

HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project



Ground-Water Restoration Post-Closure Monitoring Plan

Submitted On:
January 2015
Revised August 2015

Submitted To:
New Mexico Environmental Department
Nuclear Regulatory Commission

Submitted By:
Jesse R. Toepfer, Closure Manager, Grants
George Hoffman, Hydro-Engineering, LLC
Tom Michel, Hydro-Engineering, LLC

NM5501
NMSS
Received
w/ letter

Table of Contents

1. INTRODUCTION AND RESTORATION HISTORY.....	1-1
1.1 On-Site	1-2
1.2 South Off-Site	1-2
1.3 North Off-Site	1-2
2. PROPOSED POST-CLOSURE GROUND-WATER MONITORING	2-1
2.1 Alluvial Aquifer	2-1
2.2 Upper Chinle Aquifer	2-2
2.3 Middle Chinle Aquifer	2-2
2.4 Lower Chinle Aquifer	2-2
3. REFERENCES	3-1

List of Figures

Figure 1-1. Restoration Areas and the Location of Irrigation Areas	1-3
Figure 2-1. Maximum Extent of Alluvial Site Standard Exceedance.....	2-3
Figure 2-2. Maximum Extent of Upper Chinle Site Standard Exceedance	2-4
Figure 2-3. Maximum Extent of Middle Chinle Site Standard Exceedance.....	2-5
Figure 2-4. Maximum Extent of Lower Chinle Site Standard Exceedance.....	2-6

1. INTRODUCTION AND RESTORATION HISTORY

This report presents the post-closure monitoring plan that will be employed to confirm both the completion of ground-water restoration and the continued compliance with ground-water site standards in restored areas of the aquifers at the Homestake Mining Company of California (HMC) Grants, New Mexico site. The maximum extent of site standard exceedance for each of the aquifers is presented in a series of figures to delineate those areas where constituent of concern (COC) concentrations have exceeded one or more of the site standards during the period of record for ground-water monitoring. Post-closure monitoring will be done in the areas where the site standards have been exceeded to demonstrate that the restored ground water continues to meet the site standards for two years after the cessation of restoration efforts in the area and aquifer under review.

The proposed post-closure monitoring will be done in phases following completion of restoration in an area or aquifer. Prior to initiation of monitoring for a specific area or aquifer, a proposed post-closure monitoring letter will be submitted to the New Mexico Environment Department (NMED) that lists the proposed monitoring wells, their completion information, historical ground-water monitoring from these wells and those constituents that will be monitored.

The monitoring wells used to demonstrate stability of ground-water quality after ground-water restoration will be selected and discussed based upon the well location in a restoration area and the aquifer completion. As restoration progresses at the site, post-closure monitoring plans for individual areas of completed restoration will be developed following the same process. Each time a new area is to enter into post-closure monitoring, a new letter will be submitted to NMED requesting approval to proceed.

Three ground-water restoration areas have been defined for the Grants site. These areas are the On-Site restoration area and two Off-Site areas (South and North). Figure 1-1 shows the locations of the three ground-water restoration areas. Ground water collected from wells in the On-Site area will mainly be treated with the RO plant, while the collected water from the two Off-Site areas is planned to be treated through the zeolite process. Figures 2-2, 2-3, 2-4 and 2-5 in the Grants Remediation Strategy report (2014) show the areas where ground-water restoration is needed in each aquifer and wells planned to be used in the restoration of the alluvial, Upper Chinle, Middle Chinle and the Lower Chinle aquifers, respectively.

The Grants Remediation Strategy report (2014) presents the results of the numerical modeling that predicts the ground-water restoration. Wells will be selected for the post-closure monitoring which cover the areas of the ground-water restoration in each aquifer. Unless special circumstances dictate otherwise, approximately twenty percent of the collection wells used to restore an area will be used for monitoring during the corrective action program (CAP) to show restoration progress and to define when restoration is complete. These same monitoring wells may be proposed to be converted to the post-closure monitoring after demonstration of restoration in an area of the aquifer. In areas

where the initial COC concentrations are significantly greater than site standards, operational changes in the restoration program may become necessary to ensure clean-up targets are met. When COC concentrations are reduced to levels approaching the corresponding site standards, a formal monitoring program, similar to the one proposed for the CAP may be initiated.

1.1 On-Site

The On-Site restoration area includes the areas near the Large Tailings Pile (LTP) and Small Tailings Pile (STP) and an area west of the LTP. It also includes the restoration of the alluvial aquifer to the south of the STP which is designated as the L area. Restoration in the On-Site area will be in the alluvial, Upper Chinle and Middle Chinle aquifers.

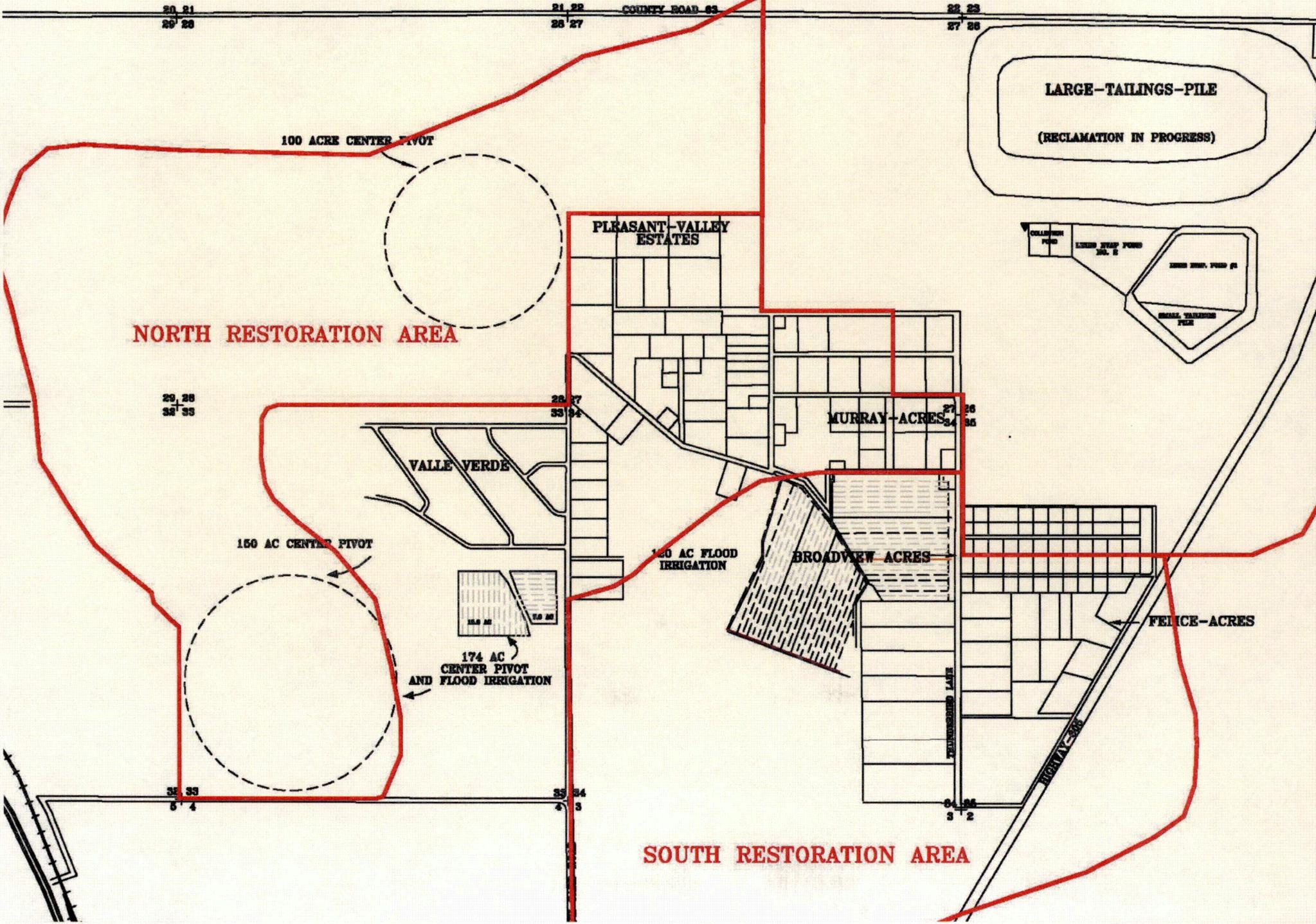
1.2 South Off-Site

The South Off-Site restoration area includes areas in Section 3 of T11N, R10W and Felice Acres and adjacent areas. Restoration in the South Off-Site area will be in the alluvial, Middle Chinle and Lower Chinle aquifers. A very minor amount of restoration is needed in the Upper Chinle aquifer in the South Off-Site area.

1.3 North Off-Site

The North Off-Site restoration area is in T12N, R10W and includes the western half of Section 27, Section 28 and an extension to the south of Section 28 including the Section 33 South Pivot (see Figure 1-1). Restoration in the North Off-Site area is only in the alluvial aquifer.

SITE RESTORATION AREA



2. PROPOSED POST-CLOSURE GROUND-WATER MONITORING

The post-closure ground-water monitoring will consist of two years of quarterly monitoring of selected wells in the restoration areas to demonstrate that the restored aquifer COC concentrations continue to meet the approved site standards. Wells will be selected for the particular area so as to provide a reasonable distribution, which will help to ensure the post-closure monitoring adequately defines water quality in the restored aquifer. Post-closure monitoring will start after an area has been adequately restored (*i.e.*, meets the site standards).

As described in Section 1, the post-closure monitoring will be done in phases as restoration progresses. The restoration progress will be evaluated periodically, and when restoration is completed in an area large enough to warrant transition to post-closure monitoring, the post-closure plan for each area will be developed and submitted. The selection of future post-closure monitoring areas and wells will consider proximity to ongoing restoration activity. Unless special circumstances warrant otherwise, wells in the restored area will be abandoned after confirmation that restoration stability has been achieved.

It should be noted that unless specifically stated otherwise, the sampling frequency specified for post-closure monitoring will always be quarterly and the sample parameter list will include those constituents where historical concentrations have exceeded corresponding site standards. Sample parameters may also include indicator constituents such as Se, SO₄ or Cl.

CAP monitoring will generally be initiated in an area when constituent concentrations are approaching site standards. Roughly twenty percent of the operating collection wells will be used in the CAP monitoring to define when restoration is adequate. These CAP monitoring wells are proposed to be used for the post-closure monitoring of an area following completion of ground-water restoration. The CAP and post-closure monitoring wells will generally be selected to provide coverage over the area under consideration.

Trend and/or statistical analysis of post-closure water quality data will only be necessary if there is an exceedance of a site standard in the post-closure monitoring period. If an exceedance does occur, the well may be resampled and a review of the affected data along with historical data may be performed to determine if the affected data is an outlier and needs to be replaced with the resample data. If statistical analyses are necessary, a nonparametric 95 % analysis may be performed on the post-closure data set.

2.1 Alluvial Aquifer

Wells in the On-Site, South Off-Site and North Off-Site areas will be used to restore the applicable aquifers (*e.g.*, Alluvial; Upper, Middle, and Lower Chinle) in these three areas. Figure 2-1 shows

the extent of the area where constituent concentrations in the alluvial aquifer have exceeded one or more of the site standards over the historical monitoring period.

In the area labeled as the western portion of the North Off-Site area on Figure 2-1, there is a confluence of the San Mateo and Rio San Jose alluvium. Because the direction of ground-water flow in the Rio San Jose alluvial aquifer is generally to the south, the pattern showing the maximum extent of site standard exceedance is terminated just to the north of the confluence to reflect the general limit of HMC impacts in this area.

2.2 Upper Chinle Aquifer

Post restoration monitoring is needed in the On-Site and South Off-Site areas for the Upper Chinle aquifer. Figure 2-3 in the Grants Remediation Strategy report shows the Upper Chinle areas where restoration is needed and wells planned to be used in the restoration of these two areas. Figure 2-2 shows the limits where Upper Chinle site standards have been exceeded and where post-closure monitoring in the Upper Chinle aquifer will occur.

2.3 Middle Chinle Aquifer

Restoration is needed for the Middle Chinle aquifer in the On-Site and South Off-Site areas. Figure 2-4 in the Grants Remediation Strategy report shows the Middle Chinle areas that require restoration and wells planned to be used in the restoration of these two areas. Figure 2-3 shows the limits where Middle Chinle site standards have been exceeded and where post-closure monitoring in the Middle Chinle aquifer is needed.

2.4 Lower Chinle Aquifer

Wells in the South Off-Site area will be used to restore the Lower Chinle aquifer in this area. Figure 2-5 in the Grants Remediation Strategy report shows the Lower Chinle area where restoration is needed and wells planned to be used in the restoration of this area. Figure 2-4 shows the limits where Lower Chinle site standards have been exceeded and the area where post-closure monitoring of the Lower Chinle aquifer is needed.

20, 21
29, 28

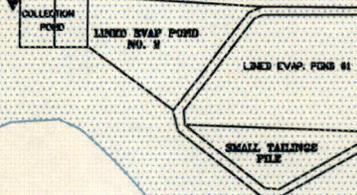
21, 22
28, 27 COUNTY ROAD 63

22, 23
27, 26

LARGE-TAILINGS-PILE

100 ACRE CENTER PIVOT

PLEASANT-VALLEY
ESTATES



WESTERN PORTION OF
NORTH OFF-SITE
AREA

EASTERN PORTION OF
NORTH OFF-SITE
AREA

SAN MATEO
ALLUVIUM

29, 28
32, 33

28, 27
33, 34

26
34, 35

MURRAY-ACRES

VALLE VERDE

FLOOD IRRIGATION
120 AC FLOOD

BROADVIEW ACRES

150 AC CENTER PIVOT

174 AC
CENTER PIVOT
AND FLOOD IRRIGATION

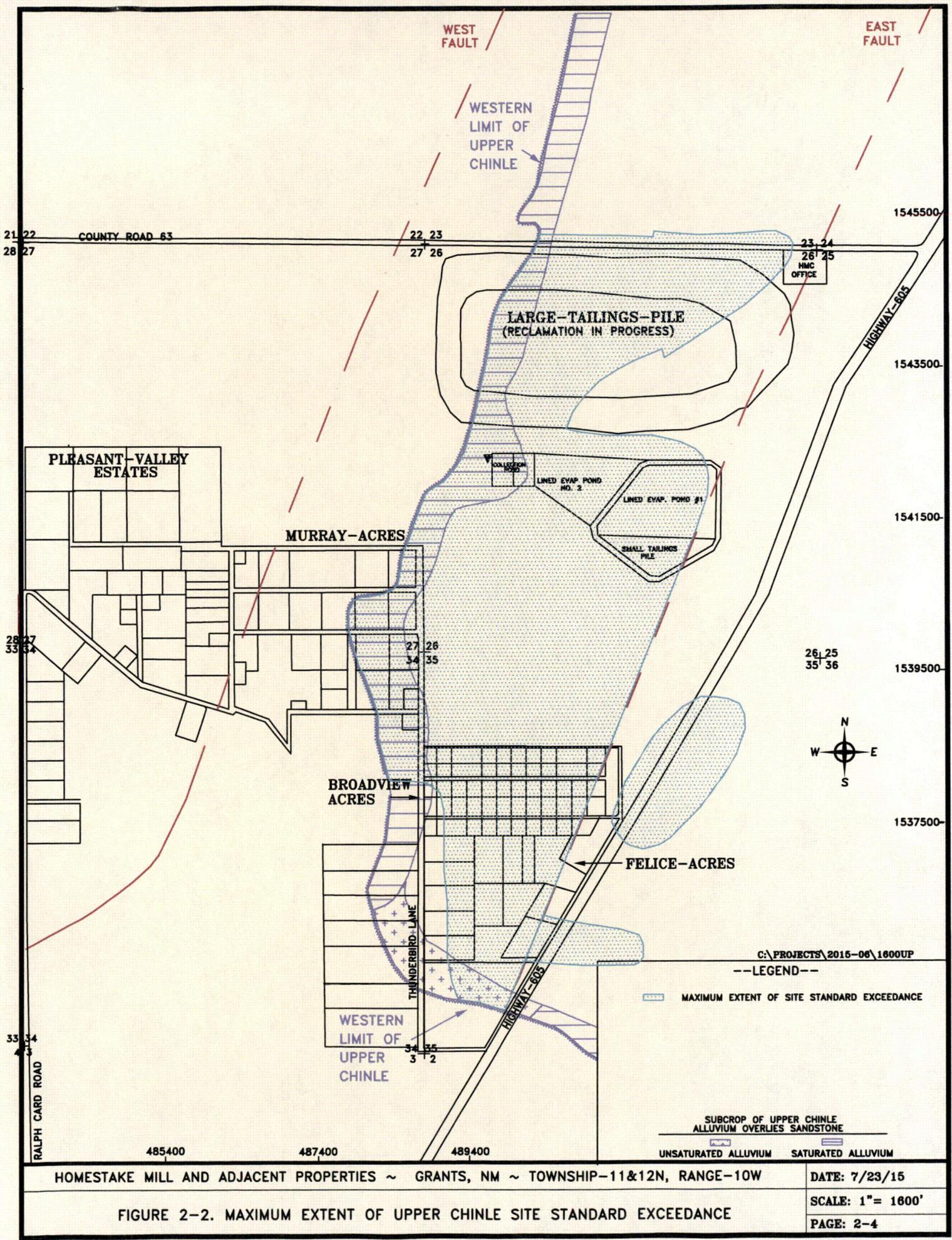
FELICE-ACRE

32, 33
5, 4

33, 34
4, 3

THUNDERBOLT LANE
HIGHWAY 605

RALPH CARD ROAD



HOMESTAKE MILL AND ADJACENT PROPERTIES ~ GRANTS, NM ~ TOWNSHIP-11&12N, RANGE-10W

DATE: 7/23/15

FIGURE 2-2. MAXIMUM EXTENT OF UPPER CHINLE SITE STANDARD EXCEEDANCE

SCALE: 1" = 1800'

PAGE: 2-4

C:\PROJECTS\2015-06\1600UP
--LEGEND--

MAXIMUM EXTENT OF SITE STANDARD EXCEEDANCE

SUBCROP OF UPPER CHINLE ALLUVIUM OVERLIES SANDSTONE
UNSATURATED ALLUVIUM SATURATED ALLUVIUM

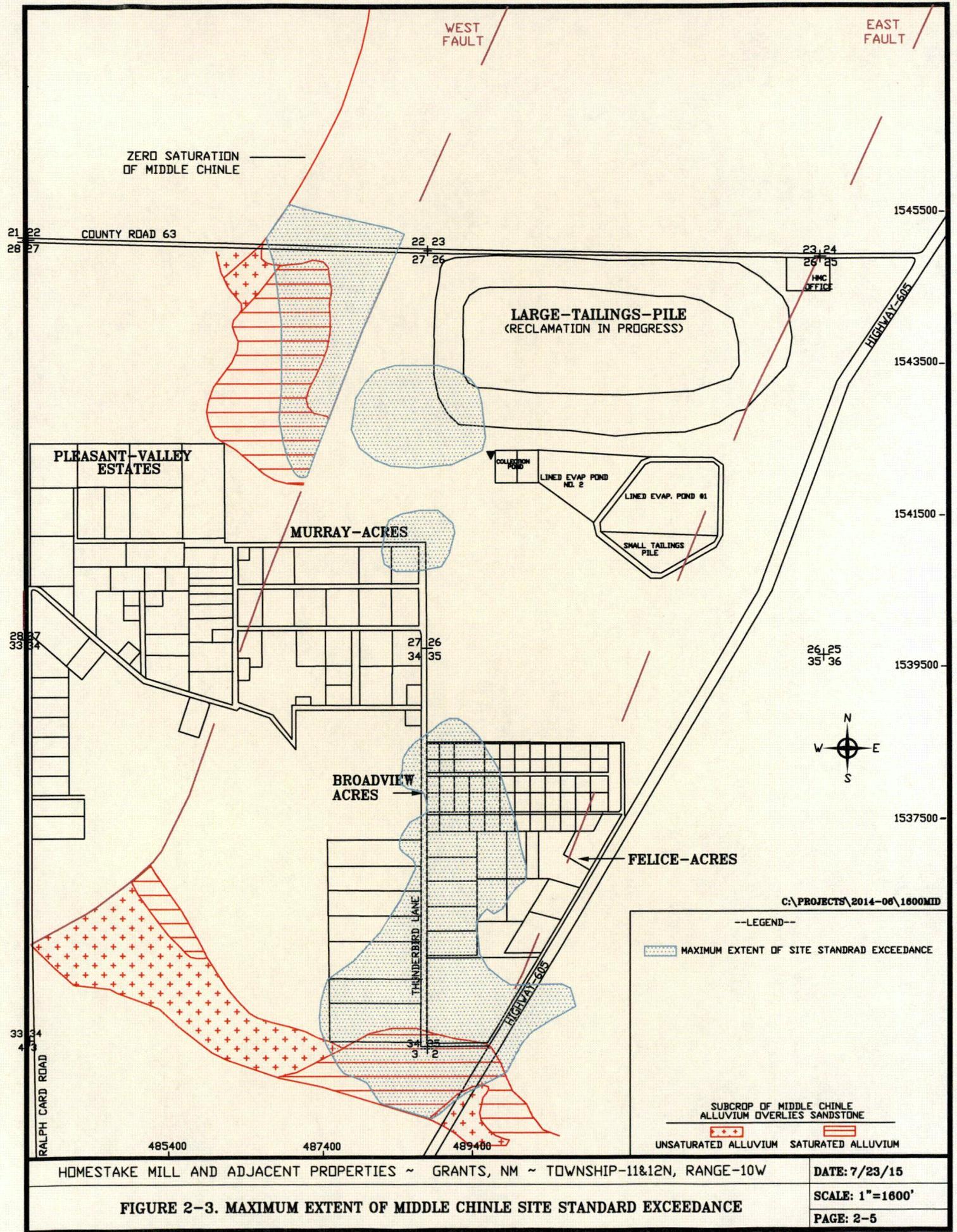
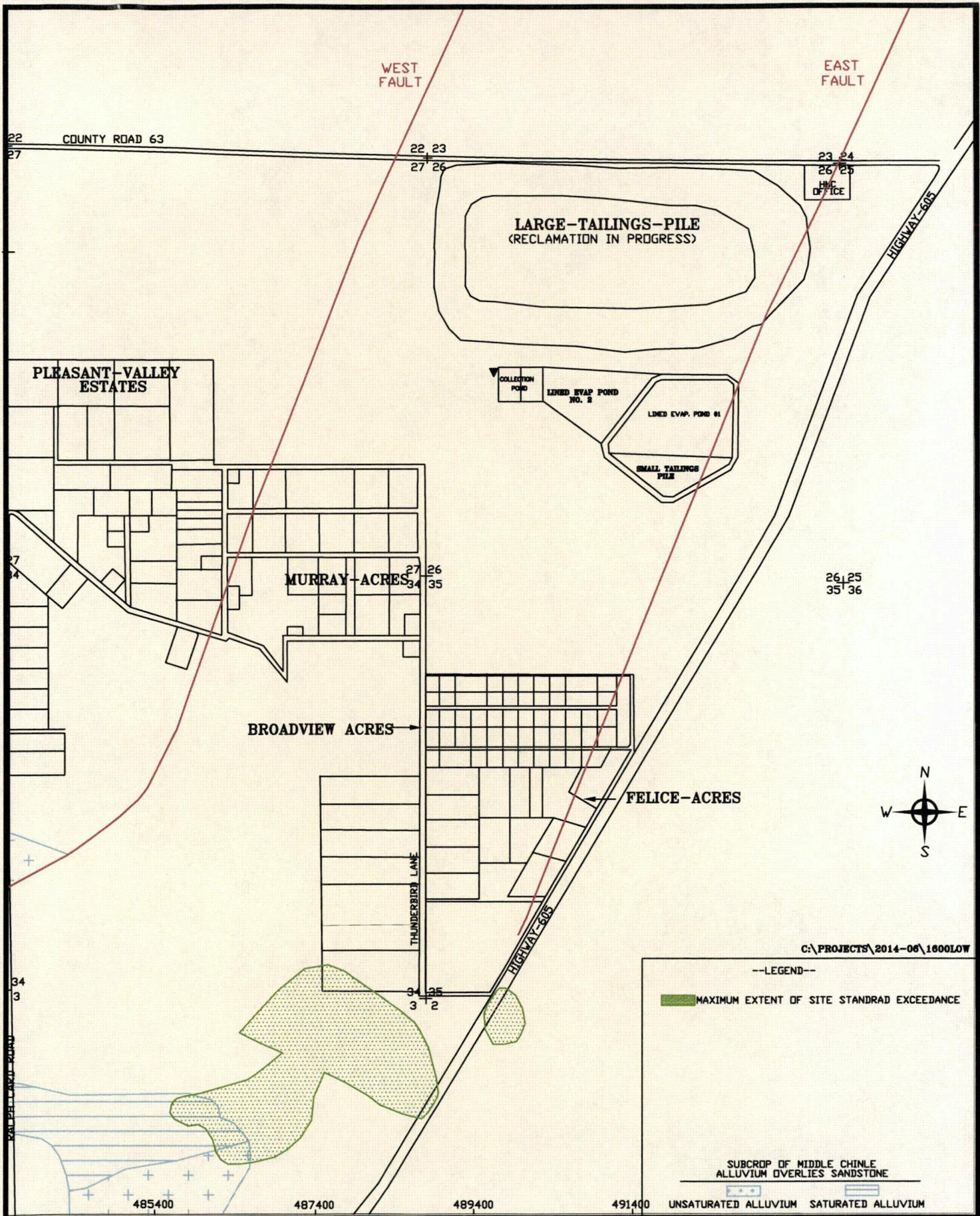
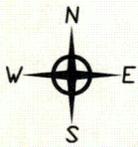


FIGURE 2-3. MAXIMUM EXTENT OF MIDDLE CHINLE SITE STANDARD EXCEEDANCE



C:\PROJECTS\2014-06\1800LOW



3. REFERENCES

Homestake Mining Company, 2014, Status Report: Remediation Strategy, Homestake Mining Company of California, Grants, New Mexico.