HOMESTAKE

GRANTS PROJECT

ALAN D. COX
PROJECT MANAGER
- GRANTS

21 June 2004

Mr. Gary Janosko, Branch Chief
c/o Document Control Desk
Chief of Fuel Cycle Facilities Branch (Mailstop T8-A33)
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Two White Flint North
Rockville, MD 20852-2738

Re: Grants Project – SUA-1471 – Docket No. 40-8903
Chinle Aquifer Site Standards

Dear Mr. Janosko:

This letter is in follow-up to meeting discussions held in Denver with NRC staff concerning the Grants reclamation site on May 17, 2004 during the most recent Uranium Recovery Workshop. During the meeting, the current status of regulatory agency reviews (NRC, EPA and New Mexico Environment Department (NMED)) of the Grants site Supplemental Chinle Aquifer background water-quality document was discussed. As part of the discussion, it was agreed that Homestake would provide a summary review and rationale / justification for the water quality site standards that should be set for the Chinle aquifers and related Chinle mixing zone at the Homestake Grants site. Pursuant to that request, the following is provided concerning Homestake's view of those ground-water constituents that should have site standards set and those constituents that are not of concern and do not require establishment of standards values.

Since the meeting of May 17, Homestake received a FAX copy of the comments from the NMED regarding the supplemental background document. As a part of our response to those comments, a review was undertaken for a portion of the statistical analysis pertaining to the detection limits for certain parameter constituents. Results of that review are also reflected in the following discussion concerning site standards. By separate mailing, we will be providing our response to the NMED comments and the resultant revision / errata sheets for the supplemental background report and the associated statistical analysis.

In general, it can be concluded that the constituent concentrations in the Chinle mixing zone and the Chinle aquifers for vanadium, thorium-230, radium-226 + 228 and nitrate are not significant and, therefore, site standards are not considered necessary for these parameters.

NMSS01

The only exception to this is the assessment and conclusion that a vanadium standard should be set for the Chinle mixing zone and the Upper Chinle non-mixing zone (no vanadium site standard is deemed necessary for the Middle and Lower Chinle non-mixing zones). A summary discussion and presentation of data to support these conclusions are provided below.

The following tabulation presents the proposed site standards for the alluvial aquifer that have been agreed upon previously, and the proposed standards for the Chinle mixing zone and Upper, Middle and Lower Chinle aquifers non-mixing zones. The 10 agreed-upon proposed site standards for the alluvial aquifer are based on the alluvial background report submitted, and agency reviewed, during 2003. The table also presents the proposed site standards for selenium, uranium, molybdenum, sulfate, chloride and TDS for the Chinle mixing zone and the three Chinle aquifers. A site standard for vanadium, as mentioned above, is also proposed for the Chinle mixing zone and Upper Chinle non-mixing zone. It should be noted that the Lower Chinle non-mixing zone uranium standard is the federal EPA drinking water standard of 0.03 mg/l while the proposed chloride standard for the Chinle mixing zone and Middle Chinle non-mixing zone is the New Mexico state ground-water standard (250 mg/l).

PROPOSED SITE STANDARDS

CONSTITUENTS	ALLUVIAL	CHINLE MIXING ZONE	UPPER CHINLE NON-MIXING ZONE	MIDDLE CHINLE NON-MIXING ZONE	LOWER CHINLE NON-MIXING ZONE
SELENIUM (mg/l)	0.27	0.14	0.06	0.07	0.32
URANIUM (mg/l)	0.15	0.18	0.09	0.07	0.03
MOLYBDENUM (mg/l)	0.05	0.10	0.08	0.05	0.03
SULFATE (mg/l)	1870	1750	914	857	2000
CHLORIDE (mg/l)	250	250	412	250	634
TDS (mg/l)	3060	3140	2010	1560	4140
VANADIUM (mg/l)	0.02	0.01	0.01	*** 0.01	0.01
THORIUM-230 (pCi/l)	0.30	*** 0.70	0.33	0.82	0.72
RA-226 + RA-228 (pCi/l)	5	5	5	5	5
NITRATE (mg/l)	23	15	10	10	10

*** Gray = Constituents not considered necessary for setting of site standard.

Site standards are not proposed for vanadium (in the Middle and Lower Chinle non-mixing zones) and for thorium-230, radium 226+228 and nitrate for the Chinle mixing zone and the Chinle aquifers based upon exclusions provided in 10 CFR Part 40 Appendix A - Criterion 5B(3)(a)(i) and (ii). The above table does, however, include the derived background values for these constituents in the Chinle aquifers and Chinle mixing zone based upon the data review contained in the Supplemental water-quality background document, with the exception of the radium 226+228 value (taken from 10 CFR Part 40, Appendix A, Table 5C – 5 pCi/l) and the non-mixing zones nitrate standard (State ground-water standard for nitrate – 10 mg/l).

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Nitrate, radium 226+228, vanadium and thorium-230 concentrations in the Chinle aquifers are very low due to the limited migration of these constituents in the alluvial aquifer. These constituents, as observed in the Chinle aquifer system, are detailed in the attached figures.

Upper Chinle Aquifer – Nitrate, Ra 226+228, Vanadium & Th-230

Figure 1 attached presents the observed nitrate concentrations for 2003 in the Upper Chinle aquifer. This figure lists the mixing zone background concentration of 15 mg/l which would be used as a site standard and the non-mixing zone background of 4.9 mg/l. The highest nitrate concentration in the Upper Chinle aquifer in 2003 was 2.2 mg/l at well CE2. This shows that the limited nitrate concentrations in the alluvial aquifer have not migrated to the Upper Chinle aquifer and will not be an issue for the project aquifer restoration program.

Figure 2 shows the radium 226 and radium 228 concentrations in the Upper Chinle aquifer with the highest combined concentration of these two constituents of 4.7 pCi/l at upgradient well CW52. The next highest radium 226+228 value is 2.7 pCi/l at well CE1. The fact that the two largest values do not exceed an appropriate standard of 5 pCi/l illustrates that a radium 226+228 site standard is not needed for the Upper Chinle aquifer.

Figure 3 shows the 2003 vanadium concentrations for the Upper Chinle aquifer. None of the mixing zone concentrations exceeded the tabulated vanadium concentration while the concentration in one non-mixing zone well (CW3) did exceed the tabulated non-mixing zone vanadium concentration of 0.01 mg/l in 2003. A 2004 sample from well CW3 had a vanadium concentration of 0.04 mg/l. Past data indicates that vanadium is not very mobile in the aquifer systems with the exception of this isolated area near CW3; this is related to recent pumping from this well which has influenced upgradient movement of aquifer water to this well from the Large Tailings Pile. Nevertheless, the most recent data suggests that a site standard would be appropriate for the Upper Chinle non-mixing zone as well as for the Chinle mixing zone to assure that vanadium concentrations are addressed in these two zones during the ongoing aquifer remediation program.

Figure 4 shows the thorium-230 concentrations for 2003 in the Upper Chinle aquifer with the highest measured values being 0.5 pCi/l at wells CW50 and CW52 in the upgradient mixing zone. The calculated statistical background value for Th-230 in the Upper Chinle non-mixing zone (0.33 pCi/l) is exceeded at only one well location (well 929) where a value of 0.40 pCi/l was observed in 2003. This value is not expected to be attributable to influences from tailings pile seepage from the site due to the location and the alluvial and Upper Chinle aquifer flow directions near well 929. No observed values for Th-230 in the mixing zone exceed the calculated site standard value of 0.70 pCi/l. Consequently, it is viewed as unnecessary to set a site standard for Th-230 in the mixing zone or Upper Chinle non-mixing zone based upon review of the historical data.

Migration into the Upper Chinle for these four constituents in the alluvial aquifer has been very limited and, therefore, migration into the Upper Chinle aquifer is not significant except for the minor migration of vanadium to well CW3 for the reasons discussed above.

Middle Chinle Aquifer – Nitrate, Ra 226 & Ra 228, Vanadium & Th-230

The nitrate, radium 226 and radium 228, vanadium and thorium-230 concentrations are presented in Figures 5 through 8 for the Middle Chinle aquifer in 2003. All of these Middle

Chinle concentrations are less than the appropriate standards for the Middle Chinle aquifer. These constituents would have to travel a very large distance in the alluvial aquifer from the tailings area to the subcrop area in southern Felice Acres prior to entering the Middle Chinle aquifer. These four constituents have not migrated very far in the alluvial aquifer and, therefore, it is not reasonable to expect migration of these constituents to affect concentrations in the Middle Chinle aquifer.

Lower Chinle Aquifer – Nitrate, Ra 226 & Ra 228, Vanadium & Th-230

Figures 9 through 12 present the nitrate, radium 226 and radium 228, vanadium and thorium-230 concentrations for the Lower Chinle aquifer for 2003. All of the values for these four constituents in the Lower Chinle aquifer are less than the tabulated comparison standards.

<u>Summary</u>

Based on the foregoing, and the related data in the table and attached figures, it is concluded that:

1. Site standards for selenium, uranium, molybdenum, sulfate, chloride, TDS, vanadium, thorium-230, radium 226+228, and nitrate should be set for the alluvial aquifer;

2. Site standards for selenium, uranium, molybdenum, sulfate, chloride and TDS should be set for the Chinle aquifers and the Chinle mixing zone, and for vanadium in the Chinle mixing and Upper Chinle non-mixing zones only; and,

3. Thorium-230, radium 226+228 and nitrate should not have site standards set for the Chinle aquifers and the Chinle mixing zone.

Thank you for your time and attention on this matter. If you or members of the NRC staff have any questions regarding our data review and /or conclusions, please contact me at your earliest convenience.

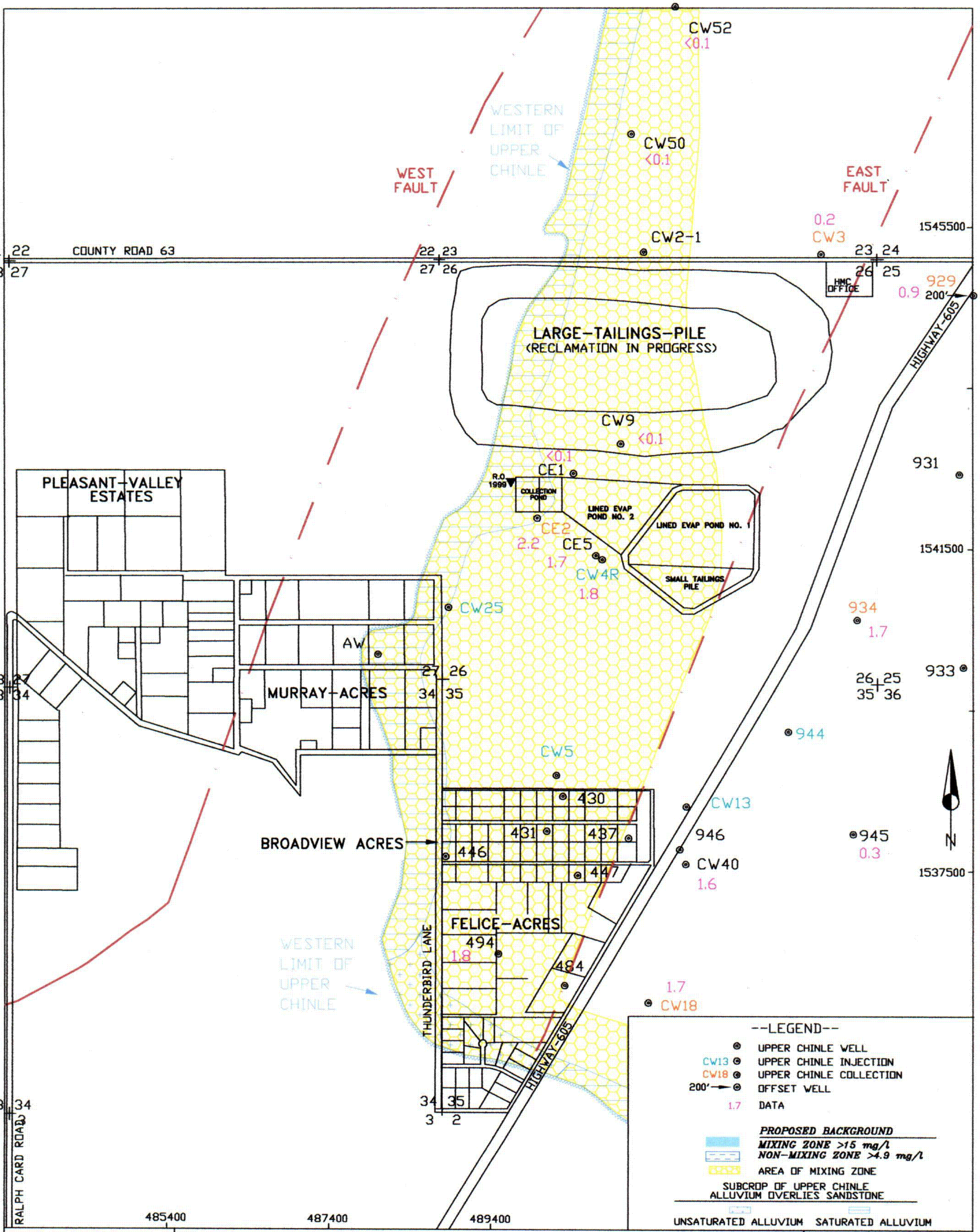
Sincerely yours,

HOMESTAKE MINING COMPANY OF CALIFORNIA
Alan D. Cox

Enclosures (12 figures)

cc: M. Purcell, Region VI EPA, (w/encl)
D. Mayerson, NMED (w/encl)
K. Myers, NMED (w/ encl.)

R. Chase, SLC
J. Gleadle, Grants files
G. Hoffman, HYDRO-Engineering



SCALE: 1"=1600'	HOMESTAKE-MILL-AND-ADJACENT-PROPERTIES GRANTS-NM-TOWNSHIP-11&12-N-RANGE-10-W	DATE: 05/25/04
FIGURE 1. NITRATE CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2003, mg/l		c:\projects\2004-06\UP1600
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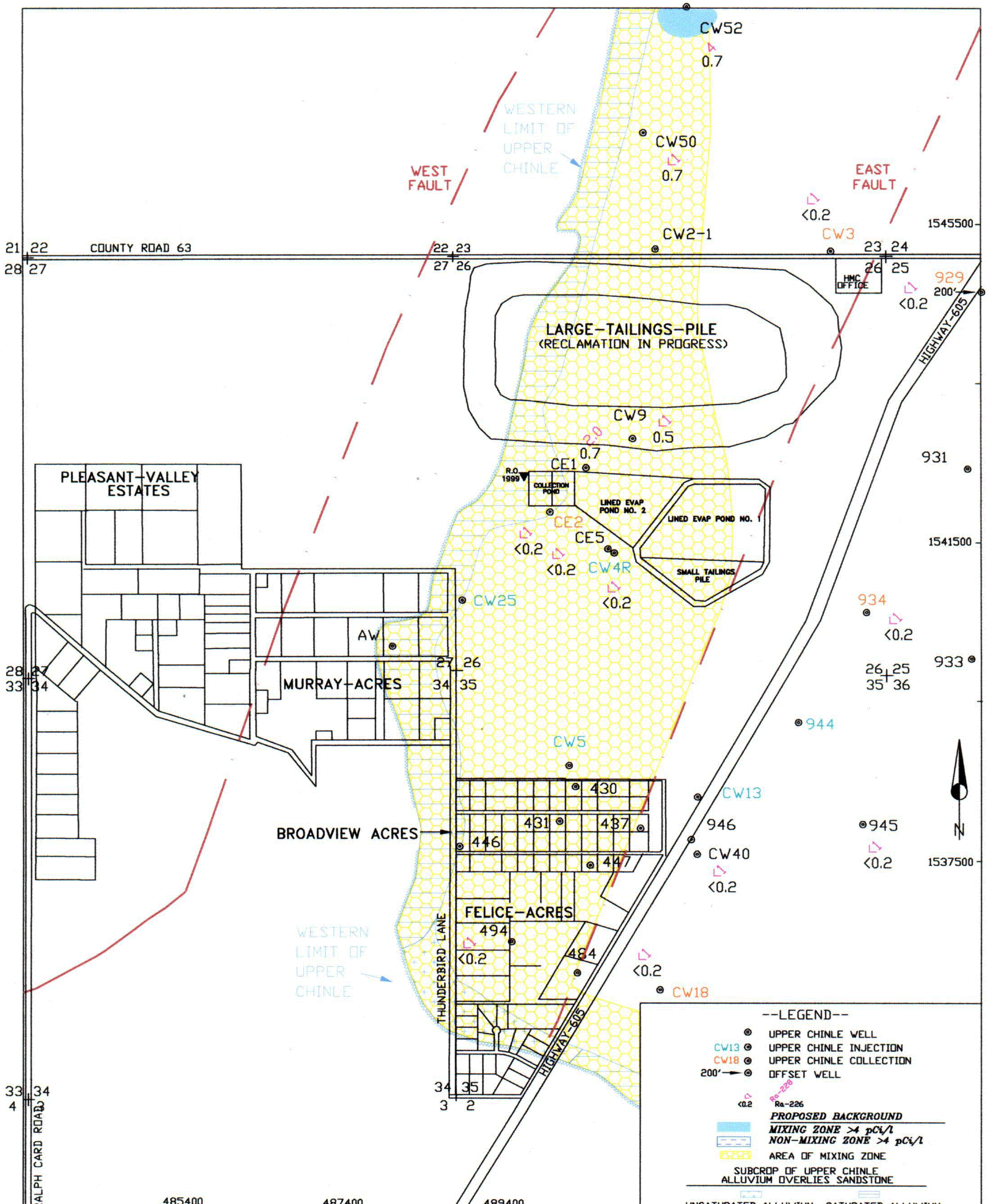

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FIGURE 2. RADIUM-226 AND RADIUM-228 CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2003, pCi/l

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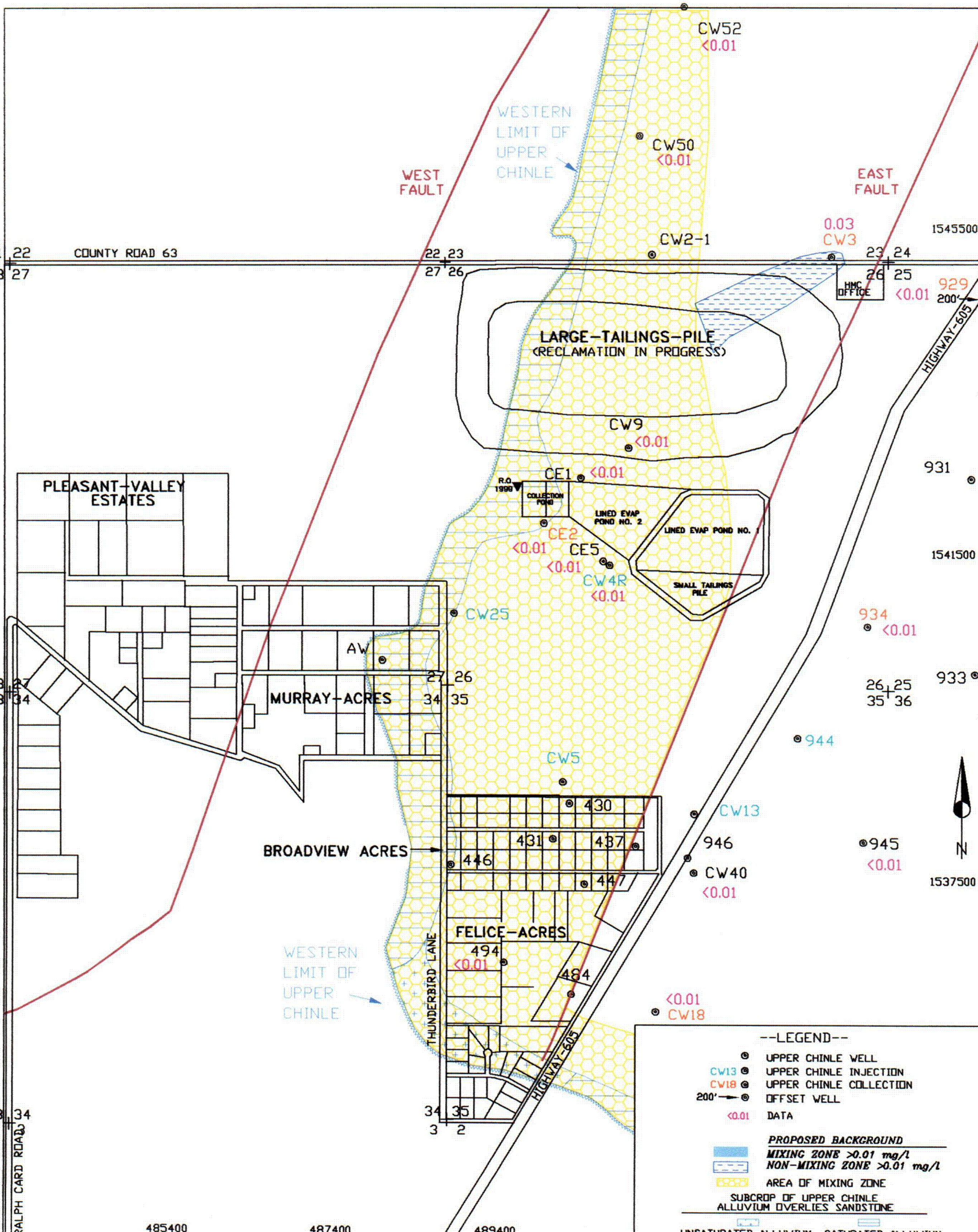

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FIGURE 3. VANADIUM CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2003, mg/l

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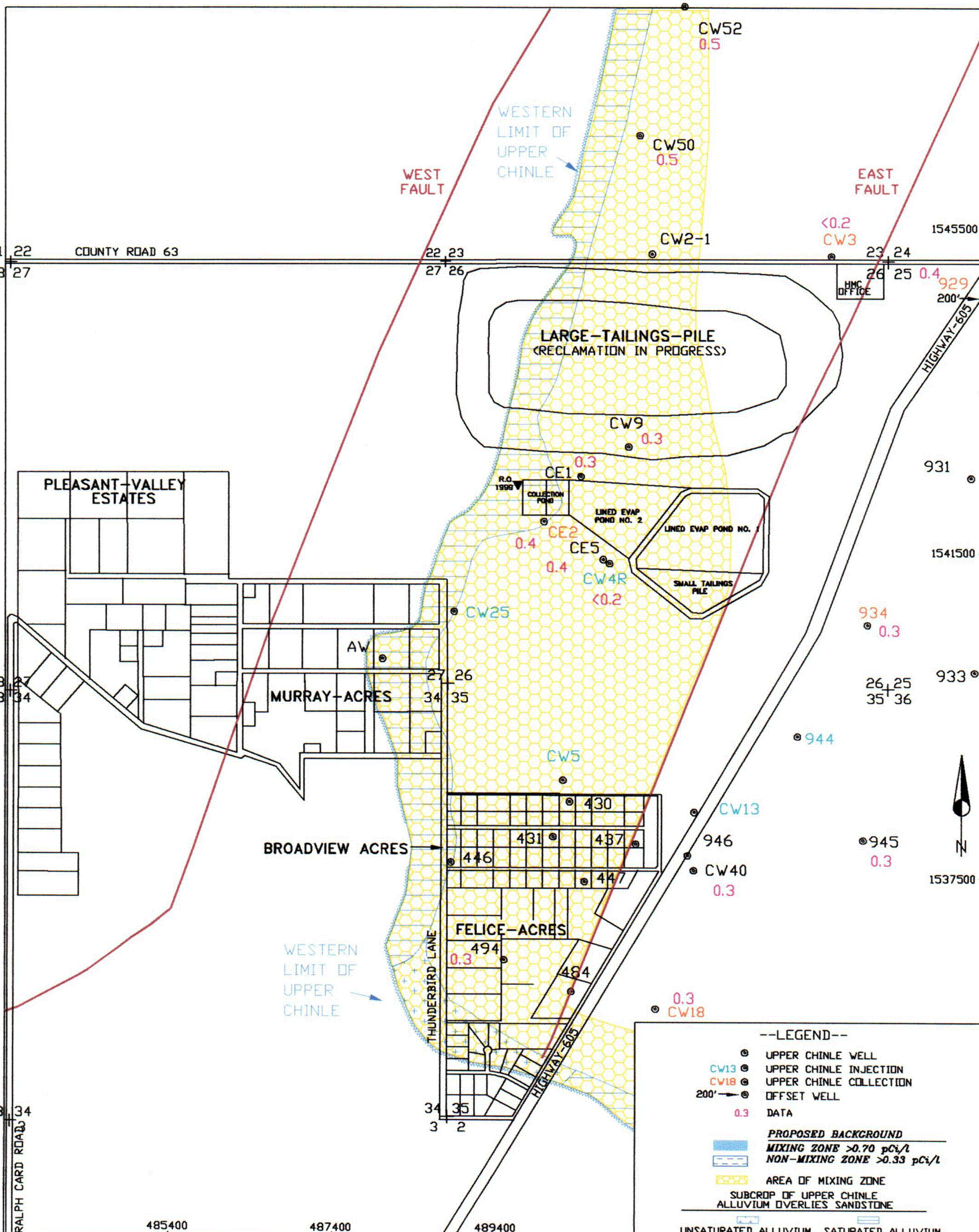

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FIGURE 4. THORIUM-230 CONCENTRATIONS OF THE UPPER CHINLE AQUIFER, 2003, pCi/l

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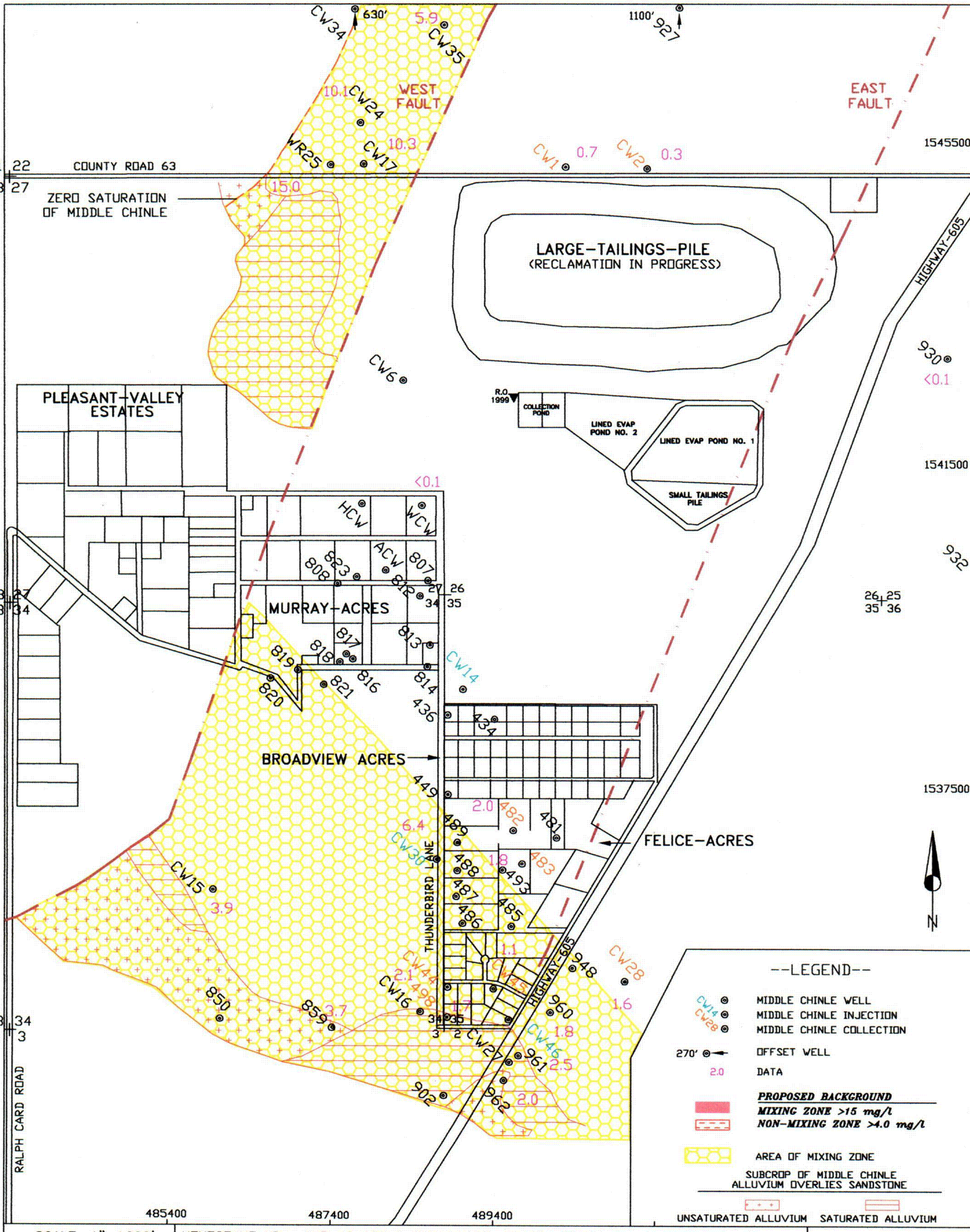

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	FIGURE 5. NITRATE CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2003, mg/l	c:\projects\ 2004-06\MID1600
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C06

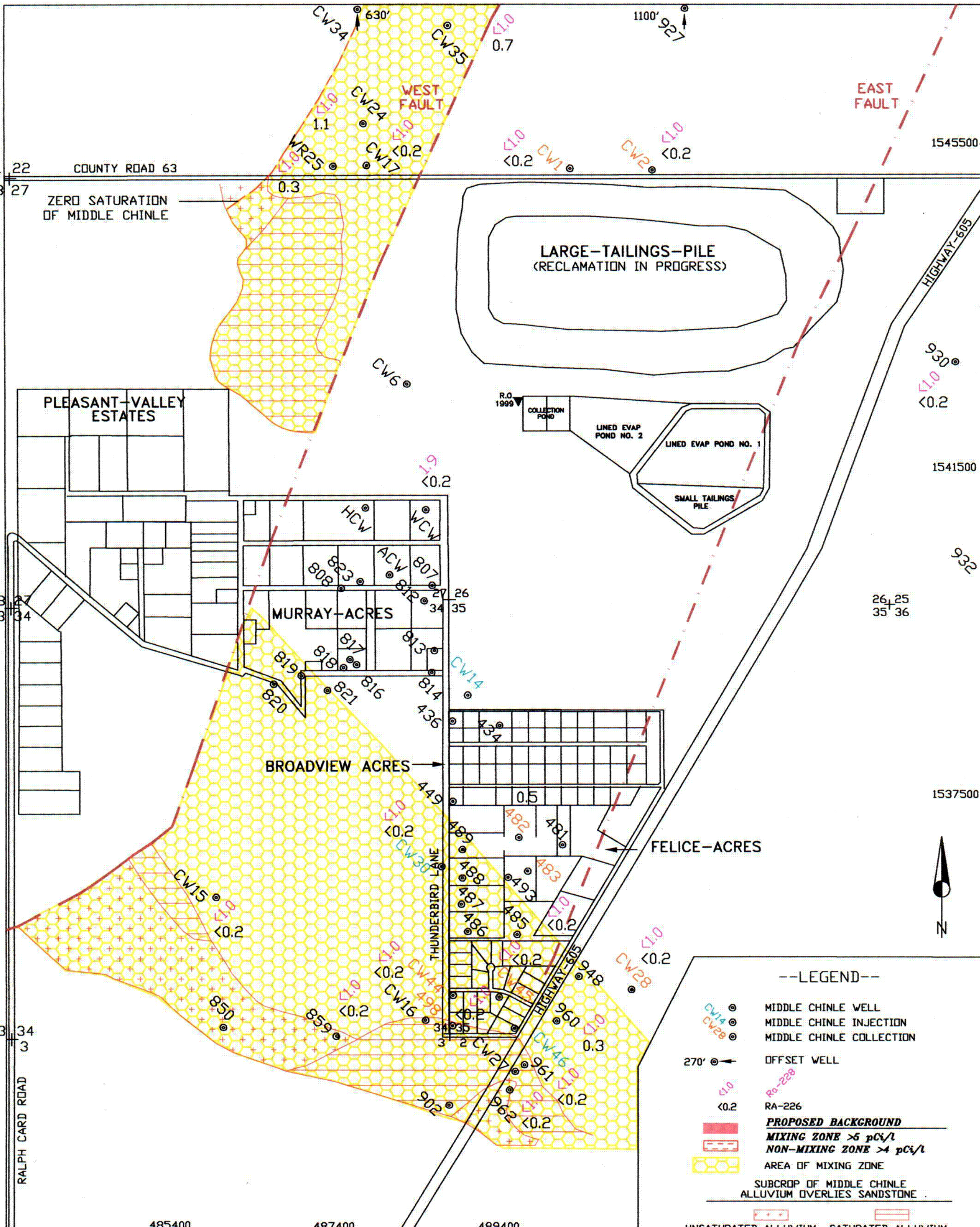

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FIGURE 6. RADIUM 226+228 CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2003, pCi/l

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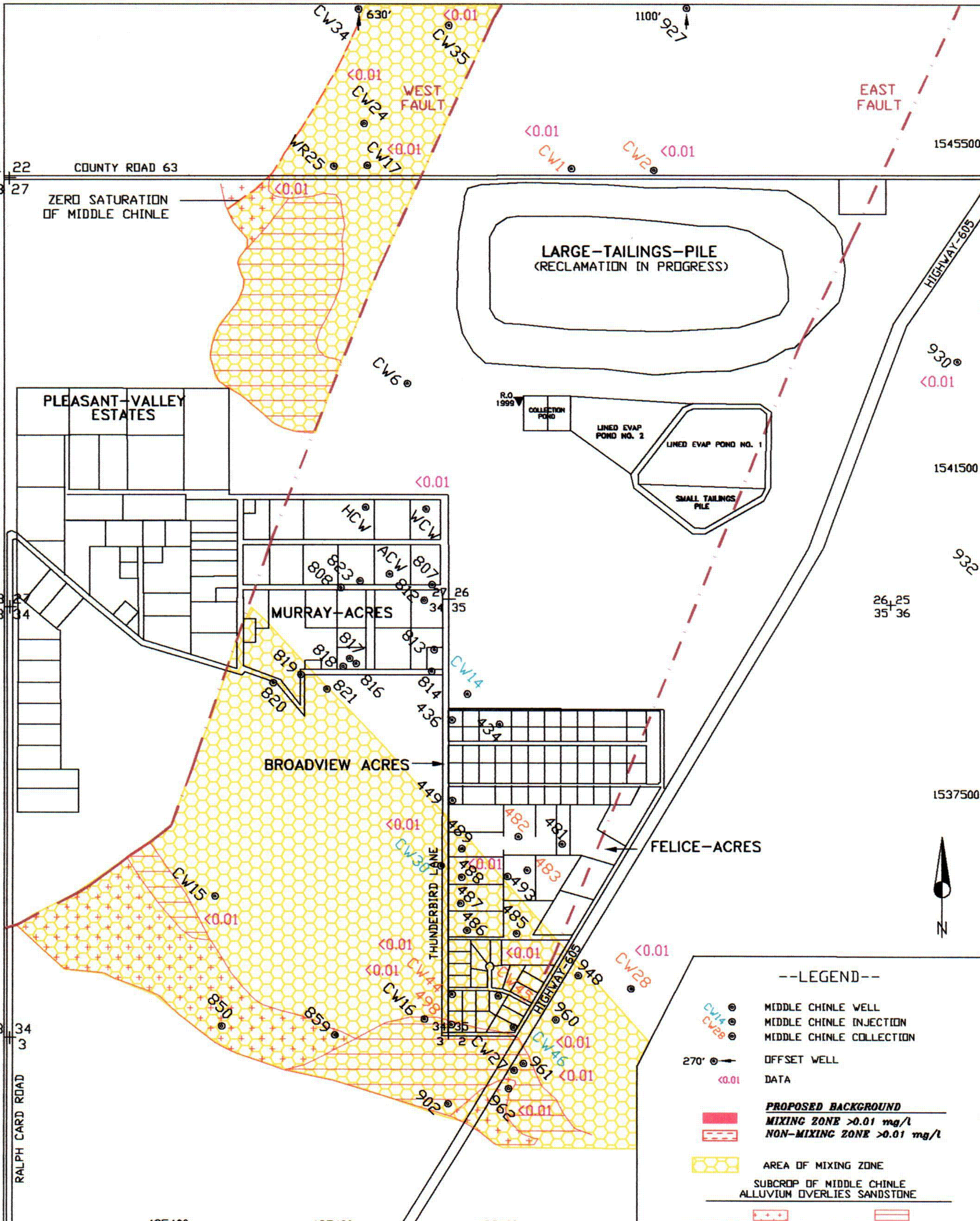

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FIGURE 7. VANADIUM CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2003, mg/l

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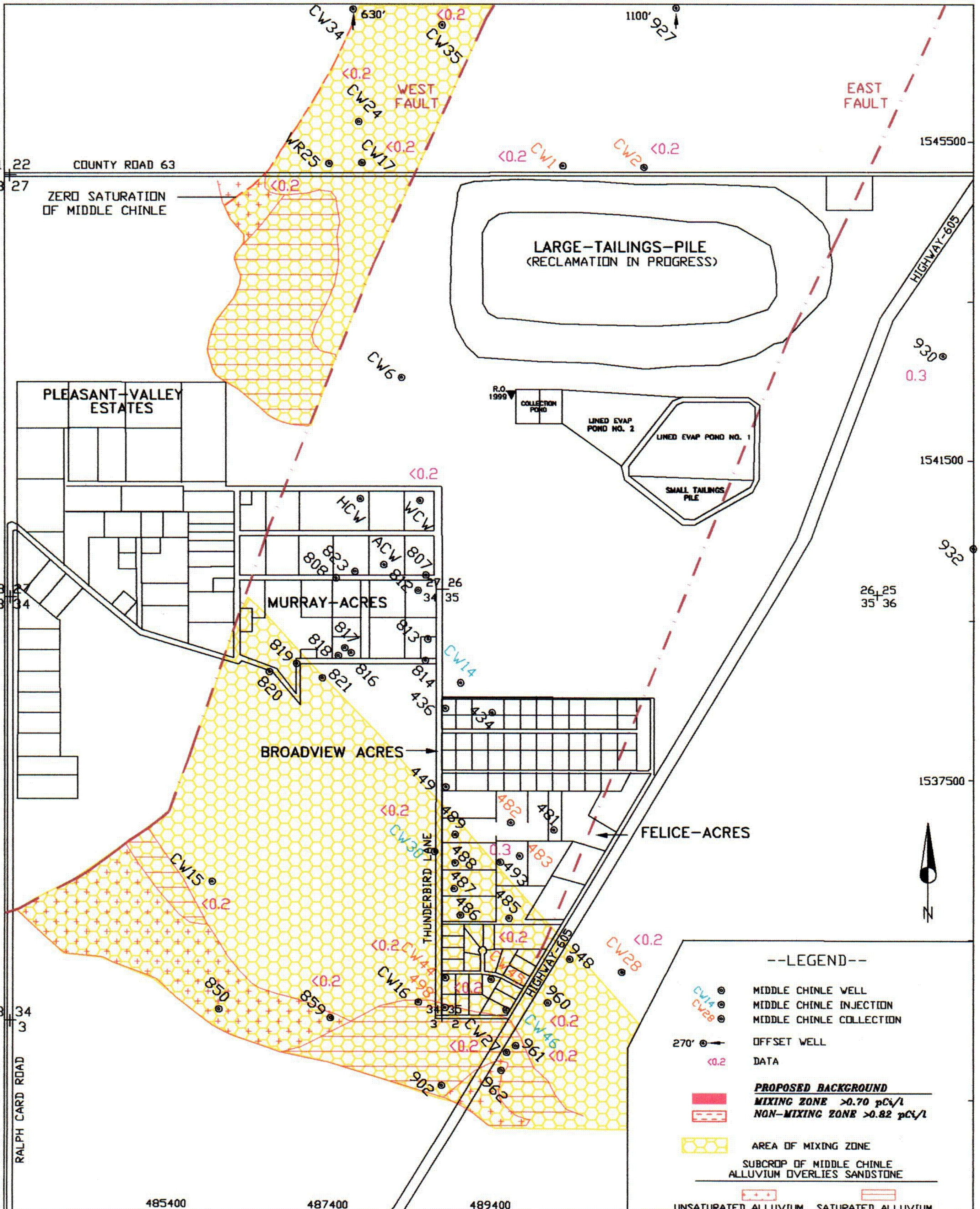

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FIGURE 8. THORIUM-230 CONCENTRATIONS OF THE MIDDLE CHINLE AQUIFER, 2003, pCi/l

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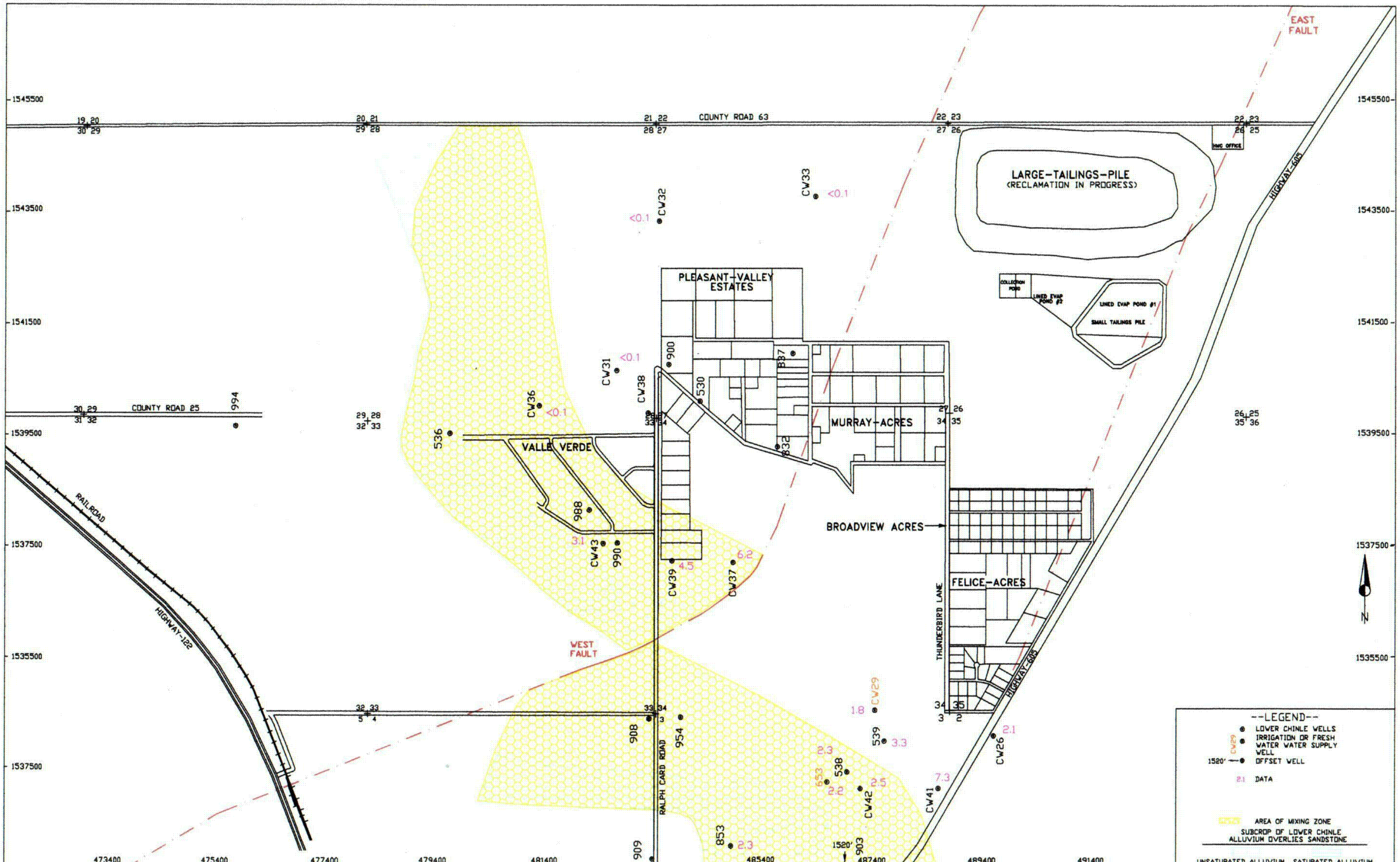

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FIGURE 9. NITRATE CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, 2003, mg/l

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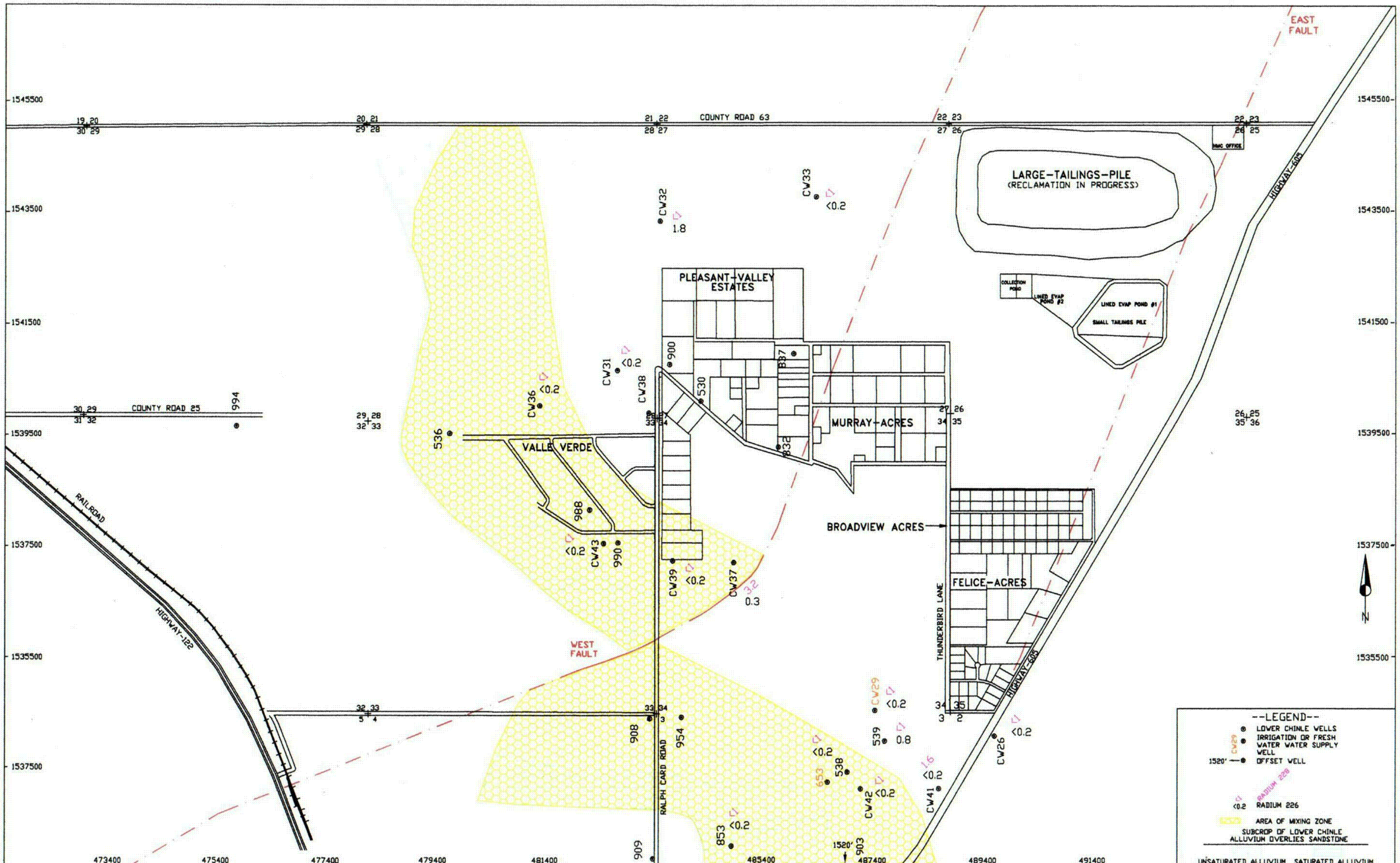

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FIGURE 10. RADIUM-226 AND RADIUM-228 CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, 2003, pCi/l

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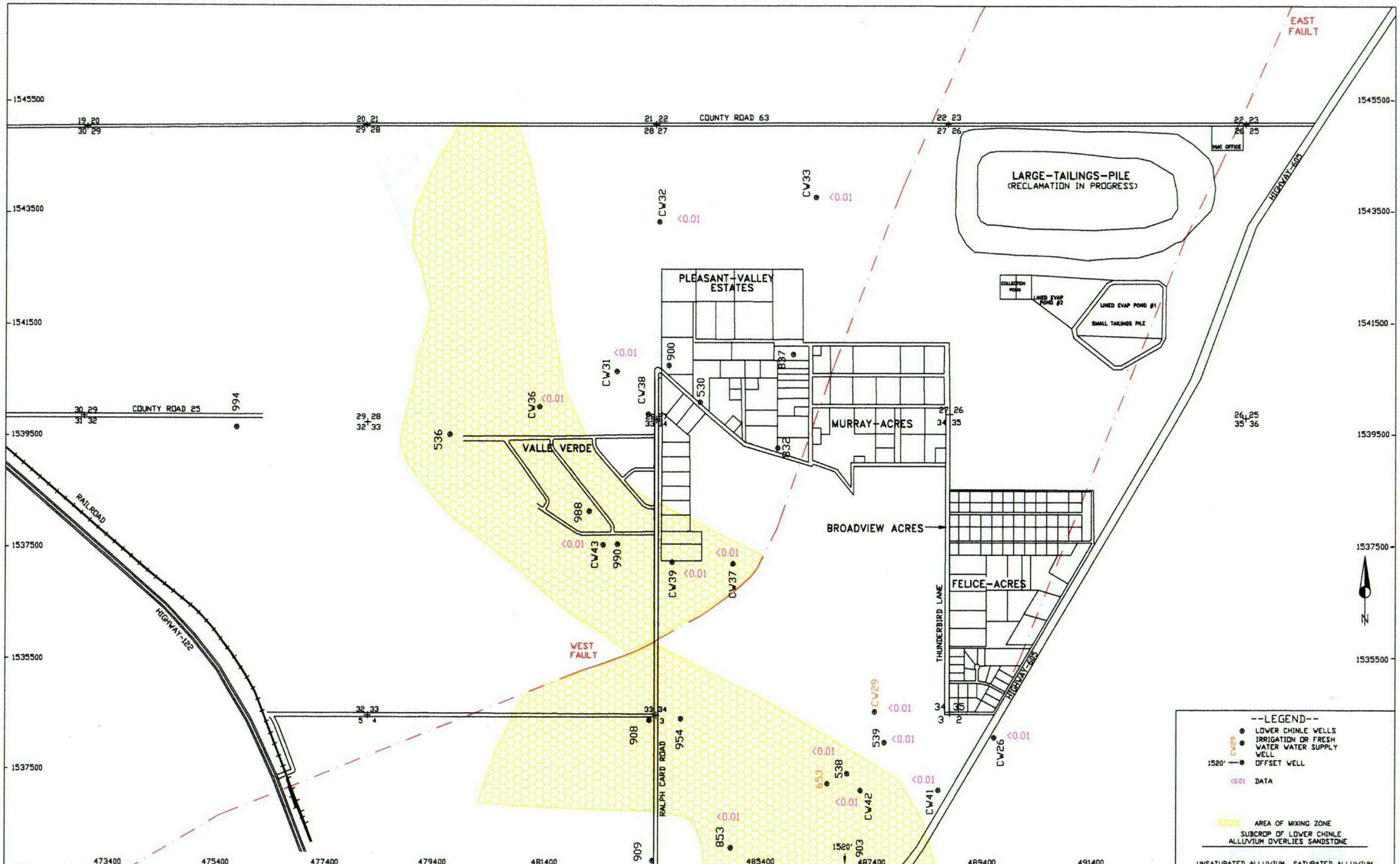

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FIGURE 11. VANADIUM CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, 2003, mg/l

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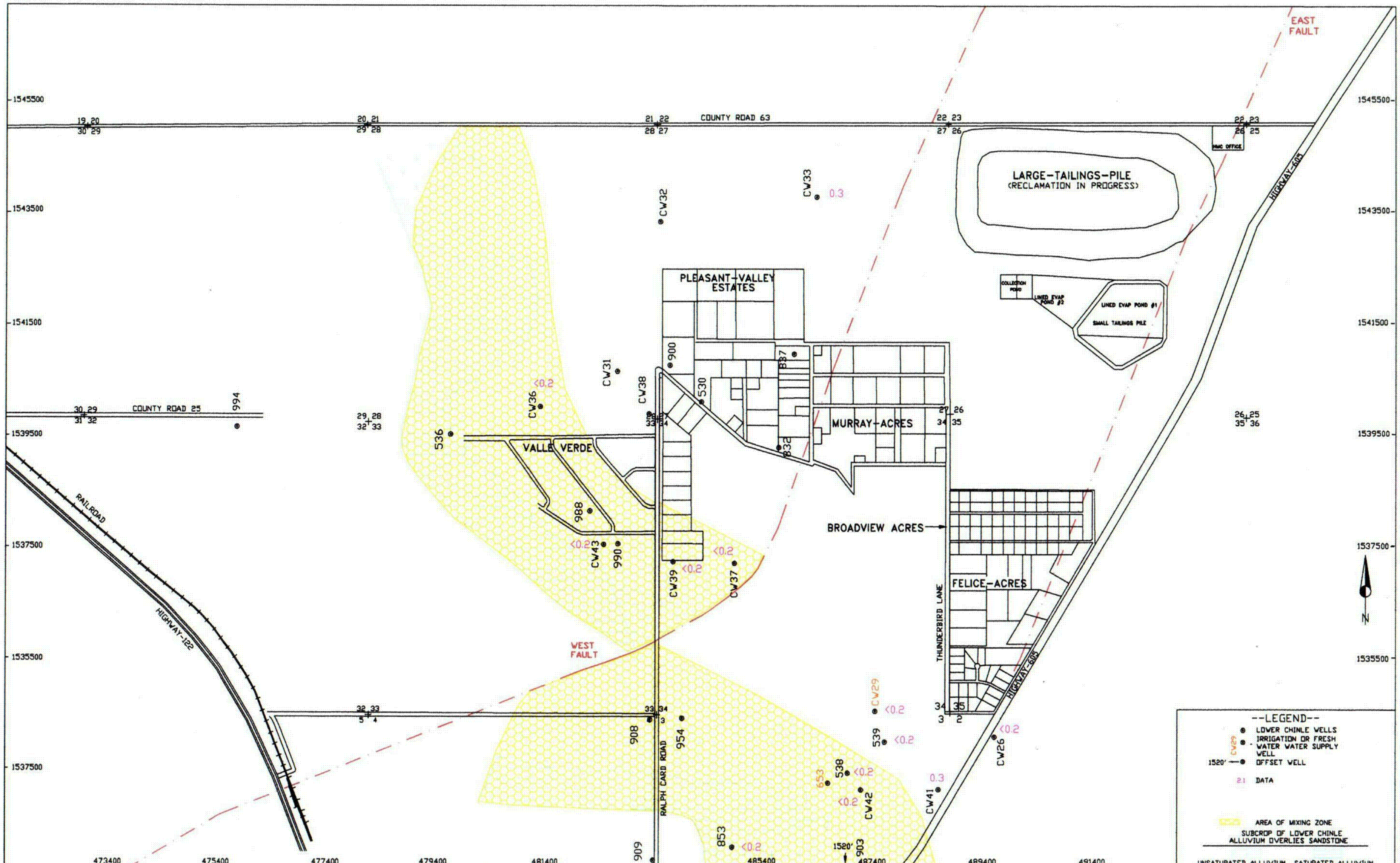

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FIGURE 12. THORIUM-230 CONCENTRATIONS OF THE LOWER CHINLE AQUIFER, 2003, pCi/l

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