Pacific Gas and Electric Company

Curt Russell
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GT&D Remediation

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July 31, 2017

Mr. Aaron Yue, Project Manager
Department of Toxic Substances Control
5795 Corporate Avenue
Cypress, CA 90630

Subject: **Response to DTSC's Geological Services Unit April 6, 2017 Memorandum titled *Proposal for Alternative Groundwater Sampling Trial, Pacific Gas and Electric, Topock Compressor Station***

Dear Mr. Yue:

Pacific Gas and Electric (PG&E) has reviewed the approval conditions and requests in the technical memorandum from the California Department of Toxic Substances Control's (DTSC) Geological Services Unit (GSU) dated April 6, 2017. The DTSC GSU April 2017 memorandum is in response to PG&E's 2015 alternative sampling approach recommendations for long screen bedrock monitoring wells.

The attached table summarizes PG&E's understanding and reply to the April 2017 technical memorandum. With a few exceptions, PG&E will begin to implement DTSC's approval in the Q4 2017 sampling event.

For the exceptions outlined in the table, we would appreciate your review and concurrence by September 1, 2017. We would be glad to use weekly technical calls or ad hoc calls to facilitate your review. Please contact me at (760) 791-5884 if you have any questions or comments regarding this response.

Sincerely,

Curt Russell
Topock Site Manager

cc: Chris Guerre/DTSC, Pam Innis/DOI

Well ID	Recommendation in August 2015 Letter	Approval Conditions or Requests in DTSC's April 6, 2017 Letter	PG&E's Reply, July 31, 2017
MW-23-60	MD; well is already sampled with MD-capable pump	MD approved with SC, pH profiles	Accept - Collect SC & pH profiles; begin MD sampling in Q4 2017.
MW-23-80	MD; well is already sampled with MD-capable pump	MD approved with SC, pH profiles	Accept - Collect SC & pH profiles; begin MD sampling in Q4 2017.
MW-24BR	MD Trial, with dedicated bladder pump, at 408 feet	MD approved with new Flow Testing to verify MD depths	**Request for deviation from April 2017 Letter: Continue 3V sampling.** This is a low-yield deep well with a 60-foot screen in bedrock. Historical data (CH2M 2008) measured very low hydraulic conductivity. A dedicated electric submersible pump was used since 2014, due to biofouling concern at this well.
MW-48	MD Trial with dedicated tubing 4Q 2015 through 2016	MD approved with SC profile and periodic purge dry	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017. Note that MD may not maintain limited drawdown so return to "purge dry then sample" could be outcome of trial.
MW-57-070	Change to MD with pump at mid- screen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-57-185	MD Trial with pump at 171 feet	Trial of MD at 2 depths 150 & 171 feet vs. 3V purge, SC profile	Accept - Collect SC profile and begin sampling trial in Q4 2017.
MW-58BR	Continue current MD sampling purge approach, with pump at 190 feet	Reconstruct well with screens corresponding to former packer placement in bedrock open bore, add flood protection	Accept – Evaluate and add flood protection, with a request for deviation below. **Request for deviation from April 2017 Letter: Continue current sampling.** Remedy use is planned with current sampling approach after several multilevel configurations in past.
MW-60BR-245	MD Trial, with pump at 180 feet	Trial of MD at 2 depths 175 & 238 feet vs. 3V purge, SC profile	Accept - Collect SC profile and begin sampling trial in Q4 2017.
MW-61-110	MD, keep pump at 100 feet	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-62-065	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-63-065	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-64BR	HydraSleeve and MD Trial; continue MD sample collection from middle of saturated borehole and test HS sampling.	Reconstruct well with screens corresponding to former packer placement in bedrock open bore	**Request for deviation from April 2017 Letter: Continue current sampling.** Remedy use is planned with current sampling approach after several multilevel configurations in past. HS trial request withdrawn.
MW-65-160	Bladder pump since 2014	DTSC directed to add this well. MD approved with SC profile.	Accept - Collect SC profile; begin MD sampling in Q4 2017.
MW-66BR-270	HydraSleeve (HS), from mid screen	HS trial approved with SC profile	**Request for deviation from April 2017 Letter: Continue current sampling.** HS

Well ID	Recommendation in August 2015 Letter	Approval Conditions or Requests in DTSC's April 6, 2017 Letter	PG&E's Reply, July 31, 2017
			trial request withdrawn. Continue purge dry then sample
MW-68BR-280	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-69-195	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-70-105	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-70BR-225	MD Trial, with pump, at 215 feet	MD vs. 3V sampling trial approved, with SC profile	Accept - Collect SC profile and begin sampling trial in Q4 2017.
MW-72-080	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
MW-72BR-200	MD Trial, with dedicated bladder pump, at 151 feet	Trial of MD at 2 depths 152 & 195 feet vs. 3V purge, SC profile	Accept - Collect SC profile and begin sampling trial in Q4 2017.
MW-73-080	MD from midscreen	MD approved with SC profile	Accept - Collect SC pH profiles; begin MD sampling in Q4 2017.
OW-03S	MD Trial, midscreen	MD approved with SC profile	Accept - begin MD sampling in Q4 2017, with request for deviation below. **Request for deviation from April 2017 Letter:** **No SC profile for shallow alluvial wells.**
TW-01	MD Trial, midscreen	MD specific depths need justification, consider flow tests	**Justification: See attached 2003 flow tests and sampling for MD/HS trial at 3 depths** (170, 205, and 230-foot depths)
TW-04	MD Trial, midscreen	Not in DTSC response	**Request DTSC approval:** **Conduct MD vs. 3V trial, MD specific depth 222 feet (log attached), SC profile.**
TW-05	MD Trial, midscreen	Not in DTSC response	**Request DTSC approval: Conduct MD vs. 3V trial, MD specific depth 147 feet (log attached), but No SC profile** (well is not screened near bedrock so no SC profile).
MW-60-125, MW-74-240, OW-3S; OW-1S, OW-1M, OW-1D, OW-2S, OW-2M, OW-2D, and OW-5D	Change to MD with pump at mid- screen	MD approved with SC profile approved in these wells with 30-foot or shorter screens.	Accept – begin MD sampling in Q4 2017 and SC profile the deep screen "D" wells, with request for deviation below. **Request for deviations from April 2017 Letter:** **1) No SC profile for shallow alluvial wells screened above bedrock.** **2) logs (attached) were reviewed to select MD sampling depths (feet bgs) for Trial in longer screen wells, because flow testing not practical in 2-inch wells:** • OW-5S 107 feet, OW-5M 240 feet • CW-1M 175 feet, CW-1D 267 feet • CW-2M 177 feet, CW-2D 317 feet • CW-3M 197 feet, CW-3D 297 feet • CW-4M 150 feet, CW-4D 280 feet
OW-5S, OW-5M, CW-1M, CW-1D, CD-2M, CW-2D, CW-3M, CW-3D, CW-4M, CW-4D	MD Trial, midscreen	MD Trial approved with SC profile and flow testing to select MD sampling depths in these wells with 40 to 50-foot screens	

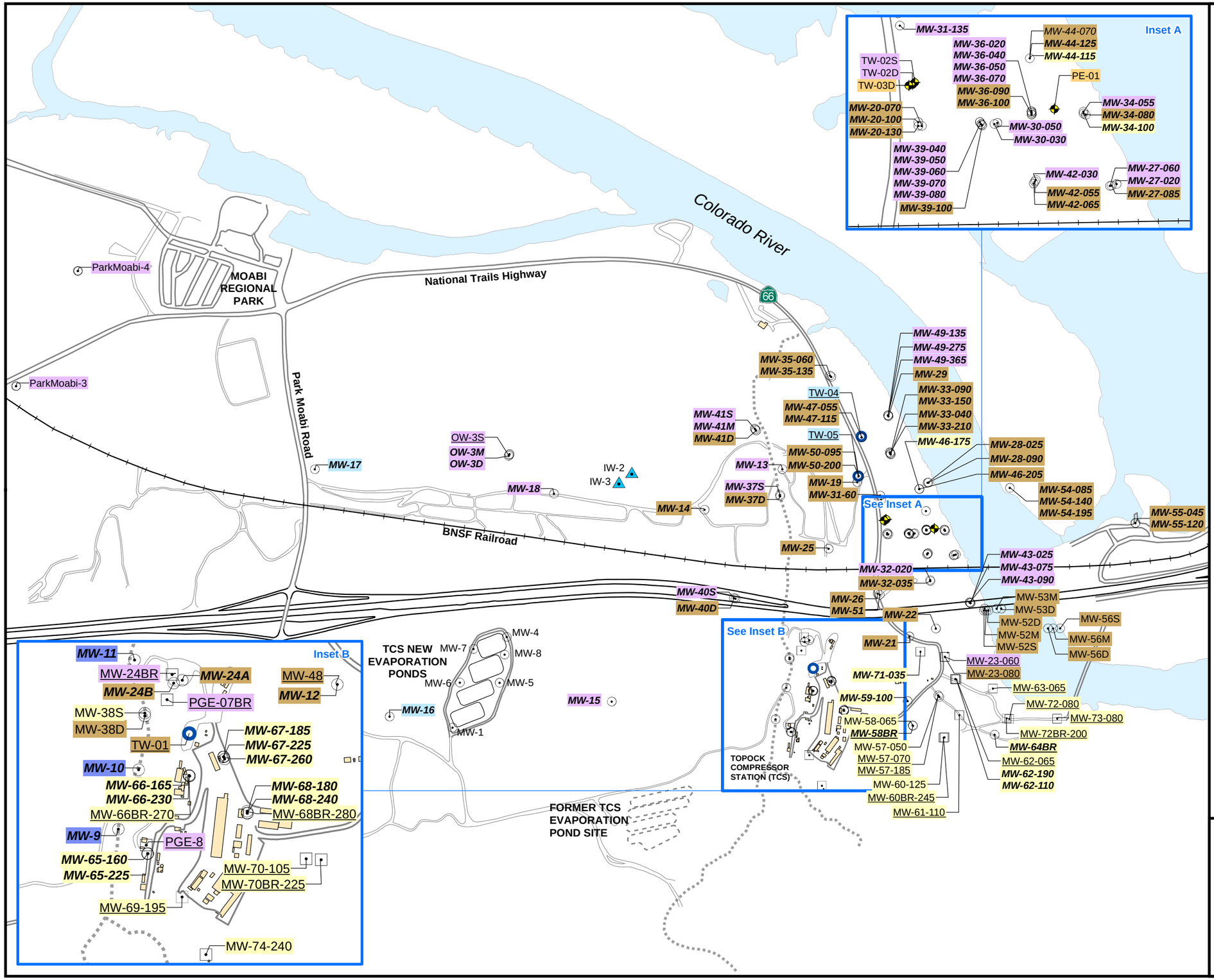
Well ID	Recommendation in August 2015 Letter	Approval Conditions or Requests in DTSC's April 6, 2017 Letter	PG&E's Reply, July 31, 2017
PGE-07BR	MD Trial, with dedicated bladder pump, at 275 feet	MD approved with new Flow Testing to verify MD depths	**Request for deviation from April 2017 Letter:** **Continue 3V sampling.** This is a deep well with an approximate 50-foot packed-off screen in bedrock. Historical data (CH2M 2008) measured very low hydraulic conductivity. Bedrock Cr results are ND.
PGE-08	3V	Explore feasibility of packer removal then video logging, flow testing	**Request for deviation from April 2017 Letter:** **Continue 3V sampling.** This is a former supply well with an approximate 150-foot screen in bedrock. Existing packer blocks access to screen. Packer is damaged and lodged in place (CH2M 2008). All results are ND for chromium.

CH2M HILL 2008. *Summary Report for Hydraulic Testing in Bedrock Wells, PG&E Topock Compressor Station, Needles, California*. January.

MD minimal drawdown sampling method
HS HydraSleeve sampling method
3V three volume purge sampling method

Attachments

Attachment 1
Topock Monitoring Well Location Maps



LEGEND

- Groundwater Monitoring Well Completed in Bedrock
- Injection Well (Active)
- Groundwater Monitoring Well
- Test Well or Supply Well (inactive)
- Extraction Well (Active)

Sampling Frequency for Groundwater Monitoring Program (GMP)

- MW-17 Biennial sampling
- MW-13 Annual sampling
- MW-9 Annual; plus the next quarterly event following any channel-wide flows in Bat Cave Wash with discharge through the highway culverts
- MW-21 Semiannual sampling
- MW-38S Quarterly sampling
- TW-03D Monthly sampling
- TW-01 Well with sampling method trial or change proposed

Notes:
Bold/Italicized labels indicate sample collected using micropurge sampling method; otherwise, sample collected using the method indicated on Table 3-1.

N

0 500 1,000 Feet

California State Plane NAD83 Zone 5 US Feet

FIGURE 1
MONITORING WELL LOCATIONS AND SAMPLING FREQUENCY FOR GMP WELLS IN PROPOSED SAMPLING METHOD TRIAL

PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

Path: G:\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2015\GMP_Report\Fig1_GMP_Sampling_Frequency_GMP.mxd Date Saved: 8/4/2015 4:06:35 PM

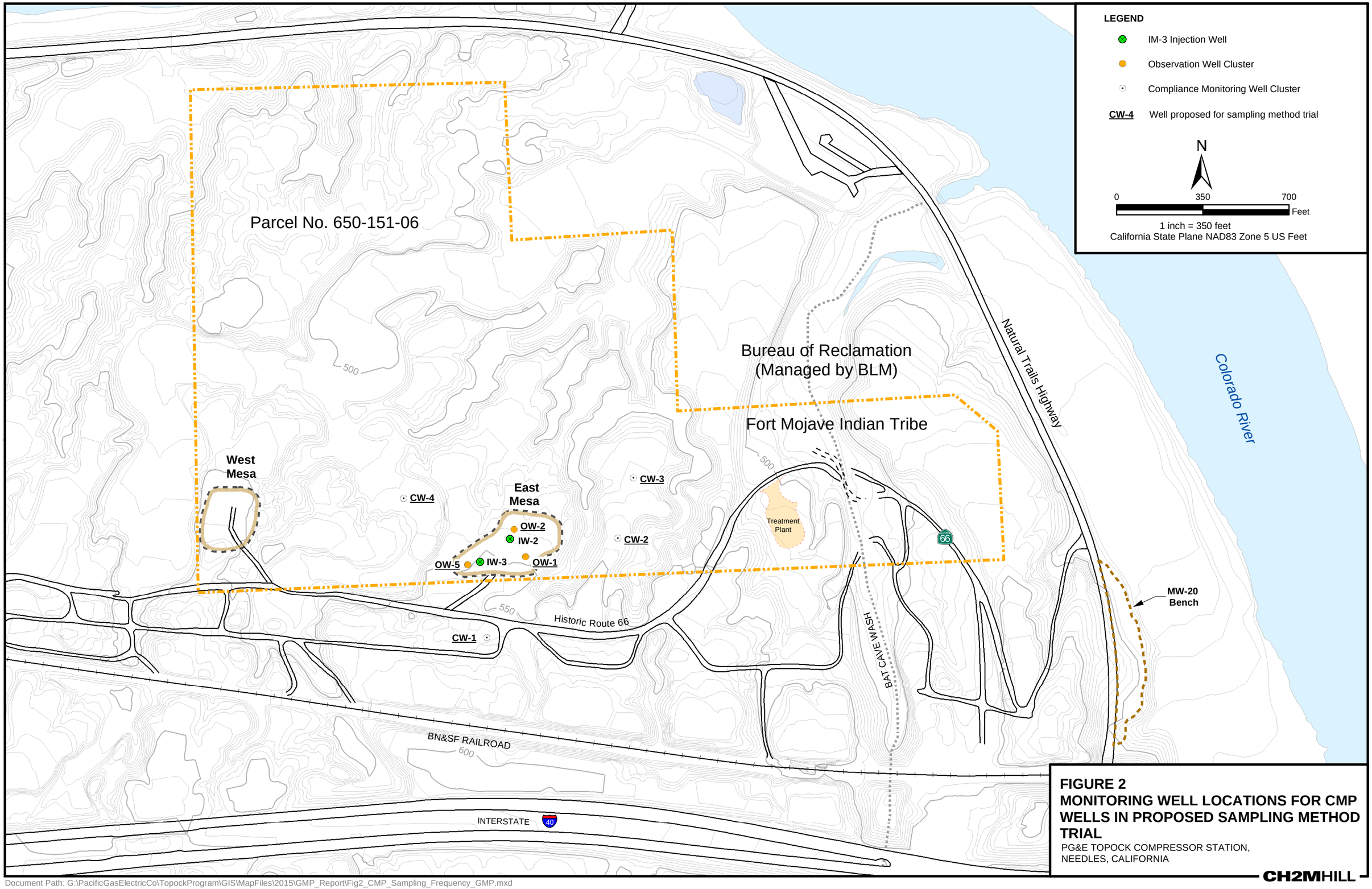


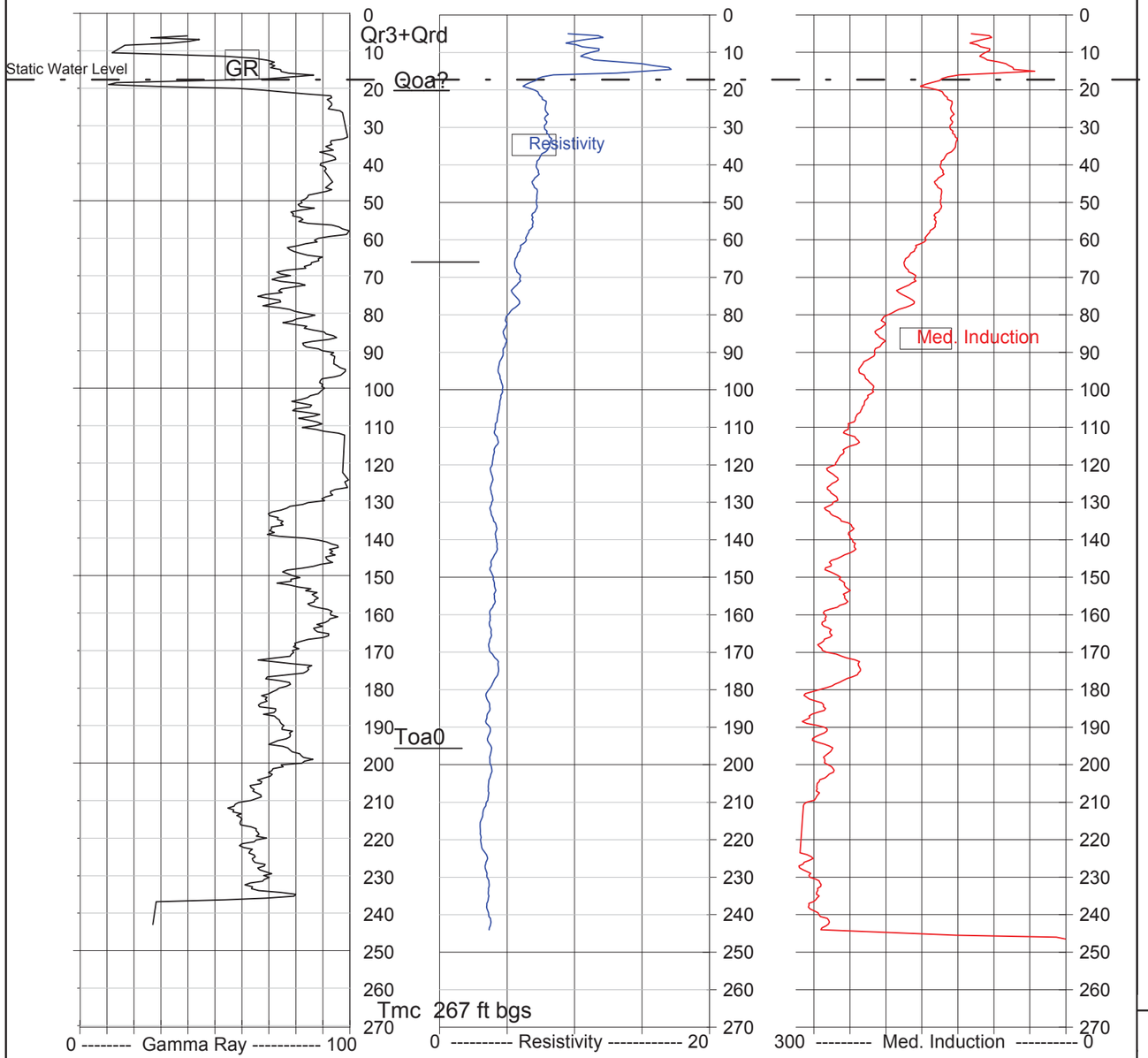
FIGURE 2
MONITORING WELL LOCATIONS FOR CMP WELLS IN PROPOSED SAMPLING METHOD TRIAL
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Document Path: G:\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2015\GMP_Report\Fig2_CMP_Sampling_Frequency_GMP.mxd

Attachment 2
Logs for TW-04 and TW-05

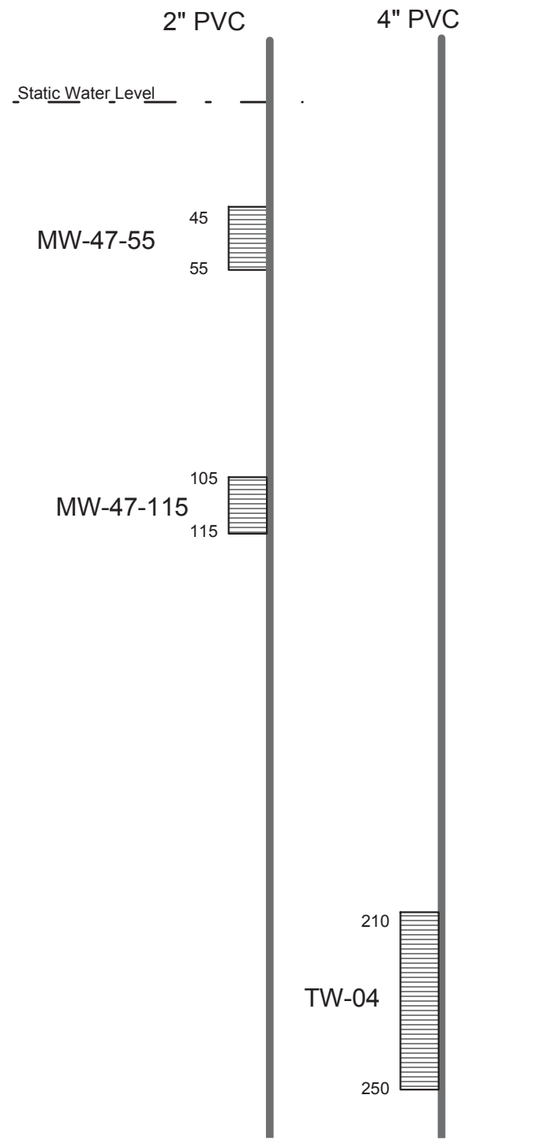
TW-04 Cased Well Geophysical Logs



TW-04 Geophysical Log April 27, 2006

Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

Well Cluster MW-47 and TW-04

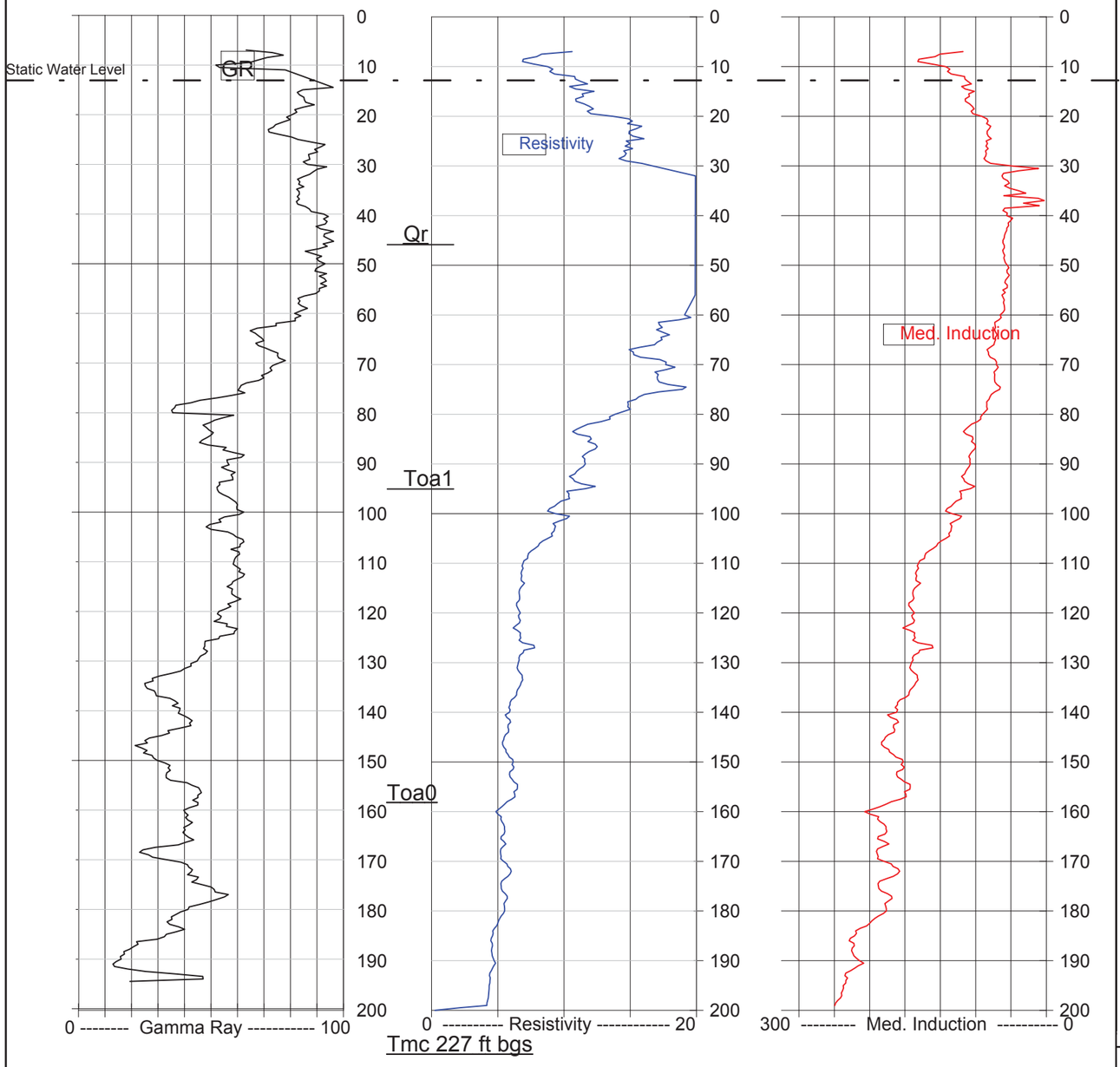


APPENDIX C-2I
SUMMARY OF HYDROGEOLOGIC LOGGING FOR TW-04 WELL

RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION REPORT (VOLUME 2)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

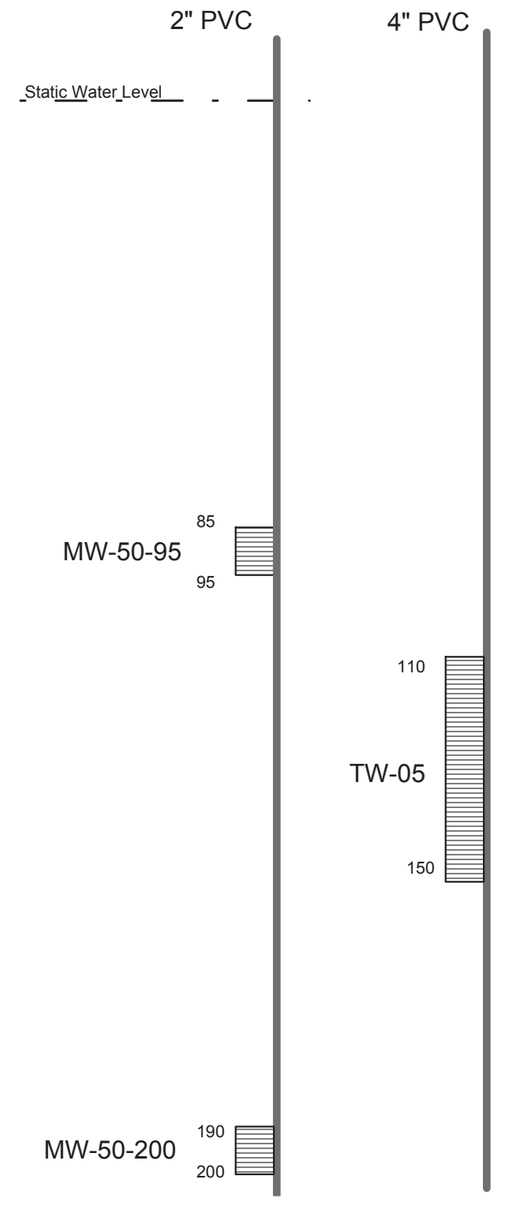
MW-50 Cased Well Geophysical Logs



MW-50 Geophysical Log April 27, 2006

Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

Well Cluster MW-50



APPENDIX C-2K
SUMMARY OF HYDROGEOLOGIC LOGGING FOR MW-50 WELLS
RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION REPORT (VOLUME 2)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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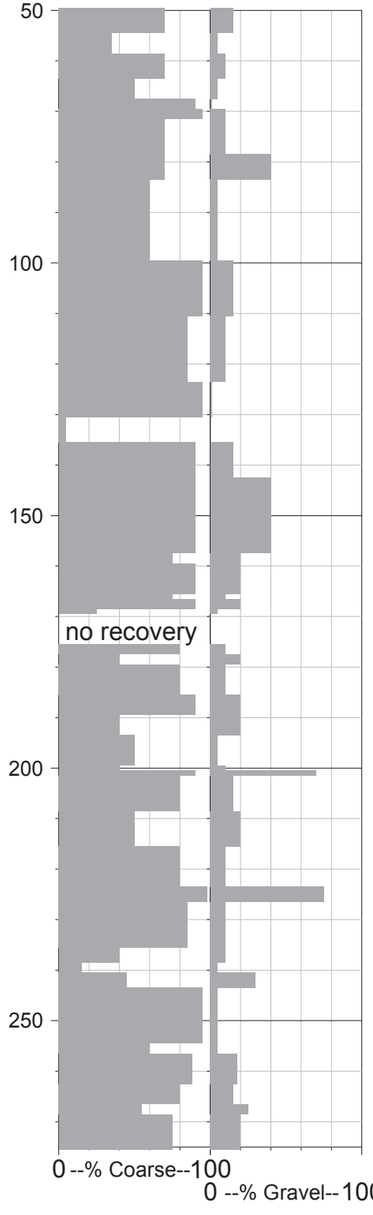
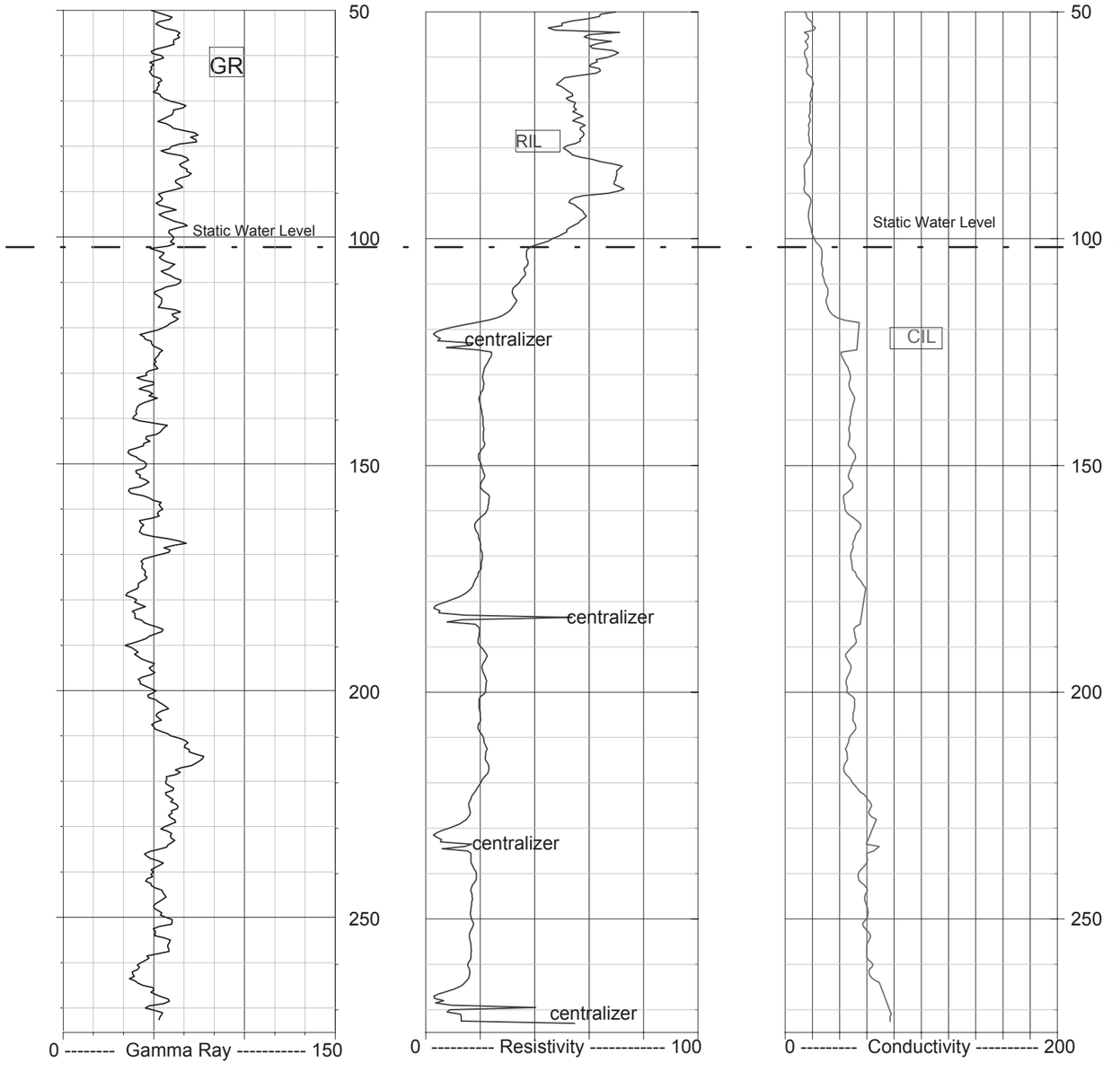
Attachment 3
Logs for OW-5, CW-1, CW-2, CW-3, CW-4

OW-3D Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

OW-3D Cased Well Geophysical Logs



OW-3D Geophysical Log November 10, 2004

Log Units: Gamma Ray (GR, API units), Induction Resistivity (RIL, ohm/m), Induction Conductivity (CIL, uS/cm)

Observation Well Cluster OW-3

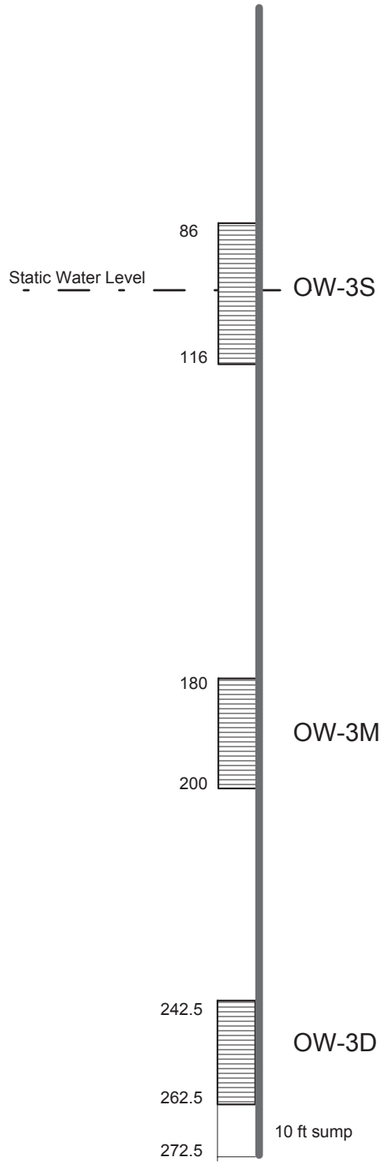
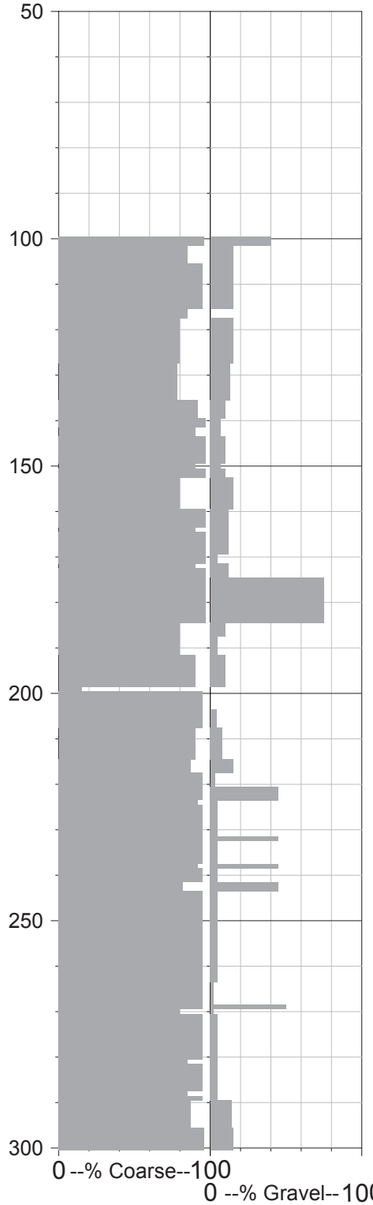


FIGURE B1-2
SUMMARY OF HYDROGEOLOGIC LOGGING FOR OW-3 WELL CLUSTER
IM-3 GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

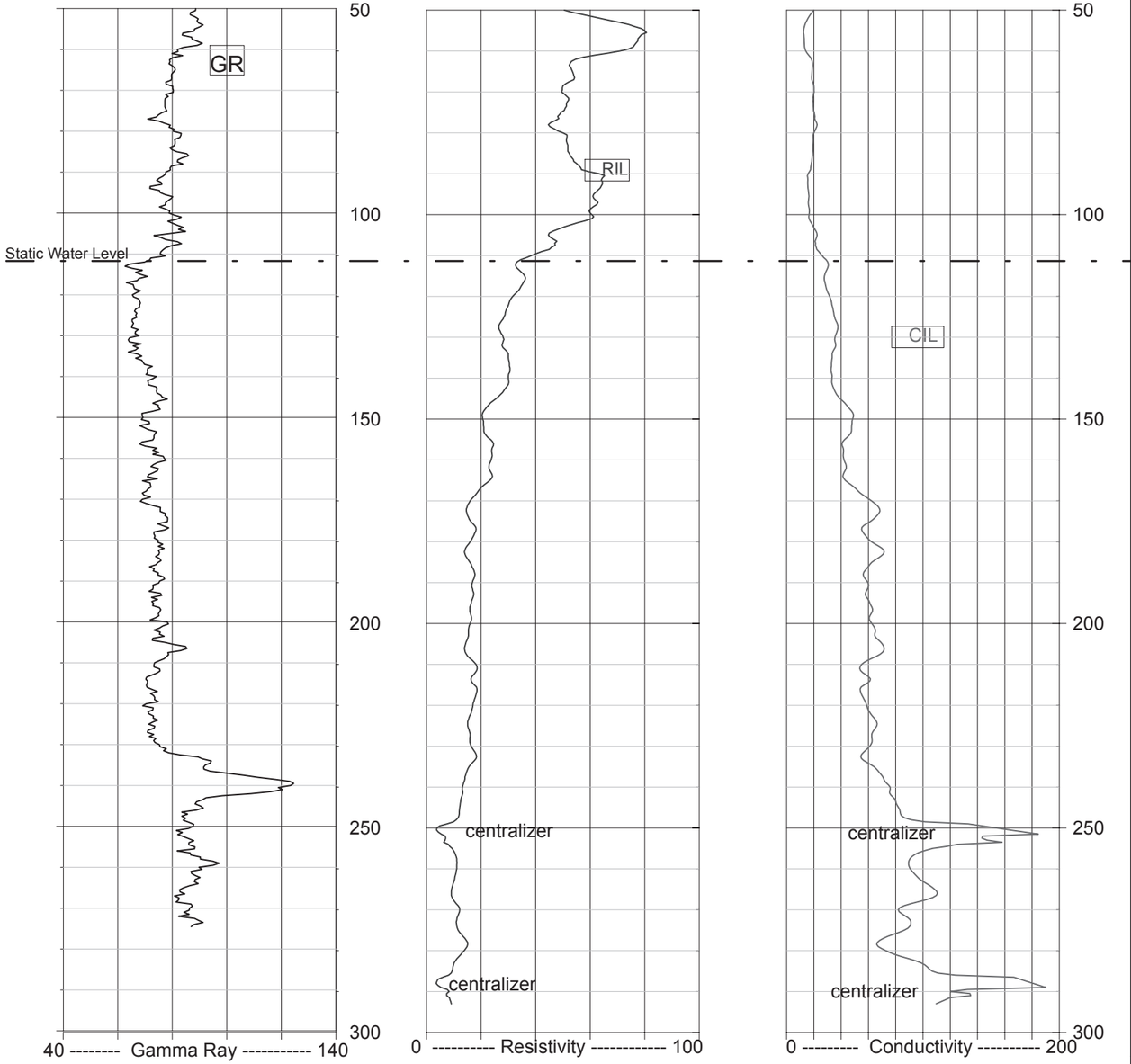
CH2MHILL

CW-1D Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

CW-1D Cased Well Geophysical Logs



CW1 Geophysical Log March 2, 2005

Log Units: Gamma Ray (GR, API units), Resistivity (RIL, ohm/m), Conductivity (CIL, mS/cm)

Compliance Well Cluster CW-1

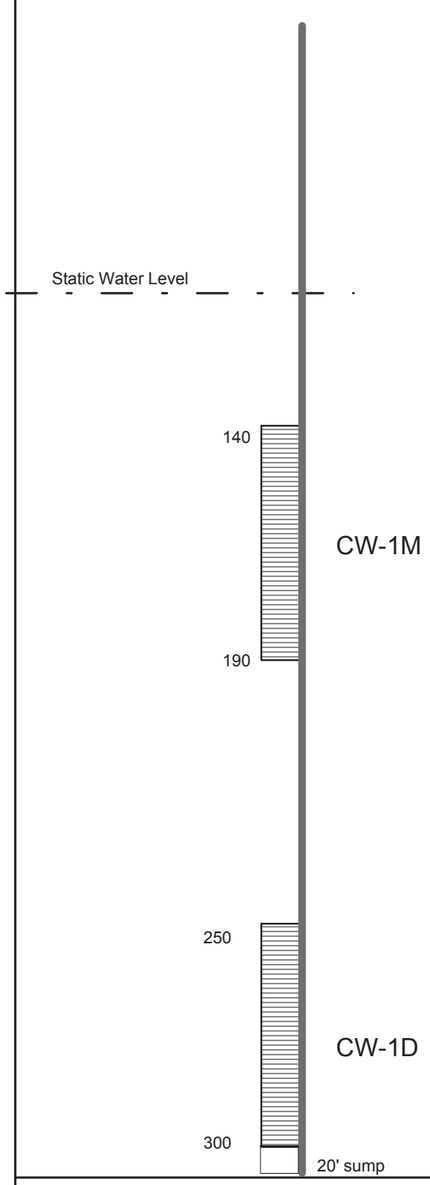
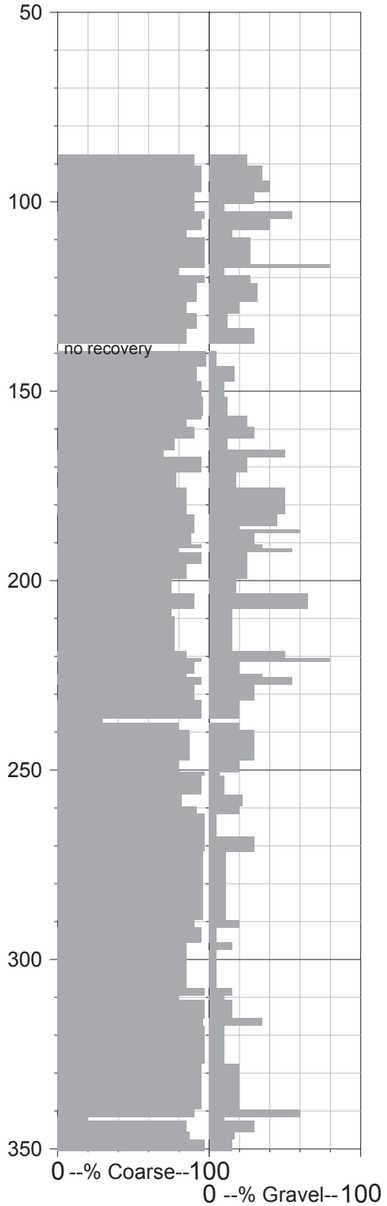


FIGURE B2-1
SUMMARY OF HYDROGEOLOGIC LOGGING FOR CW-1 COMPLIANCE WELLS

IM-3 GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

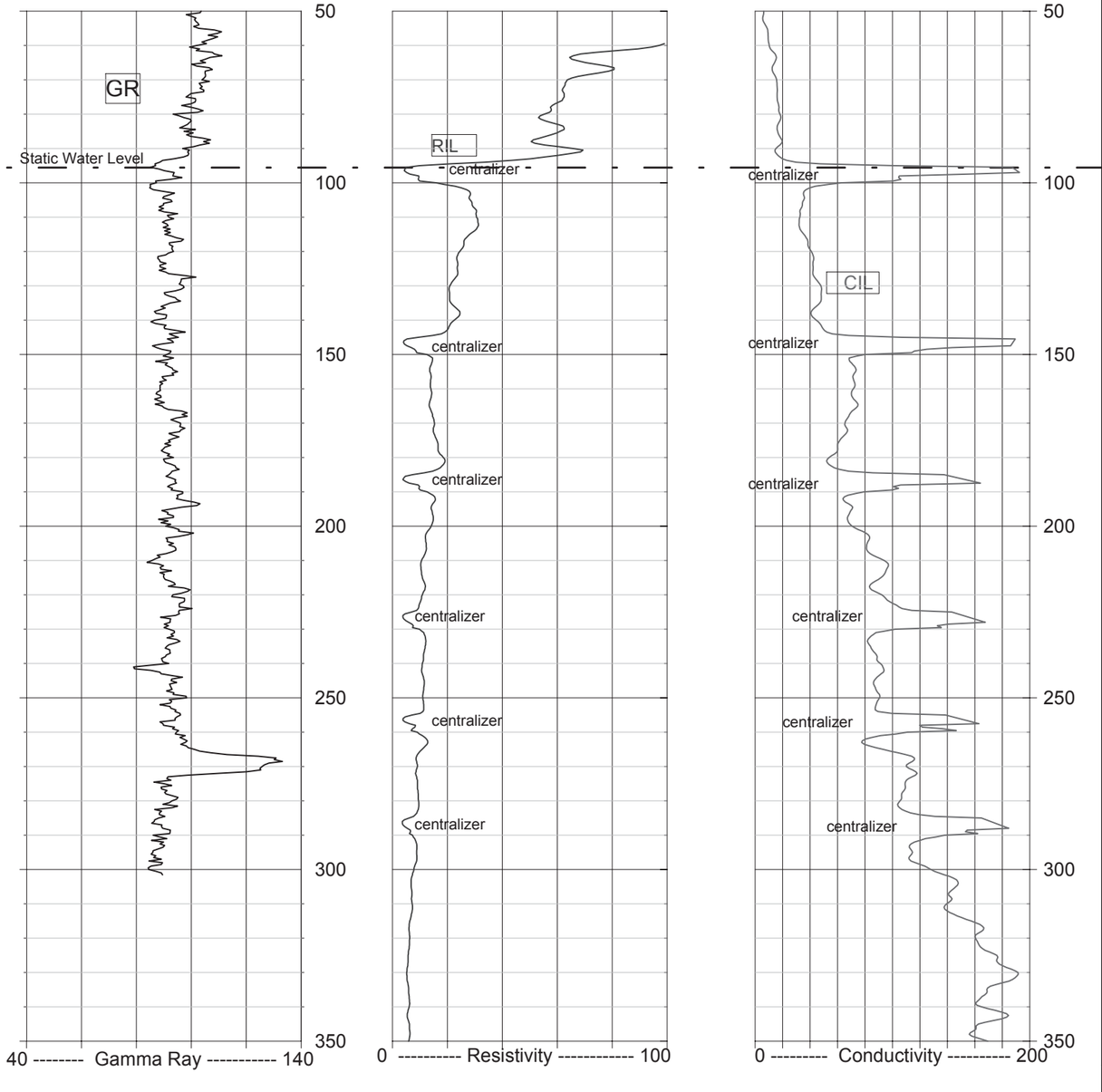
CH2MHILL

CW-2D Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

CW-2D Cased Well Geophysical Logs



CW2-D Geophysical Log March 2, 2005

Log Units: Gamma Ray (GR, API units), Resistivity (RIL,ohm/m), Conductivity (CIL, mS/cm)

Compliance Well Cluster CW-2

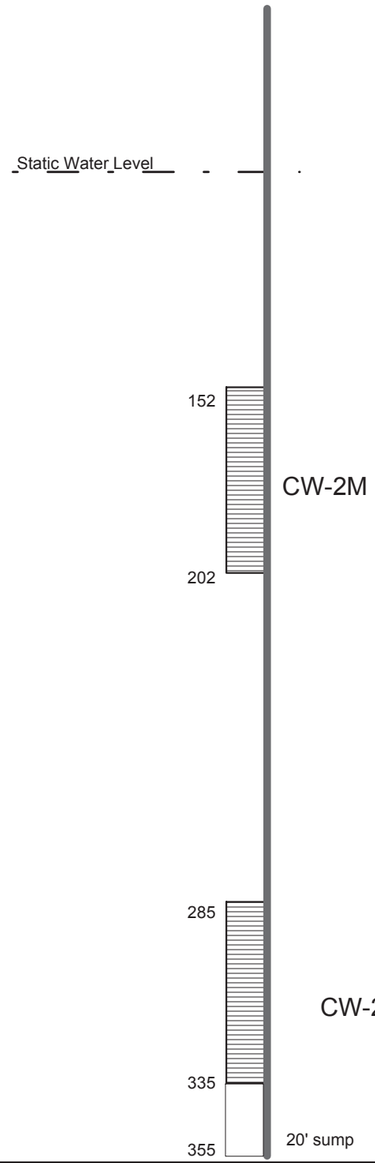


FIGURE B2-2
SUMMARY OF HYDROGEOLOGIC LOGGING FOR CW2 COMPLIANCE WELLS
IM-3 GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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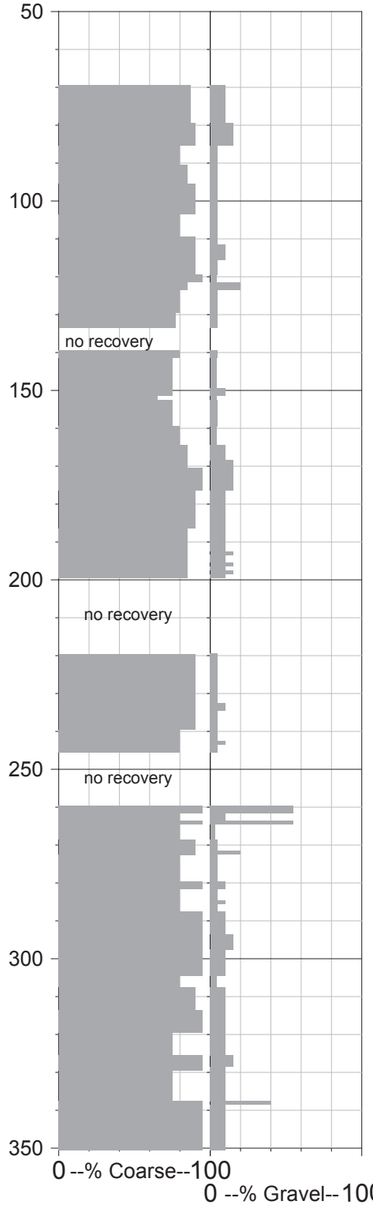
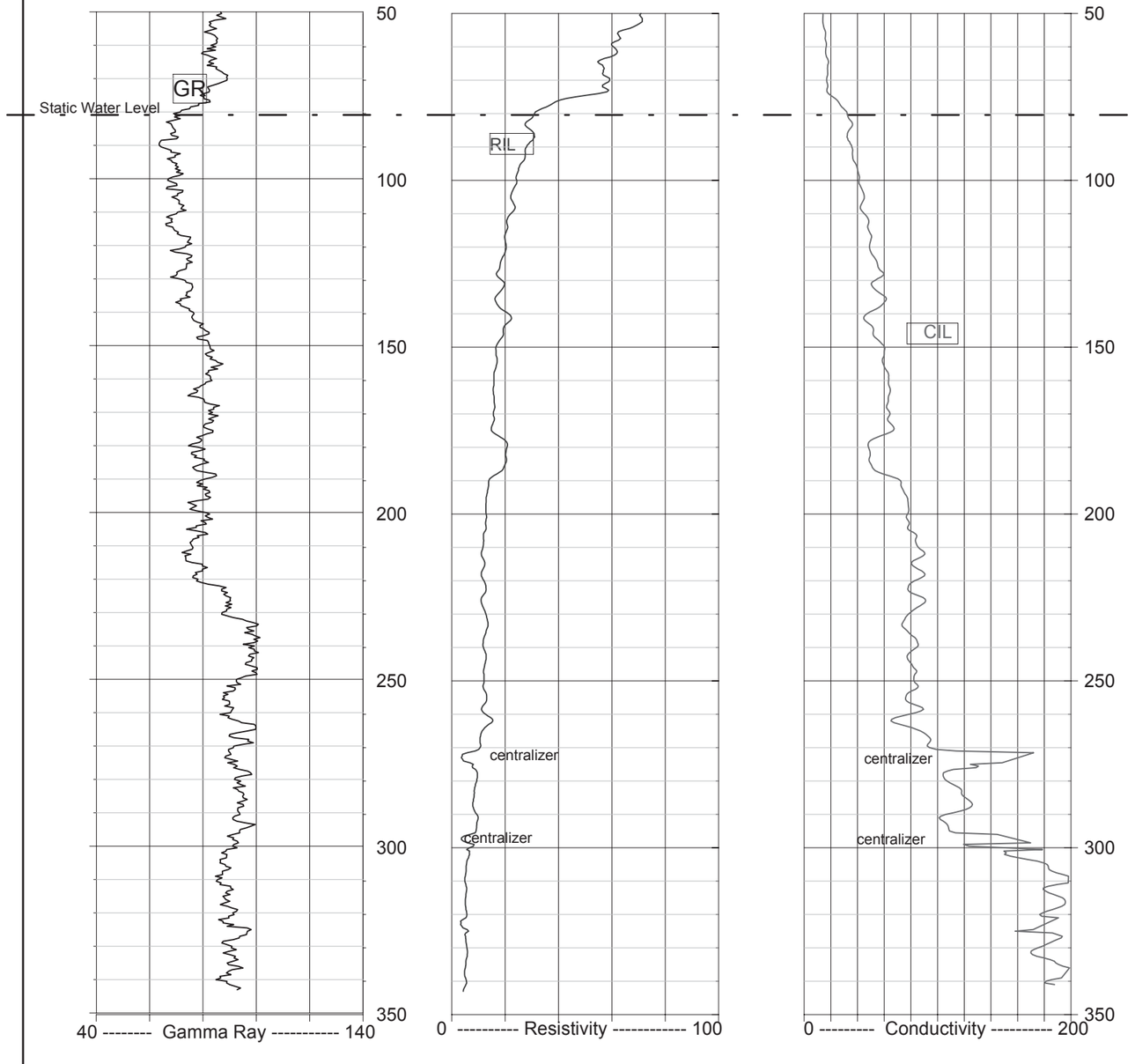
CW-3D Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

CW-3D Cased Well Geophysical Logs



CW3-D Geophysical Log March 2, 2005

Log Units: Gamma Ray (GR, API units), Resistivity (RIL,ohm/m), Conductivity (CIL, mS/cm)

Compliance Well Cluster CW-3

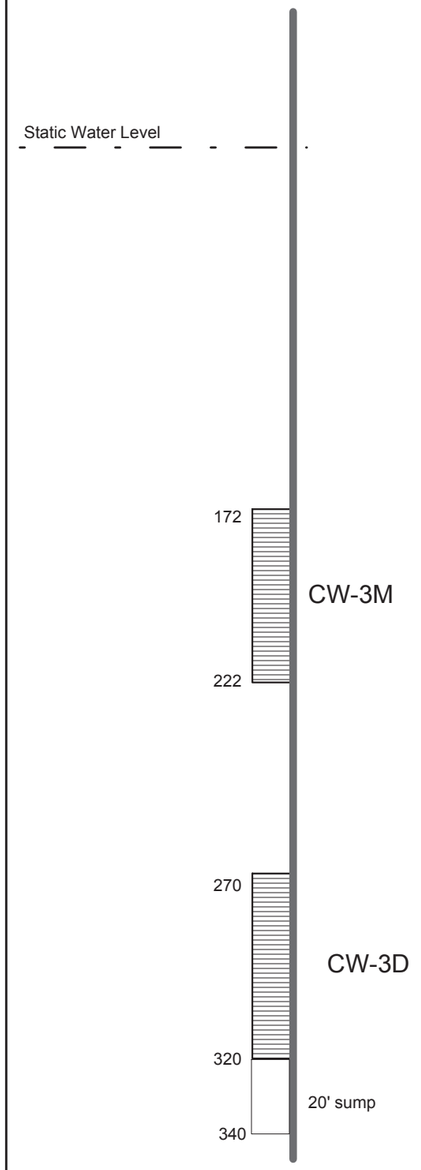


FIGURE B2-3
SUMMARY OF HYDROGEOLOGIC LOGGING FOR CW-3 COMPLIANCE WELLS
IM-3 GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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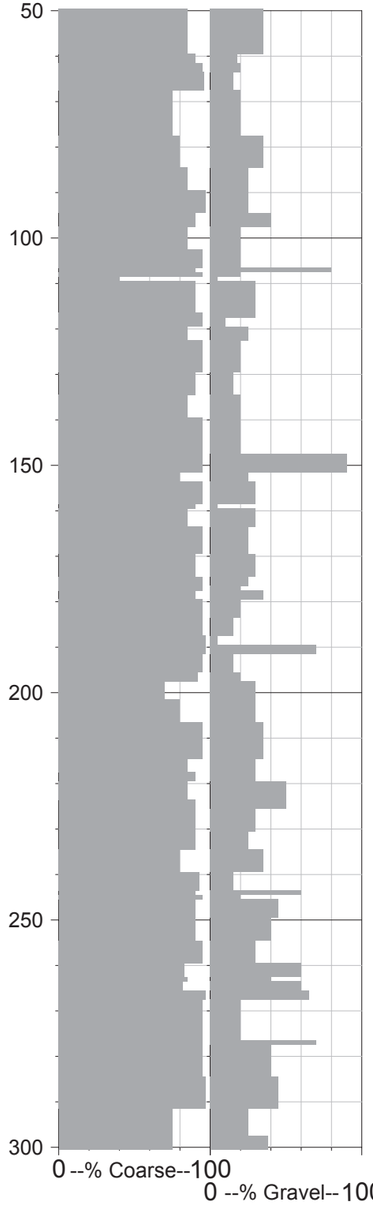
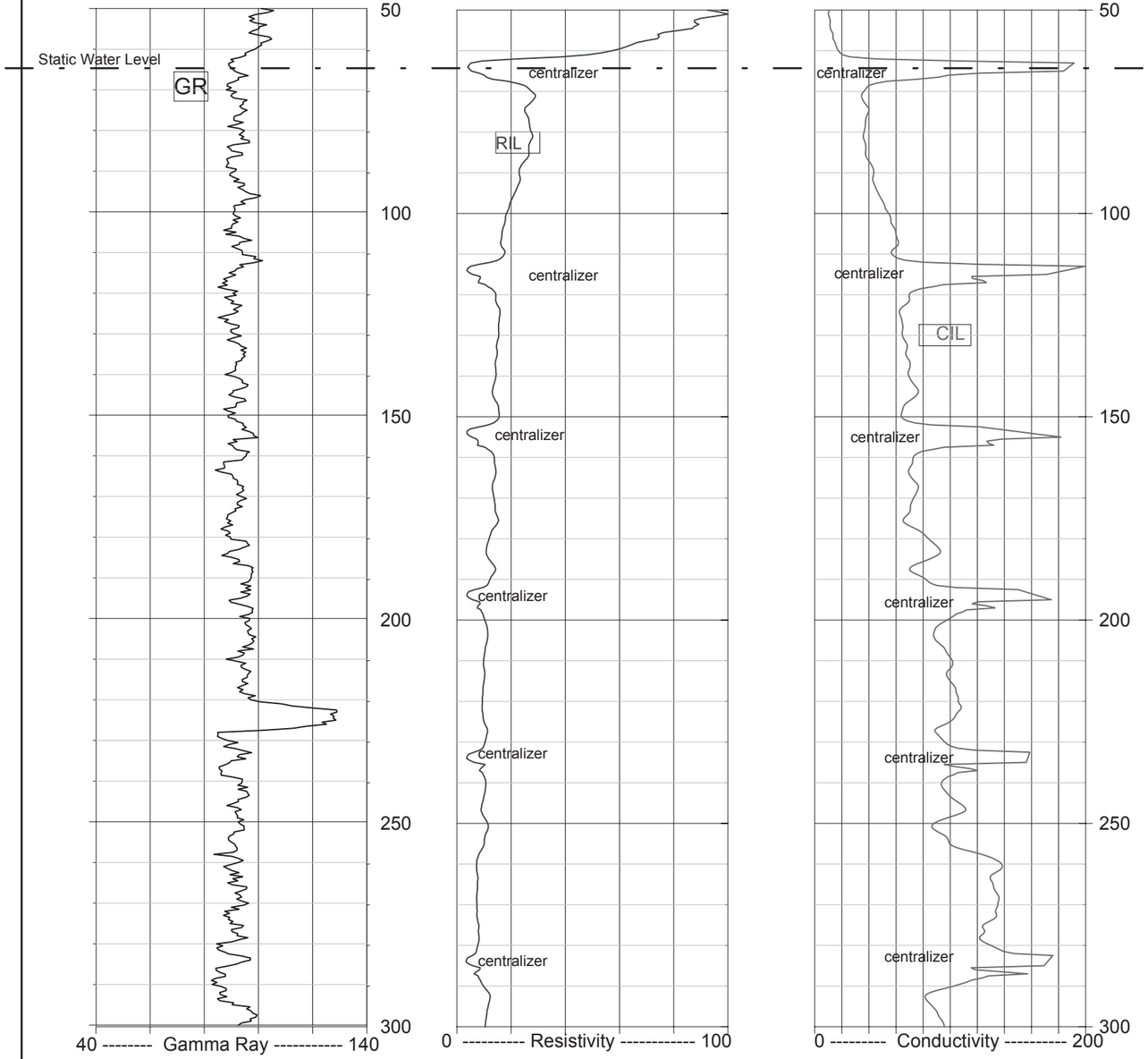
CW-4D Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

CW-4D Cased Well Geophysical Logs



CW4-D Geophysical Log March 2, 2005

Log Units: Gamma Ray (GR, API units), Resistivity (RIL, ohm/m), Conductivity (CIL, mS/cm)

Compliance Well Cluster CW-4

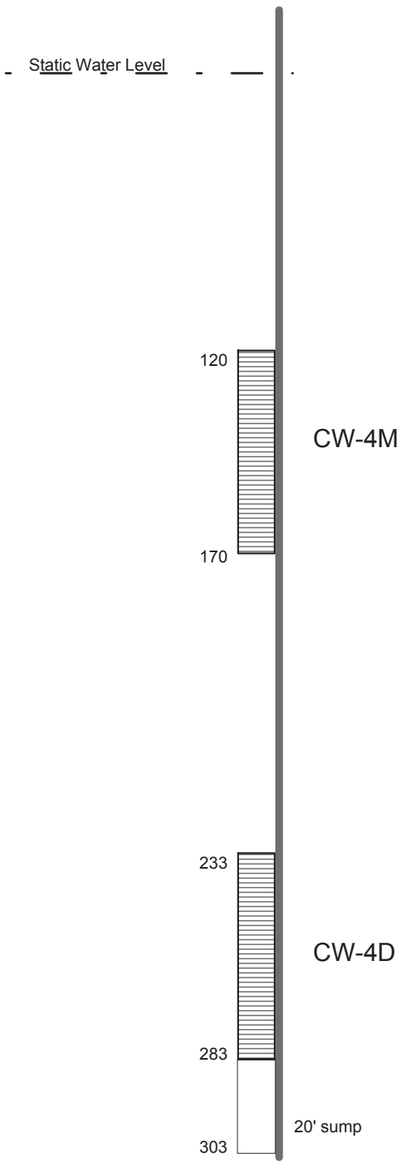


FIGURE B2-4
SUMMARY OF HYDROGEOLOGIC LOGGING FOR CW-4 COMPLIANCE WELLS
IM-3 GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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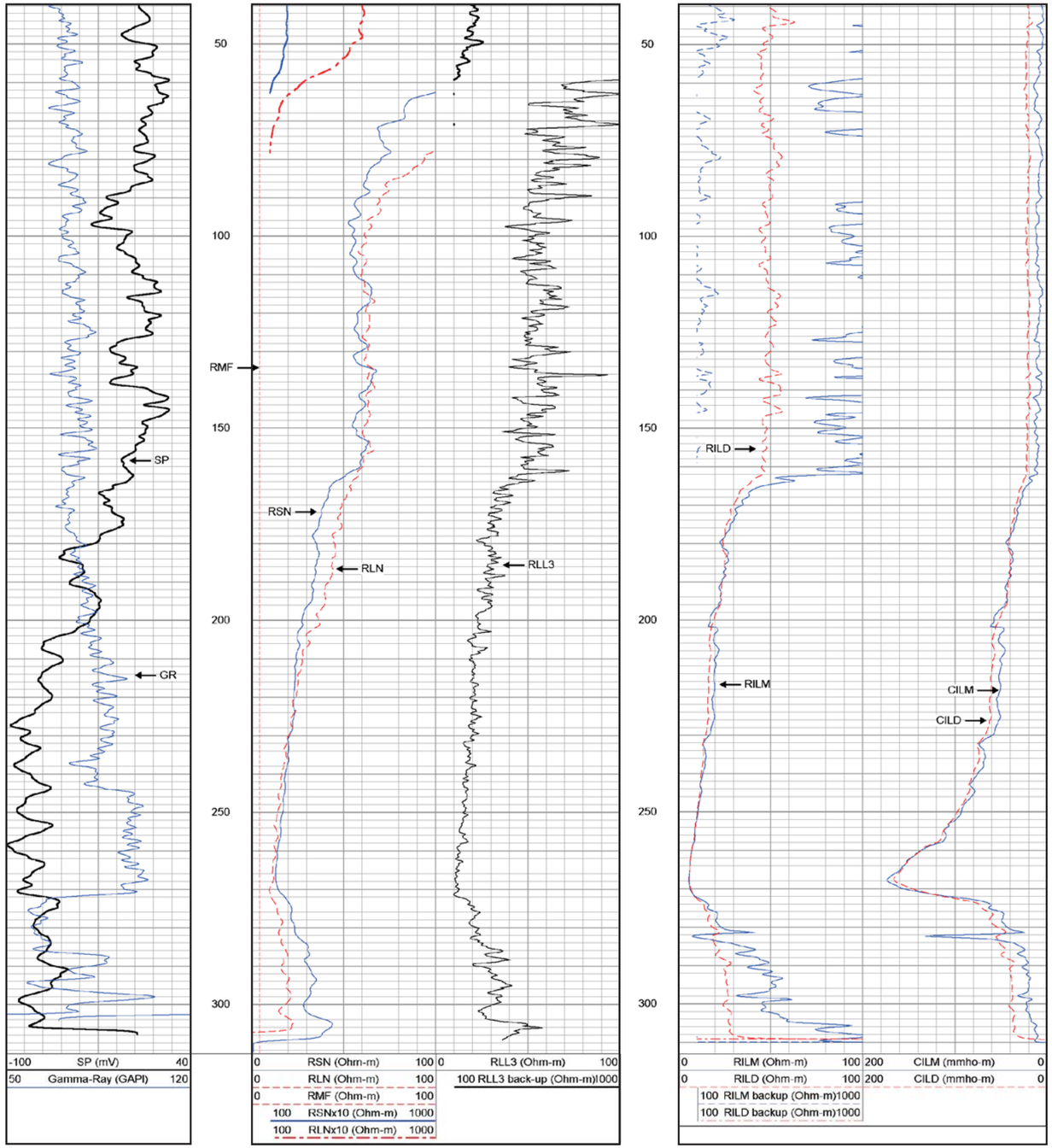
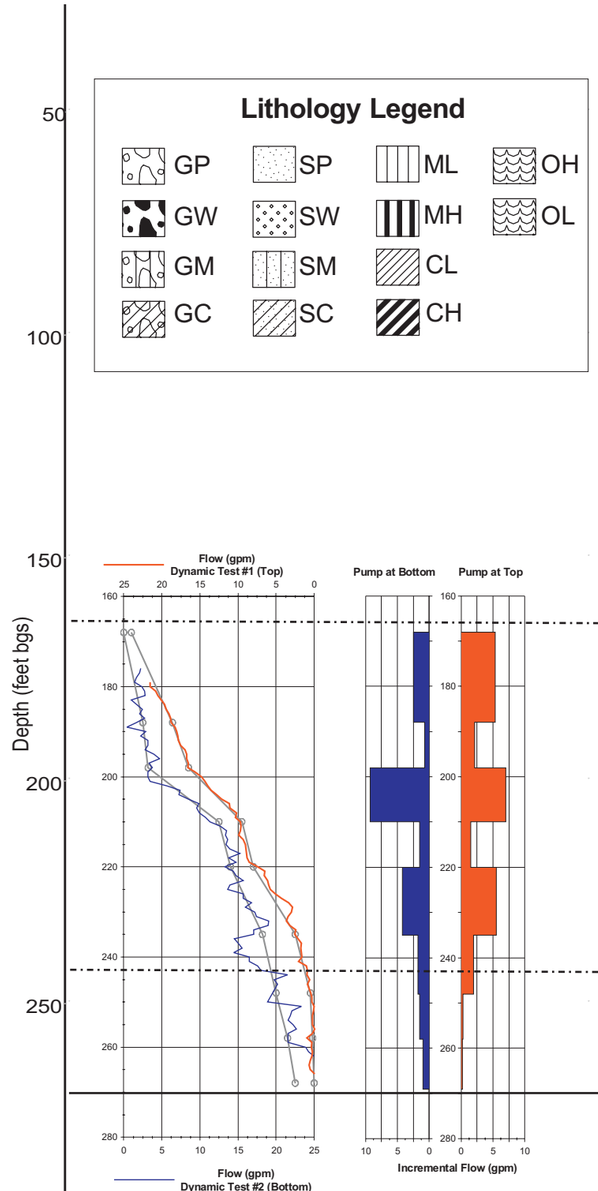
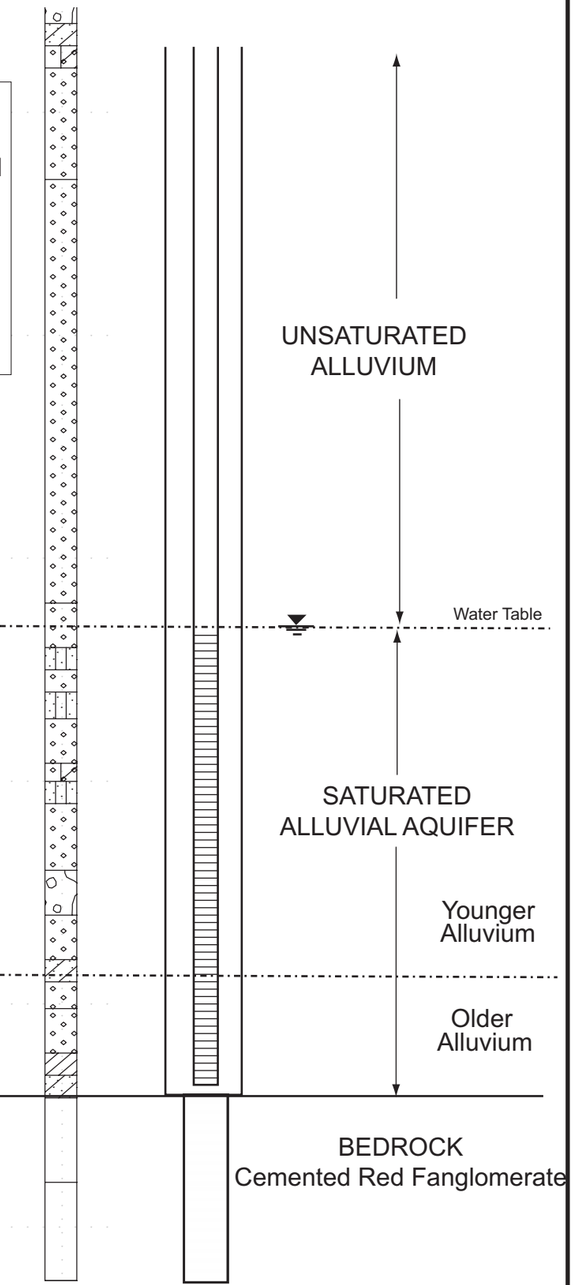
Attachment 4
Log for TW-01

GEOPHYSICAL LOGS	VELOCITY LOG	LITHOLOGY & WELL COMPLETION





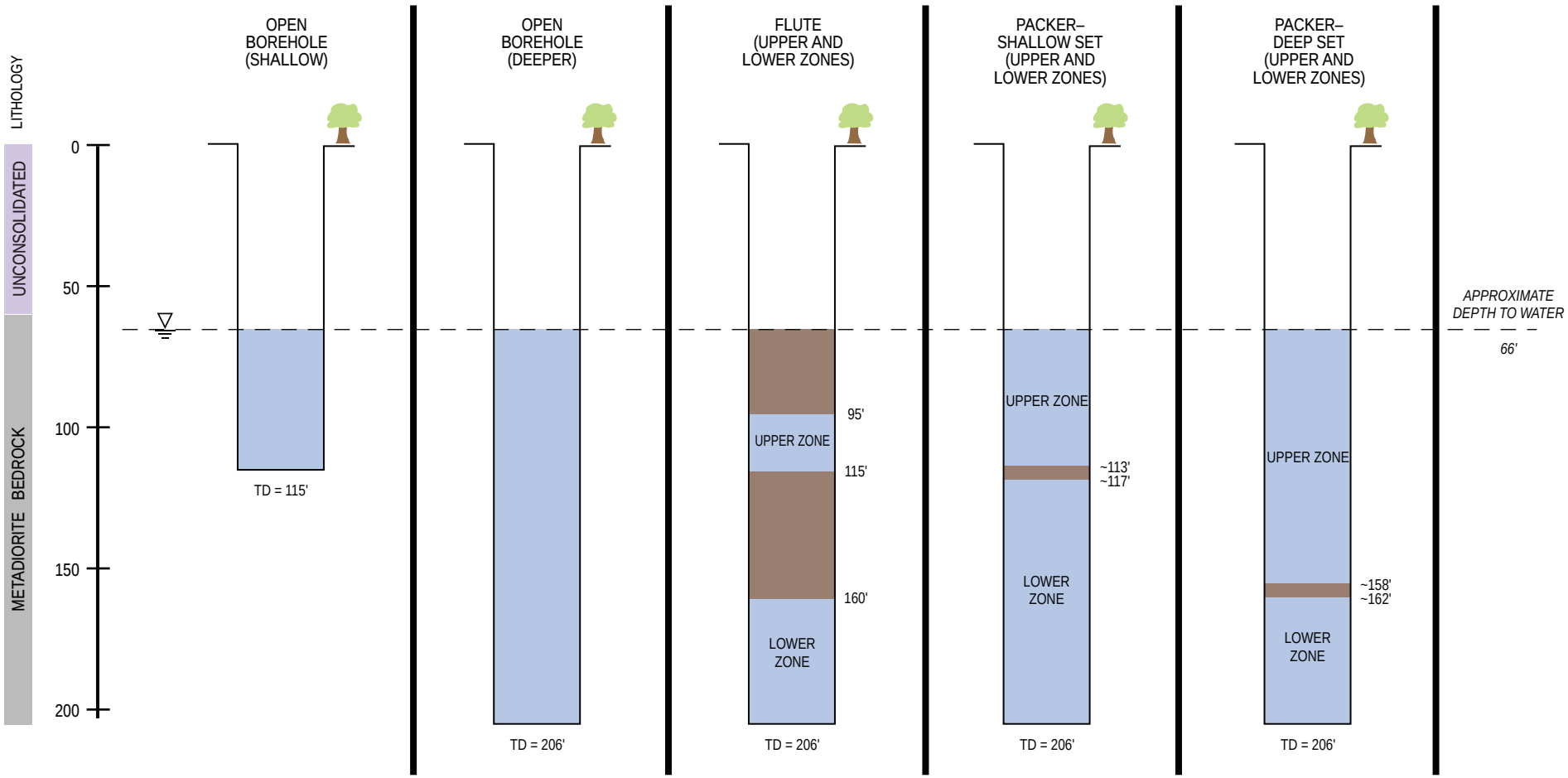


TW-1 WELL COMPLETION SHOWING
GEOPHYSICAL LOGS, VELOCITY LOGS
AND LITHOLOGY

EXPLORATORY DRILLING RESULTS
PG&E TOPOCK

CH2MHILL

Attachment 5
MW-58BR and MW-64BR Construction History



LEGEND

- Portion of borehole exposed during sample collection
- Portion of borehole sealed during sample collection

NOTES:
– Scale is approximate.
– All depths presented as feet below ground surface.

MW-58BR Sampling Configurations
PG&E Topock Compressor Station
Needles, California

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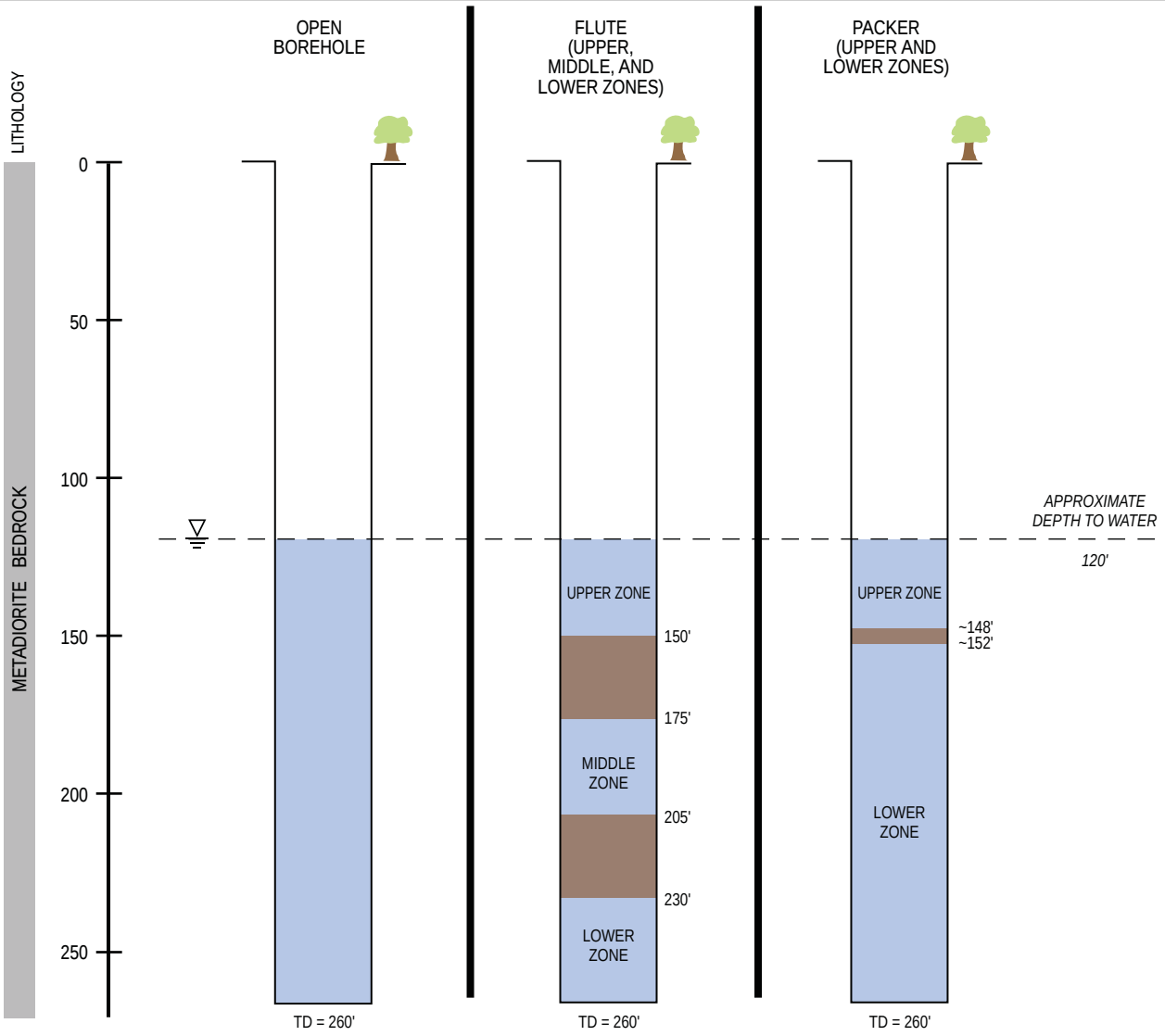

LEGEND

- Portion of borehole exposed during sample collection
- Portion of borehole sealed during sample collection

NOTES:
– Scale is approximate.
– All depths presented as feet below ground surface.

MW-64BR Sampling Configurations
PG&E Topock Compressor Station
Needles, California

CH2MHILL