December 19, 2014

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ACCEPTANCE OF PLAN FOR HYDRAULIC TESTING ACTIVITIES AND TEMPORARY AMENDMENTS TO MONITORING AND REPORTING PROGRAM IN CLEANUP AND ABATEMENT ORDER NO. R6V-2008-0002A3, PG&E HINKLEY COMPRESSOR STATION, SAN BERNARDINO COUNTY, WDID 6B369107001

The California Regional Water Quality Control Board, Lahontan Region (Water Board) accepts PG&E's proposal for conducting hydraulic testing activities in the southern chromium plume. The Water Board's Prosecution Team will not pursue enforcement actions against PG&E should capture metrics required in Cleanup and Abatement Order (CAO) No. R6V-2008-0002A3 not be maintained as a result of implementing the testing activities, as long as contingency actions are taken when required as described below. This letter temporarily modifies the CAO by requiring PG&E to provide additional data and assessments in monthly capture metric reports and implement the contingency plan when or if conditions described below occur.

Background

On March 14, 2012, the Water Board issued amended CAO R6V-2008-0002A3 (Enclosure 1) requiring PG&E to maintain hydraulic containment of chromium-affected groundwater south of Thompson Road in Hinkley. PG&E was to operate and maintain a groundwater extraction system it proposed to prevent further plume migration. Hydraulic containment compliance would be determined by comparing hydraulic gradients or flow direction vectors calculated from groundwater elevation data. Attachment B in the amended CAO listed select well pairs and triplets and piezometers and control limits that would be used to evaluate hydraulic capture metrics. If PG&E was found by the Water Board to be out of compliance with the amended CAO, it is to submit and implement a contingency plan to re-establish plume capture.

On October 3, 2014, PG&E submitted a memorandum proposing to conduct hydraulic testing activities in the northern area of the southern chromium plume (attached to the source area at the Hinkley Compressor Station). Recent monitoring data indicate remedial actions have been effective at hydraulic containment and at reducing the chromium contaminated area; specifically the 10 micrograms per liter (µg/L) and 50 µg/L chromium plume boundary lines have shrunk southward and the capture metrics

adopted in March 2012 are no longer sited in appropriate locations. The proposal, prepared by Arcadis, states that select extraction wells will have reduced pumping rates during a three-month testing period while other extraction wells will be pumping to achieve plume containment. The purpose of the testing is to evaluate an alternate and more southerly capture zone configuration for the chromium plume.

During testing, current capture metrics required in amended CAO R6V-2008-0002A3 to demonstrate plume containment, may not be achieved indicating no containment in the area between Acacia Street and Thompson Road. However, PG&E believes extraction well pumping south of Acacia Street will demonstrate an alternate capture zone configuration for controlling the chromium plume from migration. Monthly collection of hydraulic elevation data will be used to evaluate hydraulic influences in the alternate capture zone. This data and evaluation will be presented in monthly capture metric reports required by amended CAO R6V-2008-0002A3. In addition, PG&E proposes to use quarterly groundwater quality data with elevation data to assess whether contingency measures are warranted and would propose contingency as part of the first quarter 2015 groundwater monitoring report due April 30, 2015, pursuant to CAO R6V-2008-0002.

At Water Board staff's request, PG&E submitted a November 6, 2014 contingency plan. The contingency plans states that if, during testing, data indicates increasing hexavalent chromium concentrations outside or within the plume footprint near the current capture zone, PG&E will initiate extraction at selected contingency wells to provide containment. Figure 1 (Enclosure 2) in the plan shows contingency extraction wells for both the A1 (upper) and A2 (deep) zones in the upper aquifer. PG&E states in its plan that any hexavalent chromium increases can be addressed with existing extraction wells and piping infrastructure.

Public Comments

At the November 12, 2014 Water Board public hearing, Water Board staff and PG&E staff presented PG&E's request to suspend remedial requirements in CAO R6V-2008-0002A3 for developing alternate capture metrics. In a December 1, 2014 correspondence from the Independent Review Panel's consultant, Project Navigator stated its support of PG&E's request to put CAO requirements on hold so as to conduct investigations to optimize pumping rates for plume capture.

Water Board Comments

Order 3.9 in CAO R6V-2008-0002A3 allows PG&E, upon approval by the Water Board, to suspend remedial requirements for no longer than is necessary to develop alternate pumping regimes. Consistent with Order 3.9, I have no objections to implementing hydraulic testing activities as proposed. However, it is not necessary to put the CAO into abeyance during testing activities. If PG&E fails to maintain capture metrics required in amended CAO R6V-2008-0002A3, no enforcement actions will be levied provided appropriate contingency actions are implemented under the conditions listed below. I am also requiring PG&E to include additional available and relevant ground water data in the monthly capture metric reports rather than the quarterly site-wide

groundwater monitoring reports so that PG&E can more quickly implement contingency measures if needed to address increasing chromium concentrations observed.

Temporary Amendments to CAO R6V-2008-0002A3

Order No. 3 in CAO R6V-2008-0002A3 is amended to include the following

1. In monthly capture metric reports due by the 15th of the following month and required under Order 3.2, PG&E must provide any preliminary monitoring data (from the first quarter 2015 site-wide sampling effort where laboratory reports for individual wells have been at PG&E for a minimum of 10 days) indicating a) hexavalent or total chromium concentrations increase by 50% or more for monitoring wells within ½ mile of the current capture zones depicted in Figure 1(black and orange lines) as compared to fourth quarter 2014 data or b) any increases of hexavalent chromium above 10% in domestic wells within ½ mile of the capture zones. A map must show the location of all referenced monitoring data.

2. Order 3.4 is revised to require contingency plan proposals to re-establish plume capture if hexavalent and/or total chromium concentrations increase by 50% or more for monitoring wells within ½ mile of the current capture zones depicted in Figure 1(black and orange lines) as compared to fourth quarter 2014 data or 10% increase in hexavalent chromium concentrations at domestic wells located within ½ mile of the capture zones depicted in Figure 1 (enclosed). All contingency assessments and subsequent actions shall be described in monthly capture metric reports.

3. Order 3.5 is added requiring notification to the Water Board within three working days when contingency actions are taken. The notice shall identify the data or instance leading to the contingency action, what the contingency action is, and monitoring actions to be undertaken for verifying the contingency action is effective. A map shall accompany all data showing the location of subject monitoring wells and extraction wells.

These amendments may be modified by the Water Board in writing at any time or may be superceded by new Orders adopted by the Water Board.
If you have any questions, you may contact me at (530) 542-5436 or lauri.kemper@waterboards.ca.gov.

Lauri Kemper

LAURI KEMPER
ASSISTANT EXECUTIVE OFFICER

Enclosures: 1. Cleanup and Abatement Order No. R6V-2008-0002-A3
2. Figure 1

cc: PG&E Hinkley Technical Mailing List
PG&E Hinkley Lyris List

File Under: VVL WDID 6B369107001
LSD/dk/T: PG&E hydraulic testing response 12-14

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

AMENDED CLEANUP AND ABATEMENT ORDER
NO. R6V-2008-0002A3

WDID NO. 6B369107001

REQUIRING PACIFIC GAS AND ELECTRIC COMPANY TO CLEAN UP AND ABATE WASTE DISCHARGES OF TOTAL AND HEXAVALENT CHROMIUM TO THE GROUNDWATERS OF THE MOJAVE HYDROLOGIC UNIT

San Bernardino County

The California Regional Water Quality Control Board, Lahontan Region (Water Board), finds:

1. The Pacific Gas and Electric Company owns and operates the Hinkley Compressor Station (hereafter the "Facility"), located at 35863 Fairview Road, Hinkley in San Bernardino County. For the purposes of this Order, the Pacific Gas and Electric Company is referred to as the "Discharger."

2. The purpose of this Amendment is to address the hydraulic containment of chromium-affected groundwater south of Thompson Road in Hinkley, California, and actions to reduce plume migration in the area generally north of Thompson Road.

3. On August 6, 2008, the Water Board issued Cleanup and Abatement Order No. R6V-2008-0002 (combined with its amendments, hereafter referred to as the "CAO" or "CAO R6V-2008-0002") to the Discharger to clean up and abate the effects of waste discharges and threatened discharges containing hexavalent chromium and total chromium to waters of the State. The CAO required the Discharger to develop and implement a comprehensive cleanup strategy to clean up and abate the chromium plume to background levels and set an interim maximum background level of 4 parts per billion (ppb).

4. The CAO also required the Discharger to take immediate additional corrective actions to contain chromium migrating with groundwater and to continue to implement groundwater remediation in the source area and central plume area. The CAO also modified the monitoring and reporting program for permitted projects.

5. Order Paragraph 3 of the CAO required the Discharger to contain the hexavalent and total chromium plumes to locations where hexavalent chromium was below the interim background level of 4 ppb and the total chromium was below 50 ppb.

a. The Discharger was required to achieve containment of the hexavalent chromium plume in the ground water by December 31, 2008, using the Discharger's *Boundary Control Monitoring Program and Updated Site-Wide Groundwater Monitoring Program* (submitted July 2, 2008 and prepared by Secor International) as described in Finding 16 in the Order.

b. The Discharger was required to achieve containment of the total chromium plume in the ground water by December 31, 2008, also based on the *Boundary Control Monitoring Program and Updated Site-Wide Groundwater Monitoring Program* as described in Finding 16 in the Order.

6. Amendment Order No. R6V-2008-0002A1, effective November 12, 2008, adopted average and maximum background levels for hexavalent chromium of 1.2 ppb and 3.1 ppb, respectively. The adopted average and maximum background levels in the Amendment Order for total chromium are 1.5 ppb and 3.2 ppb, respectively. These background levels were adopted for the purposes of establishing background water quality conditions, considering cleanup strategies and supporting future decisions regarding cleanup levels. For plume containment, the level remained at 4 ppb for both hexavalent chromium and total chromium.

7. Amendment Order No. R6V-2008-0002A2, effective April 7, 2009, allowed lateral migration of the 4 ppb hexavalent chromium plume boundary east of the South Central Remediation In-situ Area from discharges to groundwater extracted and piped from cleanup actions in the northwest plume area. Lateral plume expansion of 1,000 feet was allowed as long as it could be shown that the chromium would be captured by the existing groundwater extraction system in the downgradient flow direction.

8. In its First Quarterly 2009 Evaluation Monitoring Report, the Discharger reported that hexavalent chromium control limits were exceeded in Monitoring Well 62-A beginning in November 2008. The results were verified in February and March, 2009. The report was submitted April 29, 2009. Subsequent quarterly reports indicated that Monitoring Well 62-A continued to exceed hexavalent chromium control limits (with the exception of one quarter) through the Fourth Quarterly 2011 Groundwater Monitoring Report, submitted January 30, 2012. Data reported by the Discharger indicates that Monitoring Wells 72S and 79S have also exceeded hexavalent chromium concentrations, greater than 4 ppb. Since 2009, the migrating chromium plume in groundwater has affected domestic and agricultural wells at concentrations exceeding the maximum background concentration for hexavalent chromium of 3.1 ppb or total chromium of 3.2 ppb. Affected wells are located east of Summerset Road, and north of Thompson Road to Mount General Road.

9. On March 14, 2012, the Water Board adopted Settlement Agreement and Stipulation for Entry of Order; Order No. R6V-2012-0013 at its public meeting after receiving comments from the public. The Settlement Agreement addresses the period of

violation of CAO R6V-2008-0002 for plume migration from January 1, 2009 to December 31, 2011. As part of Order No. R6V-2012-0013, the Water Board agreed to amend CAO R6V-2008-0002 to replace CAO Paragraph 3 with the requirements presented in this Amendment to CAO R6V-2008-0002 addressing chromium plume migration.

10. In the interim period prior to Water Board certification of an environmental impact report and adoption of waste discharge requirements to achieve comprehensive cleanup, modified corrective actions by the Discharger from those listed in CAO R6V-2008-0002 are necessary to achieve containment north of Highway 58, at the Desert View Dairy and north to Thompson Road, and north of Thompson Road to Salinas Road. The Discharger will take actions reasonably available and permissible to reduce chromium levels in the impacted areas during this interim period. Chromium impacts to groundwater may be subject to cleanup additional investigative and cleanup requirements set by the Water Board.

11. This enforcement action is being taken by this regulatory agency to enforce the provisions of the California Water Code, and as such is exempt from the provisions of the California Environmental Quality Act (Public Resources Code section 21000 et seq.) in accordance with California Code of Regulations, title 14, section 15321. The implementation of this CAO Amendment is an action to assure the restoration of the environment and is exempt from the provisions of the California Environmental Quality Act, and in accordance with the California Code of Regulations, title 14, sections 15301 and 15303. The existing monitor well pairs and triplets and infrastructure are subject to section 15301 because there is negligible or no expansion of their existing uses. The extraction well to be installed north of Thompson Road is a new, small structure subject to section 15303.

IT IS HEREBY ORDERED that, pursuant to the Water Code section 13304, the Discharger shall clean up and abate the effects of the discharge and threatened discharge of chromium to waters of the State, and shall comply with the provisions of this Order:

A. Cleanup and Abatement Order No. R6V-2008-0002 is amended for the purposes of evaluating plume containment and complying with Requirement No. 3 of Cleanup and Abatement Order No. R6V-2008-0002 by replacing Requirement No. 3 with the following.

3. <u>Plume Containment</u>

Hydraulic Containment of Chromium-Affected Groundwater South of Thompson Road: As part of its effort to prevent further migration of chromium-affected groundwater, the Discharger shall achieve and maintain hydraulic capture within the targeted areas shown on Figures 1 and 2 in Attachment A (incorporated herein by reference) by completing the following.

3.1 Discharger shall operate and maintain the groundwater extraction system that exists as of January 15, 2012, or its functional equivalent, such that hydraulic containment is maintained within the areas indicated on Figures 1 and 2 in Attachment A on a year-round basis. Separate Areas of Hydraulic Containment are established for the shallow zone of the Upper Aquifer and the deep zone of the Upper Aquifer. The Water Board will determine hydraulic containment compliance by comparing hydraulic gradients or groundwater flow direction vectors calculated from groundwater elevation data from select well pairs and triplets and piezometers with control limits, as outlined in Attachment B of this Order (incorporated herein).

3.2 Water levels shall be monitored on a monthly basis, year-round. For this evaluation, the Discharger shall collect continual pressure transducer data by the end of the month (e.g., January 31) and a data evaluation shall be submitted by the Discharger by the 15th of the subsequent month (e.g., February 15). If the evaluation demonstrates that the average monthly water level data from any of the well pair or triplet metrics provided in Attachment B is not met, the Discharger shall:

a. Verify the water levels manually within five days of the evaluation, and in any case no later than the 20th of the month when the data evaluation is submitted.

b. If the manual measurements confirm that there is no longer an inward gradient, the Discharger will adjust operations within five days in the field using existing infrastructure (i.e., adjust individual well pumping rates).

c. With the Water Board staff's written approval, the Discharger may demonstrate plume capture using alternative metrics (e.g., well pairs or triplets) to verify inward plume capture.

3.3 The Water Board may find the Discharger out of compliance with this Order if either of the following occurs:

a. The third consecutive month of data (e.g., January, February and March) for the same well pair or triplet indicates that the capture metrics are still not met, or

b. If for any 3 out of 12 months during the course of one year (e.g., July 2012 through July 2013), a specific well pair or triplet dos not meet capture metrics.

3.4 Should either condition 3.3.a. or 3.3.b. occur, then by the 15th of the following month, the Discharger shall submit a contingency plan to re-establish capture

in addition to the existing infrastructure. The Water Board staff will review the contingency plan and either accept it or request modifications in writing.

Actions to Reduce Plume Migration in Area Generally North of Thompson Road: The Discharger shall take reasonable and practicable corrective actions to reduce hexavalent chromium concentrations in groundwater and to reduce plume migration in areas north of Thompson Road (as illustrated by Attachment C incorporated herein by reference) by taking the following interim actions prior to the approval of the final remedy proposed by Discharger:

3.6 Starting the summer of 2012, the Discharger shall conduct groundwater extraction during the summer months of June 1 through September 30 in at least one location to maximize extraction and chromium removal. Failure to implement this action will constitute a violation of this Order.

3.7 By July 1, 2012, the Discharger shall review existing extraction and well sampling data and evaluate the need for additional extraction within the area depicted by Attachment C. If additional extraction is deemed necessary, the Discharger shall evaluate extraction methods and propose additional actions and a schedule to implement further chromium removal north of Thompson Road in the area depicted on Attachment B. The Discharger shall include the most effective actions reasonably feasible. The Discharger shall then implement these additional actions according to the schedule, subject to obtaining all required permits from regulatory agencies including approvals required by the California Environmental Quality Act and state and federal Endangered Species Acts, which approvals the Discharger shall diligently seek. In the event of any delay, the Discharger shall notify the Water Board staff in writing and seek a modification of the schedule. Failure to implement this action will constitute a violation of this Order.

3.8 The Discharger shall dispose of extracted groundwater containing chromium concentrations in a manner approved by Water Board staff.

3.9 In the event the Discharger determines that the new remedial components required by paragraphs 3.1-3.5 are interfering with the Discharger's ability to maintain inward gradients as required by paragraphs 3.1-3.5, the Discharger shall notify Water Board staff within five days of that determination and provide written evidence supporting the Discharger's determination. After notifying the Water Board, the Discharger may suspend the remedial requirements required by paragraphs 3.1-3.5 for no longer than is necessary to develop alternative pumping regimes above and/or below Thompson Road that will maintain internal hydraulic capture south of Thompson Road while maximizing chromium removal north of Thompson Road. The Discharger shall consult Water Board staff as necessary and seek written approval before taking any actions inconsistent with paragraphs 3.1-3.9 of this Order.

Any modifications to this order amending CAO No. R6V-2008-0002 are only effective upon the written approval of the Executive Officer or Assistant Executive Officer. Failure to comply with the terms or conditions of this Order will result in additional enforcement action that may include the imposition of administrative civil liability pursuant to California Water Code section 13350 or referral to the Attorney General of the State of California for such legal action as she may deem appropriate.

Any person aggrieved by this action of the Lahontan Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

I, Harold J. Singer, Executive Officer and Board Advisor, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, Lahontan Region, on March 14, 2012.

Harold J. Singer

HAROLD J. SINGER
EXECUTIVE OFFICER

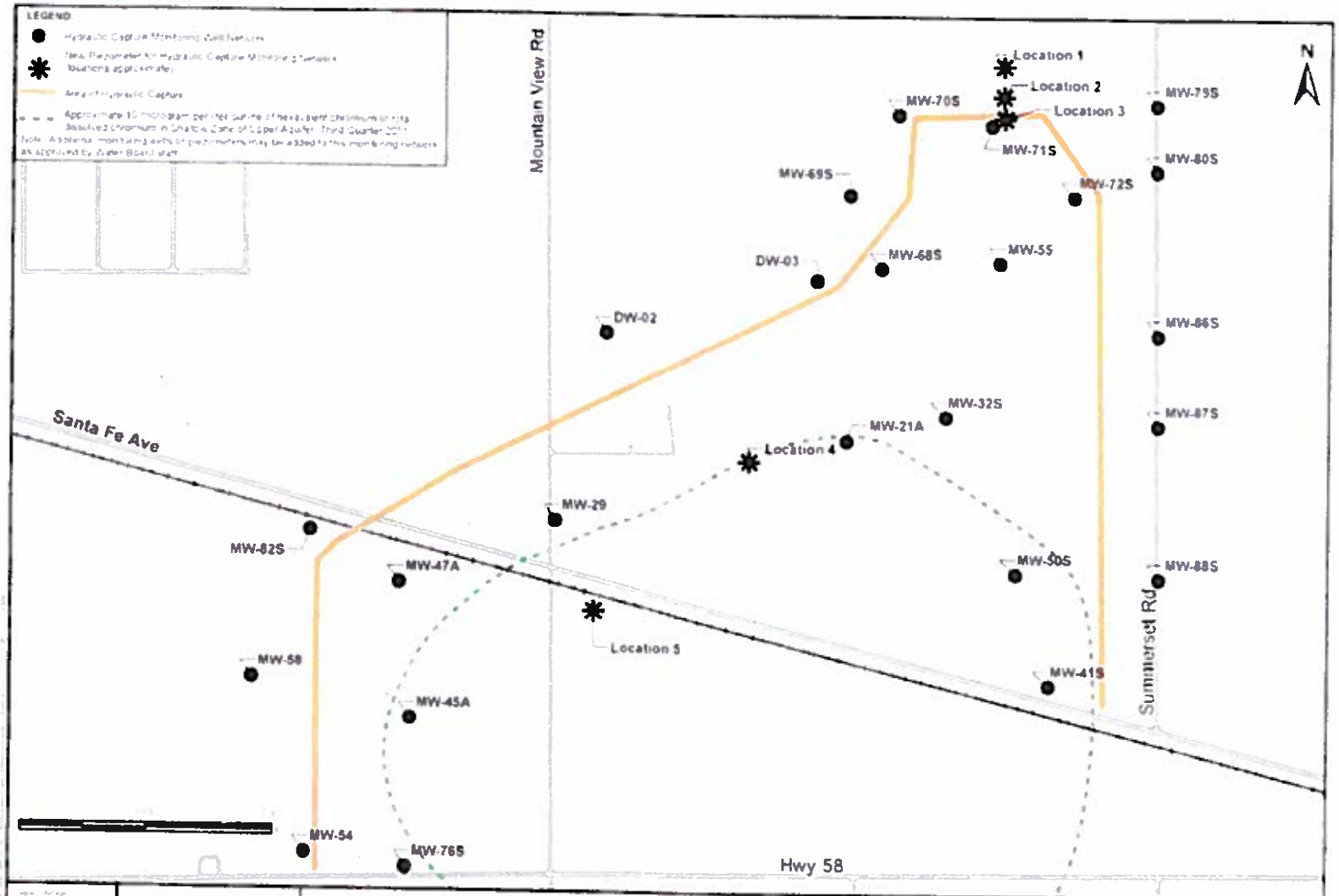
Attachments:

A. Hydraulic Capture Zones, Figures 1 and 2
B. Hydraulic Zone Capture Metrics
C. Area for Extraction and Treatment of Hexavalent Chromium in Ground Water North of Thompson Road

ATTACHMENT A

HYDRAULIC CAPTURE ZONES

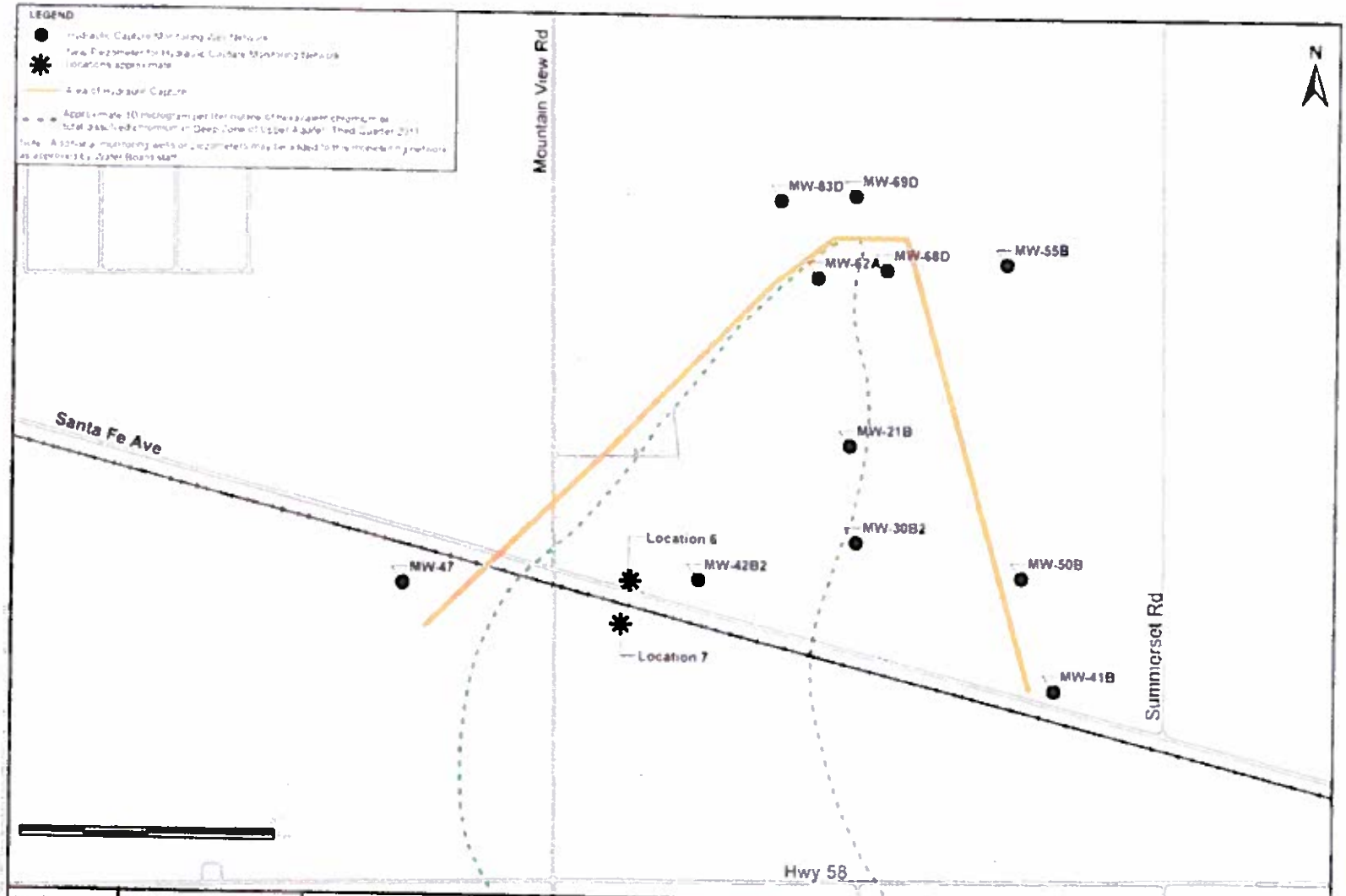
FIGURES 1 AND 2



ARCADIS

Hydraulic Capture Monitoring Plan.
Shallow Zone of Upper Aquifer

FIGURE 1



ARCADIS

Hydraulic Capture Monitoring Plan,
Deep Zone of Upper Aquifer

Pacific Gas and Electric Company
Hinkley, California

FIGURE 2

ATTACHMENT B

HYDRAULIC ZONE CAPTURE METRICS

APPENDIX A

Hydraulic capture shall be demonstrated through analysis of potentiometric surfaces in the A1 and A2 layers of the upper aquifer measured at least monthly. Hydraulic capture shall be demonstrated using those monitoring wells or piezometers identified in Table A-1 or other wells as accepted by Water Board staff. For well pairs, the inner well must have a potentiometric surface lower than the outer well. For well triplets, the vector described by the potentiometric surfaces at the three wells must show a gradient directed inward of the capture boundary line shown on Figures A-1 or A-2, for the A1 and A2 depth layers, respectively.

Table A-1 Hydraulic Capture Monitoring Plan

Depth Interval	Well Pairs		Well Triplets
A1Layer	Outer Well	Inner Well	
	MW-86S	MW-55S	
	MW-80S	MW-72S	
	DW-03	MW-68S	
	MW-79S	MW-71S	
	New wells [1,2]	MW-71S	
			MW-88S, -87S, -32S
			MW-70S, -69S, -71S[2]
			DW-02, MW-29, -21A or new piezometer[1] near MW-31
			MW-58, -45A and -47A
	MW-82S	new piezometer[3] near EX-29/-30	
			MW-54, -76S and -45A
			MW-50S, -88S and -41S
A2 Layer	Outer Well	Inner Well	
	MW-41B	MW-30B2	
	MW-83D	MW-62A	
	MW-69D	MW-62A[2]	
	MW-50B	MW-21B	
	MW-47	MW-42B2 or new piezometer[3] near EX-29/-30 or EX-26	
			MW-69D, MW55B, MW-68D[2]

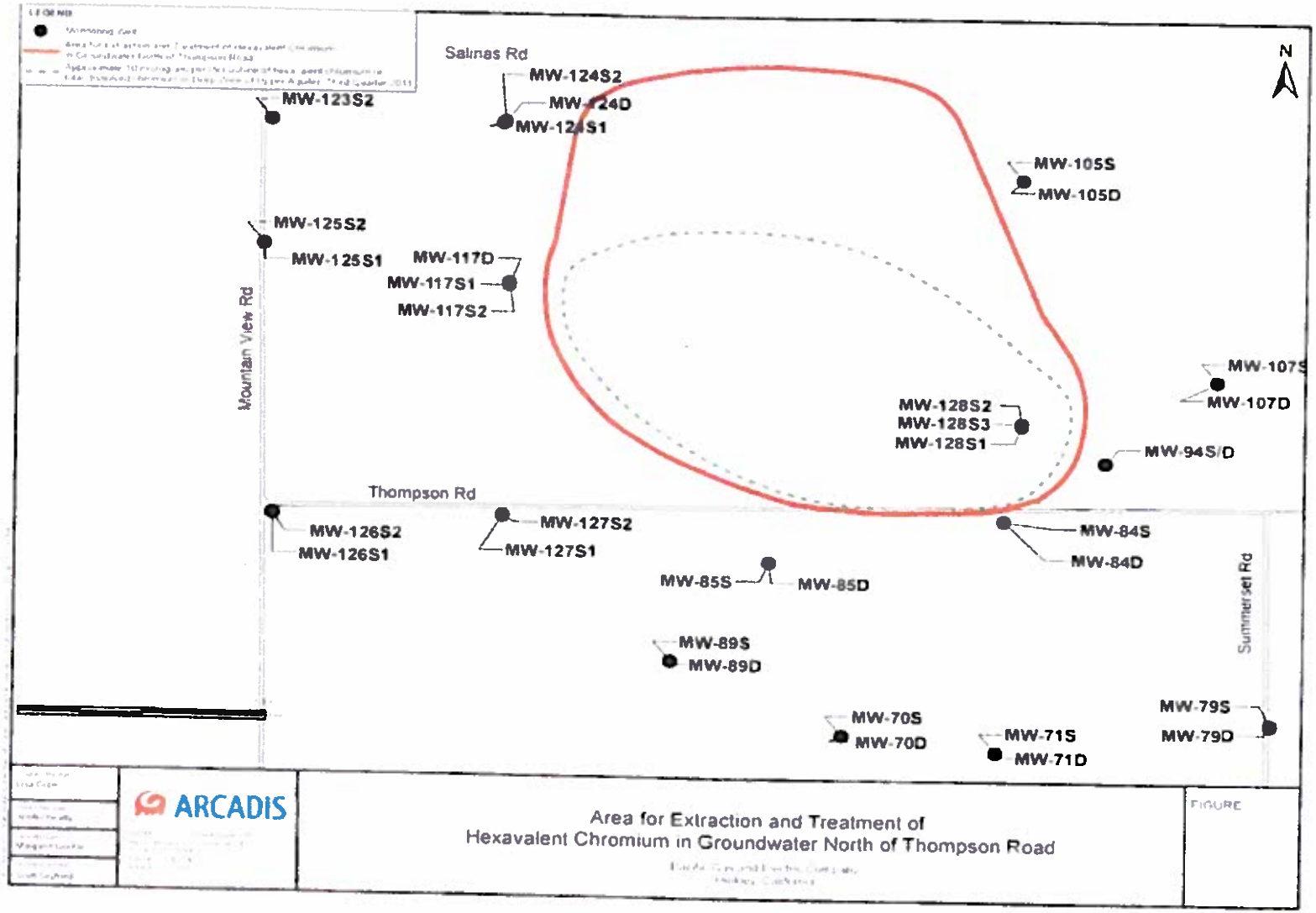
[1] "New Wells" indicates one or more piezometers in a row north of 71S. There is technical uncertainty as to the exact location of the down gradient capture line. Therefore only one of the piezometers will need to indicate an inward gradient. This piezometer must be outboard of the containment line.

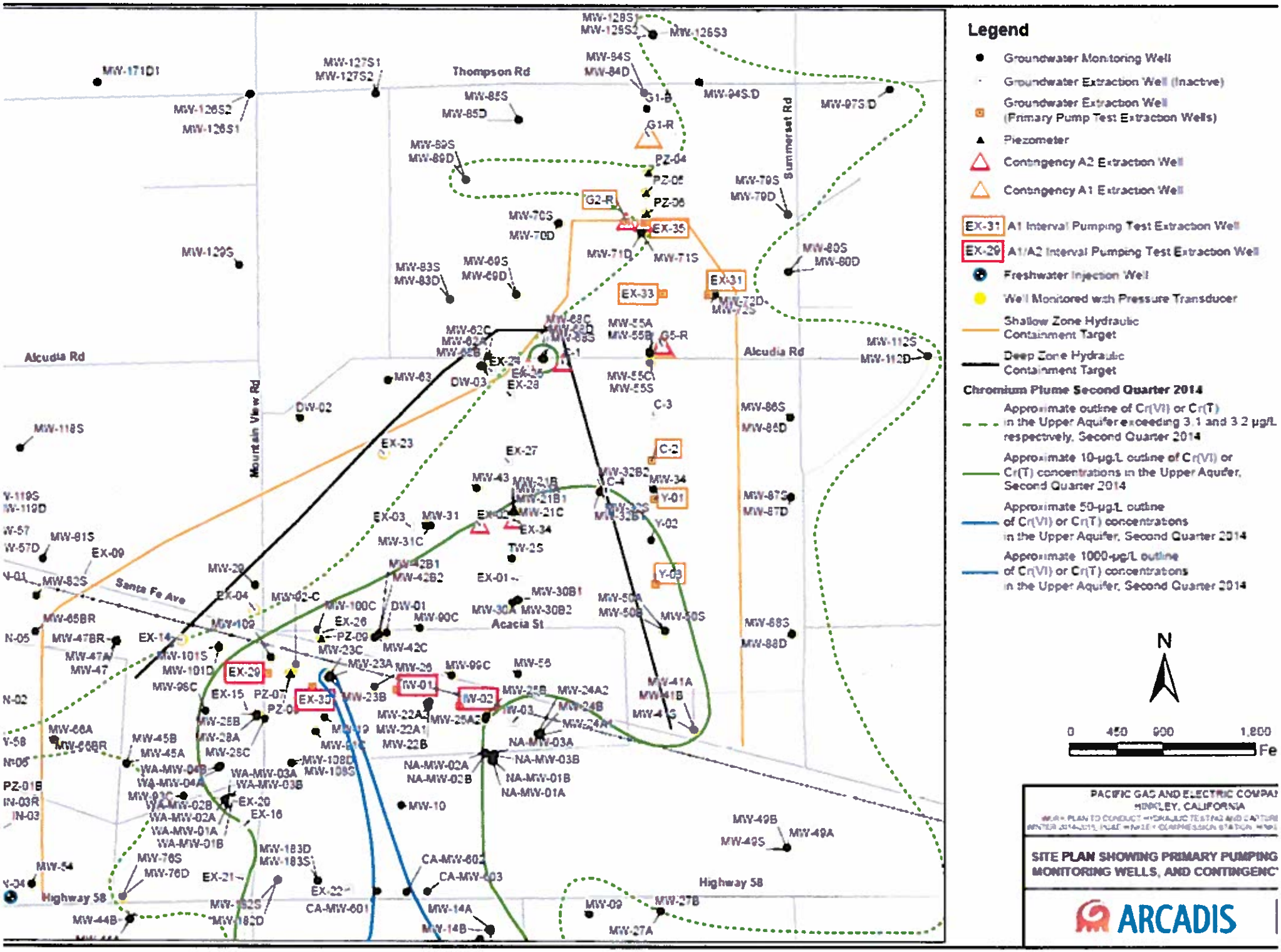
[2] It is understood that seasonal groundwater extraction to the north of this well pair/triplet may temporarily expand capture to the north. As a result, it is acceptable that an inward gradient or vector at these points may not be demonstrated during extraction from the A1 interval north of G2R, and/or from the A2 interval north of Alcudia Road. Expanding capture to the north will continue to meet the minimal plume capture requirement.

[3] If the new piezometer cannot be installed due to access limitations pursuant to Endangered Species Act, then PG&E will develop an alternative location.

ATTACHMENT C

AREA FOR EXTRACTION AND TREATMENT OF HEXAVALENT CHROMIUM IN GROUND WATER NORTH OF THOMPSON ROAD


Salinas Rd
MW-124S2
MW-124D
MW-124S1
MW-123S2
MW-105S
MW-105D
MW-125S2
MW-125S1
MW-117D
MW-117S1
MW-117S2
Mountain View Rd
MW-107S
MW-107D
MW-128S2
MW-128S3
MW-128S1
MW-94S/D
Thompson Rd
MW-126S2
MW-126S1
MW-127S2
MW-127S1
MW-84S
MW-84D
MW-85S
MW-85D
Summerset Rd
MW-89S
MW-89D
MW-79S
MW-79D
MW-70S
MW-70D
MW-71S
MW-71D
N
ARCADIS
Area for Extraction and Treatment of
Hexavalent Chromium in Groundwater North of Thompson Road
FIGURE


Legend
Groundwater Monitoring Well
Groundwater Extraction Well (Inactive)
Groundwater Extraction Well (Primary Pump Test Extraction Wells)
Piezometer
Contingency A2 Extraction Well
Contingency A1 Extraction Well
EX-31 A1 Interval Pumping Test Extraction Well
EX-29 A1/A2 Interval Pumping Test Extraction Well
Freshwater Injection Well
Well Monitored with Pressure Transducer
Shallow Zone Hydraulic Containment Target
Deep Zone Hydraulic Containment Target
Chromium Plume Second Quarter 2014
Approximate outline of Cr(VI) or Cr(T) in the Upper Aquifer exceeding 3.1 and 3.2 µg/L respectively, Second Quarter 2014
Approximate 10-µg/L outline of Cr(VI) or Cr(T) concentrations in the Upper Aquifer, Second Quarter 2014
Approximate 50-µg/L outline of Cr(VI) or Cr(T) concentrations in the Upper Aquifer, Second Quarter 2014
Approximate 1000-µg/L outline of Cr(VI) or Cr(T) concentrations in the Upper Aquifer, Second Quarter 2014
N
0 450 900 1,800
Fe
Thompson Rd
Alcudia Rd
Mountain View Rd
Summerset Rd
Santa Fe Ave
Acacia St
Highway 58
PACIFIC GAS AND ELECTRIC COMPA
HINKLEY, CALIFORNIA
SITE PLAN SHOWING PRIMARY PUMPING
MONITORING WELLS, AND CONTINGENC
ARCADIS