**Rio Algom Mining LLC**
P.O. Box 218, Grants, NM USA 87020 (505)287-8851

August 1, 2005

Certified mail
Return Receipt (7004 1350 0000 8065 7730)

ADDRESSEE ONLY
Gary Janosko, Chief
Fuel Cycle Facilities Branch, NMSS
Mail Stop T-8A33
U.S. Nuclear Regulatory Commission
Washington, DC 20850

Re: **License SUA-1473, Docket No. 40-8905**
***Annual Report, Corrective Action Plan***

Dear Mr. Janosko,

Pursuant to license condition #34 of the above referenced license, please find attached the annual Corrective Action Plan (CAP) review for the above referenced facility. The review describes the groundwater corrective action implemented and associated results subsequent to the plan's approval on December 29, 1989.

If you have any questions concerning this submittal, please contact me at (505) 287-8851, extension 205.

Regards,

Peter Luthiger
Manager, Radiation Safety
and Environmental Affairs

Enclosure

xc: NMED - GWPB
file

# RIO ALGOM MINING LLC
# AMBROSIA LAKE FACILITY

# CORRECTIVE ACTION PLAN 2005 ANNUAL REPORT

August 1, 2005

# RIO ALGOM MINING LLC
# AMBROSIA LAKE FACILITY
# CORRECTIVE ACTION PLAN – 2005 ANNUAL REPORT

NRC source material license SUA-1473, condition #34(D) requires Rio Algom Mining LLC (RAM) to review the facility's Corrective Action Plan (CAP) annually and report results of the review on or before August 1 of each year. This 2005 Annual Report discusses findings of the 2005 review and documents the progress of the Ambrosia Lake CAP. Data generated by semi annual monitoring of groundwater in monitoring wells completed in Alluvium, Tres Hermanos A, Tres Hermanos B, and Dakota Sandstone is included with this document in accordance with license condition #34(A).

## General Hydrogeologic Setting

RAM's former mill site and tailings facility are located in Ambrosia Lake Valley within the southern-most extent of the San Juan Basin, New Mexico. With the exception of Holocene alluvial/colluvial deposits lining valley bottoms and drainage channels, all sedimentary units within the San Juan Basin dip gently toward its structural center. Sedimentary units beneath the RAM facility dip approximately three degrees to the northeast. The mill facility was built with the intention of servicing nearby underground uranium mines within the Grants Uranium District that extends northwest through the Ambrosia Lake Valley from the western side of Mount Taylor.

The stratigraphic sequence of hydrologic significance at the site consists, in descending order, of Alluvium, Mancos shale, including the interbedded Tres Hermanos Sandstone units, Dakota Sandstone, and Brushy Basin (shale) and Westwater Canyon (uranium ore bearing sandstone) members of the Morrison Formation.

Underground mining required that the Westwater Canyon be dewatered to a level below the mine workings. Groundwater in the Westwater Canyon was pumped to the surface, treated to reduce uranium and radium concentrations, and then discharged to the Arroyo del Puerto. The bedrock formations above the Westwater Canyon Member of the Morrison Formation have also been dewatered by drainage to the Westwater through ventilation holes and mine shafts located to the north of Rio Algom's mill and tailings facility.

Tailings were first produced at the site in 1958. Tailings impoundment #1 encompasses 260 acres containing approximately 30 million tons of uranium mill tailings, while tailings impoundment #2 covers approximately 90 acres and contains three million tons of mill tailings. In addition to discharge of tailings effluents to impoundments #1 and #2, early process streams included discharge into unlined evaporation ponds (ponds 4, 5, 6, 7, and 8).

The above referenced features were the primary sources of mill tailings seepage to groundwater. The units that have been affected by seepage from milling activities are the Alluvium, Tres Hermanos B, Sandstone, and the Dakota Sandstone. Tailings impoundment #1 and tailing impoundment #2 have been reclaimed in accordance with license requirements. The unlined ponds were taken out of service in 1983 pursuant to the Assurance of Discontinuance with the State of New Mexico and surface reclamation of the tailings impoundments was completed in 1996. Thus, sources of tailings seepage have been removed per NRC regulations.

**Current Corrective Action Plan**

The current requires continued pumping of the Section 30 and 30 West mines. During the period when the current CAP was designed (late 1980's) there was still some production from the mines and the approach was to intercept and capture any residual seepage from the tailings facility in the cone of depression formed as a result of mine dewatering.

In addition, the discharged mine water was designed to perform a "groundwater sweep" as it flowed down Arroyo del Puerto. Pumped mine water flowing down Arroyo del Puerto infiltrates alluvial materials, forming a mound beneath the arroyo channel. This mound forms a hydrologic barrier, preventing flow of seepage from the tailings impoundments toward the axis of the bedrock paleochannel currently filled with alluvial material.

The hydraulic head of the groundwater mound is maintained at a higher level than the water levels in an interceptor trench at the toe of tailings impoundment #1 causing a reversal of the groundwater gradient and flow from the mound toward the trench. The trench was designed to intercept, collect and remove impacted waters from the tailings impoundments. Treated mine water infiltrates and flushes the alluvium from the fresh water creek back towards

the interceptor trench resulting in the collection and removal of additional impacted waters from the alluvium. All solutions removed from the intercept trench are discharged into lined evaporation cells.

During the period of CAP design it was presumed that flow toward the center of the paleochannel would turn south at some point to follow the channel axis toward the site boundary. RAM has gained a more complete understanding of site conditions during the years since implementation of the current CAP. Recent investigations incorporated into the Alluvial ACL Petition indicate that the ultimate fate of tailings seepage into the Alluvium will be into the same cone of depression that captures seepage to the bedrock units.

Because RAM does not intend to continue underground mining operations, we now do not foresee a need to continue dewatering of the mines. The calibrated groundwater model presented in the Alluvial ACL Petition predicts that alluvial materials will return to their previously unsaturated condition within 60 to 100 years following cessation of mine pumping. The water currently residing in these materials will drain through the bedrock units into the cone of depression created by historic and present mine pumping. Because the volume of seepage through bedrock is small compared to the volume of groundwater that will refill the cone of depression over the next several millennia, resulting groundwater impacts will be too small to measure.

**Review of Corrective Action Plan in the Bedrock Units**

In accordance with requirements of license condition #34, Appendix A presents the July 2004 through June 2005 analytical results from the monitoring program wells specified by the NRC CAP. Appendix B presents time versus concentration plots using data from this data set. Appendix C presents plume maps based on the most recent analytical data collected from groundwater present in monitoring wells.

During the review period of July 2004 to June 2005, 169 million gallons of water containing negligible amounts of tailings seepage was pumped from Section 30 and 30 West mines. Once the ACL petition for the alluvial materials is granted, this pumping and discharge will be terminated. Given that new sources of milling related seepage will not exist, but the cone of depression will exist for millennia, continued mine dewatering may even be detrimental to

protecting human health and the environment because it prolongs saturation in the alluvial materials increasing the potential for human and environmental exposure.

The current CAP monitoring program consists of semi-annual monitoring of background and point of compliance wells within the Alluvium, Tres Hermanos A Sandstone, Tres Hermanos B Sandstone, and the Dakota Sandstone for specific parameters as outlined within condition #34 of the facility source material license. A revised monitoring program is described in the already submitted Alluvial and Bedrock ACL petitions and subsequent associated correspondence between RAM and the NRC.

***Dakota Sandstone***

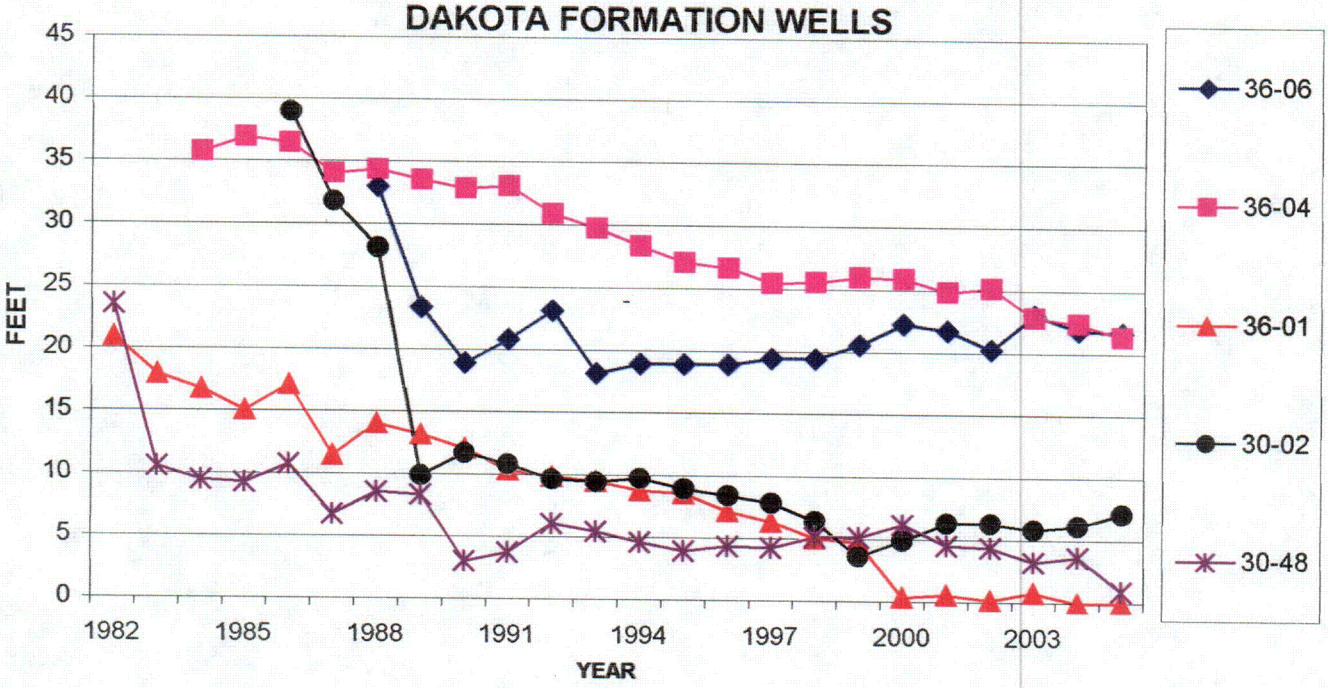
The Dakota Sandstone is described as a sandstone unit deposited over an erosional surface developed on the Brushy Basin Member of the Morrison Formation. It dips approximately three degrees to the northeast and is characterized as a fine to medium-grained, clean sandstone with poor to moderate permeability. The Dakota is approximately 80 feet thick across most of the Ambrosia Lake area. Groundwater movement in the Dakota is down dip and down gradient to the north-northeast toward mine features installed to allow mines in the Westwater Canyon to vent to the surface (vent holes).

Much of the former mill site is underlain by Mancos Shale that forms a barrier to bedrock seepage. Tailings seepage originally entered the Dakota Formation in the vicinity of the tailings evaporation pond #7 where a small subcrop of Dakota sandstone occurs just south of the unlined pond beneath shallow alluvium. Pond #7 was constructed in 1961 and utilized for evaporating mill solutions until 1983. Its use was discontinued in 1983 pursuant to the Assurance of Discontinuance (AOD) with the State of New Mexico. The mill processing solutions were removed in 1983, thereby eliminating the source of tailings seepage to the Dakota. Further, Pond #7 has been capped to eliminate potential infiltration from surface sources.

Analysis of the Dakota monitoring well data indicates that historical seepage created a narrow plume that originated from pond #7. These solutions commingled with the minimal groundwater within the Dakota, and migrated down gradient towards the mining areas located north of the mill facility. Figure

1 demonstrates the reduction in the saturated thickness within the Dakota for the Dakota monitoring wells located along the path from pond #7 to the Section 30 and 30 West mines. This graph indicates that elimination of the recharge source has resulted in steadily declining groundwater levels, confirming that residual tailings seepage is draining to the cone of depression as expected.

**FIGURE 1**
**SATURATION THICKNESS**
**DAKOTA FORMATION WELLS**




In the vicinity of the Section 30 and Section 30 West mining areas, only a few feet at the base of the Dakota is saturated. This was verified by studies in 1983, and again in 1989 during downhole investigations performed by Rio Algom within the ventilation holes and mine shafts to measure water levels and water quality in the Dakota Formation. With the cessation of underground mining throughout the mining district, study results indicate that groundwater recovery in the hydrologic depression is occurring from the northern perimeter of the depression. Thus, as predicted, the remaining tailings seepage will only comprise a small portion of the final volume of water that will fill the depression.

Rio Algom performed final reclamation work in the vicinity of former evaporation ponds #7 and #8 by placement of a soil/clay cover over the ponds. These ponds were the primary source of groundwater impacts to the Dakota. This reclamation activity was expected to potentially create a temporary pulse in the concentrations within the Dakota point of compliance well located 800 feet downgradient from the ponds. Monitoring results for this well documented the arrival of the predicted pulse after a delay of approximately two years. Constituent concentrations, which had been trending downward, began to flatten and then slowly rise. The most recent semi-annual sampling events indicate that concentrations of mobile constituents have peaked at levels far lower than those observed after monitor well installation in the 1980's and downward trends have been reestablished.

***Tres Hermanos A Sandstone***

The Tres Hermanos A Sandstone is the uppermost (stratigraphically highest) of the three thin sandstone interbeds within the Mancos Shale in Ambrosia Lake Valley. Analytical results for this unit continue to indicate that there are no impacts from tailings seepage (Appendix A). Monitoring results for this unit have remained constant and consistent with previous results (see time concentration plots in Appendix B).

***Tres Hermanos B Sandstone***

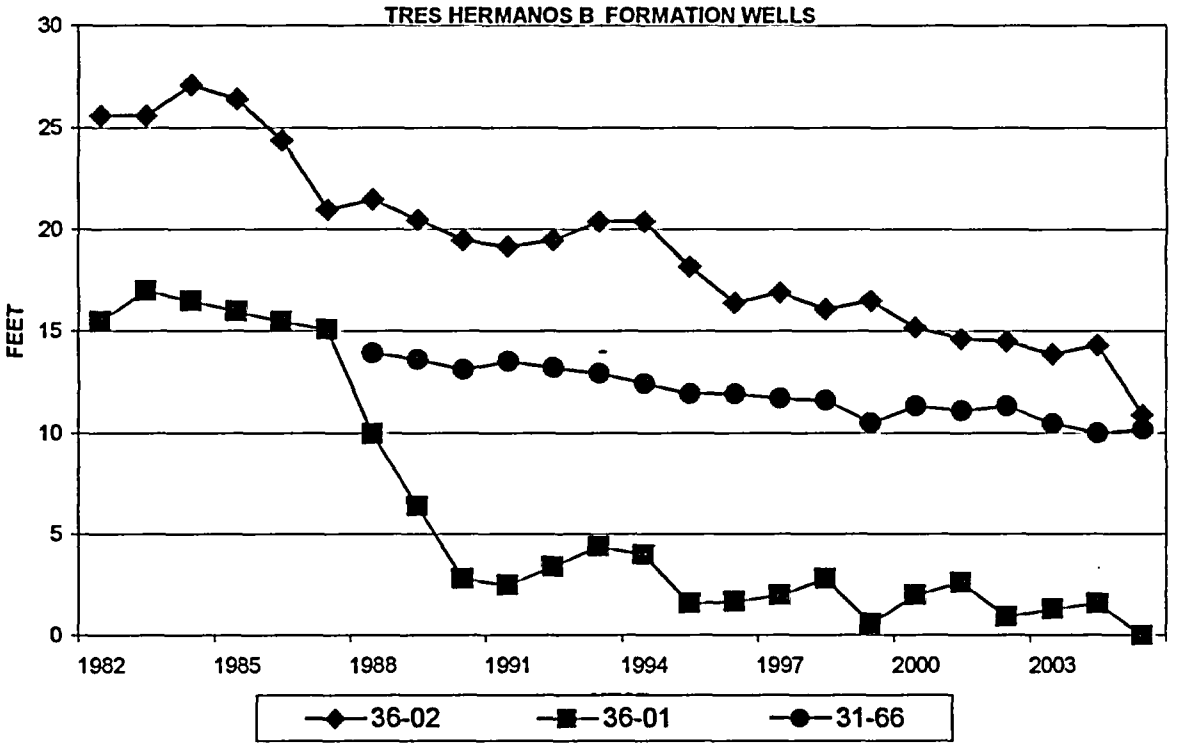
The Tres Hermanos B Sandstone is the middle unit of the three thin sandstone interbeds within the Mancos Shale. As is true of all bedrock units in the subsurface beneath the RAM facility, the Tres Hermanos B dips to the north-northeast at approximately three degrees. Geologic materials comprising the Tres Hermanos B are fine-grained silty sands with low porosity and permeability limiting the amount of water that can be produced from this unit. However, a portion of the tailings at the RAM facility were deposited in contact with or near Tres Hermanos B outcrops or subcrops. As a result, tailings seepage has been identified in this unit.

In spite of its lens-like nature at a regional scale, locally the Tres Hermanos B Sandstone is continuous from the outcrop area near the mill facility toward the mining area to the north-northeast of the mill. As with the Dakota formation, seepage to the Tres Hermanos B has migrated down gradient and down dip in a

north-northeast direction. In the unlikely event that the volume of these solutions is sufficient to maintain saturation within the sandstone as they migrate toward ventholes and mineshafts north of the facility, they will be intercepted in the same manner described for the coarser-grained Dakota Sandstone. However, migration is expected to be limited by the geologic characteristics of the Tres Hermanos B and natural attenuation processes occurring along the flow path.

As with Dakota monitoring wells, the saturated thickness of near source wells in the Tres Hemanos B has declined following surface remedial action to remove the source of seepage (Figure 2) resulting in continued capture, collection, and removal of water from the unit.

**FIGURE 2**




The remedial action specified for constituents of concern within the Tres Hermanos B Sandstone by the NRC approved CAP consists of pumping and dewatering of the Section 30 and Section 30 West mines. As stated above, 169 million gallons of water were pumped from Section 30 and 30 West mines during

the review period of July 2004 to June 2005. This water contained negligible amounts tailings seepage.

***Effectiveness of CAP in the Bedrock Units***

Rio Algom believes that continuation of mine pumping is not necessary to accomplish the interception of the minimal groundwater that remains within the bedrock units. Regional groundwater modeling studies have shown that it will take hundreds of years for the dewatering centers to recover following termination of mine pumping in order for resaturation to occur at potential point of exposure (POE) locations within the Dakota and Tres Hermanos units. Continued mine pumping has had little impact on any real or perceived environmental risks in the Dakota due to tailings seepage. In contrast, surface remediation of sources, including removal of solutions and byproduct material from ponds has been effective in reducing concentrations at the point of compliance locations in the Dakota, thereby effectively reducing any potential risk and protecting groundwater in the Dakota at POE locations.

Evaluation of alternative corrective actions (enhanced tailings dewatering and groundwater interception and treatment) indicated that these actions will not significantly improve groundwater concentrations in the bedrock units. A cost-effectiveness evaluation of the CAP alternatives was performed with results indicating that either alternative would cost approximately $1.7 million for averting one person-rem. RAM believes that this cost, which is far in excess of the NRC ALARA guidance cost estimates of $2,000 to $20,000 per person-rem averted, demonstrates that groundwater concentrations within the bedrock units are ALARA. RAM submitted an application to the NRC on February 19, 2000 requesting ACLs for the bedrock units (Dakota and Tres Hermanos units), which is presently under review by NRC. Rio Algom continues to hold discussions with NRC on the few issues that remain unresolved on the ACL application.

## Review of Corrective Action Plan in the Alluvial

Prior to mining, the alluvium within the Ambrosia Lake Valley was dry. With the commencement of mining and milling activities in the area during the 1950's by numerous mining companies, dewatering of the mines resulted in: 1)

development of a cone of depression within the underlying geologic units (Tres Hermanos, Dakota, and Westwater); 2) saturation of alluvial materials from discharge of treated mine water. Discharged mine water constitutes the bulk of current saturation in alluvial material. When milling activities were initiated, smaller volumes of tailing seepage mingled with discharged mine water.

Corrective actions that have been initiated to mitigate impacts and protect human health and the environment include: 1) re-alignment of the Arroyo del Puerto in 1976 to divert surface water flows around the evaporation ponds; 2) removal of the solutions from and decommissioning of all unlined evaporation ponds; 3) construction of an intercept trench at the toe of tailings impoundment #1.

The intercept trench collects tailings seepage and acts as a part of the system that performs a "groundwater sweep" in alluvial material. Treated mine water flowing in the Arroyo del Puerto infiltrates and flushes the alluvium from the arroyo towards the intercept trench, improving water quality within the impacted alluvium. During the period of July 2004 through June 2005, more than 28 million gallons of water, consisting of treated mine water and tailings seepage, were recovered and removed from the alluvium via the intercept trenches and discharged to lined evaporation ponds.

In addition to the active flushing action, resulting in the dilution of tailings seepage, and collection of water from the interceptor trench, passive natural processes act to limit concentrations of constituents in alluvial groundwater. High attenuation capacity in alluvial materials (presence of abundant clay minerals, calcite and iron oxyhydroxides) results in reduced solubility of constituents in groundwater.

***Effectiveness of CAP in the Alluvium***

As the site progresses toward closure, reclamation tasks have been concentrated in areas within or adjacent to the alluvium. These tasks include closure of the interceptor trench, soil clean-up verification, construction of erosion protection features, and Pond 3 closure. These reclamation activities have the potential to create a temporary pulse in the concentrations within the alluvial monitoring wells located in the vicinity of the intercept trench.

When RAM receives approval for ACLs and is authorized to discontinue mine dewatering, groundwater levels that are being artificially maintained by the current CAP will dissipate and any potential for risk to human health and the environment will decline as the system returns to pre-mining unsaturated conditions.

Recently, groundwater modeling was performed to investigate the effectiveness of the current CAP. The investigation focused on the time frame required to complete site reclamation under the current CAP and feasibility of alternative corrective actions, including application of ACLs in the alluvial materials. The modeling effort indicated that it will take between 50-100 years for tailings seepage to decline to steady state conditions. However this residual seepage will make little difference to risk at POE locations due to the high attenuation capacity of alluvial materials.

The investigation also concluded that the time frame required to actively collect impacted water from the seepage would extend beyond the 100 years predicted to reach steady state, raising the possibility that the existing CAP would have to be continued for as much as 150 years into the future.

RAM submitted an ACL application documenting these investigations and other studies pertaining to saturation in the alluvial materials in May 2001. The document is currently under review by NRC. RAM continues to hold discussions with NRC on the few issues that remain unresolved on that application.

# APPENDIX A

## ANALYTICAL RESULTS

## DAKOTA, TRES HERMANOS A, TRES HERMANOS B, ALLUVIUM

RIO ALGOM MINING LLC
2004 CAP REPORT
DAKOTA WELL RESULTS

| Well | Date | Depth To Water | Total Depth | Spec. (Cond.) | Temp C | pH | Chloride (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | As (mg/L) | Be (mg/L) | Cd (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17-01KD | 24-Aug-04 | 687.3 | 809.4 | 2950 | 22.8 | 11.5 | 194 | 580 | -0.02 | 0.0051 | -0.0001 | -0.0001 |
| 17-01KD | 18-Apr-05 | 685.6 | 809.7 | 2520 | 22.8 | 11.0 | 199 | 620 | -0.02 | 0.0041 | -0.0001 | 0.0003 |
| 30-02KD | 16-Aug-04 | 307.8 | 314.0 | 6110 | 18.7 | 7.5 | 1380 | 760 | -0.02 | -0.0030 | -0.0005 | -0.0005 |
| 30-02KD | 11-Apr-05 | 307.7 | 314.8 | 5640 | 15.3 | 7.3 | 1500 | 680 | 0.03 | -0.0005 | -0.0001 | -0.0001 |
| 30-48KD | 23-Aug-04 | 338.4 | 340.4 | 6200 | 21.2 | 7.5 | 250 | 2790 | 0.04 | -0.0030 | -0.0005 | -0.0005 |
| 30-48KD | 25-Apr-05 | 338.7 | 339.7 | | | | | | | | | |
| 32-45KD | 16-Aug-04 | 252.9 | 278.5 | 2280 | 16.3 | 7.6 | 183 | 770 | 0.09 | 0.0006 | -0.0001 | 0.0003 |
| 32-45KD | 11-Apr-05 | 253.1 | 278.1 | 1841 | 14.9 | 7.9 | 201 | 810 | 0.02 | 0.0008 | -0.0001 | 0.0002 |
| 36-06KD | 30-Aug-04 | 176.6 | 198.7 | 9500 | 15.4 | 4.4 | 1170 | 5950 | -0.02 | -0.0050 | 0.0340 | 0.0240 |
| 36-06KD | 25-Apr-05 | 176.5 | 198.2 | 8180 | 11.7 | 4.8 | 1220 | 560 | -0.02 | 0.0220 | 0.0290 | 0.0070 |

| Well | CN (mg/L) | Pb (mg/L) | Mo (mg/L) | Ni (mg/L) | Se (mg/L) | Sb (mg/L) | U-nat (mg/L) | Th-230 (pCi/L) | Pb-210 (pCi/L) | Ra-226 (pCi/L) | Ra-228 (pCi/L) | Gross Alpha (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17-01KD | -0.01 | -0.0001 | 0.0888 | 0.0353 | -0.001 | -0.0002 | 0.00047 | -0.1 | 0.0 | 0.2 | 0.6 | 3.3 |
| 17-01KD | -0.01 | -0.0001 | 0.0970 | 0.0312 | -0.001 | 0.0005 | 0.00154 | 1.0 | 2.4 | 0.1 | 0.2 | 8.1 |
| 30-02KD | -0.01 | -0.0005 | 0.0029 | 0.0330 | -0.001 | -0.0010 | 0.00170 | -0.3 | 0.3 | 1.3 | 0.8 | 12.7 |
| 30-02KD | -0.01 | -0.0001 | 0.0023 | 0.0284 | -0.001 | -0.0002 | 0.00435 | 0.1 | 6.9 | 0.6 | 1.4 | 21.1 |
| 30-48KD | -0.01 | -0.0005 | 0.0027 | 0.0180 | -0.001 | -0.0010 | 0.03240 | 0.0 | 0.0 | 3.2 | 0.8 | 17.7 |
| 30-48KD | | | | | | | | | | | | |
| 32-45KD | -0.01 | -0.0001 | 0.0129 | 0.0040 | -0.001 | 0.0002 | 0.00367 | -0.1 | 0.0 | 1.3 | 1.0 | 6.2 |
| 32-45KD | -0.01 | -0.0001 | 0.0136 | 0.0046 | -0.001 | -0.0002 | 0.00511 | -0.3 | 6.0 | 0.7 | 1.2 | 9.5 |
| 36-06KD | -0.01 | 0.0120 | 0.0020 | 0.3470 | 0.013 | -0.0020 | 1.34 | 159.0 | 8.8 | 39.0 | 12.3 | 0.0 |
| 36-06KD | -0.01 | 0.0080 | -0.0050 | 0.3130 | 0.013 | -0.0040 | 1.17 | 150.0 | 11.0 | 48.0 | 8.3 | 407.9 |

Well 30-48KD contained insufficient water for sample collection.
A negative sign corresponds to "less than"

RIO ALGOM MINING LLC
2004 CAP REPORT
TRA WELL RESULTS

| Well | Date | Depth To Water | Total Depth | Spec. (Cond.) | Temp C | pH | Chloride (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Mo (mg/L) | Ni (mg/L) | Se (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31-01 | 17-Aug-04 | 202.9 | 251.5 | 2660 | 16.5 | 8.1 | 140 | 1280 | 0.02 | 0.0008 | 0.0053 | -0.001 |
| 31-01 | 1-Feb-05 | 201.0 | 251.5 | 2530 | 10.5 | 7.8 | 129 | 1200 | 0.03 | 0.0008 | 0.0010 | -0.001 |
| 33-01TRA | 10-Aug-04 | 118.5 | 181.7 | 3550 | 15.6 | 7.3 | 96 | 1730 | 0.09 | 0.0029 | 0.0070 | -0.001 |
| 33-01TRA | 4-Apr-05 | 118.5 | 183.7 | 3510 | 14.5 | 8.0 | 36 | 1950 | 0.08 | 0.0027 | 0.0040 | -0.001 |

| Well | CN (mg/L) | U-nat (mg/L) | Th-230 (pCi/L) | Pb-210 (pCi/L) | Ra-226 (pCi/L) | Ra-228 (pCi/L) | Gross Alpha (pCi/L) |
|---|---|---|---|---|---|---|---|
| 31-01 | -0.01 | 0.0045 | -0.1 | 1.4 | 0.5 | 1.1 | 7.4 |
| 31-01 | -0.01 | 0.0038 | -0.2 | 6.4 | 0.9 | 0.7 | 4.1 |
| 33-01TRA | -0.01 | 0.0042 | -0.1 | 0.0 | 0.7 | 0.0 | 7.7 |
| 33-01TRA | -0.01 | 0.0132 | -0.2 | 4.7 | 0.5 | 1.8 | 0.0 |

A negative sign corresponds to "less than"

RIO ALGOM MINING LLC
2004 CAP REPORT
TRB WELL RESULTS

| Well | Date | Depth To Water | Total Depth | Spec. (Cond.) | Temp C | pH | Chloride (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Mo (mg/L) | Ni (mg/L) | Se (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19-77 | 31-Aug-04 | 282.7 | 288.3 | 4400 | 18.6 | 7.2 | 25 | 1970 | 0.47 | 0.006 | 0.009 | -0.001 |
| 19-77 | 26-Apr-05 | 282.1 | 288.6 | 3970 | 15.6 | 7.8 | 26 | 1910 | 0.98 | 0.006 | 0.004 | -0.001 |
| 31-66 | 10-Aug-04 | 113.4 | 123.4 | 40000 | 16.0 | 6.3 | 28200 | 5700 | 1.14 | -0.005 | 0.200 | 0.008 |
| 31-66 | 1-Feb-05 | 113.2 | 123.4 | 40000 | 11.9 | 6.5 | 15400 | 5370 | 1.07 | -0.005 | 0.150 | 0.008 |
| 31-67 | 17-Aug-04 | 20.1 | 96.4 | 6800 | 12.8 | 7.1 | 600 | 3070 | 0.71 | -0.001 | 0.014 | -0.001 |
| 31-67 | 25-Jan-05 | 20.3 | 96.4 | 4990 | 12.2 | 7.3 | 720 | 2970 | 0.70 | 0.001 | 0.002 | -0.001 |
| 36-01TRB | 31-Aug-04 | 57.1 | 58.8 | | | | | | | | | |
| 36-01TRB | 12-Jun-05 | 57.2 | 58.8 | | | | | | | | | |
| 36-02 | 30-Aug-04 | 46.8 | 57.9 | 7970 | 15.4 | 7.2 | 1700 | 3190 | 0.07 | 0.001 | 0.017 | -0.001 |
| 36-02 | 25-Jan-05 | 47.0 | 57.9 | 8320 | 11.6 | 7.7 | 1790 | 3220 | 0.09 | 0.001 | 0.006 | 0.001 |

| Well | CN (mg/L) | U-nat (mg/L) | Th-230 (pCi/L) | Pb-210 (pCi/L) | Ra-226 (pCi/L) | Ra-228 (pCi/L) | Gross Alpha (pCi/L) |
|---|---|---|---|---|---|---|---|
| 19-77 | -0.01 | 0.0129 | -0.3 | 1.9 | 1.0 | 0.9 | 11.5 |
| 19-77 | -0.01 | 0.0127 | -0.2 | 3.4 | 3.2 | 1.8 | 38.4 |
| 31-66 | -0.01 | 0.2070 | -0.4 | 0.0 | 12.6 | 0.0 | 252.9 |
| 31-66 | -0.01 | 0.2170 | -0.3 | 0.0 | 4.9 | 12.6 | 129.1 |
| 31-67 | -0.01 | 0.0064 | -0.1 | 0.0 | 1.5 | 2.1 | 42.5 |
| 31-67 | -0.01 | 0.0051 | 0.0 | 1.0 | 1.3 | 2.3 | 12.2 |
| 36-01TRB | | | | | | | |
| 36-01TRB | | | | | | | |
| 36-02 | -0.01 | 0.0079 | -0.1 | 0.0 | 0.9 | 0.5 | 0.0 |
| 36-02 | -0.01 | 0.0079 | -0.1 | 2.7 | 1.1 | 2.0 | 0.0 |

A negative sign corresponds to "less than"
Monitor Well 36-01TRB contained insufficient water for sample collection.

RIO ALGOM MINING LLC
2004 CAP REPORT
ALLUVIUM WELL RESULTS

| Well | Date | Depth To Water | Total Depth | Spec. (Cond.) | Temp C | pH | Chloride (mg/L) | Sulfate (mg/L) | Nitrate (mg/L) | Mo (mg/L) | Ni (mg/L) | Se (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31-61 | 9-Aug-04 | 17.7 | 27.1 | 6770 | 13.5 | 7.1 | 530 | 3740 | 1.35 | 0.003 | 0.032 | -0.001 |
| 31-61 | 24-Jan-05 | 17.6 | 27.2 | 6400 | 12.9 | 6.9 | 640 | 3580 | 1.19 | 0.002 | 0.014 | -0.001 |
| 32-59 | 9-Aug-04 | 14.4 | 39.4 | 5000 | 13.1 | 6.6 | 450 | 2050 | 0.12 | 0.008 | 0.020 | -0.001 |
| 32-59 | 24-Jan-05 | 14.1 | 40.0 | 4520 | 12.7 | 7.4 | 460 | 1960 | 0.14 | 0.006 | 0.005 | -0.001 |
| 5-03 | 9-Aug-04 | 19.2 | 40.3 | 4350 | 15.2 | 8.5 | 470 | 1710 | 0.09 | 0.002 | 0.005 | -0.001 |
| 5-03 | 24-Jan-05 | 18.4 | 45.7 | 4230 | 13.8 | 9.1 | 400 | 1900 | -0.02 | 0.001 | 0.001 | -0.001 |
| MW-24 | 31-Aug-04 | 50.1 | 50.3 | | | | | | | | | |
| MW-24 | 17-Jun-05 | 50.1 | 50.3 | | | | | | | | | |

| Well | U-nat (mg/L) | Th-230 (pCi/L) | Pb-210 (pCi/L) | Ra-226 (pCi/L) | Ra-228 (pCi/L) | Gross Alpha (pCi/L) |
|---|---|---|---|---|---|---|
| 31-61 | 0.127 | 2.0 | 0.0 | 0.8 | 0.7 | 0.0 |
| 31-61 | 0.143 | -0.1 | 3.6 | 2.0 | 2.0 | 0.0 |
| 32-59 | 0.157 | 0.2 | 0.0 | 0.3 | 6.1 | 0.0 |
| 32-59 | 0.181 | -0.1 | 1.9 | 0.6 | 0.4 | 66.5 |
| 5-03 | 0.004 | -0.5 | 0.0 | 0.5 | 0.3 | 18.3 |
| 5-03 | 0.003 | -0.4 | 1.6 | 0.7 | 0.7 | 4.5 |
| MW-24 | | | | | | |
| MW-24 | | | | | | |

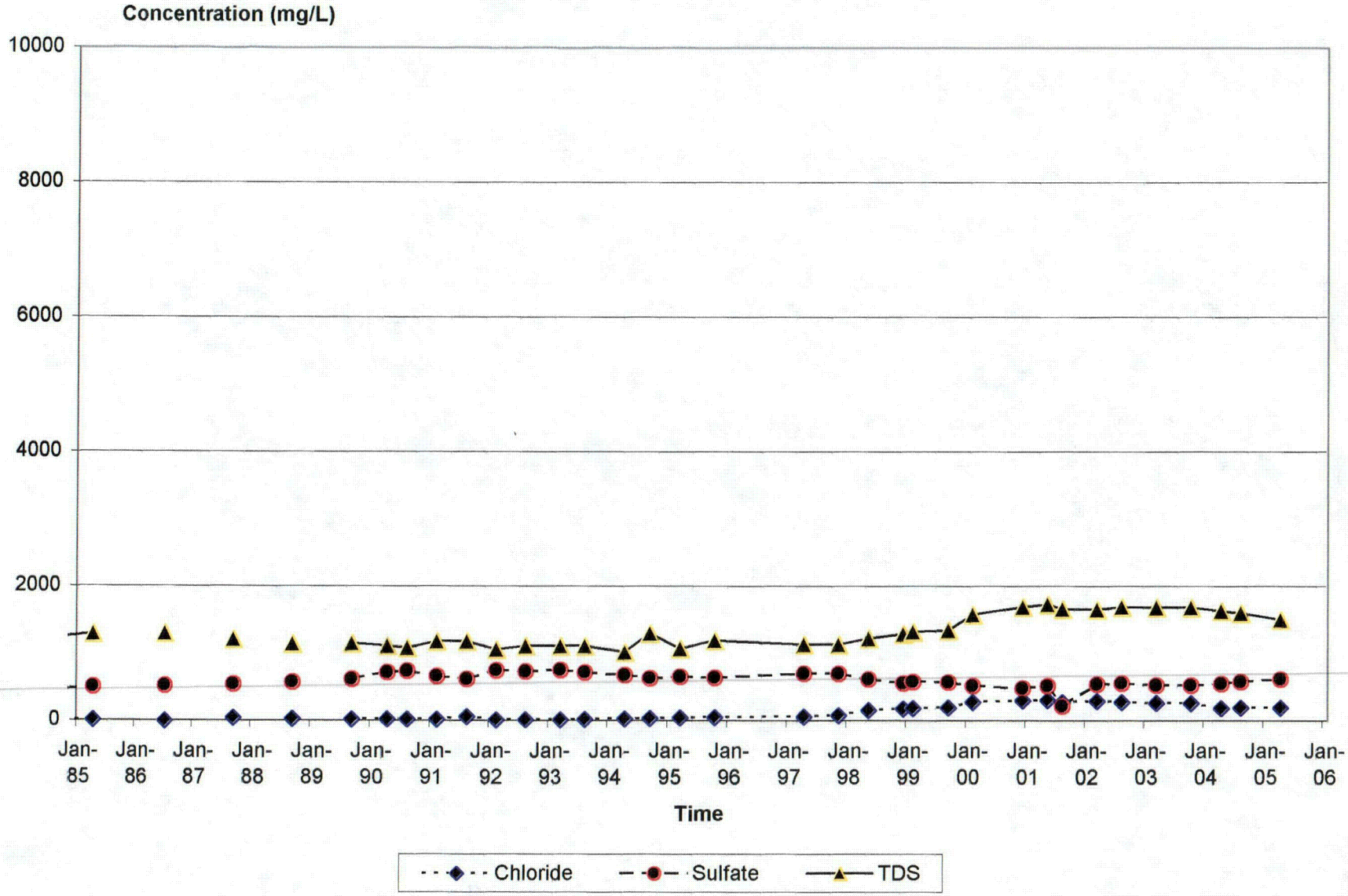
A negative sign corresponds to "less than"
Monitor Well MW-24 contained insufficient water for sample collection.

# APPENDIX B

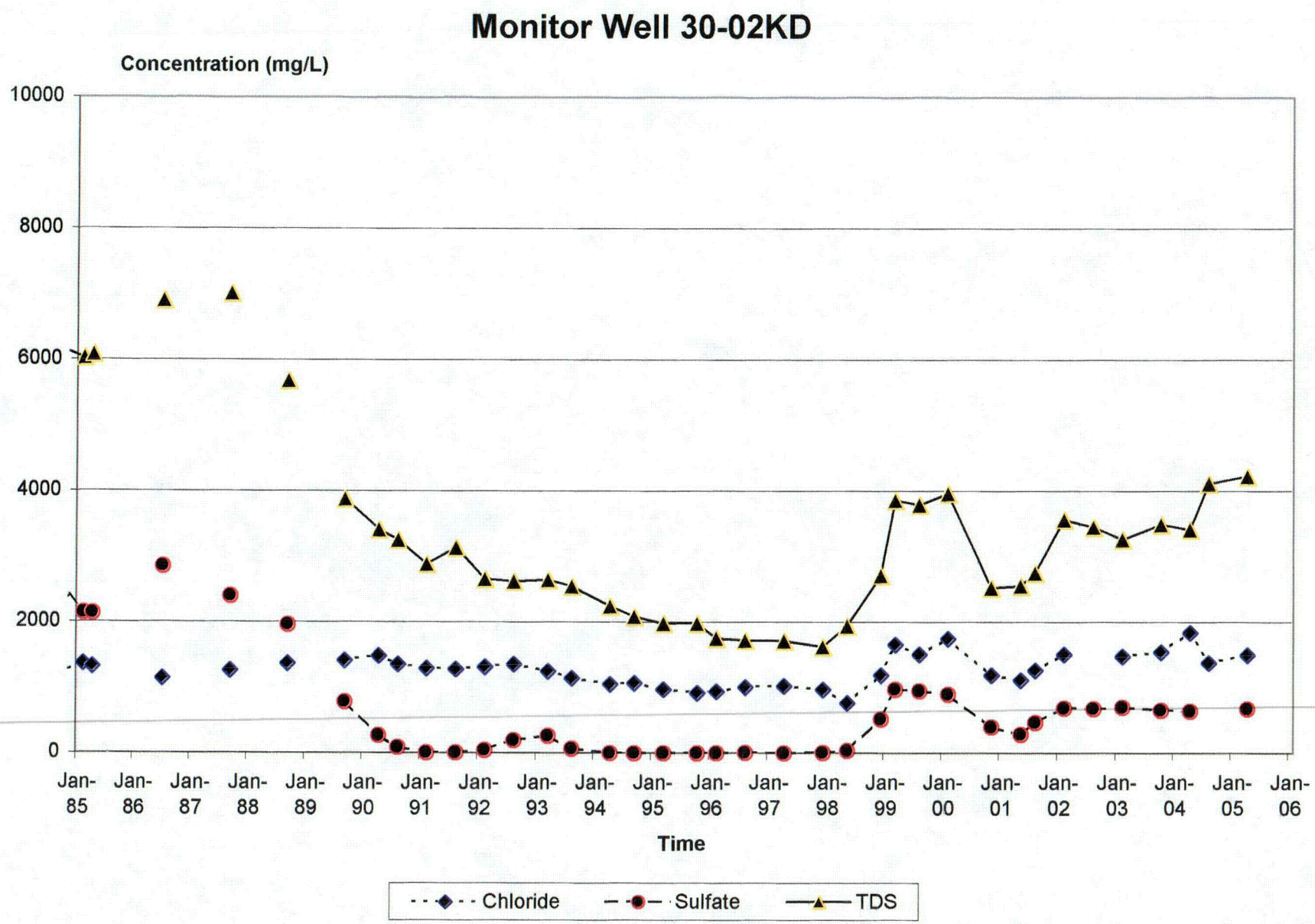
## TIME vs CONCENTRATION CHARTS

## DAKOTA, TRES HERMANOS A, TRES HERMANOS B, ALLUVIUM

# Monitor Well 17-01KD

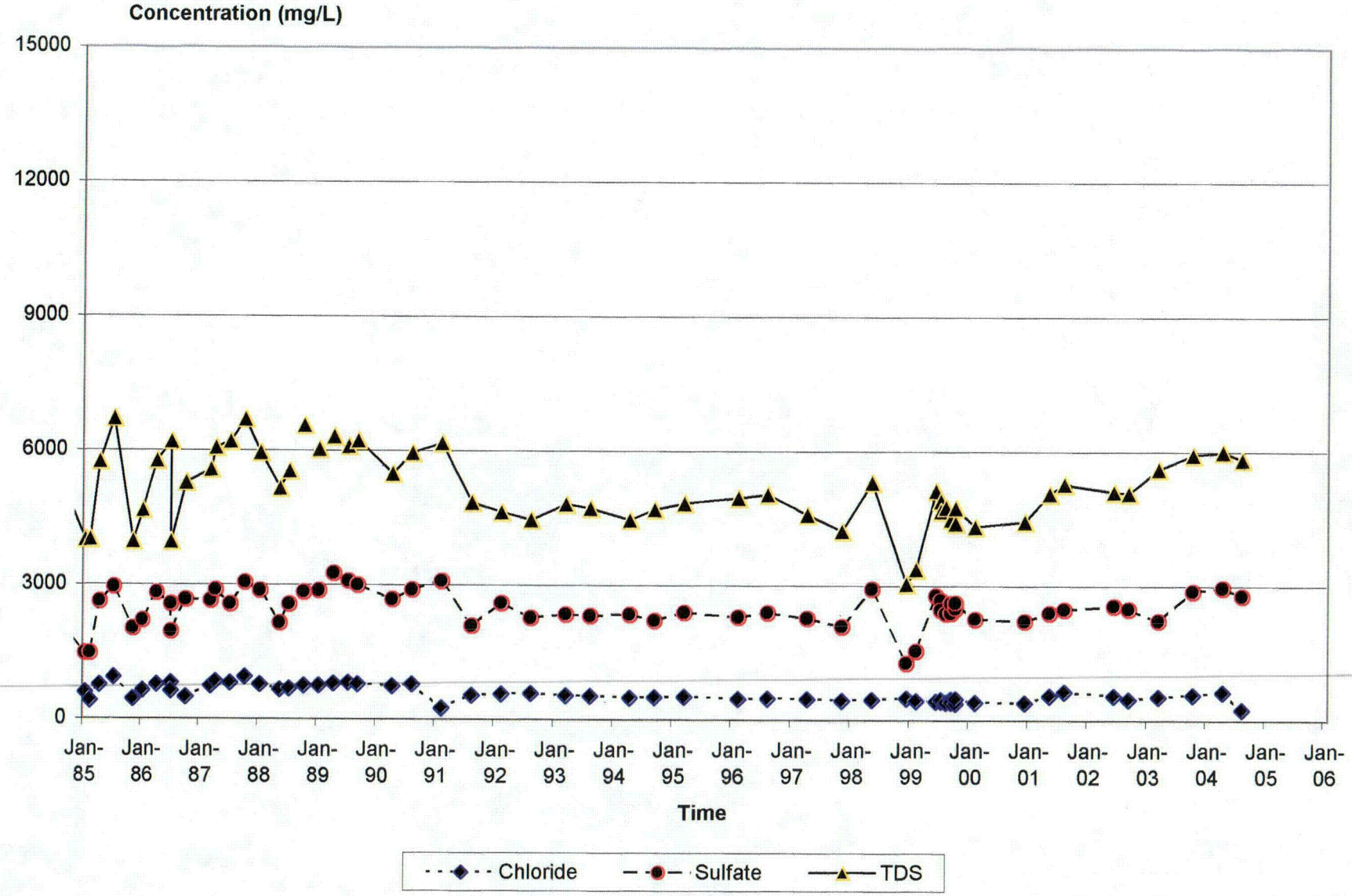



C02


Monitor Well 30-02KD
Concentration (mg/L)
10000
8000
6000
4000
2000
0
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

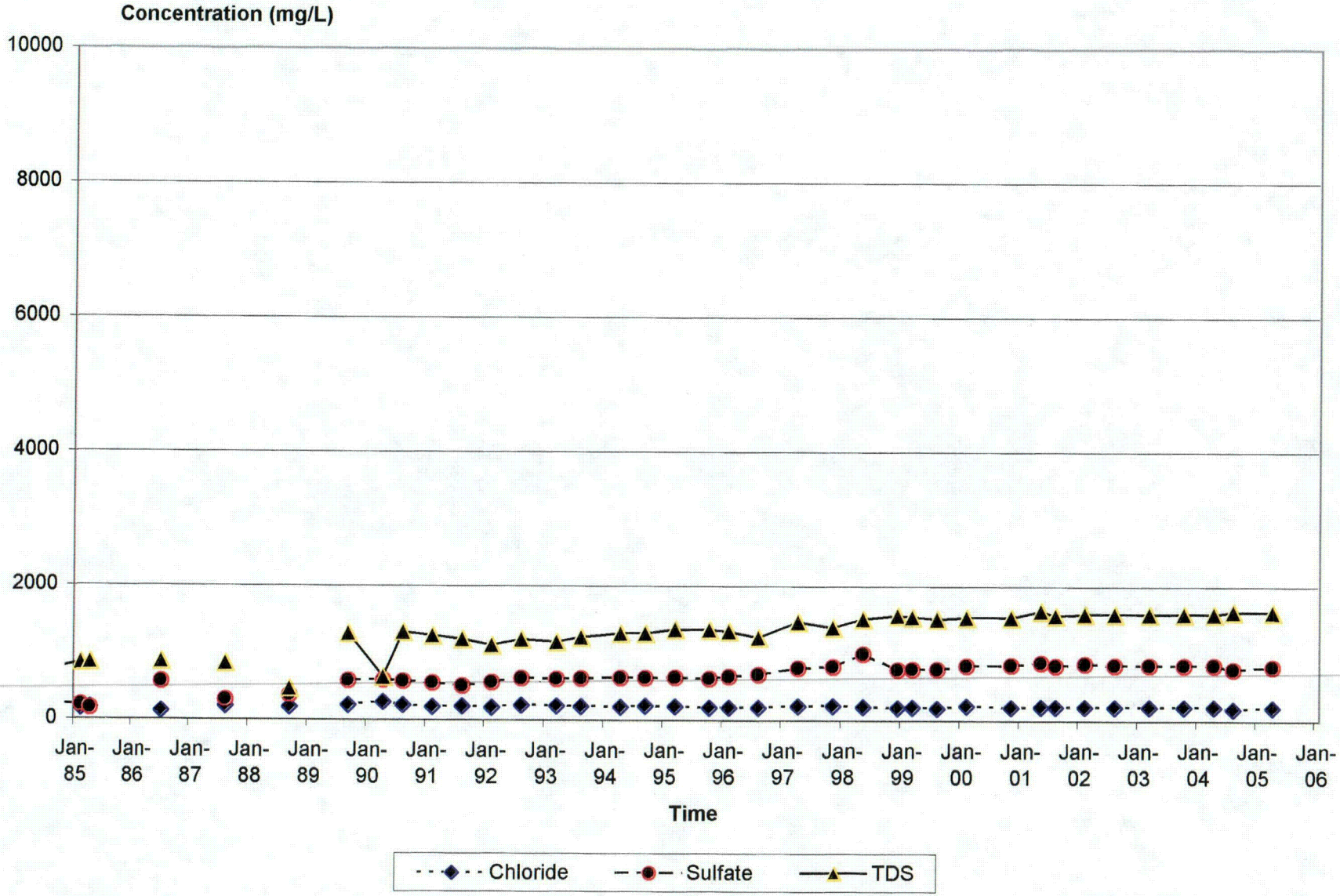
C03

# Monitor Well 30-48KD



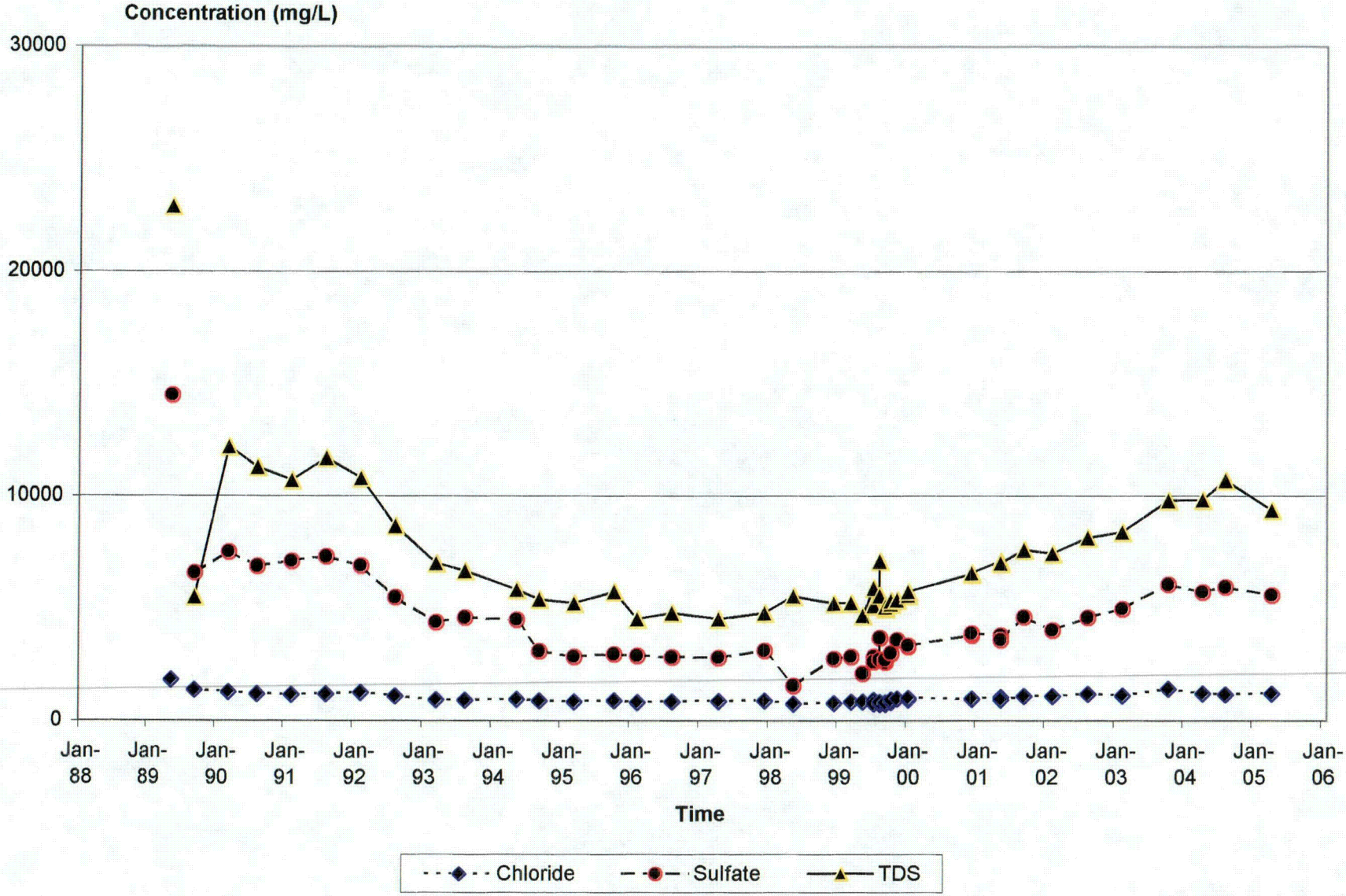

COF

# Monitor Well 32-45KD



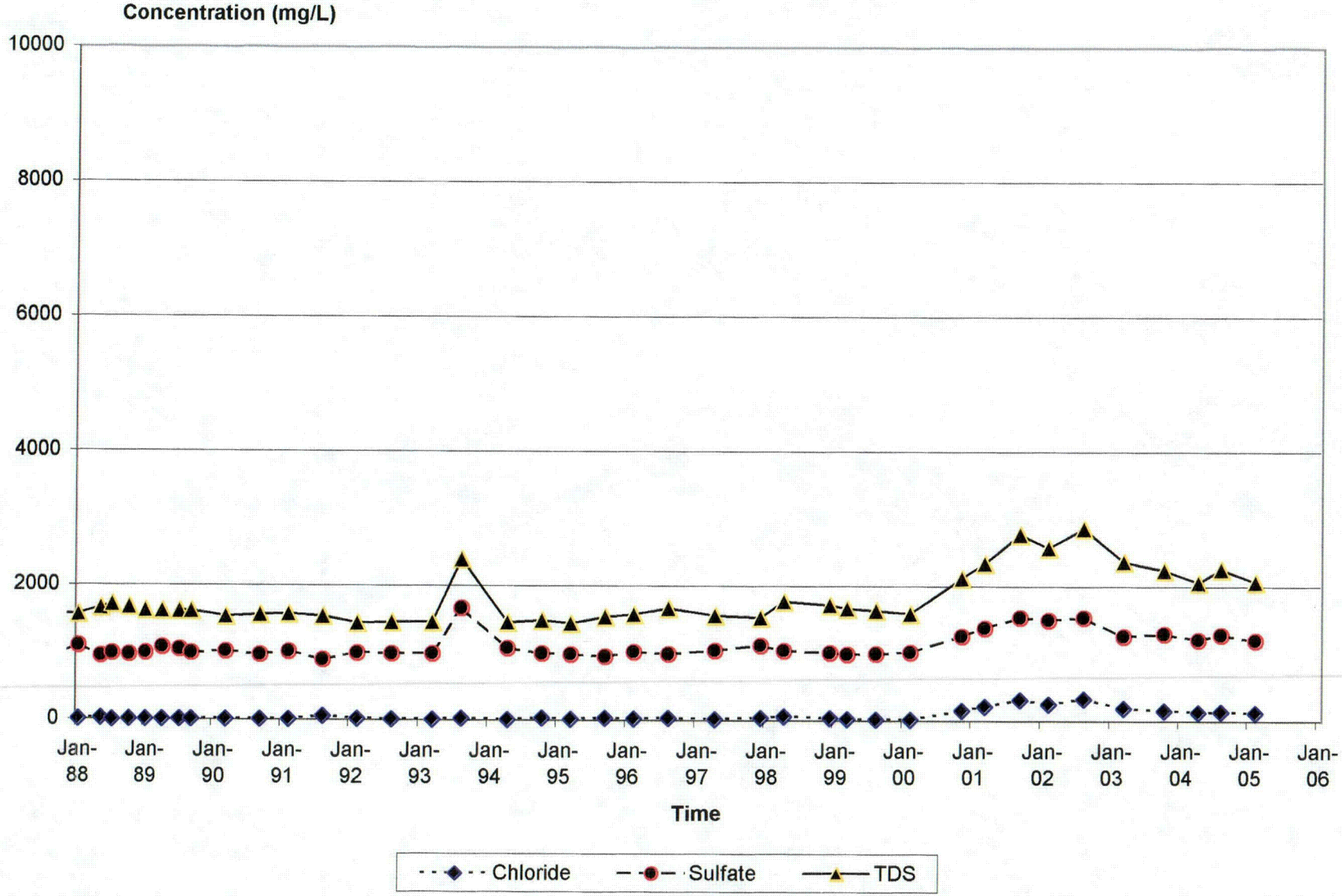

C05

# Monitor Well 36-06KD



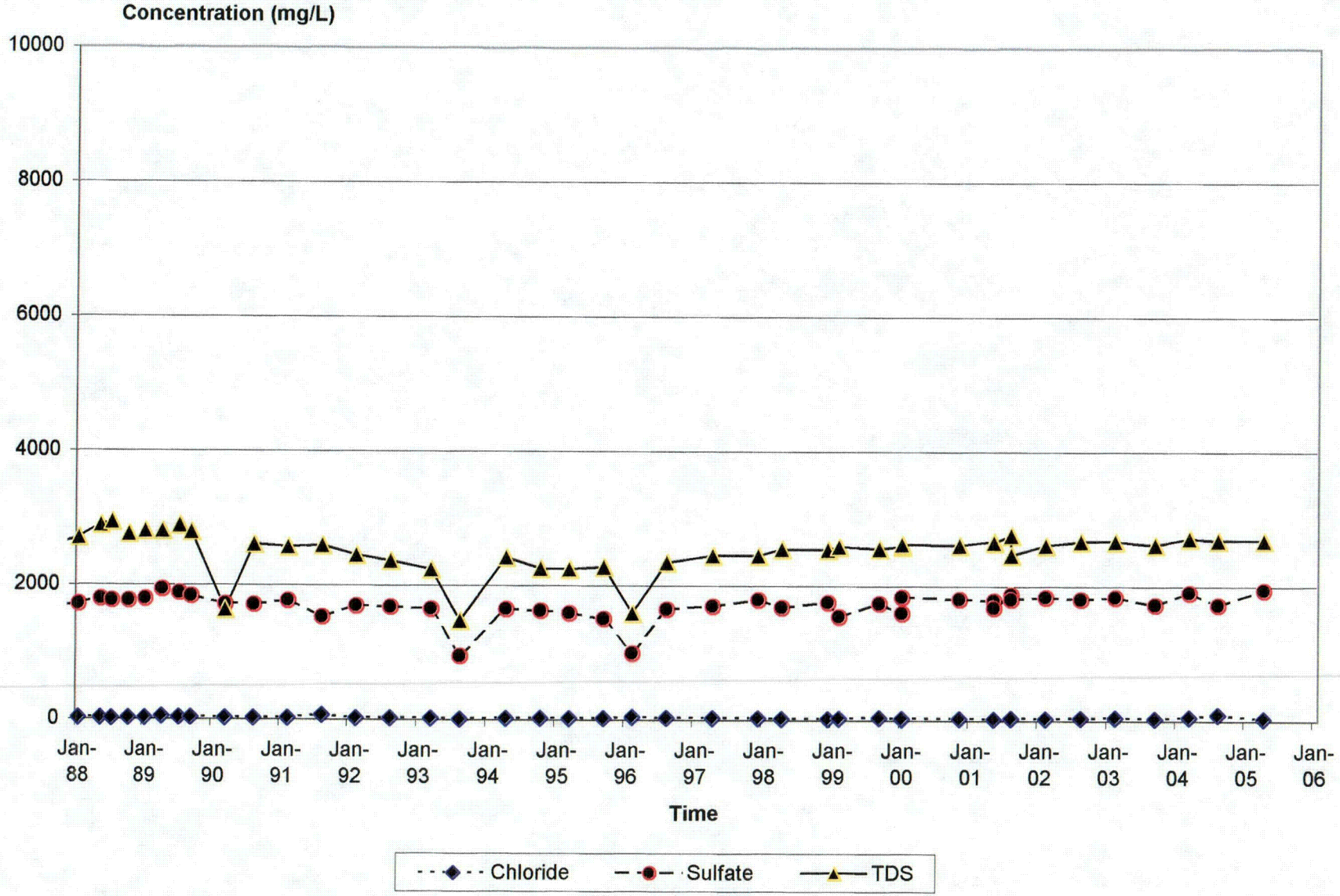

C06

# Monitor Well 31-01TRA

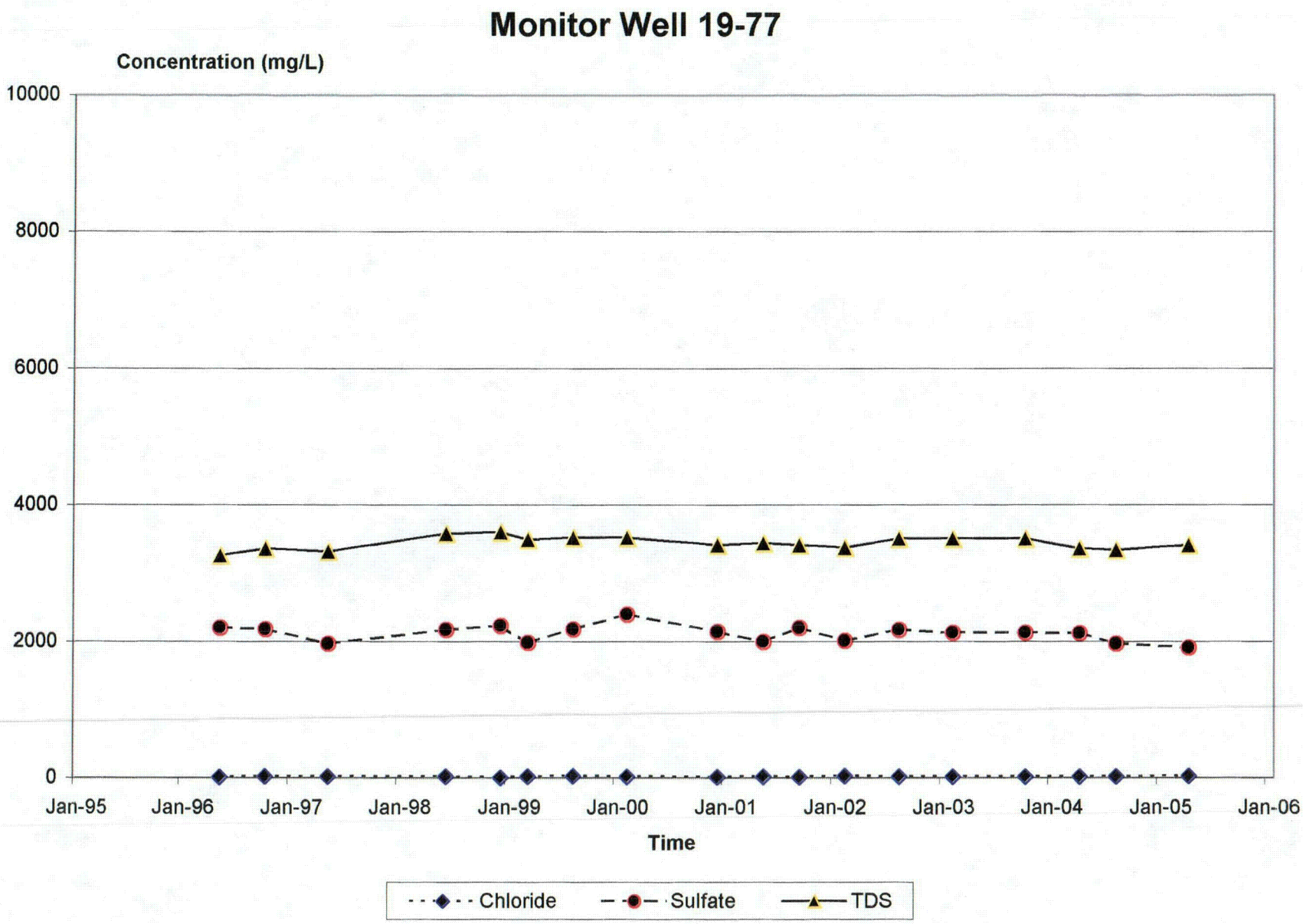



C07

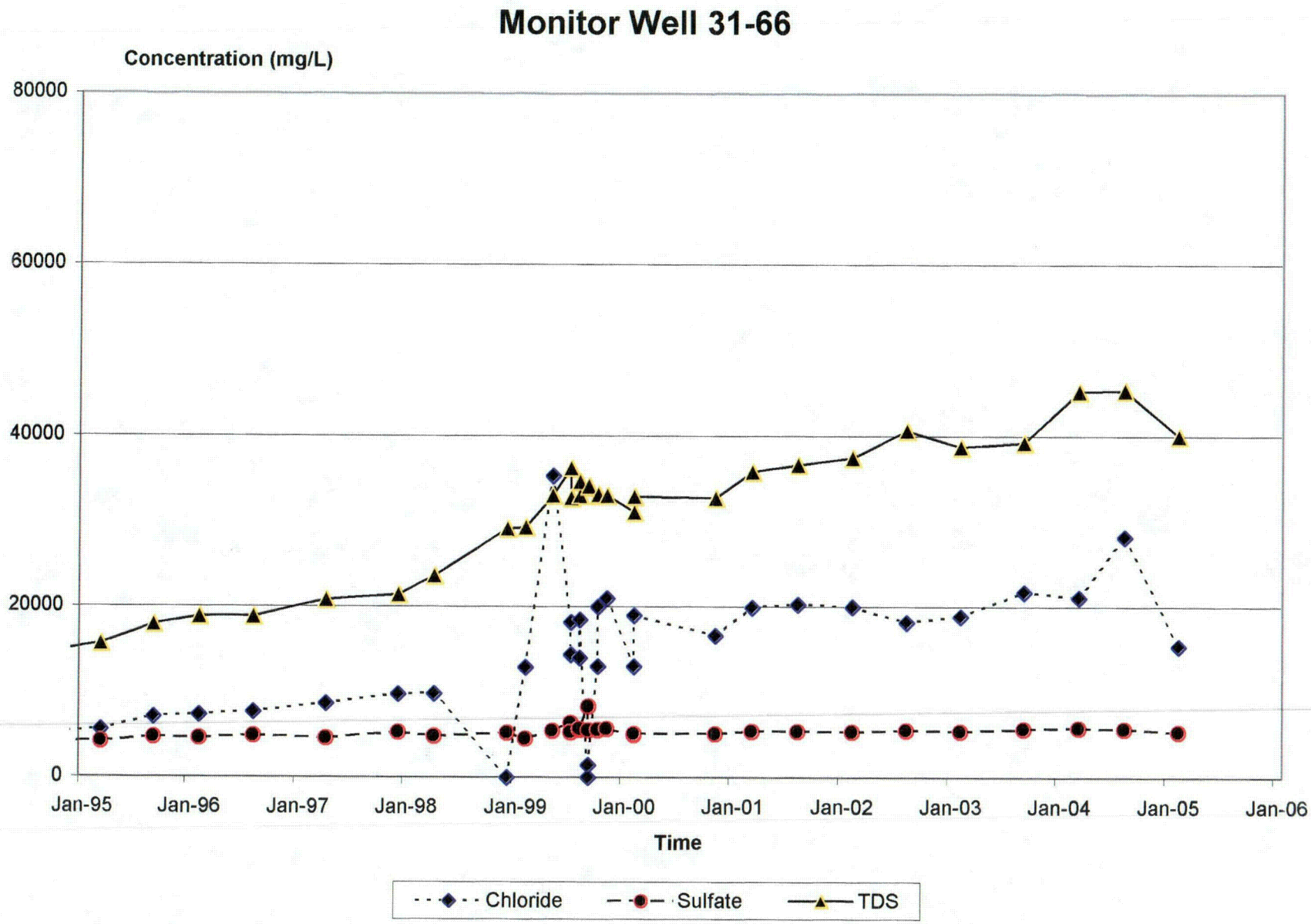
# Monitor Well 33-01TRA

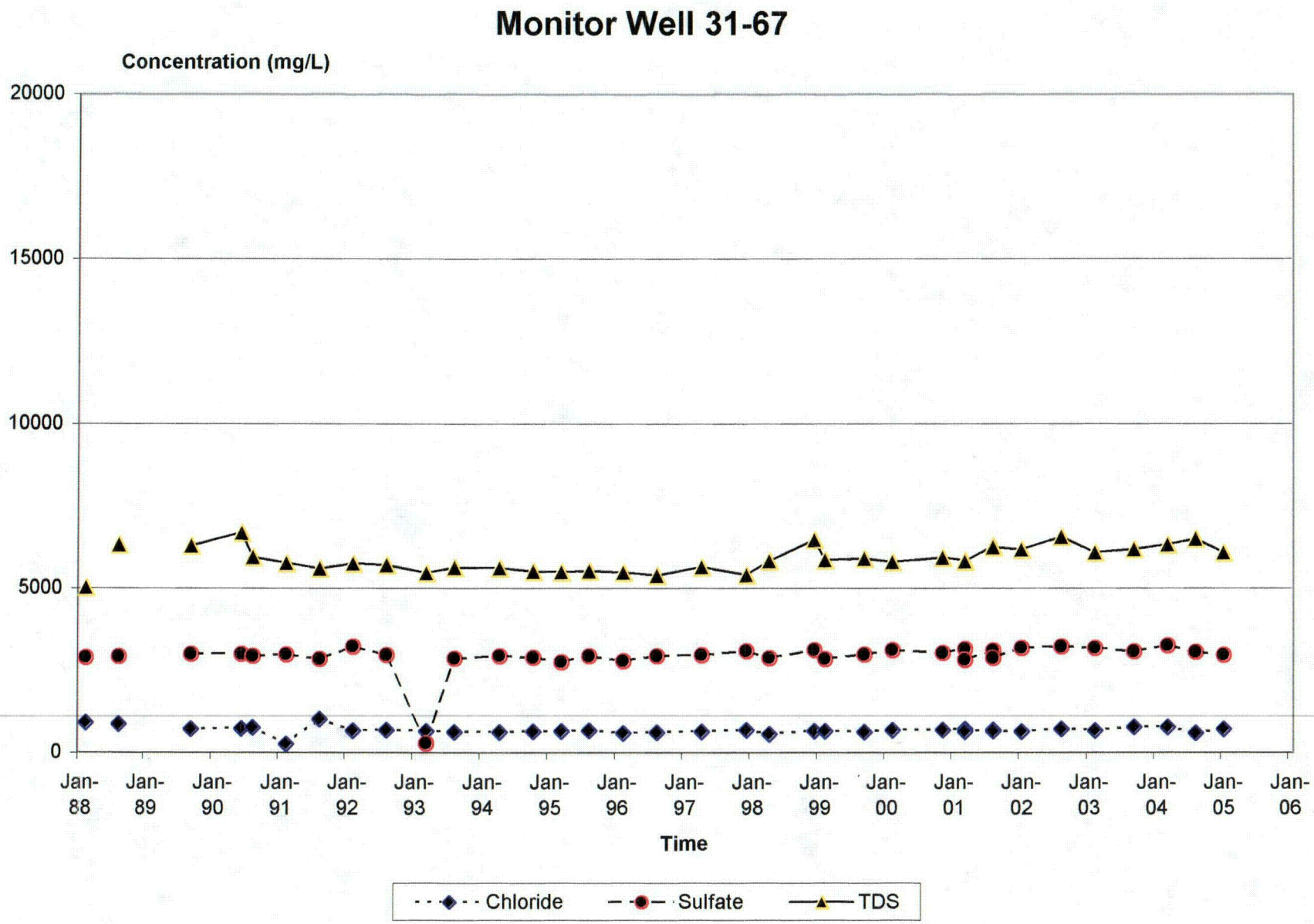



C08

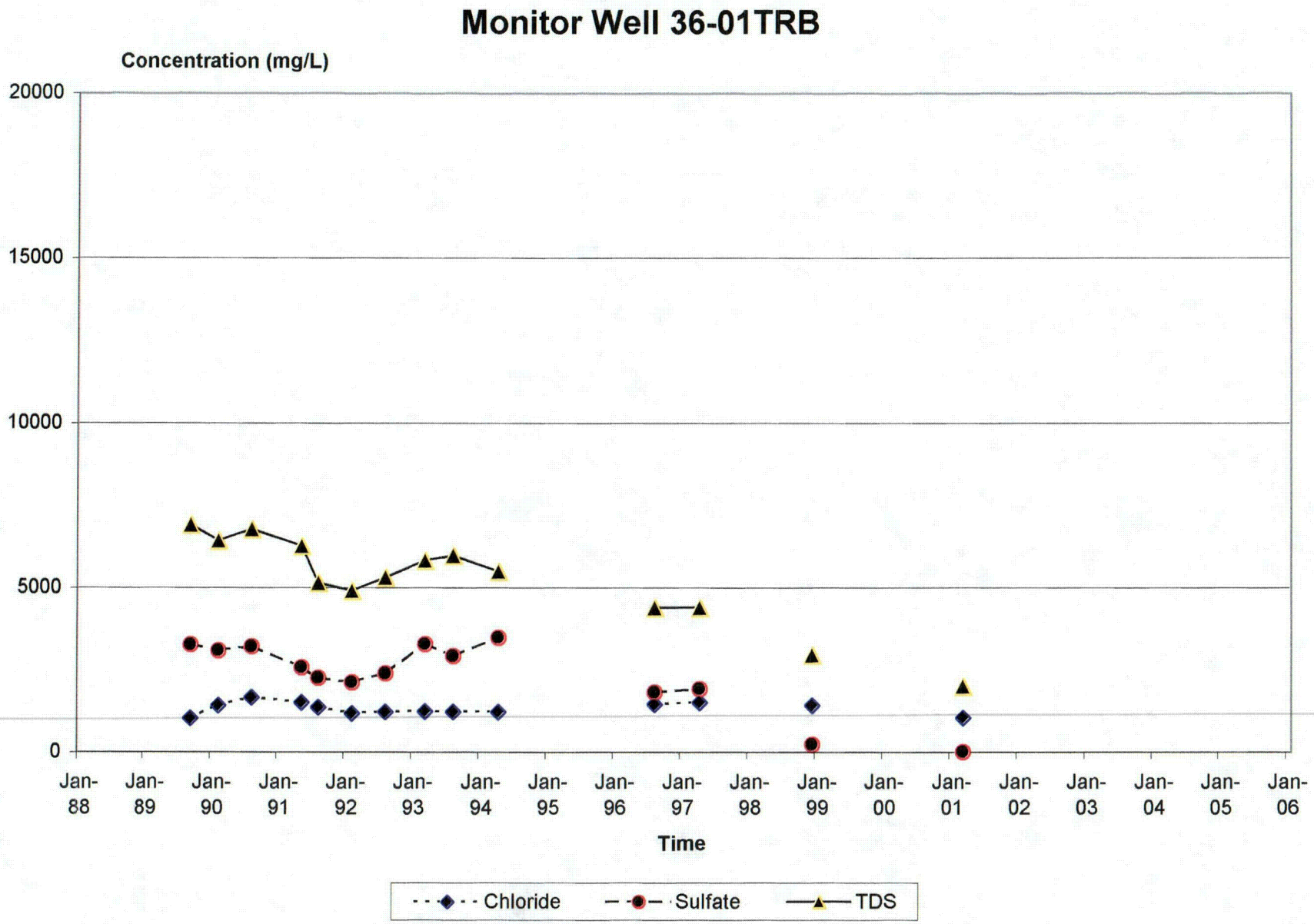

Monitor Well 19-77
Concentration (mg/L)
10000
8000
6000
4000
2000
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

C09


Monitor Well 31-66
Concentration (mg/L)
80000
60000
40000
20000
0
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

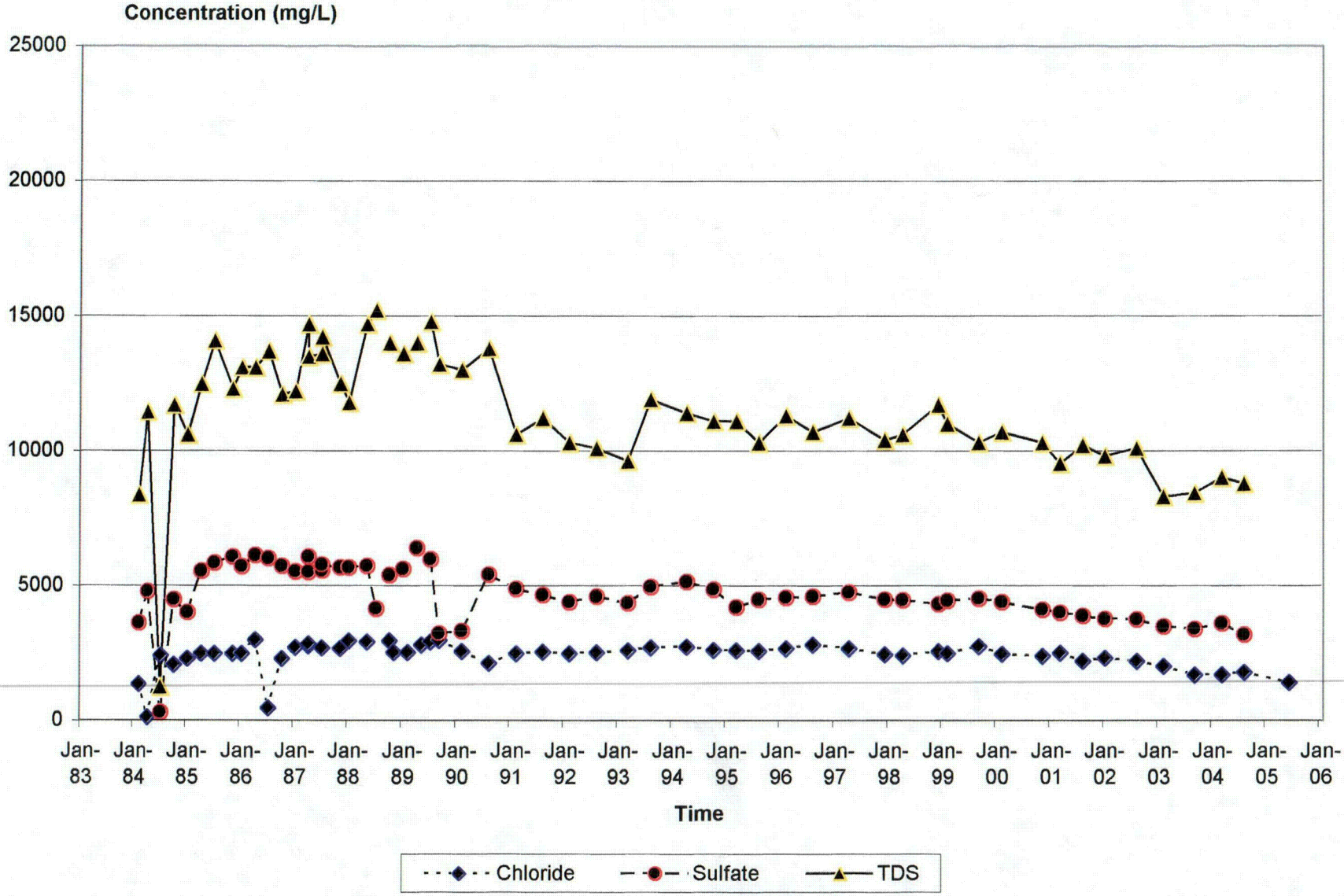

Monitor Well 31-67
Concentration (mg/L)
20000
15000
10000
5000
0
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

C11


Monitor Well 36-01TRB
Concentration (mg/L)
20000
15000
10000
5000
0
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

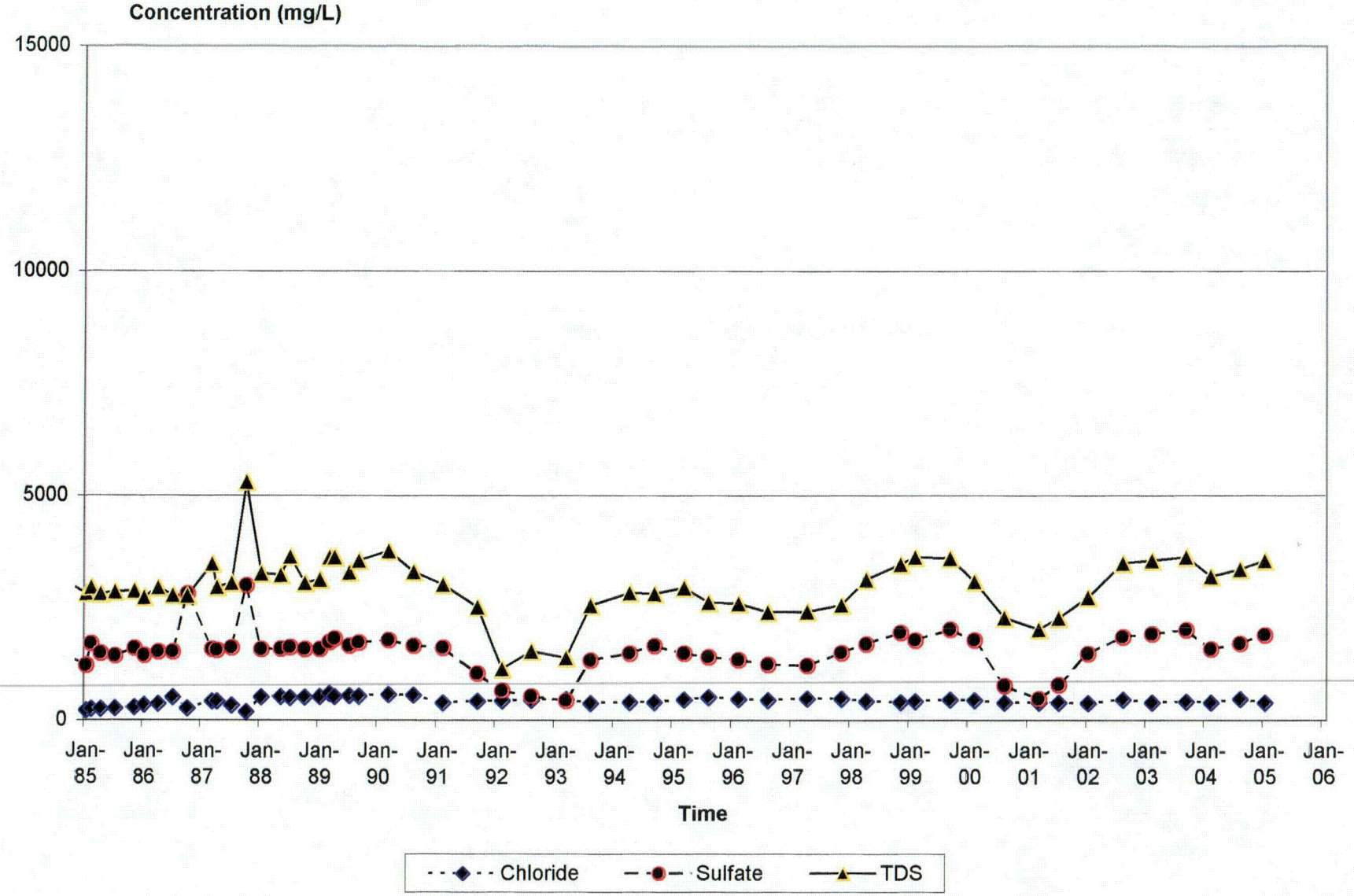
C12

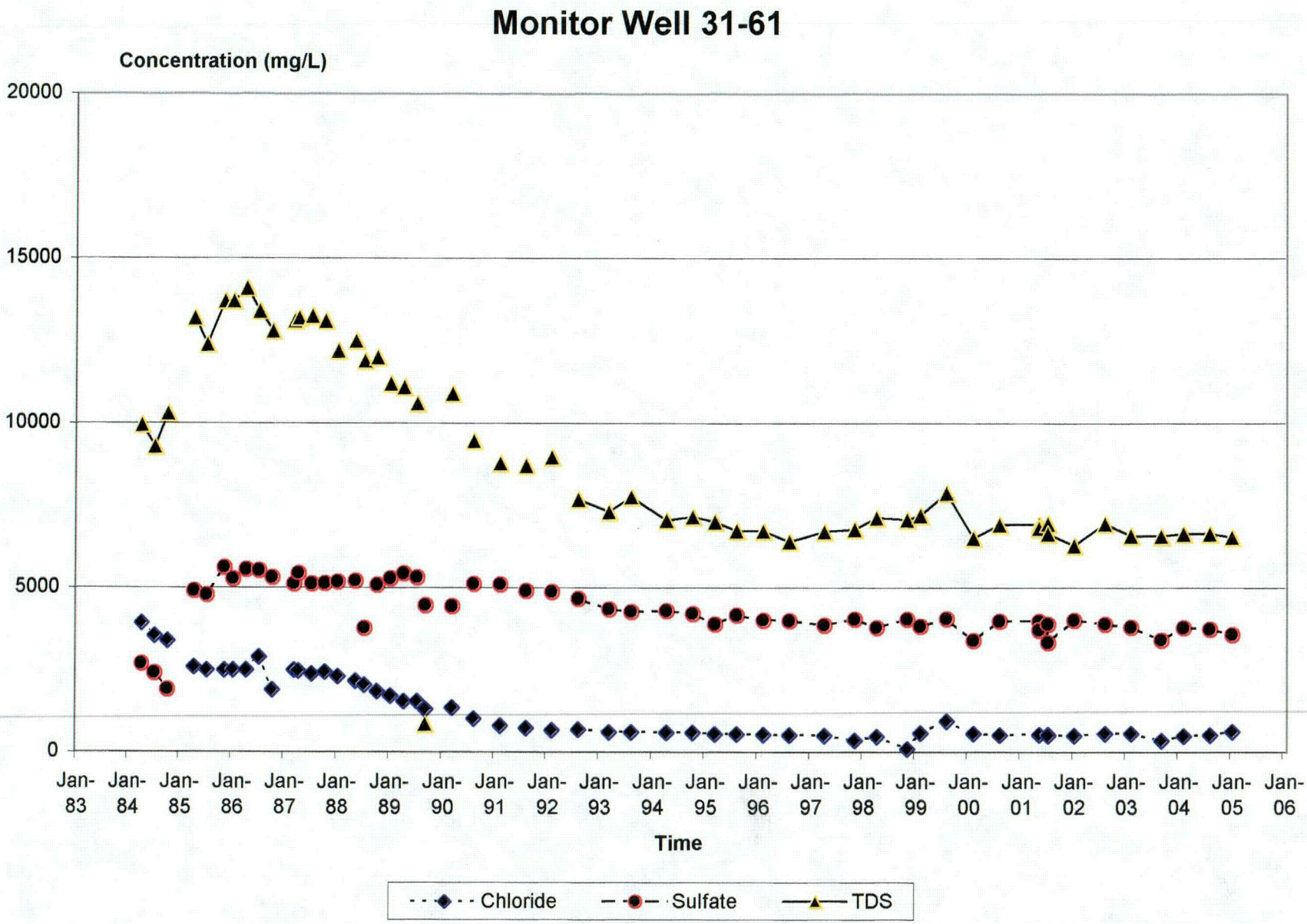
# Monitor Well 36-02TRB



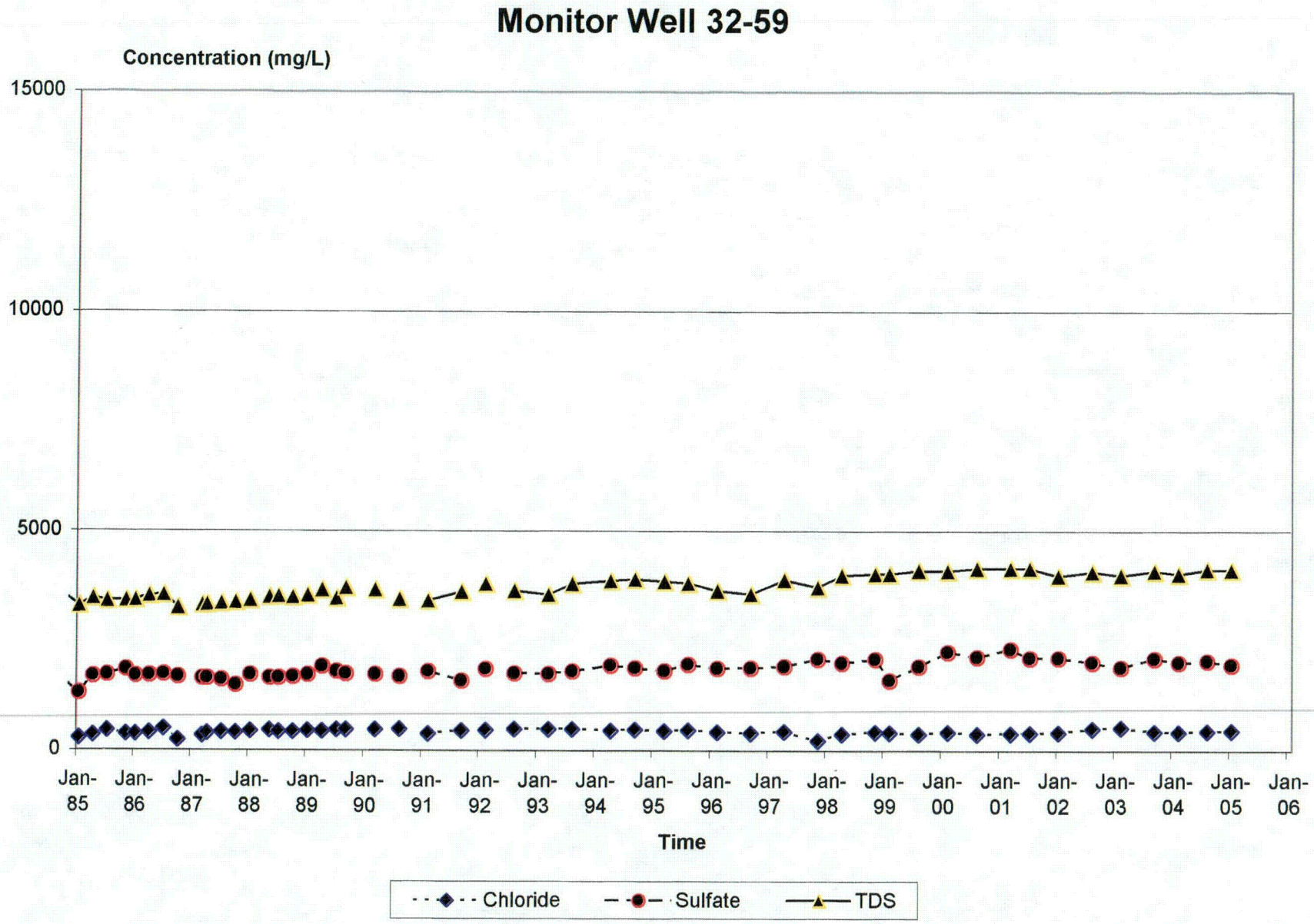

C13

# Monitor Well 5-03




Monitor Well 31-61
Concentration (mg/L)
20000
15000
10000
5000
0
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

C15

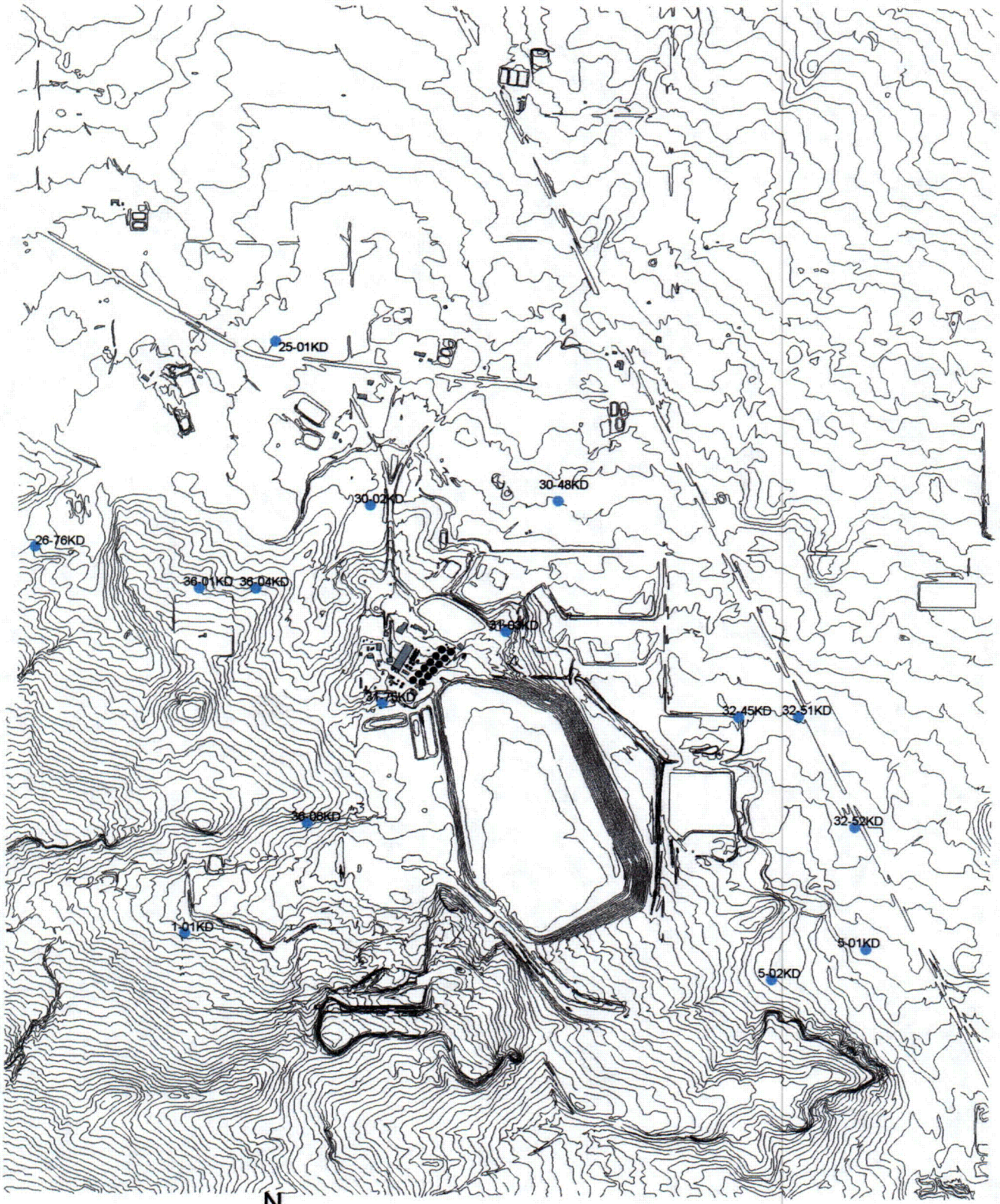

Monitor Well 32-59
Concentration (mg/L)
15000
10000
5000
0
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Time
Chloride
Sulfate
TDS

C16

## PLUME PLOTS

## DAKOTA, TRES HERMANOS B, ALLUVIUM

# RIO ALGOM MINING LLC
## LICENSE SUA-1473
# ANTIMONY
### 2005 CONCENTRATION ISOPLETH
### GROUND WATER PROTECTION STANDARD = 0.05 mg/L



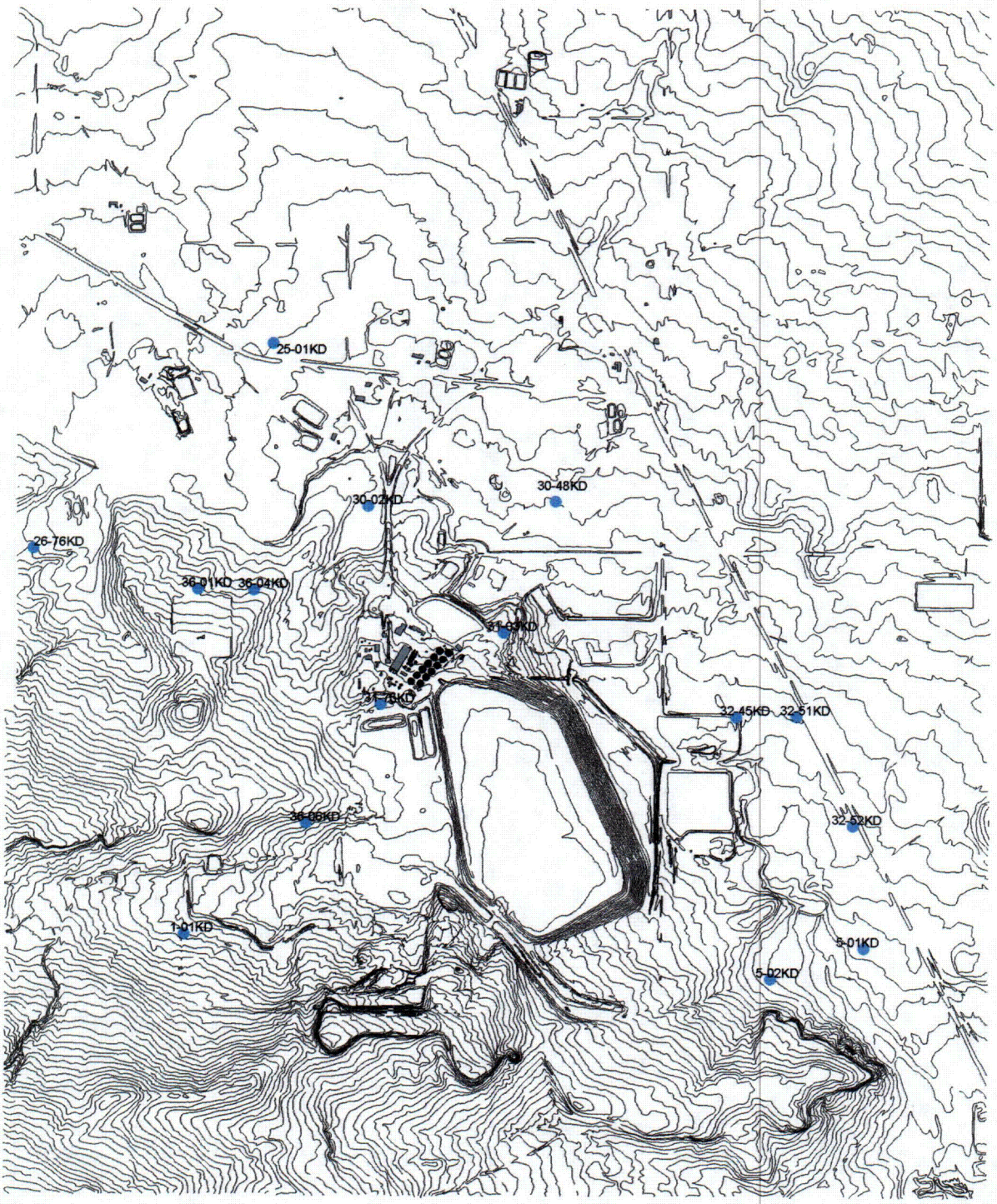

N

1 inch = 2300 feet

DAKOTA

Antimony concentrations in all wells are at or below the groundwater protection standard.

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# ARSENIC
## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.1 mg/L




N

1 inch = 2300 feet

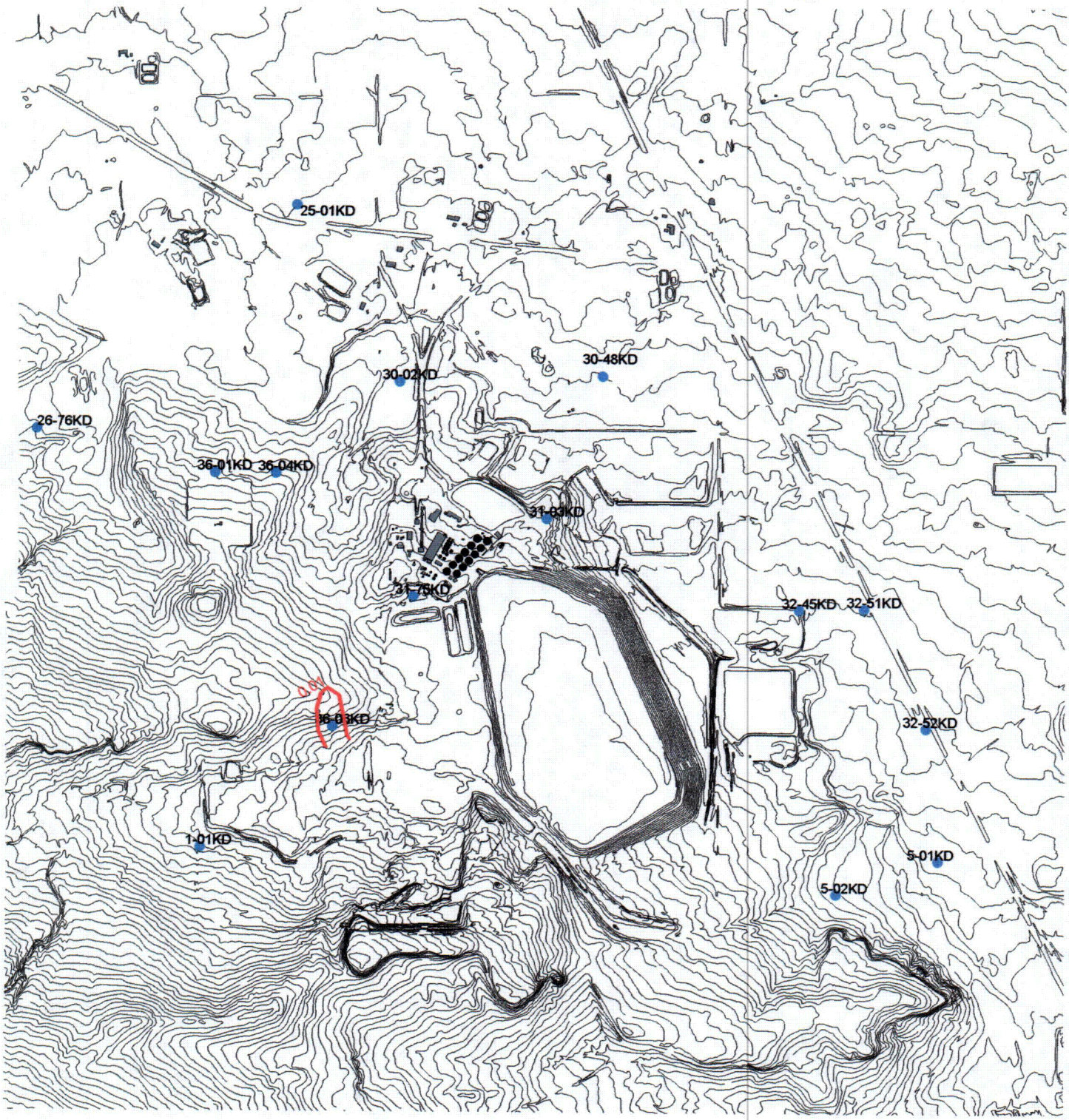
DAKOTA

Arsenic concentrations in all wells are at or below the groundwater protection standard.

C18

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# BERYLLIUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.01 mg/L




1 inch = 800 feet

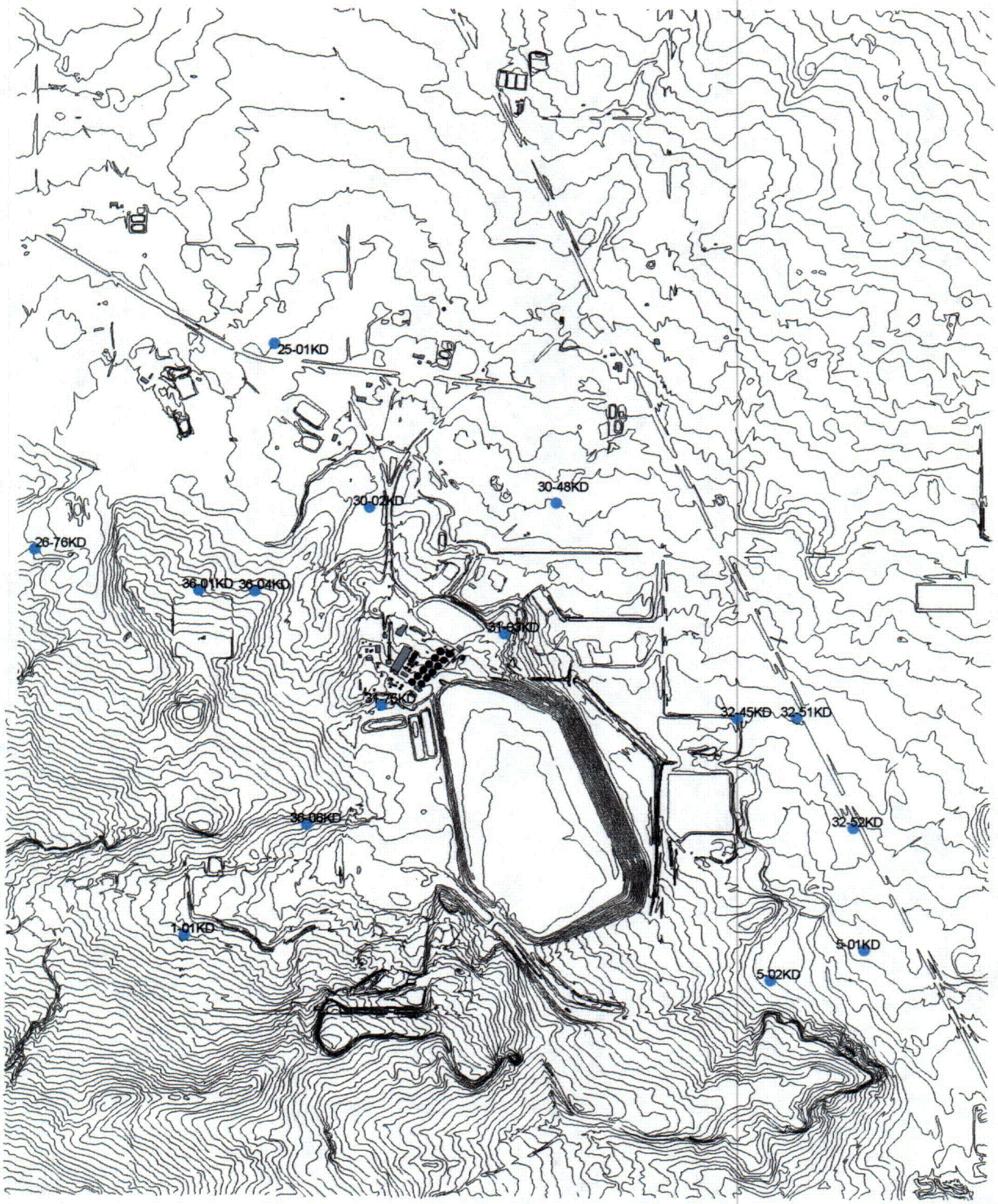
N

DAKOTA

C19

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# CADMIUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.01 mg/L




N

1 inch = 2300 feet

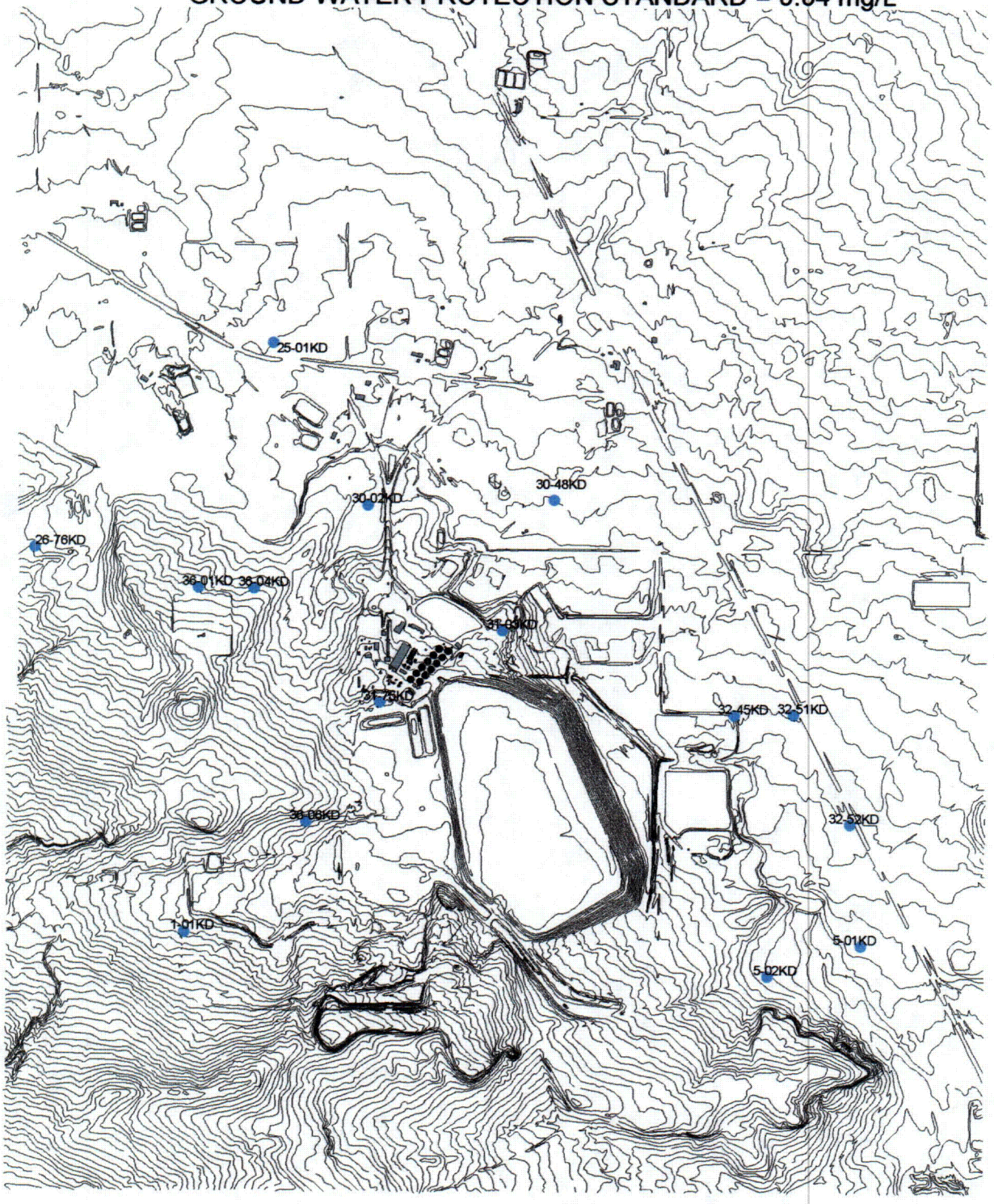
DAKOTA

cadmium concentrations in all wells are at or below the groundwater protection standard.

C20

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# CYANIDE

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.04 mg/L




N

1 inch = 2300 feet

Cyanide concentrations in all wells are at or below the groundwater protection standard.

DAKOTA

C21

RIO ALGOM MINING LLC

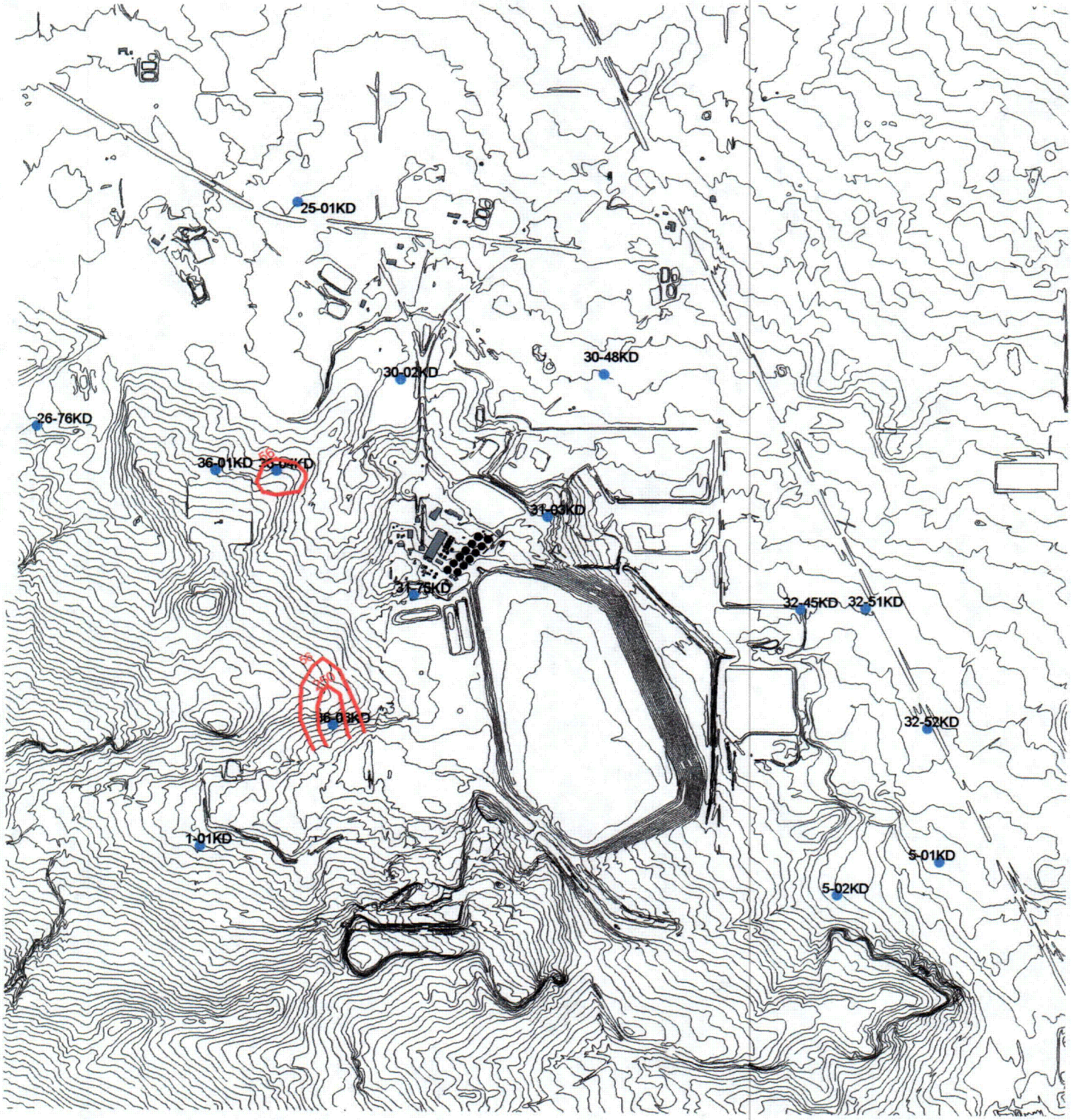
LICENSE SUA-1473

# GROSS ALPHA

(EXCLUDES URANIUM AND RADON)

2005 CONCENTRATION ISOPLETH

GROUND WATER PROTECTION STANDARD = 56 pCi/L




1 inch = 800 feet

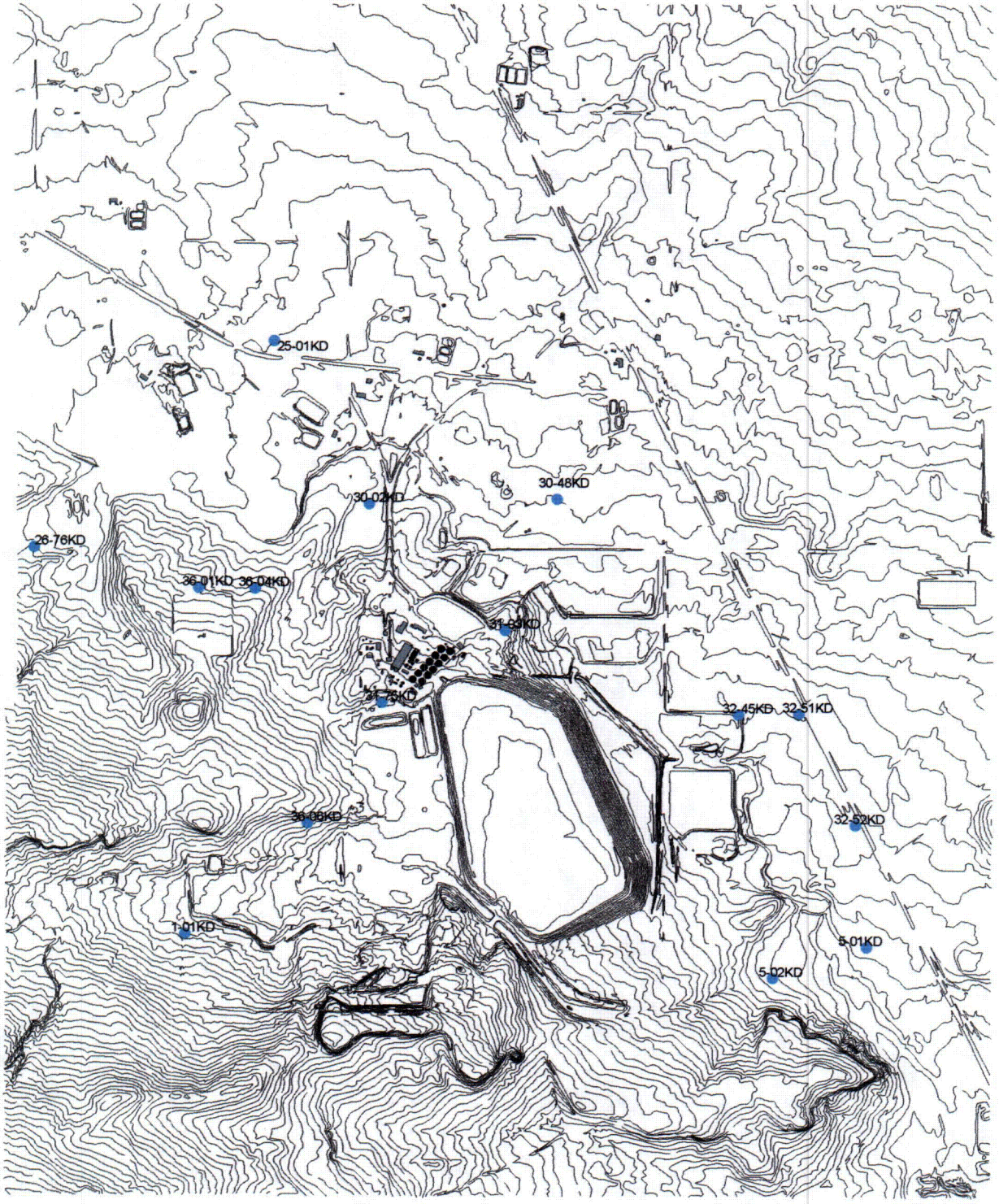
N

DAKOTA

C22

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# LEAD

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.14 mg/L




N

1 inch = 2300 feet

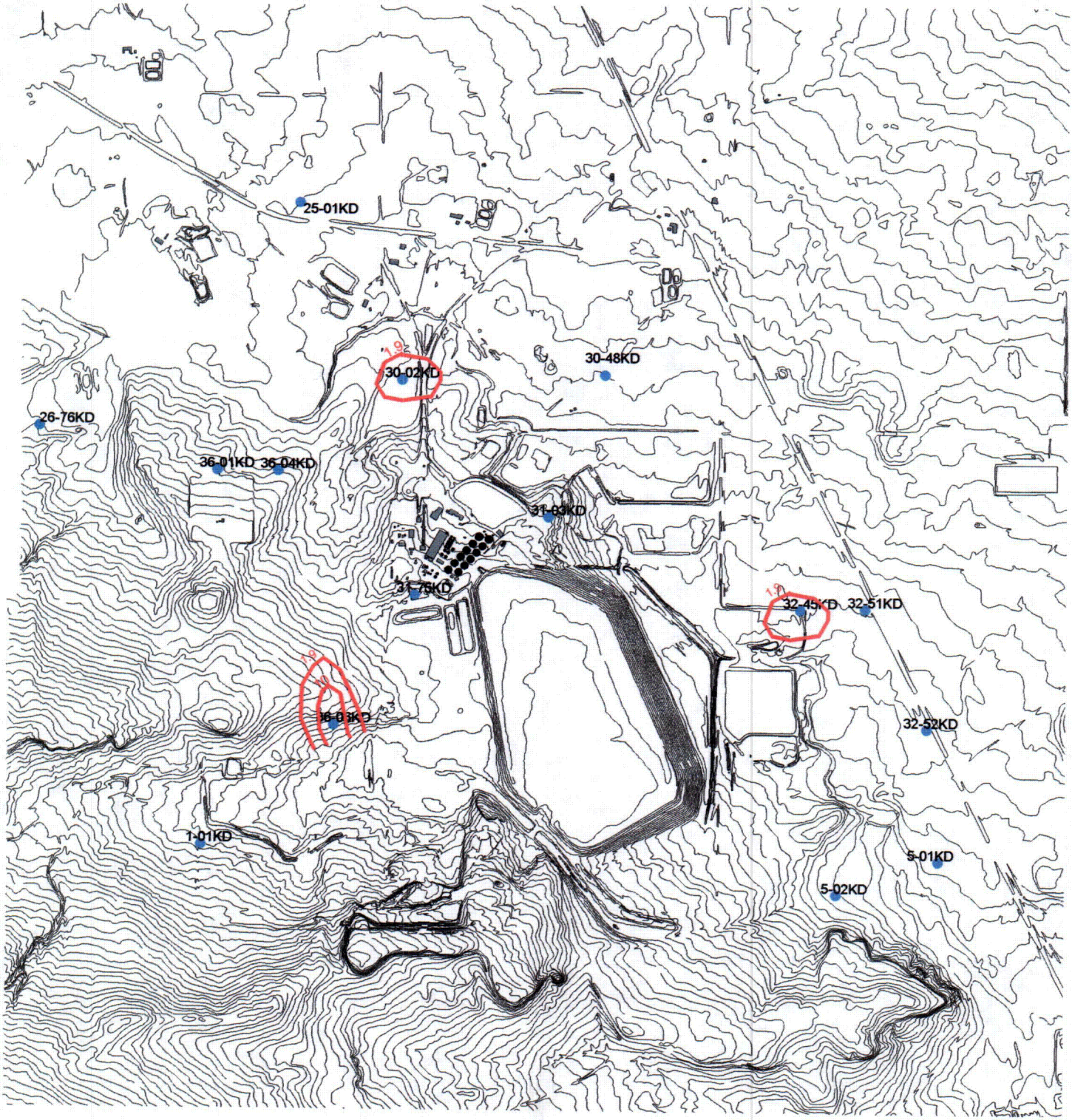
DAKOTA

Lead concentrations in all wells are at or below the groundwater protection standard.

C23

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# LEAD-210

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 1.9 pCi/L




1 inch = 800 feet

DAKOTA

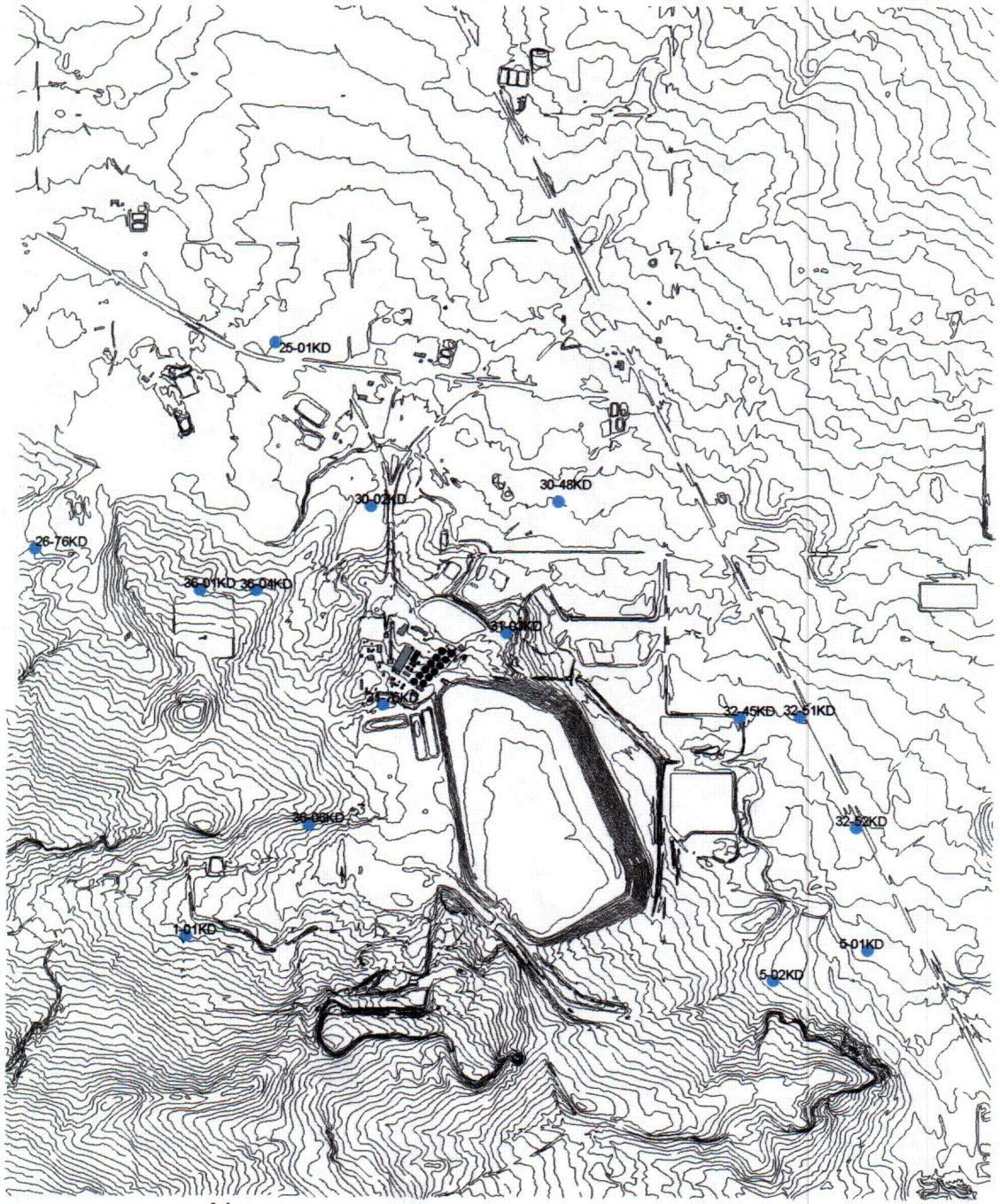
N

C24

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# MOLYBDENUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.06 mg/L




N

1 inch = 800 feet

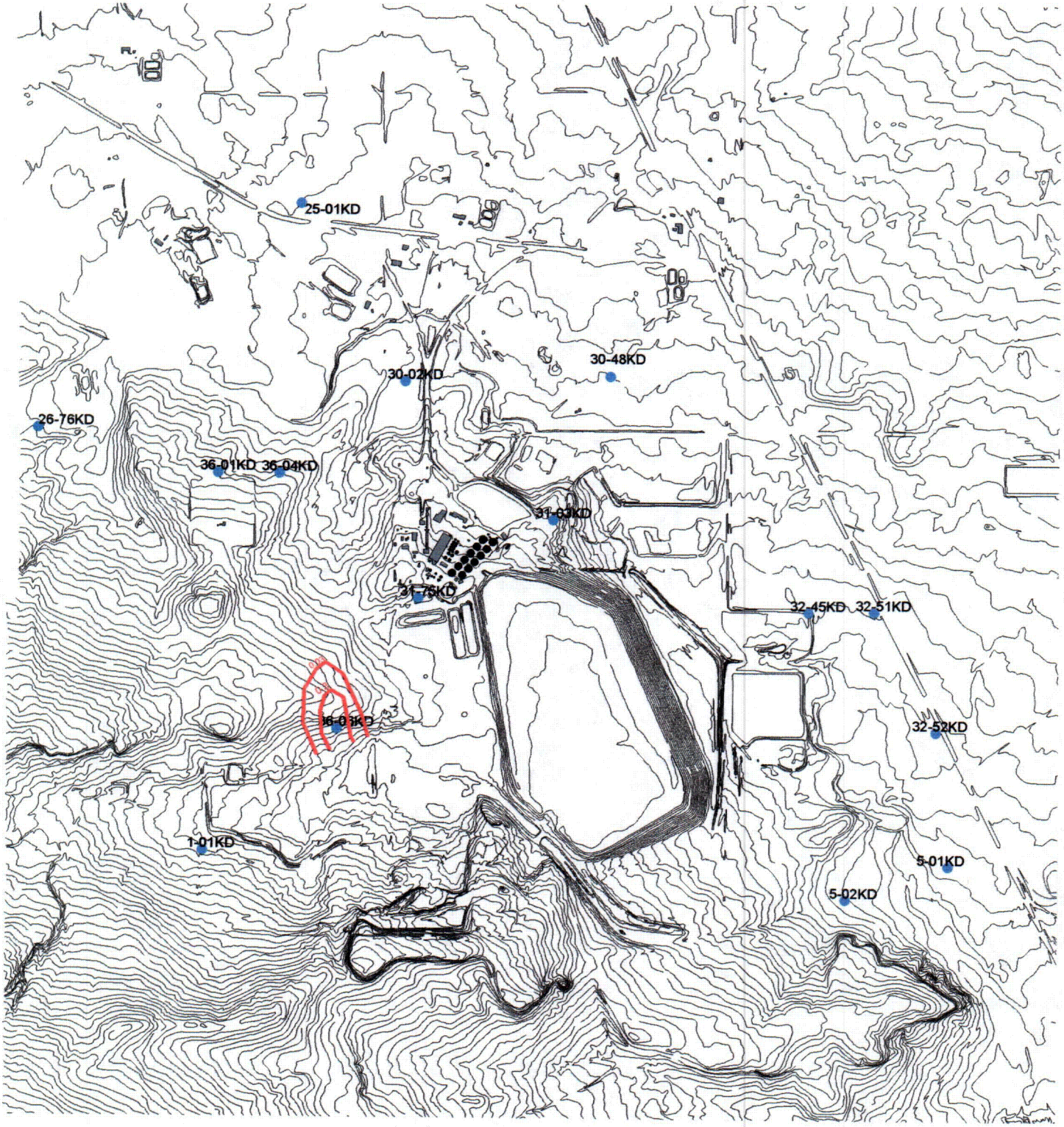
DAKOTA

Molybdenum concentrations in all wells are at or below the groundwater protection standard.

C25

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# NICKEL

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.03 mg/L




DAKOTA

1 inch = 800 feet

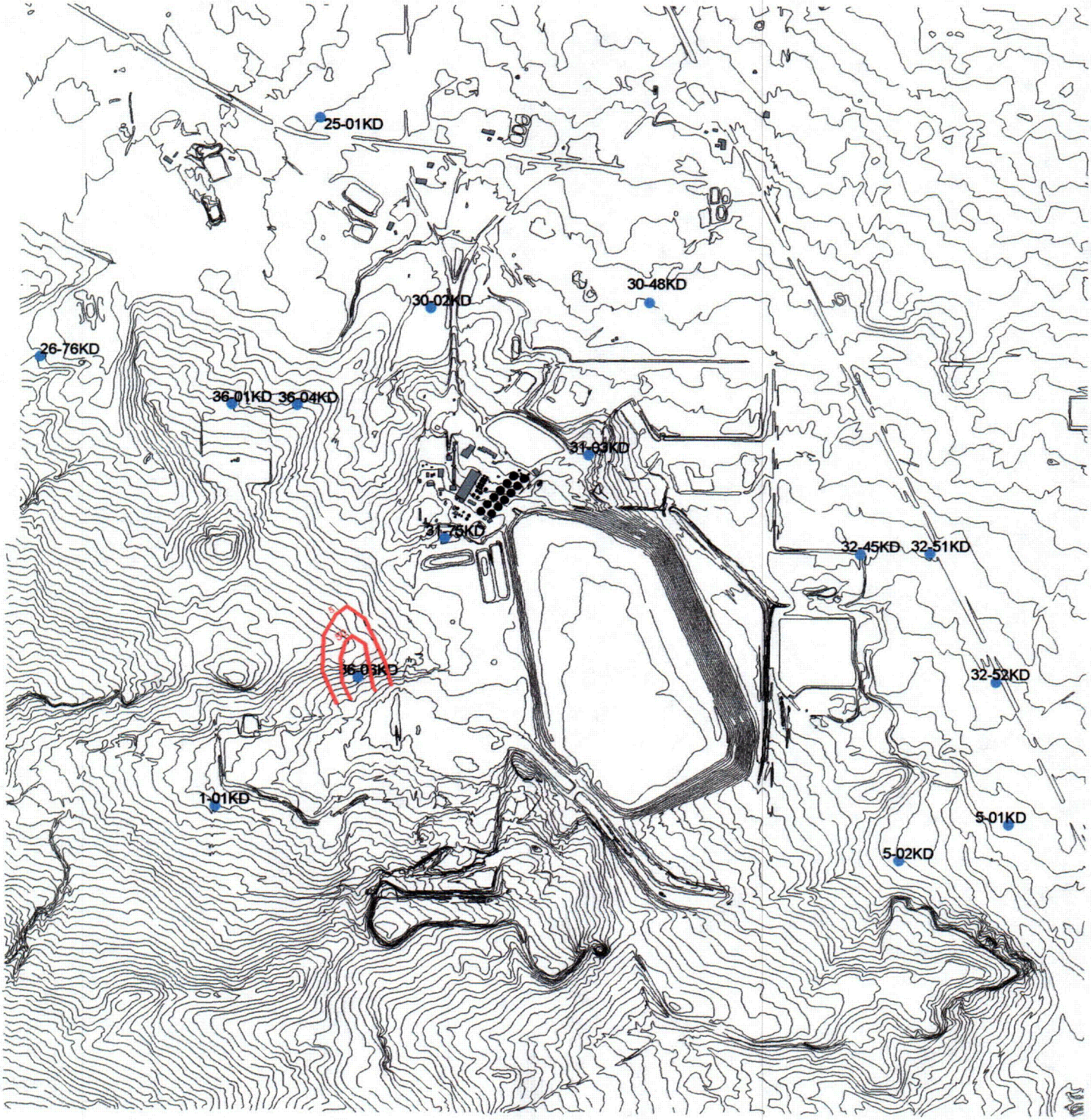
N

C26

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# RADIUM-226/228

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 5 pCi/L




DAKOTA

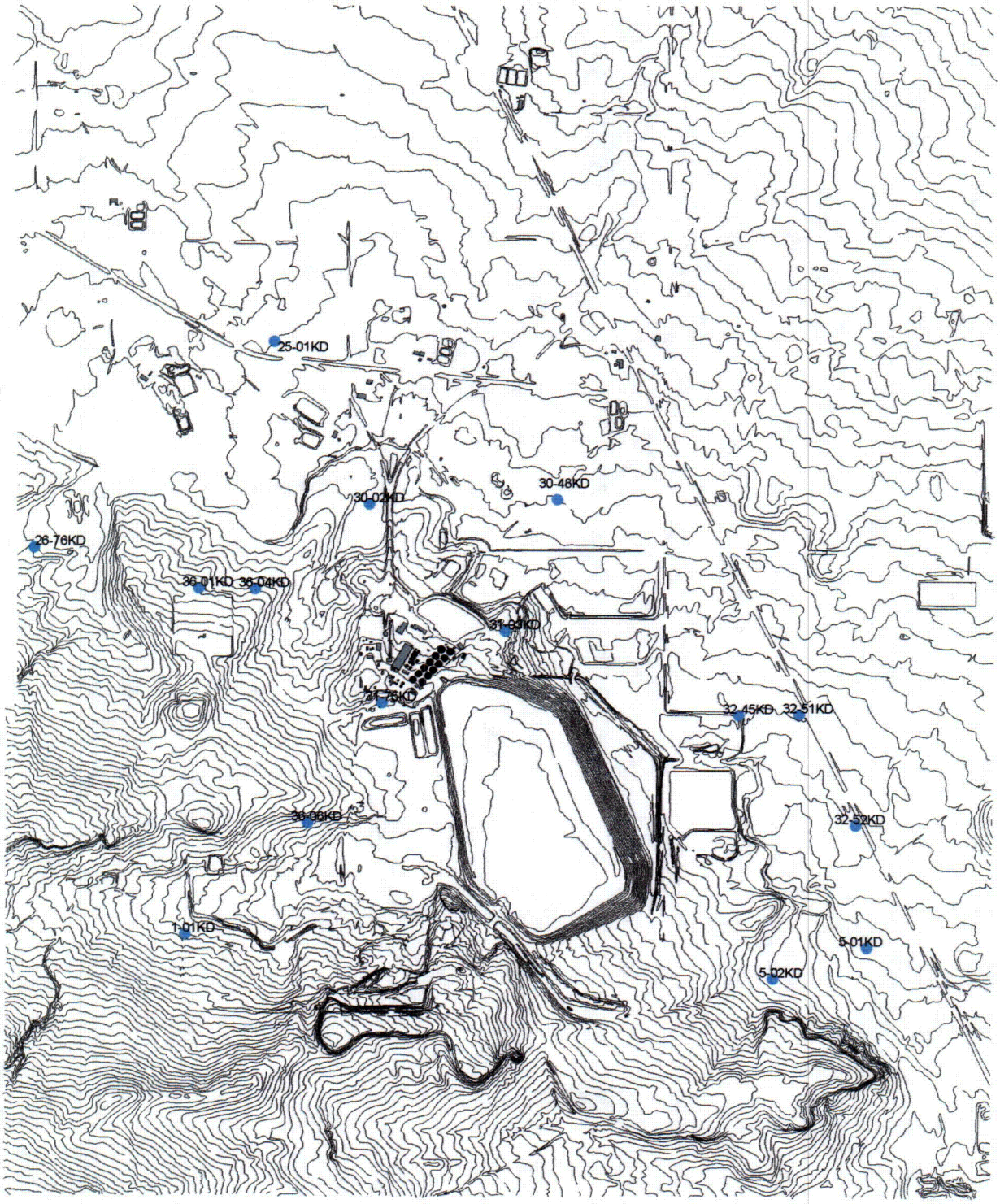
1 inch = 800 feet

N

C27

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# SELENIUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.04 mg/L




DAKOTA

N

1 inch = 2300 feet

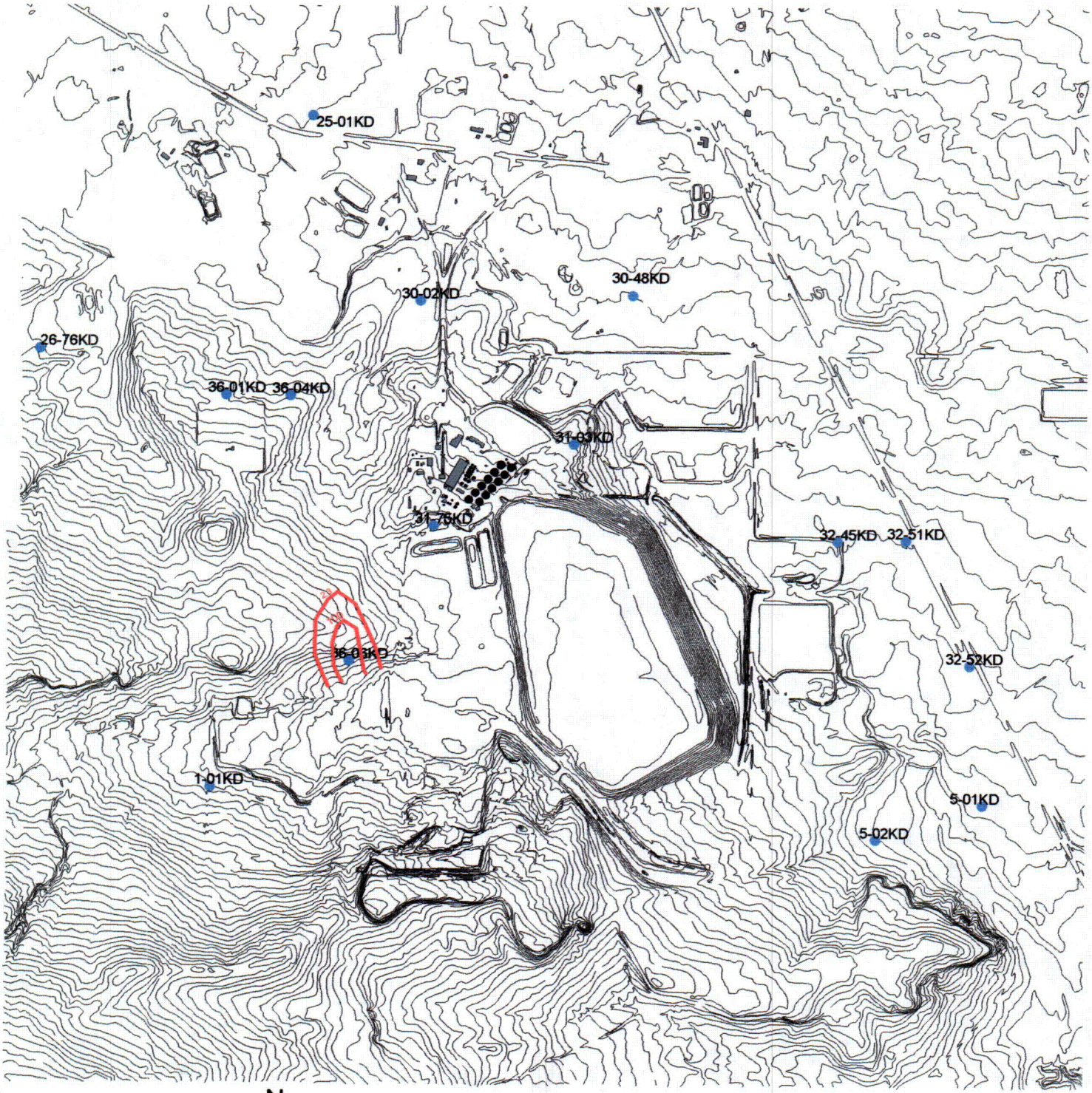
Selenium concentrations in all wells are at or below the groundwater protection standard.

C28

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# THORIUM-230

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 2.3 pCi/L




DAKOTA

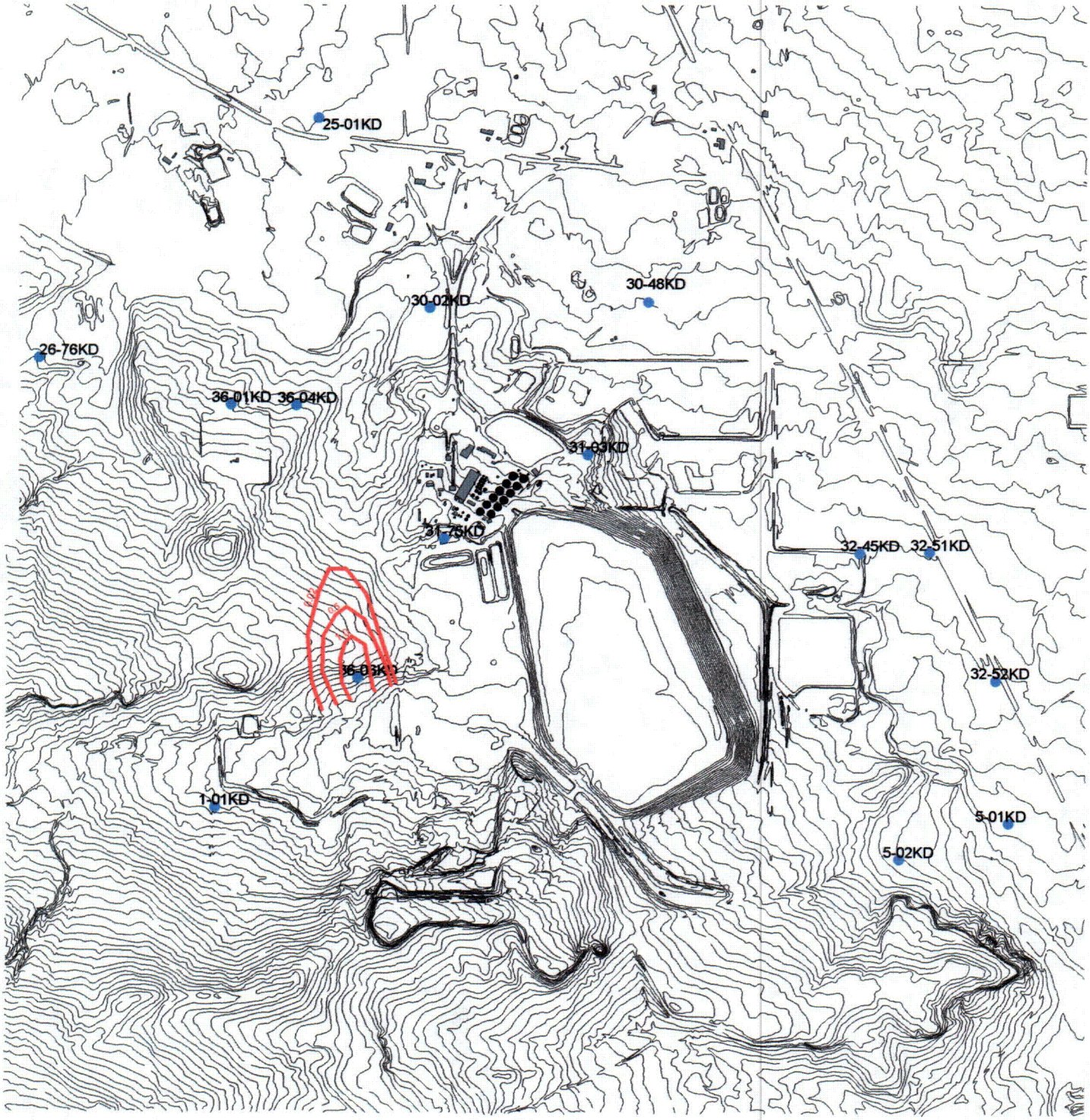
N

1 inch = 2300 feet

C29

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# URANIUM

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.02 mg/L




1 inch = 800 feet

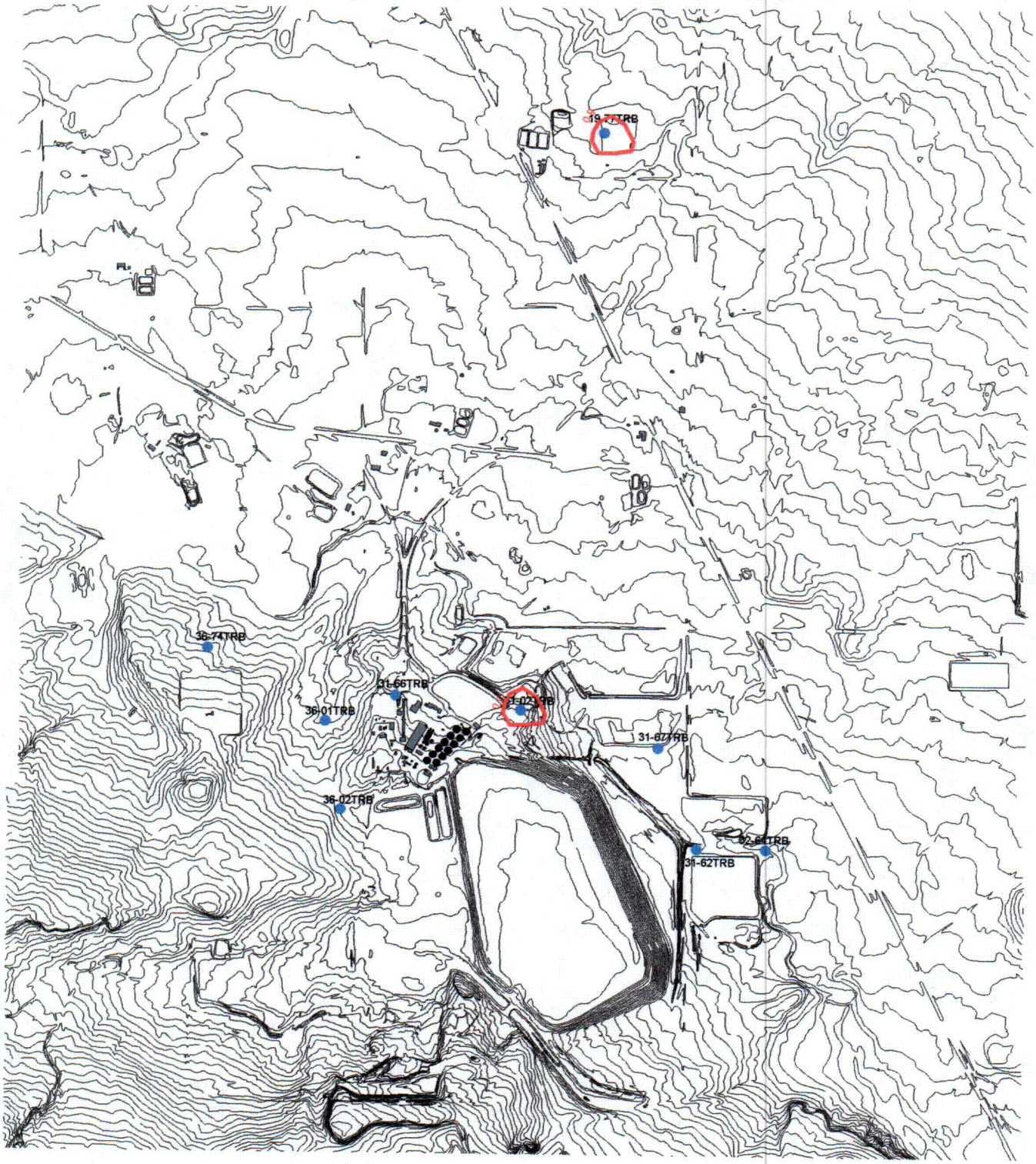
N

DAKOTA

C30

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# LEAD-210

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.9 pCi/L




1 inch = 2400 feet

N

# TRES HERMANOS B

C31

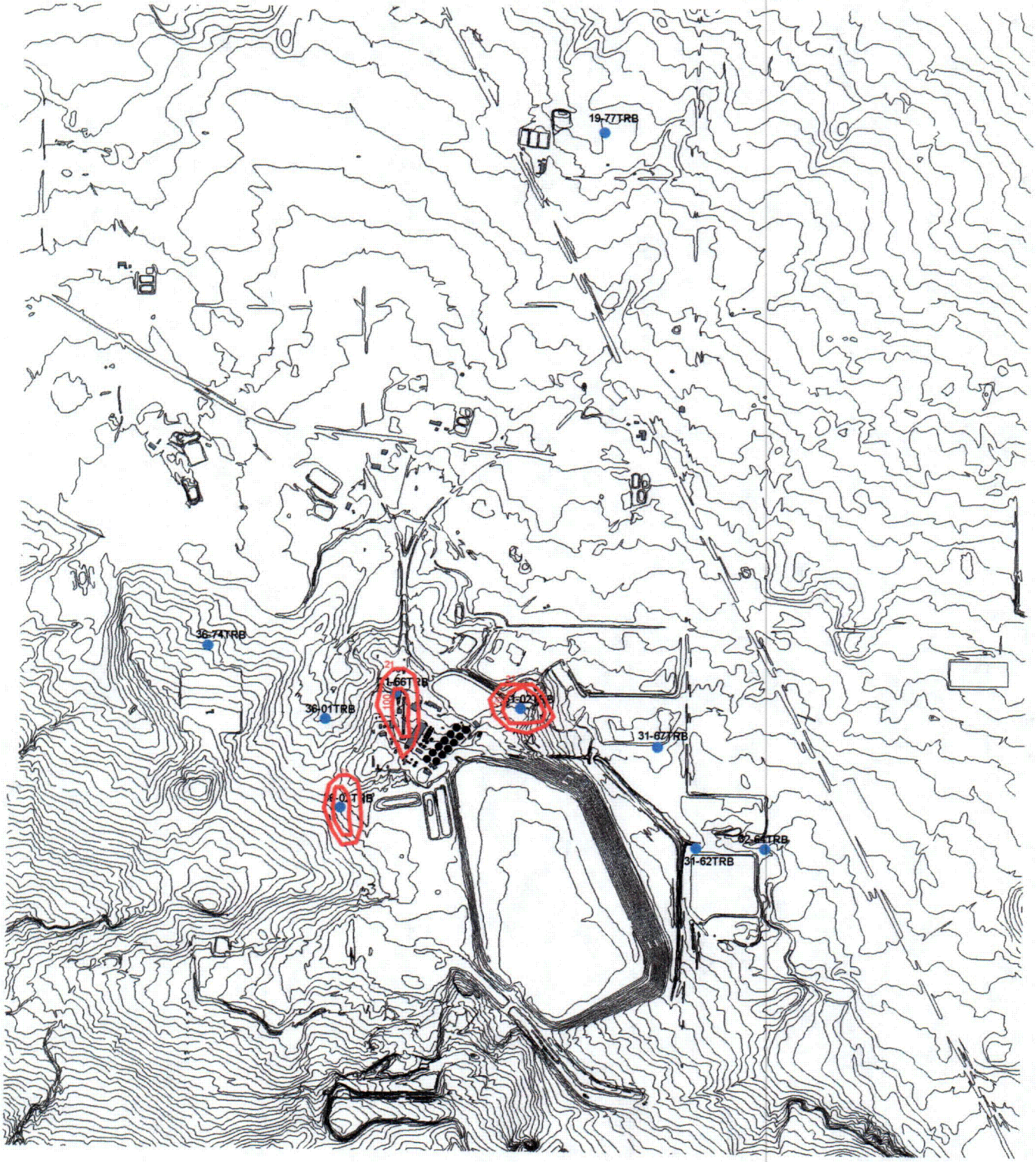
# RIO ALGOM MINING LLC

## LICENSE SUA-1473

# GROSS ALPHA

(EXCLUDES URANIUM AND RADON)

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 21 pCi/L




1 inch = 900 feet

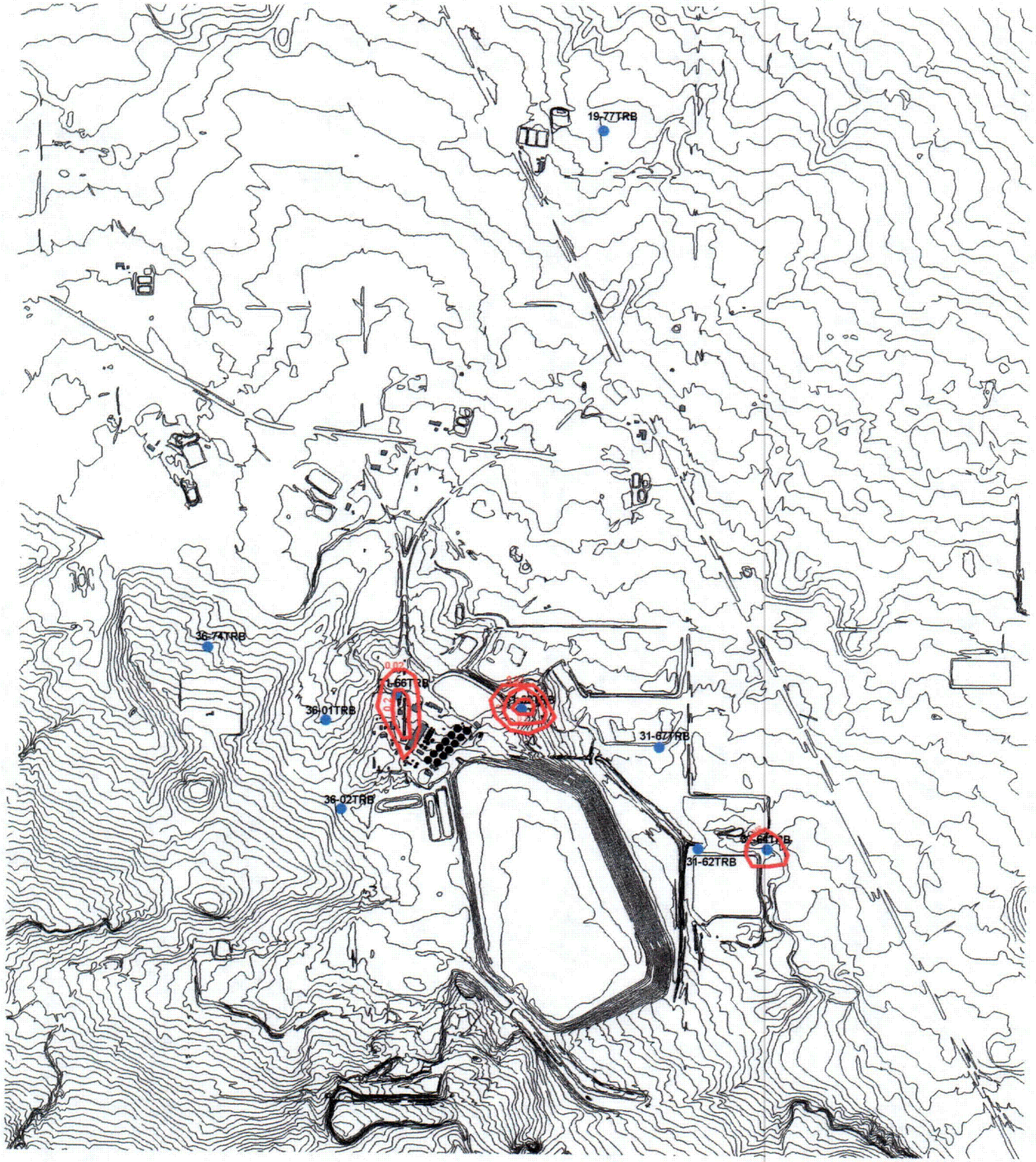
N

# TRES HERMANOS B

C32

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# URANIUM

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.02 mg/L




1 inch = 900 feet

N

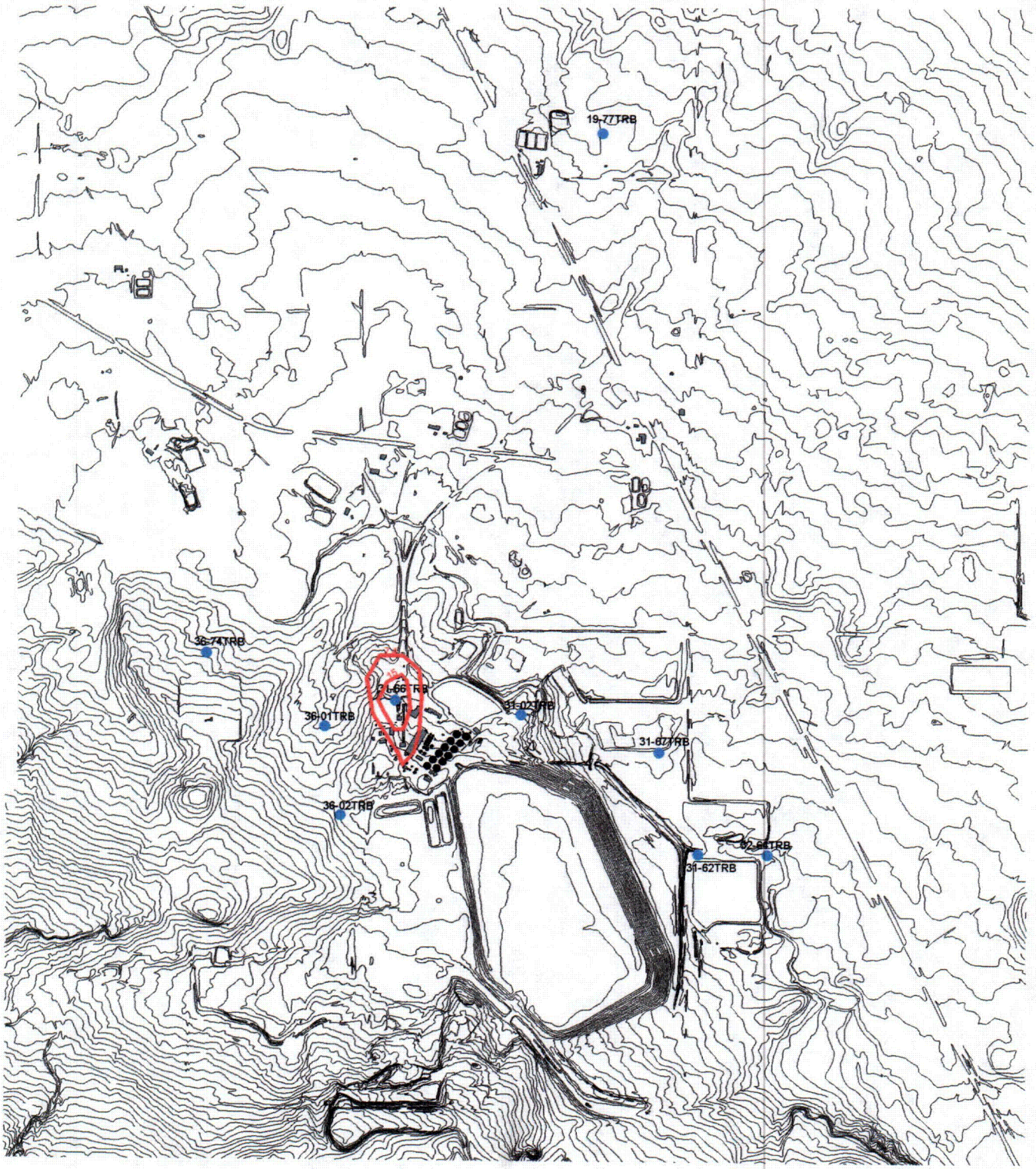
TRES HERMANOS B

C33

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# RADIUM-226/228

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 7.4 pCi/L




1 inch = 900 feet

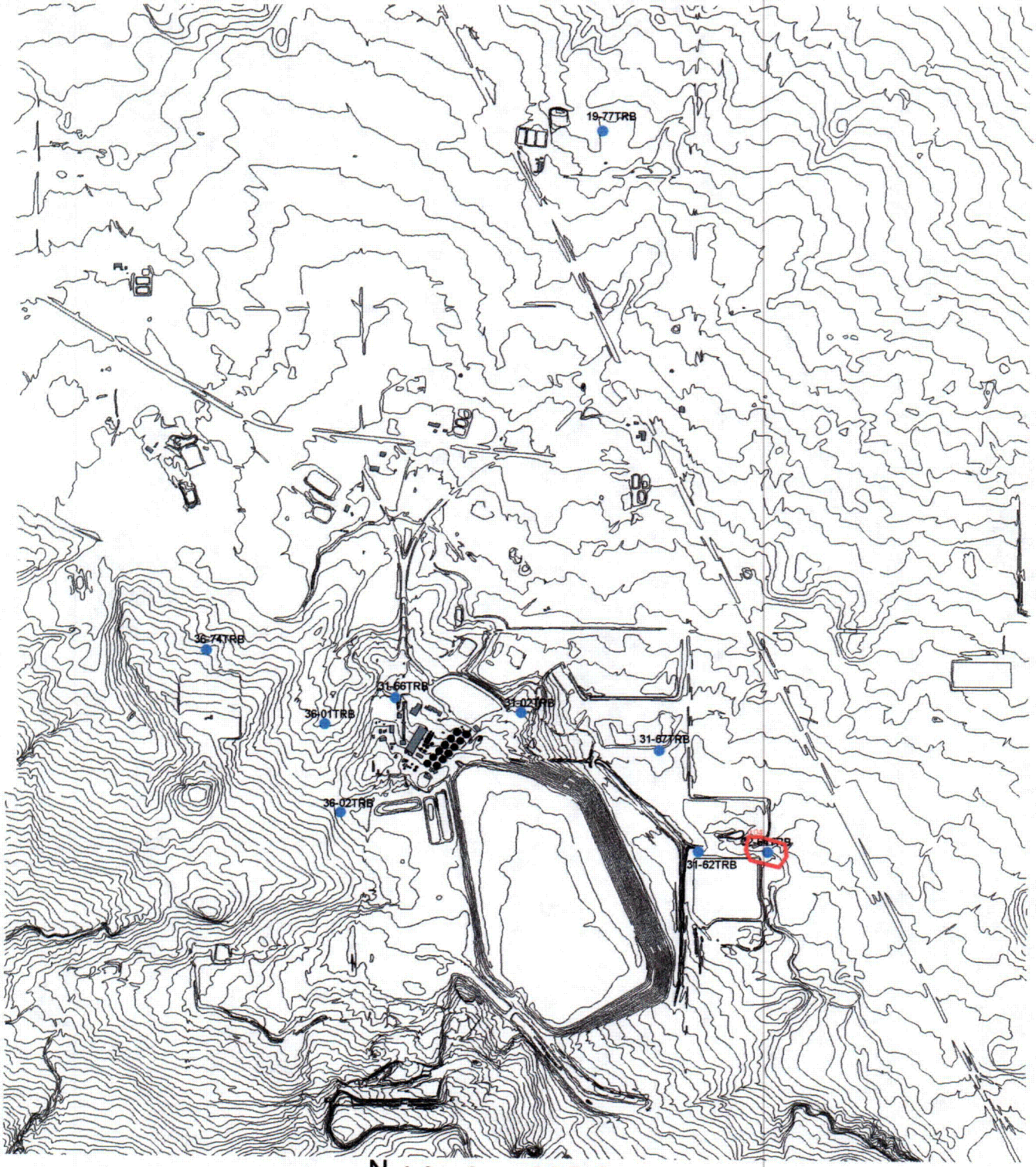
N

TRES HERMANOS B

C34

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# SELENIUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.04 mg/L




TRES HERMANOS B

N

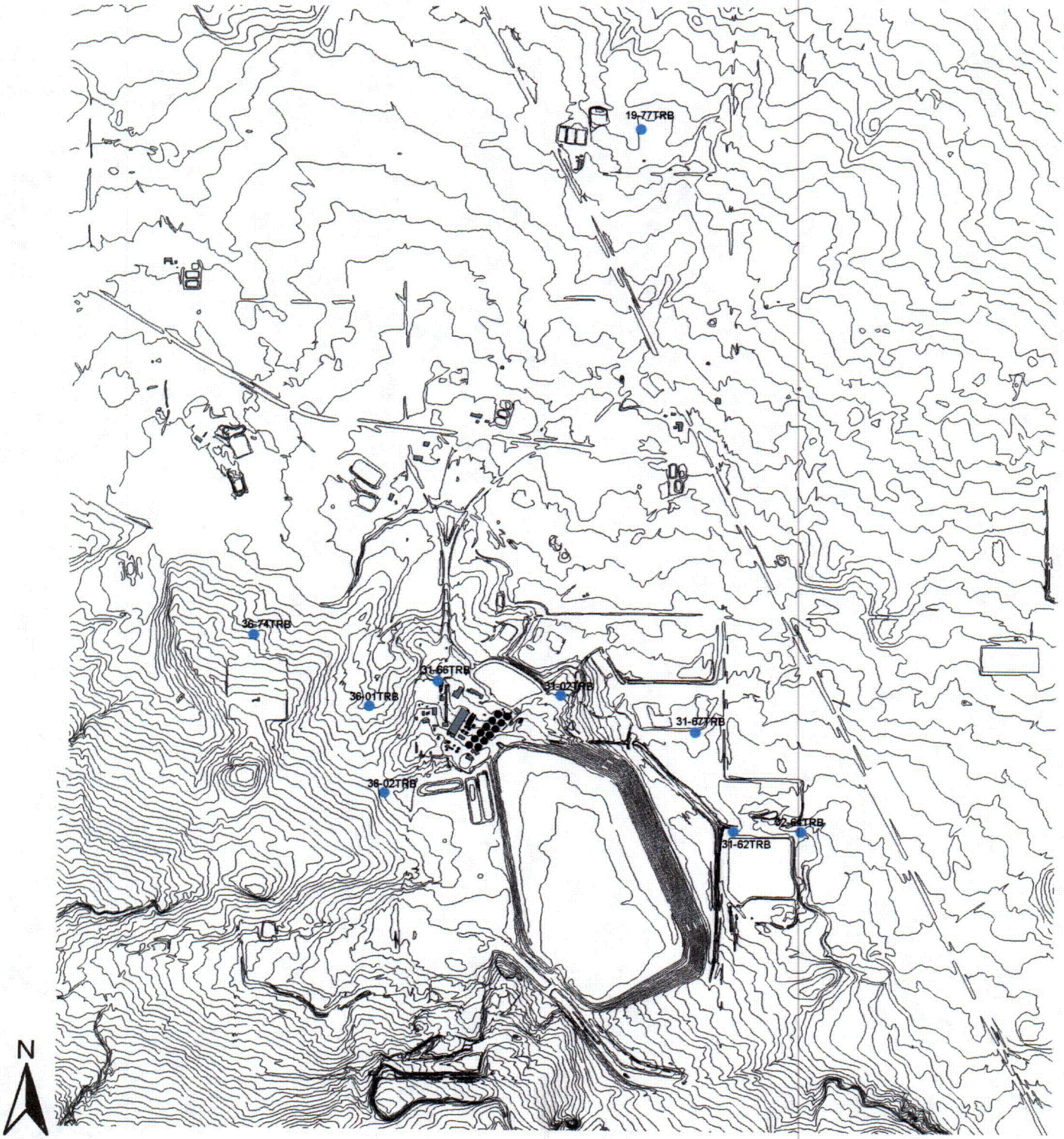
1 inch = 900 feet

C35

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# THORIUM-230

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 2.2 pCi/L




TRES HERMANOS B

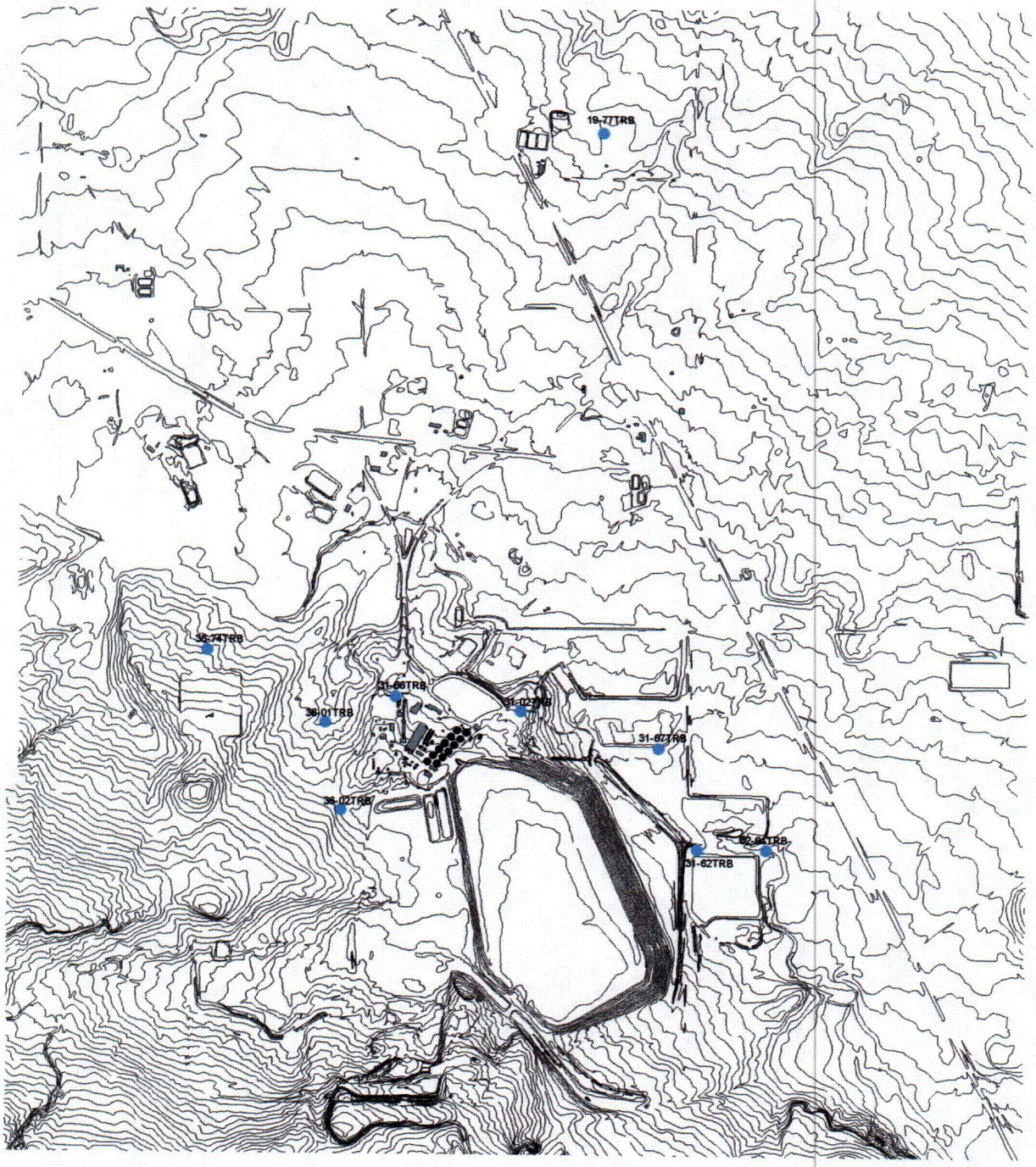
1 inch = 2400 feet

Thorium-230 concentrations in all wells are at or below the groundwater protection standard.

C36

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# MOLYBDENUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.08 MG/L




N

1 inch = 2400 feet

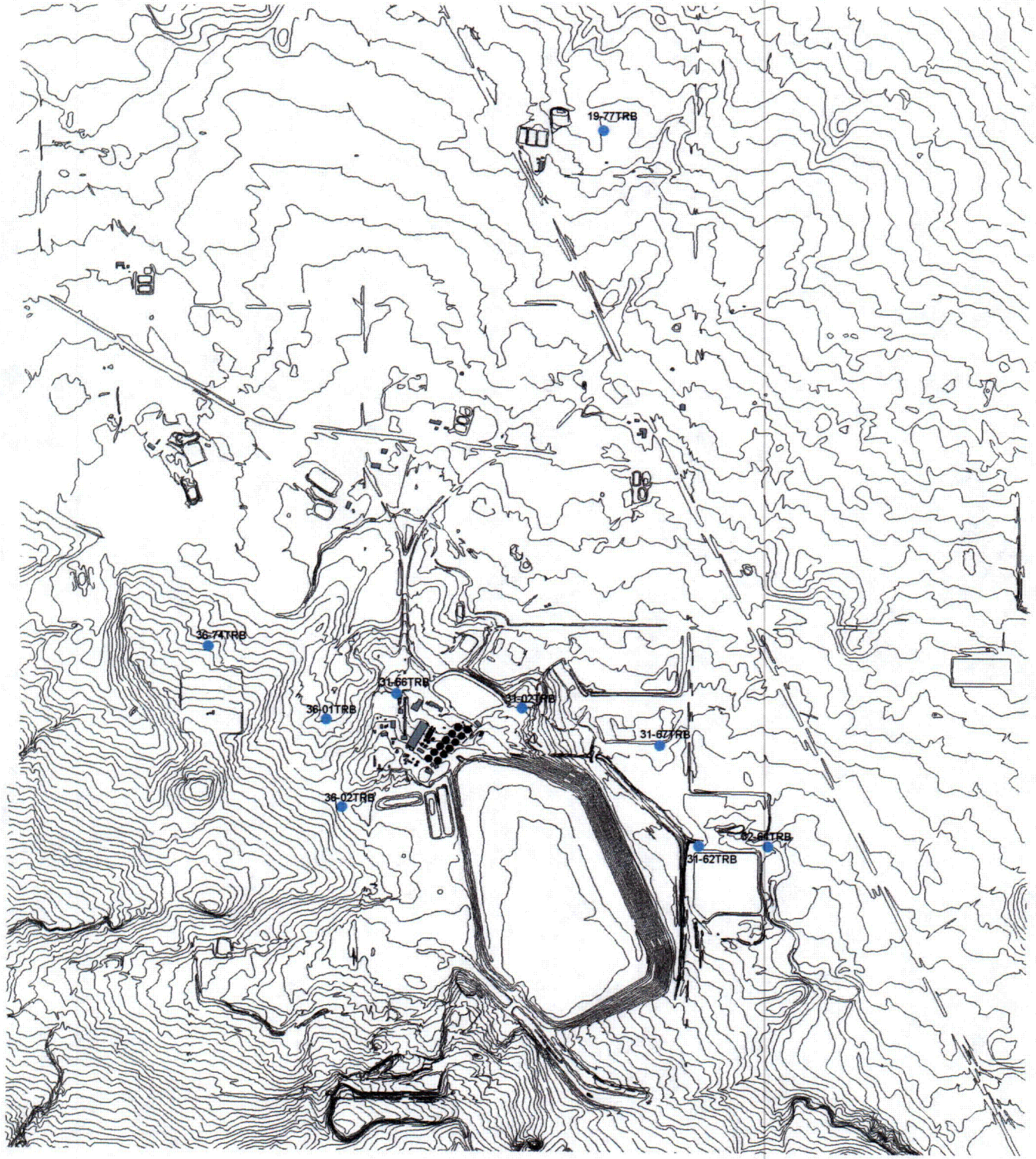
TRES HERMANOS B

Molybdenum concentrations in all wells are at or below the groundwater protection standard.

C37

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# CYANIDE

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.01 mg/L




1 inch = 2400 feet

## TRES HERMANOS B

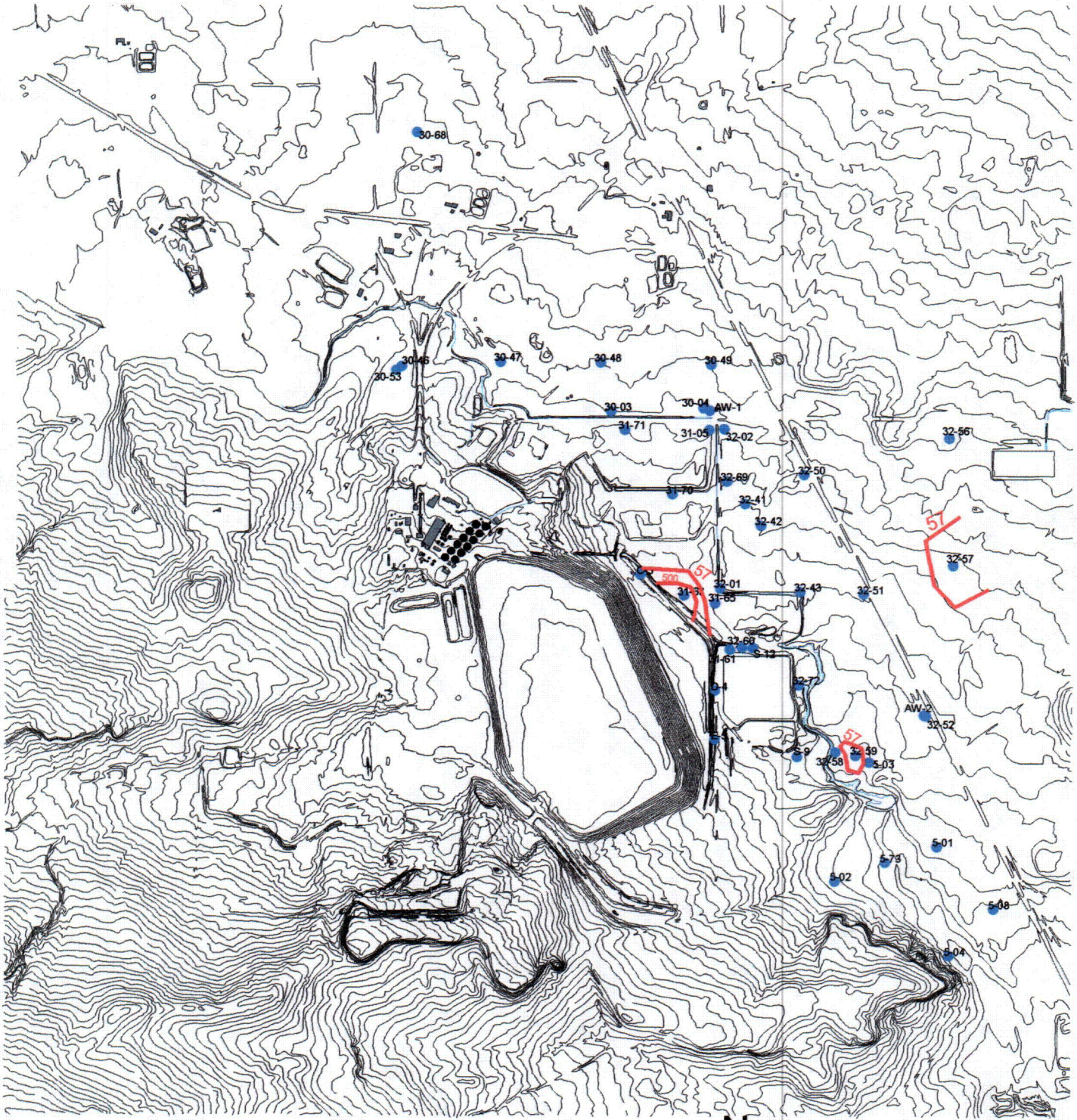
Cyanide concentrations in all wells are at or below the groundwater protection standard.

C38

RIO ALGOM MINING LLC
LICENSE SUA-1473

# GROSS ALPHA
(EXCLUDES URANIUM AND RADON)

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 57 pCi/L




N

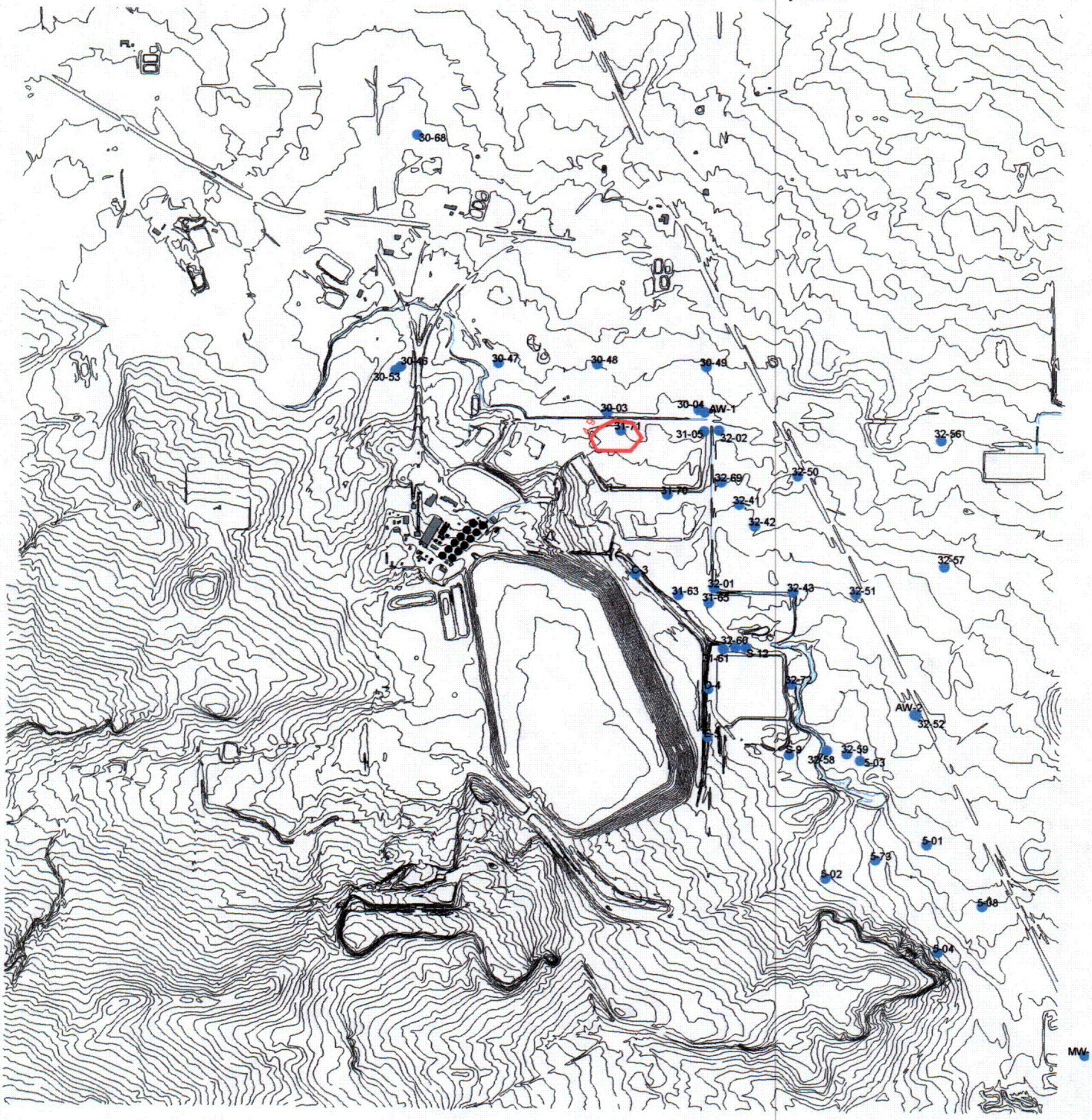
1 inch = 2100 feet

ALLUVIUM

C39

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# LEAD-210

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 4.9 pCi/L




ALLUVIUM

N

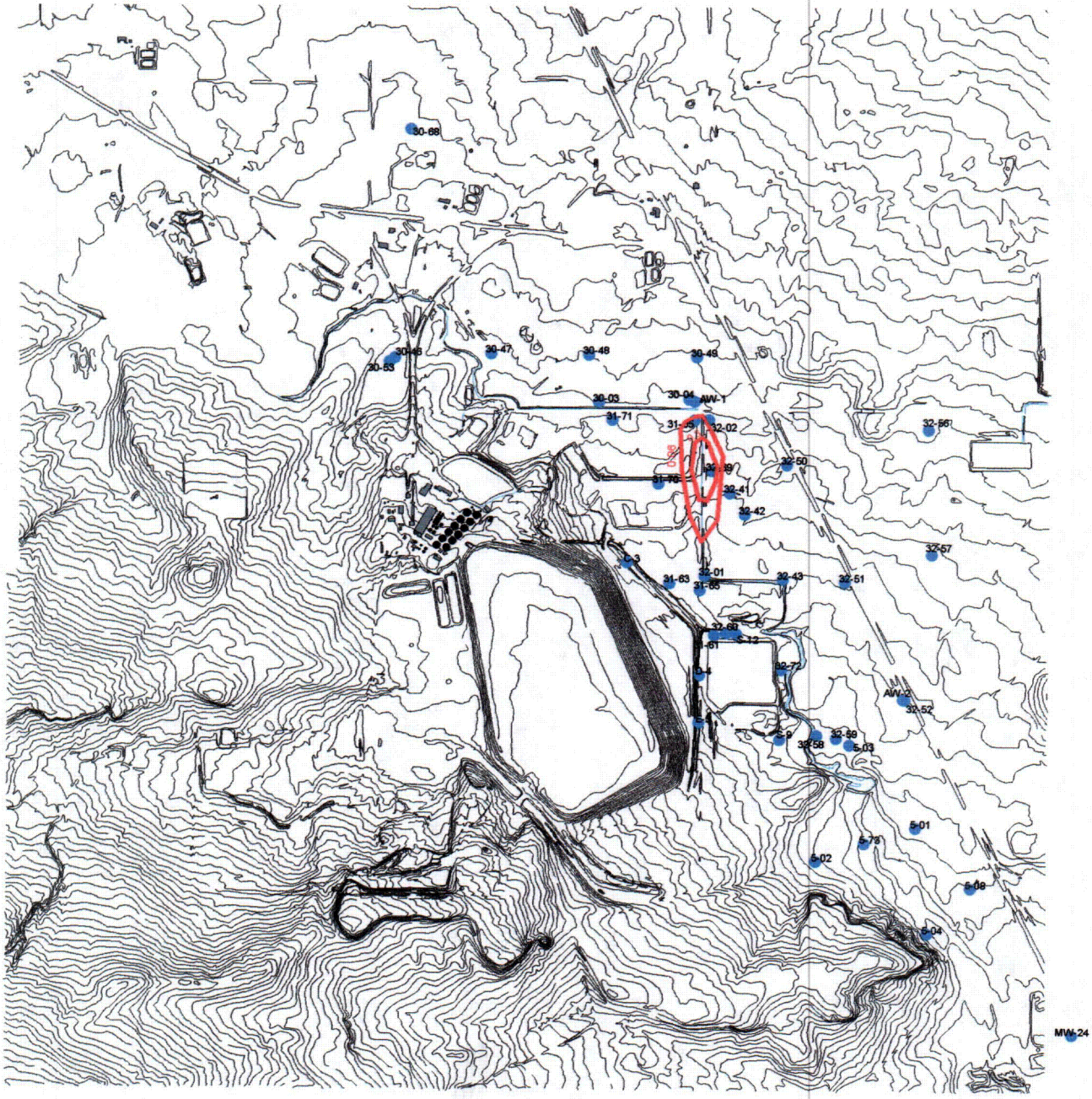
1 inch = 2100 feet

C40

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# MOLYBDENUM

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 0.06 MG/L




ALLUVIUM

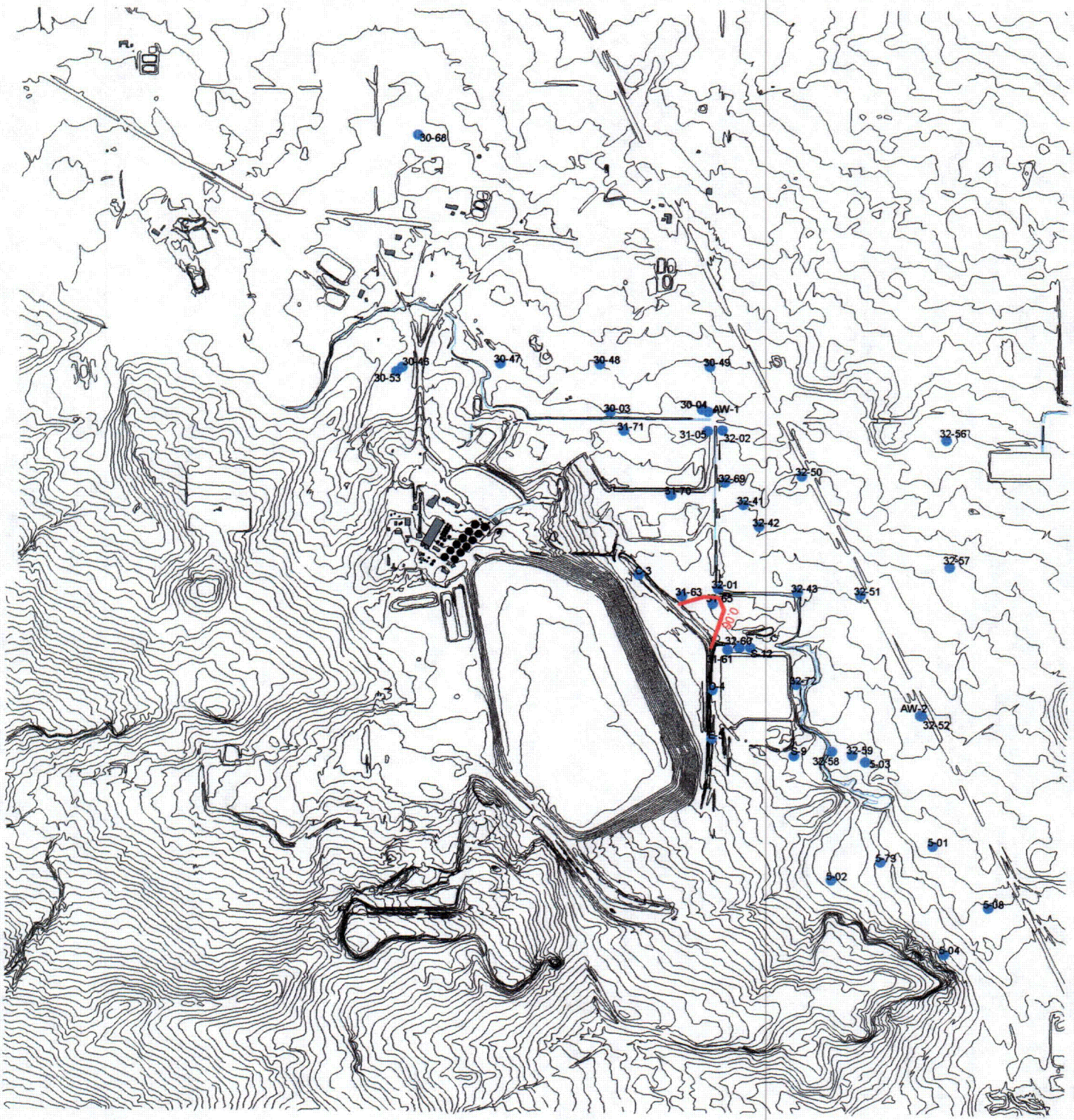
1 inch = 2100 feet

N

C41

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# NICKEL

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.06 MG/L




ALLUVIUM

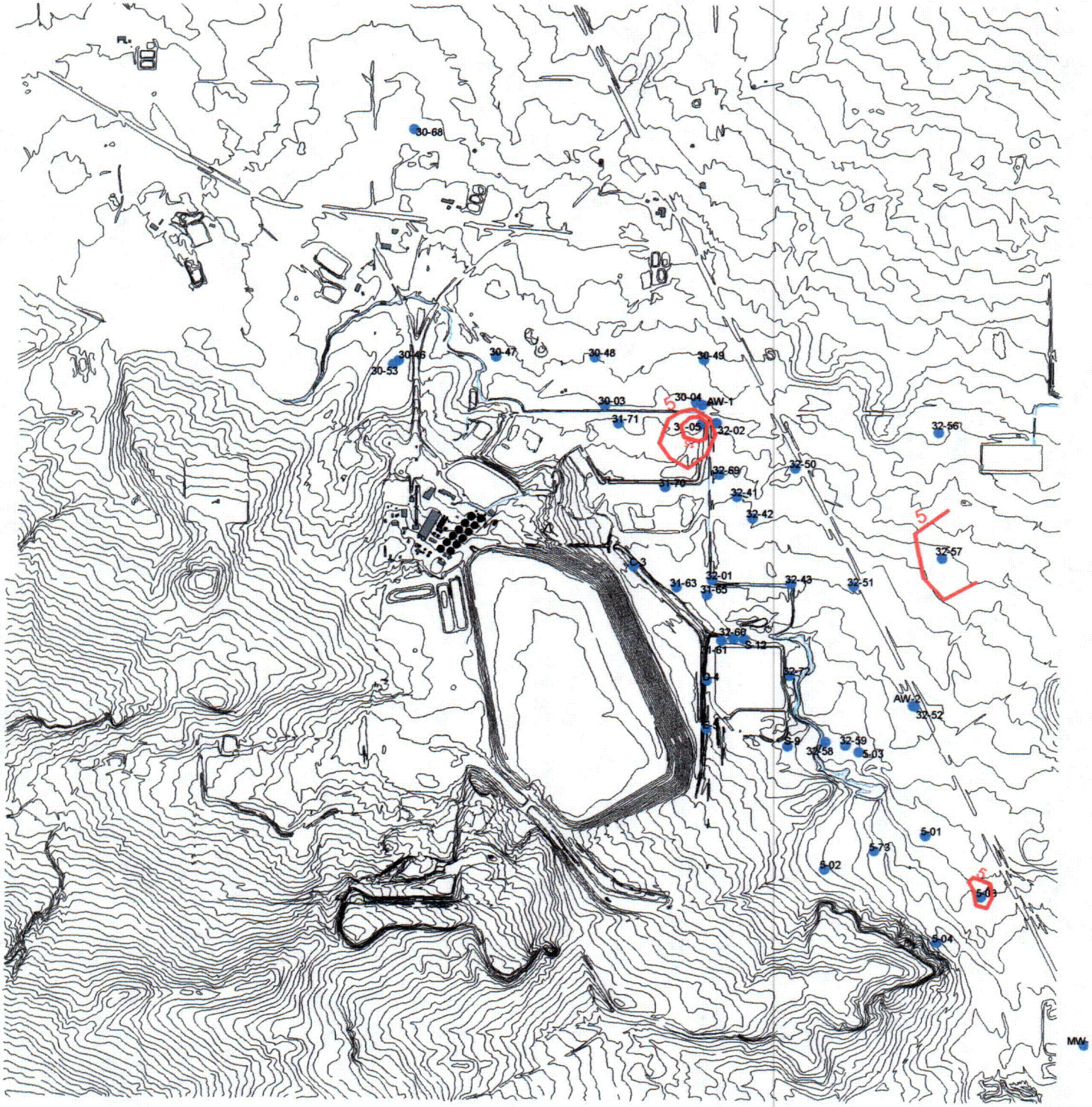
N

1 inch = 2100 feet

C42

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# RADIUM-226/228

2005 CONCENTRATION ISOPLETH
GROUND WATER PROTECTION STANDARD = 5 pCi/L




ALLUVIUM

N

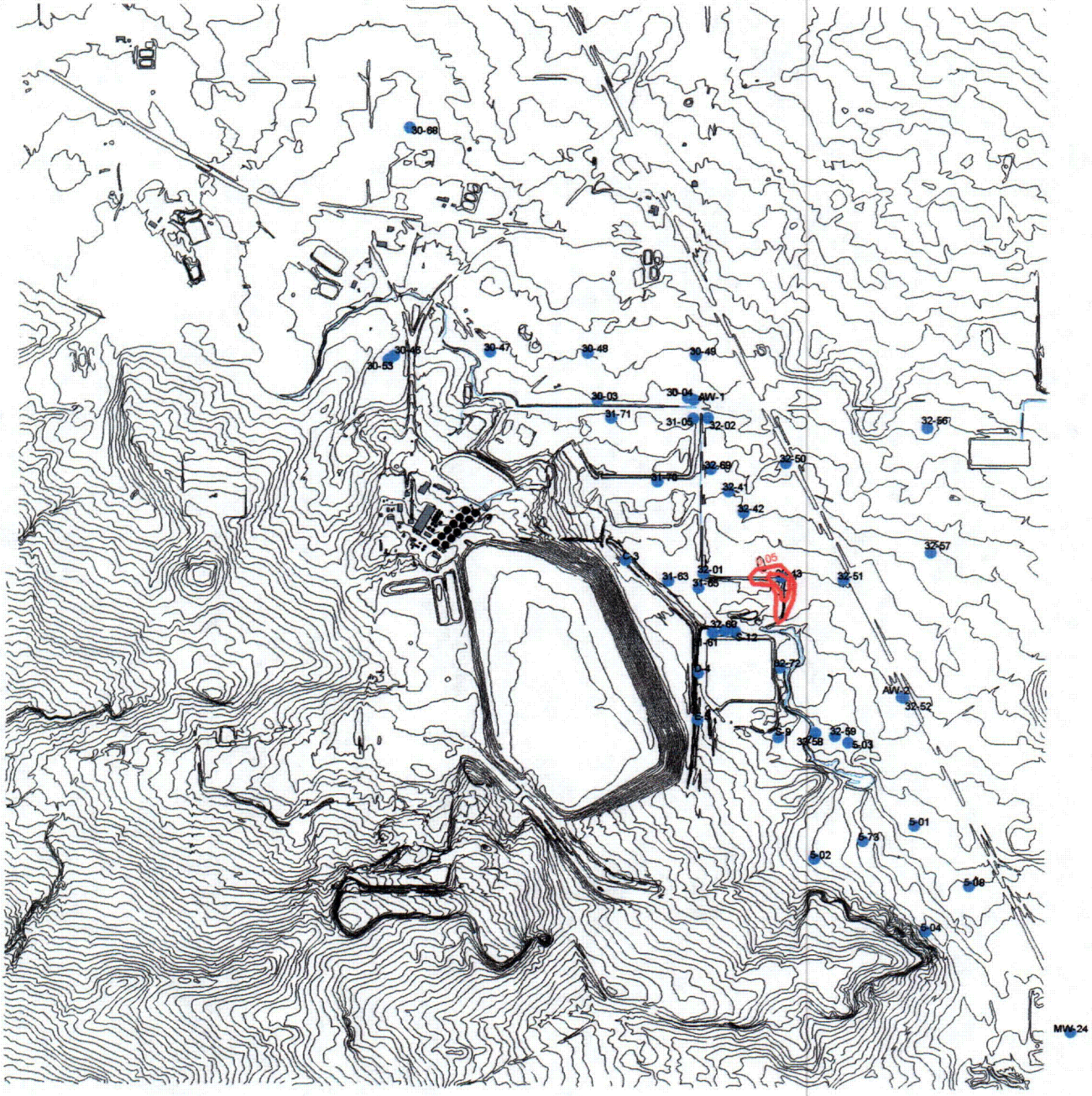
1 inch = 2100 feet

C43

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# SELENIUM

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.05 MG/L




# ALLUVIUM

1 inch = 2100 feet

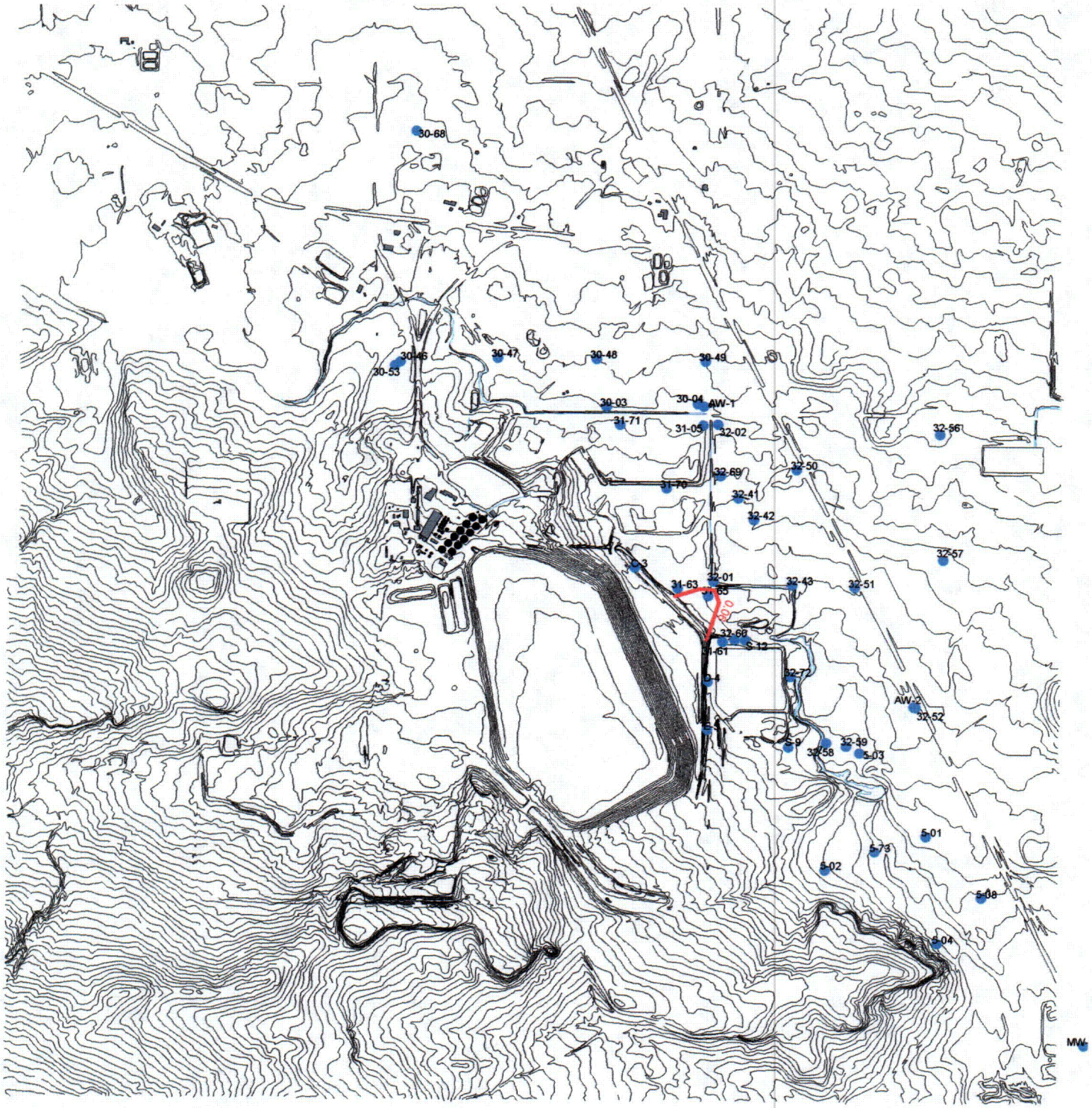
N

C44

# RIO ALGOM MINING LLC
# LICENSE SUA-1473

# THORIUM-230

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 3.1 pCi/L




ALLUVIUM

N

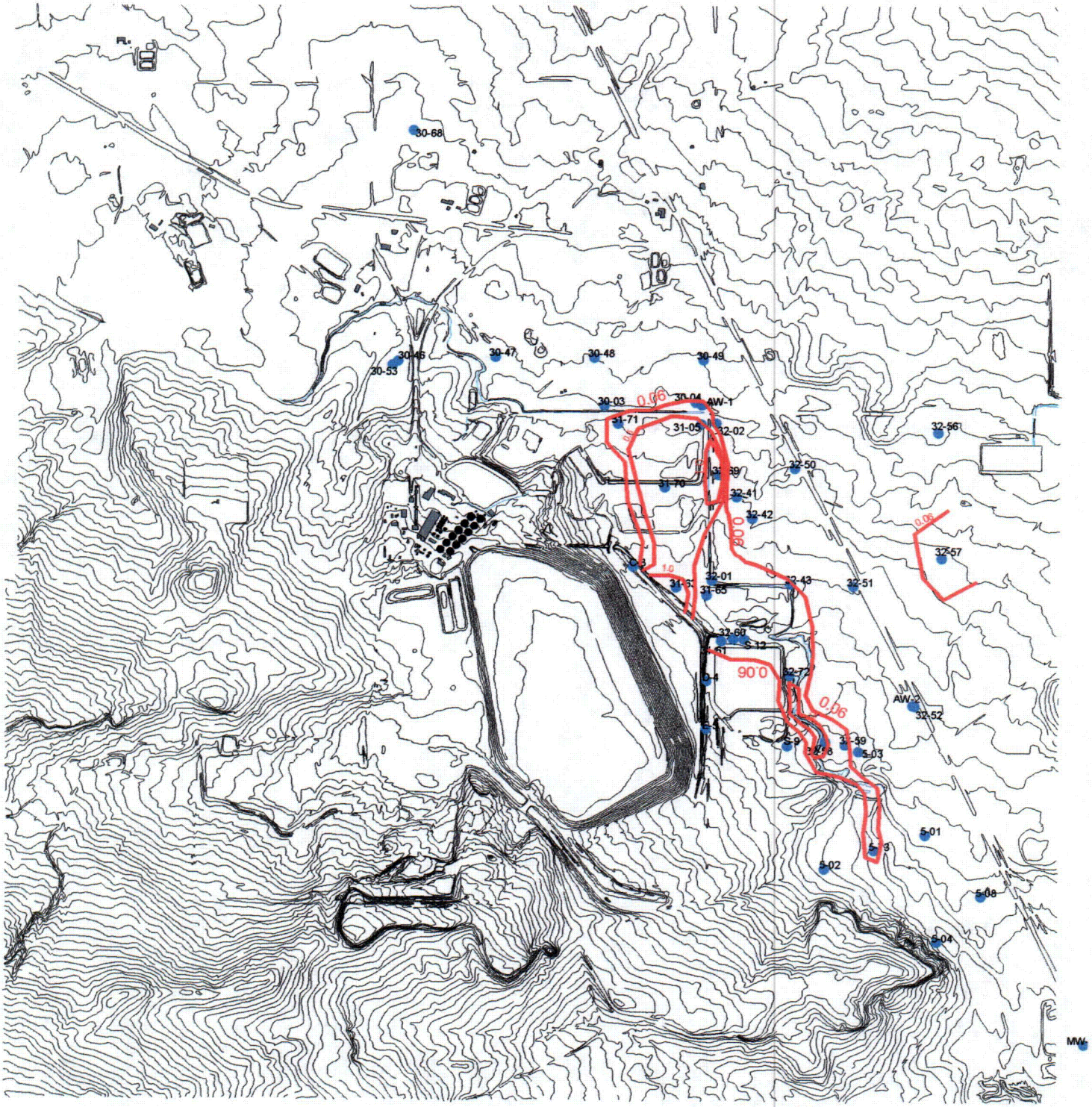
1 inch = 2100 feet

Thorium-230 concentrations in all wells are at or below the groundwater protection standard.

C45

# RIO ALGOM MINING LLC
# LICENSE SUA-1473
# URANIUM

## 2005 CONCENTRATION ISOPLETH
## GROUND WATER PROTECTION STANDARD = 0.06 MG/L




# ALLUVIUM

1 inch = 2100 feet

N

C46