

# Data Validation Package

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**January 2006**

**Monument Valley, Arizona, Processing Site**

**April 2006**



**U.S. Department of Energy  
Office of Legacy Management**

# Contents

Sampling Event Summary .....	1
Sample Locations at Monument Valley, Arizona, Processing Site .....	3
Data Assessment Summary.....	4
Water Sampling Field Activities Verification Checklist .....	5
Laboratory Performance Assessment .....	7
Laboratory Performance Assessment .....	14
Sampling Quality Control Assessment .....	21
Certification .....	22

## **Attachment 1—Assessment of Anomalous Data**

Minimums and Maximums Report  
Anomalous Data Review Checksheet

## **Attachment 2—Data Presentation**

Ground Water Quality Data  
Static Water Level Data  
Time Versus Concentration Graphs

## **Attachment 3—Sampling and Analysis Work Order**

## **Attachment 4—Trip Report**

# Sampling Event Summary

**Site:** Monument Valley, Arizona, Processing Site

**Sampling Period:** December 6, 2005 and January 9-11, 2006

Eighteen ground water samples were collected at the Monument Valley, Arizona, Processing Site to monitor ground water contaminants as specified in the *Final Site Observational Work Plan for the UMTRA Project Site at Monument Valley, Arizona*. Water levels were measured at each sampled well. Sampling and analysis was conducted as specified in *FY 2006 Sampling Frequencies and Analyses* (October 2005) and *Ground Water and Surface Water Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (DOE 2005). One duplicate sample was collected from location 0761. Sampling was started December 6, 2005, and then later completed January 9-11, 2006.

Time concentration plots for ammonium, nitrate, sulfate, uranium, and vanadium are included with the results data. The data from this sampling event are consistent with values previously obtained. Increasing uranium concentrations in well 0662 have been noted, however, there are no corresponding increases in the nitrate or sulfate concentrations that would indicate contaminant movement. Ongoing erosion of a former uranium mine located upgradient from the site may be contributing to the increasing uranium concentrations at this location. The increasing nitrate concentration in wells 0761, 0762, and 0764 as indicated on the time versus concentration graphs, is consistent with downgradient movement of the contaminant plume. Wells with analyte concentrations that exceeded U.S. Environmental Protection Agency (EPA) ground water standards are listed in Table 1.

Table 1. Monument Valley Locations That Exceed Standards

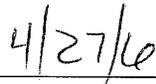
Comparison to UMTRCA Maximum Groundwater Concentration Standards  
 Laboratory: PARAGON (Fort Collins, CO)  
 Report Identification Number (RINs): 05110265, 06010295  
 Report Date: 03/20/2006

Analyte	Standard <sup>a</sup>	Site Code	Location	Concentration
Nitrate as Nitrogen	10	MON01	0606	220
			0655	95
			0656	22
			0761	27
			0761	28
			0762	69
			0764	48
			0765	130
			0770	23
			0771	160
Uranium	0.044	MON01	0619	0.063
			0662	0.47
			0774	0.065

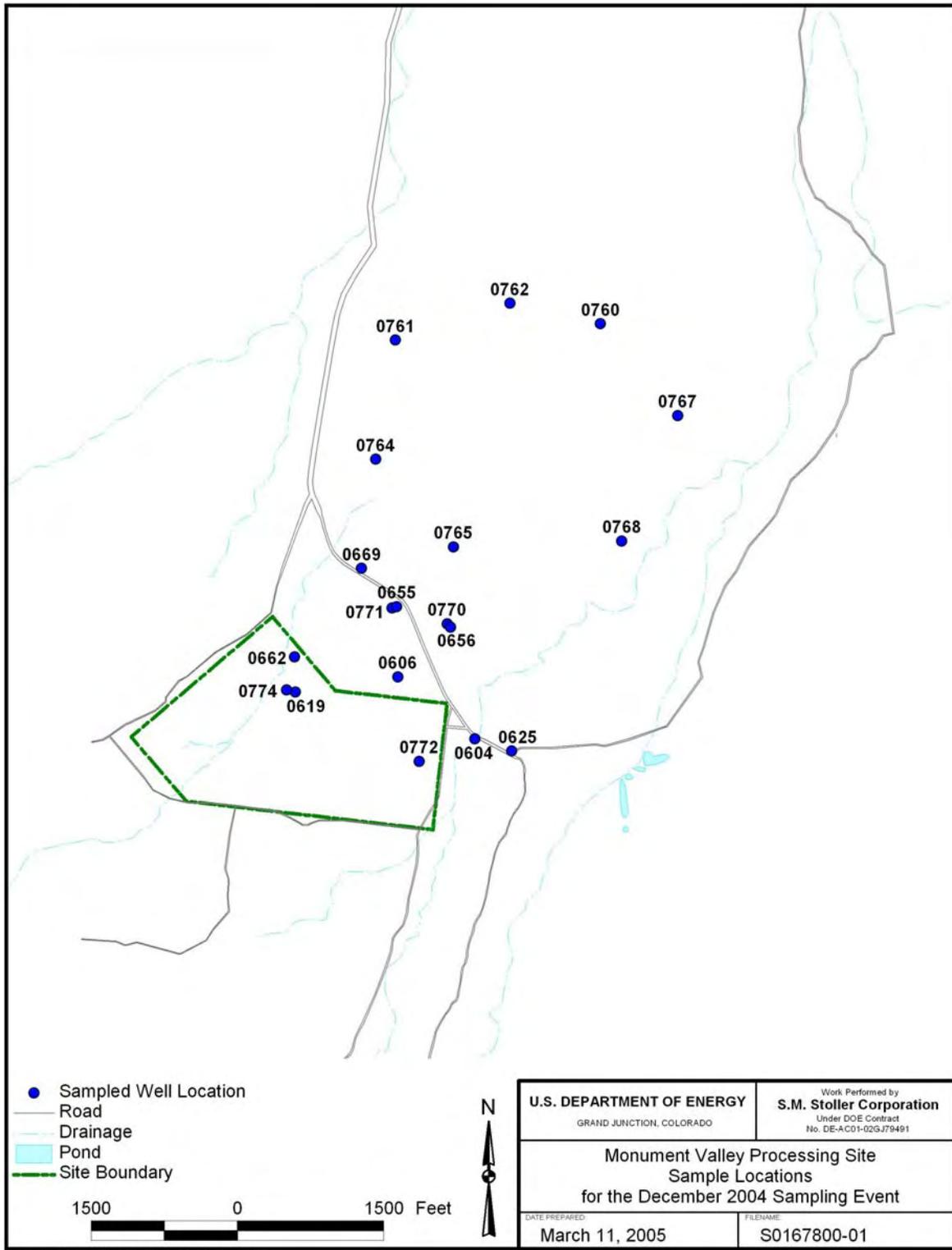
<sup>a</sup> Standards are listed in 40 CFR 192.02 Table 1 to Subpart A; units are in mg/L.



David Miller  
 Site Lead, S.M. Stoller



Date



Sample Locations at Monument Valley, Arizona, Processing Site

# **Data Assessment Summary**

## Water Sampling Field Activities Verification Checklist

<b>Project</b>	Monument Valley, Arizona	<b>Date(s) of Water Sampling</b>	12/06/2005 and 01/09-01/11/2006
<b>Date(s) of Verification</b>	March 20, 2006	<b>Name of Verifier</b>	Steve Donovan

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOP's, instructions.	Yes	Work Order Letter dated November 15, 2005.
2. Were the sampling locations specified in the planning documents sampled?	Yes	Private well 0201 was not sampled per site lead direction.
3. Was a pre-trip calibration conducted as specified in the above named documents?	Yes	
4. Was an operational check of the field equipment conducted twice daily? Did the operational checks meet criteria?	Yes Yes	
5. Were the number and types (alkalinity, temperature, Ec, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Was the Category of the well documented?	Yes	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 mL/min? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	Yes Yes Yes Yes NA	

## Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
Was the true identity of the samples recorded on the Quality Assurance Sample Log?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members?	Yes	Only one signature at locations 0762, 0767, and 0768
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 05110265  
Sample Event: December 6, 2005  
Site(s): Monument Valley, Arizona  
Laboratory: Paragon Analytics  
Work Order No.: 0512063  
Analysis: Metals and Inorganics  
Validator: Steve Donovan  
Review Date: March 9, 2006

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), "Standard Practice for Validation of Laboratory Data," GT-9(P) (2004). See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were analyzed concurrently with samples from RIN 05120263. The sample matrix for all samples is equivalent allowing the use of common quality assurance samples. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N, NH <sub>3</sub> -N	WCH-A-005	MCAWW 350.1	MCAWW 350.1
Nitrate + Nitrite as N, NO <sub>3</sub> -NO <sub>2</sub> -N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Sulfate, SO <sub>4</sub>	MIS-A-044	SW-846 9056	SW-846 9056
Uranium, U	GJO-01	SW-846 3005A	SW-846 6020A
Vanadium, V	GJO-18	SW-846 3005A	SW-846 6020A

### Data Qualifier Summary

None of the analytical results required qualification.

### Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received eight water samples on December 8, 2005, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form and the sample tickets had no errors or omissions.

## Preservation and Holding Times

The sample shipment was received cool and intact with a temperature within the chilled cooler of 1.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples were analyzed within the applicable holding times.

## Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods.

### *Method MCAWW 350.1*

The initial calibration for ammonia as N was performed using six calibration standards on December 13, 2005, resulting in a calibration curve with a correlation coefficient ( $r^2$ ) value greater than 0.995 and an intercept less than three times the method detection limit (MDL). Initial and continuing calibration verification (CCV) checks were made at the required frequency, resulting in seven CCVs. All calibration checks were within the acceptance range.

### *Method SW-846 6020A*

Calibrations for vanadium were performed on January 3, 2006, and uranium on January 4, 2006. The initial calibrations were performed using six calibration standards resulting in calibration curves with  $r^2$  values greater than 0.995. The absolute values of the intercept of the calibration curves were less than three times the MDL. Calibration and laboratory spike standards were prepared from independent sources. Initial and CCV checks were made at the required frequency resulting in nine CCVs. All calibration checks met the acceptance criteria. A reporting limit verification check (CRI) was made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit. The CRI results met the acceptance criteria. The mass calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure. Internal standard recoveries were stable and within acceptance ranges.

### *Method SW-846 9056*

Initial calibrations were performed for sulfate using five calibration standards on December 10, 2005. The calibration curve  $r^2$  values were greater than 0.995 and intercepts less than three times the MDL. Initial calibration and calibration check standards were prepared from independent sources. Initial and CCV checks were made at the required frequency resulting in two CCVs. All calibration checks met the acceptance criteria.

### *Method MCAWW 353.2*

The initial calibration for  $\text{NO}_3+\text{NO}_2\text{-N}$  was performed using seven calibration standards on December 14, 2005, resulting in a calibration curve  $r^2$  value greater than 0.995 and an intercept

less than three times the MDL. Initial and CCV checks were made at the required frequency resulting in four CCVs that met the acceptance criteria.

#### Method and Calibration Blanks

All initial and continuing calibration blank results were below the practical quantitation limits for all analytes. The sulfate, NH<sub>3</sub>-N, and NO<sub>3</sub>+NO<sub>2</sub>-N method blanks were below the method detection limits

#### Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

#### Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed for NH<sub>3</sub>-N, NO<sub>3</sub>+NO<sub>2</sub>-N, sulfate, uranium, and vanadium as a measure of method performance in the sample matrix. The MS/MSD analyses resulted in acceptable recovery and precision for all analytes.

#### Laboratory Replicate Analysis

The laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference (RPD) values for the laboratory replicate samples and matrix spike duplicate sample results for non-radiochemical analytes were less than 20 percent.

#### Laboratory Control Sample

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analysis categories.

#### Metals Serial Dilution

Serial dilutions were prepared and analyzed for uranium and vanadium to monitor chemical or physical interferences in the sample matrix. The serial dilution data were not evaluated because the concentration of the undiluted sample was less than 100 times the practical quantitation limit.

#### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of uranium to reduce interferences. The required detection limits were met for all analytes with the following exceptions: the required detection limits were not met for gross alpha, gross beta, and TDS because of the elevated levels of dissolved solids in the samples.

### Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

### Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

### Electronic Data Deliverable (EDD) File

An EDD file arrived on January 14, 2006. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

# SAMPLE MANAGEMENT SYSTEM

## General Data Validation Worksheet

**RIN:** 05110265    **Lab Code:** PAR    **Validator:** Steve Donovan    **Validation Date:** 3/9/2006  
**Site:** MONUMENT VALLEY    **Analysis Type:**  Metals     General Chem     Rad     Organics  
**# of Samples:** 8    **Matrix:** WATER    **Requested Analysis Completed:** Yes

**Chain of Custody**  
 Present: OK    Signed: OK    Dated: OK

**Sample**  
 Integrity: OK    Preservation: OK    Temperature: OK

### Exceptions

Method	Analyte	Location	Ticket	Collection Date	Preparation Date	Analysis Date	Dilution Factor	Holding Time Met	Detection Limit Met

**Comments:**    The reported detection limits are equal to or below contract requirements.  
                     All samples were analyzed within the applicable holding times.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SAMPLE MANAGEMENT SYSTEM**  
**Metals Data Validation Worksheet**

RIN: 05110265      Lab Code: PAR      Date Due: 1/5/2006  
 Matrix: Water      Site Code: MON      Date Completed: 1/18/2006

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	MS/MSD RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB								
Uranium	01/04/2006	0.0000	0.9999	OK	OK	OK	OK		109.0	109.0	0.0	107.0		92.6	
Vanadium	01/03/2006	0.0050	1.0000	OK	OK	OK	OK		115.0	116.0	1.0	95.0		116.0	

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SAMPLE MANAGEMENT SYSTEM**  
**Inorganics Data Validation Worksheet**

**RIN:** 05110265      **Lab Code:** PAR      **Date Due:** 1/5/2006  
**Matrix:** Water      **Site Code:** MON      **Date Completed:** 1/18/2006

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R <sup>2</sup>	ICV	CCV	ICB	CCB						
Ammonia as N	12/13/2005	-0.034	0.9999	OK	OK	OK	OK	OK	97.0	108.0	109.0	1.00	
Nitrate+Nitrite as N	12/14/2005	-0.001	1.0000	OK	OK	OK	OK	OK	102.0	95.0	97.0	1.00	
Sulfate	12/10/2005	0.137	0.9999	OK	OK	OK	OK	OK	103.0	95.0	95.0	0	

**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 06010295  
Sample Event: January 9-10, 2006  
Site(s): Monument Valley, Arizona  
Laboratory: Paragon Analytics  
Work Order No.: 0601069  
Analysis: Metals and Inorganics  
Validator: Steve Donovan  
Review Date: March 9, 2006

This validation was performed according to the *Environmental Procedures Catalog* (STO 6), "Standard Practice for Validation of Laboratory Data," GT-9(P) (2004). See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 3.

Table 3. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N, NH <sub>3</sub> -N	WCH-A-005	MCAWW 350.1	MCAWW 350.1
Nitrate + Nitrite as N, NO <sub>3</sub> -NO <sub>2</sub> -N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Sulfate, SO <sub>4</sub>	MIS-A-044	SW-846 9056	SW-846 9056
Uranium, U	GJO-01	SW-846 3005A	SW-846 6020A
Vanadium, V	GJO-18	SW-846 3005A	SW-846 6020A

### Data Qualifier Summary

Analytical results were qualified as listed in Table 4. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 4. Qualified Results

Sample Number	Location	Analyte	Flag	Reason
0601069-9	0768	U	U	Less than 5 times the calibration blank

### Sample Shipping/Receiving

Paragon Analytics in Fort Collins, Colorado, received 11 water samples on January 13, 2006, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the COC form and the sample tickets had no errors or omissions.

## Preservation and Holding Times

The sample shipment was received cool and intact with a temperature within the chilled cooler of 0.6 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples were analyzed within the applicable holding times.

## Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods.

### *Method MCAWW 350.1*

The initial calibration for ammonia as N was performed using six calibration standards on January 30, 2006, resulting in a calibration curve with a correlation coefficient ( $r^2$ ) value greater than 0.995 and an intercept less than three times the method detection limit (MDL). Initial and continuing calibration verification (CCV) checks were made at the required frequency, resulting in seven CCVs. All calibration checks were within the acceptance range.

### *Method SW-846 6020A*

Calibrations for vanadium were performed on January 17, 2006, and uranium on January 18, 2006. The initial calibrations were performed using six calibration standards resulting in calibration curves with  $r^2$  values greater than 0.995. The absolute values of the intercept of the calibration curves were less than three times the MDL. Calibration and laboratory spike standards were prepared from independent sources. Initial and CCV checks were made at the required frequency resulting in three CCVs. All calibration checks met the acceptance criteria. A reporting limit verification check (CRI) was made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit. The CRI results met the acceptance criteria. The mass calibration and resolution was checked at the beginning of each analytical run in accordance with the procedure. Internal standard recoveries were stable and within acceptance ranges.

### *Method SW-846 9056*

Initial calibrations were performed for sulfate using five calibration standards on February 1, 2006. The calibration curve  $r^2$  values were greater than 0.995 and intercepts less than three times the MDL. Initial calibration and calibration check standards were prepared from independent sources. Initial and CCV checks were made at the required frequency resulting in eight CCVs. All calibration checks met the acceptance criteria.

### *Method MCAWW 353.2*

The initial calibration for  $\text{NO}_3+\text{NO}_2\text{-N}$  was performed using seven calibration standards on

January 30, 2006, resulting in a calibration curve  $r^2$  value greater than 0.995 and an intercept less than three times the MDL. Initial CCV checks were made at the required frequency resulting in three CCVs that met the acceptance criteria.

#### Method and Calibration Blanks

All initial and continuing calibration blank results were below the practical quantitation limits for all analytes. The sulfate,  $\text{NH}_3\text{-N}$ , and  $\text{NO}_3\text{+NO}_2\text{-N}$  method blanks were below the method detection limits.

#### Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

#### Matrix Spike Analysis

Matrix spike and matrix spike duplicate samples (MS/MSD) were analyzed for  $\text{NH}_3\text{-N}$ ,  $\text{NO}_3\text{+NO}_2\text{-N}$ , sulfate, uranium, and vanadium as a measure of method performance in the sample matrix. The MS/MSD data were not evaluated for  $\text{NO}_3\text{+NO}_2\text{-N}$  because the concentration of the unspiked sample was greater than four times the spike concentration. The MS/MSD analyses resulted in acceptable recovery and precision for all analytes.

#### Laboratory Replicate Analysis

The laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference (RPD) values for the laboratory replicate samples and matrix spike duplicate sample results for non-radiochemical analytes were less than 20 percent.

#### Laboratory Control Sample

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analysis categories.

#### Metals Serial Dilution

Serial dilutions were prepared and analyzed for uranium and vanadium to monitor chemical or physical interferences in the sample matrix. The serial dilution data were not evaluated for vanadium because the concentration of the undiluted sample was less than 100 times the practical quantitation limit. The uranium serial dilution results were within the acceptance range.

#### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of uranium to reduce interferences. The required detection limits were

met for all analytes

### Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

### Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

### Electronic Data Deliverable (EDD) File

An EDD file arrived on February 9, 2006. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

# SAMPLE MANAGEMENT SYSTEM

## General Data Validation Worksheet

**RIN:** 06010295    **Lab Code:** PAR    **Validator:** Steve Donovan    **Validation Date:** 3/9/2006  
**Site:** MONUMENT VALLEY    **Analysis Type:**  Metals     General Chem     Rad     Organics  
**# of Samples:** 11    **Matrix:** WATER    **Requested Analysis Completed:** Yes

**Chain of Custody**  
 Present: OK    Signed: OK    Dated: OK

**Sample**  
 Integrity: OK    Preservation: OK    Temperature: OK

### Exceptions

Method	Analyte	Location	Ticket	Collection Date	Preparation Date	Analysis Date	Dilution Factor	Holding Time Met	Detection Limit Met

**Comments:**    The reported detection limits are equal to or below contract requirements.  
                     All samples were analyzed within the applicable holding times.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SAMPLE MANAGEMENT SYSTEM**  
**Metals Data Validation Worksheet**

RIN: 06010295      Lab Code: PAR      Date Due: 2/10/2006  
 Matrix: Water      Site Code: MON      Date Completed: 2/13/2006

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	MS/MSD RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB								
Uranium	01/18/2006	-0.0010	0.9999	OK	OK	OK	OK		109.0	99.0	3.0	107.0	5.0	92.4	
Vanadium	01/17/2006	0.0010	1.0000	OK	OK	OK	OK		98.0	103.0	2.0	104.0	14.0	73.3	

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SAMPLE MANAGEMENT SYSTEM**  
**Inorganics Data Validation Worksheet**

RIN: 06010295      Lab Code: PAR      Date Due: 2/10/2006  
 Matrix: Water      Site Code: MON      Date Completed: 2/13/2006

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
Ammonia as N	01/30/2006	-0.006	1.0000	OK	OK	OK	OK	OK	96.0	85.0	81.0	5.00	
Nitrate+Nitrite as N	01/30/2006	-0.004	1.0000	OK	OK	OK	OK	OK	100.0				
Sulfate	02/01/2006	0.288	0.9999	OK	OK	OK	OK	OK	96.0	107.0	104.0	1.00	

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **Sampling Quality Control Assessment**

The following information summarizes and assesses quality control for this sampling event.

### Sampling Protocol

All monitor well sample results were qualified with an “F” flag in the database indicating the wells were purged and sampled using the low-flow sampling method. Additionally, sample results from well 0771 were qualified with a “Q” flag because of water level draw down, and sample results from well 0760 were qualified with a “Q” flag because the turbidity criteria were not met.

### Equipment Blank Assessment

An equipment blank was not collected because all samples were collected using dedicated equipment.

### Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of the overall precision of the measurement process. The precision observed includes both field and laboratory precision and have more variability than laboratory duplicates which measure only laboratory performance. Duplicate samples were collected from well 0761. The duplicate results met the EPA recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than five times the practical quantitation limit and are therefore acceptable.

### Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator: Steve Donivan 4-28-06  
Steve Donivan Date

Data Validation Lead: Steve Donivan 4-28-06  
Steve Donivan Date

**Attachment 1**  
**Assessment of Anomalous Data**

# **Minimums and Maximums Report**

## **Minimums and Maximums Report**

The Minimums and Maximums Report is generated by a data validation application used to query the SEEPro database. The application compares the new data set with historical data and lists all new data that fall outside the historical data range. Data listed in the report require further review if:

- (1) Identified low concentrations are not the result of improved detection limits.
- (2) The concentration detected is not within 50 percent of historical minimum or maximum values.
- (3) There were five or more historical sample results for comparison.

The uranium result from location 0662 is not within 50 percent of the historical maximum value for that location. This result will be compared to data from the next sampling event.

The sulfate concentration at location 0768 that was identified as anomalously low in December 2004 returned to a value within 50 percent of the previous historical minimum.

Data Validation Minimums and Maximums Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 06010295

Comparison: History Begin Date: 1/6/1996

Report Date: 3/20/2006

Site Code	Location Code	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Count	
				Result	Qualifiers		Result	Qualifiers		Result	Qualifiers		N	N Below Detect
					Lab	Data		Lab	Data		Lab	Data		
MON01	0604	12/06/2005	Sulfate	120		F	113			100		F	11	0
MON01	0606	12/06/2005	Vanadium	0.00034		F	0.013	U		0.00042		FJ	5	4
MON01	0619	12/06/2005	Sulfate	77		F	65		F	49.7		F	10	0
MON01	0619	12/06/2005	Vanadium	0.023		F	0.022		FJ	0.015			5	0
MON01	0662	01/09/2006	Uranium	0.47		F	0.28		F	0.0222			6	0
MON01	0761	01/10/2006	Sulfate	470		F	520			473			10	0
MON01	0761	01/10/2006	Sulfate	460		F	520			473			10	0
MON01	0762	01/10/2006	Sulfate	1500		F	1430		F	761			10	0
MON01	0764	01/10/2006	Sulfate	330		F	430		L	340		FQ	10	0
MON01	0771	12/06/2005	Uranium	0.017		FQ	0.0327			0.018		F	5	0
MON01	0774	12/06/2005	Sulfate	86		F	70.1			55			10	0

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

- |   |  |   |   |   |                  |
|---|--|---|---|---|------------------|
| F | Low flow sampling method used.                     | G | Possible grout contamination, pH > 9.         | J | Estimated value. |
| L | Less than 3 bore volumes purged prior to sampling. | Q | Qualitative result due to sampling technique. | R | Unusable result. |
| U | Parameter analyzed for but was not detected.       | X | Location is undefined.                        |   |                  |

# **Anomalous Data Review Checksheet**



**Attachment 2**  
**Data Presentation**

# **Ground Water Quality Data**

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0604 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	13	-	28	168		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	13	-	28	0.1	U	F	0	.1	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	13	-	28	0.01	U	F	0	.01	
Oxidation Reduction Potential	mV	12/06/2005	N001	13	-	28	46.8		F	0		
pH	s.u.	12/06/2005	N001	13	-	28	8.32		F	0		
Specific Conductance	umhos/cm	12/06/2005	N001	13	-	28	592		F	0		
Sulfate	mg/L	12/06/2005	0001	13	-	28	120		F	0	5	
Temperature	C	12/06/2005	N001	13	-	28	15.81		F	0		
Turbidity	NTU	12/06/2005	N001	13	-	28	1.31		F	0		
Uranium	mg/L	12/06/2005	0001	13	-	28	0.002		F	0	.0000048	
Vanadium	mg/L	12/06/2005	0001	13	-	28	0.0024		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0606 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	32	-	42	212		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	32	-	42	130		F	0	20	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	32	-	42	220		F	0	2	
Oxidation Reduction Potential	mV	12/06/2005	N001	32	-	42	113		F	0		
pH	s.u.	12/06/2005	N001	32	-	42	7.24		F	0		
Specific Conductance	umhos/cm	12/06/2005	N001	32	-	42	2871		F	0		
Sulfate	mg/L	12/06/2005	0001	32	-	42	430		F	0	25	
Temperature	C	12/06/2005	N001	32	-	42	15.65		F	0		
Turbidity	NTU	12/06/2005	N001	32	-	42	0.51		F	0		
Uranium	mg/L	12/06/2005	0001	32	-	42	0.0096		F	0	.0000048	
Vanadium	mg/L	12/06/2005	0001	32	-	42	0.00034		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0619 WELL Water Use Permit No. 92-082.

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	103.9 - 153.9	155		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	103.9 - 153.9	0.1	U	F	0	.1	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	103.9 - 153.9	3.6		F	0	.02	
Oxidation Reduction Potential	mV	12/06/2005	N001	103.9 - 153.9	59.4		F	0		
pH	s.u.	12/06/2005	N001	103.9 - 153.9	7.79		F	0		
Specific Conductance	umhos /cm	12/06/2005	N001	103.9 - 153.9	475		F	0		
Sulfate	mg/L	12/06/2005	0001	103.9 - 153.9	77		F	0	5	
Temperature	C	12/06/2005	N001	103.9 - 153.9	15.68		F	0		
Turbidity	NTU	12/06/2005	N001	103.9 - 153.9	0.54		F	0		
Uranium	mg/L	12/06/2005	0001	103.9 - 153.9	0.063		F	0	.000048	
Vanadium	mg/L	12/06/2005	0001	103.9 - 153.9	0.023		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0655 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	38	-	58		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	38	-	58		F	0	1	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	38	-	58		F	0	.5	
Oxidation Reduction Potential	mV	12/06/2005	N001	38	-	58		F	0		
pH	s.u.	12/06/2005	N001	38	-	58		F	0		
Specific Conductance	umhos /cm	12/06/2005	N001	38	-	58		F	0		
Sulfate	mg/L	12/06/2005	0001	38	-	58		F	0	25	
Temperature	C	12/06/2005	N001	38	-	58		F	0		
Turbidity	NTU	12/06/2005	N001	38	-	58		F	0		
Uranium	mg/L	12/06/2005	0001	38	-	58		F	0	.0000048	
Vanadium	mg/L	12/06/2005	0001	38	-	58		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0656 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	38	-	58		F	#		
Ammonia Total as N	mg/L	01/10/2006	0001	38	-	58		F	#	2	
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	38	-	58		F	#	.2	
Oxidation Reduction Potential	mV	01/10/2006	N001	38	-	58		F	#		
pH	s.u.	01/10/2006	N001	38	-	58		F	#		
Specific Conductance	umhos /cm	01/10/2006	N001	38	-	58		F	#		
Sulfate	mg/L	01/10/2006	0001	38	-	58		F	#	5	
Temperature	C	01/10/2006	N001	38	-	58		F	#		
Turbidity	NTU	01/10/2006	N001	38	-	58		F	#		
Uranium	mg/L	01/10/2006	0001	38	-	58		F	#	.000048	
Vanadium	mg/L	01/10/2006	0001	38	-	58		F	#	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0662 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/09/2006	0001	37.5	- 67.5	190		F	#		
Ammonia Total as N	mg/L	01/09/2006	0001	37.5	- 67.5	0.1	U	F	#	.1	
Nitrate + Nitrite as Nitrogen	mg/L	01/09/2006	0001	37.5	- 67.5	8.6		F	#	.1	
Oxidation Reduction Potential	mV	01/09/2006	N001	37.5	- 67.5	146.3		F	#		
pH	s.u.	01/09/2006	N001	37.5	- 67.5	7.33		F	#		
Specific Conductance	umhos /cm	01/09/2006	N001	37.5	- 67.5	1288		F	#		
Sulfate	mg/L	01/09/2006	0001	37.5	- 67.5	500		F	#	5	
Temperature	C	01/09/2006	N001	37.5	- 67.5	14.84		F	#		
Turbidity	NTU	01/09/2006	N001	37.5	- 67.5	1.42		F	#		
Uranium	mg/L	01/09/2006	0001	37.5	- 67.5	0.47		F	#	.000048	
Uranium-234	pCi/L	01/09/2006	0001	37.5	- 67.5	159		F	#	.531	26.7
Uranium-235	pCi/L	01/09/2006	0001	37.5	- 67.5	7.61		F	#	.411	2.05
Uranium-238	pCi/L	01/09/2006	0001	37.5	- 67.5	161		F	#	.349	27.1
Vanadium	mg/L	01/09/2006	0001	37.5	- 67.5	0.027	E	F	#	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0669 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty	
							Lab	Data	QA			
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	34	-	54	184		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	34	-	54	2.1		F	0	.1	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	34	-	54	6.5		F	0	.05	
Oxidation Reduction Potential	mV	12/06/2005	N001	34	-	54	79.9		F	0		
pH	s.u.	12/06/2005	N001	34	-	54	7.67		F	0		
Specific Conductance	umhos /cm	12/06/2005	N001	34	-	54	658		F	0		
Sulfate	mg/L	12/06/2005	0001	34	-	54	130		F	0	5	
Temperature	C	12/06/2005	N001	34	-	54	14.86		F	0		
Turbidity	NTU	12/06/2005	N001	34	-	54	0.62		F	0		
Uranium	mg/L	12/06/2005	0001	34	-	54	0.0078		F	0	.0000048	
Vanadium	mg/L	12/06/2005	0001	34	-	54	0.053		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0760 WELL

Parameter	Units	Sample		Depth Range		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)	Lab		Data	QA			
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	55	-	75		FQ	#		
Ammonia Total as N	mg/L	01/10/2006	0001	55	-	75		FQ	#	.1	
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	55	-	75	U	FQ	#	.01	
Oxidation Reduction Potential	mV	01/10/2006	N001	55	-	75		FQ	#		
pH	s.u.	01/10/2006	N001	55	-	75		FQ	#		
Specific Conductance	umhos /cm	01/10/2006	N001	55	-	75		FQ	#		
Sulfate	mg/L	01/10/2006	0001	55	-	75		FQ	#	2.5	
Temperature	C	01/10/2006	N001	55	-	75		FQ	#		
Turbidity	NTU	01/10/2006	N001	55	-	75		FQ	#		
Uranium	mg/L	01/10/2006	0001	55	-	75		FQ	#	.000048	
Vanadium	mg/L	01/10/2006	0001	55	-	75	B	FQ	#	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0761 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	39	-	49		F	#		
Ammonia Total as N	mg/L	01/10/2006	0001	39	-	49	0.1	U	F	#	.1
Ammonia Total as N	mg/L	01/10/2006	0002	39	-	49	0.1	U	F	#	.1
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	39	-	49	27		F	#	.5
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0002	39	-	49	28		F	#	.2
Oxidation Reduction Potential	mV	01/10/2006	N001	39	-	49	111.8		F	#	
pH	s.u.	01/10/2006	N001	39	-	49	7.46		F	#	
Specific Conductance	umhos/cm	01/10/2006	N001	39	-	49	1389		F	#	
Sulfate	mg/L	01/10/2006	0001	39	-	49	460		F	#	10
Sulfate	mg/L	01/10/2006	0002	39	-	49	470		F	#	10
Temperature	C	01/10/2006	N001	39	-	49	15.13		F	#	
Turbidity	NTU	01/10/2006	N001	39	-	49	8.94		F	#	
Uranium	mg/L	01/10/2006	0001	39	-	49	0.028		F	#	.0000048
Uranium	mg/L	01/10/2006	0002	39	-	49	0.028		F	#	.0000048
Vanadium	mg/L	01/10/2006	0001	39	-	49	0.0018		F	#	.0001
Vanadium	mg/L	01/10/2006	0002	39	-	49	0.0017		F	#	.0001

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0762 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty	
							Lab	Data	QA			
Ammonia Total as N	mg/L	01/10/2006	0001	29	-	49	0.1	U	F	#	.1	
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	29	-	49	69		F	#	.5	
Oxidation Reduction Potential	mV	01/10/2006	N001	29	-	49	65		F	#		
pH	s.u.	01/10/2006	N001	29	-	49	7.51		F	#		
Specific Conductance	umhos/cm	01/10/2006	N001	29	-	49	3453		F	#		
Sulfate	mg/L	01/10/2006	0001	29	-	49	1500		F	#	25	
Temperature	C	01/10/2006	N001	29	-	49	15.17		F	#		
Turbidity	NTU	01/10/2006	N001	29	-	49	8.47		F	#		
Uranium	mg/L	01/10/2006	0001	29	-	49	0.011		F	#	.0000048	
Vanadium	mg/L	01/10/2006	0001	29	-	49	0.0064		F	#	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0764 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	47	-	52		F	#		
Ammonia Total as N	mg/L	01/10/2006	0001	47	-	52	0.1	U	F	#	.1
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	47	-	52	48		F	#	.5
Oxidation Reduction Potential	mV	01/10/2006	N001	47	-	52	113.3		F	#	
pH	s.u.	01/10/2006	N001	47	-	52	7.72		F	#	
Specific Conductance	umhos/cm	01/10/2006	N001	47	-	52	1350		F	#	
Sulfate	mg/L	01/10/2006	0001	47	-	52	330		F	#	10
Temperature	C	01/10/2006	N001	47	-	52	14.88		F	#	
Turbidity	NTU	01/10/2006	N001	47	-	52	8.75		F	#	
Uranium	mg/L	01/10/2006	0001	47	-	52	0.014		F	#	.0000048
Vanadium	mg/L	01/10/2006	0001	47	-	52	0.014		F	#	.0001

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0765 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	58.6	- 88.7	247		F	#		
Ammonia Total as N	mg/L	01/10/2006	0001	58.6	- 88.7	130		F	#	20	
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	58.6	- 88.7	130		F	#	1	
Oxidation Reduction Potential	mV	01/10/2006	N001	58.6	- 88.7	152.5		F	#		
pH	s.u.	01/10/2006	N001	58.6	- 88.7	7.38		F	#		
Specific Conductance	umhos /cm	01/10/2006	N001	58.6	- 88.7	2775		F	#		
Sulfate	mg/L	01/10/2006	0001	58.6	- 88.7	630		F	#	25	
Temperature	C	01/10/2006	N001	58.6	- 88.7	13.98		F	#		
Turbidity	NTU	01/10/2006	N001	58.6	- 88.7	0.33		F	#		
Uranium	mg/L	01/10/2006	0001	58.6	- 88.7	0.011		F	#	.0000048	
Vanadium	mg/L	01/10/2006	0001	58.6	- 88.7	0.0066		F	#	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0767 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/11/2006	0001	43.5	-	63.5		F	#		
Ammonia Total as N	mg/L	01/11/2006	0001	43.5	-	63.5	0.15	F	#	.1	
Nitrate + Nitrite as Nitrogen	mg/L	01/11/2006	0001	43.5	-	63.5	0.012	F	#	.01	
Oxidation Reduction Potential	mV	01/11/2006	N001	43.5	-	63.5	-85.5	F	#		
pH	s.u.	01/11/2006	N001	43.5	-	63.5	7.92	F	#		
Specific Conductance	umhos/cm	01/11/2006	N001	43.5	-	63.5	400	F	#		
Sulfate	mg/L	01/11/2006	0001	43.5	-	63.5	30	F	#	1	
Temperature	C	01/11/2006	N001	43.5	-	63.5	12.66	F	#		
Turbidity	NTU	01/11/2006	N001	43.5	-	63.5	4.96	F	#		
Uranium	mg/L	01/11/2006	0001	43.5	-	63.5	0.00049	F	#	.000048	
Vanadium	mg/L	01/11/2006	0001	43.5	-	63.5	0.0001	U	F	#	.0001

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0768 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	01/11/2006	0001	24.4	-	44.4		F	#		
Ammonia Total as N	mg/L	01/11/2006	0001	24.4	-	44.4		F	#	.1	
Nitrate + Nitrite as Nitrogen	mg/L	01/11/2006	0001	24.4	-	44.4	0.01	U	F	#	.01
Oxidation Reduction Potential	mV	01/11/2006	N001	24.4	-	44.4	-156.1		F	#	
pH	s.u.	01/11/2006	N001	24.4	-	44.4	7.95		F	#	
Specific Conductance	umhos /cm	01/11/2006	N001	24.4	-	44.4	510		F	#	
Sulfate	mg/L	01/11/2006	0001	24.4	-	44.4	82		F	#	2.5
Temperature	C	01/11/2006	N001	24.4	-	44.4	13.55		F	#	
Turbidity	NTU	01/11/2006	N001	24.4	-	44.4	9.68		F	#	
Uranium	mg/L	01/11/2006	0001	24.4	-	44.4	0.000074	B	UF	#	.0000048
Vanadium	mg/L	01/11/2006	0001	24.4	-	44.4	0.0001	U	F	#	.0001

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0770 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Alkalinity, Total (As CaCO3)	mg/L	01/10/2006	0001	54.9	- 64.9	217		F #		
Ammonia Total as N	mg/L	01/10/2006	0001	54.9	- 64.9	36		F #	1	
Nitrate + Nitrite as Nitrogen	mg/L	01/10/2006	0001	54.9	- 64.9	23		F #	.2	
Oxidation Reduction Potential	mV	01/10/2006	N001	54.9	- 64.9	127		F #		
pH	s.u.	01/10/2006	N001	54.9	- 64.9	7.58		F #		
Specific Conductance	umhos /cm	01/10/2006	N001	54.9	- 64.9	1150		F #		
Sulfate	mg/L	01/10/2006	0001	54.9	- 64.9	220		F #	5	
Temperature	C	01/10/2006	N001	54.9	- 64.9	14.67		F #		
Turbidity	NTU	01/10/2006	N001	54.9	- 64.9	1.27		F #		
Uranium	mg/L	01/10/2006	0001	54.9	- 64.9	0.0057		F #	.000048	
Vanadium	mg/L	01/10/2006	0001	54.9	- 64.9	0.00063		F #	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0771 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers		Detection Limit	Uncertainty
							Lab	Data QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	57.4	- 77.4	308		FQ 0		
Ammonia Total as N	mg/L	12/06/2005	0001	57.4	- 77.4	220		FQ 0	20	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	57.4	- 77.4	160		FQ 0	1	
Oxidation Reduction Potential	mV	12/06/2005	N001	57.4	- 77.4	106.9		FQ 0		
pH	s.u.	12/06/2005	N001	57.4	- 77.4	7.31		FQ 0		
Specific Conductance	umhos /cm	12/06/2005	N001	57.4	- 77.4	4644		FQ 0		
Sulfate	mg/L	12/06/2005	0001	57.4	- 77.4	1900		FQ 0	25	
Temperature	C	12/06/2005	N001	57.4	- 77.4	13.03		FQ 0		
Turbidity	NTU	12/06/2005	N001	57.4	- 77.4	0.49		FQ 0		
Uranium	mg/L	12/06/2005	0001	57.4	- 77.4	0.017		FQ 0	.0000048	
Vanadium	mg/L	12/06/2005	0001	57.4	- 77.4	0.0088		FQ 0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0772 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	7.4	- 27.4	223		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	7.4	- 27.4	3.1		F	0	.1	
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	7.4	- 27.4	1.1		F	0	.01	
Oxidation Reduction Potential	mV	12/06/2005	N001	7.4	- 27.4	-29		F	0		
pH	s.u.	12/06/2005	N001	7.4	- 27.4	7.91		F	0		
Specific Conductance	umhos /cm	12/06/2005	N001	7.4	- 27.4	716		F	0		
Sulfate	mg/L	12/06/2005	0001	7.4	- 27.4	130		F	0	5	
Temperature	C	12/06/2005	N001	7.4	- 27.4	15.79		F	0		
Turbidity	NTU	12/06/2005	N001	7.4	- 27.4	0.72		F	0		
Uranium	mg/L	12/06/2005	0001	7.4	- 27.4	0.0063		F	0	.0000048	
Vanadium	mg/L	12/06/2005	0001	7.4	- 27.4	0.011		F	0	.0001	

Ground Water Quality Data by Location (USEE100) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006  
 Location: 0774 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	12/06/2005	0001	45	-	55		F	0		
Ammonia Total as N	mg/L	12/06/2005	0001	45	-	55	0.1	U	F	0	.1
Nitrate + Nitrite as Nitrogen	mg/L	12/06/2005	0001	45	-	55	4		F	0	.05
Oxidation Reduction Potential	mV	12/06/2005	N001	45	-	55	103		F	0	
pH	s.u.	12/06/2005	N001	45	-	55	7.76		F	0	
Specific Conductance	umhos /cm	12/06/2005	N001	45	-	55	500		F	0	
Sulfate	mg/L	12/06/2005	0001	45	-	55	86		F	0	5
Temperature	C	12/06/2005	N001	45	-	55	15.24		F	0	
Turbidity	NTU	12/06/2005	N001	45	-	55	7.98		F	0	
Uranium	mg/L	12/06/2005	0001	45	-	55	0.065		F	0	.0000048
Vanadium	mg/L	12/06/2005	0001	45	-	55	0.019		F	0	.0001

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

- F Low flow sampling method used.
- G Possible grout contamination, pH > 9.
- J Estimated value.

L Less than 3 bore volumes purged prior to sampling.  
U Parameter analyzed for but was not detected.

Q Qualitative result due to sampling technique. R Unusable result.  
X Location is undefined.

QA QUALIFIER:

# Validated according to quality assurance guidelines.

## **Static Water Level Data**

STATIC WATER LEVELS (USEE700) FOR SITE MON01, Monument Valley Processing Site  
 REPORT DATE: 3/20/2006

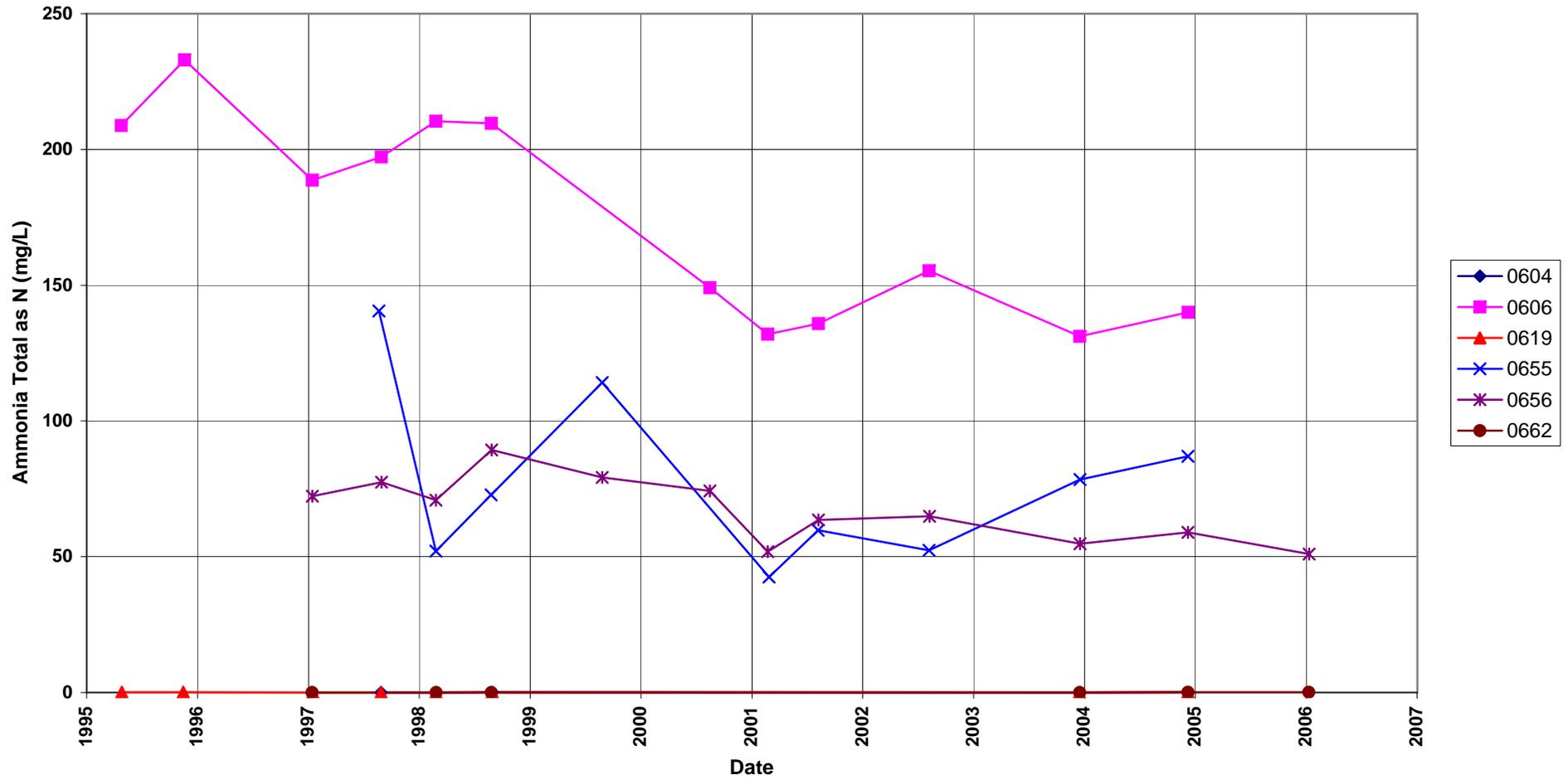
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0604	C	4840.42	06-DEC-05	14:01:00	9.22	4831.2	
0606	D	4864.73	06-DEC-05	15:27:00	36.23	4828.5	
0619	O	4888.63	06-DEC-05	12:12:00	56.28	4832.35	
0655	D	4862.06	06-DEC-05	09:22:00	39.73	4822.33	
0656	D	4856.33	10-JAN-06	09:45:00	36.47	4819.86	
0662	D	4878.56	09-JAN-06	16:10:00	48.51	4830.05	
0669	D	4867.19	06-DEC-05	16:30:00	49.41	4817.78	
0760	D	4814.8	10-JAN-06	14:50:00	25.45	4789.35	
0761	D	4835.02	10-JAN-06	13:19:00	42.74	4792.28	
0762	D	4820.74	10-JAN-06	15:53:00	32.22	4788.52	
0764	D	4851.53	10-JAN-06	12:18:00	49.28	4802.25	
0765	D	4848.45	10-JAN-06	08:40:00	35.28	4813.17	
0767	D	4808.25	11-JAN-06	09:55:00	6.8	4801.45	
0770	D	4857.26	10-JAN-06	10:20:00	33.02	4824.24	
0771	D	4863.26	06-DEC-05	10:10:00	41.57	4821.69	
0772	O	4847.6	06-DEC-05	11:35:00	12.26	4835.34	
0774	O	4880.14	06-DEC-05	13:13:00	48.09	4832.05	
0774	O	4880.14	06-DEC-05	13:13:00	48.09	4832.05	

FLOW CODES: B BACKGROUND U UPGRADIENT C CROSS GRADIENT D DOWN GRADIENT O ON SITE

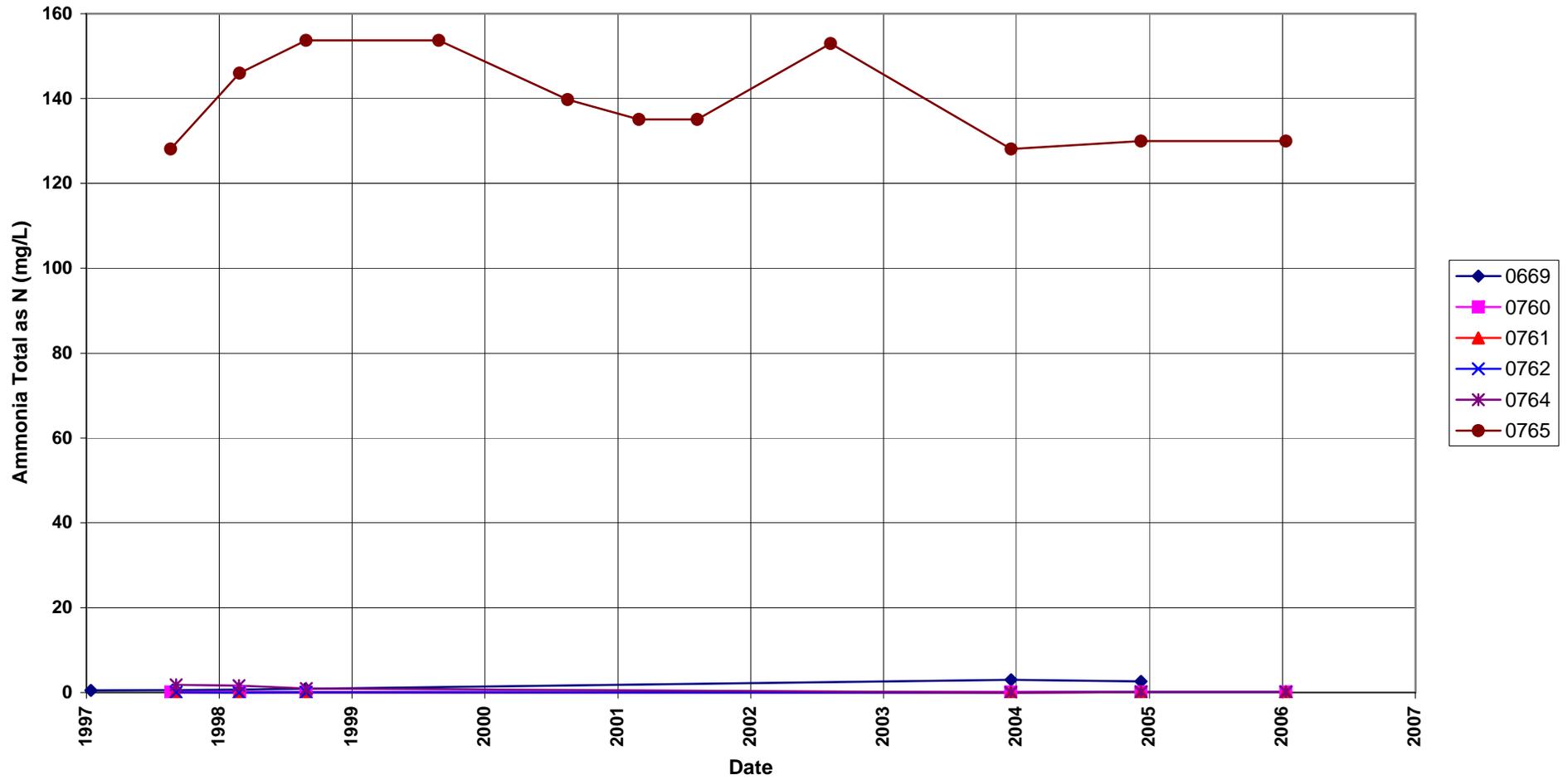
WATER LEVEL FLAGS: D Dry

## **Time Versus Concentration Graphs**

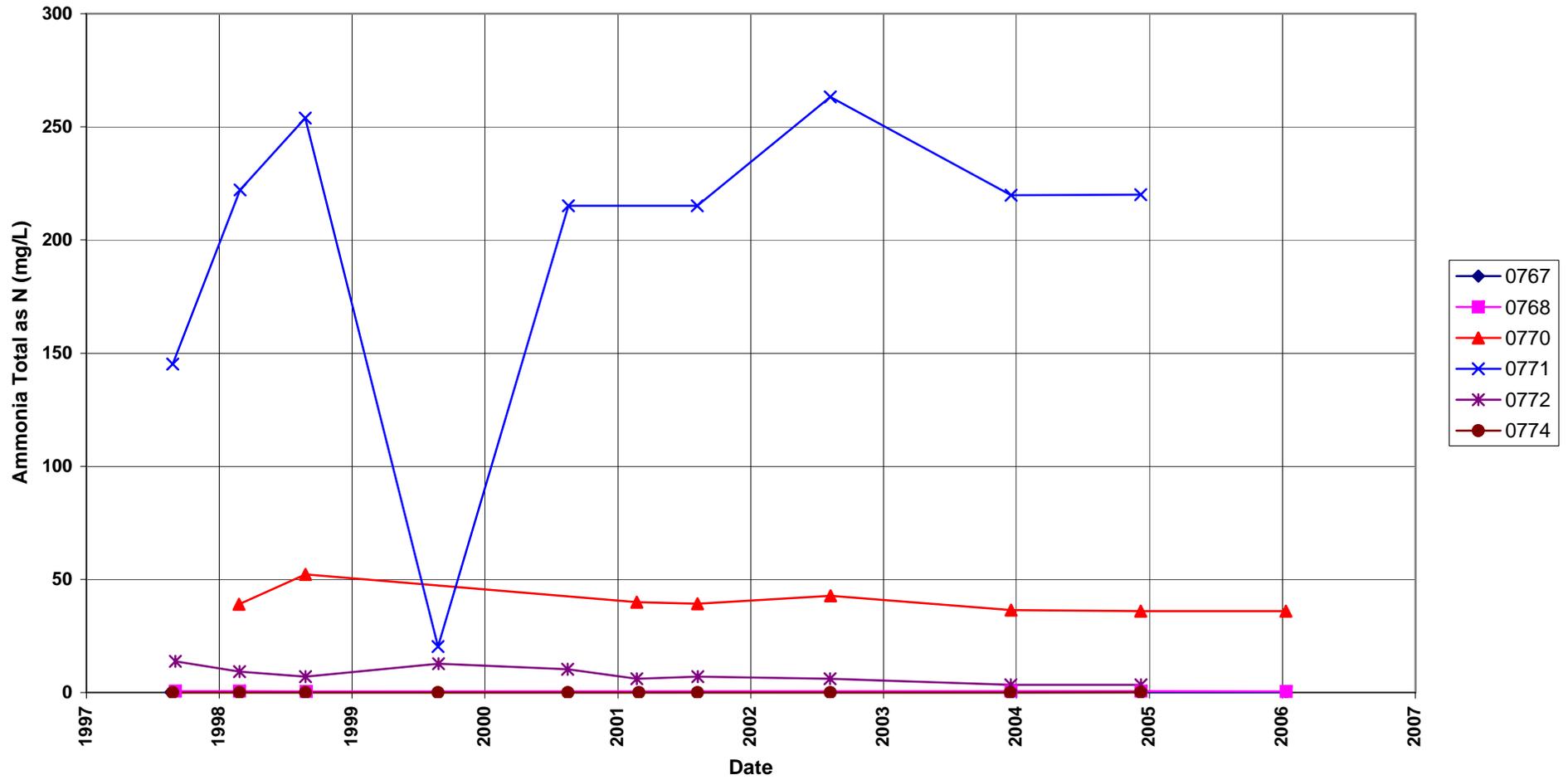
### Monument Valley Processing Site Ammonia Total as N Concentration



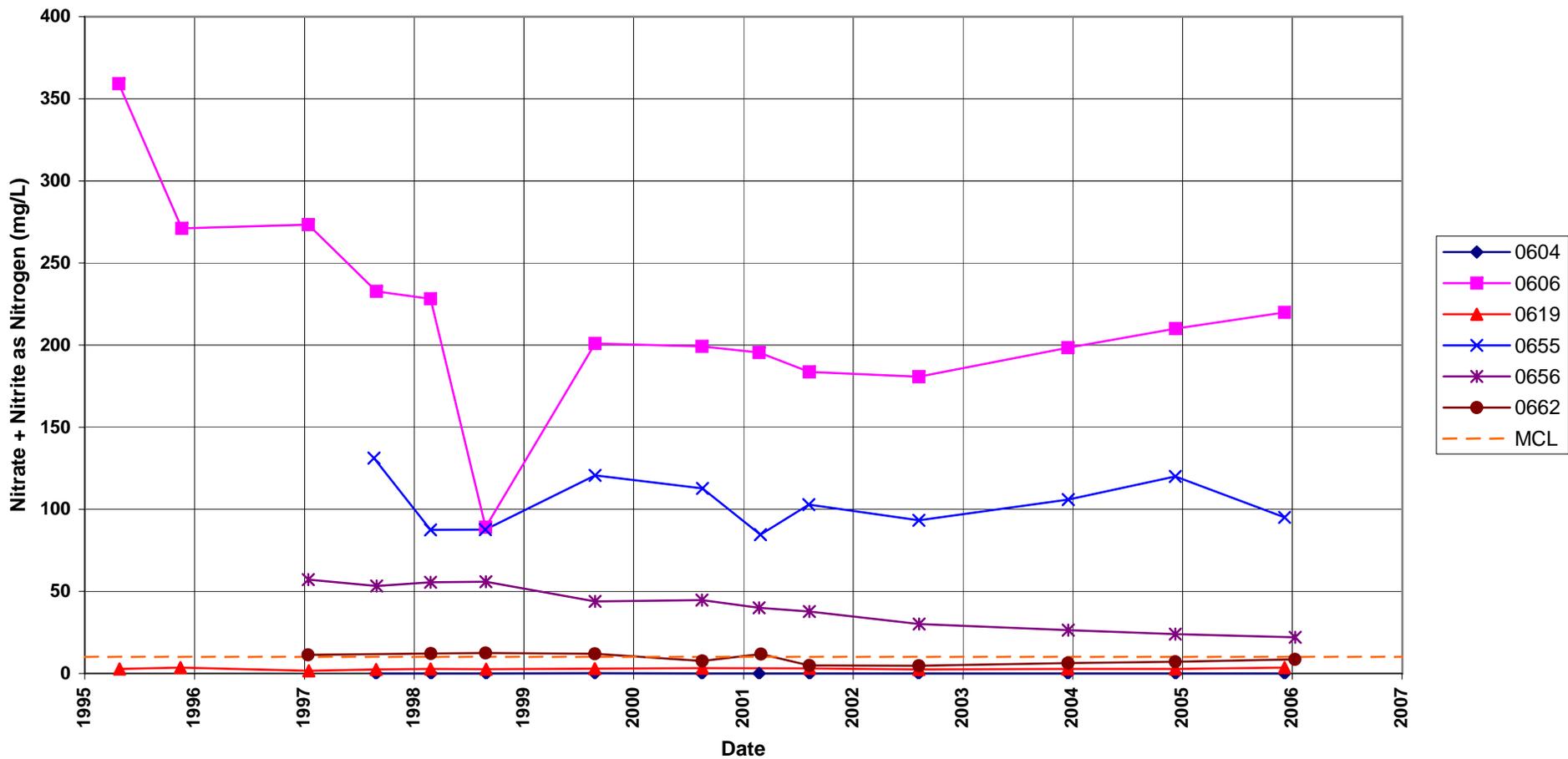
### Monument Valley Processing Site Ammonia Total as N Concentration



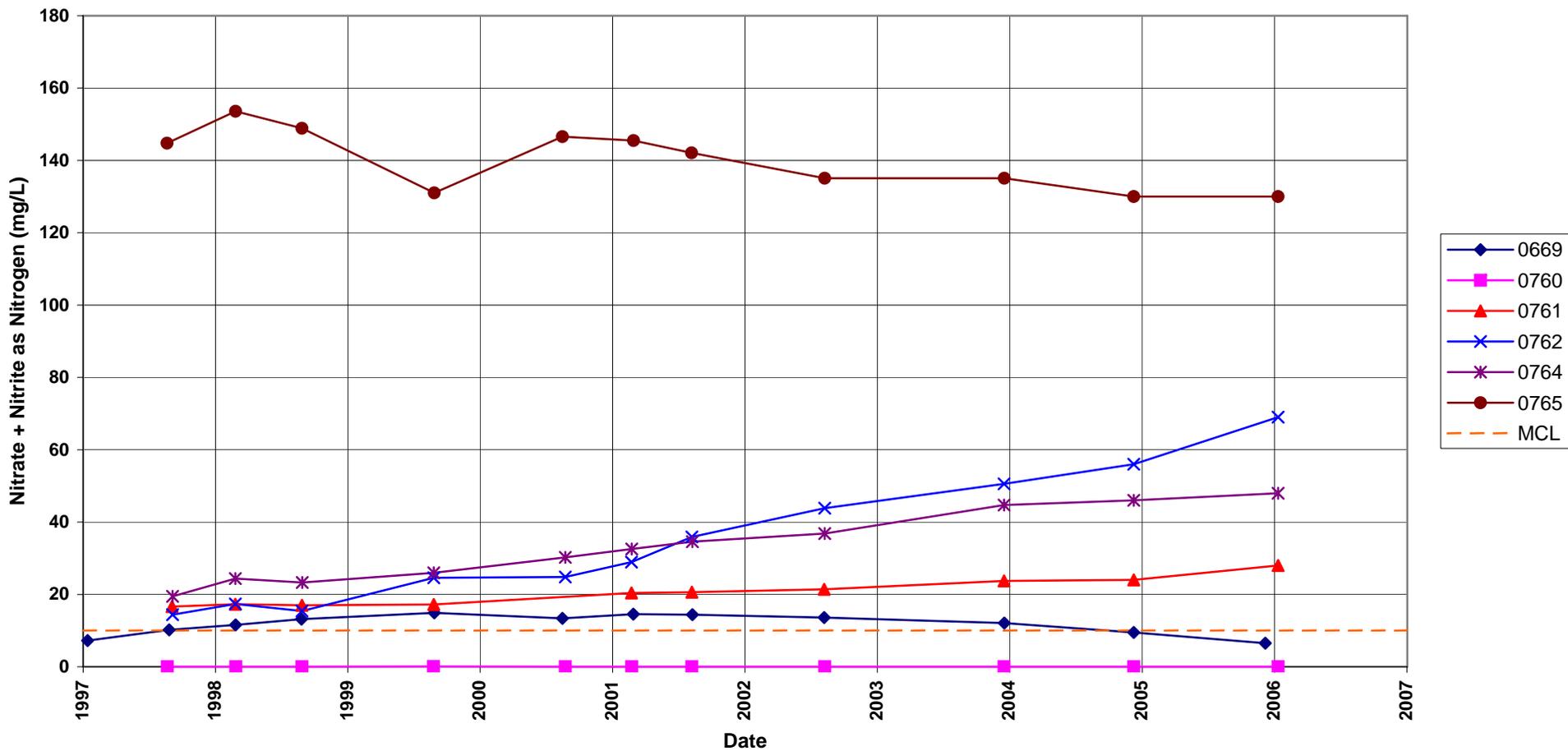
### Monument Valley Processing Site Ammonia Total as N Concentration



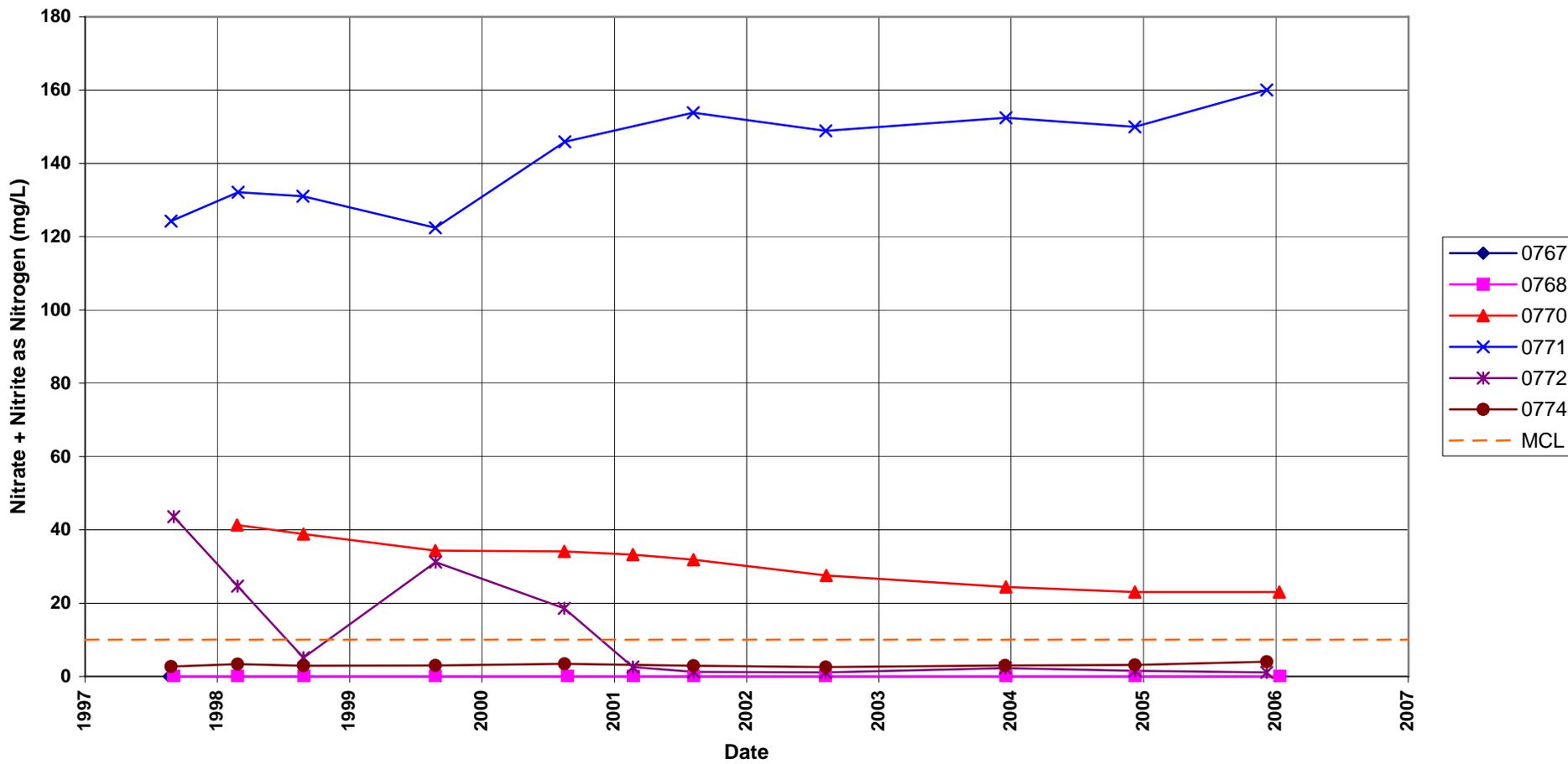
**Monument Valley Processing Site**  
**Nitrate + Nitrite as Nitrogen Concentration**  
Maximum Contaminant Level = 10.0 mg/L



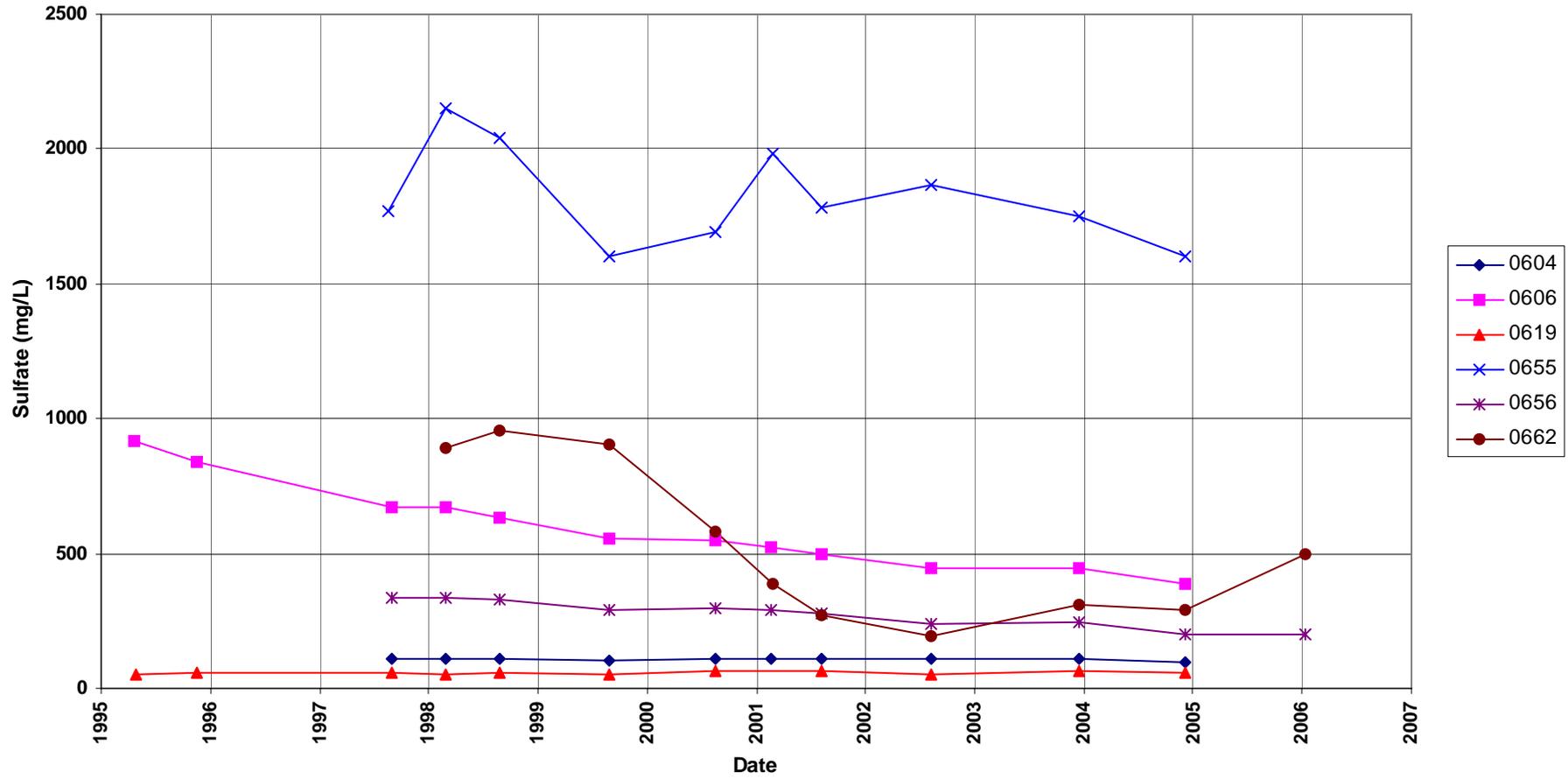
**Monument Valley Processing Site**  
**Nitrate + Nitrite as Nitrogen Concentration**  
Maximum Contaminant Level = 10.0 mg/L



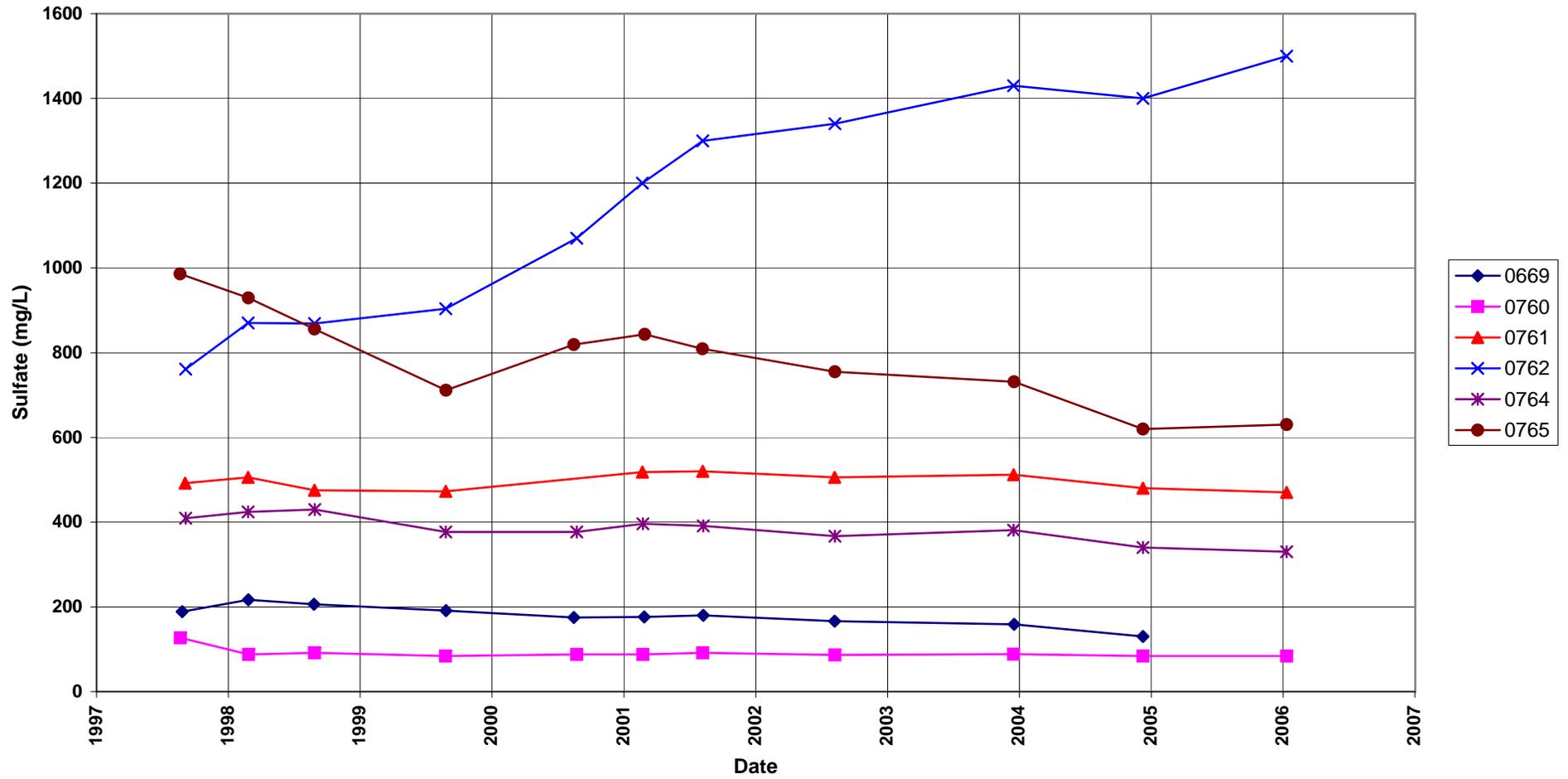
**Monument Valley Processing Site**  
**Nitrate + Nitrite as Nitrogen Concentration**  
Maximum Contaminant Level = 10.0 mg/L



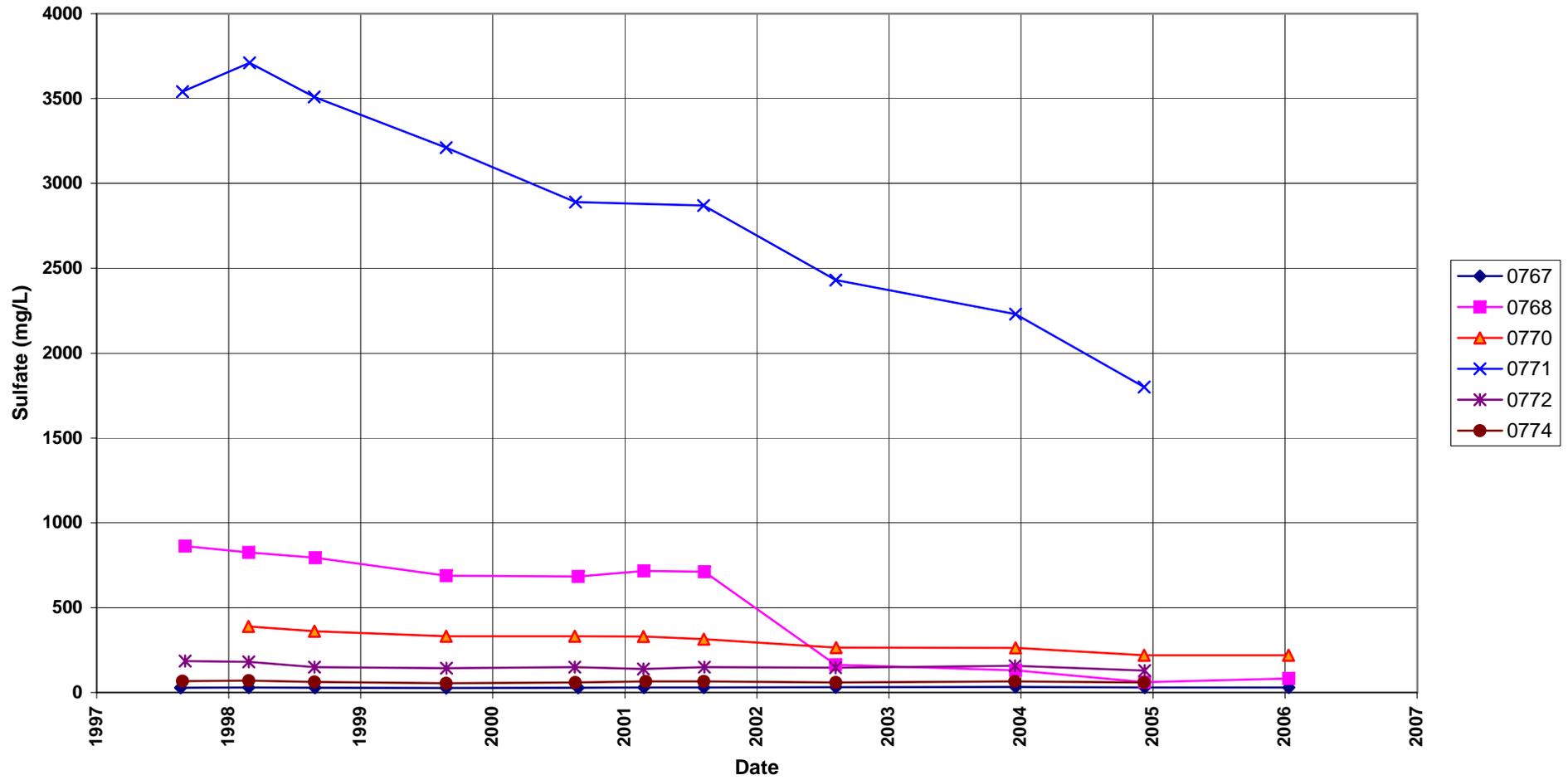
### Monument Valley Processing Site Sulfate Concentration



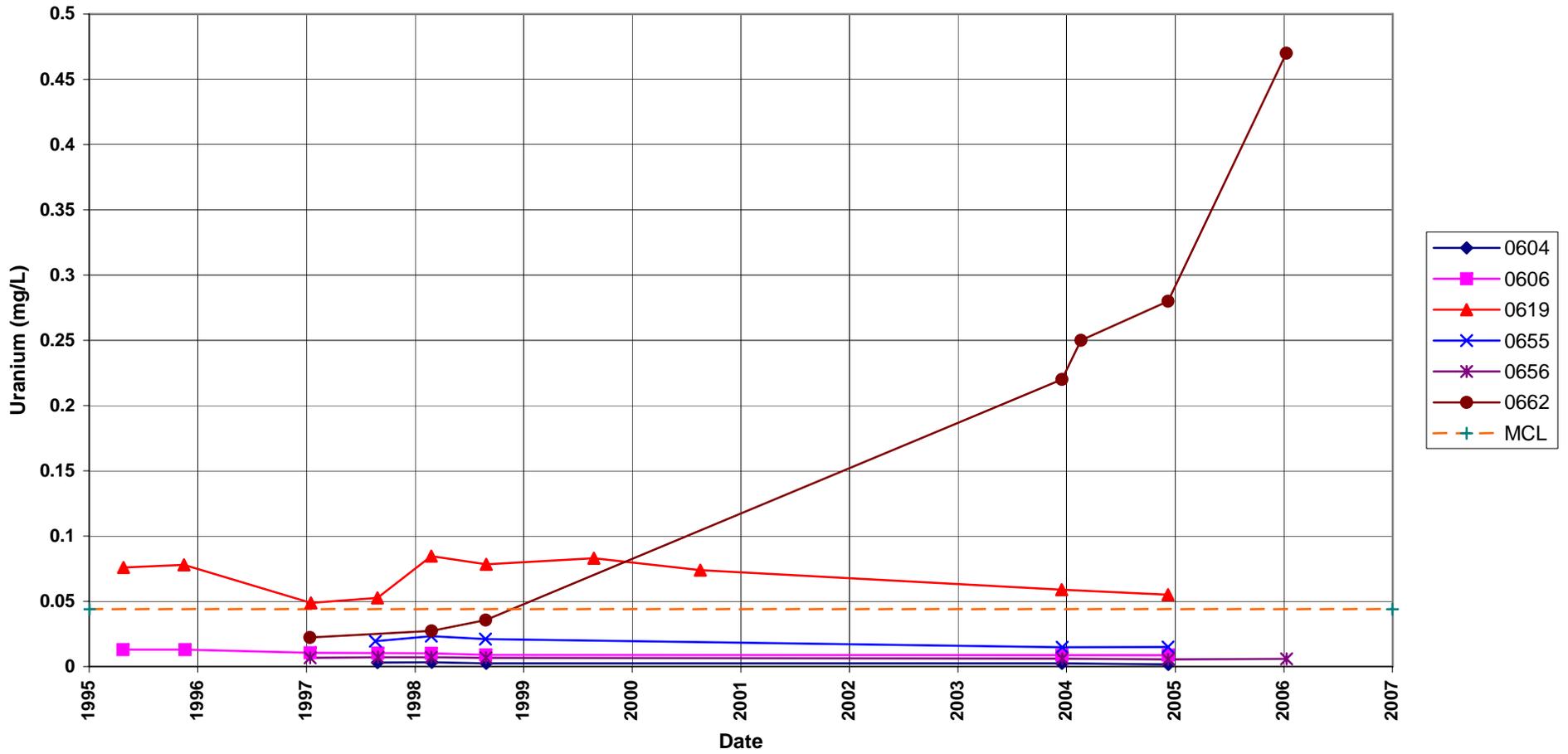
### Monument Valley Processing Site Sulfate Concentration



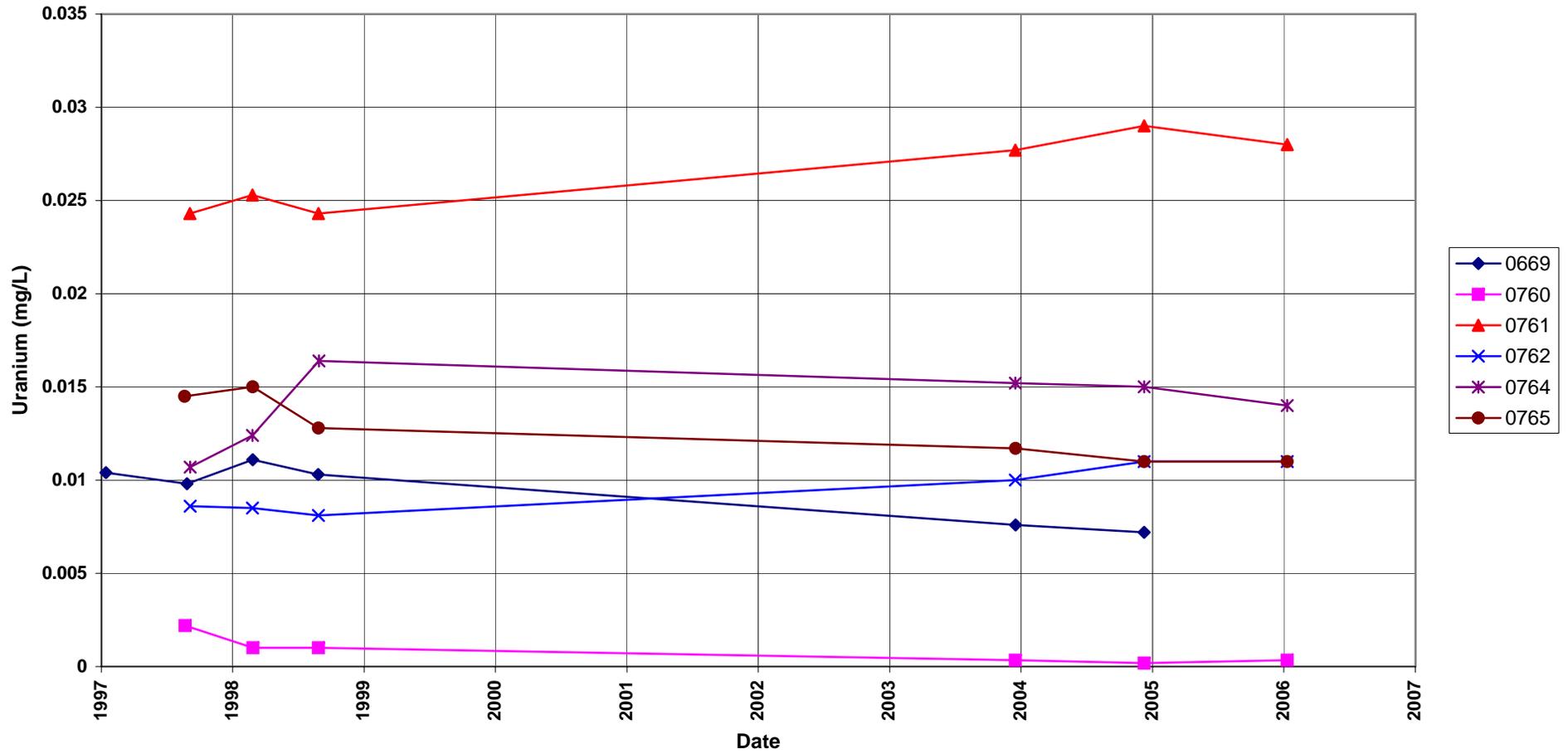
### Monument Valley Processing Site Sulfate Concentration



**Monument Valley Processing Site**  
**Uranium Concentration**  
Maximum Contaminant Level = 0.044 mg/L

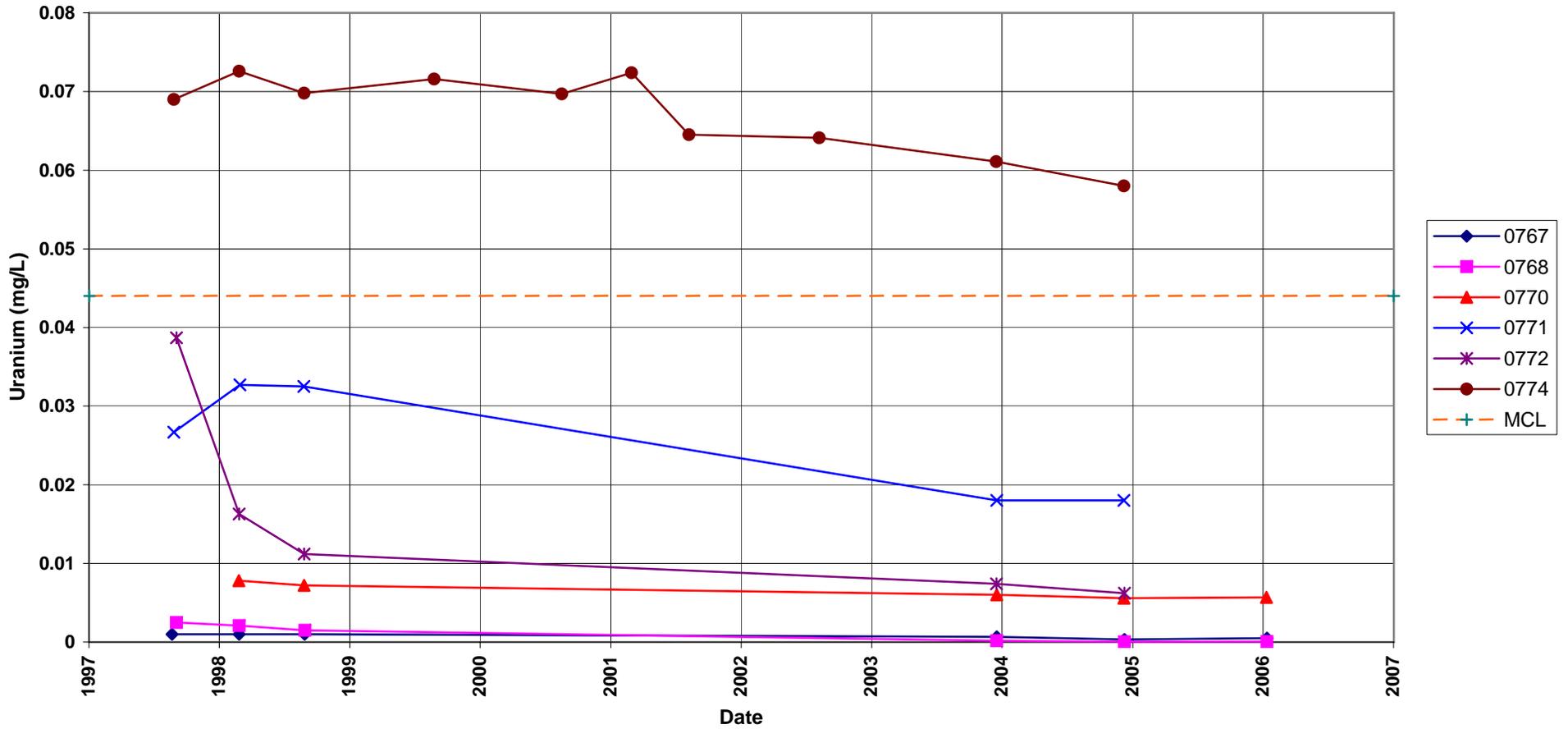


**Monument Valley Processing Site**  
**Uranium Concentration**  
Maximum contaminant Level = 0.044 mg/L

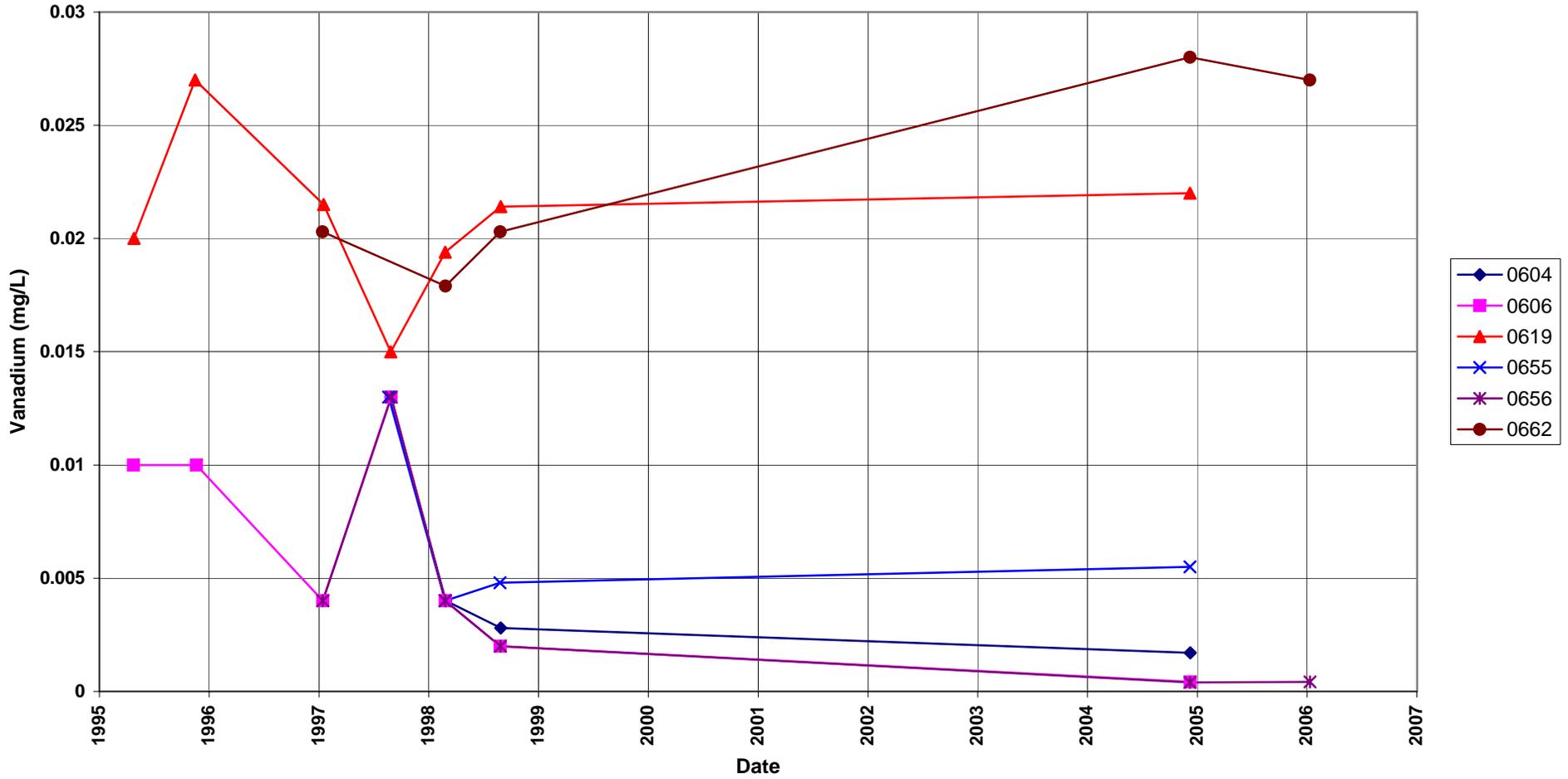


# Monument Valley Processing Site Uranium Concentration

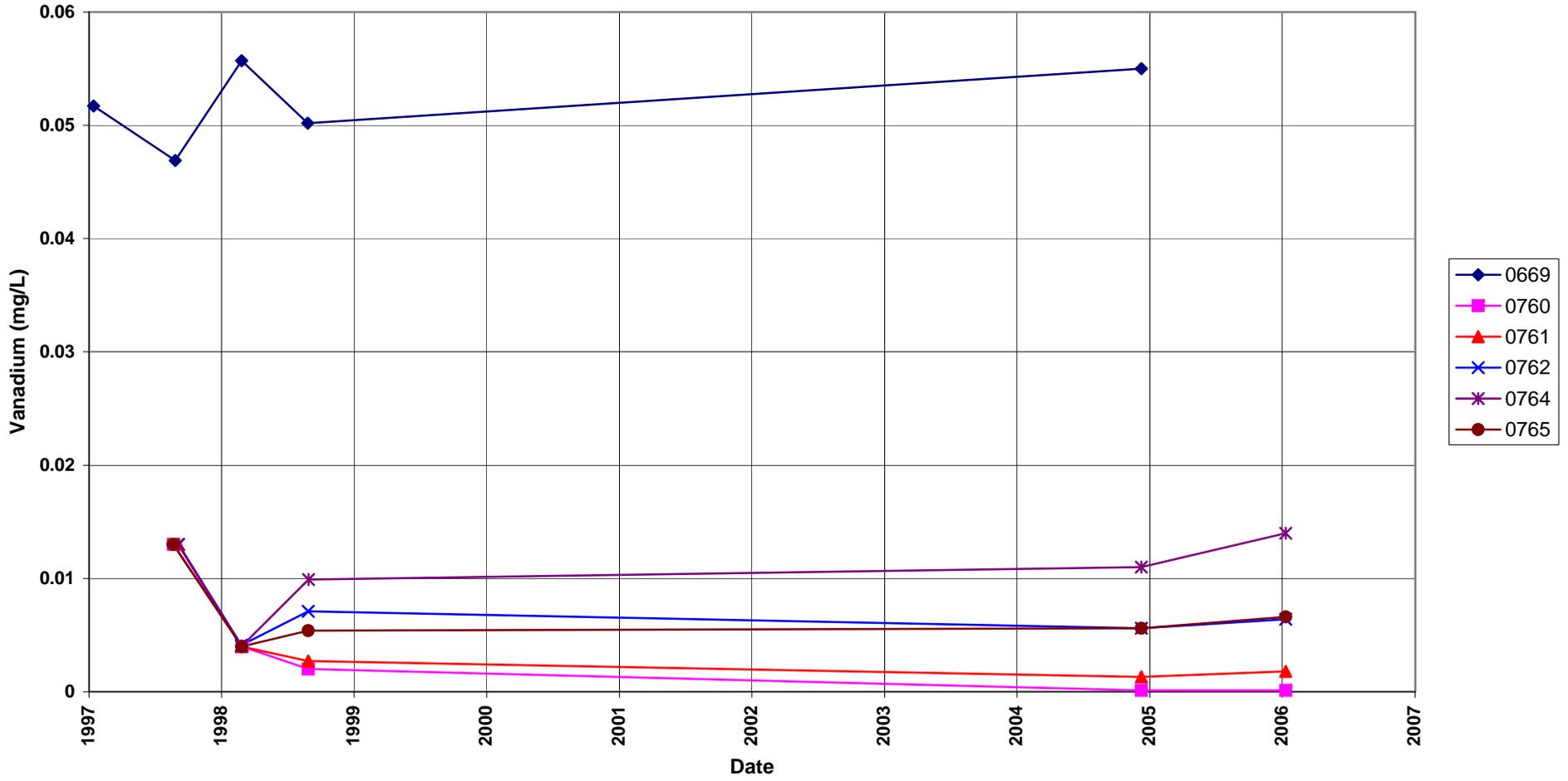
Maximum Contaminant Level = 0.044 mg/L



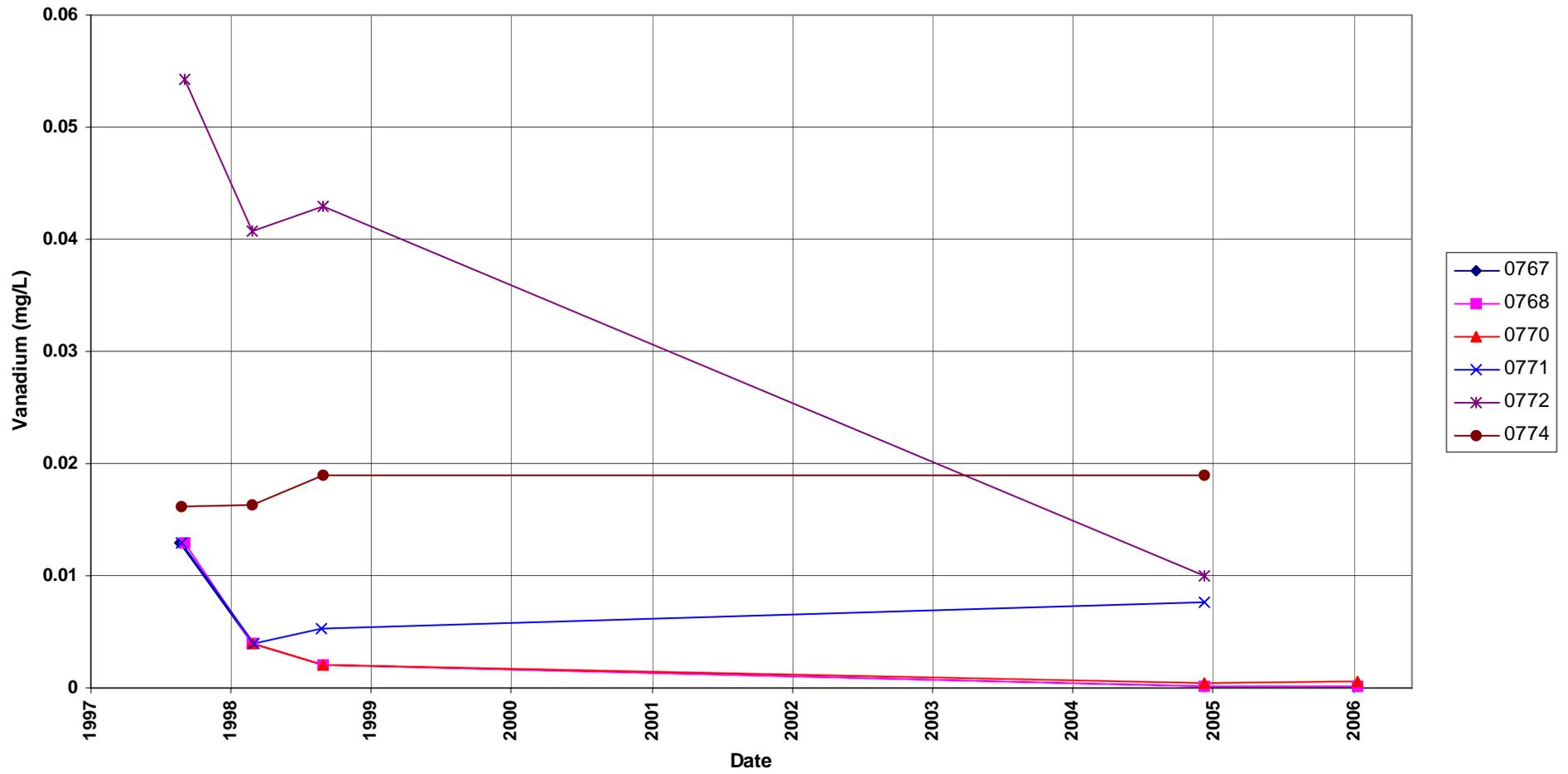
### Monument Valley Processing Site Vanadium Concentration



### Monument Valley Processing Site Vanadium Concentration



# Monument Valley Processing Site Vanadium Concentration



**Attachment 3**  
**Sampling and Analysis Work Order**

November 15, 2005

Rich Bush  
Program Manager  
U.S. Department of Energy  
Grand Junction Office  
2597 B ¾ Road  
Grand Junction, Colorado 81503

SUBJECT: Contract No. DE-AC13-02GJ79491, Stoller  
December 2005 Environmental Sampling at Monument Valley, Arizona

Reference: FY 2006 LM Task Order No. ST06-100-05-103

Dear Mr. Bush:

The purpose of this letter is to inform you of the upcoming sampling event at Monument Valley, Arizona. Enclosed are the map and tables specifying sample locations and analytes for routine monitoring. Water quality data will be collected from monitor and domestic wells at this site as part of the routine environmental sampling scheduled to begin the week of December 5, 2005.

The following lists show the monitor and domestic well locations scheduled to be sampled during this event.

**Well locations (filtered)**

604	655	669	762	767	770	772
606	656	760	764	768	771	774
619	662	761	765			

**Domestic locations (Unfiltered)**

201

QA/QC samples will be collected as directed in the *Ground Water and Surface Water Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are covered under the cooperative agreement.

If you have any questions, please call me at extension 6588 or Dave Miller at extension 6022.

Sincerely,

*Signature on original*

Clay Carpenter  
Project Manager

CEC/lcg/at

Enclosures (3)

cc: S. E. Donovan, Stoller (e)  
D. E. Miller, Stoller (e)  
K. E. Miller, Stoller  
D. G. Traub, Stoller (e)

cc w/o enclosures:

Correspondence Control File (Thru B. Bonnett)

Site	Monument Valley	
	Ground Water	Surface Water
<b>Analyte</b>		
<b>Approx. No. Samples/yr</b>	38	0
<i>Field Measurements</i>		
Alkalinity	X	
Dissolved Oxygen		
Redox Potential	X	
pH	X	
Specific Conductance	X	
Turbidity	X	
Temperature	X	
<i>Laboratory Measurements</i>		
Aluminum		
Ammonia as N (NH <sub>3</sub> -N)	X	
Antimony		
Arsenic		
Barium		
Bromide		
Cadmium		
Calcium		
Chloride		
Chromium		
Cobalt		
Copper		
Fluoride		
Gamma Spec		
Gross Alpha		
Gross Beta		
Iron		
Lead		
Lead-210		
Magnesium		
Manganese		
Molybdenum		
Nickel		
Nickel-63		
Nitrate + Nitrite as N (NO <sub>3</sub> +NO <sub>2</sub> )-N	X	
Nitrite		
PCBs		
Phosphate		
Polonium-210		
Potassium		
Radium-226		
Radium-228		
Selenium		
Silica		

Analyte	Ground Water	Surface Water
Sodium		
Strontium		
Sulfate	X	
Sulfide		
Thallium		
Thorium-230		
Tin		
Total Dissolved Solids		
Total Organic Carbon		
Total Suspended Solids		
Uranium	X	
Uranium-234, -238		
Vanadium	X	
Zinc		
<b>Total Analytes</b>	5	0

**Attachment 4**  
**Trip Report**

## Memorandum

DATE: January 25, 2006  
TO: David E. Miller  
FROM: David G. Traub  
SUBJECT: Monument Valley, Arizona, Processing Site Sampling Trip Report  
Site: Monument Valley, Arizona

**Dates of Sampling Event:** December 6, 2005 and January 9 - 11, 2006

**Samplers:** Dave Traub and Emile Bettez

**Number of Locations Sampled:** Eighteen wells were sampled. The sampling event was to have been completed in December but the sampling crew returned to Grand Junction due to a family emergency. The event was completed in January.

**Locations Not Sampled/Reason:** Private well 0201 was not sampled per site lead direction.

**Field Variance:** None.

### Quality Control Sample Cross Reference:

Ticket Number	Sample ID	Location	Sample Type	Comment
NDY 593	2277	761	Duplicate	Duplicate of well 761

**RIN Numbers Assigned:** The December samples were assigned to RIN 05110265 and were shipped to Paragon Analytics on December 7<sup>th</sup> via Fed Ex. The January samples were assigned to RIN 06010295 and were shipped to Paragon on January 12, 2006 via FedEx.

**Water Level Measurements:** Water levels were measured only in the sampled wells.

**Well Inspection Summary:** All sampled wells were in good condition. Well 0766 is about ready to fall over as the wind has blown away all the sand underneath the concrete pad and cattle rub against the well. The lock on well 0656 had been shot; it was replaced.

**Equipment:** All equipment functioned properly. Wells were sampled using either dedicated bladder pumps or dedicated tubing with a peristaltic pump.

**Location Specific Information:** At well 0662, additional water was collected to sample for chloride and  $U_{234} / U_{238}$  at the request of the project manager. There was a sulfur odor to the water at well 0768.

**Regulatory:** None.

**Site Issues:** There was a major rain event in December that may have caused turbidity problems during the January sampling. Local residents reported that during a three hour period there was a massive downpour with standing water everywhere and waterfalls off the cliffs. Several washouts were evident along the roads to the site. January sampling of the wells in the alluvium north of the former pile took longer as the turbidity was elevated in wells that usually did not have that problem.

A construction company was on site to cover up ore in the old mine that had been exposed. They were using a generator that was DOE property to power the pump used for water spraying. Due to concerns over private companies using government property for profit the generator was removed and a local resident rented a generator to the company.

**Corrective Action Required / Taken / Needed:** None required.

(DGT/lcg)

cc: R. P. Bush, LM-50 (e)  
S. E. Donovan, Stoller (e)  
S. C. Mac Millan, Stoller (e)  
K. E. Miller, Stoller