**Department of Energy**
**Office of Legacy Management**

JAN 0 3 2008

Ms. Wendy Naugle
Colorado Department of Public Health and Environment
Remedial Programs Section
Hazardous Materials & Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Subject: Transmittal of the *Verification Monitoring Report for the Naturita, Colorado, Processing Site*

Dear Ms. Naugle:

Enclosed is your copy of the subject report. This report presents the results of the sampling event conducted at the Naturita site during July 2007 and evaluates the status of the proposed compliance strategy.

In general, uranium and vanadium concentrations in ground water at the site remain elevated; however, the aqueous concentrations of these constituents in the point of compliance wells appear to be decreasing, except for minor fluctuations, and remain below the proposed alternate concentration limits.

Results for surface water samples collected from the San Miguel River adjacent to and downstream from the site indicate that the site is having no measurable effect on river-water quality.

Please contact me at (970) 248-6018 if you have any questions.

Sincerely,

Mark Kautsky
Site Manager

Enclosure

cc w/enclosure:
W. VonTill, NRC

cc w/o enclosure:
C. Carpenter, Stoller (e)
E. Cotter, Stoller (e)
File: NAP 410.02 (Roberts)

DOE–LM/1404–2007

# Verification Monitoring Report for the Naturita, Colorado, Processing Site

December 2007

U.S. Department of Energy

Office of Legacy Management

*Work Performed Under DOE Contract No. DE–AC01–02GJ79491*
*for the U.S. Department of Energy Office of Legacy Management.*

DOE-LM/GJ1404-2007

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# Verification Monitoring Report for the Naturita, Colorado, Processing Site

December 2007

Work Performed by S.M. Stoller Corporation under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

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# 1.0 Introduction

The Naturita, Colorado, Processing Site is located in western Colorado, Montrose County, approximately 2 miles north of the city of Naturita (Figure 1). It is situated on an elongated north-south section of floodplain between Colorado State Highway 141 on the west and the San Miguel River on the east. The site is the location of a former vanadium and uranium mill that operated intermittently from 1939 until 1958. The historical site area now consists of 79 acres and includes property owned by the City of Naturita and Chemetall Foote Corporation.

The Uranium Mill Tailings Remedial Action (UMTRA) Project surface remedial activity at the site occurred between January 1993 and September 1998. During this time, 771,400 cubic yards of material was removed from the site and disposed of in the Naturita Disposal Site (formally the Upper Burbank disposal cell) about 15 miles to the northwest near the townsite of Uravan, Colorado. Supplemental standards were applied to five areas totaling 11 acres on the site, and large areas of supplemental standards, also totaling 11 acres, were included in the adjoining vicinity property downgradient of the site (Figure 2). This material was left in place mainly because its removal would cause excessive environmental harm and risk to workers.

## 1.1 Purpose of Report

The purpose of this verification monitoring report is to evaluate groundwater and surface water monitoring data collected at the Naturita, Colorado, processing site since 1999 (post surface remediation) and assess the status of the compliance strategy for groundwater cleanup. This report covers 2007 monitoring for this site.

## 1.2 Compliance Strategy

The proposed compliance strategy for the Naturita site is no remediation with the application of alternate concentration limits for uranium and vanadium—the contaminants of potential concern (COPCs) for the site. Institutional controls and compliance monitoring are also components of the remedy as described in the *Ground Water Compliance Action Plan for the Naturita, Colorado, UMTRA Project Site* (GCAP) (DOE 2002a). The institutional controls that will be used for the Naturita site are environmental covenants between the landowners and the State of Colorado, represented by the Colorado Department of Public Health and Environment (Figure 3). Controls are already in place for some properties and are being negotiated for others. The GCAP is currently being revised to incorporate additional information requested by the U.S. Nuclear Regulatory Commission (NRC).

# 2.0 Site Conditions

## 2.1 Hydrogeology

### 2.1.1 Surface Water

The San Miguel River, which flows north along the east side of the site, is the dominant source of surface water at the site. It is a perennial stream that originates in the San Juan Mountains near Telluride and joins the Dolores River approximately 20 miles downstream from Naturita.

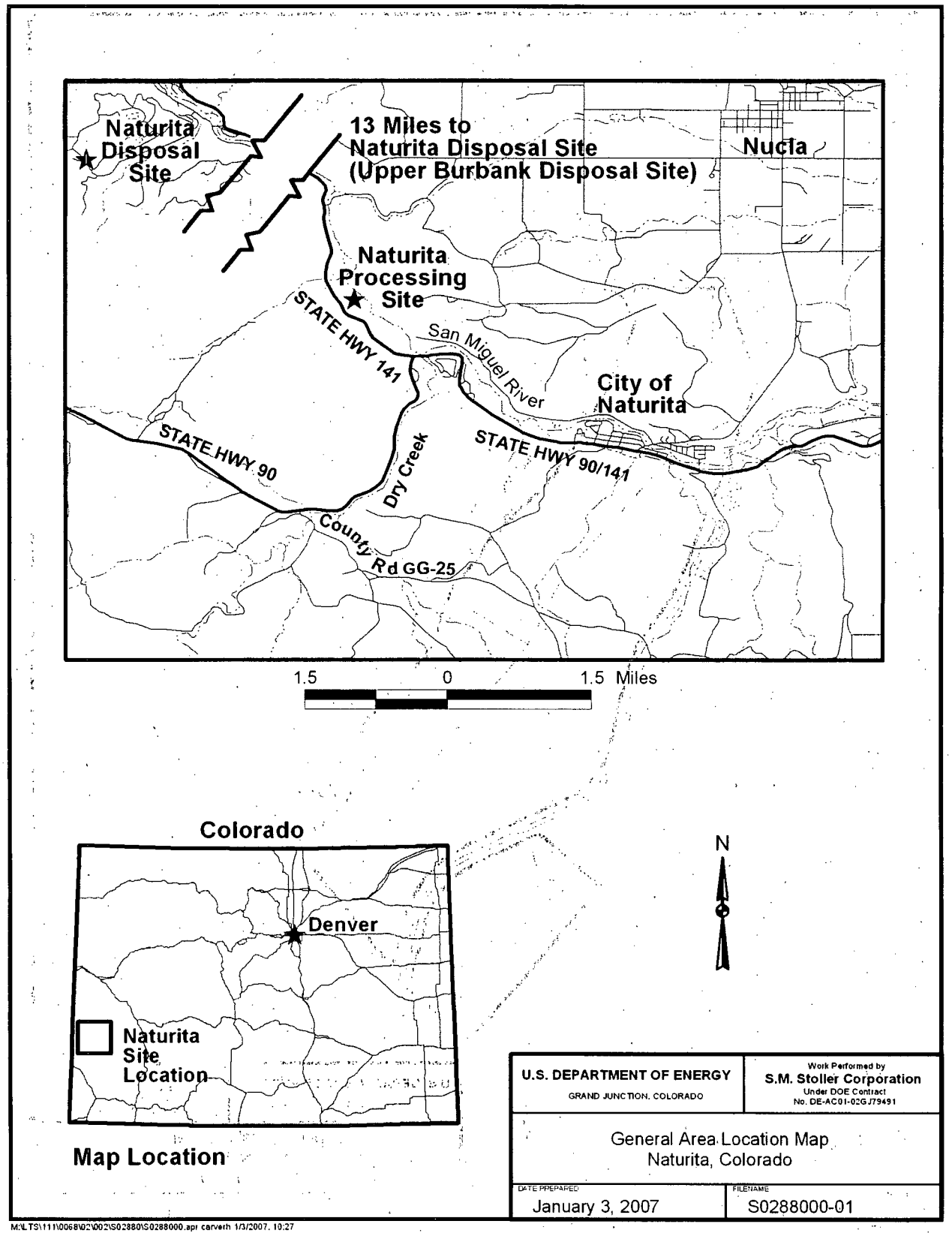



*Figure 1. General Area Location Map, Naturita, Colorado*

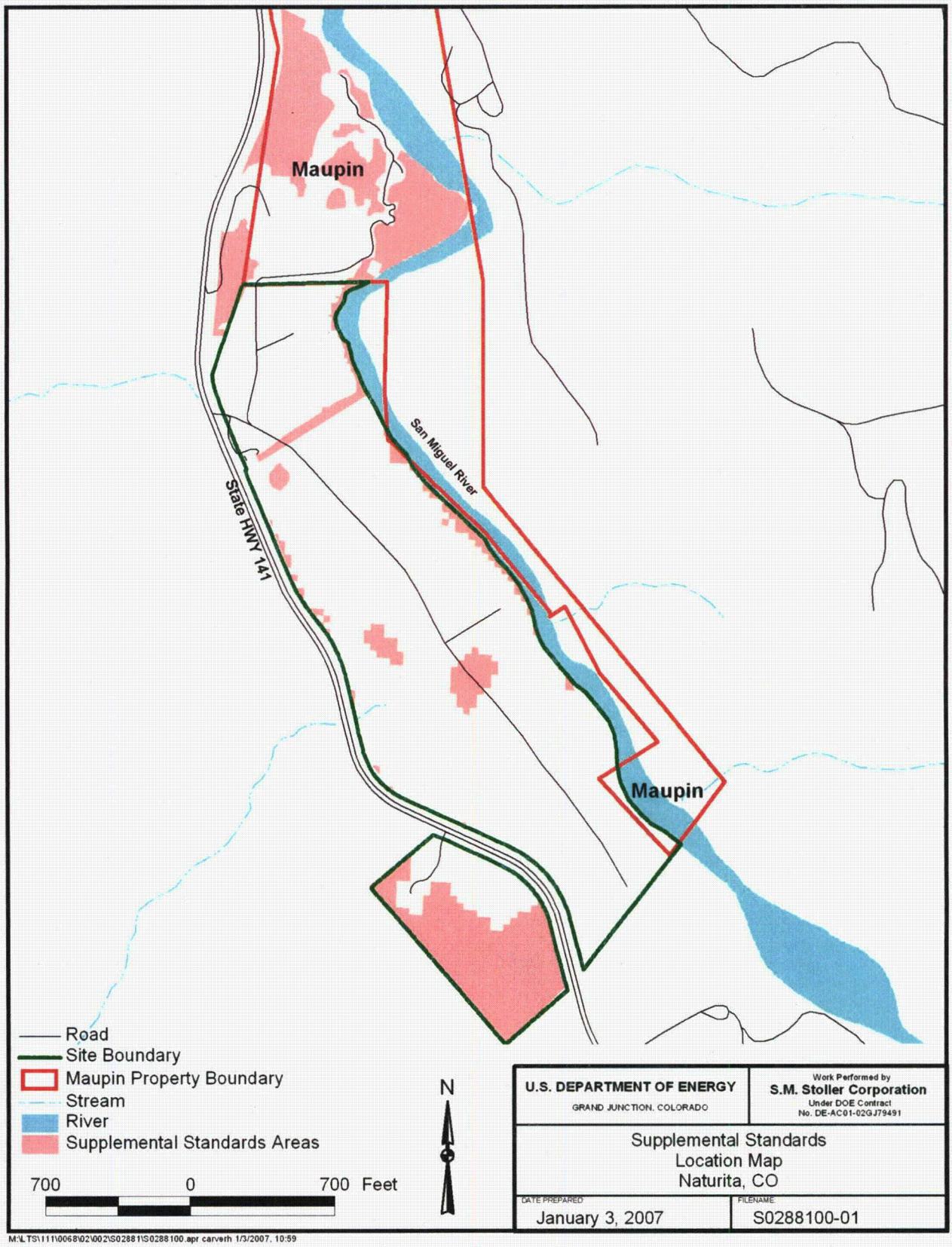



*Figure 2. Supplemental Standards Location Map at the Naturita Site*

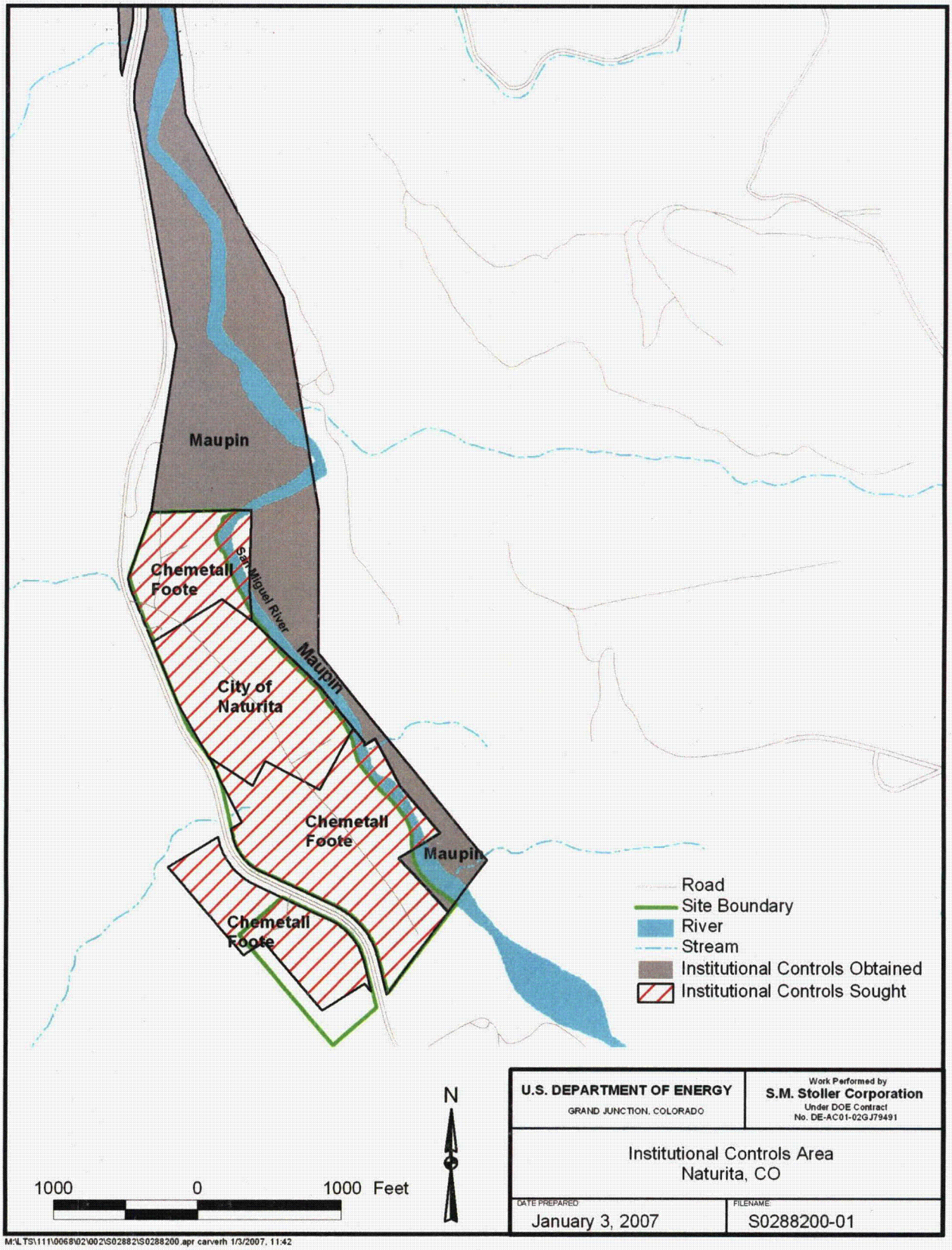



*Figure 3. Institutional Controls Area, Naturita, Colorado*

A U.S. Geological Survey gauging station at Naturita records an average maximum flow of 2,000 cubic feet per second (cfs) and an average minimum of 60 cfs (DOE 1994). The mean flow from 1918 to 1980 is 328 cfs. Maximum flows occur during the spring runoff, usually in June, and during summer storm events. The only current use of river water near the former millsite is for irrigation and livestock watering.

### 2.1.2 Alluvial Aquifer

The unconfined alluvial aquifer is the uppermost aquifer at the Naturita site and consists of the saturated portion of the river-lain alluvium. It is the only aquifer of concern for groundwater contamination because the underlying Brushy Basin Member of the Morrison Formation has an upward hydraulic gradient. Groundwater flow paths are generally parallel to the San Miguel River.

## 2.2 Groundwater Quality

Uranium and vanadium values are elevated at the former Naturita mill site. In the past, arsenic values in wells NAT03, NAT07, and NAT08 slightly exceeded the UMTRA standard for some sample rounds, but the average concentrations are at 0.05 milligrams per liter (mg/L) or below. All wells have been below the UMTRA standard for arsenic since 2003. Modeling indicated arsenic concentrations will continue to decrease. Therefore, this constituent has been removed as a COPC, and analysis of arsenic was discontinued.

Based on most recent sampling results, uranium concentrations in groundwater ranged from 0.0027 mg/L in background well DM-1, which is upgradient from the former tailings area, to 1.3 mg/L in well NAT26. Concentrations in all wells except DM-1 exceed the UMTRA maximum concentration limit of 0.044 mg/L. These results are consistent with those from earlier sampling rounds. Vanadium concentrations ranged from 0.0031 mg/L in DM-1 to a maximum value of 2.5 mg/L in well NAT08. Location NAT08 is the only location at which elevated vanadium has been observed; concentrations continue to decline at this location.

Groundwater modeling of uranium and vanadium indicates that constituents will not flush to levels permitting unrestricted use during the 100-year natural flushing period. However, because the water is not currently being used, contaminant concentrations in the groundwater do not pose a threat to human health or the environment. Alternate concentration limits have therefore been proposed for uranium and vanadium.

As noted previously, supplemental standards were applied to soils over a significant portion of the site and an adjacent vicinity property. The persistence of uranium and vanadium in these areas represents a potential continuing source of groundwater contamination. Despite this, concentrations of uranium in most wells have declined over time. The exception to this is well MAU07, where concentrations in 2007 increased back to the levels last seen in 2003 (see Appendix C, "Time-Concentration Plots for Uranium and Vanadium"). This increase is most likely due to the residual contaminants left in place in the areas immediately adjacent to the well. Similarly, the concentrations of vanadium in most wells have remained relatively constant at or near background levels over time. The two exceptions to this are wells NAT08 (which has continually decreased over time) and NAT02, which has increased slightly during the last two sampling events but remains at levels less than those seen in 2003. It is probable that concentrations will continue their current downward trend until soil and groundwater interactions

reach equilibrium; at that time groundwater concentrations will probably level off. It appears that this may already be happening at some locations (e.g., NAT02 and NAT08).

Alternate concentration limits of 3 mg/L for uranium and 6 mg/L for vanadium were proposed as action levels at the point of compliance. These values are the approximate maximum concentrations detected in groundwater over the past few years. They are protective of human health because of the lack of a complete exposure pathway. They are also protective of the environment because of the significant dilution effect of the San Miguel River (a factor of 4,000 to 5,000; DOE 1995).

The alternate concentration limits will be met at the points of compliance, which are considered to be all wells in the monitoring network. Points of exposure are any points along the San Miguel River. These point-of-compliance concentrations will result in acceptable concentrations at the points of exposure along the San Miguel River. Regular and continued monitoring will ensure that any exceedances of action levels will be detected early.

## 2.3 Surface Water Quality

The only permanent surface water features at the Naturita site are the San Miguel River and a groundwater seep (location 0538) that feeds several small pools along the former distributary channel on the Maupin property (Figure 4). Groundwater discharges to the San Miguel River. Calculations have shown that even at low river flow, contaminants discharging from groundwater to the river are diluted by a factor of 4,000 or more and have no measurable effect on river water quality. Concentrations of some constituents in water discharging from the seep are elevated and are further concentrated through evaporation effects. Uranium concentrations at surface location 0538 were 0.210 mg/L in 2004, and 0.190 mg/L in 2005. The concentration rose to 0.240 mg/L in 2006 then decreased back to 0.210 mg/L in 2007. However, the ecological risk assessment indicated that exposure of potential receptors to these waters would not result in an unacceptable risk (see DOE 2002b, Section 6.2).

## 2.4 Land and Water Use

Growth in this part of western Colorado has been very slow and has historically been linked with mining production. Mining is picking up again in the area and tourism may also become increasingly important. Ranching is the other industry of western Colorado that has been and will continue to be important. The millsite is currently safe for livestock and/or wildlife grazing, and part of it is used for this purpose. The town of Naturita is located several miles south of the site and is not expected to expand to the millsite boundary in the near future.

Naturita has expressed considerable interest in the old millsite as the future location of a municipal golf course. The town owns the central portion of the site and is actively pursuing ownership or transfer of property at the north and south ends of the site, owned by Chemetall Foote Corporation. This mining company has not developed plans for their property and is considering transferring it to the state or local government. The U.S. Department of Energy (DOE) is facilitating discussions between the landowners to expedite this decision.

It is likely that the gravel mining operation upgradient of the former millsite will continue. This could affect alluvial groundwater flow to the site. According to modeling, withdrawal and evaporation of alluvial groundwater in this area would not be expected to seriously affect flow, but there could be increased retardation of groundwater flow along the western side of the site.

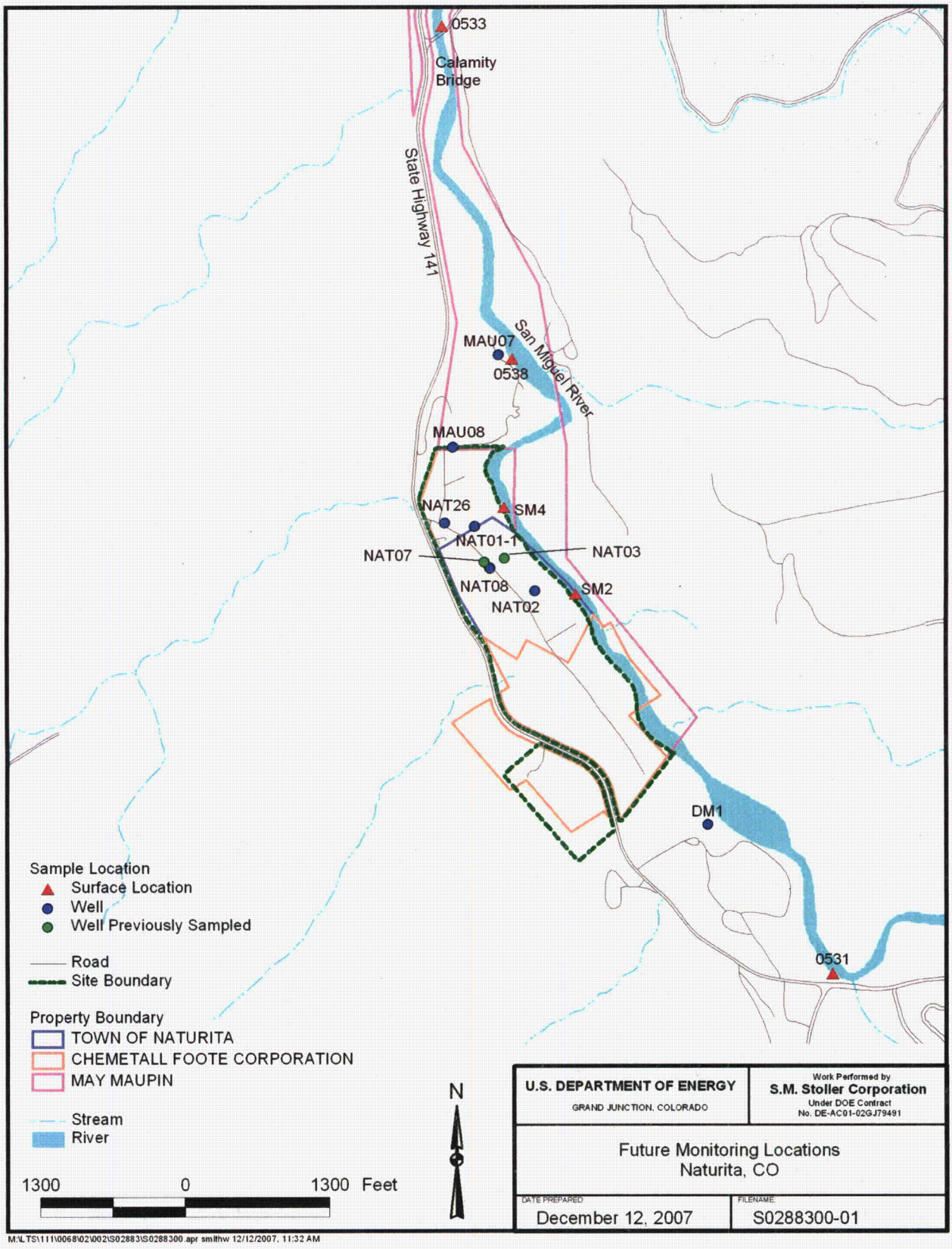



*Figure 4. Monitoring Locations at the Naturita Site*

## 2.5 Institutional Controls

Institutional controls have been or will be placed on groundwater that is currently contaminated or may be potentially affected in the future. On the basis of Colorado Senate Bill 01-145 that passed in July 2001, perpetual environmental covenants can be created that place restrictions on land use, including drilling and pumping of groundwater from that land, where remedial actions have been completed and contamination has been left in place. The covenant is between the property owner and the State of Colorado. These covenants are legally enforceable restrictions on land use and therefore meet the definition of institutional controls under the Uranium Mill Tailings Radiation Control Act. Such an environmental covenant will prohibit domestic use of contaminated groundwater until it can be demonstrated that contaminant concentrations have reached regulatory limits.

In July 2002, the Maupin family signed an environmental covenant with the Colorado Department of Public Health and Environment prohibiting the use of alluvial groundwater for drinking purposes. For this consideration, DOE provided a domestic water well to replace the beneficial use of groundwater being denied as a result of this institutional control. Similar environmental covenants to prevent use of alluvial groundwater are being negotiated with all other landowners for properties affected by site-related contamination. This will ensure protectiveness of human health and the environment for as long as necessary. Figure 3 shows the total area to be covered by this type of institutional control. It extends along the floodplain on either side of the San Miguel River for approximately 3,600 feet downgradient of the site to the Calamity Bridge.

# 3.0 Monitoring Program

## 3.1 Monitoring Network

Monitoring is planned to ensure continued protection of human health and the environment. Monitor wells DM1, NAT01-1, NAT02, NAT08, NAT26, MAU08, MAU07, and surface locations 0531, 0533, 0538, SM2, and SM4 are being monitored for uranium and vanadium (Figure 4). DM1 is a background groundwater location. If this well is removed by expansion of the gravel mining operation, a suitable location will be selected for installation of a new background well.

Surface location 0531 is upgradient on the San Miguel River; 0533 is the downgradient location on the San Miguel River; and 0538 is the seep on Maupin property. SM-2, crossgradient of the uranium plume, and SM-4, crossgradient of the vanadium plume, were added at the recommendation of Montrose County officials.

The sampling frequency is once every year for the first 5 years following NRC's acceptance of the GCAP. Thereafter, sampling will be conducted every 3 years for the next 30 years. At that time, future risks and the monitoring plan will be reevaluated. Contaminants are expected to remain above levels suitable for unrestricted use for over 100 years. However, if concentrations continue to decline and reach acceptable levels, the need for continued monitoring will be reevaluated. Table 1 presents a summary of the monitoring plan.

*Table 1. Summary of Future Monitoring Requirements*

| Location | Monitoring Purpose | Analytes | Frequency |
|---|---|---|---|
| Well DM1 | Background groundwater | Uranium, vanadium, total dissolved solids, field parameters | Annually for 5 years after NRC approval of the GCAP; afterwards every 3 years for 30 years |
| Well NAT01-1 | Added per NRC request to monitor vanadium concentration migrating toward river, POC well. | | |
| Well NAT02 | Uranium and vanadium plume, POC Well | | |
| Well NAT08 | Maximum vanadium concentration, POC well | | |
| Well NAT26 | Maximum uranium concentration, POC well | | |
| Well MAU07 | Last well before groundwater enters the San Miguel River, POC well | | |
| Well MAU08 | Uranium plume, POC well | | |
| Surface 0531 | Upgradient San Miguel River | | |
| Surface 0533 | Downgradient San Miguel River, POE location | | |
| Surface 0538 | Seep on Maupin property | | |
| Surface SM2 | Crossgradient from uranium plume, POE location | | |
| Surface SM4 | Crossgradient from vanadium plume, POE location | | |

## 3.2 Monitoring Results

Monitoring conducted since the completion of surface remediation indicates that concentrations of uranium and vanadium in groundwater have been on the decline. This is despite the fact that a persistent drought in the western U.S. has resulted in increases in groundwater concentrations at similar sites. Concentrations have remained well below the proposed alternate concentration limits for protection of surface water. Groundwater data for 2007 are presented in Appendix A; time-concentration plots for uranium and vanadium for the entire monitoring period are included in Appendix C.

Surface water samples from the San Miguel River adjacent to and downgradient from the site indicate the site is having no measurable impact on river water quality and is indistinguishable from background locations. Surface water data for 2007 are included in Appendix B.

# 4.0 Conclusions and Recommendations

The compliance strategy selected for groundwater at the Naturita processing site continues to be protective of human health and the environment. Contaminant concentrations in groundwater will likely continue their downward trend (with some minor periodic fluctuations) and remain below the proposed alternate concentrations limits. No changes in the monitoring program are recommended at the present time.

# 5.0 References

DOE (U.S. Department of Energy), 1994. *Environmental Assessment of Remedial Action at the Naturita Uranium Processing Site Near Naturita, Colorado*, DOE/EA-0464, Rev. 5, prepared by the U.S. Department of Energy Albuquerque Operation Office, Albuquerque, New Mexico.

DOE (U.S. Department of Energy), 1995. *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site near Naturita, Colorado*, DOE/AL/62350-195, Rev. 1, prepared by the U.S. Department of Energy Albuquerque Operation Office, Albuquerque, New Mexico.

DOE (U.S. Department of Energy), 2002a, *Ground Water Compliance Action Plan for the Naturita, Colorado, UMTRA Project Site,* GJO-2002-355-TAC, GJO-GWNAT 1.0, prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, September.

DOE (U.S. Department of Energy), 2002b, *Site Observational Work Plan for the Naturita, Colorado, UMTRA Project Site*, GJO–2001–234–TAR, MAC–GWNAT 1.1, prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

# Appendix A

# Groundwater Quality Data by Parameter

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:38 am

| PARAMETER | UNITS | LOCATION ID | LOCATION TYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity, Total (As CaCO3 | mg/L | DM1 | WL | 07/11/2007 | 0001 | 2.67 - 7.67 | 178 | | F | # | - | - |
| | mg/L | MAU07 | WL | 07/11/2007 | 0001 | 2.92 - 7.92 | 484 | | F | # | - | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0001 | 6.17 - 11.17 | 469 | | F | # | - | - |
| | mg/L | NAT01-1 | WL | 07/11/2007 | 0001 | 17.00 - 17.50 | 314 | | FQ | # | - | - |
| | mg/L | NAT02 | WL | 07/11/2007 | 0001 | 6.42 - 11.42 | 251 | | F | # | - | - |
| | mg/L | NAT08 | WL | 07/11/2007 | 0001 | 6.30 - 11.30 | 354 | | F | # | - | - |
| | mg/L | NAT26 | WL | 07/11/2007 | 0001 | 10.67 - 15.67 | 450 | | F | # | - | - |
| Oxidation Reduction Potent | mV | DM1 | WL | 07/11/2007 | N001 | 2.67 - 7.67 | -43.0 | | F | # | - | - |
| | mV | MAU07 | WL | 07/11/2007 | N001 | 2.92 - 7.92 | -118.0 | | F | # | - | - |
| | mV | MAU08 | WL | 07/11/2007 | N001 | 6.17 - 11.17 | -17.0 | | F | # | - | - |
| | mV | NAT01-1 | WL | 07/11/2007 | N001 | 17.00 - 17.50 | -93.0 | | FQ | # | - | - |
| | mV | NAT02 | WL | 07/11/2007 | N001 | 6.42 - 11.42 | -6.7 | | F | # | - | - |
| | mV | NAT08 | WL | 07/11/2007 | N001 | 6.30 - 11.30 | -69.0 | | F | # | - | - |
| | mV | NAT26 | WL | 07/11/2007 | N001 | 10.67 - 15.67 | 181 | | F | # | - | - |
| pH | s.u. | DM1 | WL | 07/11/2007 | N001 | 2.67 - 7.67 | 7.23 | | F | # | - | - |
| | s.u. | MAU07 | WL | 07/11/2007 | N001 | 2.92 - 7.92 | 6.95 | | F | # | - | - |
| | s.u. | MAU08 | WL | 07/11/2007 | N001 | 6.17 - 11.17 | 7.15 | | F | # | - | - |
| | s.u. | NAT01-1 | WL | 07/11/2007 | N001 | 17.00 - 17.50 | 7.23 | | FQ | # | - | - |
| | s.u. | NAT02 | WL | 07/11/2007 | N001 | 6.42 - 11.42 | 7.29 | | F | # | - | - |
| | s.u. | NAT08 | WL | 07/11/2007 | N001 | 6.30 - 11.30 | 7.04 | | F | # | - | - |
| | s.u. | NAT26 | WL | 07/11/2007 | N001 | 10.67 - 15.67 | 7.30 | | F | # | - | - |
| Specific Conductance | umhos/cm | DM1 | WL | 07/11/2007 | N001 | 2.67 - 7.67 | 533 | | F | # | - | - |
| | umhos/cm | MAU07 | WL | 07/11/2007 | N001 | 2.92 - 7.92 | 2915 | | F | # | - | - |
| | umhos/cm | MAU08 | WL | 07/11/2007 | N001 | 6.17 - 11.17 | 3355 | | F | # | - | - |
| | umhos/cm | NAT01-1 | WL | 07/11/2007 | N001 | 17.00 - 17.50 | 2008 | | FQ | # | - | - |
| | umhos/cm | NAT02 | WL | 07/11/2007 | N001 | 6.42 - 11.42 | 1016 | | F | # | - | - |

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:38 am

| PARAMETER | UNITS | LOCATION ID | LOCATION TYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specific Conductance | umhos/cm | NAT08 | WL | 07/11/2007 | N001 | 6.30 - 11.30 | 1760 | | F | # | - | - |
| | umhos/cm | NAT26 | WL | 07/11/2007 | N001 | 10.67 - 15.67 | 3624 | | F | # | - | - |
| Temperature | C | DM1 | WL | 07/11/2007 | N001 | 2.67 - 7.67 | 19.30 | | F | # | - | - |
| | C | MAU07 | WL | 07/11/2007 | N001 | 2.92 - 7.92 | 19.38 | | F | # | - | - |
| | C | MAU08 | WL | 07/11/2007 | N001 | 6.17 - 11.17 | 17.35 | | F | # | - | - |
| | C | NAT01-1 | WL | 07/11/2007 | N001 | 17.00 - 17.50 | 15.42 | | FQ | # | - | - |
| | C | NAT02 | WL | 07/11/2007 | N001 | 6.42 - 11.42 | 18.36 | | F | # | - | - |
| | C | NAT08 | WL | 07/11/2007 | N001 | 6.30 - 11.30 | 16.64 | | F | # | - | - |
| | C | NAT26 | WL | 07/11/2007 | N001 | 10.67 - 15.67 | 15.08 | | F | # | - | - |
| Total Dissolved Solids | mg/L | DM1 | WL | 07/11/2007 | 0001 | 2.67 - 7.67 | 330 | | F | # | 20 | - |
| | mg/L | MAU07 | WL | 07/11/2007 | 0001 | 2.92 - 7.92 | 2200 | | F | # | 200 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0001 | 6.17 - 11.17 | 2500 | | F | # | 40 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0002 | 6.17 - 11.17 | 2400 | | F | # | 40 | - |
| | mg/L | NAT01-1 | WL | 07/11/2007 | 0001 | 17.00 - 17.50 | 1500 | | FQ | # | 40 | - |
| | mg/L | NAT02 | WL | 07/11/2007 | 0001 | 6.42 - 11.42 | 760 | | F | # | 20 | - |
| | mg/L | NAT08 | WL | 07/11/2007 | 0001 | 6.30 - 11.30 | 1400 | | F | # | 40 | - |
| | mg/L | NAT26 | WL | 07/11/2007 | 0001 | 10.67 - 15.67 | 2500 | | F | # | 40 | - |
| Turbidity | NTU | DM1 | WL | 07/11/2007 | N001 | 2.67 - 7.67 | 1.72 | | F | # | - | - |
| | NTU | MAU07 | WL | 07/11/2007 | N001 | 2.92 - 7.92 | 2.80 | | F | # | - | - |
| | NTU | MAU08 | WL | 07/11/2007 | N001 | 6.17 - 11.17 | 2.65 | | F | # | - | - |
| | NTU | NAT01-1 | WL | 07/11/2007 | N001 | 17.00 - 17.50 | 8.85 | | FQ | # | - | - |
| | NTU | NAT02 | WL | 07/11/2007 | N001 | 6.42 - 11.42 | 1.25 | | F | # | - | - |
| | NTU | NAT08 | WL | 07/11/2007 | N001 | 6.30 - 11.30 | 2.26 | | F | # | - | - |
| | NTU | NAT26 | WL | 07/11/2007 | N001 | 10.67 - 15.67 | 1.44 | | F | # | - | - |
| Uranium | mg/L | DM1 | WL | 07/11/2007 | 0001 | 2.67 - 7.67 | 0.0027 | | F | # | 5.9E-06 | - |

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:38 am

| PARAMETER | UNITS | LOCATION ID | LOCATION TYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uranium | mg/L | MAU07 | WL | 07/11/2007 | 0001 | 2.92 - 7.92 | 0.750 | | F | # | 0.0003 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0001 | 6.17 - 11.17 | 0.850 | | F | # | 0.0003 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0002 | 6.17 - 11.17 | 0.920 | | F | # | 0.0003 | - |
| | mg/L | NAT01-1 | WL | 07/11/2007 | 0001 | 17.00 - 17.50 | 0.630 | | FQ | # | 0.0003 | - |
| | mg/L | NAT02 | WL | 07/11/2007 | 0001 | 6.42 - 11.42 | 0.170 | | F | # | 0.00003 | - |
| | mg/L | NAT08 | WL | 07/11/2007 | 0001 | 6.30 - 11.30 | 0.440 | | F | # | 5.9E-05 | - |
| | mg/L | NAT26 | WL | 07/11/2007 | 0001 | 10.67 - 15.67 | 1.300 | | F | # | 0.0003 | - |
| Vanadium | mg/L | DM1 | WL | 07/11/2007 | 0001 | 2.67 - 7.67 | 0.00031 | | FJ | # | 6.2E-05 | - |
| | mg/L | MAU07 | WL | 07/11/2007 | 0001 | 2.92 - 7.92 | 0.00033 | | FJ | # | 6.2E-05 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0001 | 6.17 - 11.17 | 0.00035 | | FJ | # | 6.2E-05 | - |
| | mg/L | MAU08 | WL | 07/11/2007 | 0002 | 6.17 - 11.17 | 0.00035 | | FJ | # | 6.2E-05 | - |
| | mg/L | NAT01-1 | WL | 07/11/2007 | 0001 | 17.00 - 17.50 | 0.0023 | | FQ | # | 6.2E-05 | - |
| | mg/L | NAT02 | WL | 07/11/2007 | 0001 | 6.42 - 11.42 | 0.960 | | F | # | 0.01 | - |
| | mg/L | NAT08 | WL | 07/11/2007 | 0001 | 6.30 - 11.30 | 2.500 | | F | # | 0.01 | - |
| | mg/L | NAT26 | WL | 07/11/2007 | 0001 | 10.67 - 15.67 | 0.00079 | | FJ | # | 6.2E-05 | - |

GROUND WATER QUALITY DATA BY PARAMETER WITH DEPTH (USEE200) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:38 am

| PARAMETER | UNITS | LOCATION ID | LOCATION TYPE | SAMPLE: DATE | ID | DEPTH RANGE (FT BLS) | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

RECORDS: SELECTED FROM USEE200 WHERE site_code='NAT01' AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%N%' AND data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%' ) AND DATE_SAMPLED >= #1/1/2007#

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

LOCATION TYPES: WL WELL

LAB QUALIFIERS:

| | |
|---|---|
| * | Replicate analysis not within control limits. |
| + | Correlation coefficient for MSA < 0.995. |
| > | Result above upper detection limit. |
| A | TIC is a suspected aldol-condensation product. |
| B | *Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry:* 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 |
| M | GFAA duplicate injection precision not met. |
| N | Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC). |
| P | > 25% difference in detected pesticide or Arochlor concentrations between 2 columns. |
| S | Result determined by method of standard addition (MSA). |
| U | Analytical result below detection limit. |
| W | Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance. |
| X | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| Y | Laboratory defined (USEPA CLP organic) qualifier, see case narrative. |
| Z | Laboratory defined (USEPA CLP organic) 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. | N | Presumptive evidence that analyte is present. The analyte is "tentatively identified". | Q | *Qualitative result due to sampling technique* |
| R | Unusable result. | U | Parameter analyzed for but was not detected. | X | Location is undefined. |

QA QUALIFIER: # = validated according to Quality Assurance guidelines.

# Appendix B

# Surface Water Quality Data by Parameter

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:37 am

| PARAMETER | UNITS | LOCATION ID | SAMPLE: DATE | ID | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity, Total (As CaCO3 | mg/L | 0531 | 07/11/2007 | 0001 | 86.0 | | | # | - | - |
| | mg/L | 0533 | 07/11/2007 | 0001 | 82 | | | # | - | - |
| | mg/L | 0538 | 07/11/2007 | 0001 | 298 | | | # | - | - |
| | mg/L | SM2 | 07/11/2007 | 0001 | 83 | | | # | - | - |
| | mg/L | SM4 | 07/11/2007 | 0001 | 75 | | | # | - | - |
| Oxidation Reduction Potent | mV | 0531 | 07/11/2007 | N001 | 48.2 | | | # | - | - |
| | mV | 0533 | 07/11/2007 | N001 | 13.4 | | | # | - | - |
| | mV | 0538 | 07/11/2007 | N001 | -40.0 | | | # | - | - |
| | mV | SM2 | 07/11/2007 | N001 | 41.0 | | | # | - | - |
| | mV | SM4 | 07/11/2007 | N001 | 12.0 | | | # | - | - |
| pH | s.u. | 0531 | 07/11/2007 | N001 | 8.57 | | | # | - | - |
| | s.u. | 0533 | 07/11/2007 | N001 | 8.61 | | | # | - | - |
| | s.u. | 0538 | 07/11/2007 | N001 | 7.79 | | | # | - | - |
| | s.u. | SM2 | 07/11/2007 | N001 | 8.51 | | | # | - | - |
| | s.u. | SM4 | 07/11/2007 | N001 | 8.45 | | | # | - | - |
| Specific Conductance | umhos/cm | 0531 | 07/11/2007 | N001 | 426 | | | # | - | - |
| | umhos/cm | 0533 | 07/11/2007 | N001 | 415 | | | # | - | - |
| | umhos/cm | 0538 | 07/11/2007 | N001 | 1436 | | | # | - | - |
| | umhos/cm | SM2 | 07/11/2007 | N001 | 430 | | | # | - | - |
| | umhos/cm | SM4 | 07/11/2007 | N001 | 426 | | | # | - | - |
| Temperature | C | 0531 | 07/11/2007 | N001 | 21.70 | | | # | - | - |
| | C | 0533 | 07/11/2007 | N001 | 25.56 | | | # | - | - |
| | C | 0538 | 07/11/2007 | N001 | 22.64 | | | # | - | - |
| | C | SM2 | 07/11/2007 | N001 | 20.98 | | | # | - | - |
| | C | SM4 | 07/11/2007 | N001 | 20.54 | | | # | - | - |
| Total Dissolved Solids | mg/L | 0531 | 07/11/2007 | 0001 | 300 | | | # | 20 | - |
| | mg/L | 0533 | 07/11/2007 | 0001 | 290 | | | # | 20 | - |
| | mg/L | 0538 | 07/11/2007 | 0001 | 1100 | | | # | 20 | - |
| | mg/L | SM2 | 07/11/2007 | 0001 | 310 | | | # | 20 | - |
| | mg/L | SM4 | 07/11/2007 | 0001 | 320 | | | # | 20 | - |
| Uranium | mg/L | 0531 | 07/11/2007 | 0001 | 0.0008 | E | | # | 5.9E-06 | - |
| | mg/L | 0533 | 07/11/2007 | 0001 | 0.0008 | | | # | 5.9E-06 | - |
| | mg/L | 0538 | 07/11/2007 | 0001 | 0.210 | | | # | 0.00003 | - |
| | mg/L | SM2 | 07/11/2007 | 0001 | 0.0008 | | | # | 5.9E-06 | - |
| | mg/L | SM4 | 07/11/2007 | 0001 | 0.0008 | | | # | 5.9E-06 | - |
| Vanadium | mg/L | 0531 | 07/11/2007 | 0001 | 0.0004 | | J | # | 6.2E-05 | - |
| | mg/L | 0533 | 07/11/2007 | 0001 | 0.0004 | | J | # | 6.2E-05 | - |

SURFACE WATER QUALITY DATA BY PARAMETER (USEE800) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 11/13/2007 10:37 am

| PARAMETER | UNITS | LOCATION ID | SAMPLE: DATE | ID | RESULT | QUALIFIERS: LAB | DATA | QA | DETECTION LIMIT | UN-CERTAINTY |
|---|---|---|---|---|---|---|---|---|---|---|
| Vanadium | mg/L | 0538 | 07/11/2007 | 0001 | 0.0003 | | J | # | 6.2E-05 | - |
| | mg/L | SM2 | 07/11/2007 | 0001 | 0.0003 | | J | # | 6.2E-05 | - |
| | mg/L | SM4 | 07/11/2007 | 0001 | 0.0003 | | J | # | 6.2E-05 | - |

RECORDS: SELECTED FROM USEE800 WHERE site_code='NAT01' AND quality_assurance = TRUE AND (data_validation_qualifiers IS NULL OR data_validation_qualifiers NOT LIKE '%N%' AND data_validation_qualifiers NOT LIKE '%R%' AND data_validation_qualifiers NOT LIKE '%X%' ) AND DATE_SAMPLED >= #1/1/2007#

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

LAB QUALIFIERS:

- * Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: 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
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compund (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) 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.
- N Presumptive evidence that analyte is present. The analyte is "tentatively identified".
- Q Qualitative result due to sampling technique
- R Unusable result.
- U Parameter analyzed for but was not detected.
- X Location is undefined.

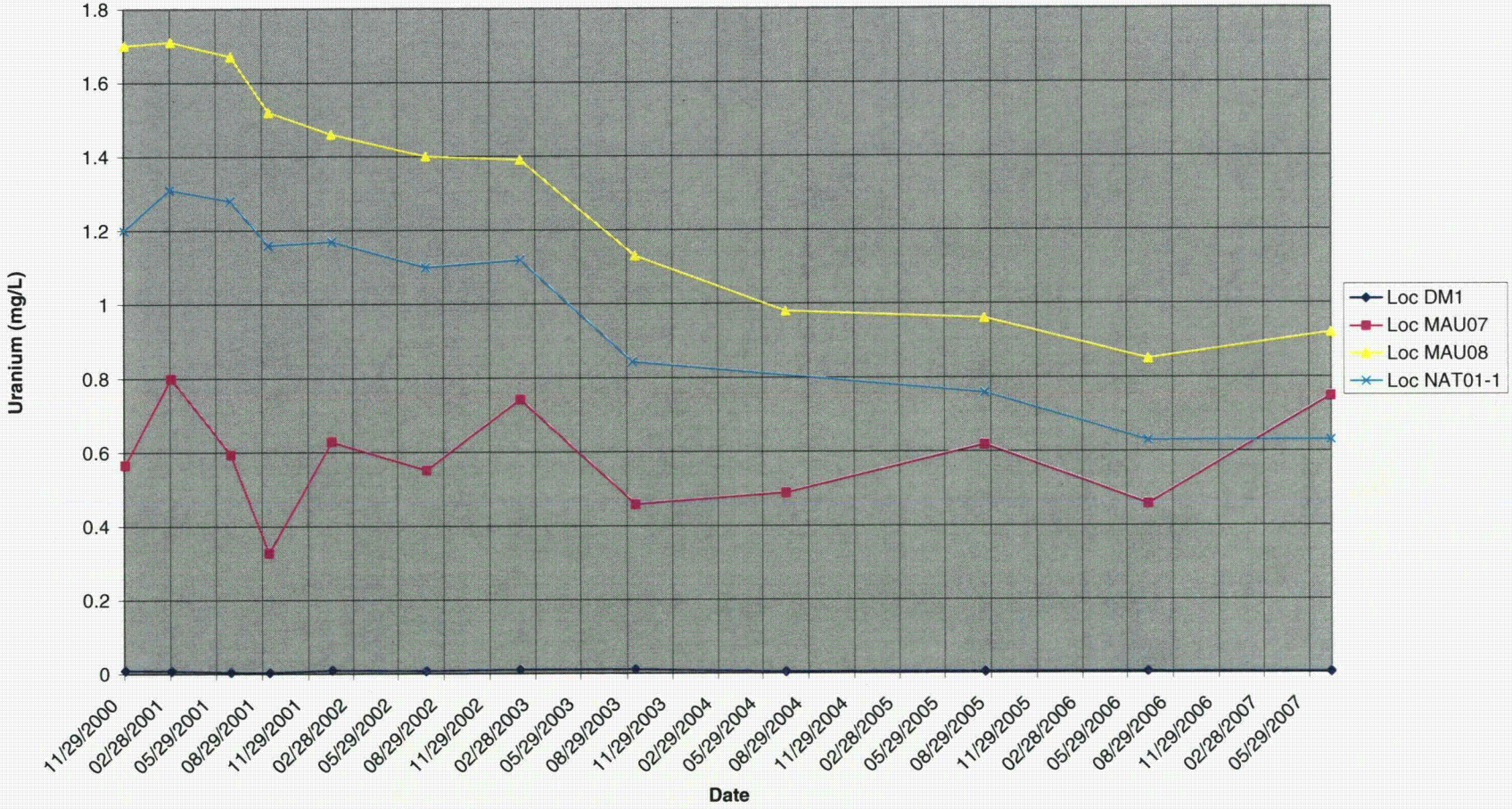
QA QUALIFIER: # = validated according to Quality Assurance guidelines.

# Appendix C

# Time-Concentration Plots for Uranium and Vanadium

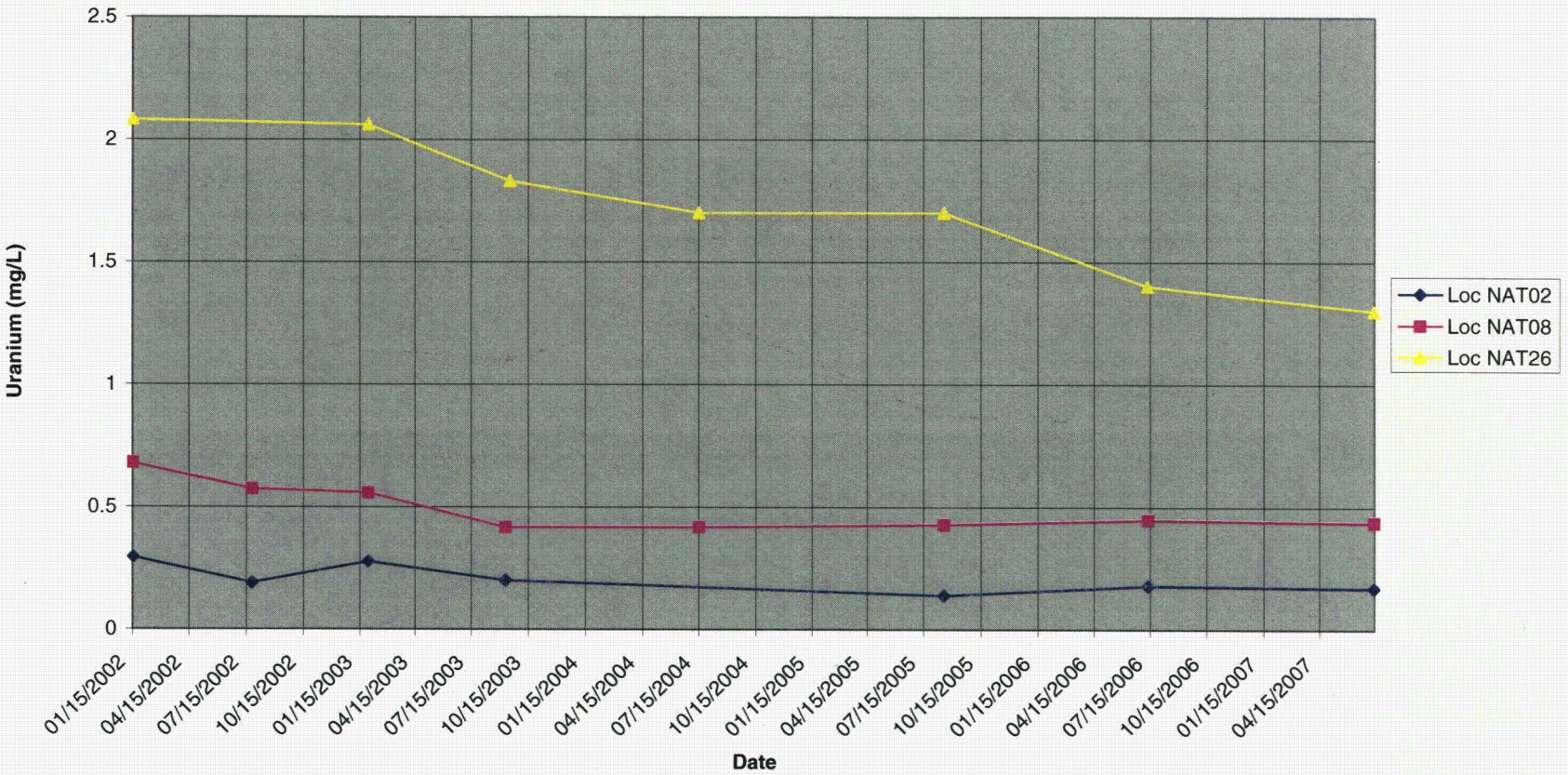
## Naturita Processing Site (NAT01)

### Uranium Concentration



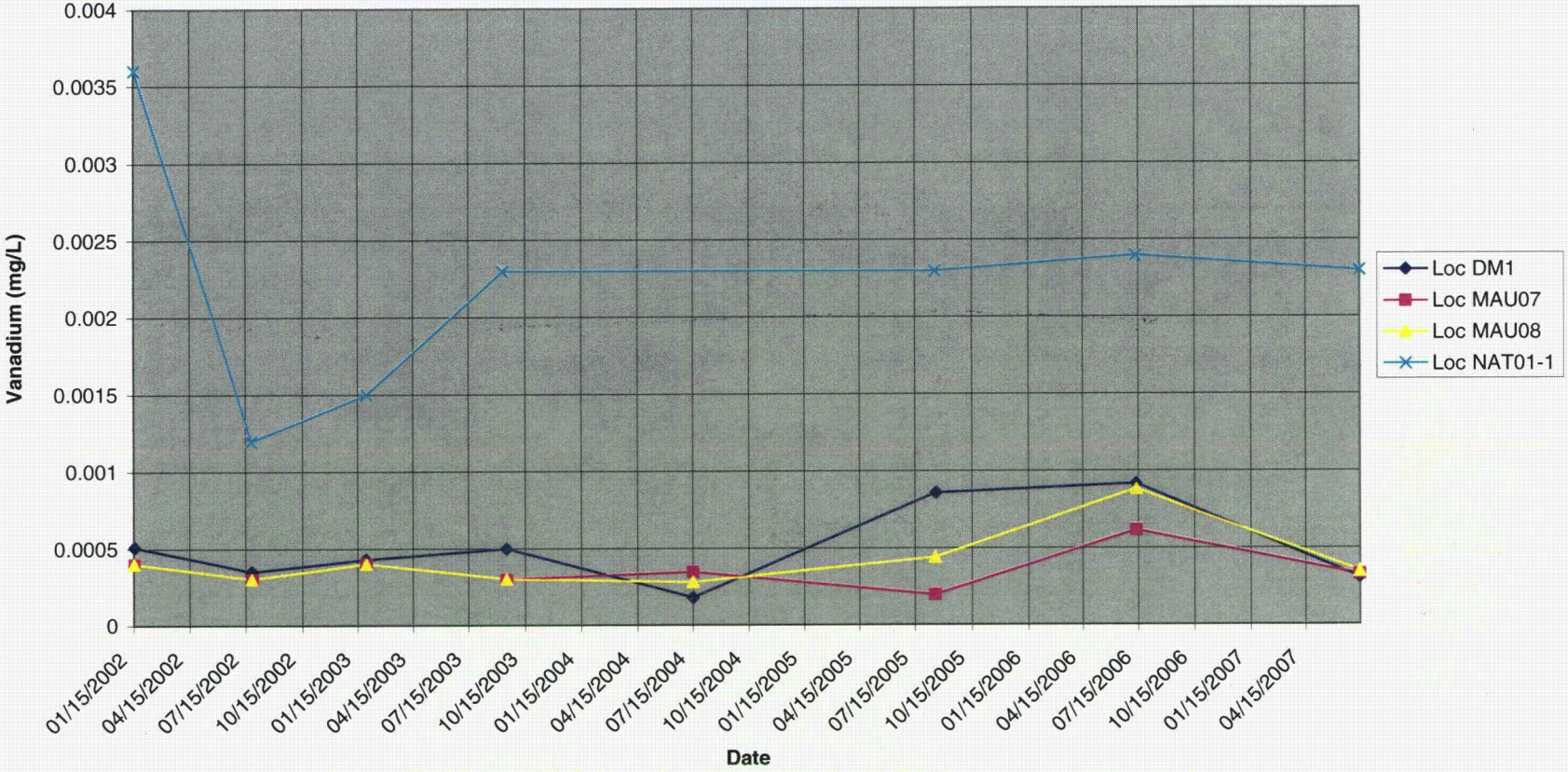
## Naturita Processing Site (NAT01)

### Uranium Concentration



## Naturita Processing Site (NAT01)

### Vanadium Concentration



## Naturita Processing Site (NAT01)

### Vanadium Concentration