

VIA EXPRESS COURIER

August 01, 2005  
In reply, refer to 2005RC02113



Regional Water Quality Control Board  
Los Angeles Region  
320 West 4<sup>th</sup> Street, Suite 200  
Los Angeles, CA 90013

Attention: Information Technology Unit

Reference: Compliance File CI-6027 and NPDES No. CA0001309

Subject: Supplement to 1<sup>st</sup> Quarter 2005 NPDES Discharge Monitoring Report  
Submittal– Santa Susana Field Laboratory

Dear Sir/Madam,

The Boeing Company, Rocketdyne Propulsion and Power Division hereby submit this Supplement to the 1<sup>st</sup> Quarter 2005 NPDES discharge monitoring report (DMR) related to National Pollutant Discharge Elimination System (NPDES) Permit No. CA0001309 for the Santa Susana Field Laboratory (SSFL). This supplement contains the analytical results of surface water samples that were collected during the 1<sup>st</sup> Quarter 2005, but were identified as Pending in Appendix E of the 1<sup>st</sup> Quarter 2005 DMR. The samples were collected and analyzed in accordance with the RWQCB-requested California Water Code, Section 13267 sampling at Outfalls 003 (Radioactive Materials Handling Facility) and Outfall 011 (Perimeter Pond). Specifically, the attached data is for radiological constituents in surface water at these outfalls.

As discussed in the 1<sup>st</sup> Quarter 2005 DMR, some of the radiological data was identified in the tables as Pending. That designation indicated the analytical testing and reporting process and/or data validation process had not been completed. The delays in evaluating the samples and reporting these data were due to several factors: 1) modifications in the requested scope of work by the RWQCB resulted in data that could not be used and samples that had to be re-collected and analyzed (the scope of work was being modified by the RWQCB during the 1<sup>st</sup> Quarter and many sample results did not meet the RWQCB's final criteria); 2) radiological testing requires extended time to complete laboratory procedures, prepare the report, and validate the data; and 3) the analytical laboratory, which specializes in performing radiological testing, was experiencing exceptional sample volume.

With this Supplement, all remaining data from the 1<sup>st</sup> Quarter 2005 is included, and the submittal of that data is considered complete.

#### **DISCHARGE ANALYSES, AND DATA VALIDATION**

All analyses of sampled discharges were conducted at a laboratory certified for such analysis by the appropriate agency in accordance with current EPA guidelines, procedures, or as specified in the monitoring program. Analytical data summary tables for Outfalls 003 and 011, Reporting Summary Notes, laboratory analytical reports, and validation reports and notes, are attached. The summary tables typically identify the outfall; the constituents evaluated (analytes), the date of sampling, the analytical result, and data validation qualifiers. The summary notes are a compilation of notes, abbreviations, and data validation codes that are found in the analytical data summary tables.

Data validation was performed on the analytical results and quality control elements were found to be within acceptable limits for all analytical methods reported, except as noted on the analytical summary tables.

#### **SUMMARY OF NON-COMPLIANCE AND CORRECTIVE ACTIONS TAKEN**

As required in the NPDES permit, Boeing notifies the RWQCB of constituents that were non-compliant. For these supplemental data, no permit limit exceedences occurred.

#### **FACILITY CONTACT**

If there are any questions regarding this report or its enclosures, you may contact Mr. Paul Costa at (818) 586-9177.

#### **CERTIFICATION**

I certify under penalty of law that this document and all appendices were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Executed on the 1st of August 2005 at the Boeing Company, Rocketdyne, Santa Susana Field Laboratory Facility.



August 1, 2005

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Sincerely,



Steve Lafflam

Division Director

Safety, Health and Environmental Affairs

SL:pj

Attachments:

Supplement to 1<sup>st</sup> Quarter 2005 Section 13267 Summary Tables, Discharge  
Monitoring Data, Outfall 003 and Outfall 011

Supplement to 1<sup>st</sup> Quarter 2005 Analytical Laboratory Reports, Validation Reports,  
and Chain-of-Custody, Outfall 003 and Outfall 011

cc: State Water Resources Control Board-DMR Processing Center  
Jim Pappas, Department of Toxic Substances Control  
Robert Marshall, California State University – Northridge, Library  
Dale Redfield, Simi Valley Library  
Lynn Light, Platt Branch, Los Angeles Library  
Stephen Baxter, Department of Toxic Substances Control

SHEA-102295



**OUTFALL 003 (RMHF)**  
**(13267 RESULTS)**  
**FIRST QUARTER 2005 REPORTING SUMMARY**  
**THE BOEING COMPANY-ROCKETDYNE**  
**SANTA SUSANA FIELD LABORATORY**  
**NPDES PERMIT CA0001309**

**January 1 through January 31, 2005**

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	1/4/2005	
			RESULT	VALIDATION QUALIFIER
<b>RADIOACTIVITY</b>				
Total Combined Radium-226 & Radium 228 (filtered)	pCi/L	5.0/-	See Note	See Note
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	5.0/-	See Note	See Note

Note: Subsequent to the initial analyses, there was not enough volume of sample remaining to run the Total Combined Radium-226 & Radium 228 analyses.

**OUTFALL 003 (RMHF)  
13267 RESULTS**

**FIRST QUARTER 2005 REPORTING SUMMARY  
THE BOEING COMPANY-ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

February 1 through February 28, 2005

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	2/11/2005		2/18/2005	
			RESULT	VALIDATION QUALIFIER	RESULT	VALIDATION QUALIFIER
<b>RADIOACTIVITY</b>						
Total Combined Radium-226 & Radium 228 (filtered)	pCi/L	5.0/-	1.426/±0.460	--	ND < 0.039/±0.361	U
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	5.0/-	1.30/±0.370	J (H)	1.249/±0.361	J (H)

**OUTFALL 003 (RMHF)**  
**(13267 RESULTS)**  
**FIRST QUARTER 2005 REPORTING SUMMARY**  
**THE BOEING COMPANY-ROCKETDYNE**  
**SANTA SUSANA FIELD LABORATORY**  
**NPDES PERMIT CA0001309**

March 1 through March 31, 2005

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	3/19/2005	
			RESULT	VALIDATION QUALIFIER
<b>RADIOACTIVITY</b>				
Gross Alpha (filtered)	pCi/L	15/-	8.96 /±3.3	J (R)
Gross Alpha (unfiltered)	pCi/L	15/-	5.03/±3.0	J (R, H)
Gross Beta (filtered)	pCi/L	50/-	18.0/±3.1	--
Gross Beta (unfiltered)	pCi/L	50/-	19.0/±3.7	J (H)
Strontium-90 (filtered)	pCi/L	8.0/-	5.49/±0.58	--
Strontium-90 (unfiltered)	pCi/L	8.0/-	5.49/±0.56	J (H)
Total Combined Radium-226 & Radium 228 (filtered)	pCi/L	5.0/-	0.091/±0.531	--
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	5.0/-	0.145/±0.561	J (H)
Tritium (filtered)	pCi/L	20000/-	-43.7 /±96	U
Tritium (unfiltered)	pCi/L	20000/-	-34.3 /±99	U
Cesium 137	pCi/g	-/-	ND <10.9	U

**OUTFALL 011-GRAB (Perimeter Pond Weir)  
13267 RESULTS**

**FIRST QUARTER 2005 REPORTING SUMMARY  
THE BOEING COMPANY-ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

February 1 through February 28, 2005

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	2/11/2005		2/25/2005	
			RESULT	VALIDATION QUALIFIER	RESULT	VALIDATION QUALIFIER
<b>RADIOACTIVITY</b>						
Gross Alpha (filtered)	pCi/L	-/-	0.681±0.61	UJ (H, R)	0.662±0.67	UJ (*1, R)
Gross Beta (filtered)	pCi/L	-/-	1.33±1.1	UJ (H)	2.27±1.2	J (*1)
Strontium-90 (filtered)	pCi/L	-/-	0.004±0.24	UJ (H)	-0.075/0.26	UJ (*1)
Total Combined Radium-226 & Radium 228 (filtered)	pCi/L	-/-	ND <0.423/±0.358	UJ (H,Q)	ND < 0.047/±0.322	UJ (*1)
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	-/-	0.034 /±0.241	J (H)	0.081 /±0.231	--
Tritium (filtered)	pCi/L	-/-	-80.6±97	U	-22.3±99	U
Cesium 137	pCi/g	-/-	ND <29.3	U	ND <27.5	U

**OUTFALL 011-GRAB (Perimeter Pond Weir)  
13267 RESULTS**

**FIRST QUARTER 2005 REPORTING SUMMARY  
THE BOEING COMPANY-ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

**March 1 through March 31, 2005**

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	3/18/2005		3/25/2005	
			RESULT	VALIDATION QUALIFIER	RESULT	VALIDATION QUALIFIER
<b>RADIOACTIVITY</b>						
Gross Alpha (filtered)	pCi/L	-/-	0.626 /±0.83	J (R)	-0.086 /±0.62	UJ (R)
Gross Alpha (unfiltered)	pCi/L	-/-	0.067 /±0.71	J (R,H)	0.510 /±0.59	UJ (R,H)
Gross Beta (filtered)	pCi/L	-/-	3.37 /±1.3	--	-0.472 /±1.3	U
Gross Beta (unfiltered)	pCi/L	-/-	2.09 /±1.3	J (R,H)	2.97 /±1.3	J (H)
Strontium-90 (filtered)	pCi/L	-/-	0.029 /±0.29	U	-0.105 /±0.26	U
Strontium-90 (unfiltered)	pCi/L	-/-	-0.108 /±0.25	UJ (R)	-0.052 /±0.37	UJ (H)
Total Combined Radium-226 & Radium 228 (filtered)	pCi/L	-/-	ND <0.450/±0.475	U	0.407 /±0.283	--
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	-/-	0.084 /±0.251	J (H)	ND <0.396 /±0.248	UJ (H)
Tritium (filtered)	pCi/L	-/-	-63.2 /±96	U	129 /±170	U
Tritium (unfiltered)	pCi/L	-/-	-16.2 /±98	U	-16.7 /±160	U
Cesium 137	pCi/g	-/-	ND <23.0	U	ND <19.4	U



**OUTFALL 011-COMPOSITE (Perimeter Pond Weir)  
13267 RESULTS**

**FIRST QUARTER 2005 REPORTING SUMMARY  
THE BOEING COMPANY-ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

**March 1 through March 31, 2005**

ANALYTE	UNITS	Permit Limit Daily Max/Monthly Avg	3/18/2005		3/25/2005	
			RESULT	VALIDATION QUALIFIER	RESULT	VALIDATION QUALIFIER
Gross Alpha (unfiltered)	pCi/L	-/-	0.305 /±0.81	UJ (R, H)	0.216/±0.63	UJ (R, H)
Gross Beta (unfiltered)	pCi/L	-/-	1.96 /±1.1	J (R, H)	2.35/±1.2	J (R, H)
Strontium-90 (unfiltered)	pCi/L	-/-	0.032/±0.22	UJ (H)	-0.105/±0.25	UJ (H)
Total Combined Radium-226 & Radium 228 (unfiltered)	pCi/L	-/-	0.063/±0.231	J (H)	ND <0.477/±0.381	UJ (H)
Tritium (unfiltered)	pCi/L	-/-	-31.0/±98	U	83.4/±170	U

**REPORTING SUMMARY NOTES  
THE BOEING COMPANY - ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

**Notes:**

1. For Dioxins and Furans, laboratory results may have been reported in picograms/liter (pg/L). However, the permit limit is stated in micrograms/liter (µg/L). To evaluate permit compliance, the laboratory results have been converted to µg/L, as necessary, to calculate the TCDD TEQ.
2. TCDD TEQs for the purpose of determining permit compliance are the sum of the products of the detected dioxin congener concentration multiplied by that congener's TEF. The resulting compliance TCDD TEQ does not include those congener concentrations that are reported as DNQ, as specified on Page 40 of the NPDES permit.
3. For some sample dates, pH was determined with a field instrument and was noted as such. These results were not validated. Since pH does not have an RL, the possible pH range is shown in the RL column.
4. The NPDES permit limits for mercury of 0.10 µg/L (Outfalls 1-2) and 0.13 µg/L (Outfalls 3-7) are not achievable by the laboratory; therefore, the laboratory reporting limit of 0.20 µg/L was used to determine compliance.
5. The volume discharged at the Alfa Test Stand (Outfall 012) is estimated based on the run time of the test.
6. All of the following abbreviations and/or notes may not occur on every table.

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-92.9 +/-200	A negative radiochemical analytical result indicates the count rate of the sample was less than the background condition
\$	reported result or other information was incorrectly reported by the laboratory; result was corrected by the data validator
--	based on validation of the data, a qualifier was not required
-/-	no permit limit established for daily maximum or monthly average
<(value)	analyte not detected at a concentration greater than or equal to the DL, MDL, or RL (see laboratory report for specific detail)
*	result not validated
*1	improper preservation of sample
*2	the ICP/MS ppb check standard was recovered above the control limit; therefore, the constituent detected was qualified as estimated (J)
*3	initial and or continuing calibration recoveries were outside acceptable control limits

**REPORTING SUMMARY NOTES**  
**THE BOEING COMPANY - ROCKETDYNE**  
**SANTA SUSANA FIELD LABORATORY**  
**NPDES PERMIT CA0001309**

*5	blank spike/blank spike duplicate relative percent difference was outside the control limit
*10	value was estimated detect or estimated non detect (J,UJ) due to deficiencies in quantitation of the constituent including constituents reported by the laboratory as Estimated Maximum Possible Concentration (EMPC) values
*11	no calibration was performed for this compound; result is reported as a tentatively identified compound (TIC)
ANR	analysis not required; e.g., constituent or outfall was not required by the permit to be sampled and analyzed (annual, semi-annual, etc.)
B	laboratory method blank contamination
C	calibration %RSD or %D were noncompliant
C5	Calibration verification %R was outside method control limits
%D	percent difference between the initial and continuing calibration relative response factors
deg F	degrees Fahrenheit
DL	detection limit
DNQ	detected but not quantified (constituent value greater than or equal to the laboratory method detection limit and less then the laboratory reporting limit)
E	duplicates show poor agreement
H	holding time was exceeded
I	ICP interference check solution results were unsatisfactory
J	estimated value
K	The sample dilution's set-up did not meet the oxygen depletion criteria of at least 2 mg/l. Therefore, the reported result is an estimated value only.
L2	the laboratory control sample %R was below the method control limits
L	laboratory control sample %R was outside control limits
LOD	limit of detection
M1	matrix spike (MS) and/or MS duplicate were above the acceptance limits due to sample matrix interference
M2	the MS and/or MS duplicate were below the acceptance limits due to sample matrix interference
MDL	method detection limit
MGD	million gallons per day
mg/L	milligrams per liter
ml/L/hr	milliliters per liter per hour
NA	not applicable; no permit limit established for the constituent and/or outfall
ND	analyte value less than the LOD or MDL
NM	not measured or determined
NTU	nephelometric turbidity unit
pCi/L	picocuries per liter
pg/L	picograms per liter
Q	matrix spike recovery outside of control limits
R	as a validation qualifier, results are rejected; the presence or absence of analyte cannot be verified

**REPORTING SUMMARY NOTES  
THE BOEING COMPANY - ROCKETDYNE  
SANTA SUSANA FIELD LABORATORY  
NPDES PERMIT CA0001309**

R	(reason code in parentheses) %R for calibration not within control limits
RL	laboratory reporting limit
RL-1	reporting limit raised due to sample matrix effects
%RSD	percent relative standard deviation
S	surrogate recovery was outside control limits
TEQ	toxic equivalent
T	presumed contamination, as indicated by a detect in the trip blank
TU <sub>c</sub>	toxicity units (chronic)
U	result not detected
µg/L	micrograms per liter
UJ	result not detected at the estimated reporting limit
umhos/cm	micromhos per centimeter
WHO TEF	World Health Organization toxic equivalency factor
^	analysis not completed due to hold time exceedence or insufficient sample volume

### CONTRACT COMPLIANCE SCREENING FORM FOR HARDCOPY DATA

AMEC Earth & Environmental  
550 South Wadsworth Boulevard  
Suite 500  
Lakewood, CO 80226

Package ID T711RA5  
Task Order 313150010  
SDG No. Multiple  
No. of Analyses 8

Laboratory Eberline  
Reviewer P. Meeks  
Analysis/Method Radionuclides

Date: 03/28/05  
Reviewer's Signature  
P. Meeks

ACTION ITEMS <sup>a</sup>	
1. <b>Case Narrative</b>	
<b>Deficiencies</b>	
2. <b>Out of Scope</b>	
<b>Analyses</b>	
3. <b>Analyses Not</b>	
<b>Conducted</b>	
4. <b>Missing Hardcopy</b>	
<b>Deliverables</b>	
5. <b>Incorrect Hardcopy</b>	
<b>Deliverables</b>	
6. <b>Deviations from</b>	Qualifications applied for:
<b>Analysis Protocol, e.g.,</b>	1. Detector efficiency outliers.
Holding Times	2. Exceeded holding imtes.
GC/MS Tune/Inst.	
Performance	
Calibrations	
Blanks	
Surrogates	
Matrix Spike/Dup LCS	
Field QC	
Internal Standard	
Performance	
Compound Identification	
and Quantitation	
System Performance	
COMMENTS <sup>b</sup>	

<sup>a</sup> Subcontracted analytical laboratory is not meeting contract and/or method requirements. .  
<sup>b</sup> Differences in protocol have been adopted by the laboratory but no action against the laboratory is required.

## Data Qualifier Reference Table

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Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

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## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

\*# Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUPS:  
IOB1556, IOB1557, IOB1559, IOB1570, IOB1571, IOB1576

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226

## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150010  
SDG#: IOB1556, IOB1557, IOB1559, IOB1570, IOB1571, IOB1576  
Project Manager: B. McIlvaine  
Matrix: Water  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 8  
No. of Reanalyses/Dilutions: 0  
Reviewer: P. Meeks  
Date of Review: March 24, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.

**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 004	IOB1556-01	8289-001	water	900.0, 905.0, 906.0
Outfall 005	IOB1557-01	8290-001	water	900.0, 905.0, 906.0
Outfall 006	IOB1559-01	8291-001	water	900.0, 905.0, 906.0
Outfall 018	IOB1570-01	8292-001	water	900.0, 905.0, 906.0
Outfall 003	IOB1571-01	8293-001	water	900.0, 905.0, 906.0
Outfall 003 Filtered	IOB1576-01	8294-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Unfiltered	IOB1576-02	8294-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Substrate	IOB1576-03	8295-001	solid	901.1

## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

All the samples in these SDGs were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . No temperature information was provided by Eberline, the subcontract laboratory; however, as it is not necessary to chill radiological samples, no qualifications were required. The samples were noted to have been received intact and in good condition. All tritium samples were received unpreserved in glass containers. All gross alpha, gross beta, and strontium samples were preserved, except for the Outfall 003 samples in SDG IOB1556. Outfall 003 Filtered, was filtered by Eberline and then preserved. Outfall 003 Unfiltered was not preserved. According to the Los Angeles Water Quality Control Board (LARWQCB) guidance letter dated 01/12/05, unfiltered samples should not be preserved. No qualifications were required.

#### 2.1.2 Chain of Custody

The original COCs were signed and dated by field and laboratory personnel. The transfer COCs were signed by personnel from both laboratories, except for the COC listing Outfall 003 in SDG IOB1571, which was not signed as received by Eberline. Eberline did not list the MWH IDs on the Form Is; therefore, the reviewer edited the Form Is to reflect these IDs. No qualifications were required.

#### 2.1.3 Holding Times

All the tritium and all the preserved gross alpha, gross beta, and strontium samples were analyzed within 180 days of collection. The Outfall 003 Unfiltered gross alpha, gross beta, strontium, radium-226, and radium-228 analyses were performed beyond the five day holding time for unpreserved samples; therefore, these results were qualified as estimated, "J." No further qualifications were necessary.

### 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

#### Gross Alpha and Gross Beta

The initial calibration included with the data was performed in February 2003. The detector efficiencies for Outfall 006, Outfall 018, Outfall 003, Outfall 003 Filtered, and Outfall 003 Unfiltered were less than 20%; therefore, these results were qualified as estimated, "UJ," for nondetects and, "J," for detects. The remaining detector efficiencies were above 20%.

#### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1995. All strontium chemical yields were at least 80% and were considered acceptable. The strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with a branch efficiency of 85%. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in May 2004. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228 and was verified in February 2001. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 70% and the actinium chemical yields were greater than 50%. No qualifications were necessary.

## **2.3 BLANKS**

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## **2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES**

Four blank spikes (8294-002, 8295-002, 8263-002, 8268-002) were analyzed in association with the samples in these SDGs. The radium-228 recovery was outside the 3-sigma limits; however, the recovery was considered acceptable at 125%. All remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## **2.5 LABORATORY DUPLICATES**

The laboratory performed duplicate analysis on Outfall 003 Filtered and Outfall 003 Substrate. All results were within the 3-sigma limits and all RPDs were  $\leq 20\%$ . No qualifications were necessary.

## **2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

The laboratory performed matrix spike analyses on Outfall 003 Unfiltered for gross alpha, gross beta, and tritium. The recovery for gross alpha was above 3-sigma; however, as the recovery of 118% was considered acceptable, no qualifications were required. The remaining recoveries were within the 3-sigma limits. No qualifications were necessary.

## 2.7 SAMPLE RESULT VERIFICATION

An EPA Level IV review was performed for the samples in these data packages. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted. No qualifications were necessary.

## 2.8 FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### 2.8.1 Field Blanks and Equipment Rinsates

The samples in these SDGs had no associated field QC samples. No qualifications were required.

### 2.8.2 Field Duplicates

There were no field duplicate samples in these SDGs.

Eberline Services

ANALYSIS RESULTS

SDG <u>8294</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502215-01</u>	Contract <u>PROJECT# IOB1576</u>
Received Date <u>02/23/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
Outfall 003 Filtered IOB1576-01	8294-001		02/18/05	03/08/05	GrossAlpha	0.904 ± 0.74	pCi/L	1.00
				03/08/05	Gross Beta	3.32 ± 1.2	pCi/L	1.79
				04/22/05	Ra228	0.746 ± 0.36	pCi/L	0.776
				03/12/05	H3	-41.9 ± 150	pCi/L	254
				05/06/05	Ra226	0.017 ± 0.023	pCi/L	0.039
				03/12/05	Sr90	0.901 ± 0.24	pCi/L	0.280
			Outfall 003 Unfiltered IOB1576-02	8294-002		02/18/05	03/08/05	GrossAlpha
	03/08/05	Gross Beta				3.75 ± 1.2	pCi/L	1.78
	04/22/05	Ra228				1.14 ± 0.36	pCi/L	0.742
	03/12/05	H3				-77.0 ± 140	pCi/L	255
	05/05/05	Ra226				0.109 ± 0.024	pCi/L	0.026
	03/12/05	Sr90				0.892 ± 0.22	pCi/L	0.253

mm s/l/s/os

Raw Qual	Qual Code
UJ	R
CCO	
BPHCHH	HHHR
	HH

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**LEVEL IV**

Certified by <u><i>n. J. Smith</i></u>
Report Date <u>05/10/05</u>
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Eberline Services

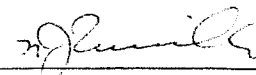
ANALYSIS RESULTS

SDG <u>8290</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502211-01</u>	Contract <u>PROJECT# IOB1557</u>
Received Date <u>02/23/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
Client Sample ID Outfall 005 IOB1557-01  MM 3/24/05		8290-001	02/18/05	03/08/05	GrossAlpha	-0.252 ± 0.33	pCi/L	0.862	U	
				03/08/05	Gross Beta	1.75 ± 1.2	pCi/L	1.87	U	
				03/12/05	H3	-3.55 ± 150	pCi/L	258	U	
				03/12/05	Sr90	-0.029 ± 0.24	pCi/L	0.308	U	

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Report Date <u>03/15/05</u>
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ANALYSIS RESULTS

SDG <u>8293</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502214-01</u>	Contract <u>PROJECT# 10B1571</u>
Received Date <u>02/23/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
Outfall 003 IOB1571-01 pm 3/24/05	8293-001	02/18/05	03/08/05	GrossAlpha	0.651 ± 1.1	pCi/L	1.90	UJ	R	
			03/08/05	Gross Beta	4.58 ± 1.4	pCi/L	1.97			
			03/13/05	H3	10.7 ± 150	pCi/L	258	U		
			03/12/05	Sr90	1.06 ± 0.23	pCi/L	0.261			

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Eberline Services

ANALYSIS RESULTS

SDG <u>8295</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502216-01</u>	Contract <u>PROJECT# 10B1576</u>
Received Date <u>02/23/05</u>	Matrix <u>SOLID</u>

Client	Lab	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u> Outfall 003 Substrate 10B1576-03	<u>Sample ID</u> 8295-001	02/18/05	03/04/05	Cs137 (G)	U	pCi/Smpl	14.4	U	

**AMEC VALIDATED**

**LEVEL IV**

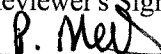
Certified by <u><i>M. Smith</i></u>
Report Date <u>03/15/05</u>
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**CONTRACT COMPLIANCE SCREENING FORM FOR HARDCOPY DATA**

AMEC Earth & Environmental  
 550 South Wadsworth Boulevard  
 Suite 500  
 Lakewood, CO 80226

Package ID T711RA4  
 Task Order 313150010  
 SDG No. Multiple  
 No. of Analyses 11

Laboratory Del Mar  
 Reviewer P. Meeks  
 Analysis/Method Radionuclides

Date: 03/24/05  
 Reviewer's Signature  


**ACTION ITEMS<sup>a</sup>**

1. <b>Case Narrative Deficiencies</b>	
2. <b>Out of Scope Analyses</b>	
3. <b>Analyses Not Conducted</b>	
4. <b>Missing Hardcopy Deliverables</b>	
5. <b>Incorrect Hardcopy Deliverables</b>	
6. <b>Deviations from Analysis Protocol, e.g.,</b>	<b>Qualifications applied for:</b>
Holding Times	1. Exceeded holding times.
GC/MS Tune/Inst. Performance	2. Matrix spike recovery outlier.
Calibrations	3. Laboratory duplicate RPD outlier.
Blanks	4. Incorrect sample container.
Surrogates	5. Detector efficiency outliers.
Matrix Spike/Dup LCS	6. Incorrect sample preservation.
Field QC	7. <i>Reanalysis rejected in favor of original result</i>
Internal Standard Performance	Three tritium results rejected due to incorrect sample preservation.
Compound Identification and Quantitation	
System Performance	

**COMMENTS<sup>b</sup>**

<sup>a</sup> Subcontracted analytical laboratory is not meeting contract and/or method requirements.  
<sup>b</sup> Differences in protocol have been adopted by the laboratory but no action against the laboratory is required.

## Data Qualifier Reference Table

---

Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

---

## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

\*# Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUPS:  
IOB0418, IOB0980, IOB0993, IOB0996, IOB0997,  
IOB1001, IOB1004, IOB1014, & IOB1069

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226

## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150010  
SDG#: IOB0418, IOB0980, IOB0993, IOB0996, IOB0997,  
IOB1001, IOB1004, IOB1014, & IOB1069  
Project Manager: B. McIlvaine  
Matrix: Water  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 11  
No. of Reanalyses/Dilutions: 0  
Reviewer: P. Meeks  
Date of Review: March 23, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.



**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 002	IOB0418-01	8237-001	water	900.0, 905.0, 906.0
Outfall 001	IOB0980-01	8265-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 001RE1	IOB0980-01RE1	8265-001	water	900.0
Outfall 007	IOB0993-01	8261-001	water	900.0, 905.0, 906.0
Outfall 007 RE1	IOB0993-01 RE1	8377-001	water	906.0
Outfall 009	IOB0996-01	8262-001	water	900.0, 905.0, 906.0
Outfall 009 RE1	IOB0996-01 RE1	8378-001	water	906.0
Outfall 008	IOB0997-01	8266-001	water	900.0, 905.0, 906.0
Outfall 008 RE1	IOB0997-01 RE1	8379-001	water	906.0
Outfall 010	IOB1001-01	8267-001	water	900.0, 905.0, 906.0
Outfall 010 RE1	IOB1001-01 RE1	8380-001	water	906.0
Outfall 011	IOB1004-01	8263-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Unfiltered	IOB1014-01	8264-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Filtered	IOB1014-03	8264-001	water	900.0, 905.0, 906.0
Outfall 003 Filtered	IOB1069-01	8268-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Unfiltered	IOB1069-02	8268-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Substrate	IOB1069-03	8269-001	water	901.1

## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

Most samples in these SDGs were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . Eberline, the subcontract laboratory, did not provide sample receipt temperature information; however, as it is not necessary to chill radiological samples, no qualifications were required. All samples were received intact and in good condition.

According to the Eberline login sheet, Outfall 002 was received unpreserved. It was confirmed in correspondence with Eberline dated 01/31/05, that the gross alpha, gross beta, and strontium samples were not preserved upon receipt. The gross alpha, gross beta, and strontium results were not qualified for lack of preservation, as the method also specifies a five-day holding time for unpreserved samples.

Eberline noted on their login sheets that Outfall 007, Outfall 008, Outfall 009 and Outfall 010 were received preserved, in plastic containers. The method states that tritium samples should not be preserved. Per a telephone conversation with M. Mannion of Eberline, these samples were adjusted back to a pH of about 7 upon receipt at Eberline. Due to the improper pH adjustments, the tritium results for Outfall 007, Outfall 008, Outfall 009, and Outfall 010 were rejected, "R." Del Mar Analytical sent additional aliquots of Outfall 007, Outfall 008, Outfall 009, and Outfall 010 for tritium reanalyses. These samples were received in the proper containers and were not preserved.

Additionally, according to the Los Angeles Regional Water Quality Control Board's guidance letter dated 01/12/05, samples collected for tritium analysis should be submitted in glass containers to avoid potential loss of tritium by sorption onto the plastic container. As the Outfall 007, Outfall 008, Outfall 009 and Outfall 010 tritium analyses were previously rejected, no further qualifications were required.

After all analyses were complete, Del Mar Analytical sent extra volume of Outfall 001 to Eberline for gross alpha reanalysis and radium-228 and radium-226 analyses. Extra volume of Outfall 011 (IOB1004 and IOB1014) was sent to Eberline for radium-228 and radium-226 analyses. These aliquots were received properly preserved. The radium-226 and radium-228 results for Outfall 003 Unfiltered and Outfall 011 Unfiltered (IOB1014) were not preserved and were not qualified for lack of preservation, as the methods specify a five-day holding time for unpreserved samples.

Additionally, per a request from Del Mar Analytical (see section 2.1.2), Eberline filtered and then preserved radium-226 and radium-228 aliquots for Outfall 003 Filtered and gross alpha, gross beta, and strontium aliquots for Outfall 011 Filtered (IOB1014). No further qualifications were required.

#### 2.1.2 Chain of Custody

The original COCs were signed and dated by field and laboratory personnel and the transfer COCs were signed by personnel from both laboratories.

Filtered, unfiltered, and substrate analyses were requested for Outfall 011 (IOB1014) on the original COC from the field to Del Mar. These instructions did not appear on the transfer COC to Eberline and subsequently only unfiltered analyses were originally performed. Extra volume of Outfall 011 (IOB1014) was sent by Del Mar Analytical (see section 2.1.1) for the filtered analyses. The results are reported as Outfall 011 Filtered (IOB1014).

The remaining original and transfer COCs accounted for the samples and analyses presented in this data package. Eberline did not list the MWH IDs on the Form Is; therefore, the reviewer edited the Form Is to reflect these IDs. A gross alpha was reanalyses was requested for Outfall 001, and tritium reanalyses were requested for Outfall 007, Outfall 008, Outfall 009, and Outfall 010. To distinguish between the original and reanalysis results, the reviewer added an "RE1" suffix to the original MWH and Del Mar Analytical IDs. No qualifications were required.

### 2.1.3 Holding Times

The tritium analyses were analyzed within 180 days of collection. The Outfall 002 gross alpha, gross beta, and strontium, Outfall 003 Unfiltered gross alpha, gross beta, strontium, radium-226, and radium-228, and Outfall 011 Unfiltered (IOB1014) gross alpha, gross beta, strontium, radium-226, and radium-228 samples were analyzed beyond the five day holding time for unpreserved samples; therefore, these results were qualified as estimated, "J," for detects and, "UJ," for nondetects. As the Outfall 011 Filtered (IOB1014) aliquots for gross alpha, gross beta, and strontium were preserved more than five days after collection, these nondetected results were qualified as estimated, "UJ." No further qualifications were necessary.

## 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

### Gross Alpha

The initial calibration included with the data was performed in February 2003. All detector efficiencies were below 20%; therefore, the gross alpha results were qualified as estimated, "UJ," for nondetects and, "J," for detects, unless otherwise rejected (see section 2.10).

### Gross Beta

The initial calibrations were performed in June 1997. All gross beta detector efficiencies were at least 20% and were considered acceptable.

### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1997. All strontium chemical yields were at least 65% and were considered acceptable and the strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with an efficiency of 85%. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in May 2004. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228 and was verified in February 2001 or June 2003. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 70%, and the actinium chemical yields were greater than 50%. No qualifications were necessary.

## **2.3 BLANKS**

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## **2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES**

Blank spikes were analyzed in association with the samples in these SDGs. For one blank spike, the gross alpha, gross beta, and strontium recoveries were outside of the 3-sigma limits, but all had acceptable recoveries of 80%, 88%, and 108%, respectively. One radium-228 blank spike was recovered outside of the 3-sigma limits, but had an acceptable recovery of 125%. The remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## **2.5 LABORATORY DUPLICATES**

The laboratory performed duplicate analyses for gross alpha, gross beta, tritium, and strontium on Outfall 002, Outfall 007, and Outfall 003 Substrate, tritium on Outfall 007 RE1, and radium-226 and radium-228 for Outfall 011 (IOB1004). The gross alpha and tritium RPDs were greater than 20% for Outfall 007. The gross alpha results were within 3-sigma and were considered acceptable, but the tritium result was just above 3-sigma; however, as no associated tritium detects were retained (see section 2.1.1), no qualifications were required. The remaining RPD were  $\leq 20\%$ . No qualifications were necessary.

## **2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

The laboratory performed matrix spike analyses for gross alpha, gross beta, and tritium on Outfall 002 and Outfall 007 and for tritium on Outfall 007 RE1. The Outfall 002 recovery for gross alpha was below 3-sigma; therefore, the gross alpha results in Outfall 001, Outfall 002, Outfall 008, Outfall 009, Outfall 010, Outfall 011 Unfiltered (IOB1014), Outfall 011 (IOB1004), Outfall 003 Filtered, and Outfall 003 Unfiltered were qualified as estimated, "J," for detects and, "UJ," for nondetects. Outfall 007 was also analyzed with Outfall 002, however, as Outfall 007 had an acceptable recovery for gross alpha, no qualifications were applied. The remaining recoveries were within the 3-sigma limits. No further qualifications were necessary.

## 2.7 SAMPLE RESULT VERIFICATION

An EPA Level IV review was performed for the samples in these data packages. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted.

The original planchet for gross alpha in Outfall 001 was recounted once per a request from MWH personnel. The recount yielded a result equivalent to original count and was not reported. The sample was later reanalyzed from extra sample volume provided by Del Mar Analytical, and was reported as Outfall 001 RE1. As the two gross alpha results were similar, the reviewer rejected, "R," the reanalysis, Outfall 001 RE1, in favor of the original result, Outfall 001. No further qualifications were necessary.

## 2.8 FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### 2.8.1 Field Blanks and Equipment Rinsates

The samples in these SDGs had no associated field QC samples. No qualifications were required.

### 2.8.2 Field Duplicates

There were no field duplicate samples in these SDGs.

Eberline Services

ANALYSIS RESULTS

SDG <u>8269</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502140-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>SOLID</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code	
Outfall 003	Substrate	IOB1069-03	8269-001	02/11/05	02/22/05	Cs137 (G)	U	pCi/Smpl	11.6	U	

pm 3/24/05

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LEVEL IV

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Report Date <u>03/04/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>B264</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502135-01</u>	Contract <u>PROJECT# IOB1014</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
<u>IOB1014-01</u>	<u>B264-001</u>	<u>02/11/05</u>	<u>03/01/05</u>	<u>GrossAlpha</u>	<u>0.895 ± 0.76</u>	<u>pCi/L</u>	<u>1.05</u>
			<u>03/01/05</u>	<u>Gross Beta</u>	<u>2.50 ± 1.3</u>	<u>pCi/L</u>	<u>1.90</u>
			<u>04/22/05</u>	<u>Ra228</u>	<u>0.375 ± 0.24</u>	<u>pCi/L</u>	<u>0.612</u>
			<u>03/02/05</u>	<u>H3</u>	<u>97.4 ± 140</u>	<u>pCi/L</u>	<u>237</u>
			<u>05/04/05</u>	<u>Ra226</u>	<u>0.034 ± 0.022</u>	<u>pCi/L</u>	<u>0.034</u>
			<u>02/25/05</u>	<u>Sr90</u>	<u>-0.216 ± 0.23</u>	<u>pCi/L</u>	<u>0.519</u>

Outfall 011 Unfiltered

PM 5/17/05

Re Qual	Qual Code
F	R, Q, H
F	H
B	H
B	H
B	H

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Eberline Services

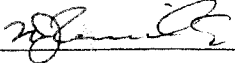
ANALYSIS RESULTS

SDG <u>8347</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503157-01</u>	Contract <u>PROJECT# IOB1014</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA	Rev Qual	Qual Code
		<u>Outfall Oil Filtered</u>								
IOB1014-03	8347-001	02/11/05	04/02/05	GrossAlpha	0.681 ± 0.61	pCi/L	0.811		UJ	H, R
			04/02/05	Gross Beta	1.33 ± 1.1	pCi/L	1.76		UJ	H
			04/07/05	H3	-80.6 ± 97	pCi/L	169		U	
			04/05/05	Sr90	0.004 ± 0.24	pCi/L	0.474		UJ	H

PM 5/17/05

**AMEC VALIDATED**  
**LEVEL IV**

Certified by 
Report Date <u>05/04/05</u>
Page 1



Eberline Services

ANALYSIS RESULTS

SDG <u>8263</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502134-01</u>	Contract <u>PROJECT# IOB1004</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
Sample ID <u>Outfall 01</u> IOB1004-01	8263-001	02/11/05	03/01/05	GrossAlpha	2.03 ± 0.91	pCi/L	0.787
			03/01/05	Gross Beta	2.30 ± 1.2	pCi/L	1.78
			04/22/05	Ra228	0.143 ± 0.31	pCi/L	0.787
			03/02/05	H3	21.1 ± 140	pCi/L	240
			05/04/05	Ra226	0.030 ± 0.018	pCi/L	0.027
			02/25/05	Sr90	-0.060 ± 0.23	pCi/L	0.470

AM 5/15/05

Qual	Qual Code
J	R, Q
U	
U	
U	

AMEC VALIDATED

LEVEL IV

Certified by <u><i>[Signature]</i></u>
Report Date <u>05/10/05</u>
Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8268</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502139-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
<i>Outfall 003 Filtered</i>							
IOB1069-01	8268-001	02/11/05	03/01/05	GrossAlpha	-0.288 ± 0.45	pCi/L	0.969
			03/01/05	Gross Beta	4.44 ± 1.3	pCi/L	1.80
			04/22/05	Ra228	1.37 ± 0.46	pCi/L	0.772
			03/03/05	H3	138 ± 150	pCi/L	242
			05/05/05	Ra226	0.056 ± 0.021	pCi/L	0.029
			02/25/05	Sr90	1.04 ± 0.31	pCi/L	0.428
<i>Outfall 003 Unfiltered</i>							
IOB1069-02	8268-002	02/11/05	03/01/05	GrossAlpha	0.240 ± 0.58	pCi/L	1.09
			03/01/05	Gross Beta	3.53 ± 1.2	pCi/L	1.82
			04/22/05	Ra228	1.30 ± 0.37	pCi/L	0.756
			03/03/05	H3	106 ± 150	pCi/L	242
			05/05/05	Ra226	0.018 ± 0.019	pCi/L	0.031
			02/25/05	Sr90	1.10 ± 0.34	pCi/L	0.462

Rev Qual	Qual Code
UJ	R, Q
U	
B5H25H	R, Q, H
	H
	H
	H

*pm s/s/s*

AMEC VALIDATED  
LEVEL IV

Certified by [Signature]  
Report Date 05/10/05  
Page 1

# CHAIN OF CUSTODY FORM

Version 5/8/12/04

Del Mar Analytical

Client Name/Address:				Project:				ANALYSIS REQUIRED												Field readings:			
MWH-Pasadena 300 North Lake Avenue, Suite 1200 Pasadena, CA 91101				Boeing-SSFL NPDES Outfall 003 - 13267 Storm Water at RMHF																Temp = pH=			
Project Manager: Bronwyn Kelly				Perimeter Pond																Comments			
Sampler: Pollock				Phone Number: (626) 568-6691 Fax Number: (626) 568-6515																Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15pCi/L			
Sample Description	Sample Matrix	Container Type	# of Cont.	Preservative	Bottle #	Sampling Date/Time	(FILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), Radium 228	(UNFILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), Total Combined Radium 226& Radium 228	Tritium (906.0)	Substrate (Radiospectroscopy for Cesium-137)												Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15pCi/L	
Outfall 003	W	1L Amber	4	HNO3		2-11-05 14:00	X	X			(Handwritten signature)												
Outfall 003	W	1L Amber	4	HNO3			X		X														
Outfall 003	W	VOAs	2	None			X																
							Date/Time: 2-11-05 17:00		Date/Time: 2-11-05 17:00													Turn around Time: (check) 24 Hours _____ 5 Days _____ 48 Hours _____ 10 Days _____ 72 Hours _____ Normal <input checked="" type="checkbox"/>	
Relinquished By: [Signature]							Date/Time: 2-11-05 17:00		Received By: [Signature]													Perchlorate Only 72 Hours _____ Metals Only 72 Hours _____	
Relinquished By: [Signature]							Date/Time: 2-11-05 20:30		Received By: [Signature]													Sample Integrity: (Check) Intact <input checked="" type="checkbox"/> On Ice: _____	
Relinquished By: [Signature]							Date/Time: 2-11-05 20:30		Received By: [Signature]													37	

July 13, 2005

MWH-Pasadena/Boeing  
300 North Lake Avenue, Suite 1200  
Pasadena, CA 91101

Attention: Bronwyn Kelly

Projects: 13267 (Study 2) / Routine Outfall 003  
Sampled: 2/11/05  
Del Mar Analytical Number: IOB1069


Dear Ms. Kelly:

Eberline Services performed the Gross Alpha/Beta (EPA 900.0), Tritium (EPA 906.0), Strontium-90 (EPA 905.0), Radium-226 (Ra-226, EPA 903.1), Radium-228 (Ra-228, EPA 904.0) and Cesium 137 by Gamma Spectroscopy (EPA 901.1) analyses for the projects referenced above. Please use the following cross-reference table when reviewing your results.

MWH ID	DEL MAR ID	EBERLINE ID
Outfall 003 Filtered	IOB1069-01	R502139-01 / 8268-001
Outfall 003 Unfiltered	IOB1069-02	R502139-01 / 8268-002
Outfall 003 Substrate	IOB1069-03	R502140-01 / 8269-001

Attached is the original report from the subcontract laboratory. If you have any questions or require further assistance, please do not hesitate to contact me.

Sincerely yours,  
DEL MAR ANALYTICAL



Michele Harper  
Project Manager



May 10, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Del Mar Analytical Project No. IOB1069  
Eberline Services NELAP Cert #01120CA (exp. 01/31/06)  
Eberline Services Report R502139-8268

Dear Ms. Harper:

Enclosed are results from the analyses of one water sample received at Eberline Services on February 15, 2005. The sample was analyzed according to the accompanying Del Mar Analytical Subcontract Order Form. The requested analyses were gross alpha/gross beta (EPA900.0), tritium (H-3, EPA906.0), and strontium-90 (Sr-90, EPA905.0); results for those analyses were reported on March 8. This report contains the analytical results for Ra-226 (EPA903.1) and Ra-228 (EPA904.0). The Ra-226 QC samples are 8368-005, 006, and 007, and the Ra-228 QC samples are 8263-002, 003, and 004. The QC LCS, blank analyses, and sample duplicates for both the analyses were within the limits defined in Eberline Services Quality Control Procedures Manual. Analyses that involve the yielding of an analytical tracer or carrier, such as Sr-90 and Ra-228, do not require matrix spike analyses to be performed. Please call me if you have any questions concerning this report.

Regards,

Melissa Mannion  
Senior Program Manager

MCM/njv

Enclosure: Report  
Subcontract Form  
Receipt checklist  
Invoice

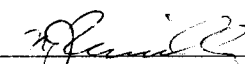
Analytical Services  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
Toll Free (800) 841-5487  
[www.eberlineservices.com](http://www.eberlineservices.com)

# Eberline Services

## ANALYSIS RESULTS

SDG <u>8268</u> Work Order <u>R502139-01</u> Received Date <u>02/15/05</u>	Client <u>DEL MAR ANAL</u> Contract <u>PROJECT# IOB1069</u> Matrix <u>WATER</u>
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Client	Lab						
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results + 2σ</u>	<u>Units</u>	<u>MDA</u>
IOB1069-01	8268-001	02/11/05	03/01/05	GrossAlpha	-0.288 ± 0.45	pCi/L	0.969
			03/01/05	Gross Beta	4.44 ± 1.3	pCi/L	1.80
			04/22/05	Ra228	1.37 ± 0.46	pCi/L	0.772
			03/03/05	H3	138 ± 150	pCi/L	242
			05/05/05	Ra226	0.056 ± 0.021	pCi/L	0.029
			02/25/05	Sr90	1.04 ± 0.31	pCi/L	0.428
IOB1069-02	8268-002	02/11/05	03/01/05	GrossAlpha	0.240 ± 0.58	pCi/L	1.09
			03/01/05	Gross Beta	3.53 ± 1.2	pCi/L	1.82
			04/22/05	Ra228	1.30 ± 0.37	pCi/L	0.756
			03/03/05	H3	106 ± 150	pCi/L	242
			05/05/05	Ra226	0.018 ± 0.019	pCi/L	0.031
			02/25/05	Sr90	1.10 ± 0.34	pCi/L	0.462

Certified by <u></u> Report Date <u>05/10/05</u> Page 1
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# Eberline Services

## QC RESULTS

SDG <u>8268</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502139-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Lab	Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
<u>LCS</u>							
	8261-002	GrossAlpha	8.92 ± 1.1	pCi/Smpl	11.2	0.403	80% recovery
		Gross Beta	10.6 ± 0.77	pCi/Smpl	12.1	0.556	88% recovery
		H3	281 ± 24	pCi/Smpl	259	23.4	108% recovery
		Sr90	12.0 ± 0.59	pCi/Smpl	11.1	0.238	108% recovery
<u>BLANK</u>							
	8261-003	GrossAlpha	-0.032 ± 0.15	pCi/Smpl	NA	0.374	<MDA
		Gross Beta	-0.073 ± 0.30	pCi/Smpl	NA	0.554	<MDA
		H3	13.6 ± 15	pCi/Smpl	NA	23.9	<MDA
		Sr90	-0.091 ± 0.10	pCi/Smpl	NA	0.234	<MDA
<u>LCS</u>							
	8263-002	Ra228	12.7 ± 0.80	pCi/Smpl	10.2	1.07	125% recovery
<u>BLANK</u>							
	8263-003	Ra228	-0.465 ± 0.43	pCi/Smpl	NA	1.19	<MDA
<u>LCS</u>							
	8368-005	GrossAlpha	13.0 ± 1.4	pCi/Smpl	11.2	0.420	116% recovery
		Gross Beta	12.4 ± 0.85	pCi/Smpl	12.1	0.581	102% recovery
		Ra226	5.45 ± 0.18	pCi/Smpl	5.58	0.056	97% recovery
<u>BLANK</u>							
	8368-006	GrossAlpha	-0.051 ± 0.14	pCi/Smpl	NA	0.355	<MDA
		Gross Beta	-0.190 ± 0.30	pCi/Smpl	NA	0.542	<MDA
		Ra226	-0.014 ± 0.011	pCi/Smpl	NA	0.021	<MDA

<u>DUPLICATES</u>				<u>ORIGINALS</u>				
Sample ID	Nuclide	Results ± 2σ	MDA	Sample ID	Results ± 2σ	MDA	3σ	
							RPD (Tot)	Eval
8261-004	GrossAlpha	3.40 ± 1.4	0.926	8261-001	1.64 ± 1.0	0.936	70	112 satis.
	Gross Beta	6.02 ± 1.4	1.80		5.18 ± 1.3	1.80	15	60 satis.
	H3	393 ± 160	242		71.9 ± 150	246	138	144 satis.
	Sr90	-0.186 ± 0.19	0.431		-0.077 ± 0.25	0.499	-	0 satis.
8263-004	Ra228	0.245 ± 0.27	0.716	8263-001	3.143 ± 0.31	0.787	-	0 satis.
8368-007	GrossAlpha	5.26 ± 5.8	8.58	8368-001	8.78 ± 6.2	7.52	50	187 satis.
	Gross Beta	11.2 ± 7.5	11.8		16.6 ± 7.3	10.8	39	118 satis.

Certified by \_\_\_\_\_

Report Date 05/10/05

Page 2

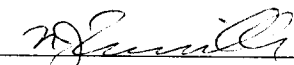
# Eberline Services

## QC RESULTS

SDG <u>8268</u> Work Order <u>R502139-01</u> Received Date <u>02/15/05</u>	Client <u>DEL MAR ANAL</u> Contract <u>PROJECT# IOB1069</u> Matrix <u>WATER</u>
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<u>DUPLICATES</u>			<u>ORIGINALS</u>						
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results + 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results + 2σ</u>	<u>MDA</u>	<u>3σ</u>	<u>RPD (Tot)</u>	<u>Eval</u>
Ra226		0.011 ± 0.27	0.488		-0.198 ± 0.13	0.241	-	0	satis.

<u>SPIKED SAMPLE</u>				<u>ORIGINAL SAMPLE</u>				
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results + 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results + 2σ</u>	<u>MDA</u>	<u>Added</u>	<u>%Recv</u>
8261-005	GrossAlpha	81.8 ± 5.3	1.04	8261-001	1.64 ± 1.0	0.936	76.6	105
	Gross Beta	82.0 ± 3.7	1.81		5.18 ± 1.3	1.80	73.9	104
	H3	17800 ± 520	243		71.9 ± 150	246	18900	94
8368-008	GrossAlpha	1560 ± 120	21.4	8368-002	26.5 ± 18	22.4	1530	100
	Gross Beta	1490 ± 72	35.5		50.6 ± 24	36.5	1480	97

Certified by   
 Report Date 05/10/05  
 Page 3





July 6, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Eberline Services NELAP Cert #01120CA (exp. 01/31/06)

Dear Ms. Harper:

Enclosed are revised gamma Cs-137 reports for various projects, the project numbers and Eberline Services report numbers are given below. The results were previously reported in the units of pCi/sample; the enclosed reports present the results in the recalculated units of pCi/g.

<u>Del Mar Project</u>	<u>Eberline Services Report</u>
IOB1069-03	R502140-8269
IOB1576-03	R502216-8295
IOB2065-04	R503156-8346
IOB1014-04	R503158-8348
IOC1523-04	R503160-8350
IOC1562-03	R503162-8352
IOC2063-04	R503231-8382
IOD2061-03	R505003-8443

Please call me if you have any questions concerning the enclosed reports.

Regards,

Melissa Mannion  
Senior Program Manager

MCM/njv

Enclosure: Reports  
Invoice

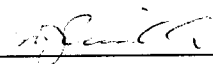
Analytical Services  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
Toll Free (800) 841-5487  
[www.eberlineservices.com](http://www.eberlineservices.com)

Eberline Services

ANALYSIS RESULTS

SDG <u>8269</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502140-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>SOLID</u>

Client	Lab						
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results <math>\pm 2\sigma</math></u>	<u>Units</u>	<u>MDA</u>
IOB1069-03	8269-001	02/11/05	02/22/05	Cs137 (G)	U	pCi/G	19.8

Certified by <u></u>
Report Date <u>07/06/05</u>
Page 1


# Eberline Services

## QC RESULTS

SDG <u>8269</u> Work Order <u>R502140-01</u> Received Date <u>02/15/05</u>	Client <u>DEL MAR ANAL</u> Contract <u>PROJECT# IOB1069</u> Matrix <u>SOLID</u>
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Lab	<u>Sample ID</u>	<u>Nuclide</u>	<u>Results</u>	<u>Units</u>	<u>Amount Added</u>	<u>MDA</u>	<u>Evaluation</u>
<u>LCS</u>	8269-002	Cs137 (G)	203 ± 9.4	pCi/Smpl	223	8.13	91% recovery
<u>BLANK</u>	8269-003	Cs137 (G)	U	pCi/Smpl	NA	12.8	<MDA

DUPLICATES				ORIGINALS			
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>3σ</u> <u>RPD (Tot) Eval</u>
8269-004	Cs137 (G)	U	20.9	8269-001	U	19.8	- 0 satis.

Certified by <u></u> Report Date <u>07/06/05</u> Page 2
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17461 Derian Ave. Suite 100, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228  
 1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046  
 9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689  
 9830 South 51st Street, Suite B-120, Phoenix, AZ 85044 Ph (480) 785-0043 Fax (480) 785-0851  
 2520 E. Sunsel Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

## SUBCONTRACT ORDER - PROJECT # IOB1069

**SENDING LABORATORY:**

Del Mar Analytical, Irvine  
 17461 Derian Avenue, Suite 100  
 Irvine, CA 92614  
 Phone: (949) 261-1022  
 Fax: (949) 261-1228  
 Project Manager: Michele Harper

**RECEIVING LABORATORY:**

Eberline Services  
 2030 Wright Avenue  
 Richmond, CA 94804  
 Phone : (510) 235-2633  
 Fax: (510) 235-0438

**Work Order Comments:** Level IV Data, include std logs

Standard TAT is requested unless specific due date is requested => **Due Date:** AWK TAT **Initials:** MH

Analysis	Expiration	Comments
<b>Sample ID: IOB1069-01</b>	<b>Water</b>	<b>Sampled: 02/11/05 14:00</b>
EDD + Level 4-OUT	03/11/05 14:00	<b>Filter w/ preweighed .45 um &amp; preserve (except Hr)</b>
Gross Alpha-O	02/11/06 14:00	<b>**LEVEL IV QC, ACCESS 7 EDD**</b>
Gross Beta-O	02/11/06 14:00	900.0, IF RESULT > 15 pCi/L, run Radium 226 & 228
Radium, Combined-O	02/11/06 14:00	900.0, IF RESULT > 50 pCi/L, run Radium 226 & 228
Strontium 90-O	02/11/06 14:00	HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Tritium-O	02/11/06 14:00	905.0
		906

- Containers Supplied:**
- 1 L Amber (IOB1069-01A)
  - 1 L Amber (IOB1069-01B)
  - 1 L Amber (IOB1069-01C)
  - 1 L Amber (IOB1069-01D)

<b>Sample ID: IOB1069-02</b>	<b>Water</b>	<b>Sampled: 02/11/05 14:00</b>	<b>Analyze as received, do not preserve</b>
Gross Alpha-O	02/11/06 14:00		900.0, IF RESULT > 15 pCi/L, run Radium 226 & 228
Gross Beta-O	02/11/06 14:00		900.0, IF RESULT > 50 pCi/L, run Radium 226 & 228
Radium, Combined-O	02/11/06 14:00		HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Strontium 90-O	02/11/06 14:00		905.0
Tritium-O	02/11/06 14:00		906

- Containers Supplied:**
- 1 L Amber (IOB1069-02A)
  - 1 L Amber (IOB1069-02B)
  - 1 L Amber (IOB1069-02C)
  - 1 L Amber (IOB1069-02D)
  - 40 ml Voa Vial (IOB1069-02E)
  - 40 ml Voa Vial (IOB1069-02F)

<b>Sample ID: IOB1069-03</b>	<b>Soil Solid</b>	<b>Sampled: 02/11/05 00:00</b>	<b>Analyze substrate on filter from IOB1069-01</b>
Gamma Scan-O		02/11/06 00:00	Cesium 137, EPA 901.1, 20 pci/sample RL

	2/14/05	2/15/05	10:00	
Released By	Date	Time	Received By	Date
	Date	Time	Received By	Date

**RICHMOND, CA LABORATORY**



**SAMPLE RECEIPT CHECKLIST**

Client: Del Mar City: Irvine State: CA

Date/Time received: 2/15/05 10:00 CoC No.: IOR1069

Container I.D. No.: Red Cooler SJ #06 Requested TAT (Days): 21 P.O. Received Yes  No

Sample # -01A

**INSPECTION**

1. Custody seals on shipping container intact? Yes [ ] No [ ] N/A [  ]
2. Custody seals on shipping container dated & signed? Yes [ ] No [ ] N/A [  ]
3. Custody seals on sample containers intact? Yes [ ] No [ ] N/A [  ]
4. Custody seals on sample containers dated & signed? Yes [ ] No [ ] N/A [  ]
5. Packing material is: Wet  Dry [ ]
6. Number of samples in shipping container: 2 Sample Matrix: water
7. Number of containers per sample: 10 (Or see CoC \_\_\_\_\_)
8. Samples are in correct container Yes  No [ ]
9. Paperwork agrees with samples? Yes  No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels
11. Samples are: in good condition  Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved  pH 7 Preservative \_\_\_\_\_
13. Describe any anomalies: \_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No  Date: \_\_\_\_\_

15. Inspected by: ZHQ Date: 2/15/05 Time: 10:00

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_

JOB 1576

CHAIN OF CUSTODY FORM

Del Mar Analytical Version 5 8/12/04

Client Name/Address:		Project:				ANALYSIS REQUIRED										Field readings:		
MWH-Pasadena 300 North Lake Avenue, Suite 1200 Pasadena, CA 91101		Boeing-SSFL NPDES Outfall 003 - 13267 Storm Water at RMHF Perimeter Pond				(FILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), Total Combined Radium 226& Radium 228	(UNFILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), Total Combined Radium 226& Radium 228	Total Combined Radium 226& Radium 228	Gross Beta, Sr-90 (905.0), Total Combined Radium 226& Radium 228	Tritium (906.0)	Substrate (Radiospectroscopy for Cesium-137)							Temp = 55.6 pH = 7.2
Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date/Time	Preservative	Bottle #											Comments	
Outfall 003	W	1L Amber	4	2-18-05 12:32	HNO3 None	None	X	X	X	X							Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15pCi/L	
Outfall 003	W	1L Amber	4		HNO3 None	None											Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15pCi/L	
Outfall 003	W	VOAS	2		None													
Relinquished By: <i>[Signature]</i>		Date/Time: 2-18-05 1450		Received By: <i>[Signature]</i>		Date/Time: 2/18/05 1450												Turn around Time: (check) 24 Hours _____ 5 Days _____ 48 Hours _____ 10 Days _____ ✓ 72 Hours _____ Normal _____
Relinquished By: <i>[Signature]</i>		Date/Time: 2-18-05 1830		Received By: <i>[Signature]</i>		Date/Time: 2/18/05 1830												Perchlorate Only 72 Hours _____ Metals Only 72 Hours _____
Relinquished By: <i>[Signature]</i>		Date/Time: _____		Received By: _____		Date/Time: _____												Sample Integrity: (Check) Intact <input checked="" type="checkbox"/> On Ice: <input checked="" type="checkbox"/>

*[Handwritten initials]*

July 13, 2005

MWH-Pasadena/Boeing  
300 North Lake Avenue, Suite 1200  
Pasadena, CA 91101

Attention: Bronwyn Kelly

Projects: 13267 (Study 2) / Routine Outfall 003  
Sampled: 2/18/05  
Del Mar Analytical Number: IOB1576

Dear Ms. Kelly:

Eberline Services performed the Gross Alpha/Beta (EPA 900.0), Tritium (EPA 906.0), Strontium-90 (EPA 905.0), Radium-226 (Ra-226, EPA 903.1), Radium-228 (Ra-228, EPA 904.0) and Cesium 137 by Gamma Spectroscopy (EPA 901.1) analyses for the projects referenced above. Please use the following cross-reference table when reviewing your results.

MWH ID	DEL MAR ID	EBERLINE ID
Outfall 003 Filtered	IOB1576-01	R502215-01 / 8294-001
Outfall 003 Unfiltered	IOB1576-02	R502215-01 / 8294-002
Outfall 003 Substrate	IOB1576-03	R502216-01 / 8295-001

Attached is the original report from the subcontract laboratory. If you have any questions or require further assistance, please do not hesitate to contact me.

Sincerely yours,  
DEL MAR ANALYTICAL



Michele Harper  
Project Manager



May 10, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Del Mar Analytical Project No. IOB1576  
Eberline Services NELAP Cert #01120CA (exp. 01/31/06)  
Eberline Services Report R502215-8294

Dear Ms. Harper:

Enclosed are results from the analyses of one water sample received at Eberline Services on February 23, 2005. The sample was analyzed according to the accompanying Del Mar Analytical Subcontract Order Form. The requested analyses were gross alpha/gross beta (EPA900.0), tritium (H-3, EPA906.0), and strontium-90 (Sr-90, EPA905.0); results for those analyses were reported on March 15. This report contains the analytical results for Ra-226 (EPA903.1) and Ra-228 (EPA904.0). The Ra-226 QC samples are 8368-005, 006, and 007, and the Ra-228 QC samples are 8263-002, 003, and 004. The QC LCS, blank analyses, and sample duplicates for both the analyses were within the limits defined in Eberline Services Quality Control Procedures Manual. Analyses that involve the yielding of an analytical tracer or carrier, such as Sr-90 and Ra-228, do not require matrix spike analyses to be performed.

Please call me if you have any questions concerning this report.

Regards,

Melissa Mannion  
Senior Program Manager

*MCM/njv*

*Enclosure: Report  
Subcontract Form  
Receipt checklist  
Invoice*

**Analytical Services**  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
Toll Free (800) 841-5487  
[www.eberlineservices.com](http://www.eberlineservices.com)

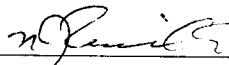


# Eberline Services

## ANALYSIS RESULTS

SDG <u>8294</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502215-01</u>	Contract <u>PROJECT# IOB1576</u>
Received Date <u>02/23/05</u>	Matrix <u>WATER</u>

Client	Lab						
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>Units</u>	<u>MDA</u>
IOB1576-01	8294-001	02/18/05	03/08/05	GrossAlpha	0.904 ± 0.74	pCi/L	1.00
			03/08/05	Gross Beta	3.32 ± 1.2	pCi/L	1.79
			04/22/05	Ra228	0.746 ± 0.36	pCi/L	0.776
			03/12/05	H3	-41.9 ± 150	pCi/L	254
			05/06/05	Ra226	0.017 ± 0.023	pCi/L	0.039
			03/12/05	Sr90	0.901 ± 0.24	pCi/L	0.280
IOB1576-02	8294-002	02/18/05	03/08/05	GrossAlpha	1.42 ± 0.93	pCi/L	1.19
			03/08/05	Gross Beta	3.75 ± 1.2	pCi/L	1.78
			04/22/05	Ra228	1.14 ± 0.36	pCi/L	0.742
			03/12/05	H3	-77.0 ± 140	pCi/L	255
			05/05/05	Ra226	0.109 ± 0.024	pCi/L	0.026
			03/12/05	Sr90	0.892 ± 0.22	pCi/L	0.253

Certified by <u></u> Report Date <u>05/10/05</u> Page 1
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# Eberline Services

## QC RESULTS

SDG <u>8294</u> Work Order <u>R502215-01</u> Received Date <u>02/23/05</u>	Client <u>DEL MAR ANAL</u> Contract <u>PROJECT# IOB1576</u> Matrix <u>WATER</u>
--	---

Lab	Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
<u>LCS</u>							
	8263-002	Ra228	12.7 ± 0.80	pCi/Smpl	10.2	1.07	125% recovery
<u>BLANK</u>							
	8263-003	Ra228	-0.465 ± 0.43	pCi/Smpl	NA	1.19	<MDA
<u>LCS</u>							
	8294-003	GrossAlpha	10.9 ± 1.2	pCi/Smpl	10.2	0.313	107% recovery
		Gross Beta	9.49 ± 0.74	pCi/Smpl	10.1	0.546	94% recovery
		H3	214 ± 23	pCi/Smpl	235	25.4	91% recovery
		Sr90	9.75 ± 0.32	pCi/Smpl	10.1	0.145	97% recovery
<u>BLANK</u>							
	8294-004	GrossAlpha	-0.034 ± 0.23	pCi/Smpl	NA	0.415	<MDA
		Gross Beta	-0.236 ± 0.29	pCi/Smpl	NA	0.551	<MDA
		H3	9.66 ± 15	pCi/Smpl	NA	25.1	<MDA
		Sr90	-0.064 ± 0.098	pCi/Smpl	NA	0.140	<MDA
<u>LCS</u>							
	8368-005	GrossAlpha	13.0 ± 1.4	pCi/Smpl	11.2	0.420	116% recovery
		Gross Beta	12.4 ± 0.85	pCi/Smpl	12.1	0.581	102% recovery
		Ra226	5.45 ± 0.18	pCi/Smpl	5.59	0.056	97% recovery
<u>BLANK</u>							
	8368-006	GrossAlpha	-0.051 ± 0.14	pCi/Smpl	NA	0.355	<MDA
		Gross Beta	-0.190 ± 0.30	pCi/Smpl	NA	0.542	<MDA
		Ra226	-0.014 ± 0.011	pCi/Smpl	NA	0.021	<MDA

DUPLICATES				ORIGINALS					
Sample ID	Nuclide	Results ± 2σ	MDA	Sample ID	Results ± 2σ	MDA	3σ	RPD (Tot)	Eval
8263-004	Ra228	0.245 ± 0.27	0.716	8263-001	0.143 ± 0.31	0.787	-	0	satis.
8294-005	GrossAlpha	0.399 ± 0.53	0.874	8294-001	0.904 ± 0.74	1.00	-	0	satis.
	Gross Beta	2.91 ± 1.2	1.78		3.32 ± 1.2	1.79	13	88	satis.
	H3	76.8 ± 150	254		-41.9 ± 150	254	-	0	satis.
	Sr90	0.884 ± 0.24	0.281		0.901 ± 0.24	0.280	2	61	satis.
8368-007	GrossAlpha	5.26 ± 5.8	8.58	8368-001	8.78 ± 6.2	7.52	50	187	satis.
	Gross Beta	11.2 ± 7.5	11.8		16.6 ± 7.3	10.8	39	118	satis.

Certified by

Report Date 05/10/05

Page 2

# Eberline Services

## QC RESULTS

SDG <u>8294</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502215-01</u>	Contract <u>PROJECT# IOB1576</u>
Received Date <u>02/23/05</u>	Matrix <u>WATER</u>

<u>DUPLICATES</u>				<u>ORIGINALS</u>			
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>3σ</u> <u>RPD (Tot) Eval</u>
	Ra226	0.011 ± 0.27	0.488		-0.198 ± 0.13	0.241	- 0 satis.

<u>SPIKED SAMPLE</u>				<u>ORIGINAL SAMPLE</u>					
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>Added</u>	<u>%Recv</u>	
8294-006	GrossAlpha	86.0 ± 5.3	0.881	8294-002	1.42 ± 0.93	1.19	71.5	118	
	Gross Beta	72.1 ± 3.5	1.79		3.75 ± 1.2	1.78	67.2	102	
	H3	22300 ± 580	252		-77.0 ± 140	255	23600	95	
8368-008	GrossAlpha	1560 ± 120	21.4	8368-002	26.5 ± 18	22.4	1530	100	
	Gross Beta	1490 ± 72	35.5		50.6 ± 24	36.5	1480	97	

Certified by
Report Date <u>05/10/05</u>
Page 3



July 6, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Eberline Services NELAP Cert #01120CA (exp. 01/31/06)

Dear Ms. Harper:

Enclosed are revised gamma Cs-137 reports for various projects, the project numbers and Eberline Services report numbers are given below. The results were previously reported in the units of pCi/sample; the enclosed reports present the results in the recalculated units of pCi/g.

<u>Del Mar Project</u>	<u>Eberline Services Report</u>
IOB1069-03	R502140-8269
IOB1576-03	R502216-8295
IOB2065-04	R503156-8346
IOB1014-04	R503158-8348
IOC1523-04	R503160-8350
IOC1562-03	R503162-8352
IOC2063-04	R503231-8382
IOD2061-03	R505003-8443

Please call me if you have any questions concerning the enclosed reports.

Regards,

Melissa Mannion  
Senior Program Manager

*MCM/njv*

Enclosure: Reports  
Invoice

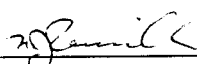
Analytical Services  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
Toll Free (800) 841-5487  
[www.eberlineservices.com](http://www.eberlineservices.com)

Eberline Services

ANALYSIS RESULTS

SDG <u>8295</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502216-01</u>	Contract <u>PROJECT# IOB1576</u>
Received Date <u>02/23/05</u>	Matrix <u>SOLID</u>

<u>Client</u> <u>Sample ID</u>	<u>Lab</u> <u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>Units</u>	<u>MDA</u>
IOB1576-03	8295-001	02/18/05	03/04/05	Cs137 (G)	U	pCi/G	20.5

Certified by <u></u>
Report Date <u>07/06/05</u>
Page 1

Eberline Services

QC RESULTS

SDG <u>8295</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502216-01</u>	Contract <u>PROJECT# IOB1576</u>
Received Date <u>02/23/05</u>	Matrix <u>SOLID</u>

Lab	Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
<u>LCS</u>	8295-002	Cs137 (G)	286 ± 25	pCi/Smpl	267	16.7	107% recovery
<u>BLANK</u>	8295-003	Cs137 (G)	U	pCi/Smpl	NA	11.7	<MDA

<u>DUPLICATES</u>				<u>ORIGINALS</u>			
<u>Sample ID</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>Sample ID</u>	<u>Results ± 2σ</u>	<u>MDA</u>	<u>RPD (Tot) Eval</u>
8295-004	Cs137 (G)	U	17.8	8295-001	U	20.5	- 0 satis.

Certified by *[Signature]*  
 Report Date 07/06/05  
 Page 2



17461 Derian Ave. Suite 100, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228  
 1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046  
 9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689  
 9830 South 51st Street, Suite B-120, Phoenix, AZ 85044 Ph (480) 785-0043 Fax (480) 785-0851  
 2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

## SUBCONTRACT ORDER - PROJECT # IOB1576

**SENDING LABORATORY:**

Del Mar Analytical, Irvine  
 17461 Derian Avenue. Suite 100  
 Irvine, CA 92614  
 Phone: (949) 261-1022  
 Fax: (949) 261-1228  
 Project Manager: Michele Harper

**RECEIVING LABORATORY:**

Eberline Services  
 2030 Wright Avenue  
 Richmond, CA 94804  
 Phone : (510) 235-2633  
 Fax: (510) 235-0438

**Work Order Comments:** Level IV Data, include std logs

**Standard TAT is requested unless specific due date is requested => Due Date:** AWK TAT **Initials:** MH

Analysis	Expiration	Comments
<b>Sample ID: IOB1576-01</b> Water	<b>Sampled: 02/18/05 12:32</b>	<b>Filter w/ preweighed .45 um &amp; preserve (except H3)</b>
EDD + Level 4-OUT	03/18/05 12:32	**LEVEL IV QC, ACCESS 7 EDD**
Gross Alpha-O	02/18/06 12:32	900.0, IF RESULT>15 pCi/L, run Radium 226 & 228
Gross Beta-O	02/18/06 12:32	900.0, IF RESULT>50 pCi/L, run Radium 226 & 228
Radium, Combined-O	02/18/06 12:32	HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Strontium 90-O	02/18/06 12:32	905.0
Tritium-O	02/18/06 12:32	906

- Containers Supplied:**
- 1 L Amber (IOB1576-01A)
  - 1 L Amber (IOB1576-01B)
  - 1 L Amber (IOB1576-01C)
  - 1 L Amber (IOB1576-01D)

<b>Sample ID: IOB1576-02</b> Water	<b>Sampled: 02/18/05 12:32</b>	<b>Analyze as received, do not preserve</b>
Gross Alpha-O	02/18/06 12:32	900.0, IF RESULT>15 pCi/L, run Radium 226 & 228
Gross Beta-O	02/18/06 12:32	900.0, IF RESULT>50 pCi/L, run Radium 226 & 228
Radium, Combined-O	02/18/06 12:32	HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Strontium 90-O	02/18/06 12:32	905.0
Tritium-O	02/18/06 12:32	906

- Containers Supplied:**
- 1 L Amber (IOB1576-02A)
  - 1 L Amber (IOB1576-02B)
  - 1 L Amber (IOB1576-02C)
  - 1 L Amber (IOB1576-02D)
  - 40 ml Voa Vial (IOB1576-02E)
  - 40 ml Voa Vial (IOB1576-02F)

<b>Sample ID: IOB1576-03</b> Solid	<b>Sampled: 02/18/05 12:32</b>	<b>Analyze substrate on filter from IOB1576-01</b>
Gamma Scan-O	02/18/06 12:32	Cesium 137, EPA 901.1, 20 pci/sample RL

*2-22-05*

Released By: Michele Harper Date: 2/22/05 Time: 1700 Received By: AK Date: 2/23/05 Time: 10:00

Released By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_



Del Mar Analytical

17461 Derian Ave. Suite 100, Irvine, CA 92614	Ph (949) 261-1022	Fax (949) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324	Ph (909) 370-4667	Fax (909) 370-1046
9484 Chesapeake Drive, Suite 805, San Diego, CA 92123	Ph (619) 505-9596	Fax (619) 505-9688
9830 South 51st Street, Suite B-120, Phoenix, AZ 85044	Ph (480) 785-0043	Fax (480) 785-0851
2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120	Ph (702) 798-3620	Fax (702) 798-3621

## SUBCONTRACT ORDER - PROJECT # IOB1576

### SAMPLE INTEGRITY:

All containers intact:  Yes  No  
 Custody Seals Present:  Yes  No

Sample labels/COC agree:  Yes  No  
 Samples Preserved Properly:  Yes  No

Samples Received On Ice:  Yes  No  
 Samples Received at (temp): \_\_\_\_\_

<i>Michelle Hepp</i>	<i>2-22-05</i>	<i>1700</i>				
Released By	Date	Time	Received By	Date	Time	

Released By	Date	Time	Received By	Date	Time	



RICHMOND, CA LABORATORY



SAMPLE RECEIPT CHECKLIST

Client DEL MAR ANALYT. City IRVINE State CA

Date/Time received 2/23/05 10:00 CoC No. T0B1576

Container I.D. No. 2PP0 Requested TAT (Days) 4 wk P.O. Received Yes [ ] No [ ]

INSPECTION

1. Custody seals on shipping container intact? Yes [✓] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [✓] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [✓] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [ ] No [ ] N/A [✓]
5. Packing material is: Wet [ ] Dry [ ]
6. Number of samples in shipping container: 2 Sample Matrix WATER
7. Number of containers per sample: 10 (Or see CoC \_\_\_\_\_)
8. Samples are in correct container? Yes [✓] No [ ]
9. Paperwork agrees with samples? Yes [ ] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [✓]
11. Samples are: In good condition [✓] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [✓] pH 7 Preservative \_\_\_\_\_
13. Describe any anomalies: \_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_  
 15. Inspected by JK Date: 2/23/05 Time: 10:00

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_

IOC 1562

# CHAIN OF CUSTODY FORM

Del Mar Analytical Version 02/17/05

Client Name/Address:				Project:			
MWH-Pasadena 300 North Lake Avenue, Suite 1200 Pasadena, CA 91101				Boeing-SSFL NPDES Outfall 003-13267 Stormwater at RMHF			
Del Mar Contact: Michele Harper				Phone Number: (626) 568-6691			
Project Manager: Bronwyn Kelly				Fax Number: (626) 568-6515			
Sampler: <i>P. Paddock</i>							
Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date/Time	Preservative	Bottle #	ANALYSIS REQUIRED  (FILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), & Radium 226  X  (UNFILTERED) Gross Alpha, Gross Beta, Sr-90 (905.0), & Radium 228  X  Total Combined Radium 226 & Radium 228  Tritium (906.0)  Substrate (Radiospectroscopy for Cesium -137)  X  X  X  X  X  X
Outfall 003	W	1L Amber	4	2-19-05 09:46	None		
Outfall 003	W	1L Amber	4		None		
Outfall 003	W	VOAs	2		None		

Field readings:  
Temp = 54.3F  
pH = 6.7

Comments

Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15 pCi/L

Analyze for Total Combined RA-226 & 228 only if Gross Alpha > 15 pCi/L

Relinquished By: *[Signature]* Date/Time: 3-19-05

Relinquished By: *[Signature]* Date/Time: 3/19/05

Relinquished By: *[Signature]* Date/Time: 3/19/05

Received By: *[Signature]* Date/Time: 3/19/05 12:45

Received By: *[Signature]* Date/Time: 3/19/05 15:30 DMAI

Received By: *[Signature]* Date/Time: 3/15/00 17:30

Turn around Time (Check)  
24 Hours \_\_\_\_\_ 5 Days     
48 Hours \_\_\_\_\_ 10 Days \_\_\_\_\_  
72 Hours \_\_\_\_\_ Normal \_\_\_\_\_  
Perchlorate Only 72 Hours \_\_\_\_\_  
Metals Only 72 Hours \_\_\_\_\_  
Sample Integrity (Check)  
Intact: \_\_\_\_\_ On Ice:   

*[Handwritten initials/signature]*

July 13, 2005

MWH-Pasadena/Boeing  
300 North Lake Avenue, Suite 1200  
Pasadena, CA 91101

Attention: Bronwyn Kelly

Projects: 13267 (Study 2) / Routine Outfall 003  
Sampled: 3/19/05  
Del Mar Analytical Number: IOC1562


Dear Ms. Kelly:

Eberline Services performed the Gross Alpha/Beta (EPA 900.0), Tritium (EPA 906.0), Strontium-90 (EPA 905.0), Radium-226 (Ra-226, EPA 903.1), Radium-228 (Ra-228, EPA 904.0) and Cesium 137 by Gamma Spectroscopy (EPA 901.1) analyses for the projects referenced above. Please use the following cross-reference table when reviewing your results.

MWH ID	DEL MAR ID	EBERLINE ID
Outfall 003 Filtered	IOC1562-01	R503161-01 / 8351-001
Outfall 003 Unfiltered	IOC1562-02	R503161-01 / 8351-002
Outfall 003 Substrate	IOC1562-03	R503162-01 / 8352-001

Attached is the original report from the subcontract laboratory. If you have any questions or require further assistance, please do not hesitate to contact me.

Sincerely yours,  
DEL MAR ANALYTICAL



Michele Harper  
Project Manager



May 10, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Del Mar Analytical Project No. IOC1562  
Eberline Services NELAP Cert #01120CA (exp. 01/31/06)  
Eberline Services Report R503161-8351

Dear Ms. Harper:

Enclosed are results from the analyses of two water samples received at Eberline Services on March 22 2005. The samples were analyzed according to the accompanying Del Mar Analytical Subcontract Order Form. The requested analyses were gross alpha/gross beta (EPA900.0), tritium (H-3, EPA906.0), strontium-90 (Sr-90, EPA905.0), radium-226 (Ra-226, EPA903.1), and radium-228 (Ra-228, EPA904.0). The QC samples for gross alpha/beta, tritium, and Sr-90 are 8344-002, 003, 004, and 005; for Ra-226 the QC samples are 8368-005, 006, and 007; for Ra-228 the QC samples are 8263-002, 003, and 004. The QC LCS, blank analyses, sample duplicates, and matrix spike results for the analyses were within the limits defined in Eberline Services Quality Control Procedures Manual. Analyses that involve the yielding of an analytical tracer or carrier, such as Sr-90 and Ra-228, do not require matrix spike analyses to be performed.

Please call me if you have any questions concerning this report.

Regards,

Melissa Mannion  
Senior Program Manager

*MCM/njv*

*Enclosure: Report  
Subcontract Form  
Receipt checklist  
Invoice*

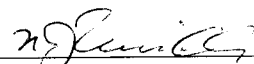
Analytical Services  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
Toll Free (800) 841-5487  
[www.eberlineservices.com](http://www.eberlineservices.com)

# Eberline Services

## ANALYSIS RESULTS

SDG <u>8351</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503161-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab						
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results + 2σ</u>	<u>Units</u>	<u>MDA</u>
IOC1562-01	8351-001	03/19/05	04/08/05	GrossAlpha	8.96 ± 3.3	pCi/L	2.54
			04/08/05	Gross Beta	18.0 ± 3.1	pCi/L	3.73
			04/22/05	Ra228	0.448 ± 0.53	pCi/L	0.961
			04/07/05	H3	-43.7 ± 96	pCi/L	164
			05/05/05	Ra226	0.091 ± 0.026	pCi/L	0.034
			04/05/05	Sr90	5.49 ± 0.58	pCi/L	0.445
IOC1562-02	8351-002	03/19/05	04/06/05	GrossAlpha	5.03 ± 3.0	pCi/L	3.27
			04/06/05	Gross Beta	19.0 ± 3.7	pCi/L	4.56
			04/22/05	Ra228	0.386 ± 0.56	pCi/L	0.897
			04/07/05	H3	-34.3 ± 99	pCi/L	168
			05/05/05	Ra226	0.145 ± 0.028	pCi/L	0.031
			04/05/05	Sr90	5.49 ± 0.56	pCi/L	0.404

Certified by <u></u> Report Date <u>05/10/05</u> Page 1
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# Eberline Services

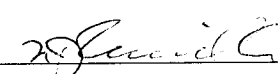
## QC RESULTS

SDG <u>8351</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503161-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Lab	Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
<u>LCS</u>							
	8263-002	Ra228	12.7 ± 0.80	pCi/Smpl	10.2	1.07	125% recovery
<u>BLANK</u>							
	8263-003	Ra228	-0.465 ± 0.43	pCi/Smpl	NA	1.19	<MDA
<u>LCS</u>							
	8344-002	GrossAlpha	8.03 ± 1.1	pCi/Smpl	11.2	0.419	72% recovery
		Gross Beta	11.3 ± 0.78	pCi/Smpl	12.1	0.541	93% recovery
		H3	236 ± 15	pCi/Smpl	258	16.5	91% recovery
		Sr90	11.6 ± 0.61	pCi/Smpl	11.1	0.239	105% recovery
<u>BLANK</u>							
	8344-003	GrossAlpha	-0.115 ± 0.12	pCi/Smpl	NA	0.392	<MDA
		Gross Beta	0.070 ± 0.31	pCi/Smpl	NA	0.546	<MDA
		H3	1.47 ± 9.9	pCi/Smpl	NA	16.6	<MDA
		Sr90	-0.039 ± 0.12	pCi/Smpl	NA	0.246	<MDA
<u>LCS</u>							
	8368-005	GrossAlpha	13.0 ± 1.4	pCi/Smpl	11.2	0.420	116% recovery
		Gross Beta	12.4 ± 0.85	pCi/Smpl	12.1	0.581	102% recovery
		Ra226	5.45 ± 0.18	pCi/Smpl	5.59	0.056	97% recovery
<u>BLANK</u>							
	8368-006	GrossAlpha	-0.051 ± 0.14	pCi/Smpl	NA	0.355	<MDA
		Gross Beta	-0.190 ± 0.30	pCi/Smpl	NA	0.542	<MDA
		Ra226	-0.014 ± 0.011	pCi/Smpl	NA	0.021	<MDA

<u>DUPLICATES</u>			
Sample ID	Nuclide	Results ± 2σ	MDA
8263-004	Ra228	0.245 ± 0.27	0.716
8344-004	GrossAlpha	0.239 ± 0.86	1.59
	Gross Beta	2.19 ± 1.2	1.85
	H3	8.93 ± 100	168
	Sr90	-0.013 ± 0.24	0.484
8368-007	GrossAlpha	5.26 ± 5.8	8.58
	Gross Beta	11.2 ± 7.5	11.8

<u>ORIGINALS</u>						
Sample ID	Results ± 2σ	MDA	3σ	RPD (Tot)	Eval	
8263-001	0.143 ± 0.31	0.787	-	0	satis.	
8344-001	0.305 ± 0.81	1.20	-	0	satis.	
	1.96 ± 1.1	1.80	11	122	satis.	
	-31.0 ± 98	166	-	0	satis.	
	0.032 ± 0.22	0.442	-	0	satis.	
8368-001	8.78 ± 6.2	7.52	50	187	satis.	
	16.6 ± 7.3	10.8	39	118	satis.	

Certified by 

Report Date 05/10/05

Page 2

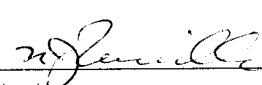
# Eberline Services

## QC RESULTS

SDG <u>8351</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503161-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

DUPLICATES				ORIGINALS					
Sample ID	Nuclide	Results + 2 $\sigma$	MDA	Sample ID	Results + 2 $\sigma$	MDA	3 $\sigma$	RPD (Tot)	Eval
	Ra226	0.011 $\pm$ 0.27	0.488		-0.198 $\pm$ 0.13	0.241	-		0 satis.

SPIKED SAMPLE				ORIGINAL SAMPLE					
Sample ID	Nuclide	Results + 2 $\sigma$	MDA	Sample ID	Results + 2 $\sigma$	MDA	Added	%Recv	
8344-005	GrossAlpha	63.4 $\pm$ 5.6	1.22	8344-001	0.305 $\pm$ 0.81	1.20	76.6	82	
	Gross Beta	77.1 $\pm$ 3.6	1.83		1.96 $\pm$ 1.1	1.80	73.7	102	
	H3	23100 $\pm$ 500	223		-31.0 $\pm$ 98	166	23500	98	
8368-008	GrossAlpha	1560 $\pm$ 120	21.4	8368-002	26.5 $\pm$ 18	22.4	1530	100	
	Gross Beta	1490 $\pm$ 72	35.5		50.6 $\pm$ 24	36.5	1480	97	

Certified by <u></u> Report Date <u>05/10/05</u> Page 3
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# EBERLINE

SERVICES

July 6, 2005

Ms. Michele Harper  
Project Manager  
Del Mar Analytical  
17461 Derian Avenue, Suite 100  
Irvine, CA 92614

Reference: Eberline Services NELAP Cert #01120CA (exp. 01/31/06)

Dear Ms. Harper:

Enclosed are revised gamma Cs-137 reports for various projects, the project numbers and Eberline Services report numbers are given below. The results were previously reported in the units of pCi/sample; the enclosed reports present the results in the recalculated units of pCi/g.

<u>Del Mar Project</u>	<u>Eberline Services Report</u>
IOB1069-03	R502140-8269
IOB1576-03	R502216-8295
IOB2065-04	R503156-8346
IOB1014-04	R503158-8348
IOC1523-04	R503160-8350
IOC1562-03	R503162-8352
IOC2063-04	R503231-8382
IOD2061-03	R505003-8443

Please call me if you have any questions concerning the enclosed reports.

Regards,

Melissa Mannion  
Senior Program Manager

MCM/njv

Enclosure: Reports  
Invoice

Analytical Services  
2030 Wright Avenue  
P.O. Box 4040  
Richmond, California 94804-0040  
(510) 235-2633 Fax (510) 235-0438  
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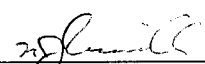


Eberline Services

ANALYSIS RESULTS

SDG <u>8352</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503162-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>SOLID</u>

<u>Client</u> <u>Sample ID</u>	<u>Lab</u> <u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>	<u>Results ± 2σ</u>	<u>Units</u>	<u>MDA</u>
IOC1562-03	8352-001	03/19/05	04/25/05	Cs137 (G)	U	pCi/G	10.9

Certified by <u></u>
Report Date <u>07/06/05</u>
Page 1

Eberline Services

QC RESULTS

SDG <u>8352</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503162-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>SOLID</u>

Lab	Sample ID	Nuclide	Results	Units	Amount Added	MDA	Evaluation
LCS	8346-002	Cs137 (G)	265 ± 27	pCi/Smpl	267	21.5	99% recovery
BLANK	8346-003	Cs137 (G)	U	pCi/Smpl	NA	11.0	<MDA

DUPLICATES				ORIGINALS			
Sample ID	Nuclide	Results ± 2σ	MDA	Sample ID	Results ± 2σ	MDA	RPD (Tot) Eval
8346-004	Cs137 (G)	U	28.4	8346-001	U	27.5	- 0 satis.

Certified by <u><i>[Signature]</i></u>
Report Date <u>07/06/05</u>
Page 2



17461 Derian Ave, Suite 100, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228  
 1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046  
 9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689  
 9830 South 51st Street, Suite B-120, Phoenix, AZ 85044 Ph (480) 785-0043 Fax (480) 785-0851  
 2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

## SUBCONTRACT ORDER - PROJECT # IOC1562

**SENDING LABORATORY:**

Del Mar Analytical, Irvine  
 17461 Derian Avenue, Suite 100  
 Irvine, CA 92614  
 Phone: (949) 261-1022  
 Fax: (949) 261-1228  
 Project Manager: Michele Harper

**RECEIVING LABORATORY:**

Eberline Services  
 2030 Wright Avenue  
 Richmond, CA 94804  
 Phone: (510) 235-2633  
 Fax: (510) 235-0438

**Work Order Comments:** Level IV Data, include std logs

Standard TAT is requested unless specific due date is requested => **Due Date:** 3 weeks **Initials:** \_\_\_\_\_

Analysis	Expiration	Comments
<b>Sample ID: IOC1562-01 Water</b>	<b>Sampled: 03/19/05 09:46</b>	<b>Filter w/ preweighed .45 um &amp; preserve (except H3)</b>
EDD + Level 4-OUT	04/16/05 09:46	**LEVEL IV QC, ACCESS 7 EDD**
Gross Alpha-O	03/19/06 09:46	900.0, IF RESULT>15 pCi/L, run Radium 226 & 228
Gross Beta-O	03/19/06 09:46	900.0, IF RESULT>50 pCi/L, run Radium 226 & 228
Radium, Combined-O	03/19/06 09:46	HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Strontium 90-O	03/19/06 09:46	905.0
Tritium-O	03/19/06 09:46	906

**Containers Supplied:**

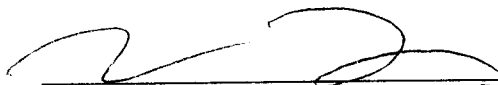
- 1 L Amber (IOC1562-01A)
- 1 L Amber (IOC1562-01B)
- 1 L Amber (IOC1562-01C)
- 1 L Amber (IOC1562-01D)

<b>Sample ID: IOC1562-02 Water</b>	<b>Sampled: 03/19/05 09:46</b>	<b>Analyze as received, do not preserve</b>
Gross Alpha-O	03/19/06 09:46	900.0, IF RESULT>15 pCi/L, run Radium 226 & 228
Gross Beta-O	03/19/06 09:46	900.0, IF RESULT>50 pCi/L, run Radium 226 & 228
Radium, Combined-O	03/19/06 09:46	HOLD for Gross Alpha/Beta result; EPA 903.1 & 904.0
Strontium 90-O	03/19/06 09:46	905.0
Tritium-O	03/19/06 09:46	906

**Containers Supplied:**

- 1 L Amber (IOC1562-02A)
- 1 L Amber (IOC1562-02B)
- 1 L Amber (IOC1562-02C)
- 1 L Amber (IOC1562-02D)
- 40 ml Voa Vial (IOC1562-02E)
- 40 ml Voa Vial (IOC1562-02F)

<b>Sample ID: IOC1562-03 Water</b>	<b>Sampled: 03/19/05 09:46</b>	<b>analyze substrate on filter from IOC1562-01</b>
Gamma Scan-O	03/19/06 09:46	Cesium 137, EPA 901.1, 20 pci/sample RL


**SON THAI**
03/22/05
10:30 AM

Released By \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ Received By \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Released By \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ Received By \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

**RICHMOND, CA LABORATORY**



**SAMPLE RECEIPT CHECKLIST**

Client: DEL MAR City: IRVINE State: CA

Date/Time received: 03/22/05 CoC No.: IOC 1562

Container I.D. No.: DUDEK Requested TAT (Days): 3 weeks P.D. Received Yes [ ] No [ ]

**INSPECTION**

1. Custody seals on shipping container intact? Yes [✓] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [✓] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [ ] No [✓] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [ ] No [✓] N/A [ ]
5. Packing material is: Wet [✓] Dry [ ]
6. Number of samples in shipping container: 2 Sample Matrix: Water
7. Number of containers per sample: \_\_\_\_\_ (Or see CoC IOC-1562)
8. Samples are in correct container Yes [✓] No [ ]
9. Paperwork agrees with samples? Yes [✓] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [ ]
11. Samples are: In good condition [✓] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [✓] pH 7 Preservative \_\_\_\_\_
13. Describe any anomalies: \_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date: \_\_\_\_\_  
 15. Inspected by: TS Date: 03/22/05 Time: 10:00 AM

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_



## Data Qualifier Reference Table

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Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

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## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

\*# Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUPS:  
IOB0418, IOB0980, IOB0993, IOB0996, IOB0997,  
IOB1001, IOB1004, IOB1014, & IOB1069

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226

## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150010  
SDG#: IOB0418, IOB0980, IOB0993, IOB0996, IOB0997,  
IOB1001, IOB1004, IOB1014, & IOB1069  
Project Manager: P. Costa  
Matrix: Water/Soilid  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 13  
No. of Reanalyses/Dilutions: 5  
Reviewer: P. Meeks  
Date of Review: March 23, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.

**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 002	IOB0418-01	8237-001	water	900.0, 905.0, 906.0
Outfall 001	IOB0980-01	8265-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 001RE1	IOB0980-01RE1	8265-001	water	900.0
Outfall 007	IOB0993-01	8261-001	water	900.0, 905.0, 906.0
Outfall 007 RE1	IOB0993-01 RE1	8377-001	water	906.0
Outfall 009	IOB0996-01	8262-001	water	900.0, 905.0, 906.0
Outfall 009 RE1	IOB0996-01 RE1	8378-001	water	906.0
Outfall 008	IOB0997-01	8266-001	water	900.0, 905.0, 906.0
Outfall 008 RE1	IOB0997-01 RE1	8379-001	water	906.0
Outfall 010	IOB1001-01	8267-001	water	900.0, 905.0, 906.0
Outfall 010 RE1	IOB1001-01 RE1	8380-001	water	906.0
Outfall 011	IOB1004-01	8263-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Unfiltered	IOB1014-01	8264-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Filtered	IOB1014-03	8264-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Substrate	IOB1014-04	8348-001	solid	901.1
Outfall 003 Filtered	IOB1069-01	8268-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Unfiltered	IOB1069-02	8268-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Substrate	IOB1069-03	8269-001	solid	901.1

## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

Most samples in these SDGs were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . Eberline, the subcontract laboratory, did not provide sample receipt temperature information; however, as it is not necessary to chill radiological samples, no qualifications were required. All samples were received intact and in good condition.

According to the Eberline login sheet, Outfall 002 was received unpreserved. It was confirmed in correspondence with Eberline dated 01/31/05, that the gross alpha, gross beta, and strontium samples were not preserved upon receipt. The gross alpha, gross beta, and strontium results were not qualified for lack of preservation, as the method also specifies a five-day holding time for unpreserved samples.

Eberline noted on their login sheets that Outfall 007, Outfall 008, Outfall 009 and Outfall 010 were received preserved, in plastic containers. The method states that tritium samples should not be preserved. Per a telephone conversation with M. Mannion of Eberline, these samples were adjusted back to a pH of about 7 upon receipt at Eberline. Due to the improper pH adjustments, the tritium results for Outfall 007, Outfall 008, Outfall 009, and Outfall 010 were rejected, "R." Del Mar Analytical sent additional aliquots of Outfall 007, Outfall 008, Outfall 009, and Outfall 010 for tritium reanalyses. These samples were received in the proper containers and were not preserved.

Additionally, according to the Los Angeles Regional Water Quality Control Board's guidance letter dated 01/12/05, samples collected for tritium analysis should be submitted in glass containers to avoid potential loss of tritium by sorption onto the plastic container. As the Outfall 007, Outfall 008, Outfall 009 and Outfall 010 tritium analyses were previously rejected, no further qualifications were required.

After all analyses were complete, Del Mar Analytical sent extra volume of Outfall 001 to Eberline for gross alpha reanalysis and radium-228 and radium-226 analyses. Extra volume of Outfall 011 (IOB1004 and IOB1014) was sent to Eberline for radium-228 and radium-226 analyses. These aliquots were received properly preserved. The radium-226 and radium-228 results for Outfall 003 Unfiltered and Outfall 011 Unfiltered (IOB1014) were not preserved and were not qualified for lack of preservation, as the methods specify a five-day holding time for unpreserved samples.

Additionally, per a request from Del Mar Analytical (see section 2.1.2), Eberline filtered and then preserved radium-226 and radium-228 aliquots for Outfall 003 Filtered and gross alpha, gross beta, and strontium aliquots for Outfall 011 Filtered (IOB1014). No further qualifications were required.

#### 2.1.2 Chain of Custody

The original COCs were signed and dated by field and laboratory personnel and the transfer COCs were signed by personnel from both laboratories.

Filtered, unfiltered, and substrate analyses were requested for Outfall 011 (IOB1014) on the original COC from the field to Del Mar. These instructions did not appear on the transfer COC to Eberline and subsequently only unfiltered analyses were originally performed. Extra volume of Outfall 011 (IOB1014) was sent by Del Mar Analytical (see section 2.1.1) for the filtered and substrate analyses. The results are reported as Outfall 011 Filtered (IOB1014) and Outfall 011 Substrate (IOB1014).

The remaining original and transfer COCs accounted for the samples and analyses presented in this data package. Eberline did not list the MWH IDs on the Form Is; therefore, the reviewer edited the Form Is to reflect these IDs. A gross alpha reanalysis was requested for Outfall 001, and tritium reanalyses were requested for Outfall 007, Outfall 008, Outfall 009, and Outfall 010. To distinguish between the original and reanalysis results, the reviewer added an "RE1" suffix to the original MWH and Del Mar Analytical IDs. No qualifications were required.

### 2.1.3 Holding Times

The tritium and cesium analyses were analyzed within 180 days of collection. The Outfall 002 gross alpha, gross beta, and strontium, Outfall 003 Unfiltered gross alpha, gross beta, strontium, radium-226, and radium-228, and Outfall 011 Unfiltered (IOB1014) gross alpha, gross beta, strontium, radium-226, and radium-228 samples were analyzed beyond the five day holding time for unpreserved samples; therefore, these results were qualified as estimated, "J," for detects and, "UJ," for nondetects. As the Outfall 011 Filtered (IOB1014) aliquots for gross alpha, gross beta, radium 226, radium 228, and strontium aliquots were preserved more than five days after collection, these nondetected results were qualified as estimated, "UJ." No further qualifications were necessary.

## 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

### Gross Alpha

The initial calibration included with the data was performed in February 2003. All detector efficiencies were below 20%; therefore, the gross alpha results were qualified as estimated, "UJ," for nondetects and, "J," for detects, unless otherwise rejected (see section 2.10).

### Gross Beta

The initial calibrations were performed in June 1997. All gross beta detector efficiencies were at least 20% and were considered acceptable.

### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1997. All strontium chemical yields were at least 65% and were considered acceptable and the strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with an efficiency of 85%. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in May 2004. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228 and was verified in February 2001 or June 2003. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 70%, and the actinium chemical yields were greater than 50%. No qualifications were necessary.

## **2.3 BLANKS**

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## **2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES**

Blank spikes were analyzed in association with the samples in these SDGs. For one blank spike, the gross alpha, gross beta, and strontium recoveries were outside of the 3-sigma limits, but all had acceptable recoveries of 80%, 88%, and 108%, respectively. One radium-228 blank spike was recovered outside of the 3-sigma limits, but had an acceptable recovery of 125%. The remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## **2.5 LABORATORY DUPLICATES**

The laboratory performed duplicate analyses for gross alpha, gross beta, tritium, and strontium on Outfall 002, Outfall 007, tritium on Outfall 007 RE1, radium-226 and radium-228 on Outfall 011 (IOB1004), for radium 226 on Outfall 011 Filtered, and cesium on Outfall 003 Substrate. The gross alpha and tritium RPDs were greater than 20% for Outfall 007. The gross alpha results were within 3-sigma and were considered acceptable, but the tritium result was just above 3-sigma; however, as no associated tritium detects were retained (see section 2.1.1), no qualifications were required. The remaining RPD were  $\leq 20\%$ . No qualifications were necessary.

## **2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

The laboratory performed matrix spike analyses for gross alpha, gross beta, and tritium on Outfall 002 and Outfall 007, for tritium on Outfall 007 RE1, and for radium 226 on Outfall 011 Filtered (IOB1014). The Outfall 002 recovery for gross alpha was below 3-sigma; therefore, the gross alpha results in Outfall 001, Outfall 002, Outfall 008, Outfall 009, Outfall 010, Outfall 011 Unfiltered (IOB1014), Outfall 011 (IOB1004), Outfall 003 Filtered, and Outfall 003 Unfiltered were qualified as estimated, "J," for detects and, "UJ," for nondetects. Outfall 007 was also analyzed with Outfall 002, however, as Outfall 007 had an acceptable recovery for gross alpha, no qualifications were applied. The remaining recoveries were within the 3-sigma limits. The radium 226 recovery for Outfall 011 Filtered

was outside the 3-sigma limit; therefore, nondetected radium 226 in Outfall 011 Filtered was qualified as estimated, "UJ." No further qualifications were necessary.

## 2.7 SAMPLE RESULT VERIFICATION

An EPA Level IV review was performed for the samples in these data packages. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted.

The original planchet for gross alpha in Outfall 001 was recounted once per a request from MWH personnel. The recount yielded a result equivalent to original count and was not reported. The sample was later reanalyzed from extra sample volume provided by Del Mar Analytical, and was reported as Outfall 001 RE1. As the two gross alpha results were similar, the reviewer rejected, "R," the reanalysis, Outfall 001 RE1, in favor of the original result, Outfall 001. No further qualifications were necessary.

## 2.8 FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### 2.8.1 Field Blanks and Equipment Rinsates

The samples in these SDGs had no associated field QC samples. No qualifications were required.

### 2.8.2 Field Duplicates

There were no field duplicate samples in these SDGs.



Eberline Services

ANALYSIS RESULTS

SDG <u>8237</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502073-01</u>	Contract <u>PROJECT# 10B0418</u>
Received Date <u>02/08/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
Outfall 002 10B0418-01	8237-001		02/04/05	03/02/05	GrossAlpha	0.865 ± 2.9	pCi/L	4.35	UJ	H, R, Q
				03/02/05	Gross Beta	4.17 ± 3.4	pCi/L	5.53	UJ	H
				02/28/05	H3	5.86 ± 94	pCi/L	158	UJ	*H
				02/25/05	Sr90	0.010 ± 0.22	pCi/L	0.420	UJ	*H

pm 3/24/05

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ANALYSIS RESULTS

SDG <u>8265</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502136-01</u>	Contract <u>PROJECT# IOB0980</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u> IOB0980-01	8265-001	02/11/05	03/01/05	GrossAlpha	17.3 ± 4.5	pCi/L	2.78	J	R, a
<u>Outfall 001</u>			03/01/05	Gross Beta	20.0 ± 3.4	pCi/L	3.94		
			03/29/05	Ra-228	0.904 ± 0.20	pCi/L	0.449		
			03/03/05	Tritium	157 ± 150	pCi/L	244	U	
			04/04/05	Ra-226	0.660 ± 0.32	pCi/L	0.423		
			02/25/05	Sr-90	0.034 ± 0.20	pCi/L	0.392	U	

am 3/19/05

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ANALYSIS RESULTS

SDG <u>8384</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503234-01</u>	Contract <u>PROJECT# IOB0980</u>
Received Date <u>03/30/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
		<u>Outfall 001 RE1</u>								
IOB0980-01 RE1	8384-001	02/11/05	04/04/05	GrossAlpha	18.1 ± 4.3	pCi/L	2.40		R	D

*pm 4/14/05*

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ANALYSIS RESULTS

SDG <u>8261</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502132-01</u>	Contract <u>PROJECT# IOB0993</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results - 2σ	Units	MDA	Qual	Qual Code
Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results - 2σ	Units	MDA	Qual	Qual Code
<u>Outfall 007</u>										
IOB0993-01	8261-001	02/11/05	03/01/05	GrossAlpha	1.64 ± 1.0	pCi/L	0.936	J	R	
			03/01/05	Gross Beta	5.18 ± 1.3	pCi/L	1.80			
			03/02/05	H3	71.9 ± 150	pCi/L	246	R	*1	
			02/25/05	Sr90	-0.077 ± 0.25	pCi/L	0.499	U		

*mm 3/24/05*

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ANALYSIS RESULTS

SDG <u>8377</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503226-01</u>	Contract <u>PROJECT# IOB0993</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
		<u>Outfall 007 RE1</u>								
IOB0993-01 RE1		8377-001	02/11/05	04/08/05	H3	-86.2 ± 99	pCi/L	171	U	

pm 4/20/05

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ANALYSIS RESULTS

SDG <u>8262</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502133-01</u>	Contract <u>PROJECT# IOB0996</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Raw Qual	Qual Code
Client <u>Sample ID</u> Out fall 009 IOB0996-01  pm 3/24/05	8262-001		02/11/05	03/01/05	GrossAlpha	0.812 ± 0.63	pCi/L	0.864	U	R,Q
				03/01/05	Gross Beta	1.76 ± 1.1	pCi/L	1.79	U	
				03/02/05	H3	59.8 ± 140	pCi/L	240	R	#1
				02/25/05	Sr90	0.078 ± 0.25	pCi/L	0.470	U	

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ANALYSIS RESULTS

SDG <u>8378</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503227-01</u>	Contract <u>PROJECT# IOB0996</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code
Outfall 009 RE1										
IOB0996-01 RE1	8378-001	02/11/05	04/09/05	H3	-129 $\pm$ 98	pCi/L	172		U	

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SDG <u>8266</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502137-01</u>	Contract <u>PROJECT# IOB0997</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
outfall 008		8266-001	02/11/05	03/01/05	GrossAlpha	6.07 ± 1.7	pCi/L	1.06	J	R, Q
IOB0997-01				03/01/05	Gross Beta	7.48 ± 1.5	pCi/L	1.88		
				03/03/05	H3	110 ± 150	pCi/L	242	R	*1
				02/25/05	Sr90	-0.107 ± 0.22	pCi/L	0.458	U	

*PM 3/24/05*

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SDG <u>8379</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503228-01</u>	Contract <u>PROJECT# IOB0997</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code
		<u>Outfall 008 RE1</u>								
IOB0997-01	RE1	8379-001	02/11/05	04/09/05	H3	-76.3 $\pm$ 100	pCi/L	172	U	

mm 4/20/05

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SDG <u>8267</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502138-01</u>	Contract <u>PROJECT# IOB1001</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
Outfall 010 IOB1001-01		8267-001	02/11/05	03/01/05	GrossAlpha	4.98 ± 1.5	pCi/L	1.06	J	R, Q
				03/01/05	Gross Beta	8.16 ± 1.6	pCi/L	1.92		
				03/03/05	H3	271 ± 150	pCi/L	240	R	<del>Q</del>
				02/25/05	Sr90	-0.061 ± 0.24	pCi/L	0.485	U	<del>Q</del>

mm 3/24/05

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SDG <u>8380</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503229-01</u>	Contract <u>PROJECT# IOB1001</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA	Rev Qual	Qual Code
		<u>Outfall 010 RE1</u>								
		<u>IOB1001-01RE1</u>	<u>8380-001</u>	<u>02/11/05</u>	<u>04/09/05</u>	<u>H3</u>	<u>-59.6 ± 100</u>	<u>pCi/L</u>	<u>175</u>	<u>U</u>

pm 4/20/05

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Eberline Services

ANALYSIS RESULTS

SDG <u>8269</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502140-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>SOLID</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u>	<u>Sample ID</u>								
Outfall 003 Substrate									
IOB1069-03	8269-001	02/11/05	02/22/05	Cs137 (G)	U	pCi/Smpl	11.6	U	

PM 3/24/05

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ANALYSIS RESULTS

SDG <u>8263</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502134-01</u>	Contract <u>PROJECT# IOB1004</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
Sample ID								
<i>Outfall (1)</i>								
IOB1004-01	8263-001	02/11/05	03/01/05	GrossAlpha	2.03 ± 0.91	pCi/L	0.787	
			03/01/05	Gross Beta	2.30 ± 1.2	pCi/L	1.78	
			04/22/05	Ra228	0.143 ± 0.31	pCi/L	0.787	
			03/02/05	H3	21.1 ± 140	pCi/L	240	
			05/04/05	Ra226	0.030 ± 0.018	pCi/L	0.027	
			02/25/05	Sr90	-0.060 ± 0.23	pCi/L	0.470	

*Am 5/15/05*

Qual	Code
J	R, Q
U	
U	
U	

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ANALYSIS RESULTS

SDG <u>8268</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502139-01</u>	Contract <u>PROJECT# IOB1069</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
<u>IOB1069-01</u>	<u>8268-001</u>	<u>02/11/05</u>	<u>03/01/05</u>	<u>GrossAlpha</u>	<u>-0.288 ± 0.45</u>	<u>pCi/L</u>	<u>0.969</u>
			<u>03/01/05</u>	<u>Gross Beta</u>	<u>4.44 ± 1.3</u>	<u>pCi/L</u>	<u>1.80</u>
			<u>04/22/05</u>	<u>Ra228</u>	<u>1.37 ± 0.46</u>	<u>pCi/L</u>	<u>0.772</u>
			<u>03/03/05</u>	<u>H3</u>	<u>138 ± 150</u>	<u>pCi/L</u>	<u>242</u>
			<u>05/05/05</u>	<u>Ra226</u>	<u>0.056 ± 0.021</u>	<u>pCi/L</u>	<u>0.029</u>
			<u>02/25/05</u>	<u>Sr90</u>	<u>1.04 ± 0.31</u>	<u>pCi/L</u>	<u>0.428</u>
<u>IOB1069-02</u>	<u>8268-002</u>	<u>02/11/05</u>	<u>03/01/05</u>	<u>GrossAlpha</u>	<u>0.240 ± 0.58</u>	<u>pCi/L</u>	<u>1.09</u>
			<u>03/01/05</u>	<u>Gross Beta</u>	<u>3.53 ± 1.2</u>	<u>pCi/L</u>	<u>1.82</u>
			<u>04/22/05</u>	<u>Ra228</u>	<u>1.30 ± 0.37</u>	<u>pCi/L</u>	<u>0.756</u>
			<u>03/03/05</u>	<u>H3</u>	<u>106 ± 150</u>	<u>pCi/L</u>	<u>242</u>
			<u>05/05/05</u>	<u>Ra226</u>	<u>0.018 ± 0.019</u>	<u>pCi/L</u>	<u>0.031</u>
			<u>02/25/05</u>	<u>Sr90</u>	<u>1.10 ± 0.34</u>	<u>pCi/L</u>	<u>0.462</u>

Rev Qual	Qual Code
UJ	R, Q
U	
45C45H	R, Q, H
	H
	H
	H

Am 5/15/05

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Eberline Services

ANALYSIS RESULTS

SDG <u>8347</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503157-01</u>	Contract <u>PROJECT# IOB1014</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
Sample ID ICB1014-03	Sample ID 8347-001	02/11/05	04/02/05	GrossAlpha	0.681 ± 0.61	pCi/L	0.811
			04/02/05	Gross Beta	1.33 ± 1.1	pCi/L	1.76
			06/08/05	Ra-228	0.368 ± 0.18	pCi/L	0.423
			04/07/05	Tritium	-80.6 ± 97	pCi/L	169
			06/09/05	Ra-226	-0.133 ± 0.31	pCi/L	0.675
			04/05/05	Sr-90	0.004 ± 0.24	pCi/L	0.474

Rev Qual	Qual Code
55	H, R
55	H
55	H
55	H, R
55	H

PM 8/2/05

Outfall oil Filtered

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ANALYSIS RESULTS

SDG <u>8264</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R502135-01</u>	Contract <u>PROJECT# IOB1014</u>
Received Date <u>02/15/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u>	<u>Sample ID</u>								
<u>Outfall 011 Unfiltered</u>									
IOB1014-01	8264-001	02/11/05	03/01/05	GrossAlpha	0.895 ± 0.76	pCi/L	1.05	CJ H B H B H	R, Q, H
			03/01/05	Gross Beta	2.50 ± 1.3	pCi/L	1.90		H
			04/22/05	Ra228	0.375 ± 0.24	pCi/L	0.612		H
			03/02/05	H3	97.4 ± 140	pCi/L	237		
			05/04/05	Ra226	0.034 ± 0.022	pCi/L	0.034		H
			02/25/05	Sr90	-0.216 ± 0.23	pCi/L	0.519		H

PM 5/17/05

**AMEC VALIDATED**

**LEVEL IV**

Certified by <u>[Signature]</u>
Report Date <u>05/10/05</u>
Page 1



Eberline Services

ANALYSIS RESULTS

SDG <u>8348</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503158-01</u>	Contract <u>PROJECT# IOB1014</u>
Received Date <u>03/22/05</u>	Matrix <u>SOLID</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u> Outfall IOB1014-04	<u>Sample ID</u> Oil Substrate 8348-001	02/11/05	04/11/05	Cs137 (G)	U	pCi/G	29.3	U	

pm 8/2/05

**AMEC VALIDATED**

**LEVEL IV**

Certified by <u>[Signature]</u>
Report Date <u>07/06/05</u>
Page 1

**CONTRACT COMPLIANCE SCREENING FORM FOR HARDCOPY DATA**

AMEC Earth & Environmental  
 550 South Wadsworth Boulevard  
 Suite 500  
 Lakewood, CO 80226

Package ID T711RA6  
 Task Order 313150010  
 SDG No. IOB2064, 65, 69

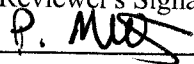
No. of Analyses 3

Laboratory Eberline

Reviewer P. Meeks

Analysis/Method Radionuclides

Date: 03/31/05

Reviewer's Signature  


**ACTION ITEMS<sup>a</sup>**

1. Case Narrative Deficiencies
2. Out of Scope Analyses
3. Analyses Not Conducted
4. Missing Hardcopy Deliverables
5. Incorrect Hardcopy Deliverables
6. Deviations from Analysis Protocol, e.g.,
  - Holding Times
  - GC/MS Tune/Inst. Performance
  - Calibrations
  - Blanks
  - Surrogates
  - Matrix Spike/Dup LCS
  - Field QC
  - Internal Standard Performance
  - Compound Identification and Quantitation
  - System Performance

Qualifications were applied for:  
 1) ~~Exceed~~ detector efficiencies < 20%  
 2) <sup>Analysis</sup> preservation beyond the holding time

**COMMENTS<sup>b</sup>**      Acceptable as reviewed.

<sup>a</sup> Subcontracted analytical laboratory is not meeting contract and/or method requirements.

<sup>b</sup> Differences in protocol have been adopted by the laboratory but no action against the laboratory is required.

## Data Qualifier Reference Table

---

Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

---

## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

\*# Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUPS:  
IOB2064, IOB2065 & IOB2069

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226

## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150010  
SDG#: IOB2064, IOB2065, IOB2069  
Project Manager: P. Costa  
Matrix: Water/Solid  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 5  
No. of Reanalyses/Dilutions: 0  
Reviewer: P. Meeks  
Date of Review: March 31, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.

**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 011 Composite	IOB2064-01	8306-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Grab Unfiltered	IOB2065-01	8305-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Grab Filtered	IOB2065-03	8345-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Substrate	IOB2065-04	8346-001	solid	901.1
Outfall 003	IOB2069-01	8307-001	water	900.0, 905.0, 906.0



## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

All the samples in these SDGs were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . No temperature information was provided by Eberline, the subcontract laboratory; however, as it is not necessary to chill radiological samples, no qualifications were required. The samples were noted to have been received intact and in good condition.

According to the Los Angeles Regional Water Quality Control Board's (LARWQCB) guidance letter dated 01/12/05, samples collected for tritium analysis should be submitted in glass containers to avoid potential loss of tritium by sorption onto the plastic container. All tritium samples were received unpreserved in glass containers. According to the LARWQCB guidance letter dated 01/12/05, unfiltered samples should not be preserved and filtered aliquots should be preserved after filtration. All gross alpha, gross beta, radium-226, radium-228, and strontium samples were received preserved, except for sample Outfall 011 Grab Unfiltered. Outfall 011 Grab Unfiltered was collected on 2/25/05 and received unpreserved on 3/22/05. Upon receipt, the laboratory filtered and then preserved the gross alpha, gross beta, radium-226, radium-228, and strontium aliquots. No qualifications were required.

#### 2.1.2 Chain of Custody

The original COCs were signed and dated by field and laboratory personnel. The transfer COCs were signed by personnel from both laboratories. Eberline did not list the MWH IDs on the Form Is; therefore, the reviewer edited the Form Is to reflect these IDs. After all analyses were complete, Del Mar Analytical sent extra volume of Outfall 011 Grab for unfiltered reanalyses and cesium analysis of the substrate. No qualifications were required.

#### 2.1.3 Holding Times

The tritium, cesium, and preserved gross alpha, gross beta, radium-226, radium-228, and strontium samples were analyzed within 180 days of collection. The Outfall 011 Grab Unfiltered gross alpha, gross beta, radium-226, and radium-228 were analyzed beyond the five day holding time for unpreserved samples; therefore, these results were qualified as estimated, "J," for detects and, "UJ," for nondetects. No further qualifications were necessary.

### 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

### Gross Alpha and Gross Beta

The initial calibration included with the data was performed in February 2003. The gross alpha detector efficiencies were all less than 20%; therefore, these results were qualified as estimated, "UJ," for nondetects and, "J," for detects. The remaining detector efficiencies were above 20%.

### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1995. All strontium chemical yields were at least 75% and were considered acceptable. The strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in May 2004. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228 and was verified in February 2001. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 70%. And the actinium chemical yields were greater than 50%. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with an efficiency of 85%. No qualifications were necessary.

## **2.3 BLANKS**

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## **2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES**

Aqueous blank spikes were analyzed in association with the samples in these SDGs. One strontium and one radium-228 recovery exceeded the 3-sigma limits; however, these recoveries, 110% and 125%, were deemed acceptable. The remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## **2.5 LABORATORY DUPLICATES**

The laboratory performed duplicate analyses on Outfall 011 Grab Unfiltered, and Outfall 011 Substrate for cesium. The gross alpha and gross beta RPDs exceeded 20%; however, as the results were within the 3-sigma limits, they were deemed acceptable. The strontium, cesium, and tritium results were within the 3-sigma limits and their RPDs were  $\leq 20\%$ . No qualifications were necessary.

## **2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

The laboratory performed matrix spike analyses on Outfall 011 Grab Unfiltered for gross alpha, gross beta, and tritium. The recovery for gross beta was above 3-sigma; however, the recovery of 108% was considered acceptable. The remaining recoveries were within the 3-sigma limits. No qualifications were necessary.

## **2.7 SAMPLE RESULT VERIFICATION**

An EPA Level IV review was performed for the samples in these data packages. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted. No qualifications were necessary.

## **2.8 FIELD QC SAMPLES**

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### **2.8.1 Field Blanks and Equipment Rinsates**

The samples in these SDGs had no associated field QC samples. No qualifications were required.

### **2.8.2 Field Duplicates**

There were no field duplicate samples in these SDGs.

Eberline Services

ANALYSIS RESULTS

SDG 8345	Client DEL MAR ANAL
Work Order R503155-01	Contract PROJECT# IOB2065
Received Date 03/22/05	Matrix SOLID

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
IOB2065-03		8345-001	02/25/05	04/02/05	GrossAlpha	0.662 ± 0.67	pCi/L	0.986	UJ	#1, R, H
				04/02/05	Gross Beta	2.27 ± 1.2	pCi/L	1.88	J	#1 H
				05/09/05	Ra-228	0.823 ± 0.32	pCi/L	0.666	<del>JS</del>	#1 H
				04/07/05	Tritium	-22.3 ± 99	pCi/L	168	U	
				05/17/05	Ra-226	0.107 ± 0.036	pCi/L	0.047	<del>JS</del>	#1 H
				04/05/05	Sr-90	-0.075 ± 0.26	pCi/L	0.514	UJ	#1 H

Out-Fall Oil Grab ~~Defiltered~~

PM 7/11/05

PM 8/2/05

SA  
8/3/05

**AMEC VALIDATED**

Certified by [Signature]  
 Report Date 05/20/05  
 Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8305</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503010-01</u>	Contract <u>PROJECT# IOB2065</u>
Received Date <u>03/01/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
<u>IOB2065-01</u>	<u>8305-001</u>	<u>02/25/05</u>	<u>03/15/05</u>	<u>GrossAlpha</u>	<u>1.50 ± 0.89</u>	<u>pCi/L</u>	<u>1.05</u>	
				<u>Gross Beta</u>	<u>2.27 ± 1.2</u>	<u>pCi/L</u>	<u>1.77</u>	
				<u>Ra228</u>	<u>0.250 ± 0.23</u>	<u>pCi/L</u>	<u>0.595</u>	
				<u>H3</u>	<u>-45.7 ± 150</u>	<u>pCi/L</u>	<u>259</u>	
				<u>Ra226</u>	<u>0.081 ± 0.021</u>	<u>pCi/L</u>	<u>0.026</u>	
				<u>Sr90</u>	<u>0.206 ± 0.25</u>	<u>pCi/L</u>	<u>0.451</u>	

Dev Qual	Qual Code
J	R
U	
U	
U	

Outfall Oil Grab Unfiltered  
 IOB2065-01  
 Am 5/15/05

AMEC VALIDATED

LEVEL II

Certified by <u><i>[Signature]</i></u>
Report Date <u>05/10/05</u>
Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8306</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503011-01</u>	Contract <u>PROJECT# IOB2064</u>
Received Date <u>03/01/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzved	Nuclide	Results ± 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
Outfall #011 Composite IOB2064-01	8306-001	02/25/05	03/15/05	GrossAlpha	1.29 ± 0.80	pCi/L	0.947
			03/15/05	Gross Beta	2.12 ± 1.2	pCi/L	1.89
			04/22/05	Ra228	0.494 ± 0.29	pCi/L	0.658
			03/17/05	H3	-7.08 ± 150	pCi/L	261
			05/06/05	Ra226	0.010 ± 0.014	pCi/L	0.024
			03/18/05	Sr90	-0.059 ± 0.24	pCi/L	0.459

Raw Qual	Qual Code
J	R
C	
C	
C	

S/15/05

AMEC VALIDATED

LEVEL IV

Certified by *[Signature]*  
 Report Date 05/10/05  
 Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8307</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503012-01</u>	Contract <u>PROJECT# IOB2069</u>
Received Date <u>03/01/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
Client <u>Sample ID</u> Outfall 003 IOB2069-01  PM 3/31/05	8307-001	02/25/05	03/15/05	GrossAlpha	1.11 ± 1.5	pCi/L	2.46	
			03/15/05	Gross Beta	8.61 ± 1.7	pCi/L	2.06	
			03/17/05	H3	-14.1 ± 150	pCi/L	260	
			03/18/05	Sr90	2.53 ± 0.40	pCi/L	0.404	

Per	Qual
Qual	Code
05	R
U	

AMEC VALIDATED

LEVEL IV

Certified by <u><i>W. J. Smith</i></u>
Report Date <u>03/24/05</u>
Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8346</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503156-01</u>	Contract <u>PROJECT# IOB2065</u>
Received Date <u>03/22/05</u>	Matrix <u>SOLID</u>

Client	Lab	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code
<u>Sample ID</u> 10B2065-04	<u>Sample ID</u> 8346-001	02/25/05	04/09/05	Cs137 (G)	U	pCi/G	27.5	U	

pm 8/2/05

**AMEC VALIDATED**

**LEVEL IV**

Certified by <u>[Signature]</u>
Report Date <u>07/06/05</u>
Page 1



**CONTRACT COMPLIANCE SCREENING FORM FOR HARDCOPY DATA**

AMEC Earth & Environmental  
550 South Wadsworth Boulevard  
Suite 500  
Lakewood, CO 80226

Package ID T711RA8

Task Order 313150010

SDG No. Multiple

No. of Analyses 10

Laboratory Eberline

Date: 05/17/05

Reviewer P. Meeks

Reviewer's Signature

Analysis/Method Radionuclides

*P. Meeks*

**ACTION ITEMS<sup>a</sup>**

1. **Case Narrative  
Deficiencies**

2. **Out of Scope  
Analyses**

3. **Analyses Not  
Conducted**

4. **Missing Hardcopy  
Deliverables**

5. **Incorrect Hardcopy  
Deliverables**

6. **Deviations from Analysis Protocol, e.g.,** Qualifications were applied for detector efficiency outliers and exceeded holding times.

Holding Times

GC/MS Tune/Inst.

Performance

Calibrations

Blanks

Surrogates

Matrix Spike/Dup LCS

Field QC

Internal Standard

Performance

Compound Identification  
and Quantitation

System Performance

**COMMENTS<sup>b</sup>**

<sup>a</sup> Subcontracted analytical laboratory is not meeting contract and/or method requirements.

<sup>b</sup> Differences in protocol have been adopted by the laboratory but no action against the laboratory is required.

## Data Qualifier Reference Table

---

Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

---

## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

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Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUPS:  
IOC1523, IOC1526, IOC1562, IOC2063, & IOC2064

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226

## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150010  
SDG#: IOC1523, IOC1526, IOC1562, IOC2063, & IOC2064  
Project Manager: P. Costa  
Matrix: Water/Solid  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 11  
No. of Reanalyses/Dilutions: 0  
Reviewer: P. Meeks  
Date of Review: May 17, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.

**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 011 Grab/Unfiltered	IOC1523-01	8349-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Grab/Filtered	IOC1523-03	8349-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Grab/Substrate	IOC1523-04	8350-001	solid	901.1
Outfall 011 Composite	IOC1526-01	8344-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Filtered	IOC1562-01	8351-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Unfiltered	IOC1562-02	8351-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Substrate	IOC1562-03	8352-001	solid	901.1
Outfall 011 Grab/Unfiltered	IOC2063-01	8381-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Grab/Filtered	IOC2063-03	8381-002	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 011 Substrate	IOC2063-04	8382-001	solid	901.1
Outfall 011 Composite	IOC2064-01	8383-001	water	900.0, 903.1, 904.0, 905.0, 906.0

## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

All samples were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . Eberline, the subcontract laboratory, did not provide sample receipt temperature information; however, as it is not necessary to chill radiological samples, no qualifications were required. All samples were received intact and in good condition.

All samples were received unpreserved, in glass containers. According to the Los Angeles Water Quality Control Board (LARWQCB) guidance letter dated 01/12/05, unfiltered samples should not be preserved and filtered aliquots should be preserved after filtration. As instructed on the transfer COCs, Eberline filtered and then preserved samples Outfall 011 Grab Filtered (IOC1523), Outfall 003 Filtered, and Outfall 011 Grab Filtered (IOC2063). The gross alpha, gross beta, strontium, radium-226, radium-228, and cesium-137 results for the remaining samples were not qualified for lack of preservation, as the methods specifies a five-day holding time for unpreserved samples.

No qualifications were required.

#### 2.1.2 Chain of Custody

The original COCs were signed and dated by field and laboratory personnel and the transfer COCs were signed by personnel from both laboratories. None of the COCs requested radium-226, radium-228, or cesium analyses. These analyses were requested by M. Harper of Del Mar Analytical, as per instructions in a letter from the LARWQCB dated 3/22/05. The original and transfer COCs accounted for the samples and remaining analyses presented in this data package.

Eberline did not list the MWH IDs on the Form Is; therefore, the reviewer edited the Form Is to reflect these IDs. No qualifications were required.

#### 2.1.3 Holding Times

All tritium and cesium analyses, and all analyses for samples Outfall 011 Grab Filtered (IOC1523), Outfall 003 Filtered, and Outfall 011 Grab Filtered (IOC2063) were performed within 180 days of collection. The remaining analyses were performed beyond the five day holding time for unpreserved samples; therefore, the gross alpha, gross beta, radium-226, radium-228, and strontium-90 for samples Outfall 011 Grab Unfiltered (IOC1523), Outfall 011 Grab Substrate (IOC1523), Outfall 011 Composite (IOC1526), Outfall 003 Unfiltered, Outfall 003 Substrate, Outfall 011 Grab Unfiltered (IOC2063), Outfall 011 Substrate (IOC2063), and Outfall 011 Composite (IOC2064) were qualified as estimated, "J," for detects and, "UJ," for nondetects. No further qualifications were necessary.



## 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

### Gross Alpha and Gross Beta

The initial calibration included with the data was performed in February 2003. All gross alpha detector efficiencies were below 20%; therefore, the gross alpha results were qualified as estimated, "UJ," for nondetects and, "J," for detects. All gross beta detector efficiencies were at least 20% and were considered acceptable.

### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1997. All strontium chemical yields were at least 65% and were considered acceptable and the strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with an efficiency of 85%. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in June 2002. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228, which was calibrated in February 2001. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 80% and the actinium chemical yields were greater than 65%. No qualifications were necessary.

## 2.3 BLANKS

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## 2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES

Blank spikes were analyzed in association with the samples in these SDGs. Two gross alpha, three radium-228, two radium-226, one strontium-90, and one tritium LCS recoveries were outside the 3-sigma limits control limits, but all had acceptable recoveries ranging from 72- 125%. The remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## 2.5 LABORATORY DUPLICATES

The laboratory performed duplicate analyses for gross alpha, gross beta, tritium, and strontium on Outfall 011 Composite (IOC1526), for gross alpha, gross beta, tritium, strontium, radium-226, and radium-228 on Outfall 011 Grab Unfiltered (IOC2063), and for cesium on Outfall 011 Substrate. All results were within the 3-sigma limits and no qualifications were necessary.

## 2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE

The laboratory performed matrix spike analyses for gross alpha, gross beta, and tritium on Outfall 011 Composite (IOC1526) and for gross alpha, gross beta, tritium, and radium-226 on Outfall 011 Grab Unfiltered (IOC2063). The Outfall 011 Grab Unfiltered gross alpha (114%), gross beta (104%), tritium (96%), and radium-226 (104%) were outside the 3-sigma control limits; however, as the recoveries were deemed acceptable, no qualifications were required. The Outfall 011 Composite gross alpha recovery outside the 3-sigma limits; however, as the 82% recovery was deemed acceptable, no qualifications were required. The remaining recoveries were within the 3-sigma limits. No qualifications were necessary.

## 2.7 SAMPLE RESULT VERIFICATION

An EPA Level IV review was performed for the samples in these data packages. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted. No qualifications were necessary.

## 2.8 FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### 2.8.1 Field Blanks and Equipment Rinsates

The samples in these SDGs had no associated field QC samples. No qualifications were required.

### 2.8.2 Field Duplicates

There were no field duplicate samples in these SDGs.

Eberline Services

ANALYSIS RESULTS

SDG <u>8349</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503159-01</u>	Contract <u>PROJECT# IOC1523</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA	
		<i>Outfall oil Grab Unfiltered</i>							
		IOC1523-01	8349-001	03/18/05	04/02/05	GrossAlpha	0.067 ± 0.71	pCi/L	1.39
					04/02/05	Gross Beta	2.09 ± 1.3	pCi/L	1.94
					04/22/05	Ra228	0.453 ± 0.25	pCi/L	0.611
					04/07/05	H3	-16.2 ± 98	pCi/L	166
					05/06/05	Ra226	0.084 ± 0.020	pCi/L	0.023
					04/05/05	Sr90	-0.108 ± 0.25	pCi/L	0.508
		<i>Outfall oil Grab Filtered</i>							
		IOC1523-03	8349-002	03/18/05	04/02/05	GrossAlpha	0.626 ± 0.83	pCi/L	1.28
					04/02/05	Gross Beta	3.37 ± 1.3	pCi/L	1.79
					04/07/05	H3	-63.2 ± 96	pCi/L	166
					04/05/05	Sr90	0.029 ± 0.29	pCi/L	0.588

Rec Qual	Qual Code
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Am 5/17/05

**AMEC VALIDATED**  
**LEVEL IV**

Certified by <u>[Signature]</u>
Report Date <u>05/17/05</u>
Page 1

Eberline Services

ANALYSIS RESULTS

SDG <u>8349</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R501159-01</u>	Contract <u>PROJECT# IOC1523</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
		<i>Outfall Oil Grab Unfiltered</i>						
IOC1523-01	8349-001	03/18/05	04/02/05	04/02/05	GrossAlpha	0.067 ± 0.71	pCi/L	1.39
			04/02/05	04/02/05	Gross Beta	2.09 ± 1.3	pCi/L	1.94
			04/22/05	04/22/05	Ra-228	0.453 ± 0.25	pCi/L	0.611
			04/07/05	04/07/05	Tritium	-15.2 ± 98	pCi/L	166
			05/06/05	05/06/05	Ra-226	0.084 ± 0.020	pCi/L	0.023
			04/05/05	04/05/05	Sr-90	-0.108 ± 0.25	pCi/L	0.508
		<i>Outfall Oil Grab Filtered</i>						
IOC1523-03	8349-002	03/18/05	04/02/05	04/02/05	GrossAlpha	0.626 ± 0.83	pCi/L	1.28
			04/02/05	04/02/05	Gross Beta	3.37 ± 1.3	pCi/L	1.79
			06/08/05	06/08/05	Ra-228	0.340 ± 0.18	pCi/L	0.450
			04/07/05	04/07/05	Tritium	-63.2 ± 96	pCi/L	166
			06/09/05	06/09/05	Ra-226	0.392 ± 0.44	pCi/L	0.717
			04/05/05	04/05/05	Sr-90	0.029 ± 0.29	pCi/L	0.588

Rev Qual	Qual Code
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Eberline Services

ANALYSIS RESULTS

SDG <u>8350</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503160-01</u>	Contract <u>PROJECT# IOC1523</u>
Received Date <u>03/22/05</u>	Matrix <u>SOLID</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
IOC1523-04	8350-001	Outfall Oil Grab Substrate	03/18/05	04/11/05	Cs137 (G)	U	pCi/Smpl	9.67

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Eberline Services

ANALYSIS RESULTS

SDG <u>8344</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503154-01</u>	Contract <u>PROJECT# IOC1526</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA
<u>Sample ID</u> IOC1526	<u>Sample ID</u> 8344-001	03/18/05	04/02/05	GrossAlpha	0.305 ± 0.81	pCi/L	1.20
<i>Outfall oil Composite</i>							
			04/02/05	Gross Beta	1.96 ± 1.1	pCi/L	1.80
			04/22/05	Ra228	0.359 ± 0.23	pCi/L	0.576
			04/07/05	H3	-31.0 ± 98	pCi/L	166
			05/06/05	Ra226	0.063 ± 0.020	pCi/L	0.024
			04/05/05	Sr90	0.032 ± 0.22	pCi/L	0.442

Am 5/17/05

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Eberline Services

ANALYSIS RESULTS

SDG <u>8351</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503161-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
Outfall 003 Filtered IOC1562-01	8351-001		03/19/05	04/08/05	GrossAlpha	8.96 ± 3.3	pCi/L	2.54
			04/08/05	Gross Beta	18.0 ± 3.1	pCi/L	3.73	
			04/22/05	Ra228	0.448 ± 0.53	pCi/L	0.961	
			04/07/05	H3	-43.7 ± 96	pCi/L	164	
			05/05/05	Ra226	0.091 ± 0.026	pCi/L	0.034	
			04/05/05	Sr90	5.49 ± 0.58	pCi/L	0.445	
Outfall 003 Unfiltered IOC1562-02	8351-002		03/19/05	04/06/05	GrossAlpha	5.03 ± 3.0	pCi/L	3.27
			04/06/05	Gross Beta	19.0 ± 3.7	pCi/L	4.56	
			04/22/05	Ra228	0.386 ± 0.56	pCi/L	0.897	
			04/07/05	H3	-34.3 ± 99	pCi/L	168	
			05/05/05	Ra226	0.145 ± 0.028	pCi/L	0.031	
			04/05/05	Sr90	5.49 ± 0.56	pCi/L	0.404	

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Report Date <u>05/16/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>8352</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503162-01</u>	Contract <u>PROJECT# IOC1562</u>
Received Date <u>03/22/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
Outfall 003 Substrate	8352-001	03/19/05	04/25/05	Cs137 (G)	U	pCi/Smpl	5.55
IOC1562-03							

Rev Qual	Qual Code
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Report Date <u>05/03/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>8381</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503230-01</u>	Contract <u>PROJECT# IOC2063</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
Outfall Oil Grab Unfiltered IOC2063-01	8381-001	03/25/05	04/09/05	GrossAlpha	0.510 ± 0.59	pCi/L	0.852	
			04/09/05	Gross Beta	2.97 ± 1.3	pCi/L	1.84	
			05/05/05	Ra228	0.328 ± 0.16	pCi/L	0.403	
			04/21/05	H3	-16.7 ± 160	pCi/L	279	
			04/29/05	Ra226	-0.229 ± 0.19	pCi/L	0.396	
			04/18/05	Sr90	-0.052 ± 0.37	pCi/L	0.658	
			Outfall Oil Grab Filtered IOC2063-03	8381-002	03/25/05	04/09/05	GrossAlpha	-0.086 ± 0.62
04/09/05	Gross Beta	-0.472 ± 1.3				pCi/L	2.32	
05/05/05	Ra228	0.256 ± 0.19				pCi/L	0.501	
04/21/05	H3	129 ± 170				pCi/L	278	
04/29/05	Ra226	0.407 ± 0.21				pCi/L	0.285	
			04/18/05	Sr90	-0.105 ± 0.26	pCi/L	0.535	

PM 5/17/05

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5	R, H
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Report Date <u>05/11/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>8382</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503231-01</u>	Contract <u>PROJECT# 10C2063</u>
Received Date <u>03/29/05</u>	Matrix <u>SOLID</u>

Client	Lab	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA
<u>Sample ID</u> 10C2063-04	<u>Sample ID</u> 8382-001	03/25/05	04/19/05	Cs137 (G)	U	pCi/G	19.4

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**AMEC VALIDATED**

**LEVEL IV**

Certified by <u>[Signature]</u>
Report Date <u>07/06/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>8383</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R503232-01</u>	Contract <u>PROJECT# IOC2064</u>
Received Date <u>03/29/05</u>	Matrix <u>WATER</u>

Client	Lab	Collected	Analyzed	Nuclide	Results + 2σ	Units	MDA
<u>Sample ID</u>	<u>Sample ID</u>						
Outfall 011 Composite IOC2064-01	8383-001	03/25/05	04/11/05	GrossAlpha	0.216 ± 0.63	pCi/L	1.16
			04/11/05	Gross Beta	2.35 ± 1.2	pCi/L	1.82
			05/05/05	Ra228	0.348 ± 0.19	pCi/L	0.477
			04/21/05	H3	83.4 ± 170	pCi/L	278
			04/29/05	Ra226	0.237 ± 0.33	pCi/L	0.544
			04/18/05	Sr90	-0.105 ± 0.25	pCi/L	0.514

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54535	R, H
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LEVEL IV

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## Data Qualifier Reference Table

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Qualifier	Organics	Inorganics
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.	The associated value is an estimated quantity.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."	Not applicable.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.	Not applicable.
UJ	The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte cannot be verified.	The data are unusable. (Note: Analyte may or may not be present).

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## Qualification Code Reference Table

Qualifier	Organics	Inorganics
H	Holding times were exceeded.	Holding times were exceeded.
S	Surrogate recovery was outside QC limits.	The sequence or number of standards used for the calibration was incorrect
C	Calibration %RSD or %D were noncompliant.	Correlation coefficient is <0.995.
R	Calibration RRF was <0.05.	%R for calibration is not within control limits.
B	Presumed contamination from preparation (method) blank.	Presumed contamination from preparation (method) or calibration blank.
L	Laboratory Blank Spike/Blank Spike Duplicate %R was not within control limits.	Laboratory Control Sample %R was not within control limits.
Q	MS/MSD recovery was poor or RPD high.	MS recovery was poor.
E	Not applicable.	Duplicates showed poor agreement.
I	Internal standard performance was unsatisfactory.	ICP ICS results were unsatisfactory.
A	Not applicable.	ICP Serial Dilution %D were not within control limits.
M	Tuning (BFB or DFTPP) was noncompliant.	Not applicable.
T	Presumed contamination from trip blank.	Not applicable.
+	False positive – reported compound was not present. Not applicable.	
-	False negative – compound was present but not reported.	Not applicable.
F	Presumed contamination from FB, or ER.	Presumed contamination from FB or ER.
\$	Reported result or other information was incorrect.	Reported result or other information was incorrect.
?	TIC identity or reported retention time has been changed.	Not applicable.
D	The analysis with this flag should not be used because another more technically sound analysis is available.	The analysis with this flag should not be used because another more technically sound analysis is available.
P	Instrument performance for pesticides was poor.	Post Digestion Spike recovery was not within control limits.
DNQ	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.	The compound was detected between the MDL and the RL and, by definition, is considered an estimated value.

\*# Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

Unusual problems found with the data that have been described in Section 2.#, "Data Validation Findings." The number following the asterisk (\*) will indicate the subsection where a description of the problem can be found (eg. \*1 would indicate a sample was not within temperature limits).

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# DATA VALIDATION REPORT

## NPDES Monitoring

ANALYSIS: RADIONUCLIDES

SAMPLE DELIVERY GROUP: IOD2061

Prepared by

AMEC—Denver Operations  
550 South Wadsworth Boulevard, Suite 500  
Lakewood, Colorado 80226



## 1. INTRODUCTION

Task Order Title: NPDES Monitoring  
Contract Task Order #: 313150012  
SDG#: IOD2061  
Project Manager: P. Costa  
Matrix: Water/Solid  
Analysis: Radionuclides  
QC Level: Level IV  
No. of Samples: 3  
No. of Reanalyses/Dilutions: 0  
Reviewer: P. Meeks  
Date of Review: July 14, 2005

The samples listed in Table 1 were validated based on the guidelines outlined in the *EPA Prescribed Procedures for Measurements of Radioactivity in Drinking Water, Methods 900.0, 905.0, and 906.0*, and validation procedures outlined in the *USEPA CLP National Functional Guidelines for Inorganic Data Review (2/94)*. Any deviations from these procedures and guidelines are documented herein. Qualifiers were applied in cases where the data did not meet the required QC criteria or where special consideration by the data user is required. Data qualifiers were placed on Form Is with the associated qualification codes. Analytes that were rejected for any reason are denoted on the Form I as having only the "R" data qualifier and associated qualification code(s) denoting the reason for rejection. Any additional problems with the data that may have resulted in an estimated value were not denoted by a qualification code since the data had already been rejected.

**Table 1. Sample identification**

Client ID	Del Mar ID	Eberline ID	Matrix	COC Method
Outfall 003 Filtered	IOD2061-01	8442-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Unfiltered	IOD2061-02	8442-001	water	900.0, 903.1, 904.0, 905.0, 906.0
Outfall 003 Substrate	IOD2061-03	8443-001	solid	901.1

## 2. DATA VALIDATION FINDINGS

### 2.1 SAMPLE MANAGEMENT

Following are findings associated with sample management:

#### 2.1.1 Sample Preservation, Handling, and Transport

The samples in this SDG were received at Del Mar Analytical within the temperature limits of  $4\pm 2^{\circ}\text{C}$ . No temperature information was provided by Eberline, the subcontract laboratory; however, as it is not necessary to chill radiological samples, no qualifications were required. The samples were noted to have been received intact and in good condition.

According to the Los Angeles Regional Water Quality Control Board's guidance letter dated 01/12/05, samples collected for tritium analysis should be submitted in glass containers to avoid potential loss of tritium by sorption onto the plastic container. The tritium samples were received unpreserved in glass containers. According to the LARWQCB guidance letter, unfiltered samples should not be preserved and filtered aliquots should be preserved after filtration. All gross alpha, gross beta, radium-226, radium-228, and strontium samples were received unpreserved. Upon receipt, the laboratory filtered and then preserved the gross alpha, gross beta, radium-226, radium-228, and strontium aliquots for Outfall 003 Filtered. As per instructions, Outfall 003 Unfiltered was not preserved. No qualifications were required.

#### 2.1.2 Chain of Custody

The original COC was signed and dated by field and laboratory personnel. The transfer COC was signed by personnel from both laboratories. Eberline did not list the MWH IDs on the Form I; therefore, the reviewer edited the Form Is to reflect these IDs. No qualifications were required.

#### 2.1.3 Holding Times

The tritium and cesium samples, and preserved gross alpha, gross beta, radium-226, radium-228, and strontium samples for Outfall 003 Filtered were analyzed within 180 days of collection. The unpreserved gross alpha, gross beta, radium-226, radium-228, and strontium samples for Outfall 003 Unfiltered were analyzed beyond the five-day holding time; therefore, the results for gross alpha, gross beta, radium-226, radium-228, and strontium were qualified as estimated, "J," for detects and, "UJ," for nondetects. No further qualifications were necessary.

### 2.2 CALIBRATION

The laboratory calibration information included the standard certificates and applicable preparation/dilutions logs for NIST-traceability.

#### Gross Alpha and Gross Beta

The initial calibration included with the data was performed in February 2003. The gross alpha detector efficiencies were both less than 20%; therefore, the nondetected gross alpha results for Outfall 003 Filtered was qualified as estimated, "UJ," and the detected gross alpha results for Outfall 003 Unfiltered was qualified as estimated, "J." The remaining detector efficiencies were above 20%.

### Tritium

No calibration standards were analyzed for this method. According to the laboratory, every sample was spiked for efficiency determination; therefore, no calibration is necessary. All detector efficiencies in the samples were at least 20% and were considered acceptable. All internal spike efficiency to default efficiency ratios were near 1, indicating that quenching did not occur.

### Strontium-90

The initial calibrations were performed in June 1995. All strontium chemical yields were at least 75% and were considered acceptable. The strontium continuing calibration results were within the laboratory control limits. No qualifications were necessary.

### Radium

The radium-226 cell efficiencies were determined in May 2004 and October 2003. The radium-226 continuing calibration results were within the laboratory-established control limits. The radium-228 calibration utilized actinium-228 and was verified in February 2001. The radium-228 tracer, barium-133, was calibrated in March 2004. The tracer chemical yields were greater than 70%. And the actinium chemical yields were greater than 50%. No qualifications were necessary.

### Cesium

The reviewer confirmed that the 662 KeV peak was used for quantitation, with an efficiency of 85%. No qualifications were necessary.

## **2.3 BLANKS**

No measurable activities were detected in the method blanks; therefore, no qualifications were necessary.

## **2.4 BLANK SPIKES AND LABORATORY CONTROL SAMPLES**

Aqueous blank spikes were analyzed in association with the samples in this SDG. The radium-228, radium-226, and cesium recoveries exceeded the 3-sigma limits; however, these recoveries, 122%, 110%, and 117% were deemed acceptable. The remaining blank spike results were within the 3-sigma limits. No qualifications were necessary.

## **2.5 LABORATORY DUPLICATES**

The laboratory performed duplicate analyses on Outfall 003 Substrate for cesium and on Outfall 003 Filtered for all analytes except radium-228. The gross alpha RPD was greater than 20%; however, as the result was within the 3-sigma limits, no qualifications were required. All remaining RPDs were  $\leq 20\%$  and all results were within the 3-sigma limits. No qualifications were necessary.

## **2.6 MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

The laboratory performed matrix spike analyses on Outfall 003 Filtered for all analytes except radium-228 and strontium. The recoveries were all within the 3-sigma limits. No qualifications were necessary.

## **2.7 SAMPLE RESULT VERIFICATION**

An EPA Level IV review was performed for the samples in this data package. Sample results and MDAs reported on the sample result forms were verified against the raw data and no calculation or transcription errors were noted. No qualifications were necessary.

## **2.8 FIELD QC SAMPLES**

Field QC samples were evaluated, and if necessary, qualified based only on laboratory blanks. Any remaining detects are used to evaluate the associated samples.

### **2.8.1 Field Blanks and Equipment Rinsates**

The samples in this SDG had no associated field QC samples. No qualifications were required.

### **2.8.2 Field Duplicates**

There were no field duplicate samples in this SDG.

Eberline Services

ANALYSIS RESULTS

SDG <u>8442</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R505002-01</u>	Contract <u>PROJECT# IOD2061</u>
Received Date <u>04/30/05</u>	Matrix <u>WATER</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results ± 2σ	Units	MDA	Rev Qual	Qual Code
Outfall 003 Filtered IOD2061-01	8442-001	04/28/05	05/10/05	GrossAlpha	2.79 ± 3.7	pCi/L	4.35	C C C C C	U J	R
			05/10/05	Gross Beta	43.2 ± 5.9	pCi/L	6.39			
			06/13/05	Ra228	1.24 ± 0.81	pCi/L	2.22			
			05/19/05	H3	56.8 ± 110	pCi/L	185			
			06/16/05	Ra226	0.290 ± 0.38	pCi/L	0.630			
			05/19/05	Sr90	10.8 ± 0.85	pCi/L	0.551			
			Outfall 003 unfiltered IOD2061-02  pm 7/14/05	8442-002	04/28/05	05/10/05	GrossAlpha			
05/10/05	Gross Beta	43.8 ± 6.9				pCi/L	8.12			
06/13/05	Ra228	0.542 ± 0.55				pCi/L	1.73			
05/19/05	H3	65.7 ± 110				pCi/L	189			
06/16/05	Ra226	0.650 ± 0.47				pCi/L	0.707			
05/19/05	Sr90	11.4 ± 0.82				pCi/L	0.457			

**AMEC VALIDATED**

**LEVEL II**

Certified by <u>[Signature]</u>
Report Date <u>07/12/05</u>
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Eberline Services

ANALYSIS RESULTS

SDG <u>8443</u>	Client <u>DEL MAR ANAL</u>
Work Order <u>R505003-01</u>	Contract <u>PROJECT# 10D2061</u>
Received Date <u>04/30/05</u>	Matrix <u>SOLID</u>

Client	Lab	Sample ID	Collected	Analyzed	Nuclide	Results $\pm 2\sigma$	Units	MDA	Rev Qual	Qual Code
Outfall 003 Substrate		8443-001	04/28/05	05/06/05	Cs137 (G)	U	pCi/G	13.9	U	

LEVEL IV

AMEC VALIDATED

Certified by <u>[Signature]</u>
Report Date <u>07/06/05</u>
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