200 East ABC Lane

Contact: Columbia, Missouri 65202
 Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0006	Project: ABCL00107
Sample ID: 265547004	Client ID: ABCL001
Matrix: Solid	
Collect Date: 25-OCT-10 12:00	
Receive Date: 27-OCT-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DP	Analyst	Date	Time	Batch	Method
<i>Rad Liquid Scintillation Analysis</i>											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		15.9 +/-1.09	1.24	2.00	pCi/g	EXK2	10/31/10	1403	1042790		1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC
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Certificate of Analysis

Company :	ABC Laboratories, Inc.	Report Date: November 3, 2010
Address :	7200 East ABCLane	
	Columbia, Missouri 65202	
Contact:	Dr. Bradley D. Keck	
Project:	Routine Analytical - Keck	

Client Sample ID:	LGNOC2010_0016	Project:	ABCL00107
Sample ID:	265547010	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	25-OCT-10 12:00		
Receive Date:	27-OCT-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		8.62 +/-0.926	1.21	2.00	pCi/g		EXK2	10/31/10	1548	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EERF C-01 Modified	

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Certificate of Analysis

Company: ABC Laboratories, Inc. Report Date: November 3, 2010
 Address: 7200 East ABC Lane

Contact: Columbia, Missouri 65202
 Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0018	Project: ABCL00107
Sample ID: 265547012	Client ID: ABCL001
Matrix: Solid	
Collect Date: 25-OCT-10 12:00	
Receive Date: 27-OCT-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint CIA, Solid "As Received"</i>											
Carbon-14		83.1	+/-2.00	1.22	2.00	pCi/g	EXK2	10/31/10	1646	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc. Report Date: November 18, 2010
 Address : 7200 East ABC Lane

Contact: Columbia, Missouri 65202
 Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBC1b-101102	Project: ABCL00107
Sample ID: 266303004	Client ID: ABCL001
Matrix: Solid	
Collect Date: 02-NOV-10 1110	
Receive Date: 04-NOV-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analysis Date	Time	Batch	Method
<i>Rad Liquid Scintillation Analysis</i>										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		9.44 +/-1.20	1.70	2.00	pCi/g		EXK2 11/17/10	1625	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA HERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Report Date: November 18, 2010

Client Sample ID:	LBC2b-101102	Project:	ABCL00107
Sample ID:	266303006	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 12:45		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		15.0 +/-1.29	1.57	2.00	pCi/g		EXK2	11/17/10	1718	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EER? C-01 Modified	

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Company : ABC Laboratories, Inc. Report Date: November 18, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBC3b-101107	Project: ABCL00107
Sample ID: 266303008	Client ID: ABCL001
Matrix: Solid	
Collect Date: 02-NOV-10 13:45	
Receive Date: 04-NOV-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		21.0	±1.44	1.73	2.00	pCi/g	EXX2	11/17/10	1831	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EERF C-01 Modified	

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Company : ABC Laboratories, Inc. Report Date: November 18, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBC4b-101102	Project: ABCL00107
Sample ID: 266303016	Client ID: ABCL001
Matrix: Solid	
Collect Date: 02-NOV-10 1635	
Receive Date: 04-NOV-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		10.6	+-1.20	1.65	2.00	pCi/g	EXK2	11/17/10	2242	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc. Report Date: November 18, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBC5b-101102 Project: ABCL00107
 Sample ID: 266303010 Client ID: ABCL001
 Matrix: Solid
 Collect Date: 02-NOV-10 14:20
 Receive Date: 04-NOV-10
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		10.6 +/-1.27	1.78	2.00	pCi/g		EXK2 11/17/10	1931	1049453	

The following Analytical Methods were performed

Method	Description	Analyst Comments
	EPA EERF C-01 Modified	

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Certificate of Analysis

Company :	ABC Laboratories, Inc.	Report Date: November 18, 2010
Address :	7200 East ABC Lane	
	Columbia, Missouri 65202	
Contact:	Dr. Brady D. Keck	
Project:	Routine Analytical - Keck	

Client Sample ID: LBC6b-101102	Project: ABCL00107
Sample ID: 266303014	Client ID: ABCL001
Matrix: Solid	
Collect Date: 02-NOV-10 15:50	
Receive Date: 04-NOV-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<i>Rad Liquid Scintillation Analysis</i>										
<i>Liquid Scint CIA, Solid "As Received"</i>										
Carbon-14		14.2 +/-1.31	1.73	2.00	pCi/g		EXK2 11/17/10	2140	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
	HPA EERF C-01 Modified	

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Company : ABC Laboratories, Inc. Report Date: November 18, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Brndly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS7b-101102	Project: ABCL00107
Sample ID: 266303012	Client ID: ABCL001
Matrix: Solid	
Collect Date: 02-NOV-10 15:00	
Receive Date: 04-NOV-10	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
<i>Rad Liquid Scintillation Analysis</i>										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		8.33	+-1.11	1.58	2.00	pCi/g	EXK2 11/17/10 2017	1049453		1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 1b ^{14}C in Clay Bottom, 0-6" Depth

Appendix 1b Concentrations of ¹⁴C in Soil, 0-6" in Clay Bottom

Concentrations of carbon-14 in pCi/g in clay samples from 0 to 6" depth from the lagoon bottom.

Sample ID	Concentration of ¹⁴C (pCi/g)*
LBS12A	6.29
LBS13A	3.00
LBS14A	15.9
Mean +/- STDEV	8.39 +/- 6.70

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS12A-1103 Project: ABCL00107
 Sample ID: 274129037 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 10-MAR-11 10:40
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		6.29 +/-0.904	1.26	2.00	pCi/g		EXK2	04/14/11	0452	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LBS13A-1103	Project:	ABCL00107
Sample ID:	274129040	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 11:10		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		3.00 +/-0.776	1.19	2.00	pCi/g	EXK2	04/14/11	0655	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS14A-1103	Project: ABCL00107
Sample ID: 274129043	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 11:30	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		15.9 +/-1.49	1.90	2.00	pCi/g	EXK2	04/14/11	0853	1088467		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 1c ¹⁴C in Clay Bottom, 6-12" Depth

Appendix 1c Concentrations of ¹⁴C in Soil, 6-12" in Clay Bottom

Concentrations of carbon-14 in pCi/g in clay samples from 6 to 12" depth from the lagoon bottom.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LBS12B	2.83
LBS13B	1.20
LBS14B	28.2
Mean +/- STDEV	11.34 +/- 15.13

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LBS12B-1103	Project:	ABCL00107
Sample ID:	274129038	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 10:50		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		2.83 +/-0.834	1.30	2.00	pCi/g	EXK2	04/14/11	0533	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS13B-1103	Project: ABCL00107
Sample ID: 274129041	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 11:15	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.20 +/-1.07	1.79	2.00	pCi/g	EXK2	04/14/11	0729	1088467		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA ERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LBS14B-1103	Project:	ABCL00107
Sample ID:	274129044	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 11:40		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		28.2	+/-1.74	1.92	2.00	pCi/g	EXK2	04/14/11	0924	1088467	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 1d ^{14}C in Clay Bottom, 12-18" Depth

Appendix 1d Concentrations of ¹⁴C in Soil, 12-18" in Clay Bottom

Concentrations of carbon-14 in pCi/g in clay samples from 12 to 18" depth from the lagoon bottom.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LBS12C	11.8
LBS13C	1.66
LBS14C	1.63
Mean +/- STDEV	6.73 +/-7.17

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS12C-1103	Project: ABCL00107
Sample ID: 274129039	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 11:00	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		11.8	+/-1.06	1.30	2.00	pCi/g	EXK2	04/14/11	0614	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS13C-1103
 Sample ID: 274129042
 Matrix: Soil
 Collect Date: 10-MAR-11 11:20
 Receive Date: 17-MAR-11
 Collector: Client

Project: ABCL00107
 Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.66	+/-1.09	1.81	2.00	pCi/g	EXK2	04/14/11	0811	1088467	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LBS14C-1103 Project: ABCL00107
 Sample ID: 274129045 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 10-MAR-11 11:50
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.63	+/-1.19	1.97	2.00	pCi/g	EXK2	04/14/11	0956	1088467	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 1e ^{14}C in Clay Sidewall, 6-12" Depth

Appendix 1e Concentrations of ¹⁴C in Soil, 6-12" in Sidewall

Concentrations of carbon-14 in pCi/g in clay samples from 6 to 12" depth from the lagoon sidewall.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LSW15A	8.74
LSW16A	5.98
LSW17A	13.3
LSW18A	10.1
Mean +/- STDEV	9.53 +/- 3.04

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LSW15A-1103	Project:	ABCL00107
Sample ID:	274129029	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 07:50		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		8.74 +/-0.992	1.31	2.00	pCi/g		EXK2	04/13/11	2207	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Brady D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LSW16A-1103 Project: ABCL00107
 Sample ID: 274129031 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 10-MAR-11 08:05
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		5.98 +/-0.990	1.42	2.00	pCi/g	EXK2	04/13/11	2329	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LSW17A-1103	Project:	ABCL00107
Sample ID:	274129033	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 08:40		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		13.3 +/-1.11	1.32	2.00	pCi/g		EXK2	04/14/11	0052	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	LSW18A-1103	Project:	ABCL00107
Sample ID:	274129035	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	10-MAR-11 09:10		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		10.1	+/-1.00	1.27	2.00	pCi/g	EXK2	04/14/11	0329	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 1f ^{14}C in Clay Sidewall, 12-18" Depth

Appendix 1f Concentrations of ¹⁴C in Soil, 12-18" in Sidewall

Concentrations of carbon-14 in pCi/g in clay samples from 12 to 18" depth from the lagoon sidewall.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LSW15B	2.41
LSW16B	2.72
LSW17B	5.02
LSW18B	11
Mean +/- STDEV	5.28 +/- 3.98

*No Significant figures are indicated here; the result is displayed without rounding.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LSW15B-1103	Project: ABCL00107
Sample ID: 274129030	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 08:00	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		2.41 +/-0.873	1.38	2.00	pCi/g		EXK2	04/13/11	2248	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LSW16B-1103 Project: ABCL00107
 Sample ID: 274129032 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 10-MAR-11 08:20
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		2.72 +/-0.813	1.27	2.00	pCi/g		EXK2	04/14/11	0011	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LSW17B-1103	Project: ABCL00107
Sample ID: 274129034	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 08:50	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		5.02 +/-0.850	1.22	2.00	pCi/g	EXK2	04/14/11	0248	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LSW18B-1103	Project: ABCL00107
Sample ID: 274129036	Client ID: ABCL001
Matrix: Soil	
Collect Date: 10-MAR-11 09:20	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		11.0	+/-1.03	1.27	2.00	pCi/g	EXK2	04/14/11	0410	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 2a Drain Field Certificates of Analysis

Appendix 2a Drain Field Certificates of Analysis

Soil Concentrations of carbon-14 in pCi/g in Drain Field areas near pipe at various depths.

Sample ID	Concentration of ¹⁴ C (pCi/g)*	Map Marker	Depth (inches below pipe)
DF4a-1103	19.2	4	0-6
DF4b-1103	ND (3.0)^	4	6-12
DF5a-1103	26.3	5	0-6
DF5b-1103	2.85	5	6-12
DF5c-1103	ND(3.0)^	5	36-48
DF6a-1103	4.8	6	0-6
DF6b-1103	ND(3.0)^	6	6-12
Mean +/- STDEV	8.87 +/- 9.71		

*No Significant figures are indicated here; the result is displayed without rounding.

^Reporting limit (MDA) used for calculation of mean.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DF4A-1103	Project:	ABCL00107
Sample ID:	274129007	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 11:20		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		19.2	+/-2.12	2.60	2.00	pCi/g	EXK2	04/13/11	2039	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DF4B-1103	Project:	ABCL00107
Sample ID:	274129008	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 11:30		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.45	+/-1.68	2.82	2.00	pCi/g	EXK2	04/13/11	2056	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DF5A-1103	Project:	ABCL00107
Sample ID:	274129004	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 10:30		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		26.3 +/-2.38	271	2.00	pCi/g	EXK2	04/13/11	1950	1088462		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: DF5B-1103	Project: ABCL00107
Sample ID: 274129005	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 10:40	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		2.85	+/-1.74	2.84	2.00	pCi/g	EXK2	04/13/11	2006	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: DF5C-1103 Project: ABCL00107
 Sample ID: 274129006 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 09-MAR-11 10:50
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.26 +/-1.69	2.85	2.00	pCi/g	EXK2	04/13/11	2023	1088462		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DF6A-1103	Project:	ABCL00107
Sample ID:	274129002	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 09:35		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		4.80 +/-1.88	2.96	2.00	pCi/g	EXK2	04/13/11	1917	1088462		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: DF6B-1103	Project: ABCL00107
Sample ID: 274129003	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 09:45	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	2.51	+/-1.80	2.96	2.00	pCi/g	EXK2	04/13/11	1934	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 2b Application Area Certificates of Analysis

Appendix 2b Application Area Certificates of Analysis

Soil Concentrations of carbon-14 in pCi/g in Application Area near pipe at various depths.

Sample ID	Concentration of ¹⁴ C (pCi/g)*	Map marker	Depth (inches below pipe)
AA1A-1103	16.3	AA1	0-6
AA1B-1103	11.2	AA1	6-12
AA2A-1103	7.09	AA2	0-6
AA2B-1103	1.94	AA2	6-12
AA2C-1103	<2 [^] (0.610)	AA2	36-48
Mean +/- STDEV	7.42 +/- 6.51		

*No Significant figures are indicated here; the result is displayed without rounding.

[^]Reporting limit (MDA) used for calculation of mean.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: AA1A-1103	Project: ABCL00107
Sample ID: 274129017	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 15:30	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		16.3	+/-2.24	2.93	2.00	pCi/g	EXK2	04/14/11	0037	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	AA1B-1103	Project:	ABCL00107
Sample ID:	274129018	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 15:40		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		11.2 +/-1.99	2.77	2.00	pCi/g	EXK2	04/14/11	0053	1088462		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	AA2A-1103	Project:	ABCL00107
Sample ID:	274129019	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 15:50		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		7.09 +/-1.78	2.65	2.00	pCi/g	EXK2	04/14/11	0109	1088462		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: AA2B-1103	Project: ABCL00107
Sample ID: 274129020	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 1600	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.94	+/-1.66	2.76	2.00	pCi/g	EXK2	04/14/11	0126	1088462	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: AA2C-1103	Project: ABCL00107
Sample ID: 274129021	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 16:10	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.610 +/-0.763	1.29	2.00	pCi/g	EXK2	04/13/11	1637	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 2c Downslope Certificates of Analysis

Appendix 2c Downslope Certificates of Analysis

Soil Concentrations of carbon-14 in pCi/g in the Downslope areas near surface at various depths.

Sample ID	Concentration of ¹⁴ C (pCi/g)*	Map marker	Depth in inches from surface
DS1A-1103	16.3	DS1	0-6
DS1B-1103	11.2	DS1	6-12
DS2A-1103	7.09	DS2	0-6
DS2B-1103	1.94	DS2	6-12
DS2C-1103	<2 [^] (0.332)	DS2	36-48
Mean +/- STDEV	7.37 +/- 6.58		

*No Significant figures are indicated here; the result is displayed without rounding.

[^]Reporting limit (MDA) used for calculation of mean.

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DS1A-1103	Project:	ABCL00107
Sample ID:	274129022	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 16:50		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		7.02 +/-0.910	1.24	2.00	pCi/g		EXK2	04/13/11	1718	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DS1B-1103	Project:	ABCL00107
Sample ID:	274129023	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 17:00		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		2.80 +/-0.850	1.33	2.00	pCi/g		EXK2	04/13/11	1800	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC
 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DS2A-1103	Project:	ABCL00107
Sample ID:	274129024	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 17:10		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		12.0	+/-1.07	1.32	2.00	pCi/g	EXK2	04/13/11	1841	1088466	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	DS2B-1103	Project:	ABCL00107
Sample ID:	274129025	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	09-MAR-11 17:20		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.04 +/-0.771	1.28	2.00	pCi/g	EXK2	04/13/11	1922	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: DS2C-1103	Project: ABCL00107
Sample ID: 274129026	Client ID: ABCL001
Matrix: Soil	
Collect Date: 09-MAR-11 17:30	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.332 +/-0.750	1.28	2.00	pCi/g	EXK2	04/13/11	2003	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 2d Creek Sediment Certificates of Analysis

Appendix 2d Creek Sediment Certificates of Analysis

Soil Concentrations of carbon-14 in pCi/g in Creek Sediment.

Sample ID	Concentration of ¹⁴ C (pCi/g)*	Map Marker	Depth
CS1A	<2^(0.578)	CS1	0-6
CS3A	<2^(.577)	CS3	0-6
Mean +/- STDEV	0.578 +/- 0.001		

*No Significant figures are indicated here; the result is displayed without rounding.

^Reporting limit (MDA) used for calculation of mean.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	CS1A-1103	Project:	ABCL00107
Sample ID:	274129047	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	11-MAR-11 08:30		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.578	+/-1.01	1.77	2.00	pCi/g	EXK2	04/14/11	1028	1088467	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: CS3A-1103 Project: ABCL00107
 Sample ID: 274129049 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 11-MAR-11 10:30
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.577	+/-1.10	1.92	2.00	pCi/g	EXK2	04/14/11	1100	1088467	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

Appendix 2e Sewer Line Soil Samples Certificates of Analysis

Appendix 2e Sewer Line Soil Samples Certificates of Analysis

Soil Concentrations of carbon-14 in pCi/g in areas near sewer pipe.

Sample ID	Concentration of ¹⁴ C (pCi/g)*	Map Marker	Depth inches below pipe
SL1A	<2 ^{-0.0337}	SL1	0-6
SL1B	<2 ^{-0.411}	SL1	6-12
Mean +/- STDEV	-0.222 +/- 0.266		

*No Significant figures are indicated here; the result is displayed without rounding.

^Reporting limit (MDA) used for calculation of mean.

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: SL1A-1103 Project: ABCL00107
 Sample ID: 274129027 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 09-MAR-11 18:20
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.0337 +/-0.738	1.28	2.00	pCi/g	EXK2	04/13/11	2045	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: SL1B-1103 Project: ABCL00107
 Sample ID: 274129028 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 09-MAR-11 18:30
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.411 +/-0.712	1.25	2.00	pCi/g	EXK2	04/13/11	2126	1088466		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 2f Sediment Certificates of Analysis

Appendix 2f Sediment Certificates of Analysis

Samples of lagoon sediment and concentrations of carbon-14 in pCi/g.

Sample ID	Concentration of ¹⁴ C (pCi/g)*
LGNOCT2010_0001	409
LGNOCT2010_0003	727
LGNOCT2010_0005	280
LGNOCT2010_0007	659
LGNOCT2010_0009	537
LGNOCT2010_0011	645
LGNOCT2010_0013	362
LGNOCT2010_0015	346
LGNOCT2010_0017	444
LGNOCT2010_0019	576
LBS1a-101102	93.1
LBS2a-101102	565
LBS3a-101102	158
LBS4a-101102	291
LBS5a-101102	313
LBS6a-101102	128
LBS7a-101102	1,560
Mean +/- STDEV	476 +/- 337

*No Significant figures are indicated here; the result is displayed without rounding.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0001
Sample ID: 265547001
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		409	+/-8.16	1.94	2.00	pCi/g	EXK2 10/31/10	1323	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0003
Sample ID: 265547002
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		727 +/-14.3	2.52	2.00	pCi/g	EXK2	10/31/10	1336	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc. Report Date: November 3, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0005 Project: ABCL00107
 Sample ID: 265547003 Client ID: ABCL001
 Matrix: Solid
 Collect Date: 25-OCT-10 12:00
 Receive Date: 27-OCT-10
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		280 +/-5.63	1.68	2.00	pCi/g	EXK2	10/31/10	1344	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0007
Sample ID: 265547005
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		659 +/-13.0	2.41	2.00	pCi/g	EXK2	10/31/10	1449	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0009
Sample ID: 265547006
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		537 +/-10.7	2.20	2.00	pCi/g		EXK2 10/31/10	1458	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc. Report Date: November 3, 2010
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0011 Project: ABCL00107
 Sample ID: 265547007 Client ID: ABCL001
 Matrix: Solid
 Collect Date: 25-OCT-10 12:00
 Receive Date: 27-OCT-10
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		645 +/-12.7	2.40	2.00	pCi/g	EXK2	10/31/10	1508	1042790		1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0013
Sample ID: 265547008
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		362 +/-7.21	1.86	2.00	pCi/g		EXK2 10/31/10	1517	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0015
Sample ID: 265547009
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		346	+/-6.94	1.83	2.00	pCi/g	EXK2 10/31/10	1532	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LGNOCT2010_0017
Sample ID: 265547011
Matrix: Solid
Collect Date: 25-OCT-10 12:00
Receive Date: 27-OCT-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		444	+/-8.82	2.01	2.00	pCi/g	EXK2 10/31/10	1634	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 3, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID:	LGNOCT2010_0019	Project:	ABCL00107
Sample ID:	265547013	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	25-OCT-10 12:00		
Receive Date:	27-OCT-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		576	+/-11.4	2.27	2.00	pCi/g	EXK2 10/31/10	1732	1042790	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID:	LBS1a-101102	Project:	ABCL00107
Sample ID:	266303003	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 11:05		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		93.1 +/-2.33	1.66	2.00	pCi/g		EXK2 11/17/10	1543	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID:	LBS2a-101102	Project:	ABCL00107
Sample ID:	266303005	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 12:40		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
<i>Liquid Scint C14, Solid "As Received"</i>											
Carbon-14		565 +/-11.3	2.98	2.00	pCi/g	EXK2	11/17/10	1706	1049453		1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID:	LBS3a-101102	Project:	ABCL00107
Sample ID:	266303007	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 13:40		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		158 +/-3.32	1.74	2.00	pCi/g		EXK2 11/17/10	1800	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LBS4a-101102 Project: ABCL00107
Sample ID: 266303015 Client ID: ABCL001
Matrix: Solid
Collect Date: 02-NOV-10 16:30
Receive Date: 04-NOV-10
Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		291	+/-5.93	2.27	2.00	pCi/g	EXK2 11/17/10	2222	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Routine Analytical - Keck

Client Sample ID:	LBS5a-101102	Project:	ABCL00107
Sample ID:	266303009	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 14:15		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		313 +/-6.36	2.34	2.00	pCi/g		EXK2 11/17/10	1912	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC
 2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company :	ABC Laboratories, Inc.	Report Date: November 18, 2010
Address :	7200 East ABC Lane	
	Columbia, Missouri 65202	
Contact:	Dr. Bradley D. Keck	
Project:	Routine Analytical - Keck	

Client Sample ID:	LBS7a-101102	Project:	ABCL00107
Sample ID:	266303011	Client ID:	ABCL001
Matrix:	Solid		
Collect Date:	02-NOV-10 14:55		
Receive Date:	04-NOV-10		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		1560	+/-30.6	4.65	2.00	pCi/g	EXK2 11/17/10	2012	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Report Date: November 18, 2010

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Routine Analytical - Keck

Client Sample ID: LBS6a-101102
Sample ID: 266303013
Matrix: Solid
Collect Date: 02-NOV-10 15:45
Receive Date: 04-NOV-10
Collector: Client

Project: ABCL00107
Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Liquid Scintillation Analysis										
<i>Liquid Scint C14, Solid "As Received"</i>										
Carbon-14		128 +/-2.79	1.76	2.00	pCi/g	EXK2	11/17/10	2100	1049453	1

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 3 Monitor Wells Certificates of Analysis

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW1-1103	Project: ABCL00107
Sample ID: 274129051	Client ID: ABCL001
Matrix: Ground Water	
Collect Date: 11-MAR-11 12:00	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		95.3 +/-22.2	33.1	50.0	pCi/L	EXK2	04/12/11	0915	1088459		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW2-1103	Project:	ABCL00107
Sample ID:	274129050	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	11-MAR-11 10:45		
Receive Date:	17-MAR-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		426	+/-30.8	33.5	50.0	pCi/L	EXK2	04/12/11	0844	1088459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW3A-1103	Project: ABCL00107
Sample ID: 274129048	Client ID: ABCL001
Matrix: Ground Water	
Collect Date: 11-MAR-11 09:20	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-5.7 +/-19.1	33.4	50.0	pCi/L		EXK2	04/12/11	0812	1088459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW3B-1103 Project: ABCL00107
 Sample ID: 274129046 Client ID: ABCL001
 Matrix: Ground Water
 Collect Date: 11-MAR-11 08:00
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-2.4	+/-19.0	33.1	50.0	pCi/L	EXK2	04/12/11	0741	1088459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
I	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW4A-1103	Project: ABCL00107
Sample ID: 274129053	Client ID: ABCL001
Matrix: Ground Water	
Collect Date: 11-MAR-11 14:40	
Receive Date: 17-MAR-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		71.1	+/-21.6	33.4	50.0	pCi/L	EXK2	04/12/11	1017	1088459	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: April 14, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW5A-1103 Project: ABCL00107
 Sample ID: 274129052 Client ID: ABCL001
 Matrix: Ground Water
 Collect Date: 11-MAR-11 13:30
 Receive Date: 17-MAR-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		200 +/-25.2	33.2	50.0	pCi/L	EXK2	04/12/11	0946	1088459		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Intermediate Water GELP11-0967

Client Sample ID:	Intermediate Sample B (MW 1) BOK	Project:	ABCL00311
Sample ID:	285391002	Client ID:	ABCL001
Matrix:	Water		
Collect Date:	31-AUG-11 16:43		
Receive Date:	08-SEP-11		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14		191	+/-33.6	48.2	50.0	pCi/L		EXK2	09/10/11	0012	1139734	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Intermediate Water GELP11-0967

Client Sample ID: Intermediate Sample A (MW2) - 80K
 Sample ID: 285391001
 Matrix: Water
 Collect Date: 31-AUG-11 16:29
 Receive Date: 08-SEP-11
 Collector: Client
 Project: ABCL00311
 Client ID: ABCL001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14		400	+/-39.0	48.3	50.0	pCi/L		EXK2	09/09/11	2345	1139734	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Intermediate Water GELP11-0967

Client Sample ID:	Intermediate Sample C (mw 3a)	Project:	ABCL00311
Sample ID:	285391003	Client ID:	ABCL001
Matrix:	Water		
Collect Date:	31-AUG-11 16:50		
Receive Date:	08-SEP-11		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-6.27	+/-27.7	48.3	50.0	pCi/L		EXK2	09/10/11	0038	1139734	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Intermediate Water GELP11-0967

Client Sample ID: Intermediate Sample D (MW 3b) Project: ABCL00311
Sample ID: 285391004 Client ID: ABCL001
Matrix: Water
Collect Date: 31-AUG-11 1644
Receive Date: 08-SEP-11
Collector: Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	-9.66	±27.7	48.4	50.0	pCi/L		EXK2	09/10/11	0105	1139734	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Intermediate Water GELP11-0967

Client Sample ID:	Intermediate Sample E (MW4a)	Project:	ABCL00311
Sample ID:	285391005	Client ID:	ABCL001
Matrix:	Water		
Collect Date:	31-AUG-11 1635		
Receive Date:	08-SEP-11		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14		122	+/-31.7	48.4	50.0	pCi/L	EXK2	09/10/11	0131	1139734		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 13, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Intermediate Water GELP11-0967

Client Sample ID: Intermediate Sample F (MW Sa) Project: ABCL00311
 Sample ID: 285391006 Client ID: ABCL001
 Matrix: Water
 Collect Date: 31-AUG-11 04:15
 Receive Date: 08-SEP-11
 Collector: Client

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis												
Liquid Scint C14, Liquid "As Received"												
Carbon-14	U	38.0	+/-29.1	48.3	50.0	pCi/L		EXK2	09/10/11	0158	1139734	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW1-19JAN12	Project: ABCL00107
Sample ID: 294489001	Client ID: ABCL001
Matrix: Ground Water	
Collect Date: 19-JAN-12 11:30	
Receive Date: 20-JAN-12	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		175	48.4	50.0	pCi/L	EXK2	01/28/12	1031	1181265		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW2-19JAN12	Project:	ABCL00107
Sample ID:	294489002	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	19-JAN-12 11:06		
Receive Date:	20-JAN-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		367	48.5	50.0	pCi/L		EXK2	01/28/12	1058	1181265	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW3a-19JAN:2	Project:	ABCL00107
Sample ID:	294489003	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	19-JAN-12 10:24		
Receive Date:	20-JAN-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-15.9	48.5	50.0	pCi/L		EXK2	01/28/12	1124	1181265	1

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
1	EPA EERF C-01 Modified		

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW3b-19JAN12	Project:	ABCL00107
Sample ID:	294489004	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	19-JAN-12 10:08		
Receive Date:	20-JAN-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-9.16	48.5	50.0	pCi/L		EXK2	01/28/12	1151	1181265	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW4-19JAN12	Project:	ABCL00107
Sample ID:	294489005	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	19-JAN-12 10:39		
Receive Date:	20-JAN-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	29.0	48.5	50.0	pCi/L		EXK2	01/28/12	1218	1181265	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW5-19JAN12
 Sample ID: 294489006
 Matrix: Ground Water
 Collect Date: 19-JAN-12 10:50
 Receive Date: 20-JAN-12
 Collector: Client

Project: ABCL00107
 Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		69.0	48.5	50.0	pCi/L	EXK2	01/28/12	1244	1181265		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW6-19JAN12	Project:	ABCL00107
Sample ID:	294489007	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	19-JAN-12 11:10		
Receive Date:	20-JAN-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		532	48.7	50.0	pCi/L		EXK2	01/28/12	1312	1181265	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: January 13, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW7-09JAN12
 Sample ID: 293634001
 Matrix: Ground Water
 Collect Date: 09-JAN-12 09:30
 Receive Date: 10-JAN-12
 Collector: Client

Project: ABCL00107
 Client ID: ABCL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-7.33	48.5	50.0	pCi/L		EXK2	01/13/12	0058	1177954	1

The following Analytical Methods were performed:

Method	Description	Analysr	Comments
1	EPA EERF C-01 Modified		

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: January 30, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID: MW7-19JAN12 Project: ABCL00107
 Sample ID: 294489008 Client ID: ABCL001
 Matrix: Ground Water
 Collect Date: 19-JAN-12 11:37
 Receive Date: 20-JAN-12
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14	U	-17.8	48.4	50.0	pCi/L	EXK2	01/28/12	1339	1181265		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: July 17, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW2-10JUL12	Project:	ABCL00107
Sample ID:	307653001	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	10-JUL-12 14:00		
Receive Date:	12-JUL-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		341	32.0	50.0	pCi/L		EXK2	07/16/12	1153	1229203	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: July 17, 2012

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Routine Analytical - Keck

Client Sample ID:	MW6b-10JUL12	Project:	ABCL00107
Sample ID:	307653002	Client ID:	ABCL001
Matrix:	Ground Water		
Collect Date:	10-JUL-12 14:10		
Receive Date:	12-JUL-12		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Liquid "As Received"											
Carbon-14		37.5	31.0	50.0	pCi/L		EXK2	07/15/12	1354	1229203	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

Appendix 4 Lysimeter Certificates of Analysis

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABCLane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Lane Lysimeter Field

Client Sample ID: LYS-D5-	Project: ABCL00111
Sample ID: 284942023	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 09:50	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.378	1.27	2.00	pCi/g		EXK2	09/14/11	0249	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABCLane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID: LYS-D6- Project: ABCL00111
 Sample ID: 284942024 Client ID: ABCL001
 Matrix: Soil
 Collect Date: 08-AUG-11 09:55
 Receive Date: 30-AUG-11
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.0941	1.46	2.00	pCi/g		EXK2	09/14/11	0446	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID: LYS-A1-	Project: ABCL00111
Sample ID: 284942001	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 08:00	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.176	1.43	2.00	pCi/g		EXK2	09/13/11	1413	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-A2-	Project:	ABCL00111
Sample ID:	284942002	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 08:05		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.518	1.50	2.00	pCi/g		EXK2	09/13/11	1455	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratores, Inc.
 Address : 7200 East ABCLane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane LysimeterField

Client Sample ID:	LYS-A3-	Project:	ABCL00111
Sample ID:	284942003	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 08:10		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.541	1.39	2.00	pCi/g		EXK2	09/13/11	1537	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Lane Lysimeter Field

Client Sample ID: LYS-A4-	Project: ABCL00111
Sample ID: 284942004	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 08:15	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	-0.166	1.39	2.00	pCi/g		EXK2	09/13/11	1619	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-A5-	Project:	ABCL00111
Sample ID:	284942005	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 0820		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.256	1.49	2.00	pCi/g		EXK2	09/13/11	1701	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane

 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-A6-	Project:	ABCL00111
Sample ID:	284942006	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 08:25		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.514	1.33	2.00	pCi/g	EXK2	09/13/11	0303	1140350		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-B1-	Project:	ABCL00111
Sample ID:	284942007	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 08:30		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.973	1.40	2.00	pCi/g		EXK2	09/13/11	0339	1140350	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABCLane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-B2-	Project:	ABCL00111
Sample ID:	284942008	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 0835		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		1.71	1.66	2.00	pCi/g		EXK2	09/14/11	0940	1140350	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Columbia, Missouri 65202
Contact: Dr. Bradly D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-B4-	Project: ABCL00111
Sample ID: 284942010	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 0845	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.359	1.39	2.00	pCi/g		EXK2	09/13/11	1825	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABCLane

Columbia, Missouri 65202
Contact: Dr. Bradley D. Keck
Project: Lane Lysimeter Field

Client Sample ID:	LYS-B3-	Project:	ABCL00111
Sample ID:	284942009	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 08:40		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.164	1.45	2.00	pCi/g		EXK2	09/13/11	1743	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABC Lane
 Columbia, Missouri 65202
 Contact: Dr. Bradley D. Keck
 Project: Lane Lysimeter Field

Client Sample ID: LYS-B5-	Project: ABCL00111
Sample ID: 284942011	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 08:50	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.302	1.56	2.00	pCi/g		EXK2	09/15/11	0529	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
 Address : 7200 East ABCLane
 Columbia, Missouri 65202
 Contact: Dr. Bradly D. Keck
 Project: Lane Lysimeter Field

Client Sample ID:	LYS-B6-	Project:	ABCL00111
Sample ID:	284942012	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 0855		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.0143	1.47	2.00	pCi/g		EXK2	09/13/11	1949	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABCLane

Columbia, Missouri 65202
Contact: Dr. Bradley D. Keck
Project: Lane Lysimeter Field

Client Sample ID:	LYS-C2-	Project:	ABCL00111
Sample ID:	284942014	Client ID:	ABCL001
Matrix:	Soil		
Collect Date:	08-AUG-11 0905		
Receive Date:	30-AUG-11		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.938	1.45	2.00	pCi/g		EXK2	09/13/11	2113	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABCLane

Columbia, Missouri 65202
Contact: Dr. Bradly D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-C4-	Project: ABCL00111
Sample ID: 284942016	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 09:15	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14		1.58	1.53	2.00	pCi/g		EXK2	09/15/11	0643	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Columbia, Missouri 65202

Contact: Dr. Bradley D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-C5-	Project: ABCL00111
Sample ID: 284942017	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 0920	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	1.05	1.36	2.00	pCi/g		EXK2	09/13/11	2319	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-C6-	Project: ABCL00111
Sample ID: 284942018	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 0925	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.0742	1.35	2.00	pCi/g	EXK2	09/14/11	0001	1140349		1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABCLane

Contact: Columbia, Missouri 65202
Dr. Bradly D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-D2-	Project: ABCL00111
Sample ID: 284942020	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 0935	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.131	1.50	2.00	pCi/g		EXK2	09/14/11	0043	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 15, 2011

Company : ABC Laboratories, Inc.
Address : 7200 East ABC Lane

Contact: Columbia, Missouri 65202
Dr. Bradley D. Keck
Project: Lane Lysimeter Field

Client Sample ID: LYS-D3-	Project: ABCL00111
Sample ID: 284942021	Client ID: ABCL001
Matrix: Soil	
Collect Date: 08-AUG-11 0940	
Receive Date: 30-AUG-11	
Collector: Client	

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scintillation Analysis											
Liquid Scint C14, Solid "As Received"											
Carbon-14	U	0.255	1.44	2.00	pCi/g		EXK2	09/14/11	0125	1140349	1

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA EERF C-01 Modified	